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Assessment of archaeometallurgical residues from Lydney B Phase II

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Abstract

The submitted assemblage comprised approximately 192kg of material. This included 187kg of ironworking residues, of which at least 87% derived from iron smelting and only 2% certainly from smithing.

A small proportion of the overall assemblage (approximately 4%) was provided by two assemblages (probably that from (3415) and more certainly from (3473)) of tapped iron smelting slags of a slightly different, more vesicular, character to the majority of the collection but showing some similarity to material from the adjacent Phase I site) and therefore tentatively identified as being of medieval age.

The remainder of the collection (180kg) is interpreted to be of Roman age, although small quantities of medieval age may occur in some later contexts.

The Roman ironworking residues formed an assemblage comprising 28% dense tapped slags in moderately thin flows with classic flow-rivulets on their upper surfaces and internally, but 34% thick, dense sheets of slag, locally showing signs of flow (although typically not reddened except on the upper surface) and bearing fragments of iron ore along with the moulds of both split and round wood (but only occasionally moulds or fragments of charcoal). In addition to these tabular materials, large fragments of slag rods, channels and related 'tool-marked' furnace slags, comprised a further 23% of the assemblage. Approximately 2% of the assemblage was provided by pieces of hearth or furnace ceramic, the majority of which was in the form of complex mases of sloughed partially melted pale grey slag from lower parts of smelting furnaces.

Only 1% of the ironworking residues derived from contexts provisional placed in period 2, whereas 63% derive from contexts of period 3 (although a significant proportion of that material comes from levelling and construction features and its creation must therefore predate the construction of Buildings 1, 2 and 3). Although 19% of the assemblage derives from contexts of period 4, the majority of that is of Roman character and occurs within a single surface of stone and slag associated with building 5 and is interpreted as residual. It would appear likely therefore the majority of the Roman slag was generated outside the excavated area and imported for specific construction tasks.

The site produced just 346g of iron ore, of which 312g derived from contexts provisionally assigned to period 3 (including 224g from the fills of ditch/holloway [3029].

The smithing of iron is represented in the collection by a very small proportion of the assemblage, including six reasonably certain and two possible examples of complete smithing hearth cakes. These had a range of weights from 169g to 1655g; the smallest being coal-fuelled and the largest closely resembling the charcoal fuelled bloomsmithing slags from other sides. All the SHCs in the assemblage are likely to be of Roman age.

The assemblage showed close similarity with residues from other sites interpreted as employing large furnaces to smelt ores from the Bristol Channel Orefield during the second and third centuries (and possibly into the fourth, but this is less certain).

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Methods

All materials were examined visually, using a low-powered binocular microscope where required. As an assessment, the materials were not subjected to any high-magnification optical inspection, not to any form of instrumental analysis.

The identifications of materials in this report are therefore necessarily limited and must be regarded as provisional.

This assessment was conducted in June 2019 and was commissioned by Jacky Sommerville of Cotswold Archaeology.

Description of the assemblage

Iron smelting slags

The assemblage of iron smelting slags comprised three main groups of residues: fully internal and externally flow-lobed slags with reddened flow surfaces (tapslags), more massive slags with some indicators of flow (lobate basis and tops, locally reddened, tighter with more cryptic internal lobed surfaces, generally not reddened) and with clasts of split -and round-wood and iron ore and thirdly a spectrum of charcoal-bearing of massive slags resting on basal dimpled slag sheets and lying within a variety of channels, rods and feeders. These three main classes intergrade and clearly passed laterally from one to the other.

The tapslags mostly comprised fragments of amalgamated rather stout flows, commonly forming rather narrow slag cakes, often with indications of lateral constructions (preserved as non-wetted surfaces). The tapslags were commonly up to approximately 50mm in thickness. A few examples were found in which the base of tapslag was strongly secondarily reddened, suggesting inversion of slag masses during clearance after tapping onto the margin of the tapping area, with the hot gasses from the furnace arch playing over the surface of the cleared material. The tapslags commonly showed small inclusions of iron ore, particularly on their lower surfaces.

The more massive slags were typically 50-100mm in thickness. The bases often showed lobation, although examples with slightly prilly bases suggesting flows subsiding into an underlying fuel bed were also produced. The tops of the massive slags commonly showed flow lobes, although possibly with lobes of convexity than in the conventional tapped slags. The massive body of the slags was commonly interrupted by one or more surfaces of flow lobing, commonly with no significant reddening.

The dense slags frequently carried inclusions of partly- or un-reacted iron ore up to 25mm across within the body of the slag. They also commonly had moulds after pieces of round- and split-wood. The round-wood ranged up to approximately 20mm in diameter, with larger diameters apparently split. The largest split wood sowed an external radius of curvature of up to 50mm.

The channels and related materials formed a complex set of residues with channels formed from slag moulding a hollow below the cake, with rods forming where the slag-filled entity became separated from the main mass. The feeders were deeper channel-like masses, sometimes with flow-lobed or corrugated tops. The feeders were commonly multiple – either side-by-side or stacked vertically. Individual channels ranged from 35mm – 70mm in width. The slag rods were narrower, ranging between 15 and 30mm in diameter. The fills of the rods, channels and feeders graded from dense slag (similar to that of the massive cakes) though to charcoal-rich materials. The most common microstructure was probably a porous slag containing rounded but irregular vesicles.

The dense tapslags in moderately thin flows with classic flow-rivulets on their upper surfaces and internally comprised 28% of the assemblage of residues, with the more massive dense flowed slags, contributing 34%, and the fragments of slag rods, channels and related ‘tool-marked’ furnace slags, comprised a further 23% of the assemblage.

Approximately 2% of the assemblage was provided by pieces of hearth or furnace ceramic, the majority of which was in the form of complex mases of sloughed partially melted pale grey slag from lower parts of smelting furnaces. One fragment of this grey cermaic showed stalactitic slag grows descending from the wall, suggesting the wall was fragment was from an overhanging section at 65°-70°. The smaller quantity of more classic oxidised-fired vitrified lining might have derived from either smelting furnaces or smithing hearths, in either case from near the air blast.

Two contexts of period 4 yielded assemblages almost solely with tapslags which were slightly more vesicular than was typical. This tentatively suggests that these contexts contained slags associated with the medieval iron smelting on the phase I site immediately to the west. The smelting slags from this site were typically more vesicular than those from the Roman activity on the Phase II site.

Iron ore
12 pieces of ore (total 394g) were present in the collection, most of which was broken to a size probably employed in the smelting (to judge by the abundant part-reacted ore clasts in the massive slags).

The most common ore type had a layered microstructure with alternating bands of fine-grained massive ore and bands of fibrous-textured, probably botryoidal material. Although the ore is common slightly red in colour it is believed to be mainly goethite, although the cracking in a few pieces suggest it may have in those cases have been roasted. Ruddle was present in the porosity of the more stalactitic-textured pieces. Two pieces were particularly fine-grained.

Smithing hearth cakes
The assemblage included a very small proportion (2%) of slags identified as certainly or probably deriving from smithing. These pieces were essentially recognisable fragments of smithing hearth cakes or complete examples. The complete examples ranged from 169g to 1655g in weight. The smallest was a coal-fuelled blacksmithing SHC (from context (3535)). A second small crescentic slag mass (172g; context (3288)) resembled one of the forms of small coal-fuelled SHC-equivalents from Cleevelands (Young 2016, 2018c). Five SHCs (or almost certain SHCs) lay in the weight range of 316g to 466g, a range of weights towards the heavy end of the spectrum of Roman blacksmithing SHCs. The largest SHC (from context (3704) closely resembled the plano-convex charcoal-fuelled bloomsmithing slags from other sites (particularly those from School Road, Miskin; Young & Macdonald 1998; Thomas 2000).

All of the SHCs occurred in assemblages likely to be of Roman age.

Indeterminate iron slags
Approximately 9% of the assemblage by weight comprised slags that could not be assigned with any degree of certainty to any of the classes described above, mainly because they occurred as fragments too small to preserve characteristic features. Although this material probably had origins across all the classes of slag described above, it should be noted that tapslags may commonly be identified as smaller fragments than the other classes, so this material probably predominantly belongs to classes other the tapslags.

Coal
The archaeometallurgical assemblage produced a single fragment (8g) of coke (from (3364)) and two small fragments of coal (from (3332) and (3018)). A separately submitted collection of coal included contained a further 6g from context (3364) and a total of 740g of coal from 15 other contexts.

Crucible
Context (3092) produced 6 sherds (total 12g) from a very small crucible, possibly with a luted lid, in a fine pale grey fabric. This piece requires further investigation, but the small size, the possible lidded form and the lack of obvious copper-contaminated residues (though the fragments have been well cleaned) all may hint at this as a vessel used for handling precious metals.

Concretions and iron
Various concretions (from contexts (3092), (3328), (3666), (3721), (3065)) were present, probably mostly formed around slag and cemented by secondary iron minerals from the weathering of associate metallic iron debris.

Three pieces (context (3022) 82g; context (3317) 80g; context (3704) 76g) of weathered iron were identified, none with a form suggestive of being a discrete artefact, nor did they appear to be fragments of raw bloom. They may have been small bar fragments or offcuts.

Distribution of the assemblage

Only 1% of the ironworking residues derived from contexts provisional placed in period 2. The period 2 assemblage also included fragments of a small crucible from context (3092). Unlike most of the Phase 2 assemblage (which comprises small fragments of iron slag likely reworked from outside the area), this delicate piece may well have been deposited after use within the area.

63% of the residues derive from contexts of period 3 (although a significant proportion of that material comes from levelling and construction features and its creation must therefore predate the construction of Buildings 1, 2 and 3).

Although 19% of the assemblage derived from contexts of period 4, the majority of that material is of Roman character and occurs within a single surface of stone and slag associated with building 5 and is interpreted as residual Roman material.

It would appear likely therefore the majority of the Roman slag was generated outside the excavated area and imported for specific construction tasks – perhaps both in the Roman and medieval periods.

Coal was recovered from total of eighteen contexts, but apart from the single coal residue-bearing SHC from context (3535) there was no direct link between finds of coal and evidence for metallurgical activity and much of the coal used may have been for other purposes.

Interpretation

The Roman iron smelting assemblage from Phase II at Lydney North is an example of a regional technology that has not yet been fully described and interpreted. The key characteristics of the residues from this smelting technology are an assemblage in which tapslags make up only half (approximately 40-60%) of the smelting slag assemblage, the remainder including rods and channels, but dominated by massive dense slags containing moulds of round-wood, spit wood and fragments of part-reacted ore.

