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Evaluation of archaeometallurgical residues from Fleethill Farm, Finchampstead, Wokingham, Berkshire [SU 788625]

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Abstract

Residues from Fleethill Farm derived from two broad classes of contexts: firstly, contexts associated with a penannular gully, probably from a roundhouse and secondly from large, but shallow, circular pits scattered across the floodplain.

The first group are residues derived from iron smelting in a large non-slag tapping 'slagpit'-style furnace. This assemblage is dominated (in terms of weight) by four large fragments of furnace bottoms (FBs), three of which each weight almost 20kg. Other residues include flow slags, fired/vitrified furnace lining and bog iron ore fragments.

The furnace itself (or at least a furnace) may probably be identified with cut [105363]. The furnace pit appears to have been constructed as a sub-circular cut 0.60m in diameter, apparently cut through earlier metalworking pits. Relations with adjacent contexts are not entirely clear and it is possible that the furnace possessed an arch on its NW side, communicating with elongate pit [105367]. Charcoal from this possible furnace gave a calibrated ^{14}C date of 399-350 BC or 303-209 BC. Although it is always dangerous to place too much reliance on a single ^{14}C date on wood charcoal, this 3rd-4th century BC date is entirely compatible with the observed iron-smelting technology. The mounting evidence for early-middle Iron Age smelting in the Berkshire-Surrey-North Hampshire area is discussed briefly. The key significance of this site is its good evidence for the nature of the exploited ore resource.

The second group are mostly interpretable as charcoal pits and their residues are mainly small fragments and granules of bog iron ore together with mineralised charcoal - essentially charcoal coated with bog iron ore. In these cases the iron mineralisation is probably a mixture of residual material and bog ore that has grown subsequent to pit infilling. The pits gave dates mainly in the 11th-12th centuries, although a few prehistoric dates were also recorded. The archaeological record of early charcoal manufacture is poor and this is a significant addition. The pits have a similar size and shape to those identified as charcoal pits in other regions.

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Methods

All materials were examined visually with a low-powered binocular microscope where required. As an evaluation, the materials were not subjected to any high-magnification optical inspection, nor to any form of instrumental analysis. The identifications of materials in this report are therefore necessarily limited and must be regarded as provisional. The summary catalogue of examined material is given in Table 1.

The project was undertaken for Cotswold Archaeology.

Results

The descriptions of the assemblage are provided in Table 1 and a summary by context in Table 2.

Description of the residues

The identifiable archaeometallurgical residues were all from iron smelting. No pieces were certainly from smithing.

The assemblage is noteworthy for the predominance of pieces of furnace bottom (FB). The FB is typically a large slag block, formed below the bloom, in a non-slag tapping furnace. Slag may flow past the FB to accumulate in the lower part of the slag pit as discrete flow slags. The FB may either be massive (often the case if the pit was shallow) or may have the texture of amalgamated flow slags, often capped by a denser slag 'puddle'.

The largest fragments of FB were recovered from part of the gully fill (105353). These blocks are all incomplete, but provide good evidence for the nature of a complete example. The FBs appear to have been approximately 450mm in diameter and 130mm thick. On the proximal side they show a well developed burr 230-200mm wide, indicating the blowing area. The burr shows a raised lip (maximum reserved height) of deeply vitrified material rising towards the blowhole. The top of the FB on the proximal side is a flat, smooth-topped slag puddle, which extends in a narrow zone across the centre of the cake. On either side there tends to be a raised zone of charcoal-rich slag. Below the burr the base of the FB is inclined, reaching the full 130mm thickness about 100mm in from the margin. The bases of the FBs are obscured by secondary deposits in most cases, but show prills amongst large wood/charcoal moulds. Each of the large fragments weighs a little under 20kg, suggesting a full FB would have been perhaps a little over 30kg. The small fragments shows dense flow slags between large wood (?) moulds, the largest of which was at least 30x55mm in section and over 70mm long.

Smaller fragments of flow slags are a persistent feature of the assemblage, but the overall weight of such material is low. This suggests that the FB approached the pit base, rather than having much 'free' space below. Some of the basal flow slag fragments (e.g. c105364) indicate flow on subsoil. The angle of the FB base below the proximal side also supports such an interpretation, although one isolated fragment hints at a more discrete floor-wall angle (105323).

The assemblage includes many fragments of vitrified furnace wall. None of these supplied any useful information about shaft size or morphology, mostly being highly indurated low wall fragments. No fragments of blowhole were recovered.

Bog iron ore was common in many of the contexts. In some cases this was in large blocks, clearly extracted for smelting, and deposited along with other residues in 'waste' contexts. In other cases the ore particles were small, and probably present through entirely natural agency.

Distribution of the residues

Table 2 provides a summary of the distribution of archaeometallurgical residues and associated materials.

