Ary ver sh rytr. Site Nº 1162

EXAMINATION OF TECHNOLOGICAL MATERIAL FROM POST-ROMAN PHASE AT WINCHESTER WESTERN SUBURBS, HAMPSHIRE AML REPORT NO 4249

Paul Wilthew
Ancient Monuments Laboratory June 1984

Material from Post-Roman Final Phases 10-13, 15, and 17-18 was examined, as well as some unphased samples. The material was found on sites at Sussex Street (SXS), New Road (NR), Crowder Terrace (CT), Trafalgar House (TH) and St Paul's Hospital (SPHO). Where appropriate qualitative elemental analysis was carried out using energy dispersive x-ray Fluorescence (XRF). The material is discussed by final phase below, and indentifications of each sample and the analytical results are given in Final Phase order in the appendix.

Final Phase 10 (Late Saxon 860 - pre 950)

The evidence for non-ferrous metalworking during this phase was restricted to one crucible sherd (SXS) on which copper and lead were detected. The fabric of the sherd was dark, reduced fired ceramic with some porosity. It was too small to determine the size and shape of the original curcible. Although it is quite likely that copper alloy working was being carried out on or near the site during this phase, the evidence is insufficient to draw any definite conclusions.

Several small (6-8cm diameter) hearth bottoms, which consist of iron slag and other material which collects and solidifies in the bottom of a blacksmiths hearth, were found (TH). Hearth bottoms of this size are not unexpected on sites of this period. Smaller iron slag fragments were also found (NR and SXS) and, although they could have been produced during iron smelting or iron smithing, these were almost certainly iron smithing slag. Pieces of fuel ash slag, which is the result of a high temperature reaction between ash and silica rich material such as sand or clay, were also present (NR, SXS and TH). Fuel ash slag is often associated with metalworking, but it can be produced in any sufficiently hot fire. Iron smithing was taking place on or near the site during this phase, but the amount of iron slag found would indicate that it was only on a small scale.

The other material found, but which was of no technological significance, included corroded objects (NR and TH), a ferruginous nodule (NR), and a possible piece of mortar.

Final Phase 11 (Late Saxon post c860-950)

Copper, zinc and, lead (at low levels) were detected on crucible fragments (SXS and NR) from this phase. Brass (copper-zinc alloy) was almost certainly being melted and copper may also have been melted. Some of the metal would have contained lead. There was no evidence for the use of copper alloys containing tin, such as bronze (copper-tin alloy) or gunmetal (copper-tin-zinc alloy). The crucibles all had a similar dark, reduced fired fabric with some porosity. One was a two layer structure with a heavily intrified outer layer of a less refractory clay. The wall thickness of the sherds varied from about 4 mm to 8 mm, and their internal diameters at the rim, as far as could be determined with the small fragments found, were between about 3 cm- 5 cm. Both straight sided and bag shaped crucibles appeared to have been used.

A hearth bottom of about 9 cm diameter (SXS), a small amount of iron smithing slag (SXS), and iron slag (SXS, CT and NR), which was almost certainly also iron smithing slag, was present, but the bulk of the material from this phase was fuel ash slag (SXS, CT and NR) or hearth (or furnace) lining (SXS and NR). The hearth lining may have been from a blacksmith's hearth or from hearths used in melting copper alloys, although no traces of copper alloy were noted on any hearth lining sample from this

phase. Although iron smithing was probably being carried out during this phase, the amount of waste products found suggests that it was probably on a small scale.

Iron objects (SXS and CT), ferringinous nodules (SXS and NR) and fired clay (NR) from this phase were also found.

Final Phase 12 (Late Saxon c950-980)

Copper, zinc and lead were detected on three crucible fragments (CT) and one piece of hearth lining (SXS) from this phase. As in final phase II, brass was almost certainly being melted, and copper may have been melted, but again there was no evidence for the melting of bronze or gunmetal. Some, at least, of the metal melted contained lead. The sherds from this phase were very heavily vitrified, but at least one had a very similar dark, reduced fired fabric to the crucibles from phase 11. The wall thicknesses, diameters and shapes of the original crucibles could not be estimated because of the small size and heavily vitrified condition of the sherds.

