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EXAMINATION OF THE IRONWORKING RESIDUES FROM ROCESTER (STAFFORDSHIRE), NEW CEMETERY 1985-7, AND DOVE SCHOOL.

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Summary

Examination of the ironworking residues from the New Cemetery Site showed iron smithing being carried out in the constructional phase of the Roman fort and a smithy operating in Phase 5. Only background levels of slag were recovered from the Dove School Site. No chemical or mineral analyses were undertaken.

Author's address :-

Ancient Monuments Laboratory
English Heritage
23 Savile Row
London
W1X 2HE

01 734 6010 x533

EXAMINATION OF THE IRONWORKING RESIDUES FROM ROCESTER, (STAFFORDSHIRE) NEW CEMETERY 1985-87, AND DOVE SCHOOL.

Rocester New Cemetery 1985-7

1 Introduction

Excavations at the New Cemetery Site revealed seven phases of occupation (Table 1), from the first Roman Fort to modern topsoils. Approximately 130kg of ironworking debris was recovered.

TABLE 1 Rocester New Cemetery Phasing

Phase	Occupation
1	First Roman fort
2	Auxiliary fort (Late 1st- Early 2nd Century AD)
3	Roman activity and pre-medieval plough soils
4	Corn drying ovens
5	Features cut into fort's rampart top, and possible smithy (Anglo-Saxon?)
6	Late ploughsoil
7	Modern topsoil

2 Classification of Ironworking Debris

All the material described as ironworking slag was examined morphologically, and divided into five categories; three diagnostic residues, ie slags that derived only from the ironworking process, and two non-diagnostic residues which may have derived from the ironworking process or another high temperature activity.

Diagnostic Residues.

Smithing Slag Lumps (SSL) - randomly shaped pieces of slag generated by the smithing process. They ranged in size from small fragments to fist-sized lumps, individual pieces were not weighed. In general, the smithing slag lumps had a 'cindery' appearance indicating higher silica content than the normal 'fayalitic' composition.

Hearth Bottoms (HB) - plano-convex accumulations of smithing slag, that developed in the base of the smithing hearth or forge. Individual examples were weighed and their major diameter, minor diameter and depth were recorded. The values are given in Table 2; the values in brackets were those obtained from seven examples from the Roman site at Tiddington, Warwicks (McDonnell J.G 1986). The number of hearth bottoms (from both sites) is low with respect to the weight of slag recovered. The overall values indicate that the Rocester examples are slightly larger than those from Tiddington, but were distorted by two large hearth bottoms in Phase 5 (both >1000gms, Appendix 2).

TABLE 2 Mean Dimensions and Standard Deviations of the Hearth Bottoms (11 examples).

		Mean	Standard Deviation
Major Diameter	(mm)	115 (90)	45 (15)
Minor Diameter	(mm)	90 (75)	30 (10)
Depth	(mm)	50 (40)	20 (15)
Weight	(gms)	540 (350)	455 (210)

Cinder - A silica rich smithing residue, normally produced by the reaction of the clay hearth lining with the silicate slag. It may also occur as a non-diagnostic residue, eg at Beckford (McDonnell J.G 1986) where it was probably produced by the effect of high temperatures on the soil.

Non-diagnostic Residues

Hearth Lining - the vitrified clay lining of a furnace, hearth or kiln. If it is associated with diagnostic ironworking debris, then it can be considered to have derived from the iron smelting or smithing processes.

Other Residues - this group accommodated either small examples of other iron working slags or other heat affected material. Two samples were identified; the first a possible piece of iron smelting slag (Phase 3, Context 1453, weight 1375gms) which was significantly different in appearance from the smithing slag, in particular it had a high 'apparent' density. It is not uncommon to recover isolated examples of other slag types, but in this case it was probably a piece of smithing slag that was heated to a higher temperature causing changes in its mineral texture. The second example was a fragment of vitrified stone (Phase 3, Context 1551, Feature 341, weight 20gms).

