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Evaluation of archaeometallurgical residues from the N9/N10 Waterford-Kilcullen, Site 10-12, Ballykeoghan, Co. Kilkenny (E2501)

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Abstract

This site yielded archaeometallurgical residues from two contexts: a single piece of iron smelting slag from the fill of pit [c211] and 236g of mainly fine-grained residues from [c208] the fill of [c209].

The residues from [c209] include small fragments of flow slag, slag droplets and probable fine-grained ore particles. Such an assemblage is typical of the basal layers of the pit in a slagpit iron smelting. Such material is rarely found concentrated into other types of features; therefore [c209] is interpreted as the highly truncated basal pit of a slagpit iron smelting furnace.

Other samples from this site did not contain certain archaeometallurgical residues; magnetic materials from postholes within structure [c253] possibly being natural iron-rich material that had been heated.

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Methods

All investigated materials were examined visually, using a low-powered binocular microscope where necessary. For microscopic residues a general statement of the nature of each assemblage was recorded (Table 1). As an evaluation, the materials were not subjected to any high-magnification optical inspection, nor to any other form of instrumental analysis. The identifications of materials in this report are therefore necessarily limited and must be regarded as provisional.

Results

Iron Smelting: Area 10

Material from [c208], the fill of cut [c209] includes some small fragments of blebby flow slags (some as find #1, others within sample 104), together with slag droplets (some truly spheroidal, others dimpled “coffee-bean” spheroids) and ore fines (some bound together with a darker material into a sinter-like mass). Such material is typical of the base of a slagpit iron smelting furnace, in which small particles of slag and ore have trickled down through the pit-packing (probably pieces of wood) to the very base.

A single piece of slag from pit [c211] shows multiple prills of dense flow slags descending past a piece of pit packing (forming a mould of the original wood). This type of slag is the most characteristic macro-residue formed in the basal pit of a slagpit iron smelting furnace.

Other materials

Samples derived from topsoil and from two post pits within structure [c253] contained no certain materials of metallurgical origin. The piece from [c1] was natural. The magnetic materials from the postholes probably indicate magnetism induced by the heating of natural materials, possibly including small fragments of iron pan.

Interpretation

The fine-grained residues from [c208] are indicative of iron smelting in a slagpit furnace. It is unlikely that such a concentration of material would occur reworked into other cut features; the most likely interpretation is that [c209] represents a very heavily truncated basal pit from a slagpit furnace.

The maximum width given for cut [c209] was 0.4m, which is not particularly indicative of age, given the marked truncation of the feature. Some early Iron Age furnaces have pit diameters of 0.45-0.55m, whereas later Iron Age and early medieval furnaces may be slightly smaller. Later medieval furnaces are not yet well known, but may be slightly wider and are possibly less frequently cut into the ground. For further discussion of slagpit size in early furnaces see the discussion in Young 2009. Given the high degree of truncation there is no further morphological information on the furnace.

The presence of a piece of flow slag in the fill of pit [c211] which also contained a possible sherd of D-ware, suggests that iron smelting had been undertaken on, or close to, the site at some time prior to the 6th Century AD.

Evaluation of potential

The iron smelting residues from [c208] are currently undated and are relatively sparse. The ore powder is interesting however, for there are only a limited number of sites yielding good, direct, evidence for the nature of the ore. Without a date, analysis of the ore is probably not worth pursuing.

None of the materials from this site is a high priority for retention at this time. The materials from [c208] would be worth retaining if they become dated.

References

YOUNG, T.P. 2009. Evaluation of Archaeometallurgical Residues from the M8/N8 Cullahill-Cashel: AR26 (E2370), *GeoArch Report 2009/30*, 7 pp.

Table 1: Summary catalogue by context and sample

s	*c*	*feature*	*description*	*wt*	*no.*	*notes*
#1	1	topsoil		10	1	silicified rottenstone - natural
30	77	p/h in Neolithic building	magnetic		bulk	mainly stone but has some charcoal-bearing slaggy materials. Slag appears to contain some quartz sand - but hard to distinguish true slag from superficial concretion. No material of certain metallurgical origin.
32/33	79	p/h in Neolithic building	magnetic		bulk	no certain slag fragments, mainly stone, most magnetic particles are a yellowy brown - like roasted ore particles - these could be small bog ore or iron pan fragments that have been heated. Rest includes a wide variety of rock types.
#2	182	fill of pit [c211]		56	1	block of good dense flow slag, narrow prills, defining a large wood mould
#1	208	furnace [c209]		22	4	4 pieces of blebby flow slag
104	208	furnace [c209]	0.25mm retent	44	bulk	small particles of silt, together with dull particles, possibly ore dust.
104	208	furnace [c209]	1.0mm retent	170	bulk	rich assemblage, mainly of sintery materials (fairly soft grains in darker binding), together with abundant spheroids (true and coffee bean), together with a few fragments of more prilly flow slags. No large fragments.

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