GeoArch

Report 2019/18

Assessment of residues from Priory Street, Carmarthen (PSC-18-ex)

Dr Tim Young
10th December 2019

Assessment of residues from Priory Street, Carmarthen (PSC-18-ex)

Dr T.P. Young

Abstract

The submitted material comprised 38 pieces with a total weight of 3191g from 17 stratigraphic contexts.

The pieces presented materials of varying origin. Several were not related to (or not certainly related to) metallurgical activity: two (total weight 660g) were natural, albeit possibly heat-affected, one was a fragment of a (possibly over-fired) brick, one was a fragment of tarmac.

Two pieces were of iron products or semi-products: one was a short section of wrought iron bar, the other was a stack of fragments of a thin-walled cast iron vessel (or vessels). The fragments of cast-iron vessel occur with a ferruginous concretion and it is likely that these pieces may represent waste from the adjacent foundry, rather than domestic rubbish.

Pyrotechnological residues, possibly archaeometallurgical, were represented by 24 pieces of clinker (1282g), 2 pieces of grey slag and a piece of vitrified, oxidised-fired, ceramic.

The post-medieval clinker is not firmly indicative of origin, but the large size of the shale clasts in some pieces (e.g. those from (1009)) suggests the coal/coke fuel was also in large blocks in those instances. This might suggest that these clinkers were generated perhaps in the firebox of a steam boiler or similar, rather than in a small hearth. On the other hand, there are some denser clinkers and grey slags (e.g. those from (1252) and (1401)) that would appear to have been generated with a higher degree of fluid flow and these materials might be considered to be more likely to have had a metallurgical origin (well-flowed clinkers may result both from iron-founding and from blacksmithing for instance).

Earlier metalworking, probably blacksmithing, is represented by a few fragments of grey slag, probably from blacksmithing, from Roman contexts and a more certain fragment of smithing hearth cake (SHC) was recovered from a possibly medieval context.

A slab of vitrified dark ceramic resembles a fragment from a large crucible but there is no evidence for contamination by metals and it is more likely to be an over-fired fragment of non-metallurgical pottery.

Contents

Abstract 1

Contents 2

Methods 2

Description of the assemblage
- Clinker 2
- Grey slag 2
- Ceramic materials 2
- Iron 2
- Other materials 2

Distribution of the assemblage 2

Interpretation 2

Further work 3

Reference 3

Table 1. Summary Catalogue 4

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 November 2019 and was commissioned by Rhiannon Philp of Archaeology Wales.

Description of the assemblage

The submitted material comprised 38 pieces with a total weight of 3191g from 17 stratigraphic contexts.

Clinker
Twenty-four pieces (total 1282g) of the assemblage were clinker (or very closely-related materials, like slagged shale), of which 1006g (17 pieces) derived from post-medieval or modern contexts. Clinker is the product of the partial melting of the inorganic component of coal during its combustion. The clinker in this collection was very variable, from low-density, frothy, material (e.g. from (1136) and (1306)) to much denser material showing signs of flow and which has been able to de-gas (e.g. pieces from (1009) and (1401)). It is unclear, within a small assemblage such as this, whether these represent different origins, or a spectrum of textures within residues from a single origin. Some of the slagged shale particles were noted as being particularly large (particularly those from (1009)).

Amongst the clinker, one sample (the 85g fragment from (1623)) is distinct in showing textural features (including tubular vesicles) most commonly encountered in coal-fuelled smithing hearth cakes (SHCs).

Grey slag
Two pieces of residue showed a texture indicative of a more crystalline material than the clinkers. These slags were in rounded flowed lobes with dimpled surfaces (from fuel-contact). One piece (from (1306)), had associated charcoal fragments and these may have been (but were not certainly) present as fuel inclusions.

Ceramic materials
Artificial ceramic materials were represented by a fragment of a (over-fired?) brick from (1231) and a less certain slagged brick fragment from (1009; this is more likely to be a fragment of bloated coal-shale). The example of a brick was not necessarily for a metallurgical purpose.

A vitrified and slagged oxidised fired ceramic fragment from (1012) is very fine grained, micaceous, has an abundant fine organic temper (grass/hair?), and bears a few rare coarse sand grains.