The evidence for iron working during this phase consisted of two pieces of iron slag (CT) (almost certainly ironsmithing slag) in addition to a few samples of fuel ash slag (CT and SXS) and hearth lining (CT and SXS) which may have been associated with iron working. The period of time covered by this phase was, however, relatively short and iron smithing probably continued to take place on a small scale during this phase.

A large amount of daub was also found (SXS). It was largely chalk, with some sand, clay and large flint inclusions. There was no evidence that a surface layer of plaster, or any other material, had been applied, and the existing surface did not appear to have been prepared for such a layer. Many of the pieces retained the impressions of wattles arranged approximately parallel to each other, although in a few cases impression at right angles to the majority were present. Two sizes of wattle had apparently been used, of which the larger may have formed the original framework which was then filled in with narrower wattles. The same group of material also included a fragment of relatively iron rich fired clay which bore the impression of a quite sharply angled, flat surfaced object such as a beam. The fragments were reduced fired on their inner surfaces and oxidised fired on the outside and superficially ressembled lost wax casting mould fragments. However they had a coarser fabric than a mould normally has and did not have the layer of fine clay often present on the inside of a mould. Also the impressions did not correspond to those expected for a typical large medieval casting such as a bell or couldron and no metal traces were detected on the inside surface of the fragments. They may have been part of the structure of a building, but a positive identification was not possible.

One ferruginous nodule (CT) was also found.

Final Phase 13 (Saxon-Norman c980-1110)

Copper, zinc and lead were detected on crucible fragments (CT and NR), fired clay (CT) and hearth lining (CT) from this phase. As in final phases 11 and 12, brass, almost certianly, and possibly copper were being melted and some, at least, of the metal contained lead. There was no evidence for the working of bronze or gunmetal during this phase. Three fabrics seem to have been used for crucibles during this phase, the dark fabric found in phases 11 and 12, a lighter, coarse fabric with a high proportion of quartz and which was refractory, and a fairly unrefractory fabric used for thick walled (8 mm - 12 mm) crucibles and which was heavily vitrified. The wall thicknesses of the crucibles with the first two fabrics were in the range 4 mm - 7 mm, but the shapes and sizes of the crucibles could not be determined in most cases. Both straight sided and bag shaped crucibles were probably present.

Iron working was also being carried out on a small scale during this phase. Small pieces of iron slag (CT and NR), which was almost certainly iron smithing slag, were found together with hearth lining (CT) and fuel ash slag (CT, SXS and NR) which may have been associated with iron working.

The material of no technological significance from this phase included iron objects (CT and SXS), a ferruginous depost (CT), a natural calcareous deposit (CT) and Niedermendig basalt (SXS), a porous volcanic rack imported for use as quernstones.

Final Phase 15 (Medieval mid/late 12th century - early 14th century)

Copper, zinc and lead were detected on most of the crucible sherds (CT and SXS) from this phase and in two cases (CT) tin was also present. Only copper and zinc were detected on a few sherds. As with the earlier phases brass was almost certainly melted on or near the site during this phase, and copper may also have been melted. However bronze or gunmetal, or both, was also being melted during this phase. Some of the copper alloys worked contained lead.

As in earlier phases, the crucible sherds were too small and too heavily vitrified for the size and shape of the original crucibles to be determined with confidence. Their wall thicknesses varied from 4 mm to 9 mm and, where they could be estimated, their mouth diameters were about 4 cm - 7 cm. The crucibles were probably mainly straight sided. The crucibles had either a dark, reduced fired fabric similar to that found in phases 11 - 13, fairly coarse, paler reduced fired, refactory fabric with a high proportion of quartz similar to that found in phase 13 or a heavily vitrified, unrefractory fabric. A few sherds had a layer of unrefractory clay on the outside which was heavily vitrified in each case.

Some silver working probably took place on or near the site, although the evidence for it is limited to one small, shallow boat shaped crucible (CT) with pouring lip on the inside of which silver, copper, zinc and lead were detected. The sherd had a reduced fired, quartz rich and fairly coarse fabric, similar to several of the copper alloy working crucibles.

