

The Roman Glass from Mancetter

The assemblage of glass found at Mancetter is most interesting because the majority appears to be cullet, melted glass and waster fragments associated with the production of blown vessels. Similar groups of material have been found at other sites in Britain at, for example, Colchester and Wroxeter but this is the only instance where one has been found in association with a glass furnace. There is no evidence that Mancetter was a major production centre for glass, but as an example of the type of small scale production that may have been widespread in Roman Britain it is invaluable.

This report will be divided into three parts. In the first part the assemblage of vessels, glass objects and window glass will be examined in detail. In the second the evidence for glass production will be studied and finally an attempt will be made to place the Mancetter industry within the context of Romano-British glass production as a whole.

The vessels, window glass and glass objects

The site produced approximately 1350 fragments of vessel and glass waste, twenty-five fragments of window glass and six glass objects. Many of the fragments are very small and the total weight of vessel fragments and glass waster is less than two kilograms. Over 90% of the vessel and waste glass is blue/green and just under 5% is colourless. The remaining 5% consists of yellow/green, yellow/brown, pale green, deep blue, cast polychrome and blown polychrome. Of these various colours and categories the last three are represented by only one fragment each and the commonest colour (2.3% is yellow/green. Waste glass makes up 41% of the combined vessel and waste total. Into this category has been put not only the obvious waste glass that is listed in Tables 3 and 4, but also various categories of undecorated body fragments. A wide variation in the quantity and size of the bubbles can be observed, ranging from very few to so many that the glass is almost rendered opaque. An attempt to quantify this is shown in Table 1. In the first three columns (Standard, Standard with wear scratches and Bubbly) the amount of bubbles in the fragments would not be out of place in fragments where there is no suggestion that they were associated with glass production, for example in normal domestic rubbish. In the fourth and fifth columns (very bubbly and opaque bubbly) the amount of bubbles would be most unusual in fragments from such a site and so it is likely that they came from wasters. In the context of this site vessel fragments which have been affected by heat (Table 1, Column 6) have also been included in the waste glass totals, though generally the presence of heat affected glass on a site is more likely to indicate a domestic fire or destruction than to be evidence for glass production.

One fragment from a polychrome pillar moulded bowl was found (No. 1). In reflected light it appears to have opaque yellow marbling in a very dark brown ground, but when held to a strong light the ground colour is shown to be wine red. This is an unusual colour combination, brown polychrome pillar moulded bowls generally have a lighter yellow/brown ground with opaque white marbling such as one from Neronian cremation at

Sheepen (Charlesworth, 1985, Pl.10). At Vindonissa a similar wine red bowl with opaque yellow marbling was found in Claudio-Neronian context (Berger, 1960, Taf.1/16) and in Britain other fragments have been found at Spong Hill, Norfolk (Price & Cool forthcoming a), Camelon (unpublished) and probably at Traprain Law (Curle, 1931/2, 291). Pillar moulded bowls (Isings Form 3) were widespread throughout the Empire in the first century AD; polychrome ones like No.1 were mainly in use during the first half of the first century and were rare after it (Cool & Price forthcoming a).

The commonest bowl form found during these excavations was the tubular rimmed cylindrical bowl (Isings Form 44/45). When complete these had the rims bent out and down to form a tube and applied true base rings or applied pad bases, see for example a green one from a pit at Richborough dated AD 60-80 (Bushe Fox, 1949, Pl.LXVIII?372). They were sometimes decorated with ribs as on an amber one from a Trajanic pit at Hemel Hempstead (Charlesworth, 1974/6, Fig.LXIVa). The type was also made in a shallow dish-like form (Isings Form 45 - see an emerald green example from Sheepen - Charlesworth, 1985, Fig. 80/37). At Mancetter the form is mainly represented by rim fragments and it is not generally possible to identify whether they came from deep or shallow bowls. A minimum of two yellow/brown (Nos.4 & 5) and six blue/green bowls (Nos. 15-17b & 19) are represented and the rim fragments Nos. 20 and 21 are likely to have come from similar bowls though here the outward rolled rim is solid rather than tubular. The blue/green body fragment No.46 also came from a ribbed deep bowl of this type. Tubular rimmed bowls came into use during the first century BC and are found in Britain in Claudian contexts. The large, deep version became common about the mid first century AD. Thereafter, until they went out of use in the second half of the second century, they were widespread and frequently found throughout the western empire (see Cool and Price forthcoming a for general discussion), No.18 also has a tubular rim edge to a wide curved rim and probably came from a shallow dish similar to Isings Form 43 which was in use in the first and second centuries.

Collared jars (Isings Form 67b & c) were broadly contemporary with tubular rimmed bowls and are represented here by Nos. 22* and 22b and possibly by Nos. 23* and 24*. When complete these jars had the rim bent over and down to form a generally vertical collar, a globular, body, an open pushed-in base ring and, frequently, ribbed decoration, see for example deep blue and blue/green examples from pits dated to AD 60-75 and 105 respectively at Verulamium (Charlesworth, 1972, Fig. 76/25 & 26). At Mancetter the two collared rim fragments found, No. 22* which is very bubbly and may be a waster and No. 22b, both had a 'double tubular' effect to the rim formed by rolling the edge first before bending it out and down to form the collar. This double tubular rim form does occur on tubular rimmed bowls, see for example No.19, but is much more frequent on collared jars. The two wasters Nos. 23* and 24* appear to have been in the process of having double tubular rims produced so perhaps they too were initially intended to be collared jars. This form was widespread throughout the north-western provinces and was in use from the Neronian period to the second half of the second century (Cool & Price forthcoming a).

The commonest type of jar found at Mancetter is represented by outbent rim fragments with rolled in edges. These probably came from small globular or ovoid bodied jars with concave bases such as the distorted example found in the Antonine drain deposit at Housesteads (Charlesworth, 1971, Fig.10). The form is represented here by No. 11* (pale green and Nos. 25 to 28 (blue/green). Ovoid and globular bodied jars with this form of rim can range in size from small ones perhaps intended for unguents and salves to much larger examples used as cinerary urns. All of the Mancetter jars come from the lower end of the size range and have rim diameters of between 50 and 60mm. Another variant of ovoid and globular bodied jars is probably represented by the rim fragments Nos. 6* (yellow/brown) and 29-31* (blue/green) which are out-turned and have fire rounded edges. Only two (Nos. 29 & 30*) are large enough for the rim diameter to be established and in both cases they would have been slightly larger than the jars with in rolled edges represented. Many of these rim fragments of both type are very bubbly and distorted (Nos. 6*, 8*, 11*, 27*, 27b-d*, 30* and 31*) and were probably from wasters. These jars are difficult to date closely. They were in use during the first and second centuries and possibly into the third (Cool and Price forthcoming a).

Four fragments (Nos. 9, 12, 36 & 39) may have come from globular or conical jugs of Isling Forms 52 and 55 (for full discussin of these types see Cool and Price forthcoming a). No.9 is a yellow/brown ribbon handle fragment with central rib and the blue/green No.39 may be a fragment from the lower part of a similar handle. This was virtually the only handle type used on the conical jugs found in Britain, they were also used though less consistently, on globular jugs. The pale green optic blown ribbed body fragment No.12 may have come from a ribbed conical jug (see, for example the one from Turriff (Durle, 1931/2, Fig.67), and the blue/green open pushed-in base ring (No.36) could have come from either of these two jug types or from a globular collared jar (see above). Globular and conical jugs of this sort were very popular in the north western provinces from the Neronian period. The globular jugs disappeared early in the second century while the conical form went out of use early in the second half of that century.