Assemblages have been classified in Table 2 as 'M' having abundant or significant iron melting residues, 'm' having low or trace levels of metallurgical residues, 'C' having residues likely to indicate charcoal burning only and '?' assemblages not indicative of any particular process, having only residual bog iron ore.

Only three samples bearing metallurgical residues were identified from outside the Area 1A RH area, two of which had only trace levels of microscopic slag fragments (pits 105241 and 105468) and one (pit 105259, less than 50m from the ring gully) contained a single large block of vitrified furnace wall. None of these occurrences need indicate contemporaneity between the containing charcoal pits and the iron smelting (although an origin of some pits during ore extraction is likely).

Where the probable charcoal pits produced possible residues these appeared to be a mixture of residual bog iron ore (presumably present in the host sediment) and new-formed iron minerals over-growing charcoal fragments. These latter materials indicate on-going process of iron concentration in this environment.

Although some of the bog iron ore from these features had enhanced magnetic properties, it did not occur in sufficient quantities to suggest that the pits had been employed for roasting ore. Indeed, most of the ore recovered from the RH area was un-roasted – indicating the roasting did not normally occur at the point of extraction, but, if practiced, it probably happened close to the furnace.

Metallurgical features:
The size of the FBs indicates that the basal pits of the smelting furnaces must have been at least 450mm in diameter and probably a little more. Within the ring gully area, there are only two significant sub-circular features: pit 105323 and pit 105361.

Pit 105323 is unusual in being shallow, approximately 1m in diameter and apparently ringed by a series of stake holes. The pit fill included approximately just 1.5kg of iron smelting residues and also provided a medieval 14C date. Although preliminary interpretation of the feature suggested the date may have been taken from intrusive charcoal, an alternative explanation would be that this is one of the charcoal pits which has a slag-rich fill simply as a product of the nature of the residual material at this location. In either case this feature is unlikely to be a smelting furnace because of its size and there is no additional evidence from the enclosed residues as to its function.

Pit 105361 is a component of a complicated series of intercut deposits, lying mostly within the larger cut 105367/105481. This feature is 600mm in diameter and 180mm deep, precisely the sort of size suggested by the dimensions of the FB fragments. The excavators interpretation was that cut 105361 is late in the series and was cut into pre-existing deposits rich in metallurgical debris. Inspection of the photograph of the relevant section suggests an alternative interpretation is possible – and that the furnace base (cut 105361) might have been contemporary and that the fired clay visible in the section below the supposed cut for 105361 might be a collapsed arch. It would

appear quite likely that cut 105367/105481 represents a working hollow and other furnace cuts may be, or may have been, present within its limits.

Other features within the RH area also have slag-rich fills, particularly the ring gully itself, but none is clearly a metallurgical feature as such.

The widely distributed pits with a charcoal-rich fill found across the site have proved so far to be of rather controversial origin. Most appear to have a rather neat sub-circular form with a dished profile. This sits rather uneasily with an interpretation simply as the product of the grubbing out of woodland. The neat regular shape is much more similar to records of charcoal pits from elsewhere. Pits appear to have been the dominant form of charcoal production structure until the widespread adoption of the larger-volume platform techniques in the post-medieval period. Such structures are only slowly becoming recognised in Britain, but are now widely recognised in Ireland (Young, 2005b; O'Sullivan & Downey, 2009; Kenny, 2010). In Ireland, the greatest frequency of such pitshas been dated to the ninth to thirteenth centuries (O'Sullivan & Downey 2009 p. 24). Although various shapes appear to have been utilised in Ireland, sub-rectangular forms probably dominate over sub-circular examples. More locally, an example was recognised at Saddler's End (Lewis *et al.* 2011) – this was sub-circular and of similar size to the present examples. It date is uncertain, with a 14C on undisclosed wood charcoal giving a middle Saxon age, but it also contained a sherd of medieval pottery.

Most of the Fleet Hill Farm charcoal pits are undated, but there are 14C dates from a good number and these are essentially 10th to 13th century.

Two pits within the ring gully area (105280 and 105301) were of a suitable size to be potential charcoal pits as an alternative explanation to being integral components of the Iron Age site. One of these (105301) yielded 4.7kg of residues and ore, but the potential for residuality in this area of the site must be borne in mind and the stratigraphic record should be checked to determine whether these are likely to be Iron Age or medieval features.

One interesting, if problematic, example is pit 105352, which lies about 40m NW of the ring gully. This pit yielded a block of vitrified furnace wall and a piece of iron bar. If the iron bar were a product of the local smelting (i.e. it is residual along with the furnace wall in this probably medieval pit), it would be a very interesting addition to the assemblage.

Interpretation

Fleet Hill Farm lies with a belt of known Iron Age iron production sites, all probably exploiting bog iron ores (although formerly believed to have worked iron ores within the Tertiary sand)s. There are four clusters of sites, presumably reflecting the quality of local bog ore development.

