GeoArch

Report 2011/38

Assessment of the archaeometallurgical residues from the Pwllheli to Blaenau pipeline (G2148)

Dr Tim Young
29th November 2011

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Dr T.P. Young

Abstract

The materials from many sites were either natural or fired clay of uncertain origin. There was evidence for metallurgical activity at two sites:

Site 3/2 produced a single piece of a smithing hearth cake, presumably indicative of ironworking (smithing) somewhere in the general area, but the piece was recovered from a corn drier.

Site 3/14 had a cut feature which was very likely to have been a floor level smithing hearth and which contained a deposit including hammerscale and other smithing fines. The deposit also yielded two fragments of copper alloy, suggesting some working of copper alloys was undertaken too. The forging of both iron and copper alloys tends to be a feature seen on late medieval and post-medieval sites, but the assemblage is not strictly datable.

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Methods

All materials were examined visually with a low-powered binocular microscope where required. As an evaluation, the materials were not subjected to any high-magnification optical inspection, not to any form of instrumental analysis. The identifications of materials in this report are therefore necessarily limited and must be regarded as provisional. The summary catalogue of examined material is given in Table 1.

This project was undertaken for Gwynedd Archaeological Trust.

Results

Site 0/3
This site produced two very small fragments of reduced fired clay, tempered with organic material. This material is not necessarily indicative of metallurgical activity.

Site 3/2
This site produced a substantial fragment from a highly vesicular smithing hearth cake. This piece contained no surviving fuel clasts, but a maroon-brown superficial colour on the upper surface would be most compatible with a coal-fuelled hearth (although this is not certain conclusion). The lower surface of the cake was formed by a thin crust with a finely dimpled face – but again the nature of the fuel producing the dimples was uncertain.

A single piece of oxidised fired clay (32018) possessed a temper including both rounded quartz grains and coarse angular grit. This material is not necessarily indicative of metallurgical activity.

Site 3/14
This site produced a small quantity of ironworking (smithing) residues from two contexts (c314005 and c314035).

The majority of material from c314005 comprised well-preserved isolated elements of smithing fines (though mostly too coarse to be termed microresidues), including a variety of slag blebs, slag droplets, slag flats and fragments of vitrified hearth ceramic. A single small fragment of thin copper alloy sheet was recovered from c314005. The piece was slightly curved and had two small indentations or nicks on one face. This context yielded a single piece of vitrified hearth ceramic, which showed evidence for coarse grit temper as well as an organic temper with the appearance of chopped straw.

The material from find #60 (also c314005), in contrast, comprised microresidues cemented by the corrosion products of weathered iron fragments. Three of the pieces actually contained corroded iron, the other 7 appeared to be smithing pan, rich in flake hammerscale, slag fragments and fine charcoal debris. These pieces show that the deposit was probably richer in hammerscale than the isolated samples would suggest, but that the hammerscale assemblage is

preserved here with balls of corrosion product around rusting iron debris.

Site 3/27
Context 327003 at this site produced some thirty fragments, of which all but one were probably natural materials. Twenty four of the pieces were of a lime-cemented lithology with poorly sorted rounded pebbles. This was probably a natural conglomerate (such as a cemented raised beach deposit), but an alternative interpretation as degraded pieces of pebble-rich mortar is possible but unlikely. The assemblage also contained five pieces of natural red-brown siltstone and one small piece of possible oxidised fired clay.

Site 6/10
The single submitted piece from this site was a weathered rock fragment.

Site 6/29.4
The material submitted from this site included four fragments of natural rock, two of which were slightly reddened and might have been burnt.

Interpretation

Site 0/3 (03003) produced tiny fragments of burnt clay, which adds little to current site interpretation.

Site 3/2 yielded a significant piece of a smithing hearth cake (32005) and a single piece of burnt clay (32018). The burnt clay might be derived from the use of the corn drier, but the smithing slag may simply have been dumped as part of the fill. If the slag was coal-fuelled, then it would be most likely to have post-medieval age – but the fuel is not certain.