20% of the vessel glass assemblage is composed of fragments from blue/green prismatic and cylindrical bottles (Isings Forms 50 and 51 - for a general discussion see Cool & Price forthcoming a). Fragments of this type dominate every assemblage from Romano-British sites occupied in the first and second centuries. The total here is lower than on many sites but this is because of the unusual nature of the assemblage. Square, hexagonal and cylindrical bottles are represented but the last two forms only by two and one fragment respectively (Nos. 63z aa & b1). Of the nine base fragments from prismatic bottles found, four (Nos. 60 & 61b-d) are too small for the designs they carried to be suggested. Three (Nos. 56-58) have patterns of concentric circles, in the case of No.58 these have been arranged around a central dot. Concentric circles are the commonest base pattern used on these bottles, the numbers of circles usually ranges from one to five though more do sometimes occur. No.59 may originally have had a concave-sided square pattern set inside a square moulding. No.61 has a small circular ring in the corner. This angle pattern has been observed on bases with concentric circles, for

example at Colchester (Cool and Price forthcoming a). Prismatic and cylindrical bottles came into use in the Claudian period and were very common in the second half of the first century. Cylindrical bottles were probably not in use after the Trajanic period (Boon, 1969, 95; Price forthcoming) and hexagonal ones went out of use slightly later (Shepherd, 1982, 227). Square bottles continued in use through the second century and possibly into the third. They were common throughout the empire.

The remaining two forms that can be identified with some certainty came into use at a later date than all the ones discussed so far. No.13 is a colourless rim fragment from the range of colourless wheel-cut beakers with ground rims which were the main drinking cup of the second century (see Cool and Price forthcoming a for general discussion). These could have cylindrical or carinated bodies with pushed in or separately applied base rings (see for example, ones from Verulamium (Charlesworth, 1972, Fig. 77/43) and Wroxeter (Bushe-Fox, 1916, Pl.XXIII/fig.1). Though primarily a second type, the cylindrical form had come into use by the end of the first century as is shown by the upper part of one which was found in a context dated to AD 80-100 at Caerleon (Wheeler & Wheeler, 1928, Pl.XXXIV/fig.1.2).

No.14 is a small fragment from a colourless cylindrical bottle with horizontal abraded or wheel-cut decoration such as the ones found at Hauxton, 1958, Fig.6) and Corbridge (Charlesworth, 1959, Fig.10/1). These were in use in the late second and third centuries and fragments are not uncommon on Romano-British sites of that date. It is not possible to identify the vessel forms of any of the remaining fragments with precision. Jugs are represented by the neck and handle fragments Nos.38, 38b and 39b-41) and flasks or unguent bottles by the neck fragments Nos. 42-44b*. Several of the latter (Nos.43*-44b*) were so bubbly and distorted that they could well have come from wasters. The concave base fragment No.45* was also probably from a waster and could have come from either a globular or ovoid flask or jar. Other types of bases represented, all in blue/green glass, are a tall pushed-in base with hollow tube at the end (No.37) and a tall solid base ring (No.35) both probably from jugs, an applied pad base (No.34*) and two bases with base rings whose method of formation is unclear (Nos.32* & 33*). Nos.32* to 34* are very bubbly and distorted and are clearly wasters.

Various decorated body fragments may also be noted, the most outstanding is No.2 which is a tiny colourless fragment with a patch of opaque blue paint. It is much too small for the form to be identified. Painted glass was always rare. The type most frequently noted on Romano-British sites is the painted version of the colourless cylindrical bowl of Isings Form 85. These are found on sites in the north west provinces, North Germany and Scandinavia (Fremersdorf, 1970, 63ff; Price & Cool forthcoming b), and were in use during the second half of the second and the early third century. Other painted forms were in use during the first century and these have recently been discussed in connection with a fragment found at Colchester (Cool and Price forthcoming a). No.48 is a body fragment which retains the junction of two trails that have been nipped together. It came from a vessel decorated with trails nipped together in a diamond pattern such as on the beakers with feet found in

Koln (Fremersdorf, 1959, Taf.108 & 109). The other decorated fragments are much commoner and consist of ones with optic blown decoration (Nos.3, 6*, 7b, 10, 10b, 46b & c and 47*), and ones with trailed decoration (Nos.49 & 49b).

All of the window glass (No.64) was of the cast, matt/glossy variety that was in use from the first to the third centuries. As is normally the case most of it was blue/green, but there was also one fragment which was green-tinged colourless (No.64t).

Of the six objects found four were beads (Nos.65-68) and two (Nos.69 & 70) were counters. The most interesting bead (No.65) was found as a surface find in a neighbouring field. It is of black opaque glass, has a moulded face on the front and two transverse perforations. It is an example, apparently the first to be found from Roman Britain, of the third variant of Haevernick's Trilobitenperlen (1981, 266ff) which have a variety of human faces, theatrical masks, Gorgon and lion heads impressed on their fronts. No.66 appears to represent a theatrical mask. These beads were primarily in use during the fourth century, for example one with a female bust was found in a child's grave at Keszthely-Dobogo, Hungary which was dated to before AD 374 (ibid. 269). They are found widely scattered throughout the empire but only isolated examples are found in the north-western provinces. The greatest concentration is in central Europe and a Pannonian origin has been suggested for them (ibid. 269).

The other three beads are much commoner Romano-British finds. There are two melon beads which are a widespread first and second century form, one is small and of turquoise frit (No.66) and the other (No.67) is larger and made of blue glass (Guido, 1978, 100). The fourth bead (No.68) is a small annular blue/green example of Guido's Group 6iib (ibid.65) which cannot be closely dated within the Roman period.

Of the two counters, one (No.70) has been carefully grozed from a flat side fragment of a prismatic bottle and cannot be closely dated. The other (No.69) is an example of a well known fourth century plano-convex type decorated with marvered spots, it is black and has a central red dot surrounded by four blue ones. This is the commonest colour combination found on these spotted counters and occurs in two of the three complete sets of them known, one from Lankhills, Winchester in a grave dated to AD 310 to 370/90 (Clarke, 1979, Pl.1/b) and the other from a grave dated to the first half of the fourth century at Krefeld Gellup (Pirling, 1966, Farb. Taf.B). Isolated finds with this colour combination are known from Richborough (Roach Smith, 1850, 79), Woodcutts (Pitt Rivers, 1887, Pl.XLIV/14), South Shields (Allason Jones & Miket, 1984, No.4.12, where two similar unpublished ones are noted from London and Colchester), Verulamium (Charlesworth, 1984, Fig. 69/148) and Brunehaut Liberchies, Belgium (Mertens & Brulet, 1974, Fig. 35/13). Other colour combinations are noted in connection with the third complete set found in the Temple Mausoleum at Lullingstone where they were found with other grave goods dated to the third to early fourth century (Cool & Price forthcoming b). The type was clearly in use from early in the fourth century. Whether it is significant that though examples have been recorded in Belgium and Krefeld Gellep, by far

the majority of examples found so far have come from Roman Britain, is not clear; but it may well be that these gaming pieces were a Romano-British type.

The Glass blowing industry

Before we consider the different types of waste glass found at Mancetter it will be useful very briefly to sketch the basic procedures involved in glass blowing, which have remained virtually unchanged since it began in the first century BC, so that it will be clear at what points in the process glass waste can be expected. A fuller account of glass melting and blowing is to be found in Prince 1976.

The molten glass is first taken as a gather on the end of the blowing iron from the crucible. It is marvered by being rolled on a smooth block of stone or metal to give shape to the paraison or gob of glass and to cool it sufficiently for it to be blown without distorting. The vessel is then blown and shaped. Handles are applied from separate gathers of glass. If the vessel is to have a cracked off rim it is detached from the blowing iron and set to cool slowly and evenly in the annealing chamber. If it is to have a folded, rolled or fire rounded rim or a handle, a pontil iron is attached to the underside of the base, often with the aid of a small gob of additional glass, and the vessel is detached from the blowing iron with shears. The rim etc. is formed, the pontil detached and the vessel is set in the annealing chamber.

Molten waste glass can obviously form when drops of glass fall free as the gathers are taken from the crucible to be marvered. Waste glass will also be left at the end of the blowing and pontil irons. In modern glass houses the ends of the blowing irons with the surplus glass attached are generally plunged into water which leads to the glass shattering as it cools rapidly. If molten glass is plunged into water, as may happen if the glass pot shows signs of breaking, it will harden into knobbly lumps with smooth rounded surfaces. Whole vessels may be discarded as waste if they deform during production, are found to be too bubbly or cool too quickly and shatter. Waste glass will also be produced from finished perfect vessels. On vessels with cracked rims the glass that is removed from above the rim lines will all be waste but will not be distinguishable from any other broken body fragment except in the rare instances when it remains in one piece in which case it may be mistaken for a lid (Price, 1975, Fig.4).

