

AMARNA FACTORIES, WORKSHOPS, FAIENCE MOULDS AND THEIR PRODUCE

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INTRODUCTION

In 1892 PETRIE discovered thousands of pottery moulds, used for the manufacture of small faience objects, in Amarna, the short-lived late 18th dynasty capital located in Middle Egypt.² Further German and British excavations yielded hundreds more. This material received little attention, however, until BOYCE³ and later SHORTLAND⁴ studied the distribution patterns of these objects across the site. Their findings will be briefly presented below.

In the meantime, results from new excavations and experimental archaeology have further enhanced our understanding of the Amarna faience industry, making it possible to reevaluate some of the conclusions reached by my predecessors. Access to previously unpublished finds of old excavations has also increased the number of moulds available for study.

I have reexamined the distribution of moulds in Amarna and additionally I have looked into the distribution of selected types of moulded objects⁵, i.e. faience rings, pendants, and casts depicting bunches of grapes, Bes, Taweret, or a Hathor head, as well as bovid figurines. In this article I will limit myself to the first two categories. An inquiry into the supply source(s) of the Great Palace moulded inlays was also made. All this was done in order to correlate the production source(s) of object cat-

egories with the places of deposition of the pertinent objects, thus establishing possible patterns of supply and demand. I also, different from the previous studies, examined the implications of the large mould concentrations found by PETRIE.⁶ Further a comparison will be made between the use of faience in daily life with that in mortuary contexts. The role of the different players in the faience market will also be addressed. Based on the results of the investigations and on published evidence concerning other industries, the broader economic picture of Amarna will be discussed.

All published Egypt Exploration Society (EES), Deutsche Orient-Gesellschaft (DOG) and Amarna Project records, as well as the Amarna Small Finds Database (ASFD)⁷ were consulted. In each source the find list of each excavated building was examined to determine the quantities and subtypes of moulds and small faience objects. When provided, object colours were also recorded. This data was compiled in various MS Excel sheets. Making use of Adobe Illustrator CS3, the Excel data was plotted on digitised base maps of the city⁸ in order to visualize the distribution patterns of both moulds and finished objects. Stone moulds and identified kilns and ovens were also plotted on the base maps. In total 38 distribution maps were made of which 6 are included at the end of this article.

¹ This article summarises part of my 2010 MA archaeology thesis “Faience moulds in New Kingdom Egypt” at the Catholic University of Leuven, Belgium (supervisor H. WILLEMS). The impetus for this study was the discovery in 2008 of nine faience moulds in al-Shaykh Sa’id, just north of Amarna, by the Belgian archaeological mission to Dayr al-Barshā (financed by FWO-Vlaanderen; Bijzonder Onderzoeksfonds KULeuven); I would like to thank H. WILLEMS, A. STEVENS and A. SHORTLAND for reading a preliminary draft of this article and providing valuable feedback.

² PETRIE 1894, 30.

³ BOYCE 1995b.

⁴ SHORTLAND 2000, 63–77.

⁵ BOYCE 1995b, 370, also believed such work might prove fruitful.

⁶ SMIRNIOU and REHREN’S (2011) recent reexamination of semi-finished glass excavated by PETRIE and stored at the Petrie Museum has also enhanced our understanding of the Amarna glass industry.

⁷ See www1 for more info; The ASFD includes all objects, including previously unpublished ones, assigned a registration number during the course of the EES excavations from 1921–1936.

⁸ KEMP and GARFI 1993, map sheets 3-7: Reproduced by courtesy of the Egypt Exploration Society, BARRY KEMP and SALVATORE GARFI; KEMP’S plan of Amarna with superimposed excavation grid: Reproduced by courtesy of BARRY KEMP; Each grid square measures 200 x 200m.

LAYOUT OF THE CITY OF AMARNA

As I am analyzing the same material as BOYCE and SHORTLAND from the same Amarna districts, I refer to their publications for a detailed interpretation of the city layout and the difficulties encountered with the excavated city records and recording systems.⁹ A brief outline will be presented below.

Buildings were constructed over a 6 kilometer north-south stretch along the east bank of the Nile (Plate 1–6). The main thoroughfare was the Royal Road which ran from the North City through the Central City into the Main City. Several other major north-south roads connected the various parts of the city.

The Central City formed the administrative and religious heart of the city. The North City, the North Suburb and the Main City formed the major residential zones. The South Suburb had a smaller area of housing. The North City also contained the North Riverside Palace, thought to be the main residence of the king. It was surrounded by several large houses, presumably belonging to the king's favourites. Situated between the North City and the North Suburb is the North Palace, thought to be the residence of the eldest princess, Meritaten. East of the Main City two smaller villages were founded. The Workmen's Village is believed to have housed the workers who built the large rock-cut tombs in the cliffs surrounding the site. The Stone Village is currently under investigation and its function remains unclear.¹⁰

MOULDS AND FAIENCE PRODUCTION

Moulds were small, one-piece, open face, red-brown fired clay objects that were made by manually shaping plastic, fine Nile clay paste into a circular or rectangular disc. Next a small object was impressed into the wet clay. The model impression left behind

formed the mould, which was left to dry before being fired.¹¹ Some moulds also contain hieroglyphs on the front¹² (Figure 1a) or marks on the back.¹³ A faience paste would be pressed into the mould. The moulded paste would then be released immediately and excess material would be removed. Several moulded parts could be joined together with a slurry and the surface could be further treated. Finally, the shaped object would be set aside for drying prior to firing.

Faience is made by mixing silica, soda, lime and some kind of colourant or opacifier with water. In the Amarna period faience workers were capable of producing colours ranging from light to dark blue and green, indigo, violet, purple, black, white, red and yellow, using local sources as well as minerals from the Eastern and Western Deserts, the Sinai and beyond, possibly even as far as the Caucasus. Producing certain colours would have required special technical knowledge.¹⁴ Three different glazing techniques were in use, occasionally in combination: efflorescence, application and cementation.¹⁵

Faience was shaped either via modeling or moulding. Details could be added using a variety of other techniques. The choice was determined by the required scale of production.¹⁶ During the New Kingdom moulding replaced modeling as the primary shaping technique.¹⁷ Moulds were ideal for mass production of small faience objects.

It is assumed that faience was fired at temperatures between 800–1000°C.¹⁸ Four types of faience kilns/ovens are believed to have been in use in Amarna. Several possible large kilns are known from Amarna site O45.1.¹⁹ Bread ovens, found in many Amarna houses, could also be used for firing faience, as was demonstrated by ECCLESTON.²⁰ Sites Q48.4 and P46.33 have yielded a third type of faience oven. In both locations reused pottery storage jars were used not only for heating food, but pos-

⁹ BOYCE 1995b, 342–343, 356–360, 370; SHORTLAND 2000, 63–67, 72–73.

¹⁰ KEMP and GARFI 1993, 46–76; SHORTLAND 2000, 63–65; STEVENS 2006, 11–14.

¹¹ Many moulds show traces of a cord or wire impression forming a narrow channel on the upper surface next to the mould design. For the latest discussion of their meaning, see KEMP and STEVENS 2010b, 476.

¹² e.g. Petrie Museum nr. UC24142

¹³ e.g. Petrie Museum nr. UC24122; BOYCE 1989, 162.

¹⁴ BIANCHI 1998, 22–23; TITE and SHORTLAND with VANDIVER 2008; TITE and SHORTLAND with KACZMARCZYK and VANDIVER 2008.

¹⁵ See NICHOLSON 1998, 52–54; NICHOLSON 2007, 136–137; TITE and SHORTLAND with VANDIVER 2008, 47–54; NICHOLSON 2009a, 4–7 for more information on glazing techniques.

¹⁶ VANDIVER 1983, A2–A3; NICHOLSON 1998, 51–52; NICHOLSON and PELTENBURG 2000, 188; RICCARDELLI, MASS and THORNTON 2002.

¹⁷ VANDIVER 1983, A108.

¹⁸ VANDIVER 1998, 124.

¹⁹ The excavators believe that kiln 4 could have been used for faience production. It is an oval structure, measuring c. 1,75m x c. 1,40m, with a preserved depth of 1,08m (NICHOLSON 2007, 43, 154, 157, 169).

²⁰ ECCLESTON 2008a, 33–35.

sibly also for faience manufacture, as both moulds and small faience objects were found nearby.²¹ Recent excavations in Amarna Grid 12 have exposed an “oven court”, next to buildings N50.36–37, where it is believed faience was fired in open pits. Similar fire pits were also found in complex Q48.4.²²

FAIENCEN OBJECTS IN BURIALS

Before examining the distribution of moulds and faience objects across Amarna, the use of small mould-made faience items in a selection of late 18th Dynasty graves of different social classes will be presented. PATCH had previously remarked that “continuing work at Amarna ... should eventually shed light on faience use in daily life for comparison with mortuary contexts”.²³

PATCH studied faience objects found in different mortuary contexts from the upper, middle and lower levels of society, demonstrating that they were “probably not used as an inexpensive replacement for more costly materials” and illustrating that they were actually more common in royal tombs.²⁴

Tutankhamen’s funerary goods included at least 7 faience collars²⁵, at least 5 faience *šby.w* necklaces²⁶ and around 200 faience rings.²⁷ Faience vessels were also provided as well as many other goods inlaid with glass and faience.²⁸ The royal Amarna tomb likewise contained a diverse selection of faience objects.²⁹

The disturbed tomb Bubastieion I.1 of the vizier Aper-El, his wife Tawosret and his son, the general

Huy, in Saqqara still contained coffins with beautiful glass inlays. Faience collars were also included among the funerary goods.³⁰

At Dahshūr North a late 18th – early 19th Dynasty cemetery was discovered containing the burial of several overseers, stewards, scribes and other officials. Among the finds were faience pendants from collars/necklaces, several faience rings of different design and various other faience objects. Faience inlay plaques from a wooden box were also found. Additionally, glass inlay pieces as well as other glass objects were discovered.³¹ A possible link with Amarna, suggested by the excavators, comes from the royal scribe and steward Ipay/Ipy, who may have had a tomb at both sites.³²

The South Tombs cemetery in Amarna was a working class cemetery with many poorly equipped burials. More than 220 individuals have been excavated between 2006 – 2010³³ but most burials contained no faience objects.³⁴ Few faience rings and some scarabs were found. The discovery of only around thirty pendants from disturbed contexts has been reported, the majority of which probably came from one necklace and one collar.³⁵

This short overview shows that all levels of society included small faience objects in their burials. However, there does appear to be a difference in quantity and in types. In the following sections we will have a closer look at the mould distribution across Amarna. During the discussion on the manufacture of different moulded objects we will refer back to the finds of faience objects in burials.

²¹ MATHIESON 1995, 221; For oven/kiln [3401], a reused blue-painted jar in Q48.4: KIRBY 1989, 33–35; For oven/kiln [3811], probably a reused meat-jar in P46.33: KEMP 1995a, 165.

²² KEMP and STEVENS 2010a, 481–485; KEMP and STEVENS 2010b, 256.

²³ PATCH 1998, 33.

²⁴ PATCH 1998.

²⁵ CARTER nr: 21u (JE 61907), 44n (JE 62754), 46b (JE 61904), 46c (JE 61905), 46qq (JE 61909), 53a (JE 61908) and 54r (JE 61906).

²⁶ CARTER nr: 21y (JE 61935), 44bb (JE 61929-30), 44cc (JE 61931-32), 44dd (JE 61933), and 525 (JE 61935).

²⁷ Faience rings with royal names, *wḏḏt*-eye and many other designs (e.g. CARTER nr 12d, 43p, 53b, 63a, 97b, 147b, 153a and 620(66a–v)).

²⁸ REEVES 1990; See PATCH 1998, 34–36, for an overview of faience objects found in Tutankhamen’s tomb.

²⁹ MARTIN 1974, 79–87.

³⁰ ZIVIE 1990; See RAVEN 2001 for similar gilded, faience and glass objects in the tomb of Maya in Saqqara.

³¹ YOSHIMURA *et al.* 1998; 1999; 2000; 2001; 2005.

³² YOSHIMURA *et al.* 2001, 11; DAVIES 1906, 19–20.

³³ ROSE 2006, 41–45; ZABECKI 2007, 53–59; ZABECKI 2008, 61–67; ZABECKI 2009, 32–34; KEMP and STEVENS 2010a, 494.

³⁴ Another example is the New Kingdom lower class Memphite cemetery around the Teti pyramid. More than 150 burials were excavated but here too the vast majority hardly contained any objects (KANAWATI *et al.* 1984, 59–70, Pl 39–44; EL-KHOULI and KANAWATI 1988, 42–46, Pl 45–49; SOWADA *et al.* 1999).

³⁵ DOLLING 2007, 34; DOLLING 2008, 30–31; KEMP and STEVENS 2008, 41–44; STEVENSON and SHEPPERSON 2009, 11–27; KEMP and STEVENS 2010a, 480; www2; www3.

