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Evaluation of archaeometallurgical
residues from the William Jones
Almshouses, Monmouth (690)

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Abstract

This assemblage comprises 3.74kg of residues. These are dominated by 2.63kg of dense flowed slags that have been tapped from a bloomery iron smelting furnace. In addition there are 0.35kg of slags that originated within a hearth or furnace, most likely within an iron smelting furnace. There are also 0.69kg of indeterminate iron slags and two fragments of hearth or furnace lining (58g). Although some of the material is not attributable to a particular process, none of the material can be assigned to any process besides iron smelting with any certainty, and it is possible the whole assemblage derives from bloomery iron making.

Bloomery iron-making slag of this type is not intrinsically closely dateable. Later medieval assemblages from the smelting of Forest of Dean iron ores have not yet been described, but in other areas the fourteenth to fifteenth century saw an increase in size of iron smelting furnaces, and it is most likely that the current material predates that change. Some of the material is worn and the assemblage appears biased towards small fragments of dense tap slag which would be very resilient to reworking. Taken together with the relatively small amounts of slag from each context it would appear quite likely that the material is residual.

The assemblage contained two fragments of vitrified technical ceramic. One, from T2 (unstratified, probably medieval context) was of a sandy fabric with abundant transfer of sand grains into the glass layer. Such a fabric is typical of furnace materials. The second piece (from c5016) was in a much finer fabric, with a clean dark glaze. This piece might possibly have been from a different process.

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Methods

All investigated materials were examined visually using a low-powered binocular microscope where necessary. All materials were summarily described and recorded to a database (Table 1). As an evaluation, the materials were not subjected to any high-magnification optical inspection, nor to any other form of instrumental analysis. The identifications of materials in this report are therefore necessarily limited and must be regarded as provisional.

The project was undertaken for the Glamorgan-Gwent Archaeological Trust.

Results

1596g of the material was in the form of flow lobed **tapped slag** from a bloomery iron smelting furnace. The flows were very variable in size, but the fragments small – so overall cake size was not determinable. Fragments variously showed lower surface with indications of tapping onto charcoal or sand and several showed inclusions of reduced-fired clay – probably indicative of fragments broken from the tapping arch/hole. The upper surfaces had a lobed morphology with a strong surface oxidation to haematite giving a maroon colour.

A further 440g of the assemblage were probably similar tapped slags, but the fragment size precluded positive identification.

Materials that were probably tapped lags, but forming single broad (to 80mm) and deep (to 35mm) biconvex masses, may be product of a more viscous flow than that producing the coalesced rivulets of typical tap slag. The material has been termed **non-lobate tapped slag**. The bases of these pieces all indicated tapping onto charcoal, some had reduced fired clay inclusions and all had maroon-coloured, slightly roughened or broadly lobate tops. Several showed very large rounded tabular voids just below the upper surface. This type was represented by 592g of material.

Possible **furnace slags** were represented by dense slags in thicker flows without a clearly flow-lobed structure. One of these pieces was secondarily reddened suggesting it may have been re-oxidised. These pieces of dense slag somewhat resemble fragments of **smithing hearth cakes** and an origin as such cannot be entirely ruled out. This slag type had a total weight of 332g.

Two small fragments of **charcoal-rich slag** were probably also from a within-hearth or within-furnace setting. These two pieces (total 18g) were also therefore not strictly determinable as to an origin in smelting or smithing.

Two pieces of **hearth or furnace lining** had contrasting fabrics – one from T2 (unstratified, probably medieval context) was of a sandy fabric with abundant transfer of sand grains into the glass layer. Such a fabric is typical of furnace materials. The second piece (from c5016) was in a much finer fabric, with a clean dark glaze. This piece might possibly have been from a different process, although the very dark glaze suggests iron smelting or iron working. These two pieces together weighed 58g.

694g of iron slag were of **indeterminate** nature, mainly because of their small size. One large block was either a section of runner from the tapping area of a smelting furnace, or a section of smithing hearth cake, but was too abraded to allow certain discrimination of these possibilities.

Interpretation

Where determinable this material was from iron smelting. Some pieces were ambiguous, but no pieces were certainly residue from a different process.

The slags were typically very dense made although not strictly dateable, could probably be best compared with Roman or earlier medieval (pre-14th century) examples (although later medieval slags are very poorly known in the Forest of Dean area).