The different types of glass waste that were found at Mancetter are shown in Tables 3 & 4. The most frequently encountered type, apart from miscellaneous heat affected lumps, is a cylindrical form. These fragmentary cylinders are generally made of blue/green glass although there are also one of yellow/green glass and six fragments of colourless ones. The glass is almost invariably very bubbly with the bubbles being elongated and often quite large, and it frequently contains streaky impurities. The outer surfaces are smooth but the inner ones often have thin ridges down their lengths. Some of the fragments have one edge that looks like a 'rim'. This may either be flat or obliquely slanting into the interior and gives the impression of having been sheared off when the glass was still hot. Other 'rims' look as if they have been

compressed and have triangular-sectioned edges that project to either side but generally more towards the inside. A thin ridge running around the inside of the cylinder just below the 'rim' is often visible especially on the pieces which have obliquely slanting edges. The 'rims' are of a slightly irregular circular outline with diameters that range from 15 to 30mm. and which average 25mm. Where it has been possible to establish an external diameter of the body of the cylinder it varies from 18 to 28mm. The thickness of the walls, as opposed to the often thickened rims, ranges from 1 to 6mm. and average 2.5mm. The greatest length any fragment attains is 28mm. but most are much shorter. About 20% of these cylinder fragments show an appreciable amount of strain cracking.

It seems to us that these cylinder fragments are almost certainly from the waste glass that collects around the end of the blowing iron and that the 'rims' were formed at the point where the vessel was detached from the blowing iron. If, as in modern practice, the blowing irons were plunged into water after use, the shattering caused by the rapid cooling would result in the types of fragments recovered and in knobbly lumps with rounded surfaces, several examples of which were indeed found (Table 3 column 6). These cylinders are therefore very important evidence that glass was being blown at Mancetter and not merely melted for re-working as cast window glass.

Another type of waste that is not very numerous but which exists as a recurring shape is in the form of a roundel (Table 3 Column 3). When complete these seem to have had circular outlines of about 30mm. diameter. Both the upper and lower surfaces are convex, the upper surface being very smooth and the lower surface uneven and pitted. The greatest thickness (about 5mm.) is at the centre of the roundel, and it tapers to the edge in each direction. The use of these roundels is not known but it may have been connected with the process of attaching the pontil iron.

The largest category of waste is formed by miscellaneous heat affected lumps some of which have slaggy inclusions (Table 3 Column 4 and Table 4 Columns 4 & 5). These are likely to have resulted from a number of processes, for example spillages and the skimming of the top of the crucible. The majority have broken edges and look as if they have been broken up for re-use. One comparatively large but still broken piece was recovered from the topsoil. It measured 45x35x20mm. and looked as if it might have been the result of a large spillage of molten glass. Thin rods and trails of glass were also found (Table 3 Column 5 and Table 4 Columns 6 & 7) and these are likely to have formed when molten glass dropped away from the gather as it was being shaped prior to blowing.

Given the nature of the site, vessel fragments which are very bubbly, distorted and/or contain impurities may well have come from rejected vessels and be wasters. Into this category fall Nos. 6* (yellow/brown), 8* and 9* (yellow/green), 11* (pale green), 22*, 23* 27*-27d*, 30*-34*. 43*-45*, 47*-48b* (all blue/green) and, as noted above, the very bubbly, opaque bubbly and heat affected body fragments (Table 1 Columns 4-6).

From all this waste it is possible to establish the colours of vessels being made. Clearly by far the majority were blue/green but the presence of colourless and yellow/brown cylinders indicate that there was some, if only a little, production in these colours as well. If we are correct in seeing 8*, 9* and 11* as wasters these would suggest a little production in yellow/green and pale green too. The range of products being made include small jars with rolled in rims in yellow/green (no. 8*), pale green (no. 11*) and blue/green (Nos. 27*-27d* and 28*), jars with fire rounded rims in yellow/brown (No.6*) and blue/green (Nos. 30* & 31*), possibly collared jars in blue/green glass (Nos. 22* 23* & 26*) and some form of blue/green flask (Nos. 43* to 45*). The base fragments which are clearly wasters (Nos. 32*-34*) however, indicate that other types of vessels must also have been produced for they are not the types of bases that would have been used on the vessel forms for which we already have evidence of manufacture. Nos. 32* and 33* have base rings of an uncertain type and No. 34* has one formed from an applied pad. Such base rings would most likely be used on bowls or jugs. An obvious vessel type present on the site on which pad bases were used is the tubular rimmed cylindrical bowl, though none of the fragments found that could definitely be assigned to this type showed any evidence that they had been made on the site. That the production was not concerned solely with utilitarian containers is shown by the presence of decorated fragments which appear to be wasters. These include yellow/brown (No.7*) and blue/green (No.47*) fragments which have optic blown ribs and blue/green fragments (Nos.49* & 49b*) with trails. It is noteworthy that although fragments from prismatic and cylindrical bottles make up about 20% of the assemblage, there is no evidence that vessels of this sort were being made at Mancetter. Admittedly some handle fragments such as No.52 are very bubbly and contain impurities but this is not unusual in these vessels and does not necessarily indicate that they were wasters.

The raw materials used for this industry are not known. No deposits of sand, which would have been needed had they been making glass from the basic ingredients of silica, soda and lime, were found but, as we shall see below, it is unlikely that the whole glass working area was excavated, so the possibility of such deposits cannot be discounted. There is no need, however, for glass to have been made on the site by melting together the basic ingredients. It has been suggested that during the Roman period there were some establishments in areas where the raw materials and fuel were abundant, which specialised in producing the initial glass. One such site has been claimed at Ausseren Reben, Augst (Tomasevic, 1977, 248). The glass blower could thus acquire his glass ready fritted without the need for carrying on the initial process.

Another alternative would be that the raw material was provided by broken fragments of glass vessels. Such cullet was generally added to the crucible even when the glass was being made from the basic ingredients as it has the effect of lowering the melting temperature. In the post medieval period there was a thriving trade in collecting waste glass to supply the glasshouse (Vose, 1980, 67) and there is evidence of a similar trade in the Roman period. The collection of broken glass was certainly recorded in Rome during the late first

century (Price, 1976, 116). It seems very likely that at Mancetter such broken glass was being used as a raw material as many of the vessel fragments show clear evidence of wear scratches (see for example Table 1 Column 2 and No.58).

The full extent of the glass working area at Mancetter has not been established. Virtually all of the glass waste, and indeed the bulk of the glass found generally, came from sites areas (7), (7a), (7/20), (32) and (34). The only exceptions to this were less than ten heat affected lumps and very bubbly fragments which came from sites (16), (17), (18), (20) and (22) and one fragment of a blowing cylinder from site (22). The glass working area would seem, therefore, to be concentrated in the area of sites (7) and (7/20). South of this the area was largely unexcavated. It seems highly likely that at least one more glass furnace may have been in use. This is suggested by the distribution of the glass deposits. The area around the furnace and Kiln 7C produced approximately 36% of all the vessel and waste glass in the assemblage and 35% of all the waste found. Spatially the majority was concentrated in and around Kiln 7C. Stratigraphically it was scattered throughout the filling and the stoke hole. This suggests that though the material may well have derived from a heap of cullet that supplied the activities around the glass furnace, it was not in situ but represents perhaps the disposal and 'tidying-up' of such a heap after the glass blowing activities at the furnace had ceased. There was also a similar, though much smaller, concentration (5% of the total assemblage and 3.5% of the waste) in the shale floor area near Kilns 7D and E. Elsewhere on sites (7), (32) and (34) there were scattered finds but no other concentrations.

The only other major concentration, consisting of 35% of the total assemblage and 43% of the waste, was found in the filling of the water channel (7/20 (63) & (64)). It is possible that the glass waste here was originally associated with the glass furnace on Site 7 as it is very similar to the glass waste found in and around Kiln 7C, and the filling of the water channel does appear to consist of dumped material. Glass waste is, however, very scarce in the area between the glass furnace and the water channel. It is, therefore, equally possible that the glass waste in (63) and (64) was derived from a second glass furnace in the vicinity of the water channel in the unexcavated area close-by.