One dense lead rich object (SXS) was also found which was almost certainly associated with non-ferrous metalworking. It may have been a by-product of the refining of non-ferrous metals.

The presence of iron smithing slag (CT) and iron slag (almost certainly also iron smithing slag) fragments (CT, SXS and NR) implies that iron smithing took place on or near the site during this phase. It was probably on a small scale as was the case in the earlier phases. Several samples of fuel ash slag (CT, SXS and NR) and hearth lining (CT) which may have been associated with metalworking were also found.

Ferruginous nodules (CT, SXS and NR), iron objects (CT, SXS and NR), Niedermendi g basalt (CT), fired clay (SXS), hematite (SXS) and charcoal (NR) were also present.

Final Phase 17 (17th century - 18th century)

The small amount of material from this phase included fuel ash slag (CT and NR), iron smithing slag (CT), iron slag (almost certanly iron smithing slag) (CT and NR), hearth lining (NR) and an iron object (NR). the amount of iron slag found was too small to draw any definite conclusions as to the likely scale of iron working during this phase, as it is quite possible that the iron slag is residual from earlier phases. No evidence for non-ferrous metalworking was found.

Final Phase 18 (19th century - 20th century)

A small amount of material from this phase was found which included fuel ash slag

(CT, SXS and NR), a ferruginous concretion (SXS), burnt clay (NR), a natural concretion (NR), hearth lining (NR), a glazed potsherd attached to fuel ash slag (NR) and two pieces of iron slag. No conclusions could be made about the liklihood of iron working on the basis of the two peices of iron slag found, which may have been residual, and no evidence for non-ferrous metalworking during this phase was found.

Unphased

The unphased material included one crucible sherd (SXS) on which copper, zinc and lead were detected, fuel ash slag (CT, SXS and NR), iron objects (SXS), iron slag (CT, SXS and NR), a ferruginous nodule (TH) and a piece of hearth lining (SPHo).

Summary

Although the matalworking activites on the site have been described in Final Phase sections, the overall pattern is one of continuity. Both iron smithing and copper alloy working appear to have been carried out on or near the site on a small side from the Late Saxon to the medieval period, and the waste products found throughout were similar both in quantity and type. Variations in the quantity of crucibles and slag from each period appear probably to represent the relative length of each period rather than increased or decreased metalworking activity.

The crucible fabrics, crucible sizes and alloys worked in the non-ferrous metalworking industries were similar throughout the late Saxon - Medieval period, although evidence for working of silver and bronze or gunmetal was only found in final phase 15.

After final phase 15, no evidence for non-ferrous metalworking was found, and the small quantity of iron slag found may have been residual, although it is possible that iron smithing was being carried out on a small scale.

Appendix - Analytical results and identifications of each specimen

Final Phase	Site	Layer (Small Find)	Major elements detected byXRF (Minor elements)	Identifications
10	SXS	127	Cu, Pb	Crucible
10	SXS	258	-	Fuel ash slag
10	SXS	223	-	Fuel Ash slag
10	SXS	392	-	Iron smithing slag
10	NR	79	-	Iron slag: Fuel ash slag
10	NR	97	-	Fuel ash slag
10	NR	80	-	Iron slag: Fuel ash slag: iron object and fuel ash slag: Ferruginous nodule
10	TH	2	-	?Mortar
10	TH	3	-	Hearth lining: 3 hearth bottoms iron slag: clay
10	TH	4	-	Concretion round an iron object
10	TH	5	-	Fuel ash slag
11	SXS	191 (814)	Cu, Zn (?Pb)	Crucible
11	NR	453 (409)	Cu, Zn (Pb)	Crucible
11	SXS	191 (200)		Hearth lining
11	SXS	191 (539)	Cu, Zn (?Pb)	Crucible
11	SXS	264 (314)	-	Hearth lining
11	SXS	14	-	Fuel ash slag
11	SXS	280	-	Furnace/hearth lining (thick)
11	SXS	256	-	Fuel ash slag
11	SXS	259	-	Hearth lining: Iron slag: Iron object
11	SXS	265	-	Fuel ash slag: Iron slag & fuel ash slag.
11	SXS	191	-	Hearth lining
11	SXS	187	-	Iron object
11	SXS	172	-	Iron object
11	SXS	388	-	Iron smithing slag: Iron slag & fuel ash slag
11	SXS	323	-	Feru ginous nodule fragments
11	SXS	269	-	Fuel ash slag: Iron slag: Iron objects
11	SXS	14	-	Hearth bottom
11	SXS	997	-	?Iron fragments