MOULD DISTRIBUTION (PLATES 1–6)

| Area | Nr of moulds |
|------------------------|---------------------|
| North City (NC) | 0 |
| North Palace (NP) | 59+5? ³⁶ |
| North Suburb (NS) | 133 |
| Central City (CC) | 102 |
| Main City North (MC) | 714 |
| Main City South (MC) | |
| South Suburb (SS) | 2 |
| Workmen's Village (WV) | 1 ³⁷ |
| Stone Village (SV) | 1 ³⁸ |
| <i>Total</i> | 1017 |

Table 1 Table indicating the number of moulds recorded for each city area

When SHORTLAND carried out his investigation he recorded 550 published moulds.³⁹ With the additional information available from the ASFD and new Amarna Project finds this has now increased to 1017 moulds (Table 1). Before examining what new information could be obtained from this, BOYCE's and SHORTLAND's previous work on moulds will be briefly outlined.

BOYCE AND SHORTLAND

BOYCE, using *COA II*⁴⁰ records, was the first to identify squares T35/T36 in the NS (Plate 1) as a faience manufacturing area, due to the large concentration of faience moulds. This industrial quarter probably extended further west into square S36, now lost under the modern village and cultivation. He also identified two concentrations in the CC (Plate 3), using *COA III*⁴¹ records. The first was the Records Office area (square Q42) and its surroundings. The other was found in building P43.1, a series of bakeries and magazines south of the Small Aten Temple. For the MC he consulted *COA I*⁴², which deals with only a part of the area so no over-

all conclusions could be drawn for this district.⁴³ BOYCE also examined the different subtypes of pendants and these will be discussed below. Regarding the distribution of these items, he concluded that “the pendants contained within a house bear no relation to the house size. ... the only factor which controls the number of pendants found in a house appears to be its proximity to a manufacturing area”⁴⁴, which is important for the present study.

SHORTLAND, using both *Die Wohnhäuser in Tell el-Amarna (WIT)*⁴⁵ and *COA* publications, discovered several additional clusters of buildings with high concentrations of moulds in the MC (Plates 4–5), marking them as faience production quarters: N50/M50 and P46 cluster (associated with a number of kilns), P47.1–3 housing complex and O47 cluster (associated with sculptors' workshops) and building Q46.5 (associated with a small kiln and possible jewellery workshop). When he made his study it was still unknown that ordinary bread ovens could also be used for firing faience. He therefore interpreted the workings of the Amarna faience industry based on the location of larger kilns, where faience from different workshops could have been fired together. SHORTLAND also established a link between the faience and glass industries in several quarters, proposing that the workshops used the same kilns and workmen for both materials. Furthermore, he used the German records to examine the faience object categories and their colours to determine their possible connection with the status of a house.⁴⁶ He noted that over 90 % of the surveyed houses contained at least one piece of faience⁴⁷ and concluded that “the presence of faience seems to be virtually independent of the status of the house, ... the great majority of faience objects were not of high status and were available to, and used by, all ranks of society ...⁴⁸”. The short cem-

³⁶ The ASFD lists 59 NP moulds. The British Museum has 5 more moulds said to be from the NP (BM 58008-58012).

³⁷ SHANNON 1987, 155 footnote 2.

³⁸ STEVENS and DOLLING 2008, 11.

³⁹ SHORTLAND 2000, 67.

⁴⁰ The abbreviation *COA* refers to the volumes published under the title *The City of Akhenaten*; FRANKFORT, PENDLEBURY and FAIRMAN 1933; *COA II* published the results of the 1926–1932 EES excavations of the North Suburb and the desert altars.

⁴¹ PENDLEBURY, ČERNÝ, BOODLE and CLARK 1951; *COA III* published the results of the 1926–1927 and 1931–1936 EES excavations of the Central City.

⁴² PEET and WOOLLEY 1923; *COA I* published the results of the 1921–1922 EES excavations of the Main City, South Suburb and Workmen's Village.

⁴³ BOYCE 1995b, 356–361.

⁴⁴ BOYCE 1995b, 369.

⁴⁵ BORCHARDT and RICKE 1980; the volume published the results of the 1911–1914 DOG Main City excavations.

⁴⁶ SHORTLAND 2000, 63–77.

⁴⁷ SHORTLAND, NICHOLSON and JACKSON 2001, 155.

⁴⁸ SHORTLAND 2000, 77.

etry overview has, however, shown that a use discrepancy existed between the better off and the poor in mortuary contexts. Whether this may also have been the case in daily life will be discussed further on.

A DECADE LATER

The ASFD and new EES/Amarna Project publications have made it possible to make an even more detailed study of the spread of moulds across the city. Currently four types of faience firing facilities are known: the larger kiln, the typical Amarna bread oven, the reused pottery storage jar and possibly the open fire pit. I have included the first three types on the mould distribution maps to show the proximity of moulds to a possible firing station.⁴⁹ It is now clear that firing installations were even more accessible across the city and that small workshops need not have centralized their firing in a larger kiln but could instead do the work using one of the alternatives.

If we disregard, for the moment, PETRIE's thousands of moulds, the highest published mould concentration a decade ago was located in the small building cluster P47.1 in the MC, belonging to the sculptor Tuthmose, where 30 were found.

A reexamination based on the evidence currently available changes the picture somewhat. Let us look at the mould distribution, moving from north to south, across the city. Thus far no moulds have been found in the NC. According to the ASFD 59 moulds were discovered in the NP (Plate 6). This is important information as it indicates that such institutions included facilities for making their own faience objects.⁵⁰

In the NS the mould concentration in squares T35/T36 dominates the entire area (Plate 1). Moulds have also been found in outlying buildings, perhaps isolated workshops, to the north and east of this industrial quarter.⁵¹

The CC clearly has a lower concentration of moulds than the neighbouring suburbs (Plates 2–3). Only a few moulds were discovered in and around the Great Aten Temple and Great Palace. The Records Office area appears to be the only zone with a concentration of moulds. It can be expected that the density of moulds would most likely have presented itself as higher if PETRIE had published his finds since he cleared out buildings within 200 feet of building Q42.21.⁵² KEMP, GARFI and BOYCE identified the magazines south of the Small Aten Temple as buildings which contained, besides bakeries, little glass and faience factories, and perhaps a workshop for sculptors.⁵³ Glass and faience production debris found in the rubbish heaps in squares R43–S43 is also believed to have come from a nearby CC factory, whose location is no longer known.⁵⁴ The dominant industry of the CC was, however, food processing, especially in the Q40/Q41 buildings.⁵⁵

With the addition of the ASFD information the MC mould distribution pattern can be updated. The 1920s EES missions discovered many moulds in the northeastern area of the MC⁵⁶ (Plate 4). SHORTLAND identified clusters in squares P46 and P47. An additional cluster can now be identified in square Q44.

As can be seen in Plates 4–5, all along the eastern and southern perimeter of the MC North block, located between the East Road South, the wadi and

⁴⁹ *WIT* was consulted to locate the various types of ovens. As the *COA* publications are not as detailed as regards building installations, a combination of the written information and the examination of the building plans was used to identify ovens. On the base maps a single icon is used to pinpoint one or more ovens. As the scale is too small to be accurate, it only serves to indicate that such an installation was present in a building but the location of the icon does not conform to the actual placement of the firing place in the building. One should bear in mind that some areas of the city were too denuded to identify structures when they were cleared, e.g. parts of the NS, and for some parts of the city, e.g. the MC, the records are now lost. This means faience workers would have had access to more firing facilities than are now shown on the maps.

⁵⁰ KEMP and VOGELSANG-EASTWOOD 2001, 305, 469.

⁵¹ It is suggested that the uneven spread of moulds in the NS might be due to uneven recovery and recording (KEMP and STEVENS 2010a, 495). However, this appears not to be the case as numerous faience objects have also been found outside the T35/T36 area.

⁵² PETRIE 1894, 23–24.

⁵³ KEMP and GARFI 1993, 61, 65, 68; BOYCE 1995b, 359; KEMP and STEVENS 2010a, 493.

⁵⁴ KEMP and GARFI 1993, 64–65; KEMP and STEVENS 2010a, 480.

⁵⁵ KEMP and GARFI 1993, 62–63.

⁵⁶ Faience moulds accounted for one seventh of all small finds from the EES 1923 MC excavations (BOYCE 1989, 161 footnote 6).

the Main Road, moulds have been found in various concentrations in many buildings. It is fair to assume that the remaining, unexcavated buildings also contained a comparable spread of moulds.

The DOG and the EES 1920s missions also excavated many houses in the MC South in squares N49, N50 and M50 (Plate 5). Recently the Amarna Project found in and around several newly excavated houses in square N50 an additional 29 moulds.⁵⁷ The concentration of moulds in this area is now higher than the NS concentration in squares T35/T36. MC South has, as compared with the NS and contrary to MC North, besides one dense mould concentration, more housing with no or only a few moulds. However, it cannot be ruled out that more dense mould clusters remain hidden in the unexcavated areas.

Clearly the entire strip of buildings in MC North and South between East Road South and West Road South had some larger workshops, intermingled with small-scale faience production. The Records Office mould concentration in the CC forms the northern extension of this strip.

Besides the spread of moulds in the areas outlined above, there is another area in the MC with a set of non-residential buildings, serving different purposes. A series of larger and smaller compounds align the Main Road, south of the Great Palace. The larger facilities are located on the western side of this road (Plate 4). KEMP identifies them as formal places for the storage, manufacture and administration of commodities.⁵⁸ Besides PETRIE (P43.3)⁵⁹, NICHOLSON (O45.1)⁶⁰ and the Amarna Project Grid 10 excavation⁶¹ no modern excavation has been carried out in this area.

NICHOLSON discovered 80 moulds in the north-eastern corner of the O45.1 compound.⁶² These moulds form the highest concentration of published moulds in any building so far excavated in Amarna, marking a clear difference between this kind of facility and the suburban workshops of which only about a dozen contain 10–30 moulds.

In the SS only a few moulds have been found but as the area remains largely unexcavated, not much can be said about faience production in this zone. In both the WV and SV only one mould has so far been discovered so most of the faience products found here must have been brought to the site from elsewhere (Plate 6).

Having examined the mould distribution across the city, it remains interesting that no moulds have been found in the NC, which must have been the richest suburb of the entire city (Plate 6). The North Riverside Palace must have been as lavishly decorated as the Great Palace and the people living on both sides of the Royal Road must have worn exquisite jewellery. Based on the information we now have, it is conceivable that a faience workshop may have existed here, as in the NP, but that it has not been discovered yet or that all faience objects were produced elsewhere, perhaps in the large formal manufacturing compounds, and transported to this district. The recent discovery of faience moulds and Amarna age stone art work in al-Shaykh Sa'īd, just north of the NC, could indicate that another faience and sculpting workshop existed there to supply the city.⁶³

Most of the stone moulds used for making metal jewellery were found in or near a building which also contained faience moulds, further establishing the link between faience and metal jewellery workshops, which had been noted before by SHORTLAND. The study of metalworking in Amarna by ECCLESTON has equally enhanced our understanding of the symbiosis between the metal, glass and faience industries.⁶⁴ The Amarna Project Grid 12 excavation also discovered a large number of crucible fragments, indicating that copper alloy was being melted and turned into objects. The surrounding area also contains the largest concentration of stone moulds in the city (Plate 5). ECCLESTON suggests that copper alloy fragments may have served a dual purpose as a raw material in metalworking and as a colourant in the production of blue or turquoise-coloured faience.⁶⁵

⁵⁷ KEMP and STEVENS 2010b, 475–486.

⁵⁸ KEMP and GARFI 1993, 66–67.

⁵⁹ PETRIE 1894, 23.

⁶⁰ NICHOLSON 2007.

⁶¹ KEMP 1998.

⁶² NICHOLSON 2007, 139, 228–246; Had the entire compound been cleared, the number of discovered moulds would have been even higher.

⁶³ WILLEMS *et al.* 2009, 293, 297, 308, 326, P I V E; VANTHUYNE 2010, 59, figure 33.

⁶⁴ ECCLESTON 2008b.

⁶⁵ ECCLESTON 2008b, 29, 40–41; ECCLESTON 2010, 361–399; Copper alloy fragments and a possible crucible were also found in house P46.33 (BOYCE 1995a, 93); Evidence of metalworking was also discovered in Grid 10 (KEMP and STEVENS 2010a, 493).

Unfired faience moulds have been found in O45.1 and in Q48.4⁶⁶. In the same buildings pottery kilns were discovered, also establishing a link between the pottery and faience industry. The official role of both sites will become clearer further on but one could well imagine that the small suburban workshops could make their own moulds in one of the different firing installations at their disposal.

All this indicates that there is an overlap between the various high-temperature industries at Amarna, due to the similar materials and techniques used in all.

THE PETRIE FAIENGE FACTORIES

PETRIE reports he discovered “the sites of three or four glass factories, and two large glazing works”.⁶⁷ Both BOYCE and SHORTLAND made passing remarks about the faience works yet they did not further investigate their possible role in the Amarna faience industry.⁶⁸ In the following section and further on the potential significance of these discoveries will be brought to light.