Finally the date when glass was being produced at Mancetter must be established. The glass furnace itself is dated to the second century and post dates a pit immediately to the east which contained Flavian and Trajanic samian. This pit (7) (79) seems to have predated any glass blowing activity in its vicinity as it contains only four fragments of glass (Nos.55b, 63at and two blue/green body fragments - Table 1) and no evidence of glass waste. The water channel was not cut before the end of the second century but the filling (63) and (64) contains much earlier material and the latest samian is of mid to late Antonine date.

The colour of the glass can also be used to establish broadly the likely date of activity. In general there were a wide range of colours in use for blown glass in the middle of the first century. These included deep blue, yellow/brown, a variety of shades of green and polychrome glass.

About AD 65-70 a rapid change took place with the changeover to the use of colourless glass for fine tablewares with the result that polychrome and strong coloured glass rapidly went out of use during the Flavian period. The paler shades of yellow/brown and green were still in use in the second century but dying out during the middle third of it leaving colourless and blue/green glass as virtually the only colours made (see Price & Cool, 1985, 41 & Cool & Price forthcoming a for a more detailed discussion of this change). At the beginning of this report it was noted that colours other than blue/green and colourless glass made up less than 5% of the total assemblage. This would suggest that the culet was being gathered at a time when such coloured glass was still in use but not very extensively. We have also noted that a little yellow/brown glass was being produced at the site. The combination of these two observations points to production about the middle part of the second century. From the detailed discussion of the vessel forms in the first part of this report it was clear that virtually all of the vessel types which could be more or less closely dated were in use from the mid first century onwards going out of use in the second half of the second century. There was only one fragment that could be securely stated to be of the second half of the second century or later and that was the colourless bottle fragment No.15 which was found in the concentration (7/20) 63. We also noted that in the blue/green bottle assemblage cylindrical and hexagonal bottle fragments were very poorly represented. If the culet was being collected when cylindrical bottles were still in use, i.e. up to the early second century, one would expect them to be better represented for on first century sites they were very common. At Eastgate St., Gloucester, for example, cylindrical bottle fragments were twice as numerous as prismatic ones (Price & Cool forthcoming c). All of this tends to suggest again a date in the middle part of the second century for the collection of the culet.

All of the strands of evidence, therefore, point to the glass blowing activity taking place in the mid second century. As we have already seen most of the vessel types that we can show to have been made at Mancetter cannot be closely dated but a mid second century date would be appropriate for all of them.

This is not the place to discuss the production of Roman glass vessels in any detail but it will be useful to sketch very briefly such evidence as we have for their production in Britain in order to set the Mancetter industry within its wider context. Furnaces apparently associated with glass working are known elsewhere but not all of these need have been connected with the production of glass vessels. The use of window glass was widespread in Roman Britain and it is unlikely that the panes were transported over long distances. The technology required for the cast matt/glossy window glass of the first three centuries AD was very simple. The panes were made by pouring molten glass into sand lined trays and spreading it out into the corners and then leaving it to cool down slowly. It is likely, therefore, that such window panes may have been made in many places for local use and that some of the furnaces could have been concerned with this production. So, melted glass waste alone is not sufficient to indicate the production of glass vessels. Persuasive evidence lies in the presence of the cylinders we have identified as coming from blowing irons and in the presence of wasters.

Recent re-examination of the material preserved from Thomas May's excavations at Wolderspool where he identified ovens and glass workshops (1904, 37ff) has not been conclusive in this respect. Melted glass lumps were present but there was no evidence for cyliners. That Roman vessel production was carried out somewhere in the vicinity though is likely as amongst the assemblage preserved there are very bubbly and distorted vessel bases which, if not wasters, must certainly have been 'seconds' and it seems most unlikely that they would have travelled far from their point of production. A glass furnace was found during excavations at Caistor by Norwich (Atkinson, 1932, 109ff) here again examination of the waste associated with it only reveals the activity of glass melted rather than glass blowing. Perhaps it was connected with the production of window panes. Glass production waste of an unspecified type has also been noted from two sites in London. At the Tower of London one assemblage provisionally dated to the first half of the second century had been incorporated into the bank of the Roman city wall (Farnell, 1982, 95). The other assemblage had been similarly incorporated into a gravel embankment by the Walbrook which was dated to the late second or early third century (Rankov, 1982, 374).

Romano-British sites which have produced definite evidence of glass blowing are Colchester (Allen, 1983, Appendix 1) and Wroxeter (Harden, 1973, 17). At Colchester a collection of cullet was found in 1933 at Sheepen and small excavations in the presumed vicinity of this spot in 1969 (Wilson, 1970, 290) revealed a heavily burnt floor with traces of a flue. It seems possible that further excavation might reveal the glasshouse connected with the cullet found in 1933. Recent work on this material by Dr. Denise Allen has shown that jars and jugs were being manufactured mainly in blue/green but also, possibly, in yellow/green glass. Dr. Allen considers the date of production to be in the mid second century or slightly later. There is also indirect evidence for vessel production at Colchester in the form of the base designs of two prismatic bottles with the letters CCV on them (Price, 1978, 70). This is thought to stand for the official name for Colchester - Colonia Claudia Victricencis - and to indicate that the bottles could have been made there.

At Wroxeter glass waste, including pontil wads suggesting vessel production, was found together with deposits of clean sand that could have been used to make glass. So though no structural evidence of a glasshouse was found, this assemblage could well have been in the vicinity of one. The types of vessels being produced are not recorded but the activity could well have been contemporary with that at Mancetter as the cullet assemblage is dated from the late first to the mid second century.

There can thus be no doubt that glass vessel manufacture was established in Roman Britain by the mid second century and that the production was not solely with containers as at both Mancetter and Colchester there is evidence that tablewares were being produced, and at the former site there is also a little evidence for the production of colourless glass. There is as yet no physical evidence that high quality tablewares were produced in Britain but this need not mean that they were not. Even in Kiln, which was undoubtedly one of the major centres for the production

of glass vessels in the western empire, the physical evidence for that production is very slight (Doppelfeld, 1965), and gives no indication of the wealth and richness of the products. The rarity of discoveries of Roman glasshouses anywhere in the empire can be explained by the nature of the industry. Its waste products can be re-used and therefore will not generally be abandoned for future archaeologists to discover as is the case with waste that is not reusable like that associated with pottery making. Secondly, as we can see from Mancetter, the structural remains that identify an industrial area as being connected with glass working can be very small and could easily be missed in selective excavation of a site.

It may be significant that two of the four sites in Roman Britain where we can show that Roman glass vessel production took place were found in conjunction with extensive pottery manufacture. If glass vessels were being made from pre-fritted glass and cullet, there would have been no need to locate the industry close to sources of the raw materials. The position of the industry would be governed by the availability of fuel to fire the furnaces and the ability to distribute the finished products. Both of these needs, fuel and good trading connections would have been satisfied in an area where there was a large pottery industry. It may well be, therefore, that small scale production was quite widespread in Roman Britain supplying the basic needs of the local area. It must be stressed, however, that at present the evidence is only for small scale industries. Mancetter, because of the discovery of the glass furnace as well as the debris from glass blowing, is the most important of these sites excavated up to now. Yet even here the glass from all of the sites that have produced evidence of glass production (7, 7a, 7/20, 32 & 34) weights noticeably less than one and a half kilograms.

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Catalogue

Abbreviations:-

- PH - Present height
RD - Rim diameter
BD - Base diameter
WT - Wall thickness
Dim. - Dimensions

Note

* after a catalogue number indicates the fragment is likely to have been made on the site.

Pillac Moulded Bowl

1. W77 (32)+ 24
Rim fragment. Marbled mosaic, translucent wine coloured ground appearing dark brown with opaque yellow marbling. Vertical rim wheel-polished internally and externally; top of 1 rib.
Dim. 29x19mm., rim thickness 3mm.

Polychrome

2. W69 (7) 11
Body fragment. Colourless with patch of opaque blue paint.
Dim. 7x5mm., WT 1mm.

Deep Blue

3. W70 (7a) 4
Body fragment. Many small bubbles. Convex-curved body with narrow optic blown rib in high relief.
Dim. 22x15mm., WT 1mm.