Final Phase	Site	Layer (Small Find)	Major elements detected by XRF (Minor elements)	Identifications
11	CT	199	-	Iron slag: Iron object: Fuel ash slag
11	NR	473	-	Ferruginous nodule
11	NR	453	-	Hearth lining: Fuel ash slag
11	NR	69	-	Hearth lining: Fired clay
11	NR	62	-	Hearth lining & Fuel ash slag
11	NR	471	-	Feru ginous nodule
11	NR	481	-	Iron slag
11	NR	83	-	Iron slag
11	NR	77	-	Fuel ash slag
12	CT	241 (325)	Cu, Zn (Pb)	Crucible
12	CT	241 (296)	-	Hearth lining: Fuel ash slag
12	CT	251 (778)	Cu, Zn (Pb)	Crucible
12	SXS	37 (271)	Cu, Zn, Pb	Hearth lining with metal deposits.
12	SXS	68	-	Furnace/hearth lining (thick): Fuel ash slag
12	SXS	25	-	Fuel ash slag
12	CT	215	-	Iron slag: Feru ginous nodule
12	CT	241	-	Hearth lining: Iron slag
12	CT	241	Cu, Pb	Crucible
12	SXS	51	-	Daub: Fired clay
13	NR	428 (410)	Cu, Zn, (Pb)	Crucible
13	CT	193 (779)	-	Hearth lining
13	CT	190 (780)	Cu, Zn, (Pb)	Larger crucible fragments
13	CT	190 (780)	Cu, Zn, Pb	Smaller crucible fragment
13	CT	193 (564)	-	Hearth lining: ?glass
13	CT	190 (311)	(Cu, Zn, ?Pb)	Crucible
13	CT	190 (565)	-	Hearth lining
13	CT	190 (309)	-	Fuel ash slag
13	CT	190 (545)	Cu, Zn (Pb)	Crucible
13	CT	190 (335)	Cu, Zn (Pb)	Smaller peice crucible
13	CT	190 (335)	Cu, Zn Pb	Larger piece - ?outer layer of crucible

Final Phase	Site	Layer (Small Find)	Major elements detected by XRF (Minor elements)	Identifications
13	CT	190 (544)	Cu, Zn, Pb	Crucible
13	CT	190 (337)	(Cu, Zn, Pb)	Reduced fired clay
13	CT	191 (313)	Cu, Zn, Pb	?Hearth lining
13	CT	192 (566)	-	Hearth lining
13	CT	192 (314)	Cu, Zn, Pb	Crucible
13	CT	192 (315)	Cu, Zn, (Pb)	Crucible
13	CT	192 (341)	Cu, Zn, (Pb)	Crucible
13	CT	193	-	Fuel ash slag: Hearth lining: Iron object
13	CT	192	-	Iron smithing
13	CT	190	-	slag: Iron slag: Iron objects
13	CT	192	-	Fuel ash slag: Iron slag: Hearth lining
13	CT	?190	-	Fuel ash slag: Iron slag: Iron
13	CT	190	-	object Natural calcareous depost
13	CT	190	-	Iron slag: Fuel ash slag: Feru nginous deposit.
13	SXS	331/332	-	Fuel ash slag
13	SXS	250	-	Iron slag
13	SXS	199	-	Iron objects
13	SXS	104	-	Fuel ash slag
13	SXS	391	-	Fuel ash slag
13	SXS	393	-	Neidermendig basalt
13	SXS	250	-	Clay & charcoal
13	SXS	993	-	Iron (?) object: ?Iron slag
13	NR	428	-	Fuel ash slag & iron slag: Fibrous object
13	NR	152*	-	Fuel ash slag: Iron slag
15	SXS	958 (825)	Cu, Zn	Crucible
15	CT	U/S	-	?Iron slag
15	CT	216 (777*)	Cu, Zn, (Pb)	?Crucible
15	CT	143 (546)	Cu, Zn, (Pb)	Crucible
15	CT	143 (547)	(Cu, Zn, ?Pb)	Crucible
15	CT	225 (336)	Cu, Zn, Pb	Large crucible fragment
15	CT	225 (336)	Cu, Zn, Pb	Small crucible fragment
15	CT	255	-	Fuel ash slag: Niedermendig basalt
15	CT	238	-	Iron smithing slag
15	CT	250	-	Fuel ash slag: Hearth lining