In the western part of this area, the sites at Hartshill Copse (Collard *et al.* 2006; Young 2005a) and Dunston's Park (Fitzpatrick 1995) lie close to the River Kennet near Thatcham. The Dunston's Park activity has been dated as 7th century BC, Hartshill Copse at 5-6th century BC (with a contentious, probably incorrectly claimed, early phase in the 10th BC).

Closer to Eversley are the smelting sites at Heckfield (4th century BC on the basis of pottery; Dungworth 2007), Baird Road, Arborfield (3 radiocarbon dates with a range of 390-200 Cal BC; Hammond, forthcoming), Whitehall brickworks (late Iron Age to Roman ironmaking; Pine, forthcoming) Three Mile Cross (Ford *et al.* 2011) and Sadler's End (7km N, 1st-6th century BC?; Lewis *et al.* 2011). A site at Risely, west of Eversley, also yielded Iron Age slags, though probably of smithing rather than smelting (McDonnell 1984).

Approximately 15km east of Eversley lies a third cluster of sites around the Surrey Heath area. These are mainly the result of amateur investigations by the Surrey Heath Archaeology & Heritage Trust and little detail is published. Sites included one at West End, Bagshot Village, one at Ashleigh Farm, Windlesham, another at Windlesham Arboretum and a large site at Lightwater (http://heathhist.pbworks.com/ArchaeologyIronAge, http://www.chobham.info/ashleigh_farm.htm).

The fourth cluster lies in the Staines/Weybridge area 29km east of Eversley, with published sites at Brooklands (Hanworth & Tomalin 1977) and Thorpe Lea (Starley 1998). Brooklands appears to be early in date.

The furnace at Eversley was a non-slag tapping furnace with a basal pit (i.e. a slagpit furnace). The pit had a wide diameter (of at least 450mm, probably rather larger) in keeping with the sizes of other earlier Iron Age slagpit furnaces in Britain (e.g. Young 2005a) and Ireland (see Young 2011b for a discussion of furnace sizes and their dating in Ireland).

The pit appears to have been fairly shallow, leading to a well-formed FB and a low proportion of isolated flow slags. The pit packing (slagpit furnaces have their pits packed with a combustible organic material quite distinct from the main charcoal fuel prior to smelting) was apparently of spilt wood. This is the most common pit packing in the Iron Age of Britain and Ireland, with a packing of grass or cereals much less common (cf. Leda Cottages, Kent; Paynter 2007, Figure 4).

The evidence for furnace type corresponds well with that from the unpublished excavations at Hartshill Copse, Upper Bucklebury (Young 2005a), where an intact FB was preserved in a furnace pit. This FB measured 500mm x 420mm x 200mm thick and weighed 33.8kg. The furnace at Hartshill is currently undated, but similar residues are stratified within an adjacent part of the site in 5th-6th century BC contexts (Collard *et al.* 2006).

The form and height of the shaft is unknown, but the high degree of vitrification of sizeable fragments from the lower shaft suggests at least of moderate height.

If the alternative interpretation of the furnace base were to be verified, and it was determined that it did have an arch, then it would more closely resemble some rather later Iron Age forms from Ireland (e.g. Young 2008) and N. Wales (described, and reconstructed by Crew 1987,1989, 1991, 1998). In these examples, the arch served as a portal for cleaning cold slag from the furnace base after the smelt, rather than as a means of tapping slag. The possibility of such an interpretation of the available data is only extremely tentative, but illustrates the problems of appropriate field recording of these subtle structures.

The evidence for medieval charcoal production is important, for this is poorly documented in Britain. Charcoal use in medieval Britain was high, and it is not usually appreciated that this was mainly for domestic purposes rather than metallurgy (Rogers 1902). Given the location of this site away from medieval centres of metalworking, use of the charcoal for cooking or heating is very likely and it would be common for such charcoal to be sold on for use in distant towns.

Evaluation of potential

The Eversley site has enormous potential to advance understanding of Iron Age smelting in this area. Part of that potential comes from the fact that the site appears relatively simple. It provides a good range of smelting residues and most importantly, plenty of evidence for the local ore.

Understanding of the techniques of non-slag tapping iron smelting has advanced rapidly in recent years, although that hasn't always been reflected in the quality of reporting of sites and slag assemblages from the area. None of the sites investigated in recent years has had significant archaeometallurgical input, with the only rigorous modern work in this area being the report by Dungworth (2007) of slags from Heckfield. This present site has the potential to provide some much-needed detail.

The only negative factor associated with the assemblage is the assemblage is the moderately high degree of weathering present in some of the slag, and careful selection of samples will be required.

The site provides good evidence for ore, furnace materials, a full range of smelting slags and possibly some finished iron. The site lacks evidence for the refining/working of the raw blooms into finished iron – and it likely that this happened elsewhere.

Accordingly, a thorough analytical investigation of the smelting residues and associated ores is recommended.