The predominance of small fragments of dense tapped slag lobes (compared with more friable furnace slag, lining slag or furnace lining) is often an indicator of residuality or reworking. Given the large quantities of iron smelting slags (of both Roman and medieval age) in Monmouth, these small quantities are probably not indicative of contemporary iron smelting within the bounds of the site.

Evaluation of potential

This assemblage has little potential to yield useful archaeological information on further analysis. No further analysis is recommended.

Table 1: Summary catalogue by context

Context	Weight (g)	number	notes
2007	70	9	small fragments of dense maroon surfaced prills and one fragment from a larger tapped slag piece.
	4	1	natural chert
	8	3	highly eroded slag fragments, all show hints of flow lobed surfaces
5012	80	7	small fragments from tapped lags, all dense wit maroon surface
	8	1	small concretion formed around corroding iron
5013(5?)	44	3	flow lobed dense tapped slag
	78	1	angular fragment of vesicular dense slag. Has rusty accretion on one end suggesting weathering of an iron inclusion. The slag surface shows at least one charcoal mould. It is uncertain if this is a furnace slag or a dense smithing slag
5014	78	2	well-worn fragments of tapped slag with smooth maroon lobe surfaces
5016	214	9	small tapped slag fragments, ranging from thin, single-lobe sheets to thick more chaotic pieces
	224	2	dense slag s with some evidence for flow lobing, larger piece shows possible flow lobes onlapping a steep edge. Both pieces heavily accreted, but with rather iron-poor accretion - so it is not clear if the iron was derived from the slag
	22	1	reduced fired ceramic with coarse pebble and quartz temper, with well vitrified surface, black surface glass over 8mm vesicular layer
6005 T6	332	10	fragments of tapped bloomery slag with dense flow lobes with maroon upper surface, bases poorly preserved - one shows charcoal dimples and another was probably on clay. One piece has vertically constrained non-wetted contact
	128	1	equant lump of tapped slag-like material but with charcoal dimpled surfaces top and bottom, with one vertical non-wetted face. Either a possible runner fill or may have been folded/raked
	10	1	dense vesicular slag with smooth maroon surface, probably a tapped slag
	150	1	irregular plano-convex piece with irregular lobed base, top has irregular large cavities and maroon surface, where broken shows grey mirror-like surfaces of voids, with very large olivine. Rather rusty and has clay inclusions, probably a rather messy margin of a tapped slag cake
6005	142	6	fragments of dense flow lobed tapped slag with maroon upper surface. One shows slightly sandy base
	254	1	angular fragment of extremely dense slag, top has slight flow lobed surface on small scale, but they may just be wrinkles, base is poorly marked but increase in vesicularity near it suggests it is a real (internal?) surface. Block strongly cherry-reddened on surface, possible suggesting later re-oxidation. Probably a furnace slag.
	48	1	fragment of vesicular slag with one surface lobe preserved, base charcoal dimpled. Probably a tapped slag but not certain.

<i>Context</i>	<i>Weight (g)</i>	<i>number</i>	<i>notes</i>
T2 u/s but probably medieval	490	8	dense tapped slags with well developed lobes and maroon surface. 2pieces show grey, charcoal dimpled lower surface, flows range up to 50mm thick, one with granules of reduced fired pale grey clay
	452	3	dense flowed slag with maroon upper surface above large voids to 40mm. Flows to 35mm thick and 80mm wide. Non-lobed tapped slag, shows charcoal dimpled bases. One has clay clasts on base to 15mm
	18	2	iron rich charcoal-dominated fragments, probably weathered slag but might just be concretions. Probably furnace slag
	194	4	dense grey slags with dense crust like areas and more porous zones. Probably smelting slags but might just possibly be SHC fragments
	36	1	reduced fired sandy ceramic with black surface glass in thick layer rich in abundant sand grains.
	82	5	variably rusty indeterminate iron slag fragments
	418	1	large block of either (a) a runner or (b) the centre of an SHC. Piece slight bilobed in cross section with a lower single unit 40mm thick, and an irregular top layer above. The lower unit shows some radial/vertical vesicles. Top is worn into the upper vesicular layer, but has some tiny pockets of smooth maroon surface remaining- but was clearly originally rough. This piece must be residual.
T6 u/s	18	1	small eroded fragment of rather vesicular flow lobed slag with maroon surface. Base rough
	140	1	35-40mm thick sheet fragment. Both base and top rather irregular and slightly granular, both maroon. Internally has large rounded vesicles to 15mm. Probably a non-lobed tapped slag, but could just be from SHC

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