A slag assemblage resembling this description has been found *in situ* in the very poorly preserved base of a furnace at Woolaston (Fulford & Allen 1992), alongside much larger quantities on associated slag dumps. Very poorly preserved furnaces are also known from *Ariconium* (Weston-under-Penyard; Jackson, 2012, and references therein). Otherwise, however, this facies of iron slag has only been

described in *ex situ* dumps and other secondary deposits.

Based on the nature of the sites at which these residues were first identified, it was suggested (Young 2011) that they provide evidence for a particular technology, probably large domed furnaces, that may be related to military or 'state' operations (Young 2014).

Such evidence has been noted at major sites around the Forest of Dean and Glamorgan sectors of the orefield including at Alvington, Glos. (Young 2009), Caergwanaf (author's unpublished data), Cannop (Young 2011, 2013), Cardiff Castle (Young & Kearns 2011), and Weston-under-Penyard (Young 2015) as well as, more recently, from Kingswood (Young 2017a), a site without obvious 'official' connection. Some aspects of the typical assemblage of features has also been noted at Frocester Court (Price 2000; Thomas 2000), Peterstow (Young 2012) and, in the wider hinterland of the Forest of Dean ore, at Worcester (McDonnell & Swiss 2004).

This expanded list places doubt on the earlier interpretation of these as 'state' smelting sites and the technology may have been employed more broadly than initially believed. It remains possible that the furnaces employed on the largescale operations were larger than those of the typical dispersed rural smelting leading to some of the previously-observed differences.

The assemblage most closely resembling the present is that from excavations of an iron-making area outside the southern gate of the second and thirds Roman forts in Cardiff (Young & Kearns 2011). These materials are likely to be second and third century in age. They comprised 31.4kg of massive slags, 42.6 kg of tapslags (it should be noted that channel slags were included with the tapslags during the assessment of that assemblage), 173g of narrow slag rods and 21.3kg of indeterminate slags. Most of the key features of the Lydney assemblage were also present at Cardiff, including the round- and split wood moulds and the ore inclusions within the massive slags.

The good preservation of both the small-diameter roundwood and the larger-diameter split wood suggests that they had not been consumed by the furnace and might therefore either be relict charcoal preserved undamaged from the start of the smelt in the cold basal section of the furnace, or that they were wood from a basal packing. The large size of split examples exceeds the size of charcoal normally used as a fuel in a bloomery furnace (if the charcoal is too coarse then the ore will fall through the charge without reacting) and there is some evidence for fissuring on the surface of the moulds – a feature associated with the moulds of wood in slagpit furnaces. On balance, an interpretation of the moulds as evidence for a packing in the furnace base, rather than simply as fuel, seems likely.

The interpretation of these residues in terms of a smelting technology remains uncertain, but in combination with the observations from Woolaston (Fulford & Allen 1992) some general comments may be made. It would appear that end the end of smelt a large proportion of the slag remained within the furnace base. This slag appears to correspond to most, if not all, of what is recorded here as the 'massive' facies. The high iron content of this material, the presence of unreacted ore and the inclusion of wood clasts are all features that recall aspects of the earliest stages of the generation of the furnace bottom slags in a 'slagpit' furnace. Fulford & Allen (1992, 193) describe unburnt charcoal from the massive slags at Woolaston, which may refer to the same material, here identified as probably being wood rather than charcoal.

The channel slags, frequently forming amalgamated multiple structures, at Lydney can also be matched with a 580mm-long channel in the *in-situ* slag at Woolaston (Fulford & Allen (1992, 193). The distal tip of the Woolaston example passed into a small bock of tapslag. Not all the Woolaston evidence supported the presence of channels and some examples of massive slags appear to pass directly outwards into conventional tapslags. The low proportion of conventional tapslag in both assemblages demonstrates how much slag as retained in the massive slags and in the channels. One feature not observed at Woolaston is the presence on the base of some of the probable furnace floor slags of rounded mouldings suggestive of the continuation of the external channel morphology into the furnace bowl. Similar features have been noted recently on the base of 'furnace bottom' slags from large Roman dome furnaces in SE England (Young 2018b).

The presence of 'channels' extending into the furnace would suggest that the smelters encouraged the drainage of slag from the furnace by rodding through the substrate (ash, spent fuel?) below the slag accumulation in the furnace. The combination of this with the resemblance of the massive slags to materials that might have accumulated in an essentially non-tapping furnace suggests that the furnaces may have been operated in a similar way to the large dome furnaces of the later Iron Age (e.g. Folly Court, Young 2018d). The dichotomy between no-tapping and tapping furnaces may not be quite as clear-cut as present received wisdom would suggest.

Although fragmented SHCs are perhaps harder to recognise than fragmented tapslags, there seems little doubt that smithing slags are relatively rare in the assemblage (i.e. there are insufficient smithing slags to represent the residues required to process the production of raw iron evidenced by the amount of smelting slag). This might reflect the sourcing of the reworked slags from particular bodies of waste, but might also hint that, as is often the case, the working-up of the raw iron was undertaken in a different place from its production.

The presence of the small crucible from period II is an indicator of an entirely different character, and perhaps directly associated with activity on the site. Full interpretation of this vessel must await further work, but the possibility that it might represent precious metal- rather than copper-alloy working is interesting. Precious metal working is known from Dymock, similarly on the periphery of the Forest of Dean where silver was used in brooch production alongside iron smelting on at least two sites (Catchpole 2007, Young 2018a, Young & Kearns 2010).

Further work

This assemblage includes one of the most comprehensive residue suites from a distinct regional (at very least) style of Roman iron smelting so far recognised. Further characterisation of the residues from this would be highly desirable to clarify the technology, which is so far very poorly understood.

One facet of the assemblage that adds extra interest to further analysis would be the direct comparison of the Roman smelting from Phase II of this project, with the medieval smelting from Phase I (Young 2017b, 2019). It is likely that many aspects of the smelting system would be the same (or similar), such as the furnace clays and perhaps the ore. Comparison may be made through the mass-balance modelling approaches of Thomas & Young (1999a,1999b).

The ore is of particular interest, because on the adjacent medieval site there were reasonable grounds for suspecting a very local origin of the ore. It would be useful to know whether such sources were being exploited in the Roman period (when apparent trials for iron ore, if not productive sources, were opened in the Lydney area; Wheeler & Wheeler 1932). Provenancing of ore within the orefield may be attempted through the elemental discriminants of Young & Thomas (1998, 1999) and developed by Young (2000).

The value of additional investigation is reduced, however, because the residue assemblage was derived from secondary contexts; there was no structural evidence for smelting within the site and the smelting had presumably taken place outside the excavated area.

Accordingly, only a limited campaign of analysis of the iron slags and iron ores is recommended. This should take the form of suite of elemental analyses covering the major facies of smelting slags, smithing slags, furnace ceramic and iron ore.

The small crucible from (3092) requires further investigation and non-destructive analysis by pXRF to determine, if possible, its use. If a substantial part of the profile of the vessel can be reconstructed than it may be worth illustration.

References

CATCHPOLE, T. 2007, Excavations at the Sewage Treatment Works, Dymock 1995, *Transactions of the Bristol and Gloucestershire Archaeological Society*, **125**, 137-219.

FULFORD, M.G. and ALLEN, J.R.L. 1992. Ironmaking at the Chesters villa, Woolaston, Gloucestershire: survey and excavation 1987-91. *Britannia*, **23**, 159-215.

JACKSON, R. 2012. *Ariconium, Herefordshire: An Iron Age Settlement and Romano-British 'Small Town'*. Oxbow, 304pp.

McDONNELL, J.G. & SWISS, A. 2004. Ironworking residues. pp. 368-378, in: H. Dalwood & R. Edwards *Excavations at Deansway, Worcester, 1988-89: Romano-British small town to late medieval city*. CBA Research Report 139.

PRICE, E. G. 2000. *Frocester: A Romano-British settlement, its antecedents and successors*. Gloucester and District Archaeological Research Group.

THOMAS, G., 2000. *A chemical and mineralogical investigation of bloomery iron-making in the Bristol Channel Orefield, UK*. Unpublished PhD thesis, Cardiff University.

THOMAS G.R. & YOUNG, T.P. 1999a. Bloomery furnace mass balance and efficiency. *In:* POLLARD, A.M. (ed) *Geoarchaeology: exploration, environments, resources*, Geological Society of London, Special Publication, 165, 155-164.

THOMAS, G.R. & YOUNG, T.P. 1999b. A graphical method to determine furnace efficiency and lining contribution to Romano-British bloomery iron-making slags (Bristol Channel Orefield, UK). *In:* YOUNG, S.M.M., BUDD, P.D., IXER, R.A. and POLLARD, A.M. (eds). *Metals in Antiquity*, British Archaeological Reports International Series, **792**, 223-226. Archaeopress, Oxford. [ISBN 84171 008 3]

WHEELER, R.E.M. & WHEELER, T.V. 1932. *Report on the excavation of the prehistoric, Roman and post-Roman site in Lydney park, Glos.* Report of the Research Committee of the Society of Antiquaries, 9.

YOUNG, T.P. 2000. Chapter 10. The Paviland Ochres: characterisation and sourcing. *In*: Aldhouse-Green, S., *Paviland Cave and the 'Red Lady': a definitive report.* Western Academic and Specialist Press Limited, 205-225.

YOUNG, T.P. 2009. Evaluation of Archaeometallurgical residues from Alvington, Glos. (RCA08), *GeoArch Report 2009/14*, 3 pp.

YOUNG, T.P. 2011. Evaluation of archaeometallurgical residues from the Forest of Dean Archaeological Survey, Stage 3B phase 2 (37920/37921/37923/ 37924). *GeoArch Report 2011/32*. 13 pp.

YOUNG, T.P. 2012. Archaeometallurgical residues from the Brecon to Tirley gas pipeline. *GeoArch Report 2012/18*, 75pp.

YOUNG, T.P. 2013. Analysis of archaeometallurgical residues, Cannop, Glos. (Glos HER 37920). *GeoArch Report 2013-05,* 26pp.

YOUNG, T.P. 2014. Roman military control on ironmaking in South Wales. Pp. 215-226 *In*: B. Cech and Th. Rehren (Editors), *Early Iron in Europe,* Instrumentum Monographies.

YOUNG, T.P. 2015. Assessment of archaeometallurgical residues from Weston-under-Penyard, ALI-EVAL15161. *GeoArch Report 2015/22*. 12pp.

YOUNG, T.P. 2016. Assessment of archaeometallurgical residues from Cleevelands, Bishop's Cleeve, Gloucestershire. *GeoArch Report 2016/18*. 43pp.

YOUNG, T.P. 2017a. Ironworking residues from Kingswood, Gloucestershire (ACW451). *GeoArch Report 2017/06*, 93pp.