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Glossary

Bleb: a small rounded particle or textural component, often a droplet or prill

Bloomery: a furnace for smelting iron from ore in which iron is produced as a solid material. The bloomery process was employed mainly prior to the introduction of the later blast furnace from the late 15th century.

Bog Iron Ore: hydrated iron oxide ores formed in superficial sediments (including, but not limited to bogs) through the oxidation of iron-bearing groundwaters.

Flow slag: a slag showing evidence for having flowed, often as an elongate prill, but which does not show evidence of having been tapped from the furnace. Often a major component of assemblages from the lower part of the pit of a slagpit furnace.

Furnace bottom (FB): a large slag block forming below the bloom in a non-slag tapping furnace.

Goethite: a hydrated iron III oxide, FeO.OH.

Prill: a small aggregate of a material, either a spheroidal droplet or a runnel, formed from a melted liquid and either occurring as a discrete particle or as an inclusion within another material.

Slagpit Furnace: a variety of bloomery iron smelting furnace in which much of the slag formed during the smelt drains into a pit below the shaft (rather than being tapped outside the furnace).

Vesicle: a void, usually rounded and formed as a preserved gas bubble in a solidified melt.

Table 1: Summary catalogue by context and sample

C	S	label	Wt.	No.	description
105046	2	magnetic material, 1.0mm,1 of 2	2.99	assm.	charcoal, ore granules, flint/chert, cemented sand; some ore appears reddened
105046	2	magnetic material, 1.0mm, 2 of 2	2.48	assm.	charcoal, ore and relatively abundant flint/chert
105046	2	iron ore, 2mm, 1 of 2	14	assm.	iron ore granules, charcoal ,charcoal-bearing ferruginous concretion, small amount of fired clay
105046	2	slag, 10mm, 1 of 2	100	assm.	concretions of charcoal debris in fine iron-rich clay. 10-40mm lumps
105046	2	slag, 10mm	146	assm.	concretions of charcoal debris in fine iron-rich clay. 10-40mm lumps
105077	4	magnetic residue, 1.0mm, 1 of 2	52.55	assm.	mainly fine ore granules with abundant charcoal, some fired clay particles (probably) and some haematised ore.
105077	4	magnetic material, 1.0mm	30.1	assm.	dominated by charcoal, some fired clay, ore granules and possible cemented sand
105077	4	iron ore, 2mm, 1 of 2	62	assm.	ore, some reddened and mineralised, concreted charcoal
105077	4	iron ore, 2mm, 2 of 2	40	assm.	iron ore (some reddened), charcoal and charcoal-bearing ferruginous concretion
105077	4	slag? 2mm, 1 of 2	0.61	1	small limey sandy concretion rich in fine charcoal
105077	4	slag, 2mm, 2 of 2	0.53	assm.	stone, concretion (partially melted?? - or just lime coated??)
105077	4	residue, 2mm, 10% iron ore 90% mineralised plant remains, 1 of 4	758	assm.	>60% ore granules by weight, rest charcoal. Much is mildly concretionary with charcoal debris. Coarse grained to 15mm
105077	4	iron ore, 10mm, 1 of 2	8	assm.	4 pieces of bog ore plus charcoal
105077	4	iron ore, 10mm, 2 of 2	42	assm.	12 pieces of bog ore, 1 piece of charcoal, 1 piece of charcoal-bearing ferruginous concretion
105185	6	magnetic material	12.27	assm.	ore granules, abundant charcoal, some chert
105188	10	magnetic material	18.71	assm.	ore granules, some chert, rare charcoal
105197	14	magnetic material	6.85	assm.	charcoal, ore granules, flint, cemented sand
105199	12	magnetic material	9.73	assm.	well polished ore granules, some reddened, some charcoal, rather rich in chert

C	S	label	Wt.	No.	description
105199		iron ore?	25.56	assm.	mineralised charcoal, ore, chert, charcoal
105202	16	magnetic material	70	assm.	mainly fired clay, charcoal, some ore
105205	18	magnetic	320	assm.	coarse assemblage of ore granules, most dark shiny, some pale, a few reddened. Lots of charcoal
105207	19	magnetic material	1.11	assm.	small assemblage of ore granules, many strongly reddened, some charcoal, rare quartz/chert
105207	19	iron ore	338	assm.	concretions of charcoal debris in fine iron rich clay. 10-25mm lumps
105214	20	magnetic material	7.08	assm.	dominated by charcoal, also ore granules and fired clay with some chert
105214	20	iron ore	20	assm.	bog iron ore granules of a 'polished' appearance
105233	24	magnetic material	8.18	assm.	ore granules, some reddened, few fragments of chert
105240	26	magnetic material, 0.5mm	5.48	assm.	mainly iron ore fragments and rounded granules, some charcoal, some fired clay
105240	26	magnetic material, 1.0mm	12.32	assm.	indeterminate grains dominate - could be ore/slag/fired clay; fired clay and lining slag present, moderate chert and moderate charcoal
105240	26	magnetic material, 2.0mm	88	assm.	ore granules, fired clay, charcoal
105258		vitrified clay	256	1	large block of pale grey lining with smooth, well-preserved black glass on front.
105258	65	industrial waste - slag	296	assm.	moderately large fragments (to 80mm) of bog iron ore with granular texture, small fragments of charcoal
105258	65	magnetic material	34.22	assm.	dark and strongly magnetic assemblage, probably mainly ore, but also some probable fired clay, chert and charcoal
105300		vitrified clay	18	2	vitrified lining - appears almost pure sand
105300		slag	380	5	well-formed dense flow slags, mostly with good tapslag -like surfaces
			222	3	well vitrified lining, largest piece very dense for lining
			68	1	small slag fragment, charcoal rich on one side - on the other voids show large skeletal olivine up to at least 10x8mm
			102	2	concretions
			226	4	bog iron ore
			1345	8	irregular dense slag fragments - probably all from FBs