In two letters to his mother PETRIE provides more details on the two “glazing works”. In the first letter (January 3rd–9th 1892) he writes: “The main matter this week has been turning over some remains of amulet factories; over a thousand pottery moulds have been found, and much remains to be turned out yet. I have sorted out 70 or 80 varieties ... There are all the various little ornaments so common at this period [he illustrates a rosette, ankh, petal, palm leaf, triangular pendant/inlay?, scarab and was-scepter]⁶⁹ ... The factories are much denuded and only a few inches of mud brick left, so the furnaces are lost”.⁷⁰ Soon afterwards he found another factory and he writes in another letter (January 10th–24th 1892): “A fresh factory of pendants has been found, and more hundreds of moulds come pouring in, some fresh types among them”.⁷¹

Unfortunately PETRIE did not publish the exact locations of these faience factories. Only the map

on his plate XXXV records “moulds”⁷², suggesting this is the spot where he found one or more faience factories. It is believed that the modern water tower covers part or all of this area, which is situated west of the Main Road and just north of site O45.1 (Plate 4).⁷³ This would mean that the facility, using hundreds or thousands of moulds, was one of the large formal compounds, which are thought to be under state administration.⁷⁴ In the end PETRIE brought nearly five thousand moulds from Amarna, “after rejecting large quantities of the commonest”. He also found about two thousand moulded objects. In all he catalogued 594 different mould and object designs.⁷⁵

PETRIE also seems to have obtained moulds from elsewhere in Amarna. He states that Aten, Akhenaten and Nefertiti cartouche moulds were found “north of the temple, in some part of the town, from whence the Arabs brought them to me”.⁷⁶ He also excavated some houses in the MC but they “proved to be remarkably bare of antiquities”.⁷⁷ He probably found some moulds in them, as can be expected from the mould distribution pattern elsewhere in the MC, but certainly not in higher than average numbers. As discussed above, he most likely also found some during his clearance of buildings around Q42.21 in the CC.

The PETRIE factories do stand out in one other point. In the denuded area of the first site over a thousand moulds and probably many more were found. In the other location hundreds were discovered. The three largest mould concentrations found after PETRIE’s campaign yielded 80 instances in O45.1⁷⁸, 59 in the NP and 30 in P47.1. In over a hundred years of subsequent excavations just over a thousand moulds were found spread out across the entire city. Based on their dense concentration PETRIE must have found the remains of two large-scale factories, which supplied the city with many faience objects. This will be further outlined below. Regrettably we can no longer ascertain whether

⁶⁶ NICHOLSON 2007, 154; KIRBY 1989, 35.

⁶⁷ PETRIE 1894, 25.

⁶⁸ BOYCE 1995b, 359; SHORTLAND 2000, 66.

⁶⁹ Reproduced with permission of the Griffith Institute, University of Oxford.

⁷⁰ NICHOLSON 2009b, 299; The letter forms part of a series of letters to his mother, now held at the Griffith Institute. They have recently been published by NICHOLSON 2009b.

⁷¹ NICHOLSON 2009b, 300.

⁷² PETRIE 1894, Pl XXXV.

⁷³ NICHOLSON 2008, 5.

⁷⁴ KEMP and GARFI 1993, 66.

⁷⁵ PETRIE 1894, 30, Pl XIV–XX.

⁷⁶ PETRIE 1894, 28.

⁷⁷ PETRIE 1894, 20.

⁷⁸ One must remember that these 80 moulds were found in only a small excavated zone of the entire O45 complex so the overall number must be higher. If PETRIE cleared the entire complex now located under the modern water tower, it may well be so that he found hundreds of moulds in such a facility.

these factories were in operation during the entire lifespan of the city or for only a short period. That such large facilities did exist was proven by the discovery of thousands of moulds in Qantīr, which are likewise believed to have been used in state factories.⁷⁹ Also in Malqata, the palace complex of Akhenaten's father, have workshops been found with hundreds of moulds.⁸⁰ And in both these sites the large faience production facilities were located close to the palace.

MOULD TYPES

After describing the distribution of all moulds across the city, let us now turn to the spatial distribution of several types, i.e. faience rings, pendants and Great Palace inlays. The first two are the most widely produced jewellery items found in the city whereas the inlays will provide insight into the production of large scale architectural decorations. A selection of examples will be given to illustrate what was produced where and for whom. Throughout the following sections I will frequently be referring to the PETRIE object corpus, the *COA II/III* object corpus and BOYCE's pendant corpus.⁸¹

In interpreting the distribution patterns of these moulds and their end products one must, however, take into account numerous difficulties⁸², e.g. variations in recording systems, accuracy issues and incompleteness of excavation records, and post-depositional processes leading to displacement of objects. As regards the latter issue, it fortunately seems fair to assume that most items were found not far from their final place of deposition.⁸³ Location can therefore provide information on what was produced where, and this can be a basis for comparison with other city districts. Furthermore, one must assume that when a matching mould and end products are found in a location, that mould produced those objects. It is unknown whether people

took with them any moulds when they moved out of the city. The discovery of hundreds of Malqata and thousands of Amarna and Qantīr moulds points towards (most of) them having been left behind. It appears they could easily be made anew.

Faience rings

Ring shank and bezel moulds (Figure 1a–b) have been found all over the city. The two pieces were produced separately and later combined with a paste or slurry. Some ring shanks also feature a connecting bar and also here considerable variation exists. Ring moulds are also known. Rings were made in different colours, mostly blue-green, and combinations existed.

More than 2000 ring bezels have been discovered. The *COA II/III* ring corpus divided ring bezels into four subcategories: Subtype I.A contains all the royal name and Aten bezels, subtype I.B all those with other inscriptions, subtype I.C. those with designs and I.D all bezels with figures. With new designs included, there are now 58 different subtype I.A bezels, 30 I.B's, 61 I.C's and 34 I.D's.

The first known moulded royal ring bezels and cartouches were made in the Malqata palace complex⁸⁴ and they continued to be made throughout the later pharaonic history.⁸⁵ According to SHAW most bezels were made when a new king ascended the throne and those of his predecessor were quickly discarded.⁸⁶ SHANNON, however, believes other public events may also have occasioned the manufacture of these rings. Moreover, she does not rule out the possibility of continuous production.⁸⁷ These rings also ended up in burials. Over a hundred Tutankhamen faience rings were found in his tomb, many with bezel designs not encountered in Amarna.⁸⁸ Royal faience rings are, however, hardly ever included in other contemporary graves.⁸⁹

⁷⁹ HAMZA 1930.

⁸⁰ TYTUS 1903, 25; WINLOCK 1912, 185, 187; EVELYN-WHITE 1915, 254; HAYES 1959, 254.

⁸¹ PETRIE 1894, Pl XIV–XX. Petrie types will be indicated by the letter P followed by a reference number, e.g. P 176; FRANKFORT, PENDLEBURY and FAIRMAN 1933, 114–117, Pl XLIX; PENDLEBURY, ČERNÝ, BOODLE and CLARK 1951, Pl CXII; BOYCE 1995b, 345–356; See BOYCE 1995b, 342–343, for more details on the different recording systems used at Amarna.

⁸² BOYCE 1995b; SHORTLAND 2000, 72–73; SHORTLAND, NICHOLSON and JACKSON 2001, 158–159; See KEMP and VOGELSANG-EASTWOOD 2001, 471–473, for similar issues regarding the Amarna textile industry.

⁸³ KEMP and STEVENS 2010a, 492–499, 513.

⁸⁴ HAYES 1951, 231–234, figure 34.

⁸⁵ The Los Angeles County Museum of Art has in its collection 79 royal cartouche moulds providing an overview from the late 18th Dynasty until the Late Period (www4).

⁸⁶ SHAW 1984.

⁸⁷ SHANNON 1987; HAYES 1959, 250–251, suggests they were also distributed as favours during festivals, banquets, etc; See also ALDRED 1969 for more occasions that required production of a whole variety of objects.

⁸⁸ CARTER nr: 053b, 153a, 620(66a–f).

⁸⁹ See section on faience objects in burials for a brief overview.



Fig. 1a Ring shank mould with black ink mark (P237) (UC24142) (Copyright of the Petrie Museum of Egyptian Archaeology UCL)

Nearly sixty varieties of royal and Aten bezels existed, however, only 36 bezel moulds capable of producing them have so far been discovered, of which 26 were obtained by PETRIE without provenance.⁹⁰ 555 royal rings have been found by PETRIE⁹¹ and all later missions.

The following example will be used to illustrate that royal ring bezels were not only produced by official facilities but also by suburban workshops. In the NS bezel moulds for subtypes I.A.2b (P 54) and I.A.3a (P 97) were found in buildings V37.6 and U36.12-13-14 respectively.⁹² Of the first subtype 12 were found in the NS and 20 in the CC, of the second subtype 30 and 13 were found in each location respectively. Nearly one in three of all recovered royal bezels by the EES in the NS were

⁹⁰ PETRIE 1894, Pl XIV–XV.

⁹¹ PETRIE 1894, 16, 29, collected most of his royal rings in the Great Palace dumps.

⁹² PETRIE did not find any examples of these two moulds. Of I.A.3a (P 97) the NS Semenkhekare ring bezel mould is the only published example. Two Akhenaten ring bezel moulds were found by later missions. Given that at least 15 different



Fig. 1b Ring bezel mould (P217 – I.C.27) (UC2208) (Copyright of the Petrie Museum of Egyptian Archaeology UCL)

represented by these two designs. This increases to over four out of ten in the CC. This suggests that part of the production stayed in the NS and part of it was probably distributed as well to the CC. In neither of the two NS buildings with bezel moulds did the EES recover any ring shank moulds, suggesting that the bezels were either taken to a shank producer for completion or vice versa. This pattern, as will be discussed later, is also visible for other bezel subtypes.

The most common design on Amarna jewellery was the *wd3t*-eye, most instances being made of faience. *Wd3t*-eye rings⁹³ were very popular and several bezel subtypes are known (subtypes I.B.16 (P 127), I.B.25, I.C.5 (P 176), I.C.8, I.C.9 (P 173), I.C.36 (P 172), I.C.37 (P 174), I.C.38 (P 175),

varieties of Akhenaten ring bezel exist, the chances that the other bezel mould (from MC building O47.11) is the same as the NS I.A.2b (P 54) are small so it is possible that this mould represents the only known object of this subtype.

⁹³ *wd3t*-eye rings are any bezel on which a *wd3t*-eye is depicted.



Fig. 2a *wḏjt*-eye ring bezel mould (P176 – I.C.5) (UC40981)
(Copyright of the Petrie Museum of Egyptian Archaeology UCL)



Fig. 2b Blue *wḏjt*-eye faience ring (P176 – I.C.5) (UC1006)
(Copyright of the Petrie Museum of Egyptian Archaeology UCL)

I.C.39 (P 171), I.C.54, I.C.60 and new subtypes⁹⁴).

45 *wḏjt*-eye moulds have been found across the city. 17 can be designated as bezel moulds and one

as a bead mould. The others can be either for bezels or amulets.⁹⁵ Only 6 bezel moulds, all of subtype I.C.5, can be linked to their manufactured objects (Figure 2a–b).

| | I.B.16 | I.B.25 | I.C.5 | I.C.8 | I.C.9 | I.C.36 | I.C.38 | I.C.39 | I.C.54 | I.C.60 |
|----|--------|--------|-------|-------|-------|--------|--------|--------|--------|--------|
| NS | | 2 | >245 | 5 | 1 | 1 | 16 | | 1 | |
| CC | 1 | | >163 | 3 | | | | 4 | | 1 |

Table 2 Frequency of attestation of different bezel subtypes found in the NS and CC⁹⁶

Table 2 demonstrates the dominance of the I.C.5 *wḏjt*-eye bezel in two city regions. However, in the NS and CC only 3 and 2 I.C.5 bezel moulds were found respectively. It appears they were frequently used to produce these rings.

In the NS all *wḏjt*-eye bezel moulds were found in squares T35/T36 but no shank moulds were found in the same building, although several were recovered close by.⁹⁷ The concentration of bezel

and shank moulds, together with many manufactured bezels, designates this area as a subtype I.C.5 production zone whose produce was distributed across the suburb and perhaps to other districts as these rings were also found in many other NS buildings and elsewhere.

In the CC a large quantity of I.C.5s was discovered in the southern end of the Great Palace and the ceremonial Semenkhhare Hall.⁹⁸ Their presence

⁹⁴ e.g. BOYCE 1995a, 59–60: mould 8269 from house P46.33; KEMP and STEVENS 2010b, 120: bezel 36695 possibly from house N50.43.

⁹⁵ Many are just labeled ‘Wedjat’ or ‘Auge’ with no PETRIE or COA II/III corpus reference.

⁹⁶ In COA II/III the number of I.C.5 bezels is sometimes recorded as ‘several’ or ‘many’. The numbers in the table are

those counted in all other houses so the total number of discovered I.C.5 bezels is far greater.

⁹⁷ I.C.5 ring bezel moulds were found in buildings T35.4, T36.71 and T36.77. Ring moulds were discovered in buildings T35.19, T36.56, T36.57, T36.64, T36.73, T36.76 and T36.79.

