Non-ferrous metalworking evidence from St Stephen's Lane (Buttermarket), Ipswich and other related sites

Catherine Mortimer

Non-ferrous metalworking evidence at this site comprises more than 2000 pieces of ceramic debris (mostly crucibles, moulds and re-used pottery), smaller amounts of metallic debris (*eg* copper alloy dross, litharge) and structural evidence for several hearths/furnaces. A simple crucible typology was outlined and the other types of ceramic material were also described (*eg* re-used pottery, heating trays). The spatial and chronological distributions of the different types of ceramic debris were investigated. Non-destructive chemical analysis was used to determine what types of metal were being melted.

The evidence of metalworking debris was compared with the evidence from non-ferrous artefacts from the site, and with evidence from other sites of this period.

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Introduction

The site of St Stephen's Lane lies in the centre of medieval Ipswich and has produced archaeological material dating from the seventh century AD onwards. The area was used as a cemetery during the early/middle Anglo-Saxon period. Subsequently domestic and craftworking occupation took place, before the establishment of a Carmelite Friary at the site in 1278. Most of the religious buildings were demolished in 1538/9 and the area was open, covered by gardens and orchards, until the Provision Market was built in 1809.

The metalworking finds presented here are from the Middle Saxon to Late Medieval Transitional phases at the St Stephen's Lane site, with the majority of the material coming from Saxon phases. Abbreviated codes used for archaeological phases are noted in the tables (below). Parallel material from smaller sites in the immediate vicinity is also included where relevant (see Table 2); however, unless a site number is included in the reference, all discussion in the text relates to material from St Stephen's Lane. Throughout, 'observable phenomena' (OP) numbers are referred to. OP are features within contexts, *eg* OPs 74, 79 and 80 lie within context 73, but there is also material from OP/context 73. In some cases, there is no sub-division within a context, so that the OP number and the context number are the same thing.

The metalworking material will be considered in a logical order; firstly the evidence of the furnace structures, followed by the crucible and other ceramic vessel debris and finally other types of metalworking evidence. In conclusion, a summary of the data is provided and an interpretation of the processes concerned is attempted.

In total, 2461 items related to metalworking activities were examined (not including the hearth debris) from St Stephen's Lane and a further 24 samples from other Saxon sites in Ipswich. The number of fragments recorded reflects the intensity of activity but, because some of the material is quite fragile and 'fragment' sizes may vary from complete crucibles to minute sherds, these numbers are only approximate.

Analytical method: The surfaces of 112 crucibles and other technological material were analysed by XRF. This method easily detects metals such as copper, zinc, tin and lead which have been deposited on surfaces as a result of metalworking processes.

The relationship between the concentrations of metals detected on the surfaces of crucibles and the alloys originally melted inside the crucible is always complex. Zinc and lead are frequently detected in crucible and mould fragments at fairly high intensities but they may not have been major components in the original alloy. This effect arises because both lead and zinc are good glass-forming elements. Furthermore, zinc is highly volatile, so it is more likely to leave detectable traces. Lead, being a heavy element, produces plentiful X-rays and so is easily detected by XRF. Gold is also relatively easily detected, for the same reason. Conversely, under-representation of tin is thought to be common. This is because tin is not volatile, nor does it form glasses easily and it is less easily detected by XRF, since its most sensitive peak lies in a part of the XRF spectrum which is often 'noisy'. Silver also lies in this area, and has the additional problem that the X-ray tube used in this research utilises a rhodium tube, one of whose major spectral peaks lie in the silver K-alpha area. For these reasons, XRF analyses are reported in a qualitative manner here.

Ceramic debris

Hearths and related debris

Several fired-clay features at the site were thought to be the remains of industrial processes involving high-temperatures. Of these, a few had evidence which directly linked them to non-ferrous metal-working activity and the scatter of crucible findspots around some of these hearth areas is suggestive. Evidence from other high-temperature processes (*eg* ironworking, pottery kilns) will not be discussed here.

Situated within the group of features given the name Metalworking Complex A, the rectangular pit 3170 probably dates from the late 9th or early 10th century. The pit was lined with clay and contained an ash layer, mixed with copper alloy waste, giving it a green colouring. Several kilograms of material from this context was submitted for analysis. Copper and tin were detected in material from this layer, using non-destructive X-ray fluorescence analysis (XRF). It has been suggested that pit 3170 may have been a receptacle for debris formed in metalworking processes taking place above ground (K Brown, pers comm). The analytical data suggests this involved bronze-working.

Shaped and vitrified pieces of baked clay from the possible early Late Saxon context 1899 (Fig 15) may be fragments from a furnace, although too little remains to determine whether they relate to diagnostic areas (tuyères etc.). Smaller pieces of slagged and vitrified material may be furnace lining, fuel ash slag etc (Table x).

Crucibles

Fabric and Form

1094 crucibles and crucible fragments were found at St Stephen's Lane (Table x). A further 11 crucibles and crucible fragments were found at the other Ipswich sites (Table y). They are of a range of styles and sizes. The fabrics are mostly fairly fine, often with grains of sand visible. Most of the material is reduced-fired throughout to a grey colour, but some fragments are oxidised (red). A small number of the ceramic fabrics are white, suggesting that they were unused or that a different clay type was used.

631 crucibles or sherds can be associated with six distinctive crucible types (Types 1-6). 466 other sherds have fabrics closely resembling those found amongst these crucible types, but were too fragmentary to allow their forms to be more closely typed; these are given the type 'u' in the tables.

The most common crucible form is the tulip-shaped crucible **Type 1** (Fig 1), about 70mm high, 50-60 mm in diameter, with a pointed base and single pouring lip. This appears to be a wheel-thrown form, since the walls are thin and even and parallel lines run around the outside surfaces. Type 1 crucibles are made in a relatively fine fabric (walls may be as little as 5mm thick) and are either reduced grey or oxidised red. 99 fragments attributable to this form were found at St Stephen's Lane. Two fragments from a slightly smaller version were also found in St. Peter's Street (55 mm high, 47mm diameter) in an Early Medieval context (IAS5203, OP428) and a similar example from School Lane has an elongated point at the base of the crucible (IAS4801, OP296).

Many Type 1 crucibles have vitrified areas around the rim or pouring lip, where the heat has been intense. Some Type 1 crucibles have additional layers of clay on the outside which gave additional stability during use, but which were partially or completely vitrified, with various degrees of bloating. Other crucibles may have lost all traces of similar extra layers of clay, since these layers are liable to crack off after use.

Type 2 crucibles have forms similar to Type 1 but with flattened bases (Fig 2); these may be an adaptation of Type 1, but none of the Type 2 fragments from this site are sufficiently complete to enable a full assessment of the profile. The flattened base may have been developed to give greater stability. Although very few examples of Type 2 are anywhere near complete, it seems the crucible walls may be slightly thicker than those of Type 1. Fingernail impressions are frequently seen around the base of examples of Type 2.

12 examples were found at St Stephen's Lane. A small fragment from a Type 2 crucible came from an Early Medieval context (IAS5203, OP405) in St. Peter's St.

Many rim and pouring-lip fragments found within the assemblage are likely to have come from crucibles of these two types (denoted by 1/2 in Tables 1 and 2). A slightly thicker version of this form was also used at the site (*eg* OP1715). From St. Peter's St, came a Type 1 or Type 2 crucible, completely coated with quaternary alloy (copper, alloyed with zinc, lead and tin). This piece comes from a context dated to the Middle Saxon phase (5203, 608). There are three handle or lug fragments from St Stephen's Lane made of fabric similar to that used in Type 1 and 2 crucibles (OPs 300, 804 and 2305). These could also be associated with enclosed forms, such as Type 6 (see below).

