

British Mission to Tell el-Amarna

**Work in the Main City South,
Autumn 2017**



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Report on the work undertaken in the Main City South at Tell el-Amarna, 7 October–2 November 2017

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Introduction and background

An area of 306m² was excavated in the Main City South at Tell el-Amarna between October 7th and November 2nd 2017 (Figure 1). The work focussed on the area of a building complex given the numbers M50.14, .15 and .16 by C.L. Woolley, who initially excavated these buildings in 1922 on behalf of the Egypt Exploration Society (EES: Peet and Woolley 1923). Therefore, the work encompassed both re-excavation and new excavation. A previous season of excavation had taken place in October and November 2014, uncovering an area of 217m² (Hodgkinson 2015), and the work carried out in 2017 aimed to complete the area occupied by buildings M50.14, .15 and .16.

The 2014 work was planned after an area of vitrified material (kiln debris) was discovered on the surface of M50.14, an indicator of high-temperature industries (Figures 2, 19). Furthermore, the original publication of the building complex described it as a workshop for the manufacture of glass and faience objects (Peet and Woolley 1923, 19). Because of the importance of the site for the study of the Late Bronze Age Egyptian glass industries, the area was selected for excavation. Since a large amount of material related to glass-working (possibly raw glass production), together with faience manufacture and stone bead production (although without sign of ovens), was discovered, an application to the Ministry of Antiquities was made to excavate and to complete the area of the houses as described by the 1923 EES publication.

Participants

The team of archaeologists consisted of the following members: Anna K. Hodgkinson (field director, Freie Universität Berlin), Antonio Cantele, Kay Kossatz (both Freie Universität Berlin) Thais Rocha da Silva (University of Oxford), Kimberley Watt (University of Cambridge), Cordula Werschkun (formerly University of Liverpool), and our inspector from the Ministry of Antiquities, Kariman Abdelalim. We were joined by our trainee inspector, Nabil Abdeltieff, who remained with the team until November 2nd. The team employed thirteen Egyptian workmen from El-Hagg Qandil and Et-Till: Walid Mohamed Omar, Ahmed Mokhtar Salan, Salah Osman Mehenni, Hilal Mohamed Omar, Abdelaal Talaat Abdelaal, Ahmed Hamdy Ali, Bilal Nassar Omar, Hosny Osman Mehenni, Abdel Hafiz Abdel Aziz Ibrahim, Reda Omar Mohamed, Osman Mohamed Osman, Hassan Mohamed Raleb and Mohamed Abdelghafar Abdelhag

Acknowledgements

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The archaeological remains

1. Introduction and excavation methodology

The building complex, as originally published in *City of Akhenaten I* (Peet and Woolley 1923, 19), lies in the Main City South of Amarna, close to the House of Ranefer and the Grid 12 excavations carried out in the early 2000s (Kemp and Stevens 2010). The complex encompasses a domestic house, M50.16, a second house to the east of this house, M50.15, and the surrounding courtyard, which describes the overall area of the building complex, M50.14. Since the southern portion of house M50.16, together with a large area of the southern courtyard, M50.14, were excavated in 2014, the 2017 season encompassed the northern sections (including the northern boundary wall) of house M50.16, the whole of house M50.15, as well as the eastern, south-eastern and south-western portions of courtyard M50.14 (Figure 1). This was done in order to gain a complete picture of the industrial activities which took place in the courtyard, and to place them within the context of the activities found in the domestic houses and the industrial activity encountered in Grid 12 and the House of Ranefer.



Figure 1. Plan of the site showing walls and features excavated in 1922, in 2014 and in 2017.

The excavated area covers a total of 17 grid squares, each measuring 25m², although only seven of these were fully excavated (one of which, G-3, was already opened in 2014, but only completed in 2017). The size of the other squares was adjusted in order to take into account a large spoil heap to the north and to limit the excavated area to the features under investigation. Although some discrepancies between the encountered archaeology and the original plan had already been discovered in 2014, it has been possible to revise further the original plan and to add previously unknown walls and features, in particular to the north-east and the west of the site (Figure 1).

The initial set-out of the grid squares was done using a total station. Squares were extended by tape measure. Prior to excavation a topographical survey was undertaken across each grid square. Workmen were then employed to remove overburden layers, which usually consisted of wind-blown sand and/or backfill from the 2014 season. All archaeological deposits were removed by trowel and brush, and spoil was 100% sieved for finds. Hollow features, such as pits, were initially half-sectioned before being fully excavated, and the entire area was planned at a scale of 1:25. The excavation was back-filled after the conclusion of the work, using spoil from the excavation and clean sand.



Figure 2. The site prior to excavation in 2014. Looking north towards the house of Ranefer. The concentration of vitrified material can be seen in the bottom right corner.