⁹⁸ FRANKFORT, PENDLEBURY and FAIRMAN 1933, 60–61, 80.

there indicates that *wd3t*-eye rings, besides being common in residential areas, were also popular in court. One of the I.C.5 moulds was discovered in the large bakery complex Q40.5 south of the Great Temple but it represents the only mould from this facility (Plate 3). Possibly it was used there as another bakery complex P43.1 was definitely engaged in the making of small faience objects.⁹⁹ However, the scatter of recovered bezels speaks against the frequent use of the mould. The other I.C.5 CC mould was found in R42.7, which is a courtyard south of building R42.6. The excavators also found many I.C.5 bezels in the court, suggesting that these ring bezels were produced there. No ring shank moulds were found, though many were in surrounding buildings.¹⁰⁰ R42.7 is attached to R42.6, which has bricks stamped with *Pr-hꜣy-n-p3-itn*, the “House of Rejoicing of the Aten”. The excavators tentatively suggested that in this building certain activities connected with the Great Palace were conducted.¹⁰¹ The presence of many bezels in both this complex and the Great Palace corroborates their conclusion and I think it is fair to say that R42.6–7 could have supplied the palace with I.C.5 rings. Whether they did so continuously or as sole supplier is unclear.¹⁰² The R42.6–7 complex could also have supplied the neighbouring buildings as some examples were recovered there, especially in the Q43 group. The excavators report they found a small hoard of 37 faience rings in Q43.50–52, including 14 mauve and two other I.C.5 rings.¹⁰³

33 *wd3t*-eye moulds have so far been discovered in the MC, 12 being bezel moulds. A *wd3t*-eye bead

mould was recently found in N50.38–39.¹⁰⁴ The other 20 moulds could be either bezel or amulet moulds.

For instance, in Grid 12 three ring shank moulds were discovered but no *wd3t*-eye ring bezel moulds. However, three complete I.C.5s and over sixty bezel fragments were found.¹⁰⁵ Earlier I already mentioned that bezel and shank moulds were not always found together. The new data suggests that the bezels could have been produced elsewhere and then brought to a Grid 12 workshop for attachment to a shank.¹⁰⁶ Twelve unidentified *wd3t*-eye moulds were discovered within an approximate 100m radius of the site.¹⁰⁷ The actual firing of the objects could possibly have been done in one of the open fire pits of the site or a nearby oven/kiln.¹⁰⁸

In and near the excavated area of site O45.1 11 ring and ring shank moulds were found but no bezel moulds of any kind. As only a small area was cleared, their presence cannot however be ruled out. Several *wd3t*-eye bezel fragments were discovered but these could have been brought to the site from elsewhere for attachment to a shank.¹⁰⁹

The ASFD lists 11 ring and 6 *wd3t*-eye moulds of unknown subtypes from the NP. In view of their popularity in the Great Palace, one can assume that the NP produced its own *wd3t*-eye rings.

Further evidence for their popularity amongst royalty comes from Tutankhamen’s tomb where at least 19 *wd3t*-eye rings were found.¹¹⁰ Contrary to this, hardly any *wd3t*-eye rings and amulets have been discovered amongst the burials of officials and lower classes.¹¹¹

⁹⁹ See footnote 53.

¹⁰⁰ Ring moulds were found in buildings Q42.3, Q42.7, Q42.8, Q42.9, Q42.12, Q42.18, R42.9C, R42.10, R42.11, R42.14, Q43.1, Q43.54–7 and Q43.70–4.

¹⁰¹ The “House of Rejoicing” is the name of the Great Palace and of part of the Great Temple, but here it seems likely that the term refers to the Great Palace (PENDLEBURY, ČERNÝ, BOODLE and CLARK 1951, 117, 150, 181); A block mentioning the “House of rejoicing” was also found in the stone temple O42.1 (KEMP 1998, 17–18).

¹⁰² Compared to the many I.C.5 bezels, only a few royal bezels were found in the Semenkhhare Hall. PETRIE did find many early subtype Semenkhhare bezels in the Great Palace dump in squares R43/S43 and they might represent the rubbish of an earlier celebration. Several later subtype Semenkhhare bezels were found together with the I.C.5s and perhaps this concentration is the leftover of one of the last Semenkhhare

ceremonies as no Tutankhamen objects were found in the mix.

¹⁰³ PENDLEBURY, ČERNÝ, BOODLE and CLARK 1951, 125, Pl LXX-VII.7; ASFD.

¹⁰⁴ KEMP and STEVENS 2010b, 481: mould 35070.

¹⁰⁵ KEMP and STEVENS 2010b, 119.

¹⁰⁶ Detailed analysis of I.C.5 rings showed that their production was a multistep labour-intensive activity (KEMP and STEVENS 2010b, 119–120).

¹⁰⁷ The *wd3t*-eye moulds were found in buildings M50.10, N49.18, N49.20, N50.8 and N50.23.

¹⁰⁸ KEMP and STEVENS 2010a, 498 figure 10.9.

¹⁰⁹ NICHOLSON 2007, 228–246, 277–278.

¹¹⁰ CARTER nr: 053b, 63a, 097b, 620(66u–v).

¹¹¹ www2; www3: Only three *wd3t*-eye rings (object nrs 37152, 39903, 39918) and one *wd3t*-eye amulet (object nr 39937) have so far been published from the South Tombs cemetery.

PETRIE found many ring shank moulds.¹¹² The Petrie Museum also preserves dozens of *wd3t*-eye bezel moulds (subtype I.C.5 and others) (Figure 2a), so we can assume he found these moulds as well but where can no longer be ascertained.

Besides royal and *wd3t*-eye bezels, there existed at least 114 “other” bezel subtypes in Amarna of which nearly a thousand pieces were retrieved.¹¹³ In the NS 82 different “other” bezel subtypes were recorded. Surprisingly only 8 “other” bezel moulds, representing 7 bezel varieties, were discovered and only in one case were a bezel and shank mould found together. 65 different “other” CC bezel subtypes were published. Nearly one in four “other” ring bezels were recovered in the Great Palace, representing 25 different bezel subtypes, implying that a wide variety of these rings were worn in court. Out of the 102 CC moulds only one “other” ring bezel mould has been recorded. This was found in the central halls of the Great Palace, and therefore undoubtedly out of place.¹¹⁴ The rings were produced elsewhere and were perhaps distributed, e.g. from building Q43.50–52, among the state employees who worked in the various CC buildings. The record probably also represents personal jewellery, which was worn, broken and discarded by those who obtained these rings perhaps near their homes or from elsewhere.

In the MC only 30 “other” bezel moulds have so far been discovered and the ASFD records that four were found in the NP. However, it is in most cases not possible to identify the specific mould design due to poor description.

Of the 114 “other” bezel subtypes PETRIE obtained moulds of at least 31 different designs but we do not know where they were found.¹¹⁵ In comparing these with those from the NS and CC, we learn that the moulds from the latter two areas are capable of producing 4 additional varieties not recorded by PETRIE. Even if the 30 “other” MC and 4 “other” NP bezel moulds each represent designs different from those collected by PETRIE or those from the NS or CC, than moulds for 45 “other” bezel subtypes are still unaccounted for. This shows, as can be expected, that rings, produced elsewhere, were also brought into the city. Some designs were

probably made in Malqata but this cannot be verified for the moment as the recovered objects from this site have not been published in detail.¹¹⁶ Other evidence comes from Tutankhamen’s tomb where rings with several “other” designs, unknown in the Amarna corpus, were discovered.¹¹⁷ It is possible that in his reign faience workshops in another city accounted for some of the new designs. This also means that when rings were imported into the city, we can likewise assume that Amarna faience rings were also exported across the country.

The distribution pattern of faience rings has shown that they were made in various types of buildings. The NP made rings. In the NS a limited number of bezel moulds were found, some in the T35/T36 cluster but also in outlying buildings. Only four bezel moulds have been found in the CC. Except for I.C.5 rings, all other objects appear to have been made elsewhere and brought to this district. More moulds have been found in the MC. However, due to poor sampling and identification of finds by the early excavators, it is difficult to interpret the distribution patterns of moulds and objects here. Fortunately the Amarna Project excavations provide new information on faience production in this area. Many different subtypes of rings were made but the records indicate that only subtype I.C.5 was mass produced, the remainder appearing only sporadically. Some workshop production was for local use and part of it supplied other districts. Some ring subtypes were imported into and exported out of the city. Tutankhamen took with him many faience rings in his tomb, however, hardly any rings were included in lower class burials found in the South Tombs cemetery.

Collars and necklaces

Another popular category of small faience objects are pendants. They are loose-hanging pieces of jewellery used in collars, necklaces, bracelets and earrings. These pendants either have a small bead attached at the top and base or only a single bead at the top through which a string was passed. The former were used in collars and the latter in necklaces, bracelets and earrings. BOYCE examined the Amarna pendants and suggested that specific de-

¹¹² PETRIE 1894, 29, Pl XVI.

¹¹³ All other COA II/III subtype I.B, I.C and I.D ring bezels.

¹¹⁴ PENDLEBURY, ČERNÝ, BOODLE and CLARK 1951, 84.

¹¹⁵ PETRIE 1894, Pl XV–XVI; The Petrie Museum has several other subtypes in collection as well.

¹¹⁶ See HAYES 1959, 250–251, for a description of Malqata faience rings.

¹¹⁷ e.g. CARTER III: 620 (66j, m, n, o, r).

signs were selected for collars and necklaces.¹¹⁸ He made a new pendant corpus, adding some new designs (Subtype X) to the old *COA II/III* corpus (subtype IV.A (figures of gods and men), IV.B (figures of animals), IV.C (flowers and fruits), IV.D (miscellaneous) and IV.E (cartouches)). The corpus now consists of 41 necklace and 62 collar designs.¹¹⁹ The PETRIE corpus shows more objects with one or two beads attached so the number of pendants is even greater. Almost all pendants were found as individual pieces. However, a small number of finds provide information regarding the original jewellery arrangement.

Faience collars are made of two or more rows of beads and pendants, which are attached to a pair of terminals. Three main collar types are known from the later Eighteenth Dynasty: the *wsh*-collar, the plant-form collar and the amuletic collar.¹²⁰

The plant-form collar (Figure 3) is the only type known that demonstrably existed at Amarna as two complete ones were found in the NS. The largest was composed of at least 304 pendants, strung in 6 rows.¹²¹ BOYCE believes most collars were smaller, with two or three pendant rows.¹²² They were probably substitutes for real floral collars and were worn during festivals and ritual events. They are also attested as part of the funerary equipment.¹²³ Tutankhamen's tomb contained at least seven faience collars, using 3105 pendants.¹²⁴ Faience collars have also been found in elite and middle class burials but hardly ever in lower class burials. Faience necklaces are hardly attested in burials.¹²⁵

Furthermore, several incomplete necklaces have been discovered in Amarna, of which five in the NS. According to BOYCE "the most common design is a single thread holding a row of beads, with



Fig. 3 Reconstructed faience collar (UC1957)
(Copyright of the Petrie Museum of Egyptian
Archaeology UCL)

pendants placed at regular intervals along it. Usually all the pendants are of the same design and were produced from the same mould".¹²⁶

After describing the types and components of collars and necklaces, a few examples will be given to illustrate who produced what in the NS and CC. The MC record is not specific enough to differentiate between both categories, and will be disregarded here.

BOYCE's distribution maps clearly indicate the presence of pendant moulds and pendants in the NS.¹²⁷ Again there is a production cluster in squares T35/T36 and a few outliers. Many pendants are also found scattered around the suburb. Only 5 varieties (subtype IV.C.5, IV.C.10, IV.C.13b (Figure 4a), IV.C.24 and IV.C.25) of necklace pendant moulds were recorded in the NS.¹²⁸ Yet 30 different necklace pendant designs were counted in approximate-

¹¹⁸ BOYCE 1995b, 336–337.

¹¹⁹ FRANKFORT, PENDLEBURY and FAIRMAN 1933, 116–117, Pl XLIX; PENDLEBURY, ČERNÝ, BOODLE and CLARK 1951, Pl CXII; BOYCE 1995b, 345–356; I followed BOYCE's classification listed on p 349–356. Unfortunately some illustrated pendants on p 345–347 got a mismatching label. On p 345 figure 11.3 pendants C13A and C13B should be relabelled C13B and C13C, respectively. Additionally on p 346 figure 11.4a pendant B28 should be relabelled B27.

¹²⁰ See BOYCE 1995b, 337–339, for more information on the different collar types.

¹²¹ FRANKFORT, PENDLEBURY and FAIRMAN 1933, 18, 44, Pl XXX-VI.1, 2.

¹²² BOYCE 1995b, 361.

¹²³ BELL 1987, 56–57; BOYCE 1995b, 339–342; WOHLFARTH 2005, 190–197.

¹²⁴ CARTER nr: 21u (396 pendants in 5 rows), 44n (1092 pendants in 10 rows), 46b (459 pendants in 5 rows), 46c (375 pendants in 7 rows), 46qq (236 pendants in 4 rows), 53a (398 pendants in 6 rows) and 54r (149 pendants in 4 rows).

¹²⁵ See section on faience objects in burials for a brief overview on collars and necklaces in burials.