Final Phase	Site	Layer (Small Find)	Major elements detected by XRF (Minor elements)	Identifications
15	CT	201 (320)	Cu, Zn, Pb	Crucible
15	CT	201 (549)	Cu, Zn, Pb	Crucible
15	CT	210 (550)	Cu, Zn, Pb	Crucible
15	CT	210 (552)	Cu, Zn, Pb	Crucible
15	CT	201 (548)	Cu, Zn, Pb	Crucible
15	CT	201 (541)	Cu, Zn, Pb	Crucible
15	CT	201 (345)	-	Hearth lining
15	CT	203 (553)	Cu, Zn, (Pb)	Crucible
15	CT	238 (291)	(Cu, Zn)	Crucible
15	CT	204 (286)	Cu, Zn, Pb	Crucible
15	CT	216* (283)	-	Fuel ash slag
15	CT	216* (275)	-	Hearth lining
15	CT	238 (289)	(Cu, Zn)	Crucible
15	CT	245 (326)	Cu, Zn, Pb	?Crucible
15	CT	254 (284)	-	Fuel ash slag
15	CT	U/S (302)	Cu, Zn, (Pb)	Crucible
15	CT	225 (224)	Cu, Zn, Pb	Crucible
15	CT	225 (246)	Cu, Zn, Pb	Crucible
15	CT	188* (305)	Cu, Zn, Pb	Crucible
15	CT	188* (331)	Cu, Zn, Pb	Crucible
15	CT	205	Cu, Zn, Pb, Sn	Crucible & metal droplet
15	CT	216* (561)	Cu, Zn, Pb (?AS, ?Sn,?Sb)	Crucible
15	CT	U/S (567)	Cu, Zn, Pb, Ag	Crucible
15	CT	124	-	Fuel ash slag: Iron slag
15	CT	143	-	Ferruginous nodule
15	CT	142	-	Fuel ash slag
15	CT	224	-	fuel ash slag + (?) iron object
15	CT	188*	-	Iron slag: Fuel ash slag: Iron objects Ferruginous nodules: Niedermendig basalt
15	CT	203	-	Fuel ash slag: Iron object: Niedermendig basalt
15	CT	125	-	Iron sheet: Fuel ash slag + iron slag
15	CT	59	-	Fuel ash slag: Iron slag
15	CT	28	-	Iron slag
15	CT	54	-	Iron slag
15	CT	201	-	Fuel ash slag: Iron slag
15	CT	201	Cu, Zn, Pb, Sn	Crucible
15	CT	205	-	Fuel ash slag
15	CT	250, 87	-	Iron slag (Dense)