2. The courtyard, its industrial installations and evidence of industrial activity

The area of courtyard M50.14 appears to have been open, without a permanent roof. No remains related to a temporary structure have been found. The partition walls excavated within this area were usually thin and poorly preserved, usually being no more than two courses of bricks high. This was particularly evident in grid squares **K-2**, **K-3**, **L-2** and **L-3** to the east, and **L-4**, **L-5**, **K-5** and **J-5** to the south-east, where the archaeological remains were found only a few centimetres below the modern surface (see Figure 1 and 3).

The southern boundary wall, as marked on the 1923 plan, was identified, although its preservation is somewhat poor, with only a few bricks remaining in place. The best preserved section of the wall was encountered in **L-5**, although further south than marked on the 1923 plan and with another thin strip of a wall running roughly east-west through the square slightly to the north (Figure 3).

The floor surface appears to have directly overlain the desert surface (*gebel*) and consisted of a trampled surface, which contained pottery fragments and pieces of charcoal. Only one small patch of mud floor with two layers of gypsum whitewash was found against the remains of two mud bricks forming a corner in **L-4**. The original extent of this floor is uncertain, and its presence in an otherwise industrial courtyard setting was somewhat surprising. A series of small and ephemeral fireplaces was encountered in this eastern part of the courtyard (Figure 1: marked as archaeological features).



Figure 3. The south-eastern extent of the courtyard, showing the remains of the boundary wall. Looking north-west.

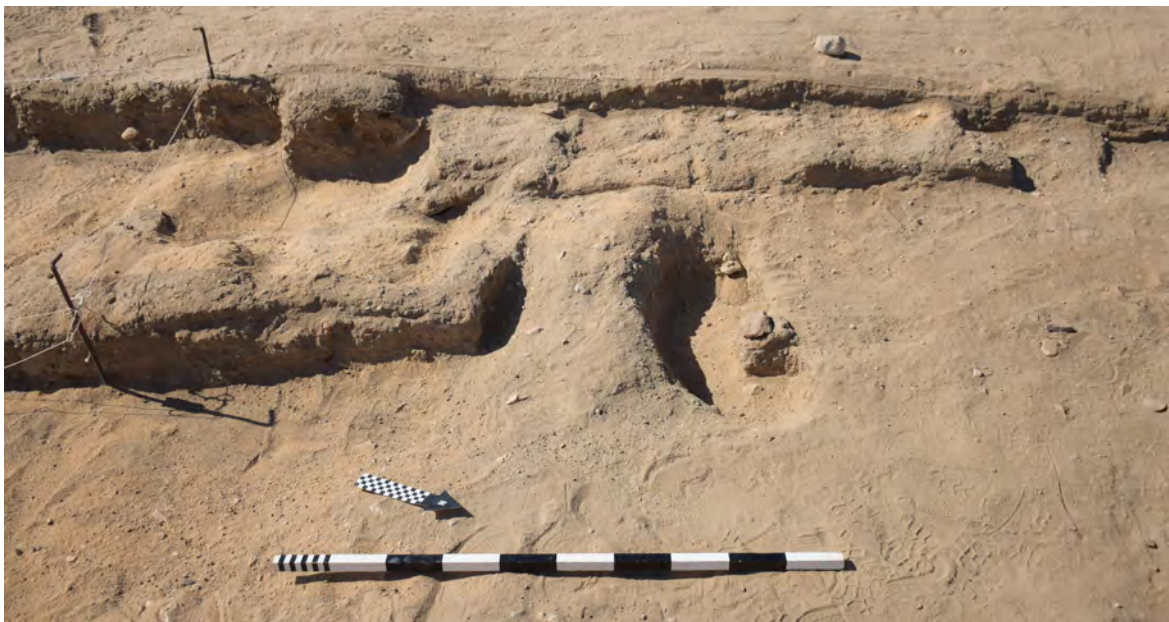


Figure 4. The oven found in J-5, with the boundary wall forming an angle around it.

The southern courtyard incorporated one probable oven pit, which may have once been lined with clay, indicated by the presence of two fragments of vitrified clay in its eastern cut. The oven contained one fill, which included pieces of charcoal, and several objects related to glass-working and faience manufacture were found, including ingot fragments, rods and several faience bead wasters. The southern boundary wall of the courtyard forms a

corner against this oven in J-5, taking this structure into account (see Figure 4). This firing structure appears to have belonged to a series of fire pits discovered in the southern courtyard during the 2014 season. These pits, too, may have been lined with clay or mud bricks, and this is supported by the presence of vitrified clay and sandstone fragments excavated as a concentration to the south of house M50.16 in 2014.

The 1923 publication describes the “remains of a glaze kiln: pit cut in sand 1.00m diam. by 0.50m deep, full of burnt brick, glass and glaze slag, and fragments of the pots used in the kiln for standing the vessels on: the bottoms and sides of these are covered with tricklings of glaze” (Peet and Woolley 1923, 19). This point was, in fact, marked on the original plan with the letter “X” next to a circular feature (Figure 1). This feature was excavated in the area between squares K-4 and L-4 in 2014, and revealed a pit, although no oven. Some glass-working-related materials were found in this area in 2014. However, a second, unmarked, circular feature was shown on the 1923 plan, in the north-eastern area of the courtyard, in grid square L-3. The 2017 excavation revealed a circular pit in this area, which was interpreted as an oven pit, since it contained four different fills with ashes and charcoal, although no structural remains. These may have been removed, or had never been in place (Figure 5).