Smaller metal charges were handled in thumb pots, **Type 3** crucibles (Figs 3 and 4). Complete examples indicate a height of 20-30mm and a similar diameter. These forms too were frequently given a second protective layer, now vitrified. Both reduced and oxidised fabrics were noted. A single example of a white fabric has been noted (OP305), although the fragments from the context concerned are rather too small for ascertaining the form precisely. A tiny version of Type 3 was found at Wingfield St/Foundation St (IAS4601, OP690).

Type 4 was given to two dish-like crucible fragments, with flat bases and gently-sloping sides (Fig 5) which come from Bridge Street and St Nicolas St (6202, OP247 and 4201, OP4). These are both from Late Medieval contexts. Rather similar crucibles were the predominant forms found at Thetford (Bayley 1984).

The two **Type 5** crucibles are tall, straight-sided vessels. They come from a post-medieval, probably nineteenth-century context (OP4962).

An enclosed crucible form, with a handle (OP2183, probably datable to the Middle Late Saxon, Fig x) was given **Type 6**. Other rarer forms of crucible (Figures x-x) are not given individual types.

Use

Many of the St Stephen's Lane crucibles show evidence of high-temperature use; slagging, vitrification, bloating, distortion, blackened surfaces, corroded copper-rich deposits *etc*. In this report, the descriptive term **slagging** will be used where surfaces have lumps of additional material and the term **vitrification** will be used where the surface is smooth and glossy (due to high temperatures) but has no extra material adhering.

40 XRF analyses were carried out on crucible fragments, including examples of each type of crucible. Both vitrified and slagged areas were analysed.

On the whole, vitrified/slagged areas of the St Stephen's Lane ceramic debris produced XRF spectra with iron, zinc and lead as the chief metallic components (Tables x and x). The presence of a small amount of copper gives such coatings a red colour. Further complications arise when an area of crucible is vitrified as a result of being exposed to very high temperatures, near to fluxing agents, such as wood ash. In this case, the only metal detected in the area is iron (from the clay), but this does not mean that iron was melted or smelted in the crucible.

Elements detected often vary significantly over small areas, with higher levels of metal being found around the pouring lip or at the 'tidemark' inside the crucible.

In this study, 21 analyses were made on copper-rich deposits, trapped on or in the crucible walls (Table x). The results of analysis on this sort of deposit are more likely to correspond to the alloys originally used than those from vitrified or slagged areas. These analyses suggest that most of these fragments come from industries in which copper, alloyed with zinc, lead or tin (or a combination of these), was used for casting. Eight samples indicated quaternary alloys (containing all four main alloying components) and four were likely to have been bronzes (without detectable zinc). Other combinations of elements were rare.

Type 1 crucibles have deposits which contain copper, zinc, lead, tin and silver, in varying proportions. Type 2 crucibles are relatively rare in the sample, and those analysed showed little non-ferrous metal was present (with the exception of one which had a possible copper peak). However, since Type 2 crucibles have been found in the same contexts as Type 1 crucibles, some of the analytical conclusions based on data from this type may be applicable to Type 2.

Exceptional forms within this collection were the three examples with appreciable amounts of silver (OPs 669, 1239 and 2183). The use of an enclosed crucible (Type 6; OP2183, Fig 9) is paralleled at several early medieval sites in this country and abroad, although with different details of design (*eg* Craddock 1989, Fig 4,b-d; Brinch Madsen 1984, 27; Lamm 1980). Enclosed forms and forms with handles may have been employed during the melting of precious metals to ensure safe handling of the melt.

Heating trays

Five 'heating trays' were found in Early Late Saxon and Early Medieval contexts (OPs 90, 316, 317, 488 and 3456). These are thick ceramic pieces, with flat bases and slightly hollowed areas on the surface (Fig 14). The top surfaces are heavily vitrified, with multi-coloured (green, red, white) slagging. Many other pieces in the collection may also have been of this form, but are now too fragmentary for positive identification. Similarly much of the reused pottery assembly may have been used for similar processes, since the types of deposit are similar (see below).

Lead was the major element detected on the surfaces of these items, together with traces of copper, zinc and silver. These fragments could have been used in small-scale cupellation (*eg* Bayley and Barclay 1990, 175). The heating of copious amounts of lead together with mixed alloys in an oxidising atmosphere causes the oxidisation of lead and the other reactive elements, whilst other elements (copper, silver, gold) are still in their reduced form. If precious metals were involved, then the process must have been largely efficient, since many of the fragments which could have been used for cupellation do not bear deposits with detectable silver or gold. This fact also makes it difficult to prove conclusively that the material was used for cupellation.

Reused pottery associated with metalworking activities

Fabrics and forms

Large amounts of pottery were found in some of the areas and contexts which are associated with metalworking activity. The surface conditions of these pottery fragments are varied, including deposits of white crusts, iron encrustation, vitrification (sometimes with trapped metallic droplets) and non-ferrous accretions. Since some of the deposits cover broken edges of the pottery it is clear that at least some of the pottery fragments were being reused for metalworking procedures, probably after use in other contexts. 1195 fragments were examined, of which nine were only possibly of this artefact type.

The vessels represented are of a variety of thicknesses and forms (Figs 10-13) and are mostly reduced-fired. Some of the fabrics are similar to those seen in the crucible assemblage; indeed, many of the smaller fragments included in this category may have come from genuine crucible forms. However, much of the material was much thicker and coarser in texture than the complete or near-complete examples of crucibles and is closer in character to Thetford ware. It seems that the base portions of vessels were preferentially selected for reuse. Since pottery classification relies heavily on rim shapes, the typological implications of the St Stephen's Lane fragments in question are generally slight. Where the vessel forms may be evaluated, many of the vessels can be seen to have had flat bases with gently- (Figs 10 and 13) or steeply-sloping sides (Fig 12). The forms are similar to the plainer Thetford ware bowl forms (*eg* McCarthy and Brooks 1988, Fig 80, no 170; Rogerson and Dallas 1984, Fig 171, no.s 289 and 297).

Use

Qualitative analysis on a selection of these objects (using XRF) showed that the deposits on the reused pottery fragments were chemically as well as visually varied (Table x). The different types of deposit tend to have different chemical characteristics;

i) **White crust-like slagging** normally has high quantities of lead, with traces of copper and zinc occasionally detected. Processes which might produce such deposits include precious metal recovery (see ii) and iii) below).

ii) **Droplets of silver metal** were observed on two pieces of pottery and shown (by XRF) in one case to be silver, with copper and traces of zinc and gold (OP1194) and in the other most probably a silver-copper alloy (OP4677). Another fragment was observed to have a droplet of gold on it (Bayley pers comm) but this individual piece was not seen again, during this investigation.

iii) In **vitrified areas**, the strongest signals are from lead, with smaller amounts of copper and zinc. As noted above, lead is a good glass-forming element and lead-rich 'glazing' can form at relatively low temperatures from any process involving lead. Green, blue, red or brown colouring is caused by the presence of iron and copper in various oxidisation states. In some examples, circular depressions can be seen within the vitrified surface, which suggests that a button of metal solidified in this position (during refining) and was then picked out for use; material from OP414 includes a particularly clear example of this (Fig x).

iv) A small fragment with an unusual profile (possibly a reused pottery fragment; OP2929, Fig 7) had a **powdery black deposit**. XRF analysis revealed lead was present. Another fragment, whose original form is unclear has a powdery orange/pink surface which is also high in lead (4801, OP308, dated to the Middle Late Saxon).

v) The **non-ferrous accretions** tested (green blobs, rather than glazes *etc.*) have a range of elements present which are very similar to those seen on crucibles from the site. Hence they may have been used for similar purposes.

vi) Several pieces had **ferrous accretions** on them.