Distribution of The Residues

A full listing of the weight of each residue type in each context by phase is given in Appendix 1. The totals for each phase are given in Table 3.

TABLE 3 Total weight of each residue type in each phase.

Phase	Smith	Hearth Bottom	Cinder	Hearth Lining	Other Type
7	1.5	-	0.07	0.09	-
6	17.67	-	-	0.27	-
5	54.60	3.17	-	0.42	-
4	10.24	0.58	0.29	0.06	-
3	22.69	2.20	0.18	0.56	1.39
2	11.38	-	0.09	0.16	-
1	2.30	-	-	-	-

There is a small quantity of smithing slag in Phase 1 which is interpreted as scattered slag derived from smithing activity associated with the establishment of the site.

In Phase 2 the smithing debris is concentrated in beam slots etc. of Structures 1 (2.86kg) and 3 (4.70kg). Again this is probably slag derived from the smithing activity associated with the construction of these buildings. There was no slag associated with Structure 2 and only a small quantity with Structure 4.

In Phase 3 about 85% (21kg) of the slag was recovered from above Structure 3, (Contexts 1444, 1477, 1491 and 1488 contained 12kg). This indicates either disturbance of the earlier material, or more probably, another period of iron smithing. Hearths and kilns were present in this area and although one hearth (F306) contained a small amount of slag (0.12kg), there was no direct evidence indicating that they were smithing hearths.

Corn drying ovens were constructed in Phase 4 and smithing slag was recovered from two of them F47 (0.93kg) and F304 (2.71kg). Three deposits contained more than 1kg of slag; Context 1044 (cobbling, 2.05kg); gully F31 associated with Structure 6 (1.20kg) and a pit F297 (1.24kg). The remaining deposits of slag weighed less than 1kg. The source of this slag is difficult to determine; either it represents disturbance of earlier material, of which there was very little directly beneath it; or there was contemporary smithing nearby; or the slag is backfill from the later Phase 5 smithing activity. The last option would seem to be the most probable, and would explain the presence of smithing slag in corn drying kilns.

The largest deposition of smithing slag occurred in Phase 5 (57.7kg) around a possible smithy building (Structure 7), of

which very little remained; a wall (F4), a small area of floor (F5) and a posthole or small pit (F8). The area was not examined for hammer scale. The slag was recovered from features eg gully F42, (17kg) and from soil horizons, eg Context 1023 (15kg), but there was no slag found within Structure 7. The quantity of slag is of the right magnitude for a smithy, but it cannot prove that Structure 7 was the smithy, although the buildings must have been close to where the slag was found. Comparisons can be made with Hamwih, Southampton (McDonnell J.G in prep) and Wharram Percy, East Yorkshire (McDonnell J.G 1985(a)).

Phases 6 and 7 contain slag disturbed from Phase 5.

Conclusions

The evidence from the New Cemetery Site, Rocester show that there was smithing activity in Phases 1 and 2, associated with the building of the forts. In Phase 3 there was possible domestic smithing activity. The slags recovered from Phase 4 were probably either residual or were 'backfill' from the major smithing activity in Phase 5.

Rocester, Dove First School

A small quantity of smithing slag (3.65kg), cinder and hearth lining was recovered, and can be considered as background level. A listing by context number is given in Appendix 3.

REFERENCES

McDonnell J.G 1985 Report on the Slag Recovered from Excavations at Beckford, Worcs. A.M.Lab Report No. 64/86

McDonnell J.G 1985(a) Report on the Slag from Wharram Percy East Yorks. A.M. Lab Report 4713 (old series)

McDonnell J.G. 1986 Slag from the 1980/81 Excavations at Tiddington, Warwicks A.M.Lab Report 67/86

McDonnell JG In Prep Report on the slags from Hamwih, Southampton

APPENDIX 1

ROCESTER NEW CEMETRY 1985-7 SLAG LISTING (Weight in Grammes)

CONTEXT - Context Number
S-PHSE - Sub-Phase either A,B or C
SMITH - Smithing Slag (Weight in gms)
HB - Hearth Bottom " " "
CINDER - Cinder " " "
HL - Hearth Lining " " "
OTHER - Other Material " " "
FEATURE - Feature Type/Description