Figure 5. The eastern extent of the courtyard, showing partition walls and the circular oven, looking south.

No direct evidence of glass-working was found in the area of this oven, although the surrounding rooms contained numerous objects related to high-temperature activities. A small fireplace was found against the eastern enclosure wall, and the adjacent bricks have been reddened because of this (Figure 6).

An almost intact, clay-lined and blue-painted water-jar was found in the south-eastern corner of the room containing the aforementioned oven, and this was filled with some collapse and organic material (Figure 7).

The north-eastern area of the courtyard M50.14 contained some walls not previously marked on the EES plan of the complex. This is probably due to the fact that the complex was not fully excavated in 1922. Rooms with ashy fills were excavated in the north-eastern areas of grid squares K-2 and L-2, and these were partially covered by spoil heaps from the 1922 Woolley excavations, as well as some ancient collapse. These rooms yielded numerous items related to industrial activity. By contrast, the excavation of grid squares G-5 and the western part of H-5 did not reveal any features, and the only evidence of industrial activity came from the excavation of two overhanging parts of a spoil heap created by Woolley’s excavations (Figure 1).



Figure 6. A superficial fireplace against the eastern boundary wall, in the north-eastern part of grid square L-3. Looking west.



Figure 7. The blue-painted water-jar during excavation. Looking south-east.

Evidence of metal-working in the northern courtyard was first encountered during the 2017 excavations, since this activity was not noticed in 2014. Other activities observed in the courtyard include stone-working, particularly of agate (some unfinished beads have been found), glass and faience. Tools made from stone and metal have been found, including some metal rod fragments, which may have been used as *mandrels* (rods which formed the central holes) in the manufacture of glass beads (Figure 19).

The western sections of the courtyard were found to be covered with vast quantities of mud-brick collapse from the boundary walls of buildings M50.16 and M50.15. It was decided to remove some of this but to leave other parts in place in order to protect the underlying archaeological features. However, the removal of the mud-brick collapse in the north-western part of G-2 revealed the outline of a possible well, indicated by a brown tinting of bricks and soil in this area (Figure 1).

Grid square G-4, the north-eastern corner of which was excavated in 2014, was cleaned and excavated fully (Figure 8), and the northern parts of G-5 and H-5 were cleared in order to complete the plan of the courtyard. A small oven pit was discovered in the western section of H-5, but no further features have been found. The original site plan does not indicate the southern boundary wall in this area, and the extent of the grid squares excavated in 2017 did not include the continuation of this wall to the south-west. The final trace of this wall was found in the south-western corner of J-5, in the shape of a single mud brick (Figure 1).



Figure 8. Grid square G-4 as re-excavated in 2017. Looking east.



Figure 9. The northern parts of M50.16, with the parts excavated in 2014 to the south. Looking east. Mud-brick wall collapse can be seen to the west and towards the centre of the image.

3. The remains of the domestic houses, M50.15 and M50.16

M50.16

Since the larger part of this building was already excavated in 2014, only the northernmost strip of this building was uncovered in 2017, measuring c.31m² (Figures 1, 9).

The northern boundary wall of M50.16 appears to be in fairly good condition in the western and eastern part of the house, although it becomes very unclear in the central part, where large parts have collapsed. A gravel trench covered the course of the wall in **I-2**, outlining the 1922 excavation (Figure 10).

In situ dumped pottery was discovered in the gap between the western side of the eastern boundary wall of M50.16 and the western wall of M50.15, in room 9 of M50.16 (Figure 11). A cylindrical household oven was found here in previous seasons, thus this room was interpreted as an open area for cooking. Owing to the series of collapse layers and weathered surfaces, formed from water-hardened sand and mud-brick collapse (see Figure 9), it was not possible to add much further detail to the plan of M50.16.

M50.15

Building M50.15 was not excavated during the 2014 season, although the southern boundary wall was planned. Since the 1922 excavations did not examine this structure in great detail, it was decided that the 2017 excavations should pay special attention to this building.

House M50.15 consists of 10 rooms, covering an area of c.51m² in grid squares **I-3** (eastern section), **J-2**, **J-3**, as well as in **K-2** and **K-3** (western sections; see Figure 1 and 12).

Room 1 was the central room, bounded by a set of mud-brick walls. These appear to have been built on a bed of gravelly *gebel*, which slopes downwards to the north from the centre of the room. The eastern boundary of this room is marked by a mass of mud bricks, which were initially interpreted as a staircase owing to their density and alignment. The northern extension of this, however, was a straight mud-brick wall, which connected with the northern enclosure wall of the house. For this reason, a section was cut into the mass of bricks to reveal a thick layer of collapse above the natural desert gravel, behind which the outline of the N-S wall became apparent (Figure 13).

