

Iron Slags in Nant Cwmnofydd, Wenallt [151 824]

The Slags

A length of several tens of metres of Nant Cwmnofydd shows pebbly deposits in the stream and extending laterally below the alluvial soils containing a large proportion of residues from bloomery iron making. The slags include tap slags, which are generally represented by rather small fragments (typically < 50mm), and smithing hearth cakes of a size consistent with bloomsmithing operations, represented by rather larger fragments.

Geological Context

The locality lies close to two known iron ore resources:

1. *The Rhiwbina Ironstone*

The Rhiwbina Ironstone is a locally haematised bioclastic limestone, which occurs just above the base of the Tongwynlais Formation (Waters & Lawrence 1987; equivalent to the Limestone Shales of earlier authors). The unit is recorded from the type section of the formation in the Tongwynlais road section [1302 8245], and also from the Cwrt-yr-ala borehole 9 km to south [1408 7339]. At these localities the unit is not strongly haematised and much of the iron enrichment has been interpreted as syn-depositional. Trials are present in the ironstone at at least 4 localities: Pant-y-Caeau [1057 8101], NE of Tongwynlais [1365 8265], 200w of Wenallt Farm (300m S of Cefncarnau-fawr) [151 842] and most importantly in Cwm Nofydd, at a point [1470 8314] approximately 800m upstream from the Wenallt slag site. Only this last locality appears to have yielded a rich ore, with substantial iron replacement of the whole rock texture. An analysis of material from the Rhiwbina Ironstone, probably from this adit, was given by Ratcliffe (in GSGB 1861):

Fe ₂ O ₃	66.554
FeO	1.131
MnO	1.127
Al ₂ O ₃	1.753 + 1.042 = 2.795
CaO	8.547 + 0.850 = 10.397
MgO	1.116 + 0.272 = 1.388
SiO ₂	0.312 + 8.589 = 8.901
K ₂ O	0.190 + 0.235 = 0.425
Na ₂ O	0.068 + 0.076 = 0.144
CO ₂	5.733
SO ₃	1.309
P ₂ O ₅	1.017
organic	0.376
H ₂ O	2.118

This ore is clearly viable for bloomery extraction. The silica content is high (due to included sand in the original limestone), but is comparable with levels of silica in the ores of the Miskin-Llanharry area. The high calcium content, due to the remaining calcite, may provide a means of recognising the smelting residues from this source.

2. *Ore bodies of the "Lesser Garth" type*

Approximately 2km to the N lie the orebodies exposed in Blaengwynlais quarry [146 841], which are then easternmost visible ores of the Penyrch-Blaengwynlais zone of the Glamorgan orefield. A great diversity of ores are present, including almost pure goethite ores, as well as siliceous and calcareous haematites. There are no surviving indications of workings, but ores were immediately visible on topsoil stripping at the quarry, so would probably have been visible during any early agricultural operations, making their exploitation reasonably likely.

Ore bodies of this type also occur in Fforest-fawr (N of Tongwynlais), and it is these which are likely to have been the ore source for the Tongwynlais blast furnace (2km west of Wenallt), which was in operation before 1564, and is thus the earliest documented blast furnace in Wales (Riden 1992). The mines in Fforest-fawr were reopened as a subsidiary source of ore for the Penyrch ironworks in the 19th Century.

Archaeological context

The field to the east of the site bears a series of terraces (and platforms?), which may be indicative of settlement. However, the field is an improved pasture, and there remains some possibility that these features may be associated with landscaping either during construction of the M4 (which forms the southern limit of the field), or Wenallt Reservoir (which forms the eastern limit). Inspection of aerial photographs should be undertaken to investigate this. There are no earthwork features suggestive of the harnessing of water power.

Three archaeologically significant sites lie close to the site: the undated enclosure on Coed-y-wenallt 300m to the northeast, the 11th Century motte 300m to the southeast, and finds of Roman remains in Gelli Quarry approximately 150m upslope of the trial adit in the Rhiwbina Ironstone (the adit itself is presumably of early 19th Century date).

The hillside of Fforest Fach north and northwest of the trial adit contain numerous examples of charcoal-burning platforms, but these are undated, and are perhaps likely to be associated with the supply of fuel to charcoal-fired blast furnaces from the 16th to 18th centuries.

Comments

The nature of the site is open to two interpretations; the more likely is that the stream is reworking an original slag dump, but it is also possible that the slag represents a secondary deposit as deliberate dumping to consolidate a ford across the stream (recent deposits of this type occur close by). The fragmented nature of the tap slag is typical, for the slags readily fracture on cooling and during subsequent weathering, and does not necessarily indicate a secondary deposit. This issue could be resolved by further work, particularly geophysical survey of the adjacent area (although overhead cables will prohibit acquisition of magnetometer data immediately upslope of the site).

Providing a date for the site is not easy. There are really only two indicators possible with this material, one is the size of slag blocks, which suggest relatively small tap slag flows and bloomsmithing hearth cakes of a couple of kilograms weight, the other is the co-occurrence of the residues of the primary and secondary processes. Comparative data are scant, but 14th Century examples from N Wales and 16th Century examples from Glamorgan show large tap slag volumes, from furnaces producing large blooms, and a physical separation of the sites of smelting and bloomsmithing. In particular, the bloomsmithies are often sited adjacent to streams to provide water power for working the large blooms. In contrast sites of 13th Century and earlier age tend to show a closer proximity of primary and secondary activities, presumably reflecting the lower degree of technological specialisation required for processing smaller blooms. The Wenallt material would be compatible with these observations of pre-13th Century sites.

The position of the site on relatively flat land as Cwm Nofydd opens out towards the coastal plain, may be significant, for this is the first flat land in the valley bottom downstream of the outcrop of the Rhiwbina ironstone. Analytical studies to confirm the source are being undertaken (a sample of tap slag and two samples of Rhiwbina Ironstone have been submitted for analysis), for this would be the first time that exploitation of the Rhiwbina Ironstone has been proposed. Iron ore at a higher level in the Dinantian limestones in the Blaengwynlais or Fforest-fawr areas would be another possible source, although the direct geographical link is less strong.

References

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