YOUNG, T.P. 2017b. Assessment of archaeometallurgical residues from Lydney B North (LYF17). *GeoArch Report 2017/16*, 14pp.

YOUNG, T.P. 2018a. Analysis of archaeometallurgical residues from Dymock. *GeoArch Report 2018/05*, 9pp.

YOUNG, T.P. 2018b. Assessment of archaeometallurgical residues from Bexhill, East Sussex. *GeoArch Report 2018/08*, 20pp.

YOUNG, T.P. 2018c. Archaeometallurgical residues from Cleevelands, Bishop's Cleeve, Gloucestershire. *GeoArch Report 2018/12*, 95pp.

YOUNG, T.P. 2018d. Archaeometallurgical residues from Folly Court, Wokingham, Berkshire. *GeoArch Report 2018/15*, 124pp.

YOUNG, T.P. 2019. Analysis of iron smelting residues from Lydney B North (LYF17). *GeoArch Report 2019/04*, 61pp.

YOUNG, T.P. & KEARNS, T. 2010. Evaluation of archaeometallurgical residues from Kyrleside, Dymock, Gloucestershire (32523 & 33787). *GeoArch Report 2010/19*, 5pp.

YOUNG, T.P. & KEARNS, T. 2011. Evaluation of metallurgical residues from the New Interpretation Centre, Cardiff Castle, Cardiff [ST181765]. *GeoArch Report 2011/02*, 27 pp.

YOUNG, T.P. & MACDONALD, P. 1998. Miskin, School Road. *Archaeology in Wales*, **37** (for 1997), 79.

YOUNG, T.P. & THOMAS, G.R. 1998. The cargo: iron ore analysis. pp. 105-111 *In:* Nayling, N. *The Magor Pill Medieval Wreck*, CBA Research Report 115, Council for British Archaeology. [ISSN 0141 7819, ISBN 1 872414 86 9]

YOUNG, T.P. & THOMAS G.R. 1999. Provenancing iron ore from the Bristol Channel Orefield: the cargo of the Magor Pill Boat. *In:* POLLARD, A.M. (ed) *Geoarchaeology: exploration, environments, resources*, Geological Society of London, Special Publication, 165, 103-121.

Table 1: summary catalogue of materials submitted as archaeometallurgical residues.

context	weight (g)	number	notes
box 2			
3020	648	1	angular fragment of thick massive slag, no surfaces, multiple roundwood moulds
	466	1	complex piece with charcoal locally dense slag, one non-wetted contact and one ceramic contact
	232	1	dense slag with multiple half roundwood pieces
	360	1	rusty slag with multiple pieces of wood, some with charcoal preservation, no surfaces
	52	1	deep vesicular lining slag on pale ceramic
	120	1	angular fragment of dense fine slag with tapslag surface protruding in mid-section
3020	286	1	thick massive fine slag with tapslag top, (non-reddened), one internal non-wetted surface could be wood margin
	136	1	tapslag
	46	2	fragments of thin indeterminate slag sheet
	24	1	rounded nub of dense slag apparently a wall intrusion
	142	1	angular fragment of charcoal debris rich slag with large fuel and wood moulds and slightly prilly base
	148	3	angular fragments of indeterminate fine massive slag
	38	1	small piece of reddish slag (cf. 142 piece above) with wood/charcoal mould margins
3053	142	1	dense slag with multiple roundwood moulds
	102	1	slag with charcoal debris in massive slag
	20	1	indeterminate slag fragment
	114	2	tapslag
3042	830	1	large block of dense slag, impressions of wood moulds form base, many pale grey ceramic inclusions in one half of block then rather cryptic level of lobes, then other half of block shows faint hints of internal lobing, with large wood mould.
	236	9	slightly worn fragments of tapslag
	6	1	fragment of pale grey furnace ceramic
	18	1	lining slag
	190	8	worn fragments of varied indeterminate dense slag
3055	76	1	base of slightly lobate slag, with striated ridge on base - probably a tool mark/rod
	66	1	small worn slag fragment with prilly base and parts of roundwood moulds

context	weight (g)	number	notes
	224	1	dense fine slag irregular fractured edges except for one re-entrant face with a non-wetted lobate contact
3005	88	1	unusual slag with dimpled base, slightly concavo-convex, upper face has intense metallic lustre, with suppressed lobes, similar to those of a non-wetted surface, no reddening
	62	1	tapslag
	104	1	dense angular slag fragment, fine grained massive
	8	1	small chip of weathered vesicular material - probably a vesicular tapslag
3008	58	1	tapslag
	48	1	sheet of vesicular lag, one side sandy, the other side has fuel dimples, unclear if from a floor or wall
3013	370	3	tapslag
3018	20	1	small fragment of slag with abundant ore fragments
	>1	1	coal
	74	4	tapslag fragments
	82	1	internally lobate slags forming moulds of large flat surfaces, probably wood
	156	2	complex slags, probably tapslags, but containing round moulds
	126	2	fragments of indeterminate dense massive lags
	108	3	vitrified and slagged slightly oxidised furnace wall
3020	8	1	rusty accretion on pot sherd
3017	96	4	tapslag fragments
	14	1	indeterminate rusty slag fragment
3035	156	1	angular fragment of dense fine slag, possible ore debris in one vuggy area
	36	2	lobate flowed slag with ore clasts, probably tapped flowing around fuel clasts
3055	14	1	worn tapslag fragment
3010	338	2	dense tapslag, one forming edge of channelled flow
3117	78	1	tapslag

context	weight (g)	number	notes
3034	24	2	tapslag
3051	16	1	tapslag
box 12			
3022	82	1	iron
	680	1	massive flow up to 70mm thick with lobate top and impression of earlier lobate surface on base, one face is non-wetted contact with red ceramic - probably a carried clast rather than a margin
	740	1	massive flow with lobate top and with lobes visible on one later non-wetted surface full height of 80mm thickness, internally appears massive, but has some cryptic lobed horizons
	264	2	large blocks of vitrified pale grey ceramic
	432	1	appears to be from margin of a slag bowl with a large piece of roundwood, and with a lobate top
	344	6	fragments of tapped slag with rather chaotic lobed texture to varying degrees
	170	1	angular fragment of dense massive slag
	62	1	sandy contact spalled from base of slag piece
3065	974	1	mostly massive dark slag, one maroon surface exposed just below top and base appears a little prilly, 100mm thick
	1020	1	massive appearing slag with prilly base and ceramic clasts, but flow lobes visible on one face that is lightly more weathered
3207	984	15	very heavily worn fragments of tapslag
	28	2	vesicular iron slag
	58	1	curved eroded piece of granular slag, could be lower part of SHC, but more likely from a runner
	282	1	dense rounded cobble of massive slag
3188	220	5	fresh fragments of tapslag
3083	62	1	slagged and vitrified lump of complex dark grey indurated wall ceramic
box 13			
3065	296	1	large thick block of grey reduced vitrified and slagged wall, front face has numerous stalactites suggesting wall at about 65-70 degree overhang

context	weight (g)	number	notes
	48	1	iron ore, dense angular fragment, alternating fibrous and fine massive layers, red on one end surface, slightly cracked in places
	572	10	tapslag
	1240	7	fine massive slags, just locally with hints of lobing, no clear tops or bases
	62	1	concretion on dense slag
	90	3	irregular indeterminate slag fragments
3263	428	1	very irregular slag mass, slightly dimpled base, appear massive but has 'randomly' located lobes, possibly FB but might be a fragment from a complex multiple runner
3261	238	2	tapslag
	500	1	highly worn and weathered rounded lump of extremely dense slag containing a partially melted sandstone clast 25mm across
3092	94	2	worn small fragments of very dense massive slag
	186	1	slag fragment with dense sheet 20mm thick attached on one side to indeterminate lumps, with some possible wood/charcoal impressions - could possibly be an SHC fragment but not certainly
	42	1	small bleb of slag, protrusions and hollows on one side, other side smooth and fragmented - possibly deformed by impact (of hammer?)
	12	1	small concretion with slag debris
3458	60	2	lobate slags, possibly tapslags, dark fresh
	442	1	very fresh dark fragment of very dense slag, non-wetted base, tapslag like top, hints of internal lobing, so thick tapslag flow, up to 60mm thick
	362	1	dark fresh, very dense slag, one face has lobate surface fused to wall, opposite face shows slightly lobed surface with fine lobes
	444	1	channel, 40mm wide and 30mm deep, top covered with finely brecciated slag
3210	434	1	massive slag with lower? face of small prills, has quarter round mould of 50mm radius, plus flat surface of split wood on opposite side.
	160	1	rounded worn dense slag lump
	46	1	tapslag fragment
	30	1	small slag fragment with flat faced wood impression
	80	2	dense slags with internal prilly structure
	32	1	dense slag fragment
	126	2	lower density iron slags with charcoal?, both with hints of lobing

context	weight (g)	number	notes
3100	102	1	iron ore - complex internal structure, possibly brecciated box-stone
	102	2	tapslag
	166	1	dense vesicular slag with curved lower crust - probably a channel fragment
	20	2	small indeterminate fragments
	53	1	fragment with well-developed double fibrous microstructures, uncertain origin
	48	1	small channel/rod fragment
	372	1	very dense slag, has curved lower face showing lobes on contact, upper face has poorly developed lobes, dense tapslag
3047	76	2	lobed slags with roundwood cavity
	2	1	fragment of vitrified and bloated pale grey lining
	166	7	tapslag
	28	1	base of slag with small dimpled probable tool mark
	44	3	fragments of indeterminate thin slag sheets
3102	188	3	deeply vitrified grey sandy lining/lining slag
	38	1	indeterminate worn rusty slag nub
	140	1	tapslag
3101	40	1	brush ore with crusts and ruddle filled cavities (might be similar to problematic texture in 3100)
	16	1	even fine grained ore
	16	1	even fine ore divided by curvilinear (botryoidal?) fibrous crusts
	50	1	fibrous brush ore divided by stringer vein/box margin
	6	1	pot sherd
	114	5	worn tapslag fragments
	16	3	small lining slag fragments
	34	1	angular fragment of dense fine slag
3092	12	6	sherds from a very small crucible - possibly with luted lid
3458	6	1	fragment of vitrified oxidised fired lining, very sandy, leading to glaze of granular appearance
3189	258	1	large block of vitrified, and flowed pale grey wall, apparently slightly convex in horizontal plane (to judge from the orientation of glaze runnels)
	154	1	tapslag with strongly reddened base - secondary heating

