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Archaeometallurgical residue from Pembroke Dock

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Abstract

The material comprises a single piece of dense iron-rich slag. It preserves chilled margins from casting into a metal container or vehicle. The piece closely resembles dense fayalitic copper-smelting slags from elsewhere in the area. Slag was commonly employed as a ballast in ships visiting Swansea and other copper-producing ports, only to be subsequently dumped when the ship took on new cargo elsewhere. This spread of copper slag is especially associated with the supply of limestone to the metallurgical areas from coastal sources in Gower and elsewhere in SW Wales.

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Methods

All material was examined visually with a low-powered binocular microscope where required. As an evaluation, the material was 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 project was commissioned by Dr Amelia Pannett of Archaeology Wales.

Results

The material comprises a single piece (130x80 x130mm) of dense, iron-rich slag. It preserves the chilled face of the slag against two adjacent steeply inclined faces, separated by a rounded orthogonal corner. The chilled margin presents a non-wetted surface that has accumulated in 10-20mm thick flow lobes. Away from the chilled margin there is little internal evidence for the flow lobes, instead the slag is very coarse-grained, with large olivine crystals extending away from the chilled margin. The chilled margin also includes some tubular vesicles 5mm in diameter, extending at least 30mm away from the margin.

The olivine shows very large crystals and the slag fractures with an irregular fracture upon which the olivine shows an iridescent sheen.

Towards the top of the piece the texture becomes more irregular, and vesicular (with vesicles of up to 30mm across) with the top showing a mixture of flow lobes and wispy protrusions, all slightly reddened. In between the protrusions, fragments of coke and an extremely fissile mudstone or slate are trapped in deep dimples.

The textures indicate a very iron-rich fayalitic slag that has cooled after tapping into a metal vessel or vehicle. Such slags are found as residues from two separate processes – copper smelting (18^{th}-20^{th} centuries) and the puddling of iron (19^{th}- mid 20^{th} centuries; for conversion from pig iron to wrought iron). The present specimen most closely resembles in texture, colour and inclusions slags produced during copper smelting.

Discussion

The large scale smelting of copper in SW Wales, particularly in the Swansea area produced large quantities of waste. This material was commonly employed as ballast for shipping in the region, particularly for the coastal trade in limestone. The ballast would be abandoned on the beaches where the boats were beached at high tide for loading at low tide. On some beaches in SW Wales copper slag remains a major component of the shore (Young 1999).

It is most likely that the present example reached Pembroke Dock by this means. Pembroke Dock did not itself have heavy metallurgical industries, although the shipbuilding there would have been a consumer of the products of the metallurgical industries elsewhere in South Wales.

References

YOUNG, T.P. 1999. The Storm Beaches of South Gower: geological composition and possible nourishment sources. 24 pp., 7 figs. (unpublished report for Swansea City Council)

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