CONTEXT	S-PHSE	SMITH	HB	CINDER	HL	OTHER	FEATURE
* TOTAL IN PHASE		1					
1394	B	140	0	0	0	0	F214 pit
1659	B	850	0	0	0	0	F399 scoop
1671	B	50	0	0	0	0	F406 floor
1681	B	1050	0	0	0	0	charcoal
1371	C	85	0	0	0	0	F200 posthole
1372	C	125	0	0	0	0	F201 "
** Subtotal **		2300	0	0	0	0	

CONTEXT	S-PHSE	SMITH	HB	CINDER	HL	OTHER	
* TOTAL IN PHASE		2					
1075	A	510	0	0	0	0	F26 pit Strul
1092	A	20	0	0	0	0	""""
1102	A	110	0	0	0	0	"
1105	A	40	0	0	0	0	"
1106	A	30	0	0	0	0	"
1116	A	10	0	0	0	0	"
1194	A	750	0	0	0	0	F85 beam Strul
1215	A	30	0	0	0	0	F110 " "
1247	A	410	0	0	0	0	F133 pit
1250	A	90	0	0	0	0	F143 pit
1261	A	30	0	0	0	0	F141 beam Strul
1289	A	380	0	0	0	0	F154 p.h Strul
1312	A	70	0	0	0	0	F173 found Strul
1319	A	90	0	0	0	0	F174 p.h Strul
1382	A	40	0	0	0	0	clay floor
1383	A	0	0	30	0	0	floor Strul
1384	A	30	0	0	0	0	F208 pit Strul
1390	A	0	0	0	60	0	F212 trench Strul
1485	A	1440	0	0	0	0	silt clay
1508	A	0	0	0	70	0	F325 beam Stru2
1548	A	0	0	10	0	0	F340 beam Strul
1569	A	10	0	0	0	0	F357 pit
1668	A	360	0	0	0	0	F404 beam Stru3
1669	A	470	0	0	30	0	F405 pit Stru3
1672	A	120	0	0	0	0	F407 beam Stru3
1673	A	530	0	0	0	0	F415 gulley Strul
1675	A	3025	0	0	0	0	F416 beam Stru3
1684	A	925	0	0	0	0	levelling
1685	A	75	0	0	0	0	F421 beam Stru3
1687	A	40	0	0	0	0	F421 " "
1712	A	600	0	0	0	0	F441 beam Stru3
1562	AA	0	0	5	0	0	F367 floor Strul
1564	AA	220	0	0	0	0	F352 beam Strul
1566	AA	10	0	0	0	0	F354 beam Strul
1164	B	20	0	0	0	0	clay wash
1168	B	550	0	0	0	0	F87 oven Stru4
1228	B	10	0	0	0	0	loam
1376	B	30	0	0	0	0	F195 hearth pit Stru 4
1379	B	230	0	0	0	0	F206 Hearth Stru4
1424	B	0	0	25	0	0	burnt soil
1647	B	0	0	20	0	0	F199 trench Stru4
1358	C	30	0	0	0	0	burnt soil
1408	C	50	0	0	0	0	burnt soil
** Subtotal **		11385	0	90	160	0	