A slab of dark ceramic from context (2289) is of uncertain origin. The piece shows a dark, vitrified surface, a paler grey core and an abundant very coarse pale temper. The concave side is more strongly glazed. The radius of curvature is large (greater than for typical crucibles), but the piece has undergone some plastic deformation. The deformation also includes cracking, with the vitrification locally extending onto the cracked surfaces. Both surfaces show areas of coarse striation. The convex surface (outside) shows adhering dark clinkery bubbles, whereas the inside shows pale vesicular adhering blebs. Neither shows evidence for contamination by metals.

Iron
Two pieces were of iron products or semi-products.

One was a short section (75mm long, 8mm square) of wrought iron bar (or square-sectioned rod) from context (1238).

The other was a stack of fragments of a thin-walled cast iron vessel (or vessels), with some associated sulphidic concretionary material (from (1049)). The fragments show a thickness ranging from 3mm - 7mm, with raised rib on one particularly low-curvature piece. The curvature suggests a large diameter vessel, so it is likely these are cauldron fragments, rather than, for instance, from a skillet.

Other materials
Several of the submitted items were not related to (or not certainly related to) metallurgical activity: two (total weight 660g) were natural, albeit possibly heat-affected, rocks and one was a fragment of tarmac.

One sample was a small ferruginous concretion containing charcoal, mortar, sand and gravel (from (1450)).

Distribution of the assemblage

The majority of the clinker derives from contexts dated as modern or post-medieval. A possible medieval context (1623) produced clinkery slag, with at least one piece having textural features suggesting is had been part of an SHC.

Roman deposits produced fragments of flow-lobed slag from (1162) and (1306). Those from (1306) including one piece with evidence for interaction of slag and sediment and a second with possible evidence for charcoal fuel.

Interpretation

Clinker may originate from both metallurgical and non-metallurgical processes and various possibilities exist for material of the type seen in the post-medieval components of this assemblage. The large size of the shale clasts in some pieces (e.g. those from (1009)) suggests the coal/coke fuel was also in large blocks in those instances. This might suggest that these clinkers were generated perhaps in the firebox of a steam boiler or similar, rather than in a small hearth. On the other hand, there are some denser clinkers (e.g. those from (1401)) that would appear to have been generated with a higher degree of fluid flow. These materials might be considered to be more likely to have had a metallurgical origin (well-flowed clinkers may result both from iron-founding and from blacksmithing for instance) as well as from non-metallurgical origins.

The grey slag from post-medieval contexts might also be the product of blacksmithing, although the there is insufficient evidence to test this. Blacksmithing is typically a task undertaken at iron foundries, for finishing and fitting castings, but equally the material might be older and residual.

The brick fragment from (1231) need have no direct connection with metallurgical activity. The vitrified ceramic fragment from (1012) may well be from a metallurgical hearth lining, but the texture is more commonly seen in early rather than industrial materials, so a residual origin for this piece may be likely.

The presence of the cast iron vessel fragments in their rather sulphidic concretion would be more compatible with an origin within a dump of clinkery waste, rather than in simple domestic waste. This suggests that the fragments may be foundry waste.

The material from possible medieval context (1623) includes a piece that is from a SHC, as well as a piece of more clinkery origin. This suggests an origin in blacksmithing, with coal being employed as fuel. Coal was employed locally in blacksmithing in the Roman period and again, increasingly from the 13th century onwards. Charcoal was widely employed in early blacksmithing, alongside the use of coal, with its use in specialised forges only disappearing in the 20th century. The material does not provide additional dating evidence and the slags could be residual Roman material.

Contexts interpreted to be of Roman age produced evidence for both the use of coal (1162) and possibly charcoal (1306) as fuel for blacksmithing. The use of both fuels is widely seen on Roman sites in South Wales.

The wrought iron bar (from (1238)) may well be a small fragment of stock iron rather than of an artefact, but the piece is not diagnostic. The vitrified pottery slab (from (2289)) is likely to be an over-fired (perhaps secondarily burnt) pottery fragment, rather than a metallurgical ceramic.

The evidence for Roman metalworking is thus very sparse, in contrast to that recorded in other areas of Carmarthen (Crew 2003).

Further work

The residues are unlikely to be capable of producing further archaeologically-useful information from further analysis, although such analysis would be possible, if the context of the finds raises significant archaeological questions. No further work is therefore recommended.