C	S	label	Wt.	No.	description
105309	28	magnetic	798	assm.	coarse assemblage of slag fragments, minor flow slags and droplets, slags with charcoal impressions, charcoal, ore, roasted ore and charcoal
105309	28	slag, 10mm	4640	total	
			2265	31	dense flow slags
			150	23	vitrified lining
			16	2	lime-cemented fragments
			10	1	round wood charcoal lump
			698	8	slab-like pieces of slag with fuel impressions
			remainder	many	indeterminate small slag pieces
105313		slag	32	1	small piece of complexly lobed flow slag
			194	9	bog iron ore
105315	32	magnetic material	76.03	assm.	ore, roast ore, lining slag, lining, greenish glass, flow slags in low density slag, - all quite coarse. Finer material less certain, includes ore, roast ore and lining materials
105317	31	magnetic material	14.2	assm.	mostly indeterminate brown particles, probably mainly ore, some slag, certain lining slag, rare charcoal, fired clay
105317	31	industrial waste -slag	1910	total	
			470	many	small fragments - mainly charcoal-bearing slag but encrusted so many uncertain
			716	many	dense flow slags
			512	many	vitrified lining, pale with dark purple glass
			196	10	granular bog ore
105323	29	magnetic material	76	assm.	dominated by indeterminate granules and fragments - both ore and slag particles present, lining slag, occasional oxidised ore, blue-green glassy slag, charcoal, fired clay
105323	29	magnetic material, 0.5mm	12.38	assm.	brown indeterminate grains- possibly ore, but dirty. Some charcoal, a few tiny flint fragments, one hollow (fuel ash?) sphere.
105323	29	iron ore, 2mm	218	assm.	assemblage largely iron ore, but has many flow slag droplets and prills, together with other slag fragments, some vitrified lining and some charcoal

C	S	label	Wt.	No.	description
105323	29	slag, 10mm	972	total	
			182	6	flow slags
			432	1	large block of FB, 70mm thick, from basal pit-wall angle?
			118	1	dimpled crust with large fuel moulds above - probably from base of FB
			24	1	angular dense slag fragment
			210	16	lining and lining slags - almost all well reduced
105323	29	iron ore, 10mm	266	assm.	mostly iron ore, but contains some small flow slag prills and fragments of vitrified and fired lining. Some pieces of ore appear to mimic wood moulds - have these formed post- IA?
105325	38	magnetic material	17.78	assm.	pale ore, rare charcoal, rare flint, some possible slag fragments, at least one definite lining slag chip
105327	36	magnetic material, 0.5mm	0.83	assm.	small poorly sorted sample. Mostly ore, including some large granules, some bright red particles, lots of charcoal and a few poor slag scraps
105327	36	magnetic material, 1.0mm	63.76	assm.	dominated by small indeterminate particles, has some fresh ore, some haematised ore, some slag and moderate charcoal
105327	36	slag, 10mm	222	total	
			98	8	flow slag
			46	5	bog ore
			6	2	concretions of small slag particles
			76	7	lining - deeply vitrified
105327	36	iron ore, 10mm	240	total	
			28	2	ore
			102	16	slag - mainly flow slag
			52	12	vitrified lining and fired clay
					remainder small fragments - probably iron-concretions on slag and corroded slag
105331		vitrified clay	82	1	deeply-vitrified lining section - possibly vitrified on rear fracture surface 40-50mm behind face too, very vesicular, front glaze largely altered to white limey material, inner glaze fresh dark
			30	3	two small lumps of vitrified lining, one piece rounded vitrified on all surfaces - failed or inclusion in fuel?
105331		slag	910	1	large gently curved block from FB wall - not quite a proper burr but similar, 30mm thick 'crust'
			416	1	flow-lobed dense slag formed around a very large wood clast at least 30x55mm in section and 70mm length seen