Light yellow/brown

4. W69 (7) 3
Rim fragment of bowl or jar. Occasional small bubbles, larger and more elongate at rim. Out-turned tubular rim, edge rolled up and in; body slopes inwards.
PH 23mm., RD 85mm., WT 2mm.
5. No. 75
Rim fragment of bowl. Small to medium elongate bubbles.
Vertical tubular rim, edge rolled out and down.

PH 10mm.

- 6*. W69 (7) 24
Rim fragment of bowl or jar. Much strain cracking. Slightly out-turned, fire rounded rim; straight upper body.
PH 12mm., WT 1.5mm.
- 7*. W69 (7) 75
Body fragment. Many small to medium bubbles. Optic blown. Convex-curved body with shallow vertical optic blown rib.
Dim. 20x17mm., WT 1mm.

Also 1 other optic blown fragment with shallow rib
b..... W77 (7/20) 64.

Yellow/Green

- 8*. W69 (7) 1
Rim fragment of jar. Glass full of small to large bubbles. Out-turned rim, edge rolled in and down; broken edges heat affected.
PH 11mm., RD (approx.), WT 1.5mm.
9. W77 (7/20) 63
Fragment of jug handle. Medium elongate bubbles. Handle slightly curved with pronounced central rib. Scar on back.
PH 21mm., section 17+ x 7mm.
10. W77 (7/20) 63
Body fragment., Occasional small bubbles. Optic blown. Convex-curved body, shallow vertical rib.
Dim. 26x17mm., WT 1mm.

Also 1 other optic blown fragment with shallow rib
b..... W69 (7) 1.

Pale Green

- 11*. W77 (7/20) 63
Rim fragment of jar. Small to large bubbles. Out-turned, assymmetrically distorted rim with edge rolled in; straight-sided body tapering inwards.
PH 13mm., RD (approx.) 50-60mm., WT 2mm.
12. W69 (7) 1
Body fragment, perhaps from conical jug. Small elongated bubbles. Slightly convex-curved body. Spiral optic blown ribs in shallow relief.
Dimensions 33x13mm., WT 2mm.

Colourless

13. W77 (7/20) 63
Rim fragment of beaker. Occasional small bubbles. Out-turned rim, edge cracked off and ground. Horizontal abraded band below

rim edge; horizontal wheel-cut line with abraded band on either side on upper body.
FH 14mm., WT 1mm.

14. W77 (7/20) 4
Shoulder and handle fragment of bottle. Occasional small bubbles; strain cracks. Edge of shoulder curving over to cylindrical side; tip of lower handle attachment. 2 horizontal abraded bands on upper body. Many vertical wear scratches.
Dim. 30x20mm., WT 3mm.

Blue/Green

15. W69 (7) 24
Rim fragment of bowl. Many small to medium elongated bubbles; black impurities. Markedly out-turned tubular rim, edge rolled out and down.
FH c. 6mm., RD (approx.) 125-140mm., WT 1mm.
16. W69 (7) 1
Rim fragment of bowl. Many small to medium elongate bubbles. Slightly out-turned tubular rim, edge rolled out and down.
FH 10mm., RD 100mm., WT 1mm.
17. W69 (7) 73
Rim fragment of bowl. Small bubbles, elongate and larger at rim; slightly dulled surfaces. Slightly out-turned tubular rim, edge rolled out and down; cylindrical upper body.
FH 11mm., RD 90mm., WT 1mm.

Also 1 other tubular rim fragment
b..... W69 (7) 1

18. Nos. 4, 14, 71
3 rim and 1 body fragment (joining) of bowl. Small bubbles; some streaky impurities. Markedly out-turned, well formed tubular rim with edge rolled down and around; shallow funnel mouth with change of angle to body.
FH 18mm., RD 115mm., WT 1mm.
19. W77 (7/20) 63
Rim fragment of bowl. Many small to medium bubbles, sometimes elongate; streaky yellow impurities. Tubular rim with edge rolled in and then bent out and down to produce a collared effect; slightly concave body sloping inwards.
FH 17mm., WT 1mm.
20. W77 (7/20) 63
Rim fragment of bowl. Many small to medium bubbles, sometimes elongated. Out-turned rim, edge rolled out and down; hollow-sided upper body tapering inwards.
FH 12mm., WT 2mm.
21. W77 (7/20) 64

Rim fragment of bowl. Some small bubbles. Rim edge rolled out and down; straight side. Distorted by heat.
FH 14mm., RD 80mm., WT 1mm.

22*. Rim fragment of bowl or jar. Many small to large bubbles. Vertical rim, edge rolled in then out and down to form collar.
FH 14mm.

Also 1 other similar collared rim fragment
b..... W69 (7) 24

23* W69 (7) 21
Waster - ? rim of jar. Small to medium bubbles; streaky yellow impurities. Rim edge rolled in and bent out and down but not touching body, the whole having an angular outline. Very distorted and part melted.
Length 65mm., WT 2mm.

24*. W69 (7) 92
Waster - rim of bowl or jar. Glass full of small and very large bubbles, contains impurities and is much distorted by heat. Rim edge rolled in, then bent out and down.
FH 16mm., WT 2mm.

25. W77 (7/20) 63
Rim fragment of jar. Some small bubbles. Rim edge rolled in and down; body slopes inwards.
FH 13mm., RD 60mm., WT 1.5mm.

26. W77 (7/20) 4
Description as No. 25.
FH 8mm., RD 50mm., WT 1mm.

27*. Rim fragment. Glass full of small to medium bubbles. Out-turned rim with edge rolled in. Distorted.
FH 8mm., RD (approx) 30mm., WT 1.5mm.

Also 4 other similar rim fragments
b*..... W69 (7) 24
c*..... W69 (7) 12 - bubbly and distorted
d*..... W70 (7a) 9 - bubbly and distorted
e W77 (7/20) 16

28*. W69 (7) 41
Rim fragment of jar. Many small bubbles; green impurities. Uneven rim with edge bent out, up, in and flattened; straight side sloping in.
FH 11mm., RD (approx) 50mm., WT 2mm.

29. W77 (7/20) 63
Rim fragment of bowl or jar. Small bubbles, sometimes elongated. Fire thickened rim; body sloping inwards.
FH 18mm., RD 85mm., WT 2mm.

- 30*. No.5
Rim fragment of bowl or jar. Small bubbles. Fire rounded rim, slightly distorted; body sloping inwards.
FH 16mm., RD 70mm., WT 1.5mm.
- 31*. W77 (7/20) 63
Rim fragment. Glass full of small to large bubbles. Fire rounded rim; distorted body.
FH 22mm., WT 1.5mm.
- 32*. Base fragment of jug or bowl. Glass full of small to large bubbles and contains black and streaky yellow impurities. Side slopes diagonally into uneven base ring and concave base with central kick.
FH 13mm., BD 55mm., WT 1.5mm.
- 33*. W77 (7/20) 63
Base fragment of jug or bowl. Glass full of small to large bubbles and contains brown impurities. Base ring distorted in places; slightly convex base with pontil mark. Side broken.
FH 10mm., BD (approx) 45mm.
- 34*. Base fragment of jug or bowl. Glass full of small to large bubbles. Pad base with rounded edges. Side and very thick base missing.
FH 11mm., BD 45mm.
35. W69 (7) 90
Base fragment of jug. Some small bubbles; surfaces dulled. Lower part only of out-splayed base ring forming a high stand. Worn.
FH 9mm., BD 70mm.
36. W69 (7) 1
Base fragment of bowl or jug. Small bubbles; surfaces dulled. Side sloping in to open pushed-in base ring; base missing. Base ring worn.
FH 13mm., BD 55mm., WT 2.5mm.
37. W77 (7/20) 16
Base fragment of jug? Some small bubbles. Pushed in base forming high footstand with hollow tube at end.
FH 10mm., BD 60mm.
38. W69 (7) 103
Neck and handle fragment of jug. Some small bubbles; dulled surfaces. Cylindrical neck with upper folded handle attachment. Edge of handle worn.
FH 24mm., neck thickness 4mm.
- Also 1 shirt fragment with tooling marks at neck/body junction
b..... W70 (19) 20
39. W77 (7/20) 63

Handle fragment. Elongated bubbles. From lower part of ribbon handle with wide central rib. One side broken.
Dim. 35+ x 15mm.