CONTEXT	S-PHSE	SMITH	HB	CINDER	HL	OTHER	
* TOTAL IN PHASE		3					
1052		1575	0	0	0	0	rampart
1079		150	0	0	0	0	F24 slot Stru6
1091		220	0	0	0	0	cobbles
1101		200	0	0	0	0	F34 cobbles Stru6
1123		20	0	0	0	0	F46 pit
1130		320	0	0	0	0	F49 beam Stru6
1135		60	0	0	0	0	" " "
1162		260	0	20	0	0	open area
1220		280	0	0	80	0	loam
1326		170	0	0	0	0	cleaning
1369		30	0	0	0	0	F198
1414		50	0	0	0	0	silt
1423		80	0	0	0	0	Stru 5?
1440		5	0	0	0	0	F373 oven
1453		50	0	0	0	0	cobbles
1477		3060	0	0	0	1375	SMELT? loam
1488		3125	420	0	120	0	cobbles
1490		145	0	160	30	0	cobbles
1583		650	230	0	0	0	loam?
1248	A	325	0	0	0	0	F134 pit
1318	A	345	0	0	0	0	F171 pit
1467	A	30	0	0	0	0	F306 hearth
1481	A	30	0	0	0	0	F312 beam Stru6
1491	A	3340	240	0	0	0	F313 pit
1494	A	430	0	0	0	0	" "
1501	A	90	0	0	0	0	F306 Hearth
1530	A	1950	0	0	0	0	F330 gulley
1542	A	230	0	0	0	0	F307 well
1551	A	60	0	0	30	20	VIT STONE F341 pit
1557	A	490	0	0	0	0	F346 pit
1558	A	250	0	0	0	0	F347 gulley?
1587	A	190	0	0	0	0	F359 pit
1588	A	260	0	0	0	0	" "
1608	A	880	0	0	0	0	F368 pit
1609	A	775	0	0	0	0	F369 pit
1622	A	70	0	0	0	0	F387 gulley
1637	A	55	0	0	0	0	F359 pit
1655	A	20	0	0	0	0	F387 gulley
1674	A	5	0	0	0	0	-----
1100	B	1650	775	0	170	0	F30 cobbles
1466	B	400	540	0	130	0	F305 Hearth
1468	B	365	0	0	0	0	" "
** Subtotal **							
		22690	2205	180	560	1395	

CONTEXT	S-PHSE	SMITH	HB	CINDER	HL	OTHER	
* TOTAL IN PHASE		4					
1027		20	0	0	0	0	F9 Cobbles
1044		2055	0	0	0	0	cobbles
1062		20	0	0	0	0	spread
1095		1000	0	0	0	0	F31 gulley Stru6
1103		100	0	0	0	0	F35 p.h Stru6
1107		20	0	0	0	0	F31 gulley stru6
1110		20	0	0	0	0	cleaning
1126		575	0	0	0	0	F47 corn d oven
1127		0	230	0	0	0	" " " "
1132		0	350	0	20	0	spoil Med
1134		0	0	0	20	0	F50 corn d oven
1136		150	0	0	0	0	F51 gulley
1138		130	0	0	0	0	F47 corn d oven
1171		15	0	0	0	0	burnt surface
1197		20	0	0	0	0	F89 wall
1427		15	0	250	0	0	F286 pit
1430		250	0	0	0	0	----
1433		150	0	0	0	0	F288 pit
1435		0	0	0	25	0	" "
1436		60	0	0	0	0	burnt clay
1438		60	0	0	0	0	F290 pit
1439		20	0	0	0	0	cleaning
1443		440	0	0	0	0	F289 road
1450		110	0	0	0	0	F287 p.h
1454		120	0	0	0	0	F291pit
1458		190	0	0	0	0	F297 pit
1461		1025	0	0	0	0	F300 pit
1462		30	0	0	0	0	F301 pit
1465		410	0	0	0	0	F304 corn d oven
1470		100	0	0	0	0	F297 pit
1471		20	0	0	0	0	" "
1473		100	0	0	0	0	" "
1478		490	0	0	0	0	F304 corn d oven
1479		140	0	0	0	0	" " "
1480		0	0	40	0	0	" "
1482		160	0	0	0	0	" " "
1484		1510	0	0	0	0	" " "
1516		65	0	0	0	0	F328 cobbles
1543		250	0	0	0	0	silt
1634		20	0	0	0	0	F384 gulley
1689		240	0	5	0	0	dumping?
1713		140	0	0	0	0	
** Subtotal **		10240	580	295	65	0	