context	weight (g)	number	notes
3073	202	3	tapslag
	18	1	fuel dimpled small prills
	124	1	angular fragment of dense fine slag, massive
box 14			
3119	808	1	fragment of tapslag cake, base shows flow over lobes so not original base, internally rather massive in appearance with better defined lobes on upper surface
3224	562	1	90x40mm cross section rounded base flat topped (fracture) porous slag, probably a large channel/runner, shows crescentic concentric ridges from flow on upper surface, broken in two, ceramic clast
	522	11	tapslag, several in unusual bloated, vesicular, viscous morphologies
	106	1	quarter round mould (?wood, ?tuyère) approximately 65mm diameter equivalent), on outside is parallel tool mark/rod 20-25mm diameter
	73	1	dimpled slag forming over cross sectioned runner/tool mark
	166	1	curved slag crust with overlying slag (obscured by accretion), base partly spalled off, but shows crust is finely vesicular. Probably furnace slag but uncertain
	126	1	dense vesicular slag fused to fine grey hearth wall, one large piece, one small piece showing angle between two ceramic-covered edges, and two ceramic pieces spalled from such a surface
	34	2	small scraps of rusty porous (charcoal-bearing?) slag
3159	48	3	ore, two angular fragments of fine even ore, and one thin sliver of a porous, possibly brecciated material
	4	1	grey vitrified furnace ceramic
	20	1	tapslag
3182	120	1	tapslag, one with a strong lateral non-wetted surface
	90	3	indeterminate worn iron slags
	26	1	pale grey vitrified furnace wall ceramic, vesicular
3046	116	1	dense slag fragment, bears ore fragments, massive, fine
	232	7	tapslag
	18	1	8mm thick basal crust, overlain by highly vesicular iron slag, base smooth planar shiny
	22	1	small fragment of dense fine slag

context	weight (g)	number	notes
3439	56	7	highly porous fragments from large storage jar
3111	56	2	slagged vitrified oxidised lining, probably from near b/h
	10	1	vitrified pale grey lining material
3332	1	2	coal
	78	1	worn and accreted indeterminate dense slag fragment
	56	2	tapslag
3194	22	1	thin indeterminate slag sheet
	26	1	lining slag
3138	34	1	angular fragment of pale grey vitrified lining
	20	1	indeterminate slag sheet fragment
3225	306	1	worn tapslag
3222	48	1	dense slag with marginal dense crust 12mm thick (probably base but not certain) passing into highly vesicular slag, culminating in exposed large rounded vesicle on fracture
3234	14	1	vitrified and vesicular pale grey lining
	8	1	dense slag fragment, probably a flow lobe
3161	284	6	worn dense slags, potentially all tapslags
3178	40	1	unusual very fine ore with localised conchoidal fracture, probably roasted, with cracking more intense in one area
	24	1	tapslag
3104	224	2	very dense tapslag fragments, worn, one with lateral contact with (or clast of) grey ceramic
	28	2	indeterminate iron slag scraps
3236	376	3	worn fragments of tapslag
u/s	46	1	possibly burnt red limestone

context	weight (g)	number	notes
	284	3	worn tapslag fragments
3146	18	1	tapslag
	4	2	prilly slag scraps
3123	158	2	worn tapslag
3126	18	1	tapslag
	34	1	lining slag
	6	1	small scrap of thin slag sheet
3165	30	2	highly worn dense slag scraps
3167	168	1	angular block of very dense fine slag, hint of lobing suggests a tap slag possibly
	8	1	small scrap of slag
box 16			
3316	512	6	dark tapslag, only one shows good reddening
	520	1	dark dense slag, red top showing in one area through accretion, one large probably charcoal clast, probably a tapslag
	542	1	angular block, upper parts show narrow flow rivulets, lower parts have large probable wood mould and other wood/charcoal moulds, lobes at odd angles, suggesting this might be from outflow from massive cake into lower-lying flow
	392	1	dark tapslag forming part of bowl, contains large charcoal piece
	86	1	highly vesicular clinkery altered furnace wall
	420	1	angular fragment of dense highly accreted slag, some areas show small prills, probably a furnace slag
3316	252	1	irregular fragment of dense fine massive slag with multiple roundwood 15mm diameter
3313	22	1	tapslag attached to (flowed over) pot sherd
	236	4	tapslag
	212	2	dense fine lags with hints of internal lobes
	262	1	dense irregular slag fragment surfaces largely obscured by accretion
	124	1	mass of coalesced prills, no sense of flow, one surface has possible wood impression

context	weight (g)	number	notes
3313	218	1	dense slag with much accretion, multiple moulds of both split and roundwood. Some may be charcoal but others probably wood
	138	1	accreted slag, probably tapslag
3317	134	1	very dense tapslag flow, internally rather massive, base has fine lobes and abundant very fine ore
3328	114	1	accretion on iron
	44	1	elongate, rod like piece, showing sign of explosion, iron bar
	100	1	dense internally lobate slag fragment, no original surfaces
3325	678	13	tapslag
	2	1	small chip of pale vitrified and vesicular lining overlain by dark glass
	196	1	rounded worn lump of slightly rusty slag with chaotic probably slightly lobate form. Indeterminate origin
box 23			
3458	262	1	deeply slagged strongly oxidised fired lining with thin reduced surface below slag
	52	1	vitrified and slightly bloated reduced lining, slightly convex surface
	598	6	tapslag fragments
	286	1	accreted lump of slag, shows two large wood/charcoal moulds, slightly dimpled base and top with ore in accretion (and possibly in slag)
	146	2	irregular lumps of porous slag - possibly furnace slag or runner fragments
	40	2	worn dense slag scraps possibly tapslag
	182	2	angular fragments of very dense, but slightly vesicular slag
3473	584	5	dense, moderately fresh pieces of tapslag
	488	8	worn and in some cases weathered rounded fragments of dense slag, all probably from tapslags
3473	2500	7	tapslag, in all but one cases more vesicular in upper most layers and with slightly wrinkled lobe surfaces, than is typical for this assemblage
3283	366	1	tapslag fragment
	534	1	very dense slag lump, probably from a flow, basal layer is vesicular, just 2mm thick, then c40mm of very dense fine slag, a few large rounded voids, then top shows some granular areas some with smooth lobes, but partially obscured by accretion

context	weight (g)	number	notes
3415	1838	18	tapslag fragments, largest is part of bowl 50mm thick, at 65mm from probable margin
	20	1	worn slag scrap
	160	1	slab of lower density slag with tapslag like lobes preserved on margin only, interior porous, could be margin of low-density flow (as seen in some of the runners)
3254	698	1	fan of tapslag flows, maximum thickness 30mm, maximum width 160mm on break about 100mm from likely apex position
	64	1	tapslag
3204	22	2	tapslag
	18	1	narrow slag prill with fuel/wood impressions along sides
	18	1	low density residue; fired hearth ceramic
3493	68	1	tapslag
3202	6	1	concretion on slag?
3490	92	1	dense irregular massive slag fragment
	48	1	worn dense slag, probably tapslag
	4	1	tapslag fragment
	52	1	shiny fuel-dimpled base of slag of uncertain nature
3272	38	1	stone with Mn staining
	402	4	very worn tapslag fragments
	46	1	porous slag fragment, probably from a runner
3204	98	4	tapslag fragments
3375	452	9	tapslag fragments
	24	1	slagged and vitrified lining with pale buff/grey colours
	20	1	bloated slagged lining, possibly a sandstone fragment rather than clay
	92	1	rounded lump of charcoal-bearing slag
3457	36	1	vitrified oxidised lining
	4	1	shard/flap of bright blue glassy slag

context	weight (g)	number	notes
	86	1	slightly dimpled probably non-wetted base from slag of uncertain nature
3496	260	1	dark tapslag fragment
3453	8	1	charcoal
	30	1	deeply vitrified pale grey furnace lining with dark glass
	216	1	fragment of tapslag
	130	1	angular block of massive slag with inclusion of iron ore
	32	1	worn dense slag fragment
box 24			
3253	760	1	double runner/channel; 120mm long, 40mm deep and 80mm wide overall, with some additional slag on top
	38	1	very worn tapslag
	62	2	fragments of neat 10mm thick curved vesicular slag sheet
	56	1	worn fragment of porous slag, probably a channel fragment
3317	80	1	concretion on iron
	134	1	slag with numerous wood/charcoal and some roundwood moulds
	396	1	very dense slag with lobate top, although with no clear flow, and with abundant roundwood moulds
	512	1	angular slag lump, porous with charcoal and vesicles, dense, has protrusion on one side contain lobate material, possibly furnace material from head of runner?
	436	1	dense angular slag fragment with moulds of roundwood pieces
3415	1980	6	tapslag blocks
	84	1	neat margin of slag cake, acute angle, slag vesicular but surfaces weathered so lacking detail
	308	1	slag block with prilly base, upper part fractured off across large moulds, probably of charcoal
3424	280	1	fragment from thick tapslag mass, has ore particles between flows
	270	1	complex slag lump in vesicular slag with charcoal - protrusion suggests a runner/rod extending from below, but piece is torn and twisted so uncertain
3507	350	1	angular fragment of extremely dense slag, locally finely vesicular

context	weight (g)	number	notes
3371	28	1	recently broken fragment from base of lobate dense slag, presumably a rather massive tapslag
	596	1	angular large fragment of dense slag, partly accreted so interpretation difficult, appears slag is granular and porous
	144	1	slightly flowed thick lining slag, up to 50mm of slightly foliated vesicular pale lining slag, possibly grading into bloated pale lining
	358	1	block from base of probable porous furnace slag, has small probable toolmark on base in form of what appears to be a small diameter rod
3258	296	5	very worn tapslag fragments
	146	3	worn fragments of channels/rods; 15mm diameter small frag, 15x10mm rod as part of 15mm radius semi-circular cross section piece; 35x20mm dense semi-circular channel
	42	1	dense slag with smooth concave areas on top, possibly deeply worn tapslag
	236	1	concavo-convex piece of dimpled, porous slag, base of FB or SHC, probably FB
3269	212	3	worn tapslag
	106	1	worn angular fragment of dense fine slag
3455	116	4	worn tapslag fragments
	272	2	worn angular blocks of fine slag with some suggestion of lobing, presumably thick tapslag blocks
	220	1	angular fragment of fine dense slag, no indication of lobing
	26	1	small scrap of slag with small roundwood impression
3303	956	30	tapslag fragments, dark fresh
	54	3	lining slag on pale grey ceramic
	4	1	pale grey furnace ceramic
	130	3	charcoal-bearing slags, two with dimpled bases
	44	1	dimpled dense slag, possibly a lobe cooled within the fuel bed
	104	2	rusty dense slags of irregular form and possible granular appearance
	16	1	dense slag with numerous small ceramic fragments, probably a worn tapslag fragment
3254	92	2	tapslag
	86	1	dense fine tapslag with non-wetted ?base with contact with thin roundwood, other surfaces fractures
3263	74	4	worn and weathered tapslag
	80	1	dimpled base of slag with crude rounded protuberances, porous interior with some large rounded cavities,