C	S	label	Wt.	No.	description
105351		slag	100	1	deeply vitrified rounded lump of lining - failed block?
105351		metal object	286	1	bent iron bar, best preserved section is slightly concavo-convex, 50mm wide and iron c. 7-10 mm thick, 150mm long total
105353	44	magnetic material, 0.5mm, 2 of 2	5.53	assm.	indeterminate fine grains, some lining slag, abundant blue-grey glassy slag chips, flint/chert, fired clay
105353	44	magnetic material, 1.0mm,1 of 2	24.88	assm.	dominated by indeterminate rusty particles - includes some ore but may not be in majority, lining slags, fired clay, reddened ore, a few slag droplets, blue-grey glassy slag chips
105353	44	magnetic residue,1.0mm, 2 of 2	23.36	assm.	indeterminate brown grains, slag, lining slag, blue-green glass chips, some ore grains
105353	44	slag, 2.0mm, 1 of 2	24	assm.	mainly 5-10mm particles of fired clay and vitrified lining, 1 piece of duck egg blue glass
105353	44	slag, 2.0mm, 1 of 2	16.01	assm.	mostly vitrified lining, a few flow slag fragments, a few duck egg vesicular glass fragments, green glass bleb, glazed small stones?
105353	44	iron ore, 2.0mm	192	assm.	much is iron ore, but also lot of ferruginous concretion, rare lining slag, rare flow slag, moderate charcoal
105353	44	iron ore, 2.0mm	226	assm.	mostly charcoal-bearing ferruginous concretion, sometimes with glassy FAS, rare ore, rare flow slag, some vitrified lining
105353	44	iron, 10mm, 2 of 2	20.4	3	flow slags
105353	44	slag, 10mm, 2 of 2	116	total	
			64	12	slagged or vitrified lining
			14	3	small slag fragments
			20	1	dense flow slag
			6	1	ferruginous soft material shot through with green-grey glassy, FAS-like, vesicular material
			18	1	contorted lining slag, tending to green glass, in ferruginous soft matrix
105353	44	iron ore, 1of 2	380	total	
			142	many	ferruginous concretions with slag, blue-green glass, charcoal
			64	9	poor flow slags
			118	11	slag fragments
			26	7	fired sandy clay
			28	7	vitrified lining

C	S	label	Wt.	No.	description
105353	44	iron ore, 10mm, 2 of 2	620	assm.	some ore, some possibly with stalk and leaf impressions (which might be secondary), most is ferruginous concretion on slag and much is slag (mainly flow slag), moderate amount of vitrified/fired lining
105353		FB #1	8000	1	very weathered and accreted so difficult to determine morphology – appears to be a c. 80mm sheet of dense, moderately charcoal-rich slag with up to 50mm raised zone on upper surface; overall 260x190x130mm
		FB #2	18700	1	Main sheet of charcoal mould rich-slag is 130mm thick; the base is fractured but FB probably did not reach base of pit. Burr slopes in 100mm over the 130mm fall to the base and rises in a 30mm lip above FB top. FB top masked by iron rich concretion (up to 50mm thick) in distal area and by collapsed wall around lateral margins. Overall 320mm from back of burr to distal edge, 310mm wide; burr well formed on chord of 230mm.
		FB #3	19500	1	All charcoal-rich material, no burr, edge shows radius of c240mm, c130mm thick, side appears to curve downwards to base of rough charcoal moulds of 130mm diameter; overall 450x320x170mm, raised charcoal rich top obscures a lower surface - parts of lower top have larger round dimples
		FB #4	19600	1	Burr chord at least 300mm, 55mm out, 330mm long 360mm wide but broken, at least 380mm wide if symmetrical about centre of burr. Central flat top has deep dimples, with raised charcoal-rich slag either side; burr side slopes in 70mm over 100mm depth, burr lip broken at top level but originally must have been stood proud.
105361	39	industrial waste	1330	assm.	iron ore (568g largest lump), 218g 16 pieces of flow slag, 20g of vitrified lining (3 pieces), 32g furnace floor concretion, few tiny pieces of charcoal, remainder fine ore fragments/granules
105361	39	magnetic	1105	assm.	assemblage of ore, roasted ore, charcoal, but dominated by fine rusty irregular grains of concretionary material with charcoal and rust/ore dust
105362		slag	1105	10	bog iron ore
			298	3	flow slags - good dense flows around broad flat wood fragments close to pit base
			50	1	slag fragment rich in fine charcoal
			152	1	dense slag with rounded voids and localised secondary reddening
105364		vitrified clay	188	3	fragments of deeply vitrified wall, one has strongly embayed section, one has 'wrinkles' in the glaze and one does not show surface well
105364		slag	348	1	block of FB with large fuel moulds
			376	1	curved base of FB with very large fuel moulds - suggests flow on subsoil
			262	1	block of FB rich in fine and some coarse charcoal
			152	1	bog iron ore
			276	1	block of FB with large moulds and sandy area suggestive of wall contact
			146	4	flowed slags
			60	1	bog iron ore, glossy granules on base grading up into diffusely-mottled material with some mineralised plant fragments
			10	7	slag bits