Further north, **room 2** was directly accessible from room 1. A gravel-filled trench, which ran from the northern enclosure wall to the centre of room 1, and which was probably cut by the previous excavation, covered a series of weathered collapse and silt layers in this area. These, in turn, covered an uneven surface, which was interpreted as the top surface of an ancient refuse pit, containing dumped potsherds and occasional pieces of charcoal (see Figures 14 and 15). The original floor surface, which lay approximately 0.35m above the top surface of the pit, was only preserved in the south-western corner of room 2, where the trench created by the 1922 expedition revealed a section through a dump of charcoal material and hardened gravel. The remains contained a small, superficial fireplace (Figure 16). Some burnt mud bricks were found in this fireplace, and (as mentioned above) evidence of metal-working, including ceramic crucible fragments, came from the adjacent collapse and silt layers. A section was cut into the charcoal dump in order to gain information on the nature of the wall in this area. It was discovered that the wall separating rooms 1 and 2 E-W is built upon the top layer of the refuse pit, while the N-S wall separating rooms 8-10 (Figure 15), as well as the N-S wall separating rooms 3-5 from room 1, are built on the *gebel*.

Room 3 was found to be an individual unit, and it had not been recognised as such by the 1922 mission. It is separated from room 2 by the northern extension of the mud-brick mass found to the east of room 1. The walls surrounding this room were built directly onto the *gebel*, and while the western wall was preserved up to a single course of bricks, the eastern wall was only preserved to a single course above this layer (Figure 12). Some organic material was found in this room.

Room 4 is the long, rectangular room to the east of house M50.15. Again, the *gebel* was reached very soon after initial clearance. No function could be determined for this room (see Figure 12).

Rooms 5 and 6 appear to have been connected, the surface and collapse layers found in room 5 sloping downward into room 6. A row of bricks (like a narrow *mastaba*) was found built against the northern wall of room 5 (see Figure 17). It is not certain whether this functioned as a stabilising wall, or if it had an alternative architectural function.

Room 7 was found to be a separate unit from room 6, which had not been recognised by the previous excavators. This was a small room, the function of which is not clear.

Rooms 8 and 9 lie in the western part of the building. The primary mud-brick collapse layers were left inside these rooms due to time constraints.

Room 10 consists of two parts, separated by an E–W wall. An aligned and slightly convex mass of mud bricks in the northern area may be the remains of a bin for the storage of corn. This feature remains unexcavated.

In summary, house M50.15 can be said to have been smaller in area than M50.16, probably having functioned as a secondary building to the latter. In terms of preservation, both houses appear to have suffered a similar fate, having been excavated during the 1922 excavations and subsequently left exposed to the elements, after which numerous instances of collapse occurred, and water action affected the collapsed bricks, the remains of which became mixed with wind-blown sand.

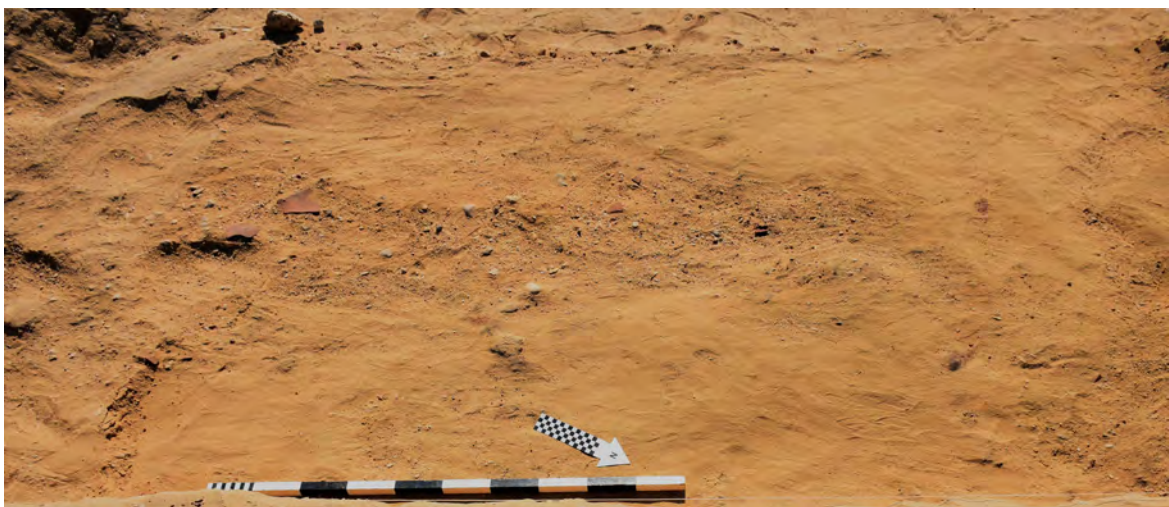


Figure 10. A gravel trench, probably the result of the 1922 excavation, running E–W on top of the northern boundary wall of M50.16.



Figure 11. Dumped pottery in the north-eastern part of M50.16.