context	weight (g)	number	notes
	14	1	indeterminate slag scrap
3356	94	1	crude rod swelling at one end, rod section 25x27mm, slag porous
3427	120	1	margin of highly vesicular slag cake, surfaces not lobed
3315	16	1	small fragment of slag sheet, fused to sand on one side, large rounded vesicles contained within the sheet
3399	26	1	tapslag
3323	6	1	indeterminate dense slag with large vesicles
3350	28	1	fragment of iron ore, has some dense zones suggestive of marcasite type ore
box 25			
3458	106	1	thin tapslag flow with fine part reacted ore incorporated
	178	1	deeply vitrified and altered grey lining - almost all slag
	178	1	dense fresh slag from base of a mass, base is 10mm or so crust, fracture above shows hint of flow outline, so mass is probably tapslag flow
	140	1	basal crust with abundant part reacted ore, appears brecciated above with possible rod base
	186	1	fragment of rather low-density iron slag, well formed microdimpled base, vertical edge formed by two layers of lobe margins, could be fragment of SHC but not certain - could be furnace slag?
	264	1	angular block of dense fine massive slag
	430	1	block of porous iron slag forming sheet with stout tool mark/channel below, slightly double profile 55mm wide, 30mm deep, slightly curved in plan view
	450	1	complex block, at first sight two large channels intersecting at 60 degrees, but might be disrupted basal crust
3315	182	1	crescentic fragment, vesicular iron slag over fused, burr-like contact with grey ceramic, probably edge from large SHC
	328	1	irregular fragment of probably lobed slag containing angular and roundwood moulds, unclear if charcoal or wood
	490	1	angular block of slag, generally fine and massive, with at least one line of maroon-surfaced lobes, one large wood mould
	196	1	irregular fragment of probable tapslag
	20	1	weathered tapslag

context	weight (g)	number	notes
	10	1	rusty slag nub
	28	1	pale grey ceramic intruded by slag vein
	78	1	polished pebble of rhyolitic (welded?) tuff
3313	202	1	dense tapslag, margin of flow
	206	1	dense tap in what appears to be a narrow, tall, flow of thin rivulets, bordered by vertical contact with ceramic/stone, small veneer of which adheres
	690	2	dense angular slag bocks in fine dense material, both with slightly lobed surfaces so probably tapslag
	1205	3	angular blocks of dense massive slag, one has ceramic clasts and maroon surface with tubular vesicles in lower part, other two less well-developed surfaces, some large vesicles some ceramic clasts
	146	1	natural conglomerate
	416	1	irregular concretionary mass, probably a porous furnace slag
box 33			
3314	510	1	tapslag, good conventional flow up to a maximum of 50mm thick
	40	1	tapslag
	310	1	indeterminate light rusty massive slag bock, one small area of face shows smooth, possibly blown surface
	596	1	massive pale slag with multiple round wood moulds and one slightly prilly (basal?) surface
	954	2	massive fine slags with some rounded voids and occasional hints of lobing
3314	138	1	lightly vitrified block of pale grey furnace wall
	966	6	tapslag
	552	3	dense fine massive slags, with just localised surfaces with lobing
	554	4	blocks of tapslag like material with abundant roundwood moulds
	16	1	vitrified pale grey hearth wall
	476	3	dense massive fine slags with rare roundwood moulds
	62	1	rounded small fragment of dense indeterminate slag
3446	234	1	broken in two fragment of probable SHC, shows flat topped bowl up to 30m thick, overlain by cauliflower like growths to 15mm with voids between
	222	1	curious ‘U’-shaped slag block, rough base, dense slag, smooth grey top with upturned edges, suggests SHC fragment
	120	1	pale grey slag forming a mass of roundwood moulds

context	weight (g)	number	notes
3394	16	1	indeterminate slag fragment
	232	1	weathered and etched rather coarse-grained slag, completely lobed internally, but on surfaces preserved
3349	250	1	worn slag block, wedge shaped, top covered in fragmented slag, rusty, worn
	58	1	tapslag
	90	1	very worn lump of probable tapslag
3296	96	2	very worn tapslag lumps
	110	1	worn lump of very dense slag without certain lobes
3506	20	1	worn indeterminate slag lump
3366	12	1	slagged vitrified strongly oxidised fine-grained lining
box 34			
3004	1965	1	200x160x40mm slab of slag, one side is rough, with brecciated slag and lining, but approximately planar, the other side shows a ridge parallel to one side and a rounded trough (i.e. a high ridge on the supporting surface), appears to be a form of FB
	136	1	fragment of rounded tool mark or runner
	64	1	slag fragment with rounded margin - from a runner or perhaps the edge of an FB of the type of the 1965g piece
	138	1	dense runner/tool mark fragment
	58	1	flat topped runner fragment, 55mm long, 30mm wide, 17mm deep
	22	1	tapslag
3004	6	1	corroded iron
	64	2	tapslag
	224	1	asymmetric channel fragment in dense slag, tool mark sheared from base of large block? Broken in 2
	86	1	small twisted runner fragment in fresh dark porous slag
	268	1	sub-conical runner fragment, with a couple of lobes on narrow end
	84	1	tapslag in narrow flow, or channel slag with tapslag like texture
	196	1	probable FB fragment has lenticular basal crust thickening into gentle basal ridge, body of more porous but obscured by accretion
	820	1	bundle of channels/feeders, double probably on base, 65 x30mm section irregular slag on top total thickness of 75mm, probably a deformed third runner, denser edge is truncated oblique

context	weight (g)	number	notes
3004	1000	1	angular block of very dense slag, 80mm thick, lower part with inclined wood contact surfaces, suggestive of wide split wood. Slag is dense and fine and contains some very fine enclaves
	352	1	highly accreted block, elongate, U shaped with one lobate margin, probably an open trough shaped runner
	408	1	angular lump of dense massive slag with low profile lobate-topped runner extending from one side
	578	1	irregular block of slag, possibly more than one held together by ferruginous accretion
	452	1	very dense dark tapslag
	90	1	thin tapslag sheet
box 35			
3288	446	1	SHC with well-formed bowl with dimpled base and with upper lining slag slab, 90x90x55(50) mm
	1075	1	fragment of bowl of very dense FB, base (or is it side) of very dense flow lobed material, body of slag contains multiple pieces of mainly round wood, 90mm thick from non-wetted edge
	460	1	irregular lump of charcoal bearing slag
	354	1	55mm wide x 45 deep piece with 10mm protruding round ridge as wide as the block
	116	1	dense slag with wood moulds, similar to structure of margin of large block in this bag
3314	344	1	tapslag flow with almost vertical non-wetted side 60mm high, granular/fragmental base, very dense
	600	1	tapslag block with 45mm thickness, planar base with non-wetted lobes and ore inclusions
	460	1	tapslag block 50mm thick, base probably missing
	648	1	slab of dense slag, 35mm thick, one face is somewhat finely fragmental
	40	1	fine slag with pore spaces and a wood contact surface
	682	1	angular block of dense slag with flow lobed top almost cherry red, roundwood mould, in lower part, 90m thick
3361	704	9	tapslag
3458	72	2	tapslag
	72	1	tapslag in narrow runner, 70mm wide, 30mm deep, good conventional dense tapslag
	56	2	worn slag pieces probable tapslags
3508	226	3	tapslag
3378	34	1	probable tapslag fragment

context	weight (g)	number	notes
box 36			
3288	972	10	tapslag
	100	1	pale grey ceramic veined with apparent slag intrusions
	118	1	rounded worn slag lump with dimpled surface, suggestive of a tool mark from the base of a block
	170	3	fragments of basal crust from slag - in each case around 20mm thick with a slightly columnar microstructure
	324	1	worn block of very dense slag, has pale (ceramic?) inclusion
	184	1	small fragment of porous slag bearing a length of small round wood mould
	108	2	broken fragments from the dimpled base of slag
	140	1	irregular slag fragment with rather chaotic appearance of small lobes
3288	770	10	10-15mm rod embedded within irregular slag fragment, probably passing from rod to tool mark
	96	1	very worn lump of slag with lobes visible in weathered cross section; tapslag
	88	2	dimpled slag bases
	172	1	crescentic slag, rather granular, with pale vesicular lining slag spread across inside of curve - probably a Cleevelands-style crescentic SHC
	174	3	irregular fragments of slightly vesicular slag
	106	1	fragment of dense slag with isolated lobe hanging below base, probably from the margin of a steep-sided tapslag
3288	582	15	tapslag
	650	1	dense bowl shaped slag, lower part is 25mm dense slag with slightly dimpled or smooth base with slightly undulating surface, upper part of block is 30mm of vesicular iron slag, with remnants of a slightly lobate top. Could be homogenised tapslag or FB type material
	420	12	worn lumps of dense slag, some show dimpled bases, but most devoid of features
	20	1	vitrified pale grey lining
3288	396	1	neat dense almost circular SHC, planar top with some ceramic clasts, base rough, half covered in altered ceramic forming burr-like layer, 90x90x40mm, small piece missing from distal side
	428	19	tapslag, mostly rather worn
	152	4	rounded worn lumps of dense massive slag
	92	5	indeterminate slag fragments
	404	1	rounded worn dense slag, indeterminate

context	weight (g)	number	notes
box 38			
3005	1635	1	large block of dense slag with irregular form, 90mm is lower part with chaotic assemblage of roundwood moulds, upper 30mm is more simply flow lobed, as is upper surface, imprints of possible roundwood also impressed into upper surface
	1210	12	tapslag, one of largest pieces shows exceptionally wide flat flow lobes, other more normal,
3547	646	1	tapslag, up to 45mm dense flow with lobed top, shows basal contact on margins, but inside margin shows fracture
3288	792	4	tapslag
	362	1	irregular slag lump with basal dense crust overlain with planar contact by more porous material, all bears charcoal
	322	1	irregular lump of charcoal-bearing slag
	432	3	worn lumps of dense indeterminate slag
	182	1	fragment of very dense crust with columnar structure (tubular vesicles and microstructure), has curved smooth embayment in upper surface. Probable but no certainly a fragment from a very large SHC
u/s	130	1	flow lobed upper surface of fractured block with large piece of roundwood below
3288	608	8	tapslag, all worn
	38	1	grey slightly vesicular vitrified lining
	228	3	worn rounded lumps of fine massive very dense slag
	68	1	40mm length of 27x30mm slag rod
	134	1	irregular subcircular pad of dense vesicular slag with grey ceramic adhering to lower face, probably from base of FB rather than SHC
	234	1	basal crust, lower 20mm dense above irregular base, and the overlain by up to 30mm of more porous slags
	360	5	worn lumps of slightly vesicular iron slag
box 39			
3347	1235	1	150mm long tall runner, 50mm wide, 115mm tall, basal section in U is vesicular, upper parts more lobate
	164	1	worn dense tapslag lump
	202	1	worn slag nub with multiple ore clasts
3364	312	1	runner 30mm wide x 15mm deep, with up to 50mm of slag of granular appearance stacked on top
	8	1	coke