Several re-used pottery fragments had extra layers of clay added on the outside (*eg* OPs 2305 and 4147). These may be 'luting' and would have served to join together two vessels or a vessel and its lid, to form complicated shapes. The fragments concerned are non-diagnostic in form, but were clearly designed to retain heat or to retain volatile elements.

It is clear that ceramic (?domestic) vessels often had extended use-lifespans and, in a secondary usage, were seen as cheap alternatives to new crucibles in various processes. It is not impossible that some of the vessels described in this section were made for a specific industrial process, however.

Moulds

Forms

There are 48 fragments from moulds at the St Stephen's Lane site (Appendix 1). Moulds are normally reduced-fired to a pale or dark grey throughout as a result of the casting processes and/or as a result of the initial firing. The fabric used is fine in texture, with few visible inclusions in the mould surface, although larger inclusions can occasionally be seen in the outside surfaces. They were made in two or possibly more parts, luted together with extra layers of clay (Figs 16-19) as in most other assemblages of this period (Wharram Percy, Flaxengate).

At St Stephen's Lane, about a dozen fragments show the decorative nature of the objects being cast (possibly caterpillar brooches, mounts, tags *etc.* (*eg* Figs 19, 21)). Occasionally the ingate area of the mould is preserved (Figs 19-21). The outside edges of the moulds were made concave or convex so that they would 'register' well in their relative positions (*eg* OP2305 (concave portion), OP413 (convex portion)).

Two possible ingot moulds were found at the site (OPs 4677 and 923). These are made from re-used bricks with roughly-cut indentations. The bricks are oxidised and there is little visual evidence for the moulds having used.

Use

The result of XRF analyses of mould fragments should be treated with caution. In addition to the reasons outlined above (pages 1-2), it is important to note that mould fabrics were selected to be as unreactive as possible to metal.

The moulds tested produced spectra in which zinc and lead are the only non-ferrous metals at significant concentrations. In a small number of cases, metal droplets were observed to be trapped in the fabric, *eg* at the ingate area of one mould (3009), a lump of copper corrosion may originally have been a bronze alloy (XRF detected copper, tin and lead with small amounts of zinc).

It was difficult to analyse the surfaces of the possible ingot moulds, because of the geometry of the XRF system, but XRF analysis of the mould from OP4677 showed zinc and traces of lead and copper. This suggests that the mould were used (it is unlikely that zinc would have been the dominant element if the non-ferrous metals detected were due to contamination during burial). Analysis of the mould from OP923 did not reveal any non-ferrous metals.

Dates of use for ceramic debris

Types 2 and 3 are mainly found in early Late Saxon contexts (*c.*850-*c.*900). Type 1 crucibles are relatively common in the early medieval period (*c.*1000-*c.*1200), but are first encountered in the early Late Saxon period. Fragments which were attributable to either Type 1 or Type 2 are most common in the early Medieval period, but were also common in Early Late Saxon, Middle Late

Saxon and Late Medieval contexts. The two type 4 fragments were found in an early Late Saxon context.

Four out of the five heating trays were found in Early Late Saxon contexts.

Nearly three quarters of the re-used pottery fragments examined (886 out of 1195) came from early Late Saxon contexts or contexts which are thought to be early Late Saxon, with some contamination (ELSc, ELS+, ELS?). The rest of the material comes from each of the remaining phases, up to and including the Late Medieval Transitional.

None of the mould fragments are sufficiently complete to allow dating by typological means (*ie* from the form of the objects being cast). However, most of the fragments were found in contexts dated to the Early Late Saxon period or to a general Late Saxon phase (ELSc or ELS/MLS). The ingot moulds come from probable Late Medieval contexts.

Non-ceramic material

Litharge cakes

The use of lead in metal refining techniques has been recorded in several contemporary sites (*eg* Coppergate, York (Bayley 1992)), so it is not surprising that similar evidence was found at this site as well. A litharge cake was found in an Early Medieval context (OP2364); it has a bowl-like shape (Fig x), similar to those seen at other sites. Litharge was the product of cupellation techniques which purified gold and silver, using copious amounts of lead. This evidence may link in with the lead-rich slagging and vitrification seen on much of the reused ceramic material. The piece of litharge from OP2364 has detectable amounts of copper and tin, as well as lead.

Droplets/dross

28 small, irregularly-shaped droplets, now thoroughly corroded, and other larger pieces of waste/slag were probably originally copper alloys. They come from various phases, from the Middle Saxon to the Late Medieval Transitional and most of them contain copper, lead and tin. Many of these are small enough to be mobile in the soil and contamination or residuality is therefore quite likely.

Scrap, debris and artefacts

Considerable amounts of non-ferrous metal were recovered from this site, in the form of artefacts as well as offcuts and other fragments of scrap, perhaps destined for recycling. The pieces consist of brooches, dress-pins, lace tags, fittings and examples of various artefact types known from other medieval sites, as well as fragments of wire and sheet. However, there were no part-formed artefacts, as far as is known.

No samples from the scrap or artefactual assemblies were included in the sample for this report, but a selection of the material has been analysed as part of another study (Blades forthcoming).

The analysis of the copper-alloy material from St Stephen's Lane shows a variety of compositions, from high-purity, high-zinc brass to bronzes with zinc and lead present. The analytical data can be grouped by phase and by alloy type (Table x).

However the dating assigned in this project relies on contextual evidence since the objects themselves were not inspected typologically.

Bronzes are more common amongst material from the Saxon and Early Medieval phases than amongst the Late Medieval, Late Medieval Transitional and Post-Medieval phases, in which high-purity, high-zinc brasses (more than 15% zinc, less than 1% tin and less than 2% lead) are common. However, high-purity, high-zinc brasses are occasionally found amongst material from Late Saxon contexts (*eg* a zoomorphic strap end from OP385 has 20.2% zinc, 3.2% lead and 0.7% tin).

Bronzes, with varying amounts of zinc and lead, were the normal casting alloy used in the early Anglo-Saxon period (Mortimer 1990) except where metals were imported from other regions (Oddy 1984). There are relatively few published analyses from Middle and Late Saxon material. Although use of bronze probably continued in these periods, it is likely that brass began to be manufactured again, by the ninth century (Metcalf 1987). Analyses carried out on large collections of medieval and post-medieval artefacts demonstrate that high-zinc, high-purity brasses are frequently found in late Medieval and later periods (eg dress pins, Caple 1986; coins and jettons, Mortimer et al 198x; sheet work, Cameron 19xx).

So the material from St Stephen's Lane fits into compositional trends observed elsewhere.

Comparison between ceramic and metal evidence

Many crucibles and re-used pottery fragments have deposits with copper, zinc, lead and tin present in variable amounts, so that on-site manufacture of all of the types of artefacts found at St Stephen's Lane is theoretically possible. However, pairing up deposits on ceramic debris with artefact compositions is difficult, if not impossible, as a survey of deposit type, sub-divided by phase, demonstrates.

Analytical information shows that tin-containing alloys were melted in ceramics found in contexts belonging to all phases at the site (Table 10). Indeed, the percentage frequency of tin-containing alloys is very similar in each phase. Despite analytical problems, it is possible to deduce that zinc was not found any more frequently on the later ceramics than on the early ceramics (as would be the case if increasing numbers of brasses were being cast at the site). Similarly, the ubiquity of lead in ceramic surfaces confuses information about the frequency of use of leaded alloys or the levels of lead in copper alloys, but the data available means that, at the very least, a dramatic decrease in levels of lead (relating to the decreasing levels of lead in Late Medieval and Late Medieval Transitional brasses) can be discounted, for the Late and Post Medieval periods.