Figure 12. House M50.15, looking south.



Figure 13. Box-section through wall collapse.



Figure 14. Concentration of pottery against the N-S wall separating rooms 10 and 1 in M50.15. Possibly part of the refuse pit on which the house was built.

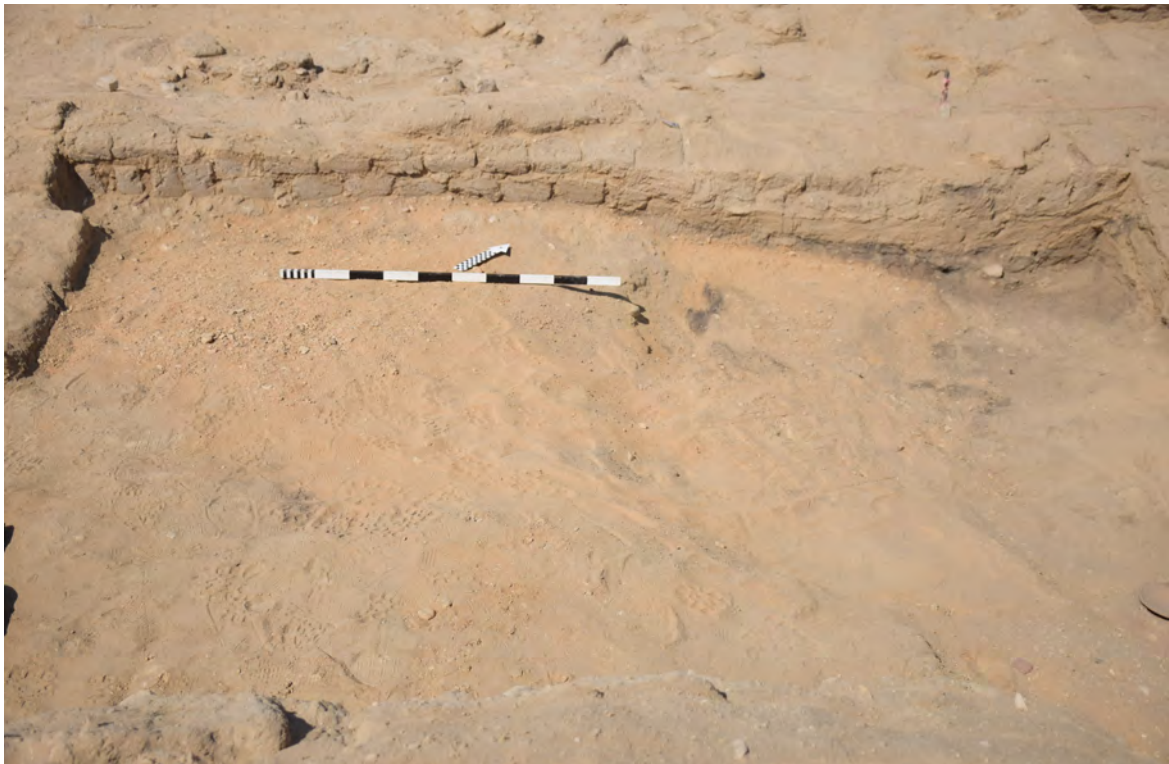


Figure 15. Looking west from room 1 into room 10 in M50.15: the natural desert surface sloping down to reveal the refuse pit along the N-S wall.



Figure 16. Charcoal dump in the north-west of M50.15, showing a fireplace to the east.



Figure 17. A row of bricks visible under the northern wall of room 5 in M50.15. Looking north.

5 The finds

Recording methodology

The finds from the 2017 excavation were sorted by material: glass, faience, metal, worked stone, organic remains (charcoal, animal bone, shell and other), vitrified material (i.e. vitrified sandstone, clay and mud brick), industrial and architectural remains (gypsum, brick), pottery (diagnostic), blue-painted pottery, industrial pottery, and other industrial material (including faience moulds). Glass and faience objects were then further separated into fragments, beads, inlays or working pieces (ingot fragments, bars, rods, etc.).

Faience beads were recorded by bead type (classified according to Andrew Boyce's Amarna bead corpus (Boyce 1995, 75–82)), recording the grid square, unit number, excavation date, number of beads, colour and further notes. Glass beads were counted and recorded in a similar fashion, and classified based on a corpus developed by Kemp and Stevens (2010, 111–115). A selection of beads was photographed.

Industrial materials, such as vitrified materials and agate fragments, were counted and weighed. They have been logged by square, unit number and date excavated. Organic remains, such as charcoal, animal bone and shell, were also logged (as with the agate, above) counted and/or weighed. The numerous small fragments of faience tiles were treated similarly, as were unidentifiable copper-alloy fragments.