context	weight (g)	number	notes
	1100	4	irregular blocks of granular slag bearing some dense lobed components. None easily interpretable
	254	1	irregular slag flow showing hot deformation (twisting and cracking on upper surface), probably a deformed thin flow, sandy base
	50	1	highly weathered tapslag fragment
3288	1055	13	tapslag pieces, mostly heavily worn
	396	6	irregular worn rounded slag fragments, one with roundwood mould
	54	1	vitrified grey sandy failed ceramic
3445	170	1	vitrified and slagged oxidised fired ceramic, large almost planar slab,
	890	4	irregular slag lumps, with some lobate surfaces, externally and internally, but of slightly chaotic appearance.
	170	1	rounded worn dense slag lump
3611	194	1	very dense tapslag block with overhanging non-wetted contact to one side
3321	306	1	very dense slag lump, with multiple roundwood moulds to 80mm long and 20mm diameter
3180	54	1	small slag piece, probably a runner fragment
3288	1620	14	tapslag bocks, the two largest both showing later constriction by non-wetted surfaces (? stones)
	486	2	large round slag nubs, slightly granular in texture, smooth curves on the surface of each may suggest gentle tool marks
	286	3	worn slag lumps, possibly slightly poorly lobed tapslags
	92	1	angular dense slag fragment, massive
3288	898	13	worn tapslag lumps
	344	3	Worn, but originally angular dense massive slag lumps
	198	1	slag with strong tool mark or narrow runner, possibly above or beside another narrow tool mark or runner, worn
3288	684	11	worn tapslag lumps
	108	2	fragments of slag sheet, origin uncertain, c15mm crust, with one piece showing more porous material above
	200	1	large rounded mass of porous slag, probably an exceptionally large flow lobe
	426	4	worn rounded irregular slag fragments, no real features
	214	1	possible block of tapped material over fuel - has small lobes in a rather chaotic pattern
	260	1	block of somewhat laminated slag carrying a piece of low-grade ore, very dense

context	weight (g)	number	notes
3535	168	1	plano-convex block, probably an SHC, has peripheral lobes, irregular top and rough base, 70x75x30mm, deeper dimples on base appear to trap coal and coke
	34	1	irregular basal part spalled from slag block
	102	2	tapslag blocks
	644	5	tapslag textured tops to massive, dense slags
box 40			
3503	266	1	crudely plano-convex mass of finely prilly slag, possibly most of an SHC, 55x90x45mm, lobes on base may be toolmarks
	298	1	thin bowl, overlain by maroon -topped slag, all dense; could be SHC fragment or remnant of drained smelting bowl, 100x(60)x45mm
	130	1	dense indurated reduced ceramic, just possibly partially stone
	68	1	slightly worn margin of very dense tapslag flow, with narrow low lobes on surface and internally
3661	4	1	small chip of tapslag
3586	16	1	probable tapslag
3580	70	5	worn tapslag fragments
	2	1	maroon surfaced slag prill, probably tapslag
	10	1	concretion on iron
3689	126	1	margin of tapslag flow, possible wood impression on base, has soft pale clast - unclear if ochre or ceramic
3716	46	1	slag sheet with columnar structure, up to 8mm thick; shows large smooth surfaced vesicle on upper surface, unclear if fractured from tapslag flow, but probably so; base smooth and very subtly dimpled
3543	110	1	tapslag flow, from near margin with tall divergent flows, so possibly part of a birds-foot structure; base includes reworked slag clasts
	24	1	small piece with thin tapslag flows passing over a probable fuel contact
box 64			
3005	32	2	small tapslag fragments
	180	1	dense tapslag

context	weight (g)	number	notes
	972	1	dense massive slag fragments, probably two separate items attached via corroded iron, one shows large open cavities, probably fuel moulds rather than vesicles
	42	1	massive dense slag with base showing possible toolmarks or lobes
	404	1	dense, rather featureless lightly accreted slag fragment
	226	1	rounded mass of finely prilly dense slag - could be a furnace slag or possibly a partly deformed SHC
	132	1	unusual channel slag, top not preserved, two sides show mostly non-wetted contacts, one with a little attached sandy ceramic; probably an asymmetric tap channel
3621	1335	1	slag channel, 70mm wide, U shaped, rough contact to 50mm above base, total thickness 70mm, 200mm long, slightly twisted so probably deformed slightly on extraction (unless original curved sideways and down)
	536	1	angular dark dense slag block with prilly base, 65mm thick, abundant moulds of cut, spilt and round wood, to 30mm diameter and >100mm long
	56	1	angular dense slag fragment with maroon top and scatter of dark sand glaze, possible SHC fragment, but base has iron ore inclusion, so probably a tapslag
	70	5	various fragments and prilly lumps of low density 'lining' slag, mostly dark in colour
	40	3	fragments of dense slag
3704	422	15	small tapslag fragments and prills
	70	3	lower density iron slag fragments, porous, slightly granular in appearance
	50	1	slag fragment with dished profile, base non-wetted dimples, top shiny, non-wetted appearance, with several grey ceramic clasts, unclear if deflated tapslag flow or SHC
	58	1	dense slag fragment with curved features on base, possibly tool marks
	40	1	elongate slag fragment
3480	440	1	massive slag block, rather lobate base, with fine slag suggestive of flow slag just above, remainder coarser with larger void - probably mainly large vesicles but one might be a wood mould, 75mm thick
3661	22	1	worn tapslag fragment
3650	32	1	small slag fragment with intersecting curved surfaces - unclear if flow lobe contacts or wood moulds
3671	248	4	very worn tapslag fragments
	422	1	worn tapslag fragment with very broad flat-topped flow lobes, base prilly suggestive of flow over charcoal, very dense
3555	56	1	worn tapslag fragment, rather vesicular

context	weight (g)	number	notes
3704	80	1	tapslag fragment, dimpled base, somewhat vesicular lobes
	406	1	large block of contorted vitrified and glazed failed wall
	668	1	block of somewhat accreted apparently granular dense massive slag
	334	1	irregular mass of porous iron slag with surfaces with layered botryoidal coatings, could be channel fill or margin of SHC
	188	1	dense mass of small prills, probably margin of tapslag block,
	46	1	tapslag fragment with multiple rounded fired ceramic clasts
	76	1	weathered iron
	62	1	glazed and crudely lobed grey sandy ceramic
	102	1	crust-like fragment with dense slag on margin passing into more coarsely open slag, one small smooth lobe hints this has fractured from the base of flow rather than being internal
box 65			
3704	1655	1	well-formed large SHC, 155x125x70mm, base mainly microdimpled with rare smooth non-wetted lobes, top flat with slightly raised edges, slightly dimpled, but details unclear
	682	1	large block of slightly porous slag, appears to be a deformed channel fragment, but not without problems because of twisting
	410	1	block with indurated curved contact surface suggesting burr, coarse crude lobes to one side - quite possibly a worn fragment of a large SHC, but furnace slag cannot be excluded
3004	756	8	somewhat worn tapslag fragments
	50	1	iron slag bearing numerous lengths of c10mm diameter roundwood moulds
3005	592	1	margin of deep eroded slag bowl, accreted surface, no lobes so either furnace slag or more likely fragment of a large SHC, bowl 55mm deep, top slightly raised in centre by 10mm
	896	1	tapering channel, probably from c100mm to 60mm, also changing from massive to flow lobed lags along this 140mm length, proximal section of channel
	660	1	porous slag with one rounded face and a top of large porous flow lobes, probably a channel slag, but might be the margin of a bowl of some sort
	734	1	extremely dense angular bock of slag with no preserved surfaces
3005	426	1	large fragment of bowl, with a rather irregular profile up to 30mm, probably a residual furnace slag rather than an SHC
	170	1	rusty appearing concretion on iron/slag
	736	3	blocks of rather variable tapslag, one well formed, others more porous and massive internally
	60	1	dense slag with slightly dimpled shiny base and large internal void

context		weight (g)	number	notes
		84	1	dense slag fragment - possibly SHC fragment, but could be deflated tapslag
		134	1	fragment from base of channel - almost V profile
		212	1	unusual plano-convex slag fragment, planar surface has fine dimples, convex surface has inflation around large fine lobe inside mass, section moderately vesicular, probably an odd tapslag, but SHC not quite certainly excluded
box 66				
3005	2 of 2	1460	1	various pieces of slag bound by concretion, apparently around iron
		792	1	double channel slag, main section 70mm wide, 50mm deep, but with various protrusions, slag porous but dense
		766	1	very dense angular block of fine slag, obscured by accretion on surface
3543		540	2	tapslag
		970	1	mass with rounded base and dense, possibly fragmented 20mm thick dense upper sheet, probably a rounded and accreted piece of FB but might just be an SHC of odd form
		1315	1	interesting large block with apparently sloping top with tapslag like reddened flows with ore debris, rear? face has several wood impressions - but these are on a steep alignment compared with the flowed surface, remainder of block is massive, fine and dense, clear base not seen, several bits of corrosion suggest former iron inclusions
3005	1 of 2	1655	1	large block of dense slag, bearing reddened lobes on /near upper surface, heterogeneous internal structure with wood contacts, occasional lobes and a non-wetted steep surface, suggests original slag cake >100mm thick
		496	1	rounded biconvex mass, densest in upper part - a possible SHC, but other interpretations are possible, but not determinable because of accretion, 80x80x50mm
		353	1	slightly biconvex lump with dimpled top, 70x90x40, possible SHC, but could be pall from FB base
		292	1	rounded accreted lump, partly dimpled base, could be FB fragment or rolled fragment of FB base?
		202	1	tapslag flow, dark with vertical non-wetted surface appearing more likely to be a wood contact than a margin
		622	1	block of slightly brecciated? dense fine FB type slag, with bowl shape contact partly preserved on one side
3677		804	1	unusually weathering (forming gey powdery surface) dense slag block showing roundwood on base, then dense slag, then flowed slag with rounded voids and ore debris, 90mm thick
		274	1	unusually weathering grey slag preserving charcoal, massive with ceramic clast, charcoal clasts and voids after roundwood
		528	1	plano-convex block of FB material, dense slag with some roundwood, odd weathering leaving yellow accretion with red clay in moulds on top