C	S	label	Wt.	No.	description
105364		slag	370	1	very dense burr fragment - attached to thin lining skim and has charcoal-rich material on interior
			488	1	irregular lump of very dense vesicle-free slag around some large fuel moulds
			164	1	bog iron ore
			126	1	irregular slag lump with charcoal
			190	2	well formed flow slags, 1 complex lobes between fuel, the other a tapslag-like flow on fine charcoal
			198	11	ore
105365		vitrified clay	160	1	vitrified lining block with oxidised rear - front shows ridges in glazed surface which is purple and also a small droplet of attached iron slag
			228	1	lining block from near blowhole - variably vitrified, shows old oxidised surface overlain by at least 30mm of newer sandy clay, all irregularly vitrified suggesting some failure and vitrification along cracks
105365		slag	230	1	block of dense flow slag, penetrating between wood fragments, slightly freer lobes on upper surface
105379		slag	2805	16	vitrified lining - dark black / purple glaze with mainly reduced wall
		(most here are somewhat concreted)	604	8	oxidised fired sandy ceramic , rather well-sorted sandy fabric, rare coarser quartz grains and some minor fine organic material
			58	1	concentrically structured concretion c. 50mm diameter - probably a completely corroded iron lump
			3750	8	dominantly massive dense slags, few fuel clasts
			1520	3	dense massive slags with sediment attachment indicating they are from burr region
			226	1	charcoal rich slag with sediment attached indicating it is from the burr region
			2915	10	dense slags with significant moulds of fuel/wood clasts
			1920	11	dense slags forming flows between fuel/wood moulds
			358	1	well-formed small birds-foot structure
			892	18	concretions - some probably simply broken from other pieces others are cored on slag
105383	43	slag 10mm	1820	assm.	bog iron ore fragments - mottles, granules and crusts
105383	43	slag	1795	total	
			488	5	deeply vitrified reduced lining
			40	1	reduced fired lining
			210	4	oxidised fired lining
			478	8	rusted charcoal rich slags - probably FB fragments
			118	1	irregular slightly spiky but rounded mass of rather low density slag
			444	3	dense slags with wood impressions
105383	43	slag 10mm	6020	assm.	bog iron ore - in blocks up to 150mm

C	S	label	Wt.	No.	description
105385	42	magnetic material	22.8	assm.	coarse, large particles to 15mm: ore, granular, and rare charcoal
105459	47	iron ore?	22	assm.	iron ore
105467	47	magnetic material	10.03	assm.	mostly indeterminate particles, probably mainly ore, but there is certainly some slag, rare stones, some charcoal.
105467	48	iron ore?	80	assm.	iron ore, some reddened - but much is very low iron
105474	49	magnetic material 0.5mm	0.35	assm.	fired clay, iron ore, charcoal
105474	49	magnetic material 1.0mm	5	assm.	ore granules, rare chert
105474	49	iron ore magnetic material 2mm	756	assm.	mostly ferruginous concretion material on plant (charcoal?) debris - probably secondary ore on charcoal deposit
105258	65	industrial waste - slag	296	assm.	moderately large fragments (to 80mm) of bog iron ore with granular texture, small fragments of charcoal
105258	65	magnetic material	34.22	assm.	dark and strongly magnetic assemblage, probably mainly ore, but also some probable fired clay, chert and charcoal
105590		slag	12.55	total	
			3.92	many	fragmented fired clay with variable buff-grey reduction
			8.86	1	bog ore
105591		slag	30	2	bog iron ore
			1	1	small fragment of fired clay with coarse rounded sand, variable reduction
105593		slag	20	1	bog iron ore
		Wessex Archaeology Samples			
10018	1	Burnt natural?	18	assm.	granules of bog ore
		Residue 2 + 1 + 0.5mm	260	assm.	granules of bog ore, chert, mineralised charcoal, some reduced fired clay
10066	2	Burnt natural?	20	assm.	granules of bog iron ore and iron cemented sand
		Residue 2 + 1 + 0.5mm	994	assm.	Mainly chert and other siliceous grains, sandy bog ore, mineralised charcoal

Table 2: Summary commentary on contexts. C = charcoal-dominated materials, m = trace of metallurgical materials, M = abundant/significant metallurgical materials, ? = no indicative materials

