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Evaluation of archaeometallurgical residues from the N11 Gorey-Arklow Scheme

Dr Tim Young
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Dr T.P. Young

Abstract

This report provides an evaluation of archaeometallurgical residues from 14 sites on the N11, Gorey-Arklow road scheme. Four sites produced evidence for a low-level of blacksmithing; other assemblages were mainly of non-metallurgical origin.

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Methods

All materials were examined visually, using a low-powered binocular microscope where necessary. All significant materials were weighed and recorded to a database.

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.

Frankfort, Site 1

Results

This site yielded a single fragment of clinker (partially fused coal-residue) from context 1. Such material is likely to be 19th-20th century, and is very likely to come from steam-driven agricultural machinery, although clinker may be generated in domestic hearths too.

Interpretation

This material is not of archaeological significance.

Site 2

Results

A single piece of natural iron pan or mottle came from c1030.

Interpretation

This material is not of archaeological significance (natural).

Moneycross Upper, Site 6

Results

This site produced fragments of natural Fe-Mn pan or granules from c7 and c629

Interpretation

This material is not of archaeological significance (natural).

Moneycross Upper, Site 8

Results

This site yielded approximately 4kg of clinkery material, with burnt coal shale, coal, iron debris and a limited amount of clinkery slag (of rather variable density), associated with post-medieval (probably C19) pottery. Material derives from c1 and c9, with 1 bag of material unlabelled.

Interpretation

This material is strongly suggestive of post-medieval iron working debris. The clinker is not in itself particularly diagnostic, but it appears to grade into a moderately dense slag, which would be compatible with an origin in a coal-fired blacksmith's forge.

The clinker and slag is associated with apparently post-medieval, ?C19, artefacts, and the residues are entirely compatible with such an age. In this part of Ireland coal would need to be imported, or moved some distance, and a date much before the late C18 would probably be unlikely.

Moneycross Upper, Site 10

Results

This site produced granules of natural Fe-Mn pan from c11 and c13.

Interpretation

This material is not of archaeological significance (natural).

Moneylawn Lower, Site 13

Results

A single small (56g) fragment of what was probably a small smithing hearth cake (find 124) was recovered from the inner enclosure ditch (c279). C283 produced some natural iron pan.

Interpretation

The slag fragment is probably from a small SHC, which would be indicative of iron-working (blacksmithing). Such SHCs are typical waste from pre-industrial period hearths, but could be produced in any period back to the Early Iron Age.

Coolneveagh, Site 21a

Results

Materials from this site were mainly natural iron pan.

Two finds (one a surface find, the other , Find 2, of unlabelled origin) were small pieces of dense clinker. Neither appeared to be certainly of metallurgical origin – production in the boiler of agricultural machinery is more likely.

The ring ditch, c56, yielded a single fragment of decomposed iron (S183).

Raheenagurren West, Site 26

Results

This site produced fragments of natural Fe-Mn pan cemented gravel fro, C86, C94 and C195.

Interpretation

These materials are not of archaeological significance (natural).

Courteencurragh, Site 31

Results

The single submitted samples from this site was a charcoal-rich ash, with no particular indication of a metallurgical association.

Interpretation

This material is not certainly of archaeometallurgical significance.

Ballyloughan, Site 33

Results

The single submitted sample from this site was a charcoal-rich ash, with no particular indication of a metallurgical association.

Interpretation

This material is not certainly of archaeometallurgical significance.

Ask, Site 37

Results

Slaggy materials from several contexts (88, 114/5, 115, 116) are recorded as being vesicular, but variable in colour. One context (c183) yielded a somewhat denser bleb. These materials are not diagnostic. However, the material from c82 (s26) includes various slag droplets and fragments which are more likely to be metallurgical.

Interpretation

Material from this site is not especially diagnostic. The various pieces of vesicular pale and/or clinkery materials are not necessarily of metallurgical origin and could derive from the cremation process – or even from domestic hearths.