¹²⁶ BOYCE 1995b, 337–342; the Amarna necklaces are illustrated on p 338.

¹²⁷ BOYCE 1995b, 364–367, figures 11.10–11.13.

¹²⁸ BOYCE 1995b, 350–351, 355, noted that a small number of IV.C.13b and IV.C.24 pendants have been found with an additional suspension bead, for use in collars but he believes this practice to have been rare.



Fig. 4a Poppy seed-head moulds (P471–473 – IV.C.13b–c) (UC68348) (Copyright of the Petrie Museum of Egyptian Archaeology UCL)



Fig. 4b String of yellow poppy seed-head faience necklace pendants (P471–473 – IV.C.13b–c) (UC1460) (Copyright of the Petrie Museum of Egyptian Archaeology UCL)

ly 650 recovered objects from the NS. The most recurrent were subtypes IV.C.13b (Figure 4b), IV.A.10, IV.C.24 and IV.C.5 and only of subtype IV.A.10 were no moulds found. Of the other three we can assume that the presence of both moulds and matching objects reflects local production of necklace pendants. A number of necklaces with these designs were in fact discovered in the course of excavation, e.g. the largest NS necklace, from building T35.26, was made of at least 59 IV.C.13b pendants.

We can conclude that even though local production accounts for a minimum of 5 subtypes, for the others, so far no moulds have been found in the NS. Therefore, many of the necklace pendants are likely to have been obtained elsewhere.

The 45 NS collar pendant moulds consisted of 12 different varieties. BOYCE made a graph of the most common designs of collar pendants in the NS and CC¹²⁹ and many of the NS pendant mould designs match those listed by BOYCE. Also here can we assume local production and assembly. For the collar found near building S35.4, all three mould designs are attested in the NS and the large collar in building U36.25, with over 300 pendants of 8

different designs, could have been assembled nearby as moulds for most of the designs were present in the NS.¹³⁰ In the over 1200 recorded NS collar pendants, 40 designs were identified. As moulds for only just over a quarter of these subtypes have been found, it is again likely that the other pendant subtypes were obtained elsewhere, be it as individual pieces for actual collar manufacture in the area or as complete collars, made elsewhere.

BOYCE concluded that the CC yielded the greatest proportion of collar pendants, suggesting that collars were more frequently worn here than in the residential areas.¹³¹ Also here more necklace and collar pendant subtypes were identified than mould subtypes to produce them. It is surprising that 5 out of 6 IV.C necklace pendant moulds represent the same subtypes as the 5 varieties from the NS. Moulds of these 5 subtypes were also found in the MC so they must represent some of the key necklace elements.¹³² Based on current published records it appears that both the NS and CC are only capable of producing 7 out of the 41 designs in the necklace pendant corpus. There is likewise an overlap between the collar pendant moulds and here both areas are only capable of manufacturing 18 of the 62

¹²⁹ BOYCE 1995b, 363 figure 11.9.

¹³⁰ Contra FRANKFORT and PENDLEBURY 1933, 17, who believed that the complete collars and necklaces were stolen property as they were found in what were to them slums.

¹³¹ BOYCE 1995b, 361–362.

¹³² In the CC another small necklace of beads and subtype IV.C.13b pendants was found in building Q43.45 (PENDLEBURY, ČERNÝ, BOODLE and CLARK 1951, 124).

designs in the collar pendant corpus. Interesting is that the Record Office area (Q42 cluster) is also capable of producing all three pendant subtypes of the complete collar found near NS building S35.4 and most of the designs of the complete collar found in the NS building U36.25. Therefore the possibility also exists that one or both of these collars could have been made and/or assembled in the CC.

In the large formal complex O45.1 in the MC many pendant moulds were found, showing such a facility was also capable of producing necklace and collar jewellery.¹³³

The NP workshop also produced pendants, as various moulds prove. From the vague published descriptions, one may cautiously deduce that it mainly concerned the manufacture of collar pendants.¹³⁴

PETRIE records he collected moulds of over half the known necklace and collar pendant corpus varieties.¹³⁵ Many subtypes are unparalleled among those discovered in the NS and CC. We do not know where he found them but in the second letter to his mother he did mention that he found a “factory of pendants”.¹³⁶ Many of his moulds ended up in the Petrie Museum and here the collection holds dozens and sometimes more than 100 or 200 Bes, poppy seed-head (Figure 4a), palm leaf, date, lotus petal, grape, mandrake, cornflower, poppy bud, drop and nefer pendant moulds. If we accept that the majority of PETRIE’s moulds come from his great factories, then besides many popular designs, they were also producing different pendants from the smaller suburban workshops. Also their production capability far outstripped that of the other workshops.

For the limited number of pendants found in the South Tombs cemetery there are matching moulds in the city, suggesting that they were made locally.

To summarise, pendants were made both in large factories and in smaller workshops across the city. It was possible to identify the most popular necklace designs, i.e. subtypes IV.C.5, IV.C.10, IV.C.13b, IV.C.24 and IV.C.25, and it has become clear that the workshops in the NS and CC were capable of manufacturing the discovered necklaces and collars in the NS, CC and the South Tombs cemetery. If PETRIE’s pendant moulds came from the factories he discovered, then these were not only producing pendants similar to those made in the suburban workshops but also more unique designs. Most importantly they had a far greater output capacity, suggesting that many products across the city could actually have been made here. And even if the published pendant records contain a number of errors as BOYCE had noticed¹³⁷, I believe the overall conclusions presented above remain valid because of the vast number of pendants and moulds used in this study.

Great Palace inlays

After examining the production of various jewellery items, let us now turn to the manufacture of moulded architectural inlays.

The major royal and religious buildings in Amarna were decorated with thousands of faience, glass and stone inlays. Faience tiles were also mass-produced, some being in turn embellished with faience inlays.¹³⁸ The Great Palace went through several construction phases. Many inlays were needed there during Akhenaten’s reign and again when it was enlarged to build the Semenkhkare Hall. All this required advanced planning to set up adequate production facilities to manufacture the necessary decorative pieces.

In his publication PETRIE describes which areas of the palace were decorated with tiles and inlays. Many pieces shown on Plate XX of his publication were used as inlays (Figure 5b). In the Semenkhkare

¹³³ NICHOLSON 2007, 228–246.

¹³⁴ ASFD.

¹³⁵ PETRIE 1894, PI XIV, XV, XVII–XX.

¹³⁶ NICHOLSON 2009b, 300; Following comments on the “pendant factory”, PETRIE remarks in his letter that among the various ring moulds and ring bezels he obtained, one was of Tutankhamen with the double name of Amen and Aten. This could mean the object was found in the factory debris. Given that the ring bezel P 118, published in PETRIE 1894, PI XV, is the mirror image of the drawing in his letter, it is

likely he made this drawing from a mould. This suggests that the “pendant factory” was at least (still) in operation during Tutankhamen’s reign.

¹³⁷ BOYCE 1995b, 358–359.

¹³⁸ According to BOYCE 1995a, 84, “a tile is a rectangular glazed form, with or without additional painted design, where the outline does not contribute to any larger pattern. An inlay is a piece shaped to resemble the object it represents, where the outline is intended as part of a larger pattern or design”.



Fig. 5a Inlay mould only found by PETRIE (P587) (UC1786)
(Copyright of the Petrie Museum of
Egyptian Archaeology UCL)



Fig. 5b Red faience inlay found many times in the Great
Palace (P587) (UC869) (Copyright of the Petrie Museum of
Egyptian Archaeology UCL)

Hall he also discovered green tiles inlaid with white daisies and violet thistles/cornflowers that once covered the whole length of the west side of the great hall¹³⁹.

The *COA III* find list records 49 different inlay subtypes from the Great Palace. The distribution of inlay moulds makes clear that the suburban workshops played no or only a very small part in the production of these pieces. The EES found only 7 inlay moulds in the entire NS, representing 6 different subtypes of which only 3 variants were recorded in the EES palace find list. In the CC they found 12 inlay moulds, representing 9 subtypes, with 5 of them being palace variants. Both areas together were capable of producing 12 different inlay designs, of which only 7 out of 49 are known to have been used in palace decoration. The vague MC mould descriptions also give an impression that not many inlay moulds were found in this area either.

PETRIE, however, recorded many moulds with different inlay designs that were used in the palace (Figure 5a). Given that hardly any were found in the suburban workshops, we can only assume he found them in his denuded factories, probably located just south of the Great Palace. The excavators of O45.1 also believed that part of the production of that facility concentrated on making architectural inlays and tiles for important building projects.¹⁴⁰ They also discovered pieces of small, elegantly crafted, red faience hands. Similar pieces, though in glass, are known to have been used as inlays in beautifully carved wooden coffins¹⁴¹, so possibly part of the inlay production of O45.1 was used for decorating portable objects.¹⁴²

That large formal factories did exist is confirmed by finds in Qantīr, the Ramesside Delta capital. In 1928 HAMZA discovered a ruined, large faience factory of the 19th–20th Dynasty, which he believed was attached to the nearby Qantīr palaces. Even

¹³⁹ PETRIE 1894, 12, 28, 30, Pl XVII–XX; Complete tiles have been found, measuring 16.8 x 11.1cm, which contain between 10–18 daisy inlays (PENDLEBURY, ČERNÝ, BOODLE and CLARK 1951, 75, Pl LXXII.1; Brooklyn Museum Accession Number 35.2001). The wall is more than 70m long and if we imagine a band of one meter was decorated with these tiles along the entire length than this would require 3754

tiles, which means 45048 inlaid daisies (Average 12/tile). The number will be even higher if the eastern side was decorated similarly.

¹⁴⁰ NICHOLSON 2007, 144–145.

¹⁴¹ e.g. ZIVIE 1990.

¹⁴² NICHOLSON 2007, 145, 227–228, 263; object nr 33903, 33904, 33980.

though the workrooms had vanished, the sheer amount of finds made him suggest that a factory must have existed in the location he excavated, as he discovered many moulded statues, tiles, uraei, rosettes, inlays, beads of various sizes and shapes, and a whole range of figures, amulets, rings, etc. in a whole range of colours. Alabaster inlays were also found by the hundreds. He additionally collected more than ten thousand moulds, covering about 800 varieties, proving that the faience pieces were made on the spot. This factory was producing a whole range of decorative designs for the royal palace and it also had the production capability, like in Amarna, to turn out many rings, collars, necklaces, amulets, etc.¹⁴³

HABACHI continued the excavation of the area next to HAMZA's plot in 1942–43 and discovered several ovens used for faience firing as well as an amazing 10000–20000 more moulds, used among other things for making similar palace decorations and jewellery¹⁴⁴.

Since 1980 the new Qantir excavations directed by PUSCH have discovered huge bronze casting installations in area Q I, located not far from the plots excavated by HAMZA and HABACHI.¹⁴⁵ Within and among these installations were found numerous items relating to other high-temperature processes. Besides many objects relating to red glass and Egyptian blue frit production, over a thousand additional faience moulds were found, which still await publication. The excavators believe this site must also have produced decorative architectural items in bronze, glass, faience and frit for the many building projects, including the royal palace, which was located not far from this site. Once the initial demand was met, the site was redeveloped in Ramesses II's time into a major military compound for chariots, with associated workshops.¹⁴⁶

Further evidence that state factories were supplying construction sites comes from Tall al-Yahudiya, where Ramesses III built a royal palace and temple. BRUGSCH excavated a chamber lined with faience tiles and discs, and brought back with him 3600 discs/rosettes of various sizes and a great number of decorated tiles. Based on the similarity of marks on both the Qantir moulds and the Tall al-Yahudiya discs, HAMZA concluded that the large Qantir faience workshops supplied the discs for the Tall al-Yahudiya palace.¹⁴⁷

Written evidence that the state at least in the 19th Dynasty managed the supply of inlays comes from P. Anastasi IV wherein the scribe of the treasury Qageb reports to the overseer of the treasury Paremheb about construction progress on a palace of Seti II, stating that the work continues uninterruptedly because he supplies the *nšdy*¹⁴⁸-workers as well as the draughtsmen that are decorating it daily.¹⁴⁹ That Qageb may have supplied the workers with faience inlays is certainly a possibility for another scribe of the treasury of the lord of the two lands Qenenhor was also overseer of faience workers.¹⁵⁰

DISCUSSION

In the following section I first want to discuss how SHORTLAND¹⁵¹, WARBURTON¹⁵² and KEMP view the way the Egyptian economy, and more specifically the faience industry, worked. SHORTLAND presents his case based on his study of the faience and glass industry in Amarna, while WARBURTON criticised this, instead opting for another interpretation of the evidence. KEMP, through successive excavation campaigns in Amarna, progressively adjusted his view as well. Following the results described above, I would like to continue this debate and, at least when it comes to the faience industry, outline my own interpretation of this sector.

¹⁴³ HAMZA 1930, 31–68, Pl IV; Unlike PETRIE, HAMZA's publication provided only one single plate with a selection of moulds so unfortunately no illustrations of his 800 different designs exist.

