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Report 2016/25

Assessment of archaeometallurgical residues from the A26 Borrow Pit 1 (AE/15/102)

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29th July 2016

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Abstract

Archaeological investigations at Borrow Pit 1 on the A26 Scheme produced approximately 0.9kg of archaeometallurgical and other pyrotechnological residues. The archaeometallurgical residues included fragments of smithing hearth cakes as well some indeterminate iron slag; an assemblage most likely to be interpretable as from blacksmithing. They were accompanied by a variety of variously fired and vitrified ceramic materials, not all of which necessarily derive from the smithing activity.

Contents

Abstract 1

Methods 1

Results
Description of Residues 2
Smithing slag cakes 2
Other iron slag 2
Technical ceramic 2
Other materials
Distribution of residues 2

Interpretation 2

Further work 3

Table 1: summary catalogue 4

Methods

The material described here derives from archaeological interventions at the Borrow Pit 1 on the A26 scheme, conducted by IAC Ltd. This project was commissioned by Maeve Tobin.

All materials were examined visually with a low-powered binocular microscope where required. As an evaluation, the materials were not subjected to any high-magnification optical inspection, not to any form of instrumental analysis. The identifications of materials in this report are therefore necessarily limited and must be regarded as provisional.

Results

Description of residues
A total of approximately 940g of materials was examined.

Smithing hearth cakes
The collection included two fragments of smithing hearth cakes. Both fragments were dense, but porous and heavily weathered. One showed a finely-dimpled base. The two pieces had a combined weight of just 169g and gave little evidence for the size of the original cakes. The pieces are not diagnostic of age.

Other iron slag
Seven fragments of weathered dense slag (total weight 123g) were probably also fragments of smithing slags but lacked diagnostic features.

Technical ceramic
There were examples of four different types of ceramic materials:

1. five fragments (total weight 62g) of oxidised-fired (bright red colour) fissured sandy ceramic bearing white rounded pebble clasts, and coated externally in a maroon glassy slag (with some pale isolated inherited crystals of quartz?). A single piece may have been of similar fabric, but reduced-fired (3g). A further three fragments (total weight 68g) were of similar slag films, but with no preserved ceramic substrate.

2. a single piece (6g) of ceramic with a mixed (mottled?) reduction state, and with a soft organic residue adhering to the front face, bears abundant small pebbles of probable basalt.

3. there were frequent fragments (10 pieces, with a total weight of 287g) from contexts (207) and (206), of variably heat affected pale ceramic. The ceramic showed a sandy white matrix, bearing rounded white larger grains. The texture resembles that seen in some firebricks. The heat alteration of some of these entailed formation of a maroon-coloured superficial slag, some a pale or green glaze, which locally penetrated the ceramic on fissures and along cracks parallel to the surface, and others a more extreme alteration involving pendent slag films, penetrative vitrification and deformation.

4. two pieces of mainly reduced fired ceramic from context (207) showed a micaceous fabric and small clasts of micaschist. Neither of these pieces showed vitrification or slagging.

Other materials
The collection also included three small concretions, two of which had formed around small iron artefacts.

Distribution of residues
Most of the material derived from contexts (206) and (207), but a single slag piece was also present in content (262).

Interpretation

Although the collections included a small component of iron slag (some certainly from blacksmithing, but with a high proportion of indeterminate material) and some ceramic that could have been hearth lining with a similar origin (groups 1 and 2 above), a significant part of the assemblage was of less certain origin.

The ceramic in groups 3 and 4 above may not have had an origin local to the site, with the probably aluminous composition of group 3 and the micaschist-bearing group 4 contrasting with the basalt-bearing group 1.

The texture of the pale ceramic of group 3 resembles that of some post-medieval bricks. The superficial vitrification and slagging of group 3 also included no material that was certainly associated with iron working. It would appear likely that the group 3 ceramics are either from a very late phase of iron-working or are from some other type of kiln.

The group 4 ceramics differ from all the others compositionally and may not necessarily be associated with metalworking. One of the pieces shows a convex outer surface of broadly the sort of radius of curvature as late medieval/post medieval ceramic tuyères, the sides of which so not necessarily get fired to high temperatures or show slagging. Such an interpretation is, however, very tentative and the fired clay might alternatively be associated with some other use entirely.

Further work

This is a small assemblage and there is a strong possibility that many of the materials are not associated with metalworking. No further analysis of the materials is recommended unless specific questions have been raised through their archaeological context.

Table 1: summary catalogue of macroscopic materials. All weights in g.

context	sample	sample note	sample wt.	item wt.	item no.	notes
206	205	field 2	112	6	1	mixed oxidation state lining with soft burnt organic material adhering to front, ceramic rich in small pebbles of ?basalt
				3	1	reduced-fired lining with moderately thick dark glass; slightly maroon; ceramic soft with abundant small whitish clasts
				83	2	slightly rough-surfaced descending flow slags in thick prills
				17	1	thin sheet of slag with one micro-dimpled surface, the other rough and sinter-like with very fine charcoal inclusions; slag pale with round vesicles
207	78	field 2	831	127	1	'L'-shaped irregular slab of vitrified white lining; pale grey slagged surface with clasts of similar lining, locally has light vitrification to the rear too,
				99	5	similar white ceramic with rounded harder pebbles; shows various sorts of vitrification and external green glaze or external dene slag dribbles
				50	3	more altered white lining: two heavily vitrified and deformed, one with very dense slag sheet coating, slag maroon surfaced and apparently forms sheet dangling below margin of white material
				62	5	maroon slags on outside of more conventional oxidised fired red crumbly lining, which bears large pale clasts in places
				68	3	dense slag sheets incorporating some large pale crystals - broadly similar to the group above but without the brittle red fissured ceramic
				44	4	concretions originally on iron - probably really just two items
				70	2	two pieces of mainly reduced-fired ceramic - very highly micaceous and contain large pieces of mica schist, one is curved suggesting it might just be the side of a tuyère?
				123	7	rough iron slag fragments; all rather scrappy and porous; probably smithing slags
				169	2	fragments of dense SHCs, both very dense despite alteration and vesicular fabric, one has hard micro-dimpled base
				15	2	rusty concretionary material rich in plant remains
262			11	11	1	very dense maroon surface slag layer with smoothish surface resting on white ceramic with up to 10mm white rounded clasts. Matrix has fine-medium quartz and white grains (?feldspar) in pale, possibly kaolinitic matrix

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