The corpus and variety of objects

Glass fragments, rods and bars

A total of 150 fragments of glass have been excavated, most of which are chips of glass ingots, indicating that the processing of glass took place at this site. A fine layer of lime powder (the so-called 'parting layer') was found adhering to several of these fragments, indicating that these were once part of a larger glass ingot. The parting layer was applied to the inside of the vessels used as ingot moulds, in order to separate the glass from the ceramic material after the batch had been melted and cooled down. Two ingots (one almost complete, and a larger fragment) were found at the site during the 2014 season, and the impression of the ceramic vessel was visible on both of these objects. Many of the chips are very small, eroded and weathered, while others are larger.

Bubbly fragments, and those fragments which are translucent and light green, may indicate primary glass manufacture, since these may be the effects of inclusions contained in the glass matrix. These fragments are usually chipped in the same manner as flint, demonstrating that at least part of the workforce employed here was skilled in the chipping of stones and able to transfer this skill to the cold-working of glass. The colour of the glass ranges from dark blue and turquoise blue/green, the two most common colours for ancient Egyptian glass, through purple, yellow, translucent, almost colourless glass, to opaque white glass.

In addition 102 glass-rods, bars and strips were found, some of which bore tool marks, demonstrating the 'chaîne opératoire' (sequence of manufacturing steps) of glass-working, particularly the manufacture of beads. One undecorated, monochrome dark-blue glass vessel fragment was found. Two further monochrome dark-blue vessel fragments found in 2014 may indicate that fragments of undecorated glass vessels, which broke during manufacture, were recycled at site M50.14–16 in order to produce new glass ingots.

An extremely clear fragment of glass, with only a very slight light-blue tint, has been found, and this fragment is very carefully chipped and highly polished. It appears to have broken vertically in the centre, but this piece was most likely intended as an eye inlay for a piece of sculpture (Figure 18).

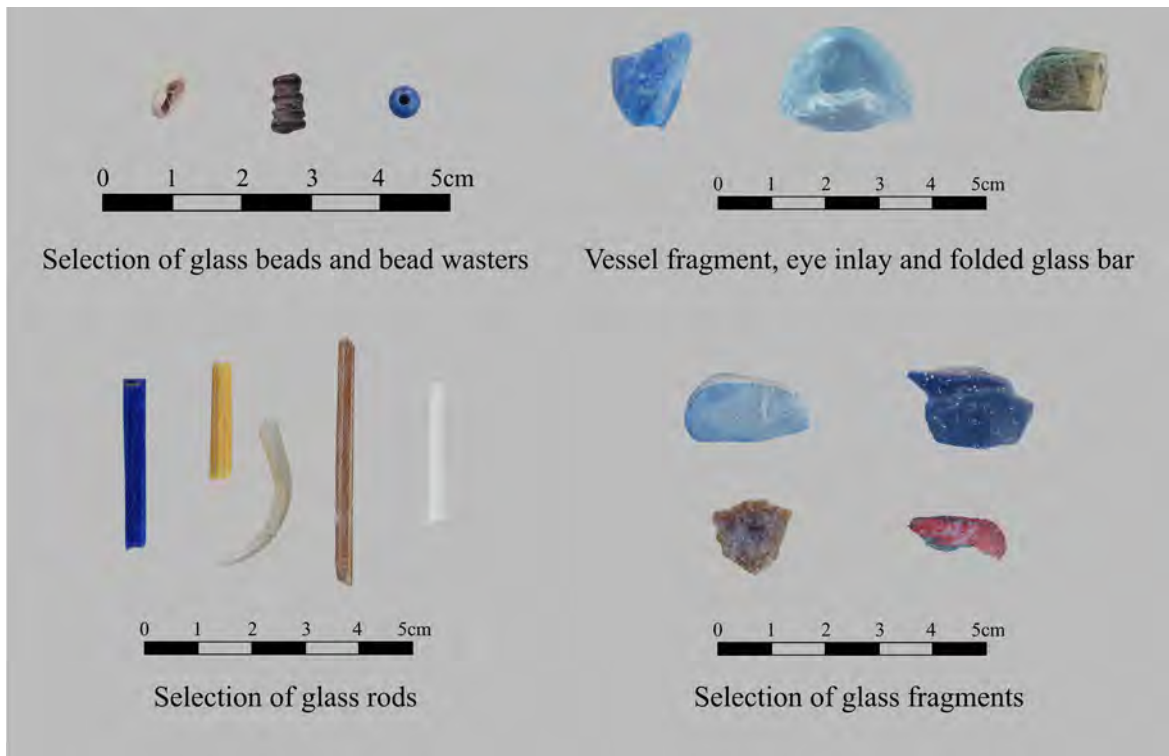


Figure 18. Objects from glass.