So it is difficult to establish the exact nature of the relationship between the ceramics used and discarded at the site and the artefacts found at the site. There is no evidence for significant amounts of brass working in the latest phases of the site, so it seems likely that any brass artefacts found on the site were not made there, unless they were not cast artefacts, in which case the metal may have been brought in partly-formed (*eg* as rolls of wire, in the case of brass pins).

Since much of the material in post-Late Saxon phases may be residual from the Late Saxon phase of occupation, it is not surprising that the ceramic and artefactual data do not correlate, when considered period-by-period.

Conclusions

There is evidence for a range of activities in the St Stephen's Lane area of Ipswich during the late Saxon and medieval periods. Metalworking evidence submitted for analysis is primarily concerned with the melting and casting of non-ferrous metals, the majority of which contained copper, zinc, tin and lead in various proportions. Other processes included refining and melting of silver.

The bulk of the material came from contexts given an Early Late Saxon date (or from contexts dominated by Early Late Saxon material, but which had suffered contamination). Since no new crucible forms are found in subsequent phases and the frequencies tend to trail off (Table 2), it seems likely that much of the material found in periods after the Early Late Saxon was residual.

Comparative material

Contemporary metalworking sites include Coppergate (York) and Flaxengate (Lincoln), both in the Danelaw during the late Saxon period, Thetford, Northampton and Winchester (Bayley forth x2; Bayley and Barclay 1990). These sites also provided material relating to non-ferrous metal melting and casting, although the evidence for each process were found in different proportions on different sites. Cupellation processes were common at Thetford (ref), leaving large numbers of litharge cakes.

Blades N forthcoming. 'Copper alloys from English Archaeological Sites 400-1600 AD: An analytical study using ICP-AES' Royal Holloway and Bedford New College, University of London, PhD thesis

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	Table 1 Complete listing of technological material, ordered by op, then context						
context	**op**	**phase**	**type**	**surface**	**number**	**xrf**	**comments**
1	1	u/s	1 , 2	ox	6		
1	1	u/s	1 , 2		9		
1	3	u/s	u	v o	2		
11	24	lmt	r	sl i mc	1		
28	26	lmt	r	v i+o grey	4		
6	31	emed	u		1		
11	55	lmt	u	v o bl	1		
11	56	lmt	r	fe cu	2	cu pb (sn)	
11	56	lmt	r	sl i mc, sl o red	5		
73	73	mls	u	v o?	3		
73	79	mls	1 , 2	i grey	9		
73	79	mls	u		2		
73	80	mls	u		1		
85	85	els	1 , 2	sl i	5		
85	85	els	hl		6		
85	85	els	m		1		
85	85	els	r	sl+v i+o bl grey	2		
85	85	els	r	sl i+o mc	17		
85	85	els	r	sl i	4		
85	85	els	r	sl o green	1		
85	85	els	r	sl i	207		
85	85	els	r	sl i+o	5		v. bloated
81	87	emed	u		3		
85	90	els	1 , 2	v i+o	2		
85	90	els	1 , 2		3		
85	90	els	heating tray		1		
85	90	els	hl		4		
85	90	els	m		2		
85	90	els	m		1		
85	90	els	r	sl i mc	187		
85	90	els	r	v i	8		
85	90	els	r	sl i+o mc	19		
85	90	els	r	v i+o	2		
85	90	els	u	v o	1		
83	92	lmt ?	1 , 2	v o	2		
83	92	lmt ?	r	v mc i	2		
95	95	nd	1	v sl mc	1		
96	96	nd	u	v o	2		
1	119	u/s	1 , 2	sl o, ol?	1		
1	119	u/s	r	v i red + black	1		
132	132	lmed/lmt	1 , 2	v o, sl i mc	2		
132	132	lmed/lmt	r	v i	1		
132	132	lmed/lmt	r	sl i mc	2		
132	132	nd	u	v	2		
208	156	lmt	u	ol bloated	1	(zn cu)	
127	166	lmed	m		1		
127	230	lmed	r	sl fe cu	1	pb sn (cu zn)	i
237	237	lmed +	3		1		
262	262	lmt	1	v ?	1		
269	269	nd	1	v o	1		
253	281	lmed	u		1		
255	282	lmed	u	v o bl	1		

289	289	lmt	1 , 2		3		
289	289	lmt	r	v i	1		
291	291	emed	1 , 2		2		
291	291	emed	m		1		
299	299	nd	ca drop		1	cu	
1	300	els	r	v o sl mc	47		
300	300	els	1	sl o	6		1xu handle? 1xr?
300	300	els	4	wh 2 layers min	2	(pb zn cu)	
300	300	els	m		1		
300	300	els	r	sl fe	1	pb (cu zn)	i
301	301	lmed	u	v o	1		
11	302	lmt	nf dross	ca	1		
317	305	els	r	sl i mc	53		
317	305	els	r	sl i mc, v o grey	1		bloated
317	305	els	r	sl i+o	3		
317	305	els	r		5		
317	305	els	r	black layer	4		
317	305	els	r	fe obj	1		
11	312	lmt	r	v	4		
316	316	els c	1	ol v	2	(pb cu)	o
316	316	els c	1	l	1	zn pb (cu)	u 10
316	316	els c	fe sl ?		3	fe pb cu	
316	316	els c	heating tray		1		
316	316	els c	m		3		
316	316	els c	m		2		
316	316	els c	r	sl v g wh blc	20	ag pb br cu zn	
316	316	els c	r	sl v mc i	23		obj?
316	316	els c	r	sl v mc i	8		
316	316	els c	r		2		
316	316	els c	r	v mc i	2	pb ag (cu)	
316	316	els c	r	sl wh	6		
316	316	els c	r	sl i orange, sl o grey	2		
316	316	els c	r	sl i+o wh	2		
316	316	els c	u	v i	1	pb cu sn zn	
316	316	els c	u	sl mc	12		
317	317	els c	1	v bl	1	pb cu (ag?)	
317	317	els c	1	sl wh i	1	pb cu sn	
317	317	els c	3		1		
317	317	els c	1 , 2	sl i wh	7		
317	317	els c	1 , 2	v i mc	1		
317	317	els c	1 , 2	sl i grey, v o	1		bloated
317	317	els c	1 , 2	black layer	1		sty
317	317	els c	fired clay		3		
317	317	els c	heating tray		1		
317	317	els c	m		1		
317	317	els c	r	v sl ca	22	cu pb sn zn, ca	
317	317	els c	r	sl wh	1	pb cu (sn)	i
317	317	els c	r	sl ca	1	pb sn cu	
317	317	els c	r	v i	10		
317	317	els c	r	sl ca	1	pb cu zn ca	
317	317	els c	r	sl wh i	5	pb cu (sn)	
317	317	els c	r	sl	2		
317	317	els c	r	sl wh i	15	pb (sn cu)	i
317	317	els c	r	v mc i	14	cu pb zn (?sn)	
317	317	els c	r	sl wh i	6		
317	317	els c	r	sl ca mc i	8		frags no coat
317	317	els c	r	sl i black	1		
317	317	els c	r	sl i+o red	1		