CONTEXT	S-PHSE	SMITH	HB	CINDER	HL	OTHER	
* TOTAL IN PHASE		5					
1013		1110	0	0	0	0	disturbance
1017		805	0	0	0	0	soil
1018		3070	0	0	0	0	soil
1019		900	0	0	0	0	soil
1023		14687	400	0	0	0	soil
1024		4125	0	0	0	0	soil
1032		1830	0	0	0	0	soil
1066		2225	0	0	0	0	"
1069		3065	0	0	0	0	"
1080		350	0	0	0	0	spread
1081		2125	0	0	0	0	soil
1119		40	0	0	0	0	"
1120		280	0	0	0	0	wash
1121		20	0	0	0	0	"
1447		60	0	0	0	0	silt
1033	A	15425	1575	0	400	0	F42 gulley
1054	A	65	0	0	0	0	F16 gulley
1070	A	230	0	0	0	0	F19 p.h
1083	A	685	1200	0	0	0	F25 cobble found
1086	A	0	0	0	20	0	F27 pit
1010	B	1090	0	0	0	0	F2 hedge bank
1012	B	340	0	0	0	0	F3 " "
1029	B	320	0	0	0	0	F10 pit
1030	B	320	0	0	0	0	F11 gulley
1031	B	825	0	0	0	0	F13 gulley
1035	B	10	0	0	0	0	" "
1037	B	150	0	0	0	0	" "
1038	B	300	0	0	0	0	" "
1040	B	70	0	0	0	0	" "
1041	B	10	0	0	0	0	" "
1045	B	20	0	0	0	0	" "
1055	B	50	0	0	0	0	F10 pit
** Subtotal **							
		54602	3175	0	420	0	
* TOTAL IN PHASE		6					
1002		60	0	0	0	0	topsoil
1003		570	0	0	0	0	"
1006		410	0	0	0	0	disturbance
1009		11555	0	0	0	0	ploughsoil
1011		10	0	0	0	0	=1006
1444		3370	0	0	190	0	plough
1446		1700	0	0	80	0	"
** Subtotal **							
		17675	0	0	270	0	

* TOTAL IN PHASE	7					
1001	695	0	30	0	0	topsoil
1005	10	0	0	0	0	spoil
1245	0	0	5	0	0	u/s
1252	0	0	0	90	0	u/s
1442	300	0	0	0	0	plough
2000	505	0	65	0	0	u/s
** Subtotal **	1510	0	100	90	0	
** Total **	120402	5960	665	1565	1395	

APPENDIX 2
HEARTH BOTTOM DIMENSIONS

CONTEXT - Context Number
HB WT - Hearth Bottom Weight (gms)
D1 MM - Major Diameter (mm)
D2 MM - Minor " "
DP MM - Depth "

CONTEXT	HB WT	D1 MM	D2 MM	DP MM
* TOTALS IN PHASE	3			
1488	420	110	70	55
1583	230	110	75	50
1491	240	90	75	45
1100	775	140	100	70
1466	210	90	70	35
1466	330	100	65	40
** Subtotal **				
	2205	640	455	295
* TOTALS IN PHASE	4			
1127	230	90	70	40
1132	350	90	80	40
** Subtotal **				
	580	180	150	80
* TOTALS IN PHASE	5			
1023	400	70	70	30
1033	1575	240	170	90
1083	1200	140	120	60
** Subtotal **				
	3175	450	360	180
** Total **				
	5960	1270	965	555

APPENDIX 3

ROCESTER DOVE FIRST SCHOOL SLAG LISTING (Weight in Grammes)

CONTEXT	SMITH	CINDER	HL
1001	32	0	0
1002	580	0	0
1003	47	0	0
1010	501	5	0
1014	0	60	0
1017	0	0	8
1035	72	0	0
1072	130	0	0
1074	120	0	0
1104	1055	0	30
1125	0	98	0
1131	0	80	0
1134	135	0	0
1154	60	0	0
1173	110	0	20
6021	205	0	0
6022	72	0	0
6023	160	0	0
6028	30	0	0
6029	30	0	0
6038	278	0	0
6042	0	0	12
6043	33	0	0
* Total **			
	3650	243	70