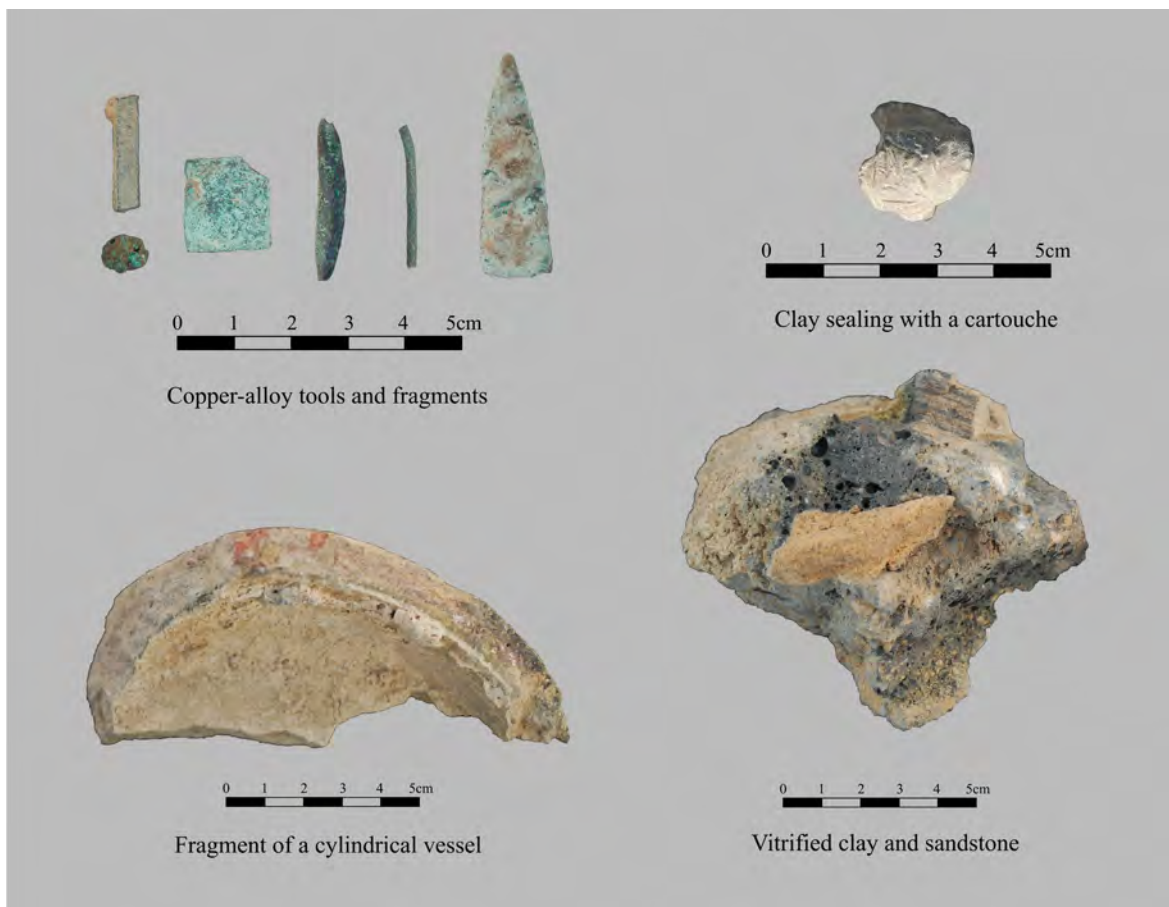


Figure 19. Objects from metal and clay, a cylindrical vessel and vitrified material.

Cylindrical vessels for glass manufacture

A total of 28 vessel fragments of cylindrical shape were found across the site. A large number of these came from the spoil heap to the south and south-east of the site, which was created during the 1922 excavations. These vessels were used as moulds for glass ingots, and some fragments had blue and purple glass adhering to them (see Figure 19). Their standardised size is reflected in the glass ingots discovered aboard the Late Bronze Age shipwreck off the Anatolian coast at Uluburun. The large glass ingot fragment discovered at site M50.14–16 in 2014 also fits into most these vessels, which may hint at Amarna being the place of their production (Hodgkinson 2015, 284). The cylindrical vessels may also have been used for the re-melting of glass, and the drawing of glass rods for the decoration of vessels and the production of beads.

Glass and faience beads

In total, 286 faience beads of a variety of types were found in 2017. The most common type is the small ring bead, followed by the disc bead and segmented and spacer beads. In addition, a total of 40 wasters (i.e. manufacturing errors, where beads have fused together and were thus discarded) were found (Figure 20).

Of glass beads, 56 have been discovered in total, the most common type being a small sphere bead. These were usually blue in colour and heavily weathered. A large number of these beads was unfinished, showing trails of glass yet to be polished off. Again, waster beads were discovered, which had not fused properly (Figure 18).

Faience jewellery and moulds

A small number (25 in total) of faience ring fragments was found, in most cases decorated with an open *udjat*-eye design, although two plaque-shaped bezels were also found, one of which is decorated with a fish. A similar number (24) of faience amulets and pendants has been registered, some of which are floral in design (i.e. poppy buds, corn flowers and leaves), while others depict household deities, including Bes. One faience scarab was also found.

The excavations furthermore yielded a total of 12 faience moulds from fired clay, the designs of which did not repeat, although one mould found in 2014 formed a direct parallel to one found in 2017. Designs include a scarab, floral amulets, a Bes-figure playing the tambourine, a frog, a *nefer*-symbol and two fragments (not matching) of a cartouche design (Figure 20).