Also 1 other fragment from lower part of ribboned handle attachment
b..... W70 (7a) 1

Also 1 ribbed handle fragment
c..... W77 (7/20) 16

40. W69 (7) 77
Handle fragment. Small elongated bubbles. One edge only, with raised rib.
FH 27mm.

Also 1 fragment from a similar handle
b..... W69 (7) 12

Also 1 shoulder fragment of (?) jug with lower attachment of similar handle
c..... W69 (7) 24

41. W70 (7a) 9
Handle fragment. Elongate bubbles. Ribbon handle, one edge missing.
FH 22mm.

42. W77 (7/20) 63
Neck fragment of unguent bottle? Some small bubbles. Dulled surfaces. Cylindrical neck flaring out towards bottom.
FH 26mm., diameter of neck 9mm., neck thickness 1mm.

43*. W77 (7/20) 63
Body fragment of flask. Glass full of small to large elongate bubbles. Neck/shoulder junction and part of convex-curved shoulder only.
Dim. 23x21mm., WT 1mm.

Also 4 similar fragments from flasks
b*..... W77 (7/20) 63 (4 fragments)

44*. W69 (7) 24
Body fragment of flask. Many small to medium elongate bubbles; streaky yellow impurities; surface dulled and distorted by heat. Part of cylindrical neck and shoulder only.
Dim. 25x16mm., WT 3.5mm.

Also 1 similar fragment
b*..... W70 (7a) 9

45*. W77 (7/20) 63
Base fragment of small flask (?). Glass full of small to medium bubbles and contains black impurities. Convex-curved side sloping into shallowly concave base.

PH 12mm., WT 1mm.

46. W77 (7/20) 63
Body fragment of cylindrical bowl. Some small bubbles. Optic blown. Vertical side with carination towards bottom. 2 parallel, slightly diagonal ribs in low relief. Tops of ridges worn.
Dim. 30x25mm., WT 1.5mm.

Also 3 other body fragments with optic blown ribs
b..... W69 (7) 52
c..... Nos. 38 & 46 (2 fragments probably from same vessel)

- 47* W77 (7/20) 63
Body fragment. Many small to medium bubbles. Optic blown. Convex-curved side with 2 ribs in very low relief, 1 rib is curved.
Dim. 26x22mm., WT 1mm.

48. W77 (7/20) 63
Body fragment. Occasional tiny bubbles. Straight side. 2 trails nipped together.
Dim. 28x16mm., WT 1mm.

- 49*. W77 (7/20) 63
Body fragment. Glass full of small to medium bubbles and contains black inclusions. Convex-curved body. 2 parallel trails in high relief.
Dim. 20x19mm., WT 1.5mm.

Also 2 other body fragments of similar bubbly glass, each with a single trail in shallow relief.
b*..... W77 (7/20) 63

50. W77 (7/20) 63
Rim fragment of bottle. Small to medium elongate bubbles; much strain cracking. Rim bent out, up, in and flattened; inner edge of rim thickened. Upper surface of inner edge of rim shows much wear. Small part of upper angle attachment on cylindrical neck below rim.
PH 20mm., outer RD 45mm.

Also 1 fragment from outer edge of similar rim and neck with streaky yellow impurities
b..... No. 30

Also 4 fragments from similar folded bottle rims
c..... W69 (7) 17 (Rim diameter c. 60mm.)
d..... W77 (7/20) 63 (With streaky yellow impurities)
e..... W77 (7/20) 48 (With scar on underside from handle attachment)
f..... W69 (7) 30

51. W77 (17/23) 169

Upper handle attachment of bottle. Large elongate bubbles.
Attachment of large angular ribbon handle folded and retains
scars on inner edge where it was attached to neck.
Width at neck 56mm.

52. W77 (7/20) 63

Neck and upper handle attachment of bottle. Handle contains many
elongate bubbles and impurities. Cylindrical neck bending out at
top towards rim; folded upper handle attachment.
PH 40mm., width of handle at neck 42mm., inner diameter of neck
c. 40mm.

Also 3 other fragments of necks with upper handle attachments

b..... W77 (7/20) 63 (2 fragments)

c..... W77+

Also 2 other fragments of bottle handles with folded upper attachments

d..... W71 (20) 92

e..... W77+

53. W71 (18) 18

Handle fragment of bottle. Elongate bubbles; dulled surfaces.
Reeded outer surface.
PH 22mm., section 25+ x 4mm.

Also 6 other fragments from reeded handles

b..... W69 (7) 1

c..... W69 (7) 58

d..... W70 (24) 1

e..... W77 (7/20) 4 (2 fragments)

f..... W77 (17/23) 22

54. W69 (7) 26

Handle fragment of bottle. Large elongated bubbles; dulled
surfaces. Very thick, plain handle bending through 90 at top.
PH 44mm., Section 28+x12mm.

Also 2 other apparently plain handle fragments from bottles or jugs

b..... W69 (7) 14

c..... W77 (7/20) 63 - worn

55. W70 (7a) 2

Handle and shoulder fragment of bottle. Elongated bubbles;
streaky black impurities in handle. Short reeded handle fragment
with part of shoulder attached.
PH 37mm.

Also 2 other reeded handle and shoulder fragments from bottles

b..... W69 (7) 79

c..... W77 (7/20) 63

Also 1 prismatic bottle shoulder fragment with tip of lower handle
attachment

d..... W77 (7/20) 63

56. W71 (20) 30
Base fragment of prismatic bottle. Base design - at least 4 concentric circular mouldings, one with expanded bulge at one point.
Dim. 54x26mm.
57. W77 (7/20) 63
Base fragment of prismatic bottle. Base design - 2 concentric circular mouldings, fragment broken by central moulding of unknown type. Much worn.
Dim. 50x34mm., diameter of outer moulding c. 100mm.
58. W70 (7a) 9
Base fragment of prismatic bottle. Base design - central dot and at least 1 concentric circular moulding. Worn.
Dim. 25x19mm.
59. W (8) 8
Base fragment of prismatic bottle. Base design - concave-sided 'V'-shaped moulding possibly part of a diamond with straight moulding close to broken edge. Worn.
Dim. 42x37mm.
60. W69 (7) 1
Base fragment of prismatic bottle. Base design - part of 1 straight and 1 curved mouldings at 45 to each other. Much worn.
Dim. 17x14mm.
61. W69 (7) 27
Base and side fragment of square bottle. Base design - small circular ring in corner. Highly worn.
FH 11mm.

Also 2 other prismatic bottle base fragments with curved mouldings
b..... W69 (7) 24
c..... W77 (7/20) 35

Also 1 other prismatic bottle base fragment with part of moulding
d..... W77 (7/20) 63

62. W77 (7/20) 63
Base fragment of square bottle. Small bubbles. Corner of base and part of side. Much worn.
FH 12mm.

63. 171 fragments from blue/green bottles

1 cylindrical neck fragment
a..... W70 (22) 1 (1 fragment)

26 shoulder fragments
b..... No.19 (1 fragment)
c..... W69 (7) 1 (3 fragments)
d..... W69 (7) 11 (1 fragment)

e..... W69 (7) 12 (2 fragments)
 f..... W69 (7) 24 (3 fragments)
 g..... W69 (7) 41 (1 fragment)
 h..... W69 (7) 74 (1 fragment)
 i..... W70 (16) 21 (1 fragment)
 j..... W71 (20) 35 (2 fragments)
 k..... W77 (7/20) 16 (1 fragment)
 l..... W77 (7/20) 63 (5 fragments)
 m..... W77 (7/20) 64 (2 fragments)
 n..... W77 (17/23) 129 (1 fragment)
 o..... W77 (17/23) 169 (1 fragment)
 p..... W77+ (1 fragment)

14 - 90 angle fragments

q..... No.1 (1 fragment)
 r..... W69 (7) 1 (5 fragments)
 s..... W69 (7) 14 (1 fragment)
 t..... W69 (7) 21 (1 fragment)
 u..... W69 (7) 24 (1 fragment)
 v..... W69 (7) 41 (1 fragment)
 w..... W69 (7) 72 (1 fragment)
 x..... W77 (7/20) 16 (1 fragment)
 y..... W77 (7/20) 63 (2 fragments)

2 angle fragment from hexagonal bottle

z..... W71 (18/8) 4 (1 fragment)
 aa..... W77 (7/20) 63 (1 fragment much worn)