¹⁴⁴ HABACHI 2001, 37, 52, 69–70, 139, 251–253; For mould numbers, see p 252 footnote 975.

¹⁴⁵ See e.g. HABACHI 2001, 133 Abb. 10, 135 Abb. 11; PUSCH 1990, 77 Abb. 1 and PUSCH and REHREN 2007, 20, Karte 1, for maps with the dig locations of HAMZA, HABACHI and PUSCH.

¹⁴⁶ PUSCH 1990; PUSCH 1994; REHREN, PUSCH and HEROLD 2001; PUSCH and REHREN 2007, 129–131; A preliminary inventory of around 500 moulds consisted for one third of rosettes, 12% of *wḏjt*-eyes and 8–10% contained the names of royals,

Ramesses II statues and cult facilities. The remainder was used, among other things, for making pendants, amulets, inlays, etc. (HABACHI 2001, 252–253).

¹⁴⁷ NAVILLE 1890, 6; HAMZA 1930, 57–58.

¹⁴⁸ *Wb* II, 342.18: jeweler; lapidary; DRENKHahn 1976, 49, comments “vermutlich fertigen sie hier Einlegearbeiten aus farbigem Steinen (oder Pasten)”; STEINMANN 1980, 155.

¹⁴⁹ P. Anastasi IV, vs. C5-C7; GARDINER 1937, 55; CAMINOS 1954, 220–221.

¹⁵⁰ P. Vatican 64; MARUCCHI 1891, 127; LUFT 1977, 73.

¹⁵¹ SHORTLAND 2000, 63–77; SHORTLAND, NICHOLSON and JACKSON 2001.

¹⁵² WARBURTON 2007.

In 2000 SHORTLAND, following the work of KEMP and others, stated that “two methods for the distribution of faience and glass from the factories are envisaged. The first is central commissioning and control followed by redistribution which is classically regarded as the dominant force in Egyptian economics”.¹⁵³ For Amarna KEMP illustrated this point by describing the role of the bakeries in the Central City.¹⁵⁴ SHORTLAND further comments that “a similar tight control was exerted over the production of other goods, and that at least some of the faience factories ...¹⁵⁵ were working (at least officially) primarily, or even exclusively, for the Court. Goods produced by the bakeries and other industries under central control would then be distributed by the state possibly in part in a ritualised way by the King personally”.¹⁵⁶ SHORTLAND also created a hypothetical three layer organisation that controlled the Amarna faience industry.¹⁵⁷ The second method for distribution was the “production and sale in the private sector”.¹⁵⁸ Accordingly SHORTLAND, NICHOLSON and JACKSON envisage that “the presence of *šwtj*¹⁵⁹ and an active private sector also explains the distribution of the faience workshop sites at Amarna. The main demand for larger, more expensive pieces would obviously come from richer people who lived in the more spacious houses. These people employed *šwtj* to carry out their purchases and there would be a significant advantage to have your workshop as close as possible to the demand, i.e. right up against the wall of the larger houses. Being in the centre of the main residential areas would also enable exchange with those who could not afford to employ specialist traders”.¹⁶⁰

WARBURTON on the other hand rejects the idea that the Egyptian economy is “a ‘redistribution economy’ or ‘supply economy’, and that commerce did not play an important role as a whole”.¹⁶¹ Likewise he argues that “in fact, there is no documentation of state control of the faience market in the

New Kingdom, nor any indication of state distribution of such articles ... these articles were probably easily available on the market in the New Kingdom as well”.¹⁶² “Those elements of ‘redistribution’ which are documented can be understood as ‘exactions’ and not as being ‘commissioned’. One could probably suggest that for the New Kingdom – even if one accepts SHORTLAND’s suggestion that the king may have rewarded some of his underlings with gifts of faience trinkets – then these may have been acquired through taxation of independent producers”.¹⁶³ For WARBURTON “the Egyptian economy was a pre-capitalist market economy in which administration played a relatively unimportant role in itself”.¹⁶⁴

KEMP identified three levels of craft production and associated workshops that manufactured and supplied goods to the city: the small-scale domestic “cottage industry”, courtyard establishments and formally constructed institutional workshops.¹⁶⁵

There is ample evidence that small-scale household activities were carried out all over the city.¹⁶⁶ The second type represents an intermediate establishment with larger workshops and/or storage facilities. The six examples KEMP describes are all located in the MC and they appear to be related to both private and institutional ownership or control. Of the large formal workshops, he cites only three examples, all associated with temples, two of which are located in the CC and one in Kom el-Nana.¹⁶⁷

KEMP suggests that the courtyard establishments and their personnel may have been a reward from the king to prominent persons. He bases this interpretation on a workshop scene depicting various craftsmen using a variety of materials, in the tomb of Huya. Next to an image of Huya is written “Appointing the craftsmen of the honoured one of the Lord of the Two Lands, the overseer of the royal harim, the overseer of the treasury, the steward of the Great Royal Wife, Tiy: Huya”.¹⁶⁸ According to

¹⁵³ SHORTLAND 2000, 77.

¹⁵⁴ KEMP 1989a, 287–317.

¹⁵⁵ i.e. the suburban factories with the mould clusters SHORTLAND described in his book.

¹⁵⁶ SHORTLAND 2000, 72.

¹⁵⁷ SHORTLAND 2000, 70–72; SHORTLAND, NICHOLSON and JACKSON 2001, 155–156.

¹⁵⁸ SHORTLAND 2000, 72, 77.

¹⁵⁹ *Wb* IV, 434.5–6: merchant, trader.

¹⁶⁰ SHORTLAND, NICHOLSON and JACKSON 2001, 156.

¹⁶¹ WARBURTON 2007, 181.

¹⁶² WARBURTON 2007, 183–184.

¹⁶³ WARBURTON 2007, 186; WARBURTON interprets *b3kw* as a “tax by profession” (e.g. WARBURTON 1997, 253–257, 259–260; WARBURTON 2000, 70).

¹⁶⁴ WARBURTON 2007, 191.

¹⁶⁵ KEMP 1989b; KEMP and STEVENS 2010a, 493.

¹⁶⁶ See e.g. SHAW 2004.

¹⁶⁷ KEMP 1989b.

¹⁶⁸ DAVIES 1905b, 13–15, Pl XVII; KEMP 1989b, 60–61, figure 2.27.

KEMP “the wording of this text and the context of the scene – it is an illustrative appendix to the Window of Appearance reward scene – imply that the workshops and their personnel were a personal reward to Huya, and not that he was being placed in charge of workshops belonging to the palace, or to Queen Tiy’s household”.¹⁶⁹ He concludes that “we seem to be looking, then, at a delegation of production and patronage which gave to high and loyal officials both the responsibilities and rewards for managing centres of production, the output from which was intended both for the court and for private consumption” and “in particular, it helps to explain the paucity of evidence for large royal workshops”.¹⁷⁰

The mould distribution survey has demonstrated that faience was produced by all three of KEMP’s workshop types. Of the six courtyard establishments that KEMP described only Q48.4 and P47.1–3 contained moulds. The former was only active during Tutankhamen’s reign and was one of the compounds supplying the WV.¹⁷¹ The latter contains the house and workshops of the overseer of works and sculptor Thutmose and here can we expect a transfer of goods in various directions. New is the suggestion by KEMP and STEVENS that the MC Grid 12 buildings and workshops might also have belonged to the establishment of a senior official, though apparently in a less direct way.¹⁷²

Huya’s industry scene can, however, be interpreted differently. The tomb scene under discussion is carved on the east side of the north wall under one of Huya’s reward scenes.¹⁷³ Yet there is another reward scene likewise on the north wall but on the west side.¹⁷⁴ Here Huya is appointed overseer of the royal harem¹⁷⁵, the overseer of the treasury and steward of the great royal wife, Tiy, and under this scene he is depicted in the treasury, car-

rying out the duties of his office. Therefore it is just as likely that he is doing exactly the same in the other scene, in which he, as the overseer of the treasury of great royal wife Tiy¹⁷⁶, is appointing craftsmen to their stations. Or, just as likely, the king appointed personnel, such as Iuty, overseer of the sculptors of great royal wife Tiy¹⁷⁷, to the workshops of the treasury of his mother, which Huya now has to manage. In fact inspecting the workshops of treasuries, which Huya may also have been doing in the scene, was one of the main tasks of treasury overseers and part of their job was also to supply the workshops with raw materials and tools.¹⁷⁸

Another official, Meryra II, holds similar titles as Huya, which include steward, overseer of the treasury and overseer of the royal harem of the great royal wife, Nefertiti.¹⁷⁹ It is hardly unlikely that Nefertiti would not control her own treasury and workshops. She, just like Tiy, delegated its management to one of her officials.

When KEMP made his interpretation, he did not consider the evidence of large royal workshops to which PETRIE referred. In the meantime a small area of O45.1 has been excavated and, as I have outlined above, PETRIE’s discoveries can also be reevaluated. These sites demonstrate that state-controlled faience factories were in fact producing and distributing goods.

Let us now have a closer look at the different Amarna treasuries. FAIRMAN remarked that “Amarna inscriptions contain numerous references to ‘treasuries’, ‘houses’, ‘harems’, ‘storehouses’, and other buildings of an obviously official nature without any further indication of their location”.¹⁸⁰ At least two queens had a treasury but it is also known that both the king and the Aten temple had one. The elite official Tutu had many high titles, including that of overseer of the treasury [...] the Aten in the

¹⁶⁹ KEMP 1989b, 60.

¹⁷⁰ KEMP 1989b, 62.

¹⁷¹ KIRBY 1989, 45–46.

¹⁷² KEMP and STEVENS 2010a, 492–499.

¹⁷³ DAVIES 1905b, 13–15, Pl XVII.

¹⁷⁴ DAVIES 1905b, 12–13, Pl XVI.

¹⁷⁵ The translation of *Im.y-r ipt nsw.t* as “overseer of the royal harem” is no longer universally accepted. In this case one can argue that it would indeed be weird for queen Tiy to have a harem. Interesting is LORTON’S (1974, 101) interpretation where he suggests Huya “was connected with supervising royal funds or goods in kind with regard to their accounting

and distribution (*ipt-nswt*), their income and storage (*pr-ḥd*), and a specific application of their distribution, the maintenance of Teye’s household” but this has also been criticized. For a more complete discussion on the meaning of the title with further references, see WILLEMS 2007, 71–72 nr. ^{ap}.

¹⁷⁶ For this title, see DAVIES 1905b, 18, Pl XIX.

¹⁷⁷ DAVIES 1905b, 14, Pl XVIII.

¹⁷⁸ HELCK 1958, 185, 186; AWAD 2002, 110–124.

¹⁷⁹ DAVIES 1905a, 45, Pl XXXI.

¹⁸⁰ PENDLEBURY, ČERNÝ, BOODLE and CLARK 1951, 210–211.

Temple of Aten in Akhetaten.¹⁸¹ Another official called Satau was the overseer of the treasury of the lord of the two lands.¹⁸² A clay jar sealing also mentions the treasury of the strong king.¹⁸³

Based on Huya's illustrations it is fair to assume that each treasury had an associated set of workshops, supervised by an official. One has to wonder whether they also produced faience objects. A closer examination of one of Huya's workshop scenes shows two workmen sitting around a table on top of which is placed a collar, which must be the jewellers DAVIES referred to.¹⁸⁴ Most likely they are stringing beads. Similar scenes of industry have come down to us from various Theban tombs belonging to a range of elite people, including viziers, several high priests of Amen as well as senior administrators of the treasury in their capacity of managers of different state and temple workshops.¹⁸⁵

Although it is not depicted on tomb walls, we know that temple workshops, besides stringing beads, also produced faience objects. In the Rameside period the title 'faience maker of Amen' is known¹⁸⁶ and a small number of moulds have actually been found in several memorial temples on the Theban west bank¹⁸⁷ and possibly in the treasury of Thutmose I at Karnak.¹⁸⁸

The extent of their faience output is unknown, but from the small number of recorded moulds one may cautiously deduce that they did not manufacture many objects. In fact the Great Harris Papyrus records in lists C and E the *inw*-donation by

Ramesses III of over a million faience beads and over 57000 faience amulets, collars, bracelets, scarabs and rings to various temples across Egypt during his reign.¹⁸⁹ According to GRANDET, list C *inw*-donations were random state offerings to different temples in order to supplement their income whereas list E *inw*-donations were used to ensure or improve the celebration of specific religious ceremonies.¹⁹⁰ Interestingly, WARBURTON conceded that apparently "precious stones and faience were exclusively in the hands of Pharaoh and were not part of the normal temple income".¹⁹¹ GRANDET had previously come to a similar conclusion.¹⁹²

The Rameside Qantir factories were in all likelihood the largest of their kind in the country and they certainly would have had the capacity to produce the quantities of goods listed. It is, however, clear from the examples above that at least some temple workshops did produce a limited number of faience items themselves. This is also true in Amarna in that a small faience workshop was located in complex P43.1–2, which is associated with the small Aten temple, but again only a small number of moulds were found here. Perhaps this affords a further clue that it was the king, through one of his large factories, who supplied the religious institutions with their faience needs.