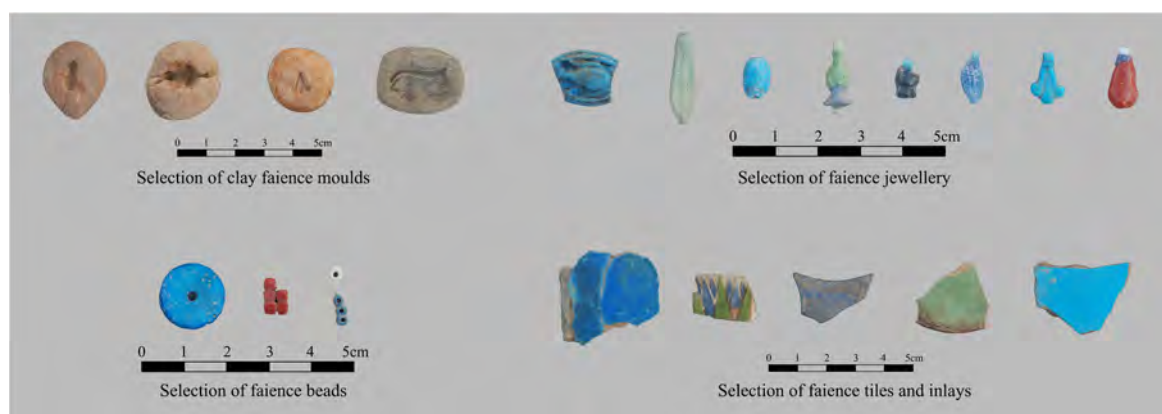


Figure 20. Objects from faience and faience moulds.

Faience inlays, tiles and other fragments

A total of 120 fragments of faience tiles or inlays was found, and the monochrome fragments were grouped by colour (light turquoise: 41 fragments; dark turquoise: 40 fragments; dark blue: 29 fragments). These objects functioned as decorative elements for walls and wooden furniture, set into plaster. A larger fragment of a detailed polychrome lotus-flower tile was also found (Figure 20).

Metal objects

Most of the metal found across the site came in the form of small, unidentifiable copper-alloy fragments and lumps, which have been weighed and counted by unit and square number. In addition, a total of 8 blade fragments and two possible chisel fragments were found alongside one rectangular piece of metal sheeting and 6 metal rods (Figure 19). These rods may have been used in glass-bead production as *mandrels*, when the molten glass rod would be wrapped around the rod to form the bead. They may, however, have been used for several other purposes, such as decorative wire.

Metal-working crucibles

These 33 objects, which have only been identified in the 2017 season, are somewhat crude fragments of Nile clay bowls, although only a very small number of diagnostic sherds was present

Agate debitage, including the work carried out on the assemblage excavated in 2014

The 2014 object corpus included a total of 1.135kg of agate debitage. Most of this material consists of small and medium-sized chippings, while some raw bead products have also been found. A smaller, but similarly distributed range of agate objects was found in 2017, c. 420g in total. The 2014 material has been analysed and evaluated by lithics specialist Cordula Werschkun.

Stone and tools and other worked stones

A small range of stone tools, mainly polishing stones made from sandstone or quartzite, has been found. In addition, tools made from pottery sherds were probably used in the manufacture of glass objects.

Vitrified sandstone and mud brick

While the 2014 season yielded almost 26 kg of vitrified mud bricks, clay and sandstones, only c.4.5 kg of vitrified material was found during the 2017 season (see Figure 19). This may be due to the fact that a small amount of the material from the concentration located in 2014 has scattered. It has not been possible to reconstruct a kiln based on this material.

Other objects

A small number of clay sealings has been registered during the 2017 season, and most of these may be document sealings. One fragment with a stamped cartouche and string impressions has been found (Figures 19, 21).



Figure 21. A stamped clay seal for a papyrus document.

Conclusions

The excavated complex, M50.14–16, comprises a main, domestic building, some secondary buildings and some outside working areas with some thin partition walls and firing structures. We can infer from the large number of raw materials and objects related to industrial activity found at the site that the excavated workshop must have processed relatively large quantities of glass, metal and stone objects. These finds are similar to those discovered during the recent excavations at the nearby house of Ranefer and those at Grid 12 (Kemp and Stevens 2010), and support the hypothesis that this area of the Main City South at Amarna was somewhat specialised in this activity. The evidence would suggest that the workshop integrated into the courtyard was specialised in the production of glass- and faience-beads, but also produced beads from other materials, such as agate. The general layout of this complex fits well into the greater picture of Amarna, in particular that of the Main City, where it is believed that areas of small, industrial houses developed amongst the larger, elite houses to which they reported.

The project has enhanced our understanding of the socio-economic structures of the Main City South at Amarna, as well as the architecture and functionality of domestic structures and their involvement in industrial processes at Tell el-Amarna during the Eighteenth Dynasty of ancient Egypt.

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