context	weight (g)	number	notes
3005	94	2	worn and corroded tapslags
3582	274	1	dark fresh tapslag
	368	1	large rounded concretion of various materials around iron
3708	42	3	tapslag
	60	1	irregular angular fragment of slag with charcoal and rounded vesicles
box 67			
3682	1115	2	tapslag, one almost birds-foot of very narrow prills and descending prills not flows in its lower part
	1180	2	large angular blocks of fine massive slags, largely without other features
	498	1	angular block of fine-grained massive slag bearing a probable wood contact, in its upper part it is cut by a smoothly contoured void - probably a feeder tube, above which is a lobed flow surface
	688	1	large angular block of mostly fine-grained massive slag, one side is a large c80-100mm diameter equivalent roundwood surface
	252	1	flat topped wide runner/channel, 60mm wide 20mm deep, base is marked by cavities (charcoal debris?), top is accreted sand
	652	1	160mm length of 60mm wide 50mm deep complex channel, appears curved, probably from amalgamation
3674	260	1	concretion on iron starting to explode
	30	1	slightly bent sheet of low-density slag - flap of lining lag?
	110	1	tapslag
	652	1	mostly dense fine slag with lobate top, appears slightly chaotic with lower part with rounded voids, at least some of which are small roundwood
u/s	460	1	dense fine slag with abundant charcoal moulds plus some roundwood ones
	566	1	dense fine slag with spit roundwood moulds, one suggesting a 80-100 mm diameter, well over the right angle probably represented, some dark-surfaced cryptic lobes in piece
	453	1	dense fine slag with prilly base(?) and some roundwood moulds
3708	542	1	unusually weathered dark fine slag blocks - polished almost black where dense, turning yellow-brown on porous sections
	50	1	tapslag
	26	1	prilly slag, probably base of tapslag flow

context	weight (g)	number	notes
3507	420	1	deeply weathered slag turned greenish, fine grain massive facies with just a hint of internal lobes. Worn cavities suggestive of fuel moulds on base
3607	210	1	fragment from two (probably) vertically-stacked runners, lower 25x15mm, upper 40mm diameter
3516	416	1	equant block of extremely dense fine slag, upper face shows low profile dark (not red lobes), a few cryptic lobes visible internally, associated with ore fragments, base shows small area of wood mould
3619	22	1	tapslag
	112	1	curved microprilly sheet, uncertain origin
3713	170	6	tapslag
	298	1	block of grey slag with lobate base, but apparently massive body (though with elongate vesicles) and top fractured away
	32	1	small fragment of indeterminate fine slag
3666	32	3	tapslag
	76	2	fine dense slag with some lobing, unclear if true tapslags
	8	1	small concretion on iron
3587	24	1	weathered low density slag, porous
3587	44	1	low density porous charcoal rich slag
3542	22	2	tapslag
	224	1	dense massive homogenous slag with maroon surfaced flow lobes on top
	102	1	irregular slag fragment with dark surfaced cryptic lobes and possible wood mould
box 68			
3516	88	1	fragment from thin tapslag sheet with planar base
	1170	1	complex block with uncertain attitude, probably c100mm thick, some impersistent lobate surfaces, very rich in roundwood moulds up to 40mm long
	680	1	dense slag block of uncertain attitude, full of moulds of roundwood to 20mm, some with bright maroon surfaces

context	weight (g)	number	notes
3640	184	2	worn fragments of tapslag with sandy bases and large rounded (viscous?) lobes
	796	1	worn large block of dense slag with some large rounded vesicles but no clear flow lobation. Contains several large blocks of part-reacted ore
	36	1	small fragment of dense slag with dimpled base
	14	1	fragment of dimpled sheet of lining slag
3545	206	1	block of tapslag, locally massive, but locally with tiny rivulets of c5mm diameter
	182	5	variable lumps of tapslag, some worn
	56	1	dense slag with prilly base - probably a tapped slag over a fuel bed
	96	1	a worn fragment, probably tapslag with a sandstone clast
3597	590	1	angular large bock of massive slag, way up uncertain, no original surfaces, multiple contact surfaces with flat surfaces apparently of large split wood
	174	1	dense slag, poorly developed lobes at top and downward prills at base, has ore inclusions
	32	1	small fuel dimpled dense slag fragment
	408	1	dense angular slag fragment with lobate upper surface of low amplitude broad lobes with clear flow sense, various lobe surfaces visible within other massive slag
	478	1	dense angular slag fragment, several prilly surfaces suggesting downward movement into fuel, has at least one large iron clast
3721	340	8	dense tapslag fragments
	84	1	ferruginous concretion
box 69			
3703	572	26	small fragments of dense tapslag
	24	1	oxidised fired vitrified lining
	310	3	fragments of probable channel slags, none with good profile
	102	1	glazed contorted grey ceramic
	38	1	ferruginous concretion
	742	10	slightly granular porous slags with occasional maroon lobe surfaces, probably disrupted taps slags but might be furnace slags
	166	1	dense slag, massive with large internal rounded vesicles
	78	1	complex slag - probably interaction of flow lobed material and reduced fired ceramic

context		weight (g)	number	notes
3579		1220	1	complex block of very dense slag, main part is massive, with lobate base and occasional lobe surfaces, pus ceramic clast, but inserted into this is a block of similar material with slightly lobate top rotated through 90 degrees. Tapped bowl must have been at least 70mm deep and completely fluid to accept rotated block
		1100	1	dense massive slag with some lobed surfaces close to ?top, but with two major steep? non-wetted surfaces, suggesting flowage into gaps between stones
		540	1	rather massive dense slag fragments with some moulds of wood fragments
		518	1	massive angular slag fragment with one surface suggestive of prills descending into charcoal bed - if so probably >70mm flow, but orientation uncertain
3588		1265	1	complex block 180mm long, 100mm tall and 65mm wide, may be two channel slags stacked above one the other - or a deep channel with the upper part not so constrained as the earlier - probably two distinct phases, vesicular
		630	1	very dense thick fragment from lenticular flow, traces of lobing top and bottom with possible non-wetting lobes (or include pre-existing lobes) on one side
		124	1	contorted crude flap or sheet of rather low-density vesicular slag
		18	1	ferruginous concretion
3673		188	5	slightly worn dense tapslag fragments
		76	1	worn dense slag fragment
3516		426	2	tapslag fragments, one missing base, the other fairly thin with a sandy base
3534		88	3	tapslag fragments
		32	2	vesicular iron slag fragments
		66	1	angular fragment of very dense slag, probably a tapslag
3473		314	6	rather varied fragments, al worn and all probable tapslags
3367		54	1	tapslag fragment
		14	1	vesicular sand-bearing iron slag
box 70				
3704	1 of 2	288	2	fresh tapslag pieces with some accretion, extremely dense
		430	1	tapslag fragment, base shows dimpling from fuel contact, but also abundant altered ceramic clasts and several large ore pieces

context		weight (g)	number	notes
		498	2	granular slags with some lobes, both of complex morphology, possibly deformed, both show hint of microprilly basal convex surface, so probably either from SHCs or furnace
		196	1	vesicular dense slag with hints of surviving maroon smooth surface area, base fractured, unclear if from a tapslag or possibly an SHC??
		354	1	extremely dense angular block, has rounded large internal voids, a vug with coarse olivine, a surface with hints of lobes and abundant ore fragments, probably a massive facies 'furnace' slag
		434	1	crudely plano-convex mass of porous dense slag, with some ceramic clasts on upper surface and rough lower surface. Probably a basal furnace slag not an SHC, but this is not certain
3703		1565	1	complex stacked multiple runner, 220mm long, at least two surfaces with large viscous lobes, but was up uncertain 110x60mm section
		1650	1	complex stacked runners, 160mm long, 130mm (wide?) x 70mm section, largest component is 70x40mm section double runner, others (progressively smaller) may have formed laterally to this
		78	5	scraps of probable tapslag
		46	2	dense featureless slag scraps
3704	2 of 2	584	8	dense tapslags
		236	1	block of tapslag, lobed top and base, massive internally, lateral surface formed by contact with furnace ceramic, which is orange until grey just mm from slag contact, could be in-situ but not certain
		126	1	dense slag, massive with irregular fracture and elongate voids, possibly from runner
		303	1	fragment of double runner
		294	1	runner fragment showing slightly brecciated nature - cracked when still hot?
3703		968	17	tapslag fragments, dense, mostly fresh (if slightly accreted)
		208	1	angular fragment of dense but vesicular iron slag of uncertain origin
		62	1	concretion on iron
		416	3	fragments of ‘U’-shaped runners with open trough like tops in porous slag
		434	1	large slag flow lobe with top cracked in raised concentric ridges
		60	1	thin flowed slag, twisted, maroon surface, dimpled fuel contacts on base (more lining than conventional tapslag?)
		70	1	complex slag fragment with granular texture and some protruding lobe margins
		280	1	dense burr-like area with attached indurated buff lining, probably from burr in furnace, but origin in a SHC not entirely to be excluded
3668		6	1	cracked (roasted?) ore fragment
		36	1	probable tapslag containing large part-reacted ore piece
		16	2	tapslag fragments

context		weight (g)	number	notes
3609		64	2	tapslag, larger piece a bundle of very fine lobes
3622		94	6	tapslag fragments
3650		6	1	Mn crusts on stone
box 71				
3595	1 of 2	22	1	tapering dimpled slag rod 50mm long 10-20mm diameter
		260	1	double or triple channel in dense slag with fragmental top, overlain by a small area of tapslag like material
		492	1	porous slag in FB like lump, but internally in the form of two adjacent channels
		442	1	dense large channel with dimpled surface 50mmx40mm overlain by somewhat lobate material
		644	1	triple channel block in rather porous slag, 30-40mm diameter components
		210	1	irregular block of slight rusty dense slag
3595	2 of 2	578	3	fragments of porous channels similar to material in bag 1
		548	1	shows shiny base suggestive of channel material, very dense, forms block of two layers, probably FB/channel
		358	1	irregularly fractured massive fine slag, hints of roundwood inclusions
		100	1	fragment of porous channels
		404	1	rusty worn fragment across lenticular material similar to 548g piece above, probably from a FB/channel, but might also be a section through the centre of an SHC
		224	1	dense plano-convex slag with attached ceramic over lower face, unclear if FB, SHC or Burr, probably latter, but uncertain
		170	1	irregular rusty worn slag lump indeterminate
3595	2 of 2	786	1	agglomeration of three channels stacked sub-vertically, lowest lobe has reddened flow lobe extending from its tip
		450	1	divergent channels/rods, 35mm in diameter
		496	2	tapslag
		726	1	irregularly fractured massive lump of fine slag, no original surfaces
3595	1 of 2	1645	6	tapslag
		220	1	rounded base of slag mass in very vesicular slag, passing up into dense slag with large elongate voids, presumably part of a channel
		256	1	dense vesicular massive slag with local hints of cryptic flow lobed surfaces