One can assume that these items eventually went back into general circulation through the temples. It may thus explain part of the distribution of designs not produced by suburban workshops.

¹⁸¹ DAVIES 1908b, 15, Pl XII.

¹⁸² DAVIES 1908a, 14, Pl XV.

¹⁸³ PETRIE 1894, Pl XXI nr 45; PENDLEBURY, ČERNÝ, BOODLE and CLARK 1951, Pl LXXXII nr 120.

¹⁸⁴ DAVIES 1905b, 14, Pl XVII.

¹⁸⁵ For a more complete list with references, see DRENKHAN 1976, 164–165; AWAD 2002.

¹⁸⁶ National museum of Scotland nr A.1956.153 Stele of Rekhamen; SHORTLAND 2000, 71.

¹⁸⁷ Memorial temple of Merenptah (JARITZ, DOMINICUS, NIEDERBERGER, SOUROUZIAN and STADLER 1999, 55; JARITZ, DOLL, DOMINICUS and RUTISHAUSER 2001, 162, Pl 25g–h); Also "a few blue beads, mostly wasters, from a factory, were found, and a few objects in coloured glaze, blue, red, and white" (PETRIE 1897, 13); Memorial temple and palace of Ramesses III (Medinat Habu) (HAYES 1959, 367; Oriental Institute Chicago OIM 15335 and OIM 15369; and perhaps HÖLSCHER, ANTHES and HAUSER 1951, 45, Pl 37; OIM 16681–16685); perhaps the memorial temple of Ramesses II (BARAIZE 1907, 195). The Ramesseum is also known to have had a textile

and a stone workshop (TT133 Neferrenpet, overseer of weavers in the Ramesseum; DEBONO 1994) so that the tomb scenes match the archaeological evidence; and perhaps the memorial temple of Tausert (WILKINSON 2009, 6).

¹⁸⁸ A single *wd3t*-eye mould (object A3826) was found in the eastern workshops of the treasury of Thutmose I at Karnak-Nord, which appear to have remained in use until the early 19th Dynasty (JACQUET 1983, 88, 138–139). However, around twenty moulds were found immediately east of the treasury wall, but they remain unpublished and undated. That site was occupied until Roman times (JACQUET 2001, 66) so it is possible that the mould in the treasury originally came from here.

¹⁸⁹ P. Harris 15b7–8, 34a7, 41a13–15, 53b1, 53b3, 55a16–17, 64b1–7, 64b15; GRANDET (1994a), 243, 270, 278, 295, 296, 298, 315, 316.

¹⁹⁰ GRANDET 1994a, 69, 71.

¹⁹¹ WARBURTON 1997, 234.

¹⁹² GRANDET 1994b, 70–71.

We can only speculate that (part of) P43.1–2 may have been a workshop of the Aten treasury. A faience workshop likewise existed in the North Palace and the ASFD lists further tools that could have been used by other craftsmen as well. Perhaps these represent remains of workshops of a possible treasury of the occupant of the palace. North of the Great Palace PETRIE also found a workshop manufacturing royal funerary goods¹⁹³ (Plate 2 square P39) and earlier I commented that he obtained cartouche moulds of Akhenaten, Nefertiti and the Aten from an unknown area north of the temple.¹⁹⁴ These may have come from an unknown royal workshop further north.

The Seti II palace construction report of the scribe of the treasury Qageb¹⁹⁵ informed us that the state treasury supplied the construction workers with inlays. From this we can deduce that the large Qantīr faience facility was one of the state factories, located close to the royal palace, supplying the royal treasury with construction materials. Likewise we can assume that the large Amarna faience factories did exactly the same.

Goods were also passed on through royal favour. The king is frequently depicted in private Amarna rock tombs rewarding officials through the Window of Appearance in the King's House with golden *šby.w* necklaces, collars, rings and other precious gifts or announcing their promotions to higher offices. The ceremony also occasioned the regular distribution of rations.¹⁹⁶

The distribution analysis of faience pendants suggested that the large PETRIE factories were capable of supplying the market with numerous and widely varying objects, often of a different design

from those from the smaller workshops. Perhaps the scatter of these items across the city may in part be seen as the remains of ceremonial awards or state distribution during festivals and/or other occasions.¹⁹⁷ However, it remains unknown what share of the faience market the large state-controlled factories had or whether they produced continuously or only for certain events. Equally unknown is whether any faience objects were sold directly to the private market.

A private market for faience objects did exist in the New Kingdom. O. Černý 19 states: "Please make arrangements to procure the two faience heart amulets about which I told you, I will pay their owner whatever he may demand for the price of them".¹⁹⁸ In Dayr al-Madīna a whole variety of goods, including jewellery, were not only purchased but also bartered, and one can expect a similar situation in Amarna.¹⁹⁹ The craftsmen were "a loosely organized cooperation in which specialized non-royal commissions were distributed among artisans attached to a royal workshop".²⁰⁰ COONEY has argued that a process of sequential production of commissioned funerary goods between craftsmen existed in the village and that village officials were occasionally contacted to organise the production of an object.²⁰¹

Such sequential production may also have existed in the jewellery sector for the Onomasticon of Amenope lists occupations such as *nšdy* (jeweler, worker in precious stones), *b^cb^c* (faience-maker), *str* (necklace-maker) and *irw-wšb.t* (bead-maker).²⁰² The Amarna mould distribution has shown that most suburban workshops only had a few moulds to work with. None were capable by themselves of

¹⁹³ PETRIE 1894, 17–18, Pl XXXV site marked "Ushabtis"; NICHOLSON 2009b, 306–307.

¹⁹⁴ PETRIE 1894, 28.

¹⁹⁵ P. Anastasi IV, vs. C5-C7.

¹⁹⁶ DAVIES 1905a, Pl X, XXXIII–XXXV; DAVIES 1905b, Pl XVI–XVII; DAVIES 1906, Pl IX; DAVIES 1908b, 22, Pl IV, XIX, XXIX: the last plate shows the king rewarding Ay and his wife with golden *šby.w* necklaces, rings and, according to DAVIES, faience collars. The same kind of collar is depicted in similar scenes with other officials; The *šby.w* award necklace was not only made in gold but frequently also in faience (PATCH 1998, 35–41). It is therefore possible that the king was distributing faience versions of these objects as well (DAVIES 1933, Pl XIV); EYRE 1987, 198; SHORTLAND 2000, 72; KEMP 2006, 276, 287; STEVENS 2006, 268.

¹⁹⁷ See previous footnote.

¹⁹⁸ ČERNÝ and GARDINER 1957, Pl 54–54A nr 4; WENTE 1990, 153.

¹⁹⁹ JANSSEN 1975; COONEY 2007; See JANSSEN 1975, 304–311, for written evidence of jewellery trade; Faience moulds have also been found in Dayr al-Madīna (BRUYÈRE and JOURDAIN 1939, 214, 345, Pl XLII; 10 moulds are shown but the quality of the print is poor. It is possible to recognize moulds for a ring, ring bezel, rosette, amulets, pendants and/or inlays); The Louvre museum has in its collection (at least) three moulds and they still have traces of paste in them (LETELLIER 1978, 72, figures 101–103).

²⁰⁰ COONEY 2008, 107.

²⁰¹ COONEY 2006; STEVENS 2006, 264–267; COONEY 2007, 156–162; COONEY 2008, 107–111.

²⁰² GARDINER 1947, 67*–69*; DRENKHahn 1976, 45–49; STEINMANN 1980, 155–156.

producing a collar like the one found in U36.25. Within a local-level barter-based exchange system it would not be necessary to have a complete set of moulds. For them to own/trade a complete necklace or collar, suburban workmen need only swap designs with their neighbours. If someone else wanted a collar with several different pendant subtypes, they, or someone charged with the assignment, would have to go to several workshops of faience makers and/or bead makers. Once all required pieces were obtained, the purchaser had to string them himself or go to a collar-maker shop for collar assembly. That this could have happened is further demonstrated by the fact that differently coloured suspension beads were sometimes attached to the pendants.²⁰³ A similar situation may have existed with rings.

The owners of the suburban workshops were both officials as well as workmen who traded across the city and perhaps the country. Whereas officials, such as Tuthmose, employed a variety of craftsmen within his establishment, households at the lower end of the social ladder practiced several crafts simultaneously.²⁰⁴

In order to examine the potential customers of the suburban workshops, it may be useful to first make a comparison with the social distribution of different coffin types in Dayr al-Madīna. COONEY divided Ramesside coffins from this site into 5 distinct groups (A–E).²⁰⁵ She states that “the artisans of Deir el Medina in group C could not afford gold at all; there is no mention of gilded funerary arts in the west Theban documentation. This group also could not (or chose not) to use glass inlay”.²⁰⁶ The late 18th Dynasty burial of Kha and Merit, however, did contain golden objects but these were most likely royal rewards since the burial included a *šby.w* necklace and inscribed royal objects.²⁰⁷ Coffin groups A and B, belonging to the mid-to-highest level elites, were gilded and made use of glass inlays whereas group D coffins were of low quality. In the Ramesside period the village craftsmen were

only able to construct group C and D coffins. In the private sector their specialisation lay in their draftsmanship for which they were also contacted by Theban officials and it was through their official connections that they often purchased the pigments and raw materials used to make paints, rather than using state supplied materials.²⁰⁸ They did not use glass because its distribution was tightly controlled and largely associated with royal usage.²⁰⁹

Earlier I had briefly examined several late 18th dynasty cemeteries and it became apparent that elite and middle class burials did have glass inlaid coffins, some of which additionally had gilded parts. It is now clear that officials could not turn to the Dayr al-Madīna craftsmen for this, so other workshops must have existed to satisfy this demand.

Could the various Amarna establishments and suburban workshops also have fulfilled the demand of members groups comparable to COONEY’s groups A and B for certain funerary and domestic goods? Perhaps *šwty* also played a role in the exchanges between different parties? All of the above seem definitely possible.

KEMP and STEVENS believe that a quota system for faience inlays may have existed in Amarna for the suburban workshops as the recent excavation of the MC Grid 12 houses and workshops also revealed that these units produced geometric faience inlays, cut from blue-coloured master sheets, for frieze-like designs. Two kinds of red geometric inlays were found although it remains uncertain that they were made on site. That the faience workers were capable of making red objects is proven by the fact that two moulds contained traces of red paste in them, but no moulds for geometric objects have been found nearby. KEMP and STEVENS suggested that the smaller workshops were responding to a new demand after state facilities, such as site O45.1, had ceased production of architectural inlays.²¹⁰ They do concede that part of the faience technology in O45.1 is not present in Grid 12²¹¹,

²⁰³ See e.g. figure 4b where one of the yellow pendants has a red instead of a yellow suspension bead.

²⁰⁴ KEMP 1989a, 305–317; SHAW 1992, 160; SHAW 1996, 100–103; SHAW 2004, 16–17; KEMP and STEVENS 2010a, 473–514.

²⁰⁵ COONEY 2007, 231–258; Group E coffins belong to the later 20th Dynasty and are not included in the discussion here.

²⁰⁶ COONEY 2007, 267; Most of the coffins of group C belonged to Dayr al-Madīna inhabitants (Ibid., 266).

²⁰⁷ For an overview of objects, see PATCH 1998, 37–39.

²⁰⁸ COONEY 2007, 117–118, 143–175, 231–258.

²⁰⁹ SHORTLAND, NICHOLSON and JACKSON 2001, 151–154; REHREN, PUSCH and HEROLD 2001; PUSCH and REHREN 2007, 140–141, 158–163.

²¹⁰ KEMP and STEVENS 2010a, 478–480; KEMP and STEVENS 2010b, 249–296.

²¹¹ KEMP and STEVENS 2010a, 483.

which could indicate that the former site was more advanced than the suburban workshops. Likewise it remains unknown for how long PETRIE's factories were in operation. One could counter that in case the need arose again for a new large batch of inlays the state could just as easily set up a new facility. For instance, PETRIE's "pendant factory" was probably at least (still) in operation during Tutankhamen's reign.²¹²

We should not entirely rule out the possibility that the Grid 12 inlays were destined for state constructions but it is just as likely, and this point was also raised by KEMP and STEVENS, that the suburban workshops and establishments were making pieces for the private market.²¹³ For example, large-sized bunches of grapes (P 448) were used as architectural decoration for attachment to or suspension from a beam, architrave, wall or ceiling of a building, shrine or kiosk.²¹⁴ In the NS one such mould was recovered in building T36.44. The final destination of the end product must have been an important building. One possible end-user was identified when the EES excavated a garden chapel in building T36.11. The ceiling fragments decorated with a vine-and-grape pattern discovered here suggested to the excavators that the chapel rafters bore large faience grapes.²¹⁵ Another large grape connected with a chapel was located in T35.21. Perhaps some were also sent to the house of the overseer of works Hatiay (T34.1) as a few large grapes were found in or near the building. This housing complex likewise contained another chapel.²¹⁶

They could also have been responding to the demand for inlays by the archaeologically nearly invisible woodworking industry. Moulds are best suited for mass production of similar elements. Cutting inlays from master sheets both takes more time and leads to more material waste than moulding. These inlays seem more suited for crafts where designs are not uniform and where shapes can be cut in response to each new project. The excavation revealed that glass inlays were also being shaped on

site. These diverse inlays could have been attached to other wooden, stone or faience objects.²¹⁷ The discovery of gold leaf in Grid 12 could be an indication that objects were also gilded in or near the Grid 12 buildings.²¹⁸ All of these factors suggest that sites such as Grid 12 could be producing the kind of goods that the Dayr al-Madīna craftsmen could not offer, whereas other parts of the city would be manufacturing items for the less well off.