Final Phase	Site	Layer (Small Find)	Major elements detected by XRF (Minor elements)	Identifications
15	CT	250, 258	-	Iron slag
15	CT	188*	-	Fuel ash slag: hearth lining
15	CT	216*	-	Iron slag: Fuel ash slag: Iron objects
15	CT	219	Cu, Pb (Zn)	Fuel ash slag
15	CT	254	-	Hearth lining
15	CT	206	-	Fuel ash slag: Ferruginous nodule
15	CT	221	-	Fuel ash slag + iron slag
15	CT	246	-	Iron slag
15	CT	204	-	Hearth lining
15	CT	245	-	Hearth lining: Fuel ash slag
15	CT	188*	-	Iron slag (Dense
15	CT	225	-	Fuel ash slag: Hearth lining: Iron slag
15	CT	225	Cu, Zn, Pb	Crucible
15	CT	221	-	Hearth lining
15	CT	226	-	Fuel ash slag:Iron objects:
15	CT	225	-	Fuel ash slag;: Iron slag: Neidermendig basalt
15	CT	68	-	Iron smithing slag
15	SXS	221	-	Iron rich clay
15	SXS	148	-	Iron slag (Dense)
15	SXS	133	-	Iron object: Fuel ash slag
15	SXS	79	-	Iron objects
15	SXS	118	-	Iron slag: Fuel ash slag: Ferruginous nodule
15	SXS	28	-	Fuel ash slag
15	SXS	8	-	Ferruginous nodule
15	SXS	181	-	Iron slag
15	SXS	1139	-	Iron slag
15	SXS	918	-	Stone
15	SXS	1000	-	Iron object
15	SXS	955	-	Fuel ash slag
15	SXS	886	-	Fuel ash slag
15	SXS	874	-	Fuel ash slag: Hematite
15	SXS	986	-	Iron slag
15	CT	188*	-	Ferruginous nodule (? round an object)
15	CT	141*	-	Iron slag

Final Phase	Site	Layer (Small Find)	Major elements detected by XRF (Minor elements)	Identification
15	SXS	955	Pb, Cu	Non-ferrous metalworking debris
15	NR	427	-	Fuel ash slag: Ferruginous nodule: Iron slag
15	NR	497	-	Iron slag
15	NR	427*	-	Iron slag
15	NR	101*	-	Iron slag: Fuel ash slag: Charcoal
15	NR	320*	-	Iron object: Fuel ash slag: Iron slag
15	NR	140	-	Fuel ash slag
15	NR	530*	-	Iron slag
15	NR	120	-	Fuel ash slag
15	NR	454	-	Ferruginous nodule: Iron slag
15	NR	119	-	Iron slag
15	NR	596	-	Iron slag
15	NR	425	-	Fuel ash slag
17	CT	84	-	Fuel ash slag (?outer layer of a crucible)
17	CT	99	-	Iron slag
17	CT	92	-	Iron smithing slag
17	CT	84	-	Fuel ash slag
17	NR	196	-	Iron slag
17	NR	202	-	Hearth lining
17	NR	34	-	Fuel ash slag
17	NR	32	-	Fuel ash slag: Iron slag: Iron object
17	NR	35	-	Iron slag
17	NR	45	-	Fuel ash slag
18	CT	12	-	Fuel ash slag
18	CT	25	-	Iron slag
18	SXS	42	-	Fuel ash slag: Ferruginous concretion
18	SXS	7	-	Fuel ash slag
18	SXS	72	-	Fuel ash slag
18	NR	468	-	Burnt clay: Concretion: Hearth lining

Final Phase	Site	Layer (Small Find)	Major elements detected by XRF (Minor elements)	Identifications
18	NR	74	-	Iron object
18	NR	455	-	Fuel ash slag: Iron slag
18	Nr	455	-	Fuel ash slag + glazed potsherd
UP	SXS	U/S (832)	Cu, Zn, Pb	Crucible
UP	CT	U/S	-	Fuel ash slag
UP	CT	U/S	-	Iron slag: ? Charcoal
UP	SXS	U/S	-	Fuel ash slag: Iron slag + fuel ash slag
UP	SXS	U/S	-	Fuel ash slag: Iron objects
UP	SXS	1024	-	Iron object
UP	NR	151	-	Iron slag
UP	NR	U/S	-	?
UP	NR	U/S	-	Fuel ash slag
UP	NR	143	-	Fuel ash slag: Iron slag
UP	NR	415	-	Iron slag
UP	TH	?	-	Ferruginous nodule
?	SPHO	?(1)	-	Hearth lining

Note: * = Post-medieval Contamination