317	317	els c	r	v i wh	1		
317	317	els c	r	v i orange, bl sl o	1		
317	317	els c	r	sl i mc	3		
317	317	els c	r	sl o wh	1		
317	317	els c	r	sl i wh	1		
317	317	els c	r	sl o	1		
317	317	els c	u	ol? bloated	1		
317	317	els c	u	sl wh i	3		
317	317	els c	u	sl ? i	4		
317	317	els c	u	sl wh i ol	3	pb cu (sn)	
321	321	els c	3	ol v gr	1		
321	321	els c	nf dross		6		sty
321	321	els c	r	sl	2	pb zn cu	
321	321	els c	r	sl wh	13	pb (cu)	
321	321	els c	r	v i	2		
321	321	els c	r	sl i green	1		
325	325	els	r	v mc	1	(cu zn pb)	
33	326	lmt	1 , 2	ox	7		
33	326	lmt	1 , 2	v o bl	5		
33	326	lmt	r	v o	9		
33	333	lmt	r	v i+o	1		
333	333	lmt	r	sl bl/wh	2	pb cu ag	
338	338	lmt	u ?		1		
29	347	nd	ca drop		1	pb sn cu	
331	353	lmt ?	3 ?		1		
331	353	lmt ?	u	sl i mc	1		
85	354	els	r	v o, sl i	2		bloated
355	355	mls	u	v o bl	1		
372	372	els	r	v+sl red	4	ag (cu)	
33	373	lmt	u	v+sl o mc	1		
85	374	els c	r	v o bl red	5		
377	377	ms	ca drop		1		
84	378	mls	u	v o	1		
29	379	emed ?	r	v o, sl i mc	5		
385	385	els c	r	v i+o, sl i	3		
385	385	els c	u	v	3		
390	390	emed	1	v o, sl i?	1		
29	392	ctm ?	1	y	2		
29	392	ctm ?	2	sl i mc	4		
413	413	lmed ?	1 , 2	v i	2		
413	413	lmed ?	m		1		
85	414	els	2		4		
85	414	els	3	ol	1		
85	414	els	m		10		
85	414	els	r	sl i	1	ag pb cu	sty ph
1	430	mls	u	fe cu	1	?	
434	434	ms/els	3	v o?	1		
434	434	ms/els	1 , 2		1		
434	434	ms / els	nf dross	cu	2		
434	434	ms / els	r	v sl mc	2		
434	434	ms/els	u		1		
435	435	lmt	u	sl+v i	2		
413	438	lmed	1	ox	1		
413	438	lmed	2		1		
413	438	lmed	3 ?	ol	1		
413	438	lmed	u	v o	1		fr
413	439	lmed	u		3		
435	448	lmt	r	sl black i	1	pb (cu)	
435	448	lmt	u	v o	1		

413	453	lmed	1	v o	3	cu zn sn	
413	453	lmed	2		1		
413	453	lmed	1 , 2	v sl mc	45		
413	453	lmed	1 , 2	ox	14		
413	453	lmed	ca drop		1	cu pb	
413	453	lmed	r	v i	1	cu zn pb sn	i
413	453	lmed	r	v sl i mc	15		
413	453	lmed	u		3		bloated
463	463	ctm	r	v bl	1	pb (cu) i	
464	467	els	r ?	v+sl i bl/ red	1	pb cu sn (zn)	
468	468	lmt	1 , 2	sl i wh	3		
468	468	lmt	r	v bl	1	pb (cu sn)	i
1	475	mls	u ox		1		
478	478	mls	r	sl	2		bloated blob
478	478	mls	u		7		
478	478	mls	u	ox	3		
478	478	mls	u		9		
482	482	els ?	1 , 2	v o	6		
482	482	els ?	u	v+sl i mc	1		
482	482	els ?	u	v o	1		
1	488	emed	heating tray		1		
488	488	emed	1	white	3	pb (cu)	
488	488	emed	2	sl o	2		2 anon frags
488	488	emed	r	wh	6	pb (cu)	
488	488	emed	r	sl mc i	4		
488	488	emed	u		4		
355	490	mls ?	?	sl	1		
355	493	mls	u		1		
496	496	mls ?	1 , 2		2		
496	496	mls ?	hl	sl+v	1		
497	497	emed	?	sl+v i	1		
497	497	emed	r	wh sl i	4	pb (cu)	
497	497	emed	r	v sl mc ca	8		
497	497	emed	r	sl i white	7	pb	
497	497	emed	u	v o	2		
501	501	mls	ca drop?		1		
501	501	mls	r	v o	3		bloated
385	512	emed	1 , 2	sl o mc	1		
520	520	mls	1 , 2	ox	4		
520	520	mls	1 , 2		5		
522	522	emed ?	1 , 2		1		
522	523	emed	u	sl o	1		
522	523	emed	u	v o	3		bloated
29	526	mls	u		1		
528	528	els	1 , 2		2		
542	528	emed	1		4		
433	534	emed	nf dross		2		
433	534	emed	u	v o	1		bloated
542	542	emed	u	ox	1		
543	543	els	1 , 2		1		
1	552	ls	1 , 2	ox	1		
559	559	mls	1 , 2		2		
559	559	mls	r	sl i	1		
569	569	lmed	r	v sl	1		
569	569	lmed	u	sl o+i mc	3		
577	577	lmt	?	sl mc	1		
553	579	emed	u		1		
33	582	lmt	r	ox	3		
33	582	lmt	u	v ?	3		

541	584	els	1 , 2		2		
541	584	els	r	sl i mc	3		
33	585	lmt	?	sl wh o	1		
570	589	emed ?	u		1		
334	590	els	r	v	1		
804	593	mls	u		13	zn cu pb ag?	o
33	597	lmt	u		2		
600	600	lmt	1 , 2	v o, red i	1		
600	600	lmt	m? r?	ca o	1		
600	600	lmt	r	sl o grey	1		
615	615	lmt ?	1 , 2		1		
624	624	lmt	r	v green i	1		
626	626	lmt -	1 , 2	v o+i	1		
626	626	lmt +	r	sl o grey	1		
643	634	ctm ?	1 , 2	v o	1		
643	634	ctm ?	nf dross	black	1	fe	
637	637	emed	u		1		
639	639	emed	?	sl	1		
643	643	emed	u	sl i, v black o	1		
1	645	els	u ?	v o	2		
650	650	mls	1	v o	7		
650	650	mls	1 , 2		2		
650	650	mls	1 , 2 ?	ol sl o	3	zn ag (cu)	
658	658	emed	1 , 2	v i green	1		
658	658	emed	u		2		
661	661	mls	1 , 2		3		
661	661	mls	r	v i green	1		
664	664	emed +	1 , 2		2		
664	664	emed +	1 , 2		1		sty ph
664	664	emed +	r	sl bl i	1	nd	
664	664	emed +	r	sl i green	3		
664	664	emed +	u		1		
665	665	emed	3		1		
615	667	lmt ?	u	v i	1		
643	668	emed	r	sl i, v o	2		
669	669	emed	1	v	11	ag cu	
669	669	emed	?	v i	1		
669	669	emed	1 , 2		1		
669	669	emed	r	v	2	ag cu (zn pb)	o
669	669	emed	r	sl o ox	1		
669	669	emed	u ?		1		
665	677	emed	1 , 2		6		
665	677	emed	ca ?		1		
665	677	emed	r	v+sl o + i mc	1		
665	677	emed	u		1		
260	680	lmed +	r	v sl mc i	1		
260	680	lmed +	u		1		
684	684	mls	r	v thick red	1	pb cu zn sn ?	
684	684	mls	r	sl o+i	2		
684	684	mls	r ?	fe i	2	fe	
684	684	mls	u		3		
261	690	lmt	3	sl ca lip	1	cu pb sn	whole
691	691	emed	r	sl ca	1		
691	691	emed	u		2		
242	692	mls c	r ?	sl / v i	1	cu pb	frag r?
242	692	mls c	u	v ? o	1		
242	692	mls c	u		2		
643	693	emed	u	v o	1		
699	699	lmed	u ?	v o	1	(cu)	o