context		weight (g)	number	notes
3595		450	4	fragments of porous channels - several of these may fit onto blocks in the bags above
		206	1	irregular fragment of base of slag mass, dimpled base, overlain by porous slag with some very large rounded voids (suggesting viscous flow?)
		44	1	small fragment of porous slag with some roughly lobate surfaces
		316	1	biconvex block suggestive of small SHC, rough base with hint of burr on one side, top is irregularly and smoothly raised and strongly reddened
box 72				
3516	1 of 2	1775	1	large runner, 230mm long, lower element is tapering, 80mm wide x 30mm deep at wide end, 50x20mm at narrow end, upper element slightly oblique to lower, whole is 85mm tall
3516	2 of 2	1200	1	large block with FB like material rich in charcoal and some roundwood, apparently passing forward into dense channels
		438	1	rather massive slag, internal detail not visible but carries several small ceramic and sandstone clasts
		704	4	tapslag, dark
3682		650	4	tapslag
		468	1	tapslag block with poorly visible internal lobes, a clast of red fired clay and on top a substantial clast of fresh ore
		490	1	dense slag, has rather fragmental top, but internally has numerous dark lobate surfaces (not reddened) possible base is slightly prilly, but may not be true base
		506	1	very dense fine slag in irregularly fractured piece, carried impression of end of 40mm diameter round-wood
		224	1	dished rusty slag with fragmental upper surface, has rounded vesicles, probably from furnace floor
		48	1	concretion on iron
		76	1	coarse slag fragment with impression of very large rounded wood exterior as well as other wood contacts
3595		234	1	30mm wide runner in dense dark slag, at one end topped by poor tapslag like lobes, the other the rod widens and becomes rough and obscure
		824	1	80mm wide channel half full of porous slag with some charcoal and some ceramic fragments
		142	1	tapslag
		318	1	massive grey slag with some cryptic dark (not red) lobe surfaces
		688	1	block of massive fine slag, has reddened lobe surfaces on top, carries one large inclusion of ore
		238	1	plano-convex section, probable runner fragment, 70mm wide, filled with porous slag with abundant fine charcoal moulds
3595	2 of 2	380	1	dense dark tapslag flow, carries some ore
		568	2	dense angular fragments of fine slag, slightly accreted so internal detail not visible

context	weight (g)	number	notes
	348	1	80mm wide runner (possibly double) in porous slag, fresh break so may join with another fragment
	544	1	dense massive fine slag with multiple slightly reddened lobe surfaces, but orientation suggests a degree of chaotic organisation

Table 2: summary catalogue of materials submitted as coal.

context	weight (g)	number	notes
box 78 coal			
3005	6.72	1	shaley coal
3175	7.7	4	coal
3180	2.58	1	coal
3188	4.31	2	coal
3191	1.33	2	coal
3234	5.17	3	coal
3300	8.75	2	coal
3317	210	1	large block of coal
3337	18.71	3	coal
3364	6.09	1	coal
3374	146	1	coal
3378	17.16	2	coal (worn?)
3457	10.66	1	coal
3458	94	assm	coal
3550	11.38	9	coal
3703	25.12	1	coal
3704	170	assm	coal (possibly a fragmented single lump)

Table 3: summary of materials in archaeometallurgy collection by period and context

Context	Sample weight (g)	SHC	SHC?	Furnace slag	Channel slag	Slag rod	Massive slag	Tap slag	Lining slag	lining	Indet. slag	Iron ore	Crucible	*residue total*	Coal/ coke	Rock	Iron	Conc.
Period 2																		
3092	346		186				94				42		12	*334*				12
3111	66									66				*66*				
3126	58							18	34		6			*58*				
3194	48								26		22			*48*				
3204	156							120	18		18			*156*				
3332	135							56			78			*134*	1			
3439	56													*0*				
3661	26							26						*26*				
3666	116							108						*108*				8
3668	58							52				6		*58*				
3671	670							670						*670*				
3708	720						542	120			60			*722*				
3721	424							340						*340*				84
Period 2/3																		
3013	370							370						*370*				
3042	1280						830	236	18	6	190			*1280*				
3046	388						116	232			40			*388*				
3047	316							242		2	72			*316*				
Period 3																		
3008	106							58			48			*106*				
3010	338							338						*338*				
3017	110							96			14			*110*				
3018	566						228	230		108				*566*	<1			
3020	2706			670			1794	136	52		46			*2698*				
3022	2774						2022	344		264	62			*2692*			82	
3051	16							16						*16*				
3053	378			102			142	114			20			*378*				
3055	380						290	14			76			*380*				
3065	4302						3234	572		296	90	48		*4240*				62
3073	344						124	202			18			*344*				
3083	62								62					*62*				
3100	863				214			474			73	102		*863*				
3101	292						34	114	16			122		*286*				
3102	366							140	188		38			*366*				
3104	252							224			28			*252*				
3117	78							78						*78*				
3119	808							808						*808*				
3123	158							158						*158*				
3138	54									34	20			*54*				
3146	22							18			4			*22*				
3159	72							20		4		48		*72*				
3161	284							284						*284*				
3165	30										30			*30*				

Context	Sample weight (g)	SHC	SHC?	Furnace slag	Channel slag	Slag rod	Massive slag	Tap slag	Lining slag	lining	Indet. slag	Iron ore	Crucible	*residue total*	Coal/ coke	Rock	Iron	Conc.
3167	176						168				8			*176*				
3178	64							24				40		*64*				
3180	54				54									*54*				
3182	236							120	26		90			*236*				
3188	220							220						*220*				
3189	412							154	258					*412*				
3202	6													*0*				
3207	1352				58			984			310			*1352*				
3210	908			126			736	46						*908*				
3222	48													*0*				
3224	1589			166	635		106	522			160			*1589*				
3253	916				816			38			62			*916*				
3254	940							940						*940*				
3261	738						500	238						*738*				
3263	596				428			74			94			*596*				
3269	318						106	212						*318*				
3272	486				46			402						*448*		38		
3283	900						534	366						*900*				
3303	1308							972	54	4	278			*1308*				
3313	4077			416			2021	1494						*3931*		146		
3314	7948						4812	2920		154	62			*7948*				
3315	1348	182					818	216		28	26			*1270*		78		
3316	2724						794	1424	86		420			*2724*				
3317	1692			512			966	134						*1612*			80	
3323	6										6			*6*				
3325	876							678		2	196			*876*				
3328	258							100						*100*				158
3364	1724				312				304		1100			*1716*	8			
3366	12									12				*12*				
3367	68							54			14			*68*				
3371	1126			358				28	144		596			*1126*				
3424	550				270			280						*550*				
3427	120										120			*120*				
3445	1230						890		170		170			*1230*				
3446	576	456					120							*576*				
3455	634						518	116						*634*				
3457	126								4	36	86			*126*				
3458	5012				1470		948	1584	178	646	186			*5012*				
3480	440						440							*440*				
3490	196						92	52			52			*196*				
3516	6897				2975		2704	1218						*6897*				
3534	186							154			32			*186*				
3542	348						326	22						*348*				
3543	2959			970	1315			674						*2959*				
3545	540							540						*540*				
3555	56							56						*56*				

Context	Sample weight (g)	SHC	SHC?	Furnace slag	Channel slag	Slag rod	Massive slag	Tap slag	Lining slag	lining	Indet. slag	Iron ore	Crucible	*residue total*	Coal/ coke	Rock	Iron	Conc.
3579	3378						3378							*3378*				
3580	82							72						*72*				10
3582	642													*0*				368
3586	16							16						*16*				
3588	2037				1265		630				124			*2019*				18
3595	14331		316	434	7018	22	3458	2663			420			*14331*				
3597	1682						1650				32			*1682*				
3607	210				210						0			*210*				
3609	64							64			0			*64*				
3611	194							194			0			*194*				
3619	134							22			112			*134*				
3621	2037				1335		536	56	70		40			*2037*				
3650	38						32				0			*32*				
3677	1606						1606				0			*1606*				
3682	6847				1410		4040	1115			224			*6789*				48
3689	126						0	126			0			*126*				
3704	9092	1655	410		1739		590	2038	468		2116			*9016*			76	
3703	7869			280	3941		166	2052	162	102	1066			*7769*				100
3713	500						298	170			32			*500*				
3716	46										46			*46*				
Period 3/4																		
3361	704							704						*704*				
3375	588							452	44		92			*588*				
Period 4																		
3225	306							306						*306*				
3234	22							8	14					*22*				
3236	376							376						*376*				
3258	720			236	146			338						*720*				
3288	20198	1196		184	1322	68	3777	8541	54	158	4898			*20198*				
3347	1601				1235		202	164						*1601*				
3350	28											28		*28*				
3356	94					94								*94*				
3378	34							34						*34*				
3399	26							26						*26*				
3415	4390							3978			412			*4390*				
3453	416						130	216	30		32			*408*				
3473	3886							3886						*3886*				
3496	260							260						*260*				
3503	762	266	298					68	130					*762*				
3506	20										20			*20*				
3507	770						770							*770*				
3508	226							226						*226*				
3547	646							646						*646*				
3622	94							94						*94*				
3640	1030						796	184			50			*1030*				
Period 4/5																		

Context	Sample weight (g)	SHC	SHC?	Furnace slag	Channel slag	Slag rod	Massive slag	Tap slag	Lining slag	lining	Indet. slag	Iron ore	Crucible	*residue total*	Coal/ coke	Rock	Iron	Conc.
3004	7817			2569	2146		1050	1468						*7233*			6	578
3005	16531		1667	718	2614		6590	2736			576			*14901*				1630
Period 5																		
3034	24							24						*24*				
Period 6																		
3035	192						156	36						*192*				
No period given																		
3296	206						110	96						*206*				
3321	306						306	0						*306*				
3349	398				250			148						*398*				
3493	68							68						*68*				
3535	948	168					644	102			34			*948*				
Not in database																		
3394	248							232			16			*248*				
3587	68							0			68			*68*				
3673	264						76	188						*264*				
3674	1052						652	110	30					*792*				260
u/s	1939						1609	284						*1893*		46		
	totals	*3923*	*2877*	*7741*	*33224*	*184*	*60301*	*58671*	*2640*	*1922*	*15573*	*394*	*12*	*187462*	*9*	*316*	*244*	*3350*

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