125 flat side fragments from prismatic bottles

ab..... No.60 (1 fragment)
 ac..... No.64 (1 fragment)
 ab..... W69 (7) 1 (10 fragments - 1 with many strain cracks)
 ae..... W69 (7) 3 (1 fragment)
 af..... W69 (7) 11 (3 fragments)
 ag..... W69 (7) 12 (5 fragments)
 ah..... W69 (7) 13 (1 fragment)
 ai..... W69 (7) 15 (2 fragments)
 aj..... W69 (7) 21 (1 fragment)
 ak..... W69 (7) 24 (23 fragments - 6 with strain cracks)
 al..... W69 (7) 28 (3 fragments)
 am..... W69 (7) 29 (1 fragment)
 an..... W69 (7) 41 (1 fragment)
 ao..... W69 (7) 57 (1 fragment)
 ap..... W69 (7) 64 (6 fragments with strain cracks)
 aq..... W69 (7) 73 (1 fragment)
 ar..... W69 (7) 74 (1 fragment)
 as..... W69 (7) 76 (1 fragment)
 at..... W69 (7) 79 (2 fragments)
 au..... W69 (7) 90 (2 fragments)
 av..... W69 unstrat. (2 fragments)
 aw..... W70 (8) 5 (1 fragment)
 ax..... W70 (7a) 9 (1 fragment)
 ay..... W70 (23) 20 (1 fragment)
 az..... W70 (17) 3 (1 fragment)

ba..... W77 (7/20) 16 (2 fragments)
 bb..... W77 (7/20) 63 (31 fragments - 1 with many strain cracks)
 bc..... W77 (7/20) 64 (1 fragments with many strain cracks)
 bd..... W77 (17/23) 4 (1 fragment)
 be..... W77 (17/23) 23 (1 fragment)
 bf..... W77 (17/23) 121 (1 fragment)
 bg..... W77 (17/23) 129 (1 fragment)
 bh..... W77 (17/23) 151 (1 fragment)
 bi..... W77 (17/23) 162 (1 fragment)
 bj..... W77 (17/23) 169 (1 fragment)
 bk..... W77 (32) + (1 fragment)

[Paul please check amount of fragments as only 115 seem to be listed]

1 side fragment from cylindrical bottle

bl..... W69 (7) 1 (1 fragment)

2 bottle fragments distorted by heat

bm..... W71 (22) 87 (1 fragment)

bn..... W69 (7) 1 (1 fragment)

Window Glass

64. 25 cast matt/glossy window glass fragments

a..... M65 () 1 (1 fragment with rounded edge)
 b..... M65 + (1 fragment with rounded edge)
 c..... W69 (7) 1 (3 fragments - 1 with rounded edge and angle)
 d..... W69 (7) 11 (1 fragment)
 e..... W69 (7) 15 (1 fragment)
 f..... W69 (7) 24 (1 fragment)
 g..... W69 (7) 28 (1 fragment)
 h..... W69 (7) 29 (1 fragment)
 i..... W69 (7) 39 (1 fragment)
 j..... W69 (7) 41 (1 fragment)
 k..... W69 (7) 46 (1 fragment)
 l..... W69 (7) 73 (1 fragment)
 m..... W69 (7) 74 (1 fragment with rounded edge)
 o..... W71 (18/8) 4 (4 fragments - 1 with rounded edge)
 p..... W71 (18/8) 6 (1 fragment with rounded edge)
 q..... W77 (7/20) 63 (2 fragments)
 r..... W77 (17/23) 4 (1 fragment)
 s..... W71 (20) 51 (1 fragment distorted by heat)
 t..... W69 (7) 1 (1 colourless fragment)

Objects other than vessels

65. W71 SF 26

Bead. Black opaque glass. Approximately oval outline with 2 perforations parallel to short axis. Moulded face in relief on front. Bead retains a lower border above and to one side of face, elsewhere border may never have been formed as edges are rounded and not broken.

Dim. 22x14mm., maximum thickness 17mm.

66. W70 + (small find 2)
Melon bead. Turquoise frit. Worn. Approximately one-third extant.
Length 12mm.
67. W77 (17/23) 226
Melon bead. Dark blue glass. Grooves well formed. Worn and chipped at either end of perforation.
Length 21mm., section 24mm.
68. W70 (19) 29 Find 15
Ring bead. Blue/green. Uneven 'D'-shaped section.
Length 3-4mm., section 10mm., perforation diameter 6mm.
69. W71 (22) 102
Plano-convex counter. 'Opaque' black glass. On upper surface a spot of opaque sealing wax red glass surrounded by 4 smaller dots of blue-grey glass have been set slightly off-centre and marvered smooth with upper surface. Base worn smooth; chipped on one side.
Diameter 17mm., thickness 6mm.
70. W77 (80) 2 23
Grozed counter. Flat body fragment of blue/green prismatic bottle grozed to sub-circular shape.
Diameter 14mm., thickness 2.5 - 4 mm.

Table 1: Undecorated blue/green body fragments

Context	1	2	3	4	5	6	7	Total
W64	23	1	7	5	-	1	4	41
M65 (T) 82	1	-	-	-	-	-	-	1
W69 (7) 1	15	1	7	11	1	4	7	46
W69 (7) 2	3	-	-	-	-	-	-	3
W69 (7) 6	-	-	-	-	-	1	-	1
W69 (7) 8	2	-	-	1	-	-	2	5
W69 (7) 9	-	1	-	1	-	-	-	2
W69 (7) 11	4	2	1	3	1	-	4	15
W69 (7) 12	6	-	3	1	-	2	6	18
W69 (7) 13	-	-	2	-	-	-	-	2
W69 (7) 14	1	-	2	1	-	-	1	5
W69 (7) 15	1	-	-	-	-	-	-	1
W69 (7) 20	-	-	1	-	-	-	-	1
W69 (7) 21	5	-	1	-	-	1	2	9
W69 (7) 24	41	4	19	10	-	4	58	136
W69 (7) 27	-	-	-	-	-	1	-	1
W69 (7) 28	1	-	-	-	-	-	-	1
W69 (7) 29	3	-	-	-	-	-	1	4
W69 (7) 39	-	-	-	-	-	1	-	1
W69 (7) 41	4	-	2	2	-	3	-	11
W69 (7) 43	-	1	1	-	-	-	-	2
W69 (7) 44	-	1	-	-	-	-	-	1
W69 (7) 47	2	-	-	-	-	-	-	2
W69 (7) 49	1	-	-	-	-	-	-	1
W69 (7) 56	-	-	-	1	-	-	-	1
W69 (7) 69	-	-	-	-	-	-	1	1
W69 (7) 72	1	-	1	-	-	-	-	2
W69 (7) 73	-	-	-	1	-	1	-	2
W69 (7) 74	1	-	-	-	-	-	-	1
W69 (7) 75	2	1	-	-	-	-	-	3
W69 (7) 76	-	-	-	-	-	1	-	1
W69 (7) 77	-	1	-	-	-	-	-	1
W69 (7) 79	1	-	-	-	-	1	-	2
W69 (7) 82	2	-	-	-	-	-	-	2
W69 (7) 83	1	-	-	-	-	-	-	1
W69 (7) 90	-	-	1	-	-	-	1	2
W69 (7) 91	1	-	-	-	-	-	-	1
W69 (7) 92	1	-	-	-	-	-	5	6
W69 (7) 105	1	-	-	-	-	-	-	1
W69 W/S	-	1	1	-	-	-	-	2
Subtotal	124	14	49	37	2	21	92	339

Continued....