Site 3/14 produced significant evidence of metalworking from pit fill (314005). This included fines from ironworking (slag, lining slag, flake hammerscale, smithing pan, iron debris) as well as pieces of copper alloy. The smithing pan (a concreted mass of hammerscale and other fines formed by cementation by secondary iron minerals from corroding iron) pieces suggest that the pit fill probably contained much more fine hammerscale that was not recovered.

The presence of these materials in the burnt fill of a shallow pit means that it is moderately likely, although not certain, that the pit was actually a floor-level smithing hearth. Unfortunately the material is not itself closely datable. In general, to find copper alloy debris (as offcuts or other forged waste, rather casting waste) associated with ironworking, tends to indicate a younger (i.e. late- or post-medieval) rather than older age, but this need not necessarily be the case.

Site 3/27 produced materials that were probably natural, apart from one piece of probable fired clay of uncertain, and not necessarily metallurgical, origin.

Material from site 6/10 was natural.

Site 6/29.4 produced materials that were natural rock fragments, but reddened and possibly burnt.

Evaluation of potential

The material possessed little potential to yield further information through detailed metallurgical study.

The metalworking evidence from site 3/14 is interesting and the date of this activity (if sufficient suitable material is available to date it) would be useful. However, even for this site, the limited amount of metallurgical residue means that little further investigation could be attempted.

Table 1: Summary Catalogue

Site	*Context*	*Sample*	*Find #*	*Number*	*Weight (g)*	*Notes*
site 0/3	03003		072	2	4.21	2 pieces of reduced fired clay with moulds of organic temper, including c3mm diameter rods
site 3/2	32005		004	1	138	fragment from rather deep, highly vesicular SHC with micro dimpled base - very shiny - good fresh slag. Upper parts have deep maroon surface layer, the fuel is uncertain – the maroon colour hints at coal, but no clasts survive.
site 3/2	32007		068	2	0.34	large piece is natural rottenstone, small piece is burnt bone
site 3/2	32018	8	078	1	0.75	small fragment of oxidised fired clay, temper of rounded sand grains and larger (4mm) angular grit
site 3/2	32020		077	1	3.74	brown gritty material with foliation. Probably a natural sandstone or tuff
site 3/14	314005 (labelled 314035)		060	10 (+ bits)	184	7 fragments of very rusty smithing pan (FHS, slag, grit, charcoal) and 3 pieces of concretion around iron.
site 3/14	314005 (labelled 314035)		061	1	6.31	fragment of oxidised fired ceramic with deeply vitrified convex surface with black glassy slag (weathering greenish). Ceramic has coarse grit and probable 'chopped' straw temper. Probably iron hearth or furnace lining. The convexity might just suggest this could be tuyère fragment, but this is very tentative.
site 3/14	314005	10	065	1	0.11	tiny fragment of thin curved copper alloy sheet, concave face has two small parallel indentations.
site 3/14	314005		069	assemblage	56	assemblage of small slag pieces, mainly irregular droplets and slag flats, but also one piece of lining, lining slag blebs, fired clay (+ one piece of cherty rock)
site 3/14	314005		076	10	2.66	8 fragments of oxidised fired clay with dark glassy slag, one unvitrified reduced fired clay piece and one probably burnt stone
site 3/27	327003	13	075	7	1.79	5 pieces or red-brown natural siltstone, 1 piece of grey cemented coarse sand/rounded grit (cf. #71 below), 1 piece possible oxidised fired clay
site 3/27	327003		071	23	42.13	pieces of rounded pebbles and grit cemented by calcareous material. Not absolutely certain if this is a natural calcrete or mortar – but probably natural.
site 6/10	61002		074	1	0.92	small grain of brown material with coarse pale and dark minerals - probably a highly weathered granitic rock
site 6/29.4	6294002		070	1	16.56	pale grey to buff material with rounded cavities (vesicles), probably weathered igneous rock
site 6/29.4	6294011		073	3	20.64	three highly weathered rock fragments, two reddened but not certainly burnt

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geoarchaeological, archaeometallurgical & geophysical investigations

Unit 6,
Block C,
Western Industrial Estate,
Caerphilly,
CF83 1BQ.

Mobile: 07802 413704
E-Mail: Tim.Young@GeoArch.co.uk
Web: www.GeoArch.co.uk