At present, subject to any additional archaeological questions, the assemblage could be considered as being of relatively low significance and therefore of limited value for retention and inclusion in the deposited archive.

Reference

Crew, P. 2003. Slags and other iron-working residues. pp. 333-340 *in:* H. James, *Roman Carmarthen: Excavations 1978-1993*. Britannia Monograph Series 20, Society for the Promotion of Roman Studies 2003.

Table 1: summary catalogue of submitted materials.

Context	Sample wt (g)	Item wt (g)	No.	Notes
1009		96	2	flow-lobed clinker, one denser, the other with reddened surface and large shale clasts
1009		33	1	slagged large shale fragment, strongly reddened
1009		26	1	slag and reddened shale block
		13	1	slightly slagged and highly bloated shale fragment or brick surface
1012		75	1	clinker, variable zones of glass, vesicular materials with maroon surface, and some coke clasts
1012		30	1	vitrified and slagged oxidised fired ceramic. Ceramic bears organic temper (grass/hair?), but is generally fine, slightly micaceous with only extremely rare coarse grains.
1049	720	652	1	rust and shale-rich debris cementing stack of four fragments of thin-walled cast iron vessel. Curvature suggests a large diameter, so probably cauldron fragments. Section from 3mm - 7mm, with a raised rib on one low curvature piece.
		16	2	2 detached fragments of concretionary material from above
		57	1	exploding fragment, probably detached from above, centred around an irregular fragment of probable wrought iron
1066		107	5	crudely lobate shale-rich clinker, mostly in fragments of thin sheets
1093		42	1	slightly lobed clinker enveloping slate fragments (these do not appear to be shale)
1136		82	1	block of coarse-grained, gravel-rich tarmac
1136	323	79	1	irregular void-rich clinker lump
		206	1	complex dense clinker lump, contains some shale, adhering sediment contains fine coal
		34	1	dense nub, starting to explode, so probably a concretion on iron. Bears charcoal
1162		86	2	complexly lobed vesicular flowed dense clinker with shale clasts
1231		129	1	rather irregularly foliated red ceramic with substantial voids. A crudely fashioned brick, just possibly over-fired
1238		117	1	irregular concretion on (square-sectioned?) iron bar, 75mm long, 8mm square

Context	Sample wt (g)	Item wt (g)	No.	Notes
1252		7	1	lobe of fine-grained grey slag with slightly dimpled surface in places
1306		17	1	highly vesicular siliceous clinker (?) with glassy-surfaced flow lobes, attached to thin lenticular piece of siliceous material (with glazed surface). Siliceous material probably a stone fragment, rather than a sherd of crucible.
1306		10	1	dense, flow lobed, dimpled slag fragment with associated (probably included) charcoal
1401		256	1	extremely dense clinkery slag sheet approximately 25mm thick, base locally lobed, locally finally dimples, reddened; top irregular smooth with some flow lobing
1401		39	1	finely prilly clinker with abundant coke inclusions and as fine particles caught in hollows on base
1450		52	1	concretion, bearing charcoal, pale clasts (mortar?), sand and gravel.
1623	173	86	2	Broken fragment of flow lobed slag of clinkery appearance. Base finely dimpled.
		2	1	Small prill of flowed slag, possibly fragmented from the above
		85	1	One surface shows red secondary oxides and moulds of straw, cross cutting angular slag fragment. The slag has tubular vesicles. Possibly a fragment from a clinkery SHC or similar
1887		399	1	rather massive fine-grained red material with fine mica. Bears irregular voids, locally in connection. Probably a natural red siltstone, possibly heated.
1889		261	1	finely micaceous fine red sandstone, in large heat-altered piece, together with very soft rounded burnt stones, red material contains large voids. Soft rounded stones and voids may be clasts in conglomerate. Outside coated in dark carbonaceous material
2289		97	1	slab of ceramic, pale grey interior locally, darker vitrified surface layers. Slightly concave side appears more highly glazed. Vitrification extends onto crack surfaces in places. Both surfaces show slight lineations on surfaces. Outside shows dark clinkery bubbles adhering, inside shows pale vesicular adhering blebs. Fabric is heavily gritted. No traces of metal, but this may be a sherd from a coarse, large crucible (otherwise over-fired pottery).

GeoArch

geoarchaeological, archaeometallurgical & geophysical investigations

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

Office: 029 20881431
Mobile: 07802 413704

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