The assemblage from c82 is more likely to be metallurgical, but even these materials are not certainly so. The

Ask, Site 40

Results

Material from this site comprised a quantity of iron-working (blacksmithing) residue from the linear stone scatter (drain?) c10, together with a smaller quantity of iron-working residue from a fill of the so-called "bowl furnace", c55.

The slags include a neat, dense SHC from c10, which weighs 390g. This is small by Irish standards and definitely in the range of blacksmithing rather than iron refining.

The assemblage from the "bowl furnace" includes fragments of corroded iron, a small quantity of slag, plus a fragment of concretionary smithing floor.

Interpretation

This assemblage clearly indicates that smithing was undertaken on the site, and that the "bowl furnace" is actually a smithing hearth.

The material is not strongly indicative of age, although the SHC is of a form likely to be pre-industrial period.

Ask, Site 42-44

Results

The material recovered from this site mainly falls into two categories: vesicular slaggy materials that may be cremation residues and natural iron pan/bog ore fragments and mottles.

The exception to this is two pieces from the topsoil, a fragment of burnt coal shale and a slaggy material of uncertain origin, but possibly residue from a limekiln.

Interpretation

This material is not of archaeometallurgical significance.

Ballyellin, Site 52

Results

This site yielded two fragments of smithing hearth cakes. One of the SHC fragments weighed 117g and was probably about 50% of the original cake; the other weighed 470g and was part of a moderately large cake, although the precise proportion represented here was not determinable.

Both SHCs showed clear evidence for the use of charcoal as fuel.

Interpretation

This material is somewhat problematic in that its provenance is uncertain. The bags were labelled c18 (a fill of the palaeochannel), but the preliminary report indicates both as coming from a presumably modern field drain (c7).

Both SHCs are of a form that fits into the typical range of waste products from Irish blacksmithing prior to the use of coal as fuel. The typical date for introduction of coal would appear to be mid-C19, but in some coastal areas might be earlier. Individual smiths might however have clung to charcoal as preferred fuel until much later. The typical SHC form also requires the use of a ceramic tuyère, something which also disappeared around the late C18/early C19 with the advent cast iron tuyères – but again the precise date of the change is uncertain and variable. In general therefore, it is likely that these residues are pre-mid C19 in age.

Summary

Many of the sites in this scheme have produced large quantities of material, such as Fe-Mn granules, which are entirely natural, although having the appearance of industrial waste. Several of the sites are cremation cemeteries, and amongst their cremation residues thee are slaggy-appearing materials, but which are not indicative of metallurgical activity. A third category of material which is likely not to metallurgical in origin is the low-density scatter of pieces of clinker and burnt coal shale recorded from the topsoil of several sites. These materials may have various origins (of which one conceivable origin is in coal-fuelled iron working), but the most likely source is as waste from coal-fuelled agricultural machinery (such as traction engines).

However, four sites have yielded archaeoemetallurgical residues and a fifth possibly so:

Site 9: evidence for probable C19/C20 coal-fuelled smithing

Site 13: single slag piece indicative of early iron-working

Site 37: a single assemblage is possibly indicative of unidentified metallurgical activity – but other high-temperature processes might have produced this material.

Site 40: the so-called "bowl furnace" appears to have been a charcoal-fuelled smithing hearth. Slags also occurred in a possible drain.

Site 52: two pieces of charcoal-fuelled SHC occurred (probably) in a relatively modern drain.

Thus there are four sites showing a low level of iron-working (blacksmithing) of various ages. Such activity has been an important component of agricultural regions until very recently.

Evaluation of potential

Of the five groups of material that may be archaeometallurgical residues there is little to be gained from further analysis of the small smithing assemblages.