702	702	emed	ca drop?		1		
705	705	emed ?	u		1		
600	707	lmt	ca drop		1	cu pb	
643	708	ctm ?	u	v o	1		
711	711	mls	1 , 2		1		
711	711	mls	hl?		1		
711	711	mls	r	o red	2		
651	720	lmed	r	sl mc	1	pb cu sn	
746	746	ctm ?	nf dross	ca	1		
746	746	ctm ?	u	v i green	1		
746	746	ctm ?	u ?		1		
749	749	emed	u	v o	1		
661	750	mls ?	r	v bl i	1		
661	750	mls ?	u		2		
756	756	lmt	u		1		
762	762	lmt	nf dross/ fl		1		
765	765	lmt ?	ca		1		
765	765	lmt ?	u		1		
776	776	els	u		1		
698	782	lmed	u		1		
329	804	emed	u	sl o	5		
804	804	mls	1		1		
804	804	mls	1 , 2		8		strap/ handle?
804	804	mls	r	sl wh i	14		
804	804	mls	u	ol v o	1		
460	805	ms	u	ol?	1		
814	814	emed	1 , 2	ox	1		
814	814	mls	tech?	glass?	1	si fe sr (zn)	
814	814	emed	u		2		
817	817	lmt	ca drop?		1		
817	817	lmt	daub		1		
818	818	mls -	r	sl i orange	1		
827	827	lmt	1 , 2		1		
829	829	lmt	u	sl ca i	2	pb (zn)	
33	830	lmt	1	ox	1		
33	830	lmt	1 , 2		1		half intact
834	834	lmed ?	1 , 2	v o	1		
827	837	lmt	u	sl?	1		
841	843	els	u		4		
854	853	els	u	v o	4		
854	854	els	m ?		1		
856	856	pmed	1 , 2	v o	2		
810	860	lmed	u		1		
810	860	lmed	u	sl	1		
1	861	u/ s	1	ox	1		
1	861	u/ s	u	sl i red	5		
865	865	mls	1 , 2		1		
868	868	lmed	1 , 2		1		
1	873	lmed	r	sl wh	1		
885	885	els c	1 , 2	v o	5		
891	891	els	r	v o	1		
923	923	lmed ?	m		1	nd	for ingot
876	930	els/ mls	1 , 2	v o	17		strange fabric
1	932	els ?	fe ore/ slag		1	fe	
933	933	ms	1 , 2	v i, v o red	1		
876	941	els/ mls	1 , 2	v o	6		
876	941	els/ mls	fe lump		2		
1	950	mls c	r ?	v ?	1		
952	952	lmed	u		1		

997	953	lmed	1 , 2		1		
997	953	lmed	r	sl mc	3	pb cu (zn sn)	i
954	954	emed	1 , 2	ox	1		
961	961	emed ?	3 ?	v o red	1		
961	961	emed ?	r		1		
997	969	lmed	1 , 2	v o bl i red	2		
997	969	lmed	r	sl+v mc	2		
424	972	els ?	r	sl+v wh	1		
834	974	lmed ?	u	v o	1		
997	997	lmed	r	sl o green	1		
996	999	els	r	sl i green	3		
1017	1017	lmed	?	sl o ?ol	1	zn cu pb	
1017	1017	lmed	r	v i	3		
1023	1023	lmt	u	ol	1	zn	
1001	1043	lmt	1 , 2	sl i grey	2		
1001	1043	lmt	1 , 2		2		
1049	1049	pmed	fs?		1	nd	
1017	1061	lmed ?	1 , 2		1		
1017	1061	lmed ?	u	v o	1		
1017	1067	lmed	r	ol	1		
1093	1093	lmed	1	sl o	1		heavy slag layer
1093	1093	lmed	r	sl i orange	3		
1093	1093	lmed	r	sl i grey	2		
1093	1093	lmed	r	sl i wh	4		
1093	1093	lmed	r	v i bl	1	cu pb ag fe	sty
1093	1093	pmed	r		1		
1093	1093	lmed	u	sl i grey	3		
1093	1093	lmed	u		1		
1096	1096	mls	u		1		
1097	1097	emed	r	sl cu i	1		
1102	1102	lmed ?	1	sl i + o grey	1		
1111	1111	lmed	u	v o	1		
1133	1132	lmed (1)	u		1		
1133	1133	lmed	1 , 2		1		
1133	1133	lmed	r	sl o wh	37		
1133	1133	lmed (1)	u	ox	1		
1148	1148	els +	r	sl ? fe	2		
1165	1165	lmed	r	v mc	1		
1165	1165	lmed	u		2		
1168	1168	emed	u	v red	1	pb (cu ag?)	
1170	1170	emed	1 , 2	v o	2		
1170	1170	emed	r	sl	2		
1	1182	u/s	1 , 2		1		
1189	1189	nd	u		1		
1194	1194	lmed	u	y	1	ag	
1	1197	els ?	1	sl i	1		
997	1210	lmed	1 , 2	v o ?	1		
1212	1212	emed	r	o mc	1		
1212	1212		r	fe	1		
1212	1212	emed	r ?	v	1		
435	1213	lmt	1 , 2	v o	1		
435	1213	lmt	r	sl i ol?	1		
1233	1233	emed	r	sl i v o	1	au pb cu zn ?ag	
1233	1233	emed	r	sl i bl+mc	1	pb zn cu	
1235	1235	lmed	r	sl v i	1		
1239	1239	lmed	1	sl bl o	4	zn cu pb	
1239	1239	lmed	r	v+sl	2		r
85	1247	emed c	1		1		
85	1247	emed c	r	sl o mc	1		

85	1247	emed c	r	sl o wh	1		
85	1247	emed c	r	v i+o	1		
85	1247	emed c	r	sl i wh	2		
85	1247	emed c	r	sl i mc	1		
1285	1285	els	u	v o	1		
1285	1285	els	u	v o	1		
1233	1288	lmed ?	r	sl mc	13	pb cu ag zn	
1304	1304	lmed	r	sl/v mc	4		
1239	1316	lmed	1 , 2	i red v o	1		
1239	1316	lmed	r	sl i	1		
1318	1318	els ?	u	v?	1	(pb cu)	i
1339	1339	lmt	u	sl wh i	1		
997	1340	lmed	r	v i bl	1		
997	1456	lmed	r	o	1		
997	1459	lmed	r		1		
1531	1531		r	sl i orange	1		
1555	1555	emed	u	v o	1		
1546	1581	els	r	v	2		
1712	1712	mls	u	v o	3		
1715	1715	els	1		1		
1715	1715	els	1 , 2	sl o	1		
1715	1715	mls	r	v bl	6		
1715	1715	els	u		1		
1800	1800	emed	1	v o	1		
1800	1800	emed	1 , 2	v o	2		
1800	1800	emed	r	v bl i	1		
1800	1800	emed	u		1		
1803	1803	mls	1 , 2		1		
1804	1804	emed ?	1 , 2	v o, sl i grey	1		
1804	1804	emed ?	u		2		
1806	1806	nd	1 , 2		2		
1815	1815	els c	1	v o	1		
1815	1815	els c	1 , 2	v o	1		
1815	1815	els c	fs?	ca blob	1		
1817	1817	emed	u		2		
1817	1817	emed	u	sl i + o	1		
1825	1825	els ?	u		1		
1826	1826	lmt	u	v o	1		
1828	1828	emed	u		1		
1828	1828	emed	u		3		
1828	1828	emed	u	i + o red	1		bloated
1831	1831	nd	1 , 2		11		
1833	1833	emed	1 , 2	ox	9		
1837	1837	emed	1		1		
1837	1837	emed	1 , 2	v o	1		
1837	1837	emed	u		1		
1833	1844	emed	r	sl i mc	1		
1857	1857	lmt	1 , 2		1		
1857	1857	lmt	r	sl i red	1		
1867	1867	emed	3	ol	1		
1872	1872	emed	1 , 2	v o red	1		
1872	1872	emed	1 , 2		1		
1872	1872	emed	1 , 2	v o black	1		
1878	1878	emed	1 , 2	v o	1		
1880	1880	emed	m ?		6		sty
1888	1888	els c	1 , 2	sl i, v o red	1		
1899	1899	els ?	nf dross/ fl	v o	2	cu pb (zn)	
1899	1899	els ?	u		3		
1899	1899	els c	u	v o mc, v i grey	1		