Table 1 - continued

Context	1	2	3	4	5	6	7	Total
b/fwd	124	14	49	37	2	21	92	339
W70 (7) 1	1	-	-	1	-	-	-	2
W70 (7a) 1	3	-	-	-	1	-	-	4
W70 (7a) 4	1	1	-	-	-	1	-	3
W70 (7a) 8	-	1	-	-	-	-	-	1
W70 (7a) 9	-	1	-	-	-	-	-	1
W70 (7a) 24	1	-	-	-	-	-	-	1
W70 (16) 2	1	-	-	-	-	-	-	1
W70 (16) 11	1	-	-	-	-	-	-	1
W70 (16) 33	1	-	-	-	-	-	-	1
W70 (17) 3	1	-	1	-	-	1	-	3
W70 (17) 5	-	-	1	-	-	-	-	1
W70 (19) 25	1	-	-	-	-	-	-	1
W70 (20) 3	-	1	-	-	-	-	-	1
W71 (18) 16	-	-	1	-	-	-	-	1
W71 (18) 21	1	-	-	-	-	-	-	1
W71 (18/8) 6	-	-	1	-	-	-	-	1
W71 (20) 21	-	1	-	-	-	-	-	1
W71 (20) 25	1	-	-	-	-	-	-	1
W71 (20) 103	1	-	-	-	-	-	-	1
W71 (20) 104	1	-	-	-	-	-	-	1
W71 (22) 55	1	-	-	-	-	-	-	1
W71 (22) 118	-	1	-	-	-	-	-	1
W71 (23) 92	-	1	-	-	-	-	-	1
W77 (7/20) 4	-	-	-	1	-	-	-	1
W77 (7/20) 16	1	-	-	-	-	1	-	2
W77 (7/20) 35	1	-	-	2	1	-	-	4
W77 (7/20) 48	1	-	1	-	1	-	-	3
W77 (7/20) 63	49	3	59*	45	14	3	32	205
W77 (7/20) 64	5	-	6	3	-	1	-	15
W77 (17/23) 14	1	-	-	-	-	-	-	1
W77 (17/23) 30	1	-	-	-	-	-	-	1
W77 (17/23) 169	-	-	1	-	-	-	-	1
W77 (17/23) 178	-	-	-	-	-	-	1	-
W77 (17/23) 142	-	-	1	-	-	-	-	1
W77 (32) 41	1	-	-	-	-	-	-	1
W77 (32) +	-	1	-	-	-	1	-	2
W77 (34) 39	1	-	-	-	-	-	-	1
W77 +	-	1	-	-	-	-	-	1
Totals	201	26	121	90	19	29	124	601

Categories:-

- | | |
|------------------|----------------------------|
| 1) Standard | 2) Worm Standard |
| 3) Bubbly | 4) Very Bubbly |
| 5) Opaque Bubbly | 6) Heat Affected Fragments |
| 7) Chips | |

* Includes 2 worm fragments

Table 2: Undecorated body fragments in colours other than blue/green

Context	Colourless				Yellow/brown		Yellow/green			Total
	1	2	3	4	1	4	1	2	4	
W64	1	2	-	-	1	-	-	-	-	4
W69 (7) 1	1	-	-	-	1	-	-	-	1	3
W69 (7) 8	-	-	-	-	1	-	-	-	-	1
W69 (7) 9	-	-	-	-	1	-	-	-	-	1
W69 (7) 10	3	-	-	-	-	-	-	-	-	3
W69 (7) 11	2	-	-	-	1	-	-	1	-	4
W69 (7) 12	2	-	-	1	1	-	1	-	-	5
W69 (7) 14	1	-	-	-	-	-	-	-	-	1
W69 (7) 24	9	1	5	-	-	1	14	-	-	30
W69 (7) 41	2	-	-	-	1	-	-	-	-	3
W69 (7) 52	-	-	-	-	1	-	-	-	-	1
W69 (7) 83	-	1	-	-	-	-	-	-	-	1
W69 (7) 92	2	-	-	-	1	-	-	-	-	3
W70 (7a) 1	-	-	1	-	-	-	-	-	-	1
W70 (16) 6	-	-	-	-	1	-	-	-	-	1
W70 (23) 5	-	-	-	-	1	-	-	-	-	1
W77 (7/20) 4	1	-	-	-	-	-	-	-	-	1
W77 (7/20) 63	6	-	3	-	2	-	5	-	2	18
W77 (7/20) 64	-	1	-	-	-	-	1	-	-	2
Totals	30	5	9	1	13	1	21	1	3	84

Categories:

- 1) Standard
- 2) Bubbly
- 3) Chips
- 4) Heat affected fragments

Table 3: Blue/green glass working waste

Context	1	2	3	4	5	6	Total
W64	4	3	-	3	9	-	19
W (7) 6	-	-	-	-	1	-	1
W69 (7) 1	1	7	-	12*	4	1	25
W69 (7) 6	-	1	-	-	-	-	1
W69 (7) 11	1	3	-	1	2	-	7
W69 (7) 12	2	-	-	7	2	1	12
W69 (7) 13	-	-	-	1	-	-	1
W69 (7) 14	1	1	-	-	-	-	2
W69 (7) 21	-	-	-	-	2	1	3
W69 (7) 24	8	12	2	45	13	3	83
W69 (7) 27	-	1	-	-	-	-	1
W69 (7) 28	-	1	-	1	-	-	2
W69 (7) 29	-	-	-	1	-	-	1
W69 (7) 30	-	-	-	-	1	-	1
W69 (7) 31	-	-	-	-	-	1	1
W69 (7) 40	-	-	-	-	-	1	1
W69 (7) 41	-	1	-	-	-	-	1
W69 (7) 43	-	1	-	-	-	-	1
W69 (7) 56	-	-	-	1	-	-	1
W69 (7) 68	1	-	-	-	-	-	1
W69 (7) 72	1	-	-	-	-	1	2
W69 (7) 74	-	1	-	-	-	-	1
W69 (7) 76	1	-	-	-	-	-	1
W69 (7) 82	-	1	-	-	-	-	1
W69 (7) 90	-	-	-	-	1	-	1
W69 (7) 92	1	2	-	-	2	-	5
W69 (7) 110	1	-	-	-	-	-	1
W70 (7a) 1	-	1	-	-	1	1	3
W70 (7a) 2	1	-	-	-	-	-	1
W70 (7a) 4	-	1	1	-	1	-	3
W70 (7a) 11	-	-	-	-	1	-	1
W70 (16) 9	-	-	-	1	-	-	1
W70 (17) 5	-	-	-	-	1	-	1
W70 (17) 17	-	-	-	-	1	-	1
W70 (18) 5	-	-	-	1	-	-	1
W70 (20) 1	-	-	-	-	-	1	1
W70 (22) 1	-	1	-	-	-	-	1
W71 (20) 30	-	-	-	1	-	-	1
Subtotals	23	38	3	75	42	11	192

Continued....

Table 3 continued:

Context	1	2	3	4	5	6	Total
b/fwd	23	38	3	75	42	11	192
W77 (7/20) 4	1	2	-	1	-	1	5
W77 (7/20) 16	-	-	1	2	1	-	4
W77 (7/20) 35	2	-	-	1	-	-	3
W77 (7/20) 48	-	2	-	-	-	-	2
W77 (7/20) 62	1	-	-	-	-	-	1
W77 (7/20) 63	11	36	4**	33	18	17	127
W77 (7/20) 64	4	5	2	2	5	1	19
W77 (34) 15	-	1	-	-	-	-	1
W77 (34) 37	-	1	-	-	-	-	1
W77 (34) 40	-	1	-	-	-	-	1
Totals	42	86	18	114	66	30	356

* Also 1 large lump of glass waste broken into 21 fragments

** Also 8 fragments possibly from roundels

Categories:-

- 1) Cylinder 'rims'
- 2) Cylinder 'necks'
- 3) Roundels
- 4) Heat affected lumps
- 5) Trails
- 6) Rounded lumps

Table 4: Glass working waste in colours other than blue/green

Context	1	2	3	4	5	6	7	8	Total
W69 (7) 1	2	-	1	1	-	-	-	-	4
W69 (7) 11	-	1	-	-	-	-	-	-	1
W69 (7) 12	1	-	-	-	-	-	-	-	1
W69 (7) 24	1	-	-	-	-	7	-	-	8
W69 (7) 29	-	-	-	-	-	-	1	-	1
W77 (7/20) 63	1	-	-	1	1	5	-	1	9
Totals	5	1	1	2	1	12	1	1	24

Categories:-

- 1) Colourless cylindrical 'rims'
- 2) Colourless cylindrical 'necks'
- 3) Yellow/brown cylindrical 'rim'
- 4) Yellow/brown heat affected lump
- 5) Yellow/green heat affected lump
- 6) Colourless trails
- 7) Yellow/green trails
- 8) Yellow/green rounded lump