The problematic assemblage from Site 37, context 82 (sample 26) might be worth further investigation. Although many high temperature processes can produce very similar residues, it is possible that some of the material in this sample might prove diagnostic. The field interpretation of this deposit as containing residues from cremation may well be valid, and detailed analysis may still not be able to discriminate for or against this interpretation. However, if any of the slag blebs in the assemblage were produced by a metallurgical process then that ***may*** be detectable through textural and/or chemical analysis.

license	site	townland	context	sample/find	context interpretation	notes
A003/055	1	Frankfort	1	<12>		purplish clinker like material
A003/056	2		1030	#17		bog iron ore/iron pan
A003/057	6	Moneycross Upper	7	<6>		sandy iron pan
A003/057	6	Moneycross Upper	629	<12>		Fe-Mn granules
A003/062	8	Moneycross Upper	9		adjacent to N building of C18-C20 farmstead	crudely lobate/prilly mass of black vesicular slag with crystals
A003/062	8	Moneycross Upper	topsoil			slag/coal - dense slag fragments with coal and shale
A003/062	8	Moneycross Upper	1	s6		2 bags (3.9kg) of lining slag and slagged shale fragments
A003/062	8	Moneycross Upper				slags with burnt shale locally. Very variable density. Probably a smithing assemblage. Lots of iron metal (including artefacts). Small bag has coal fragment (also bone and glazed ?C19 pottery)
A003/046	10	Moneycross Upper	11	<7>		Fe-Mn granules
A003/046	10	Moneycross Upper	13	<9>		Fe-Mn granules
A003/14	13	Moneylawn Lower	279	find 124	fill of inner enclosure ditch	56g small SHC fragment - probably from a small SHC
A003/015	13	Moneylawn Lower	283	<192>		iron pan
A003/040	21a	Coolneveagh	56	s183	within ring ditch	rust - decomposed iron
A003/040	21a	Coolneveagh	71	s9		Fe-Mn cemented sand
A003/040	21a	Coolneveagh	56	<312>		iron pan
A003/040	21a	Coolneveagh	114	s313		iron pan
A003/040	21a	Coolneveagh	114	s386		iron pan
A003/040	21a	Coolneveagh	43	s4		iron pan
A003/040	21a	Coolneveagh	56	s190		iron pan
A003/040	21a	Coolneveagh	133	s360		iron pan
A003/040	21a	Coolneveagh		<2>		spheroidal ball of black vesicular slag/clinker
A003/040	21a	Coolneveagh	surface	<6>		dense block of purple-surfaced slag/clinker with coke. Probably a dense clinker rather than a slag 80g
A003/044	26	Raheenagurren West	195	94		fragments of Fe-Mn pan
A003/044	26	Raheenagurren West	94	s40		Fe-Mn cemented angular gravel
A003/044	26	Raheenagurren West	86	s46		Fe-Mn cemented gravel
A003/038 039	31	Courteencurragh	60	<21>		charcoal-rich ash