1928	1928	mls	u		1		
1929	1929	lmt	r		1		v bloated
2022	1930	emed	1 , 2		2		
2022	1930	emed	u		1		
2022	1930	emed	u	v o	1		
2022	1931	emed	r	sl i wh	2		
1934	1934	emed	1	ox	1		
1937	1937	lmed +	1 , 2	v o	1		
1936	1942	mls	u	sl i +o grey	1		
1945	1945	mls	u	ox	2		
1945	1945	mls	u		2		
2022	1946	mls	u	v o	1		
2022	1946	mls	u + ol?	sl red o	2		
1948	1948	lmed	1 , 2	v o	1		
1951	1951	ms ?	u	v o	1		
2022	1952	emed	1 ?	sl/ol	1	cu (sn)	i
2022	1952	emed	u		2		
2022	1953	mls ?	3	v o	1		
1934	1961	emed	u	v o red	1		
1963	1963	els ?	1 , 2	v o red	1		
854	1977	els ?	u	v o	1		
854	1977	els ?	u		3		
1999	1999	emed	1 , 2	v i	1		
1999	1999	emed	1 , 2		2		
1999	1999	emed	u	v o	1		
1990	2008	emed	u	sl o	5		
2011	2011	lmed (+)	u	v ol? sl i green	1		
1888	2020	els	?	sl bl	1		
2021	2021	els	ca scrap		1		
2022	2022	emed	u	v o	1		
2022	2026	mls	u	v o	1		
2027	2027	emed	r ?	bl	1		
2027	2027	emed	u	v o + i red	1		bloated
2022	2047	emed	1 , 2		2		
2086	2086	emed	u	v o	1		
2022	2087	emed	r	sl wh i	1	pb (cu)	
2022	2088	emed	1 , 2	v o	1		
2140	2114	emed	r	v	1		
2140	2114	emed	u	v o r	1		
2173	2115	emed ?	1 , 2	v o	1		
2117	2131	els	1 , 2	v o mc	1		
2117	2131	els	u	v	1	cu zn	
2117	2131	els	u	v o sl / ca i	3	cu pb sn (ca)	
2117	2131	els	u	v o sl i green	3		bloated
2117	2131	els	u	o red	1		
2138	2138	emed	u	v o	1		
2140	2140	emed	nf dross		1	pb	
2139	2143	emed +	3 ?		1		
2139	2143	emed +	r	v red	1		
2173	2173	emed ?	1	ox	1		
2173	2173	emed ?	1 , 2	v o	2		
2173	2173	emed ?	1 , 2	v o	1		v. bloated
2182	2182	mls +	3	ol sl ca i	1	cu pb sn zn	whole + fr
2162	2183	mls ?	6	v	1	ag (cu zn)	
2184	2184	emed +	u		1		
2187	2187	emed	u		2		
2193	2193	ms	1	ol	1		
2193	2193	ms	1		1		

2195	2196	emed	1	v o sl i green	1		
2215	2215	emed	1 , 2	v o	3		
2215	2216	emed	u	v o red	1		
2215	2216	emed	u		1		
2235	2235	nd	3	v o red	1		
2022	2244	emed	u		1		
2246	2245	emed	1 , 2	v o	2		
2246	2246	emed	1		4		big
2173	2263	emed ?	1 , 2	v o	1		
2173	2263	emed ?	1 , 2		1		
2173	2263	emed	r	v sl	1		
2383	2277	mls c	r	sl	1	pb (cu)	i
2117	2279	els	nf dross	cu	1		
2117	2279	els	r	v o r	1		
2117	2279	els	u	v o+i	4		bloated
2246	2282	emed ?	1 , 2		3		
2246	2282	emed ?	1 , 2	sl i	2		
2246	2282	emed ?	1 , 2	v o	1		
2246	2282	emed ?	r	v / sl i	1		
3009	2287	els/mls	1 , 2	v o	1		bloated
3009	2287	els/mls	nf dross	cu	4		
3009	2287	els/mls	nf dross		4		
2117	2305	els	3	sl	1	cu zn pb sn	
2117	2305	els	3	sl ca i sl bl o	1	cu zn pb sn	i
2117	2305	els	1 , 2	sl red o cu i	1	cu pb sn	frags
2117	2305	els	1 , 2	v red o ca i c	30	cu sn pb (zn)	
2117	2305	els	1 , 2	sl ol red bl	20	cu pb sn	luting
2117	2305	els	3 ?	ol ? sl / v o	9		very small
2117	2305	els	3 ?	sl ca at lip	3		pour handle
2117	2305	els	m		2		
2117	2305	els	nf dross		2		
2117	2305	els	u	v red o	5		very fraggy
2117	2305	els	u	sl ca	9		
2246	2332	emed ?	u		2		
1	2363	emed	u		6		
2673	2364	emed	litharge		1	pb (cu sn)	
2367	2367	emed	1 , 2		23		
2367	2367	emed	1 , 2	ox	1		
2367	2367	emed	1 , 2	v i + o	1		bloated
2383	2383	mls	u		1		
2383	2383	mls	u	sl i	1		
2386	2386	emed	u	sl i v o	1		
2395	2395	emed	u	v o	1		
2936	2396	emed	fl	sl mc	2		
2395	2406	emed ?	u	v o red	1		
2243	2448	emed	u	sl i + o	1		
2456	2456	nd	u		1		
2507	2507	nd	u	v o mc sl i green	8		
2518	2519	emed ?	u		2		
2518	2520	emed	u		1		
2140	2521	nd	1 , 2	v o mc	1		
2022	2561	nd	nf dross		1	cu fe sn pb	
2567	2567	els ?	hl		5		
2567	2567	els	u	v sl	24		
2580	2580	lmt ?	1 , 2	ox	1		
2580	2580	lmt ?	u	v red green	1		
2589	2589	emed	r	fe object attached?	1		
2556	2631	emed ?	1 , 2	ol	1		