C	Wt.	description	Date		Class	
10018	278	sandy bog ore/iron pan, mineralised charcoal, chert, quartz, some fired clay	SUERC-36687 SUERC-36688	AD1020-1170 AD1040-1230	C	pit 10013
10066	1014	sandy bog ore/iron pan, mineralised charcoal, chert, quartz			C	tree throw 10065
105046	265	charcoal, partially concreted/mineralised, bog iron ore (some burnt), some fired clay			C	pit 105045, 1A
105077	994	charcoal, bog iron ore, much slightly concreted charcoal	SUERC-39925	170BC – AD10	C	pit 105078, 6
105185	12	ore granules, abundant charcoal, some chert			C	pit 105186, 1A
105188	19	ore granules, some chert, rare charcoal			C	pit 105189, 1A
105197	7	charcoal, ore granules, flint, cemented sand			C	pit 105196, 1A
105199	35	well polished ore granules, some reddened, some charcoal, much mineralised, rich in chert	SUERC-39926	1920-1740BC	C	pit 105200, 1A
105202	70	mainly fired clay, charcoal, some ore			C	pit 105203, 1A
105205	320	coarse assemblage of ore granules, most dark shiny, some pale, a few reddened, charcoal			C	pit 105204, 1A
105207	339	10-25mm concretions of charcoal in fine iron- rich clay, fine ore granules, many reddened			C	pit 105208, 1B
105214	7	bog iron ore granules of a 'polished' appearance, much charcoal and fired clay with some chert			C	pit 105215, 1B
105233	8	ore granules, some reddened, few fragments of chert			C	pit 105234, 1B
105240	106	iron ore fragments/rounded granules; fired clay and lining slag, moderate chert and charcoal	SUERC-39927	AD1030-1210	m	pit 105241, 1B
105258	586	large block of vitrified lining, fragments (to 80mm) of granular bog ore, charcoal, fired clay, chert	SUERC-39937	AD1160-1270	M	pit 105259, 1A
105300	4704	FB fragments, flow slags, vitrified lining, bog ore lumps, concretionary material			M	pit 105301, 1A (RH)
105309	5438	dense flow slags, probable FB fragments, vitrified lining, bog iron ore lumps, concretions			M	ditch 105310, 1A (RH)
105313	226	small piece of complexly lobed flow slag, 9 pieces of bog ore			m	gully 105314, 1A (RH)
105315	76	ore, roast ore, lining slag, lining, greenish glass, flow slags in low density slag			m	gully 105316, 1A (RH)
105317	1924	dense flow slags, vitrified lining, bog ore fragments and lots of finer slag debris			M	gully 105318, 1A (RH)
105323	1544	flow slags, FB fragments, vitrified lining, lining slags, iron ore fragments, concretions	SUERC-39931	AD990-1160	M	pit 105324, 1A (RH)
105325	18	pale ore, rare charcoal, rare flint, some possible slag fragments, at least one lining slag chip			m	pit 105326, 1A (RH)
105327	527	small pieces of flow slag, vitrified lining, fired clay, bog iron ore, with concretions and charcoal			M	pit 105328, 1A (RH)
105331	1438	FB fragment, large flow slag block, vitrified lining and lining slag			M	ditch 105332, 1A (RH)
105351	386	iron bar fragment, deeply vitrified rounded lump of lining - failed block?			m	pit 105352, 1A (RH)
105353	67448	large FB pieces, flow slags, vitrified lining, duck egg glass, iron ore, glazed stones, concretions			M	gully 105354, 1A (RH)
105361	2435	iron ore, flow slag, vitrified lining, furnace floor concretion, tiny charcoal, fine ore fragments	SUERC-39932	400-200BC	M	pit 105363, 1A (RH)
105362	1605	bog iron ore, flow slags, charcoal rich slag			M	pit 105363, 1A (RH)
105364	3354	FB fragments, flow slags, vitrified lining, bog ore lumps, concretionary material			M	pit 105367, 1A (RH)
105365	618	vitrified lining, flow slag			M	pit 105367, 1A (RH)
105379	15048	substantial pieces of FB, flow slags and vitrified wall, possible iron lump (gromp?)			M	pit 105382, 1A (RH)
105383	1820	bog iron ore fragments, some large, with some vitrified lining and flow slags			M	ditch 105384, 1A (RH)
105385	23	coarse, large particles to 15mm: ore, granular, and rare charcoal			?	ditch 105387, 1A (RH)
105459	22	bog iron ore			?	pit 105460, conveyor
105467	90	mostly indeterminate particles, mainly ore, but there is some slag, stones, charcoal.	SUERC-39933	AD1020-1160	m	pit 105468, conveyor
105474	761	ferruginous concretion material on plant (charcoal?) debris, fired clay, iron ore, charcoal, chert			C	pit 105475, 1A
105590	13	bog ore and fragmented fired clay with variable buff-grey reduction			?	pit 105592, HLMA 4
105591	31	bog iron ore, some fired clay			?	pit 105592, HLMA 4
105593	20	bog iron ore	SUERC-39935	AD1040-1270	?	pit 105595, HLMA 4

Figure 1. Photograph 204- section of cut [105363] with fills 105362 (lower) and 105361 (upper) to the left (east) and cut [105367] with fills 105366, 105365 and 105364 to the right (west).

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