Evaluation of slag from West Hoathly, Sussex

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Abstract

The submitted material includes a variety of slags produced from an iron-smelting blast furnace. Specimens include both tapped glassy slags, and a slag block from the internal wall of the furnace. Wealden smelting technology was very conservative, but although the present material might belong to a period from 15th to 19th centuries, there are indicators that the furnace was rather small, so a 16thto 17th century date is most likely. Various blast furnaces of this date are known from the West Hoathly area.

Contents

Material

WHS'03 (101). 3.755kg. Large curved slab of slag from furnace wall. Piece has a moderately smooth inner surface; some fired clay lining is attached to outer surface. The piece is not evenly curved. If interpreted as a steeply oriented wall, then a furnace diameter of 0.3 to 0.4m seems indicated. The piece also curves, and the slag layer thickens, in a direction perpendicular to the tightest curvature, suggesting that, if steep, the piece derives from an area of overhang within the furnace (perhaps from above the tapping arch). Alternatively, the piece could be interpreted as less steep and to be from the lower part of a inverted-conical furnace section of wider diameter. Such a morphology might suit an area below the boshes of a blast furnace, with the slag thickening towards the hearth floor. Wealden furnaces were typically brick-lined above the hearth, and the specimen shows fired clay adhering to the outside.

The slag is variable, in places mid-grey, crystalline, and with small vesicles, but in others a very dark glass. The high density of the specimen, taken together with the high degree of curvature, might suggest that this piece is derived from a bloomery iron smelting furnace, but the similarity of some of the slag to the more glassy material described below raises the possibility this is from a blast furnace (or just possibly a "high bloomery"). The piece has rounded edges and appears to have undergone some abrasion.

WHS'03 (101). 245g. 4 pieces of vesicular, brown-weathering slag. Broken surfaces reveal a dark, highly vesicular glass similar to the material from (114).The pieces are all rather rounded and weathered.

WHS'03 (111). 290g. 9 fragments of dark vesicular slag, varying from glass to more crystalline materials. Mostly material more dense than that from (114), including one small piece which clearly shows a boundary between crystalline and glassy slags. One piece, apparently dominantly of crystalline slag, shows eroded remnant of a flow-lobed surface.

WHS'03 (114) <1>. 2.02kg. A fragmented block of flow-lobed black glassy vesicular slag. Flow is up to 40mm in thickness. The lower surface of the flow is slightly dimpled (often an indication of flow over charcoal). The basal part of the flow is vesicular, mid-grey and crystalline, but above those basal few millimetres the flow is uniformly glassy. The glass appears black in hand specimen, but transmitted light shows it to be a very dark green. The upper surface of the flow shows included pieces of fired clay, possibly fallen pieces of the tap-arch blocking. The sample also includes a block of ferruginous limestone (210g).

WHS'03 (115) <2>. 310g. A bag of fragmented, highly weathered, mainly highly vesicular slag. Fresh material shows an extremely highly vesicular dark glassy slag. There is also a single piece of much denser slag (30g). This denser slag comprises a flow of weathered grey crystalline slag with a single layer of flow-lobes. The lobes have a wrinkled surface. Adhering to the top of the flow is a bleb of extremely well flow-foliated dark green glass.

WHS'03 (116). c. 5g. Fired clay,

Interpretation

The assemblage is an interesting one, for it appears to contain flows which dominantly contain a dark glassy slag, an good indicator for the origin of these slags in a blast furnace, but which have a morphology more usually found in bloomery slags.

The very dark glass of these slags suggests that the blast furnace was being operated without a large enough quantity of flux (limestone) to ensure a low iron content in the slag. The widespread use of limestone flux sufficient to reduce the iron content of the slag substantially was well established across Britain before the 18th century, although the use of "self-fluxing" ores in the Weald means that slags of this kind continued to be produced there until the 19th century (Cleere & Crossley 1995, p. 274; Hodgkinson pers. comm. 2004).

The rather insubstantial nature of the flows, with a morphology generally similar to that of bloomery tap slags, suggests that they were being produced from a very small furnace. Although the slab of furnace slag is difficult to interpret, it does also appear to be from a small furnace. The apparently very high iron content of some of the denser slags would also support an earlier age for the material.

The possible date range for the assemblage is latest 15th to 19th century, but a 16th to17th century age is probably most likely.

Isolated occurrences of blast furnace slag are common in the Wealden area. Slags were widely dispersed as materials for tracks and roads, as well as for more general purpose hard-core.

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Reference

Cleere, H. and Crossley D. 1995. *The Iron Industry of the Weald*. 425pp.