1964	2636	mls	u		1		
2673	2642	emed	u		1		
2673	2642	emed	u	v o bl	1		
2673	2643	emed ?	1	ox	2		
2673	2643	emed ?	1 , 2	v i sl	5		
854	2645	els ?	3	sl i	1		bloated
854	2645	els ?	1 , 2 ?	v i + o	1		
2022	2668	emed	fe obj ?		3		
2673	2673	emed	u		2		
2673	2674	emed	1	ox	3		
2673	2674	emed	1 , 2	v o	5		
2673	2674	emed	r	v o sl red	1		bloated
1984	2695	ms	u	v o red	1		
2673	2715	emed	1 , 2		11		
2673	2715	emed	m		1		
2673	2715	emed	u	ox	1		
2557	2717	emed	r	v o	1		
2557	2717	emed	u		1		
2671	2724	mls	r ?	sl	1		
2747	2747	ms	ca blob		1		
2747	2747	ms	fl	sl ca	6	cu sn (pb)	
2747	2747	ms	m ?	cu	1		
2339	2840	ms	u	ol	2		
2865	2866	lmed	u		2		
2580	2901	lmt ?	1	v o	4		
2580	2901	lmt ?	ca blob		1	cu pb	
2580	2901	lmt ?	u		1		
2905	2905	els	u	v sl	1		
2865	2907	lmed	1 , 2	v o green	1		
4081	2922	emed	1 , 2	v o	1		
4081	2929	emed	r	sl i+o	1	pb	
2970	2970	emed	u	sl	1	cu (pb sn)	
3000	3006	nd	r ?	sl mc ca	1	zn cu pb	
3009	3009	els/mls	m		6		
3020	3020	emed	1 , 2		1		
3020	3020	emed	r	fe ? obj	1		
3020	3020	emed	u	wh	1	pb (cu zn)	
4081	3032	mls	1 , 2		2		
3035	3035	mls/emed	1 , 2	v o	1		
3035	3035	mls/emed	u	v o red sl i	1		
3035	3035	mls/emed	u		2		
3009	3036	els/mls	u	v o red sl i	1		
3009	3036	els/mls	u	ca i v/sl o	1		
3039	3039	emed	ca sl		10	(cu sn)	
3039	3039	emed	fl?		1	sn (cu)	
3039	3039	emed	u		2		
2673	3081	emed	1 , 2	ox	1		
2673	3081	emed	1 , 2		5		
2233	3085	mls	u		1		
1801	3092	emed	u	ox	1		
1801	3092	emed	u	sl i wh	3		
3116	3116	emed	1 , 2	v o	8		
3116	3116	emed	m		1		
3116	3116	emed	r	fe	1		
85	3117	els c	u	v o sl i	1		bloated
3009	3135	els/mls	u	v o sl ca i	3	cu sn zn pb	
3009	3136	els/mls	fl	sl ca	1		
3009	3136	els/mls	u	ca at lip	2	cu pb sn (zn)	u fr? v. slaggy
2567	3138	els ?	u	v i+o red	1	fe cu sn?	

3009	3141	els/mls	fl	sl green	1		
3009	3141	els/mls	u		1		
85	3142	els ?	r	v i bl	1		
85	3142	els ?	u		2		
3009	3201	els/mls	m		1		
3238	3238	emed	r	sl i w	8		
3238	3238	emed	u	v o	1		
1	3240	ls ?	r	sl cu	1	pb cu sn i	
3251	3251	lmed	1 , 2	v o	7		
3291	3291	els	r	fe corrosion	12	nd	
3291	3291	els	u	v i + o mc	14		
3309	3309	mls	1 , 2	v o	2		
2022	3313	emed	nf dross	cu	1		
3291	3321	els	r	sl i + o ox	16		
3291	3321	els	r	sl i + o	60		
3341	3341	pmed	u	v o	1		bloated
3369	3369	mls	1 , 2		2		
3369	3369	mls	r	v o sl i red	1		
3351	3371	mls	u		1		
85	3372	els	1 , 2	v i + o	6		
3447	3447	lms	r	v o sl i	1	cu? zn?	
3447	3447	lms	r	v i	1	pb cu zn	
3448	3448	emed	1 , 2	v o bl	1		
85	3452	els	r	sl i wh	14		
85	3452	els	r	sl o bl	3		
85	3456	els c	heating tray		1		
85	3456	els c	m		1		
85	3457	els c	1 , 2		3		
85	3457	els c	m		1		
85	3457	els c	u	sl i wh orange	11		
3459	3459	lmed	r	sl / v wh / bl	1	pb cu (zn)	
3459	3459	lmed	r		1		
3460	3460	lmt +	r	v	5	pb cu sn (zn)	overheat
3461	3461	lmed	ca sl/blob		4	cu sn (pb)	
3461	3461	lmed	u	v o	2		
3463	3463	nd	r	sl red	1	pb cu zn	thick ridges
3474	3474	emed	1 , 2		2		
3465	3477	nd	u	v i + o sl i	1		
3465	3477	nd	u	v o	1		
3475	3482	emed	nf dross		1	pb cu (zn)	
3475	3482	emed	r		4		
3524	3522	emed	1	sl i	2		
3524	3522	emed	1 , 2	ox	1		
3524	3522	emed	r	sl i grey	1		
3524	3522	emed	u	sl	1		
3524	3522	emed	u		4		
3524	3524	emed	r	sl i wh	1		
3524	3524	emed	u		2		
3530	3530	emed	u	v o	1		
3542	3542	lmed +	1 , 2	v o	1		
3542	3542	lmed +	r	v o	1		bloated
3524	3543	emed	1	v o sl i wh	3		
3524	3544	emed	r	sl i	1		
3524	3544	emed	u	sl o	3		
3524	3544	emed	u	v o sl i	5		
3579	3579	mls	1 , 2		1		
3579	3579	mls	u	v o	1		bloated
1	3645	els	1	ox	1		
1	3645	els	1 , 2		1		

3701	3701	emed	1 , 2	v o	2		
3701	3701	emed	r	fe	1		
3701	3701	emed	u		2		bloated
3701	3701	emed	u	v o	1		
3342	3720	ms	r	v o black+red	1		bloated
3796	3796	ms	nf dross	green	1		
3978	3978	nd	u		3		
4020	4020	ms	1	v o mc sl i green	2		ol ?
4052	4052	mls	1 , 2	ox	1		
4052	4052	mls	1 , 2		2		
1	4061	els ?	1 , 2	v o	1		
4062	4062	lmed +	r	sl wh	1		
4062	4062	lmed +	u	v o	2		
2301	4075	els ?	hl		1		
1888	4078	els	u		1		
4096	4096	els	u	v o	1		
357	4133	nd	1 , 2	v o	1		
4147	4147	lmed +	1 , 2		1		sty ph
4147	4147	lmed +	fe fr		2		
4217	4217	nd	r	v	2	pb cu	
4217	4217	nd	u		1		
4225	4225	emed c	1 , 2		1		
4237	4237	emed	1	sl o grey	3		
4237	4238	emed	1 , 2	ox	1		
4237	4238	emed	1 , 2	v o	7		
4237	4238	emed	r		2		
4258	4258	emed	u	v o	5		
4260	4260	lmed	u	v o sl i grey	1		
4336	4336	lmed (+)	u		1		
4627	4576	mls	3 ?	sl ca v o	1	cu sn pb zn ca	
4627	4576	mls	u		1		
4165	4585	mls	1 , 2		1		
4631	4631	emed	u	v o	1		
4631	4632	emed	1	v ol o	5		
4587	4677	lmed?	m		1	zn (cu) (pb)	for ingot
4587	4677	lmed	u	grey	2	ag	
4692	4692	C19th	5	ol sl	2	cu zn (pb)	o
4728	4728	lmt ?	1 , 2		1		
4740	4740	mls	1		3		
3524	4749	emed	u		1		
4755	4755	lmt	u	v bl	1	pb cu (br? ag?)	i
3524	4756	emed	1 , 2	v o mc	2		
3524	4756	emed	u		5		
3524	4756	emed	u	sl i + o green	2		
4774	4774	emed	ca blob		1		
4774	4774	emed	u	v o	2		
4774	4774	emed	u		2		
4798	4798	lmed (+)	u	v o	1		
3579	4816	mls	1 , 2		2		
3579	4816	mls	r	v / sl i mc	1		
4817	4817	els	r	v	4	pb (cu sn)	
4903	4903	emed	r	v i orange	2		
4942	4943	lmed	1 , 2		5		
					2461		