A003/017	33	Ballyloughan	4	s3		concretionary fragments, one certainly around iron sheet
A003/028	37	Ask	114/115	s30		black glassy clinkery slag, vesicular
A003/028	37	Ask	88	s22		pale vesicular slag
A003/028	37	Ask	116	s313		dark vesicular slag
A003/028	37	Ask	115	s71		dark vesicular slag
A003/028	37	Ask	183	s75		slag bleb, denser than others from this site
A003/028	37	Ask	82	s26		(24 bags) twisted lining slag bleb, dark sandy glass, rounded possible iron slag or probably ore lump, various hollow and solid slag droplets, vesicular slag fragments
A003/036	40	Ask	10	#8	drain?	ball of hearth lining slag
A003/036	40	Ask	10	#19	drain?	390g small neat dense SHC, starting to explode
A003/036	40	Ask	55	#23	"bowl furnace"	93g slag, smithing floor and corroded iron
A003/036	40	Ask	10	#22	drain?	250g various lining and smithing slag lumps
A003/020	43e	Ask	1	#1365	topsoil	curious vesicular slag with multiple curved contact surfaces - possibly from limekiln
A003/020	43e	Ask	1	<627>	topsoil	vesicular slag, probably melted shale
A003/020	42	Ask	4	<10>	cremation pit	iron pan
A003/020	42	Ask	4	<1>	cremation pit	iron pan
A003/020	42	Ask	22	<641>	fill of enclosure ditch c21 for structure E	black vesicular residue
A003/020	42	Ask	22	<641>	fill of enclosure ditch c21 for structure E	black vesicular residue
A003/020	42	Ask	54	<69>	cut of cremation pit filled by c55	iron pan
A003/020	42	Ask	64	<82>	cremation pit	iron pan
A003/020	42	Ask	93	s181	fill of cremation pit c92	iron pan
A003/020	43	Ask	200	s573	posthole str K	iron pan
A003/020	43	Ask	264	<484>	fill of cremation pit str B	dark vesicular residue and iron pan
A003/020	43	Ask	269	<491>	fill of cremation pit str B	iron pan
A003/020	43	Ask	273	<498>	fill of posthole c200 str K	iron pan
A003/020	43	Ask	294	<521>	cremation pit str K	black vesicular residue
A003/020	43	Ask	298	<510>	fill of cremation pit str K	black vesicular residue and pan
A003/020	43	Ask	300	<511>	fill of ph str K	black vesicular residue
A003/020	43	Ask	304	<589>	fill of cremation pit str K	black vesicular slag
A003/020	43	Ask	305	s520	fill of cremation pit str K	dark vesicular slag
A003/020	43	Ask	305	<512>	fill of cremation pit str K	iron pan
A003/020	43	Ask	305	<608>	fill of cremation pit str K	black vesicular residue
A003/020	43	Ask	306	s590	fill of cremation pit str K	highly vesicular dark residue
A003/020	43	Ask	306	<514>	fill of cremation pit str K	black vesicular material
A003/020	42	Ask	314	<574>	fill of cremation pit str K	dark vesicular material
A003/020	43	Ask	314	s523	fill of cremation pit str K	iron pan
A003/020	43	Ask	314	s521	fill of cremation pit str K	dark vesicular slag and iron pan

A003/020	43	Ask	314	<612>	fill of cremation pit str K	pan
A003/020	43	Ask	315	<612>	fill of interrupted boundary ditch area A	dark vesicular residue and charcoal
A003/020	43	Ask	324	<614>	void	iron pan
A003/020	44s	Ask	399	<606>	fill of interrupted boundary ditch area A	high grade bog ore
A003/020	42n	Ask	544	#2143	void	low density slag with charcoal? Impressions
A003/020	42e	Ask	546	s650	void	large quantity of dark vesicular slag
A003/020	44e	Ask	582	<657>	cremation str J	iron pan
A003/020	42-44	Ask	627	s666	fill of crem pit str E	dark vesicular slag
A003/020	42e	Ask	654	s591	fill of double ditch 207	black vesicular residue
A003/020	42s	Ask	697	<729>	fill of tree bole area D	iron pan
A003/020	42e	Ask	703	<718>	fill of ph 722	dark vesicular material, possibly coked organics
A003/020	44e	Ask	784	<781>	cremation str H	iron pan
A003/020	42s	Ask	849	<822>	cremation area D	iron pan
A003/020	44n	Ask	1108	<851>	fill of crem pit Str G	tubular concretions
A003/052	52	Ballyellin	18	<13>	text records these as being in C7 - a modern drain	117g, part (about 50%?) of small charcoal-fuelled SHC
A003/052	52	Ballyellin	18	<12>	text records these as being in C7 - a modern drain	470g, part (indet) of SHC with very dense crust to 30mm, overlain by charcoal-rich slag.

Table 1: Summary catalogue

GeoArch

geoarchaeological, archaeometallurgical & geophysical investigations

54 Heol y Cadno,
Thornhill,
Cardiff,
CF14 9DY.

Mobile: 07802 413704
Fax: 08700 547366
E-Mail: Tim.Young@GeoArch.co.uk
Web: www.GeoArch.co.uk