Furthermore, it was not only the king who was rewarding his subjects, the latter were also giving high quality gifts to him and to the temples on a number of occasions²¹⁹ and this too must account for part of the private production of more luxurious goods.

When it comes to describing the faience industry it becomes clear that the state, contrary to WARBURTON'S opinion, did control a significant part of the faience market in the New Kingdom. However, it was not the suburban workshops, as suggested by SHORTLAND, that were under state control, instead large faience factories supplied the state's needs. Looking at the spread of moulds across the city it is highly unlikely that an exaction/quota system existed for moulded faience pieces. The large state faience factories were more than capable of producing these items themselves and as such it helps to explain why we do not find evidence of its existence in the written records. There was no need to turn to the smaller producers and given that most places only had a few moulds to work with in the first place, it would also not have been very practical or efficient.

One last topic needs to be raised. Earlier on I had suggested that a use discrepancy in faience objects existed between the higher and lower classes in mortuary contexts. In regards to use in daily life SHORTLAND had previously remarked that "the great majority of faience objects were not of high status and were available to, and used by, all ranks of society, with high status individuals having more objects".²²⁰ His data show that an amazing 77% of

²¹² See footnote 136.

²¹³ KEMP and STEVENS 2010a, 480–481.

²¹⁴ HÖLSCHER, ANTHES and HAUSER 1951, 46; CROWELL 1998, 189, 195.

²¹⁵ FRANKFORT, PENDLEBURY and FAIRMAN 1933, 24–25; large grape object nr 29/239; IKRAM 1989, 91–94.

²¹⁶ FRANKFORT, PENDLEBURY and FAIRMAN 1933, 64.

²¹⁷ KEMP and STEVENS 2010b, 249–296; Similar faience inlay pieces were found in Amarna royal tombs 28 and 29

(EL-KHOULI and MARTIN 1987, 5–6, 11, Pl 16); Shaft 13 in Dashūr North contained a wooden box inlaid with faience plaques (YOSHIMURA *et al.* 2001, 7, 10, Pl 36).

²¹⁸ KEMP and STEVENS 2010a, 495.

²¹⁹ ALDRED 1969; KEMP 1995b, 34–36; STEVENS 2006, 264–265; e.g. Tutankhamen's tomb contained ushabtis of the high officials Nakhtmin and Maya (REEVES 1990, 31, 137, 139).

²²⁰ SHORTLAND 2000, 77.

the surveyed houses in the MC, representing the two lowest housing classes, only contained on average less than 2 faience pieces.²²¹

Although there may be a use difference in life and death for some object types or specific designs, others were found in both contexts. The mould distribution survey together with an examination into the use of faience objects shows that even though some lower class workmen were producing these little items, many others choose not or could not include any faience pieces into their grave.

CONCLUSION

In this article I have taken a life-history approach to the production of small faience items in Amarna. Not only were the moulds and their produce studied but also the locations where they were found, and the people who made, distributed and used these objects. Throughout this process of creation until final deposition did the value and meaning not only accrue for the object itself but also for all its users. The results gained by this approach were then tested against previously proposed models of production and distribution.

A reexamination of the distribution of faience moulds and their finished products, coupled with a closer look at a selection of object types, did enhance our understanding of who was capable of producing what, where and for whom. In addition, the reevaluation of some of PETRIE'S discoveries in Amarna at the end of the 19th century indicate that at this site, just as in Qantīr, large state faience factories existed that were supplying state and temple treasuries.

A comparison between the moulds found by PETRIE and those across the city, suggest that the large factories had a far greater production capacity than the smaller suburban workshops. They were also capable of manufacturing more designs than the latter and the spread of these designs across Amarna suggests that certain occasions, such as royal reward ceremonies or state or religious festivities, may have accounted for their distribution. The large factories were likewise supplying decorative inlays, through treasuries, for state construction works.

A private market for faience objects also existed. Both smaller and larger workshops and establishments were in play. The mould distribution survey, however, showed that the majority of suburban workshops only had a few moulds to work with. This suggests that several craftsmen had to work together to produce individual faience pieces before final assembly. Faience pieces were used for domestic, religious or funerary objects. Royal gift giving and donations to religious institutes by private citizens may also account for part of the suburban production.

A comparison between faience use in daily life with that in mortuary contexts has shown that even though some suburban craftsmen were producing moulded faience objects, the majority of the working class actually chose not or could not afford to include these objects in their burial. Officials, however, did include them and certainly the king took with him many faience objects.

²²¹ In the status survey all finds from houses with many moulds as well as those speculated to have been involved in faience production were ignored (SHORTLAND 2000, 75–76).

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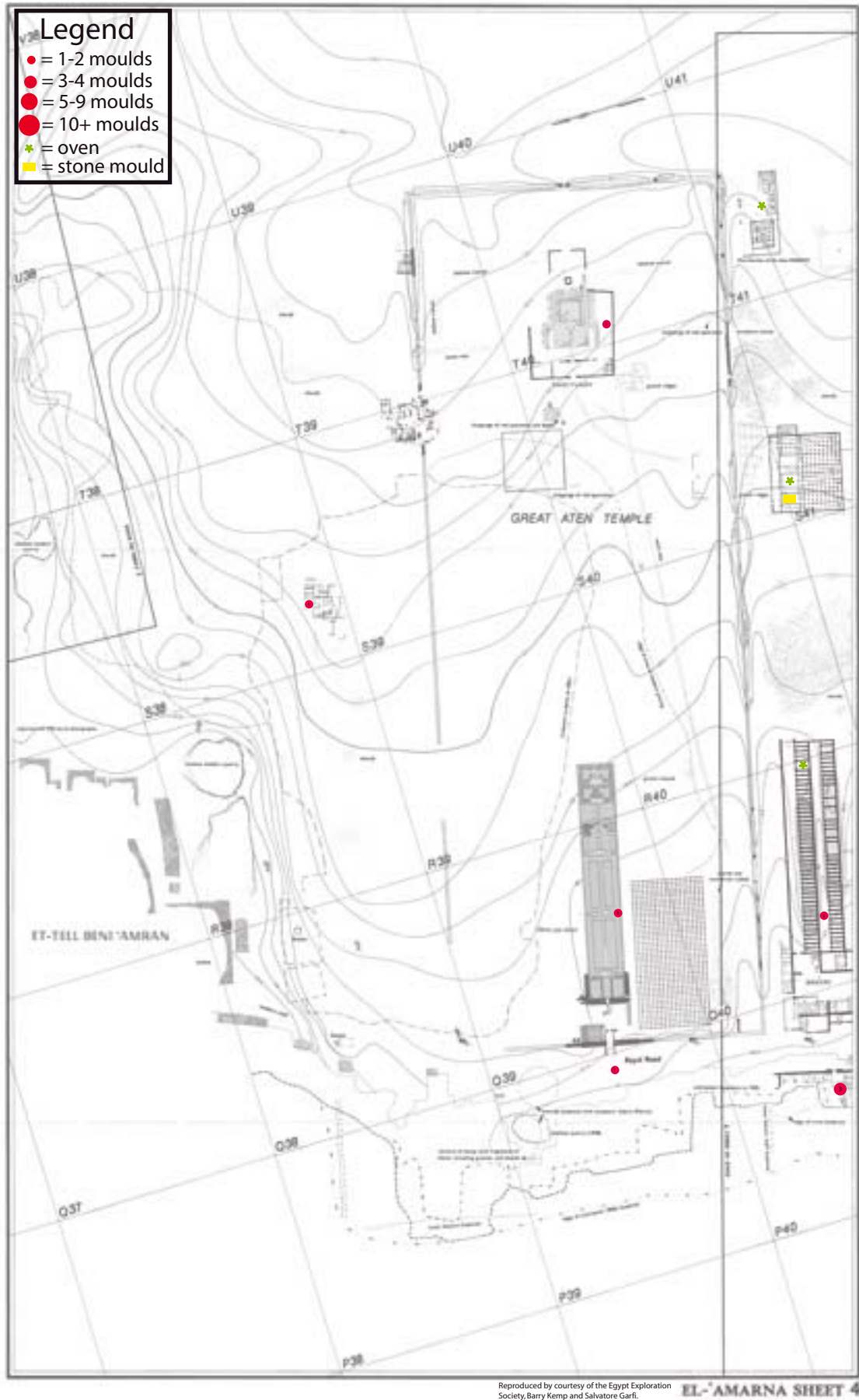
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Plate 1 Distribution of faience moulds in the NS



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EL-AMARNA SHEET 4

Plate 2 Distribution of faience moulds in the CC



Reproduced by courtesy of the Egypt Exploration Society, Barry Kemp and Salvatore Garfi. EL-AMARNA SHEET 5

Plate 3 Distribution of faience moulds in the CC

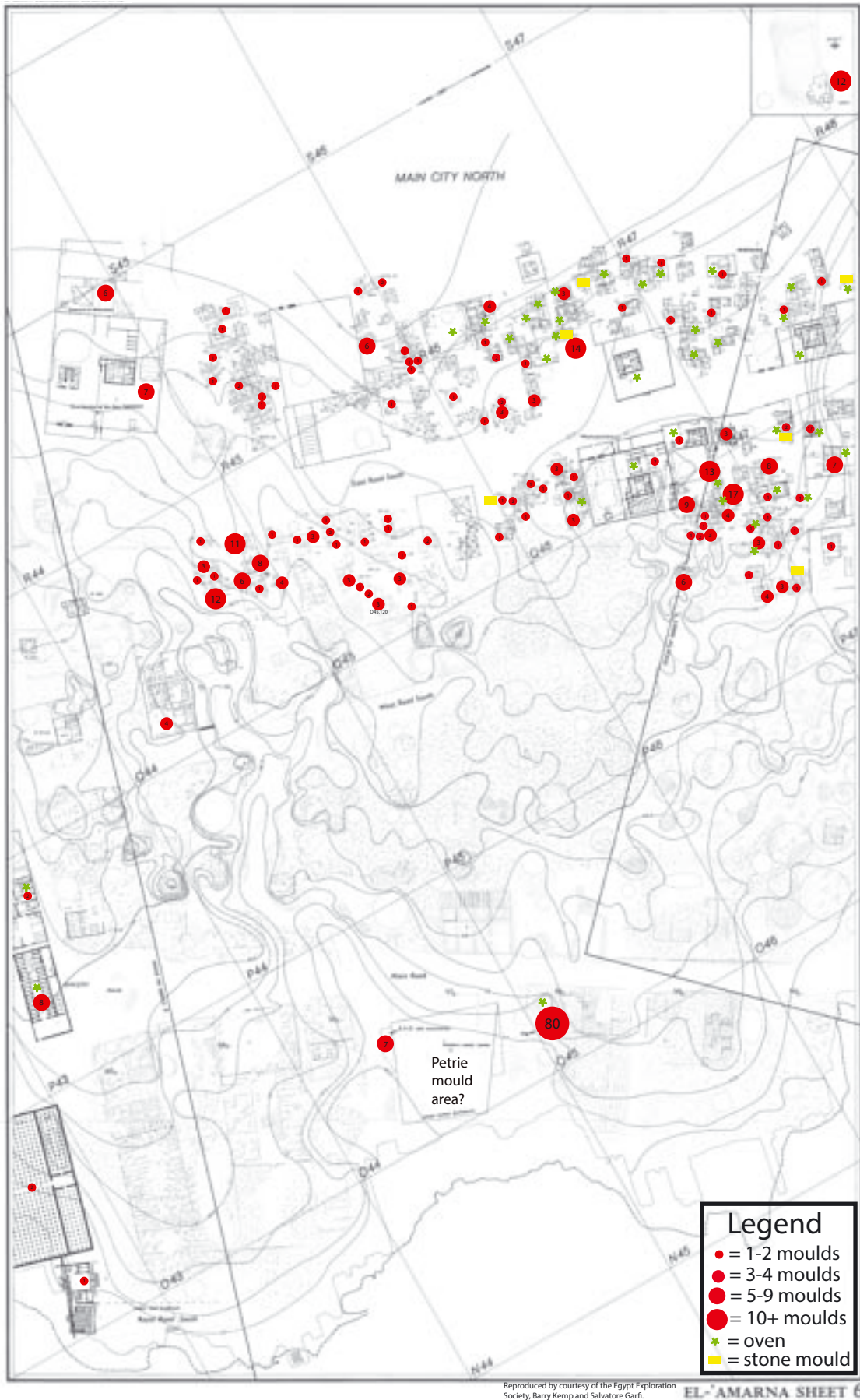


Plate 4 Distribution of faience moulds in the MC (North)

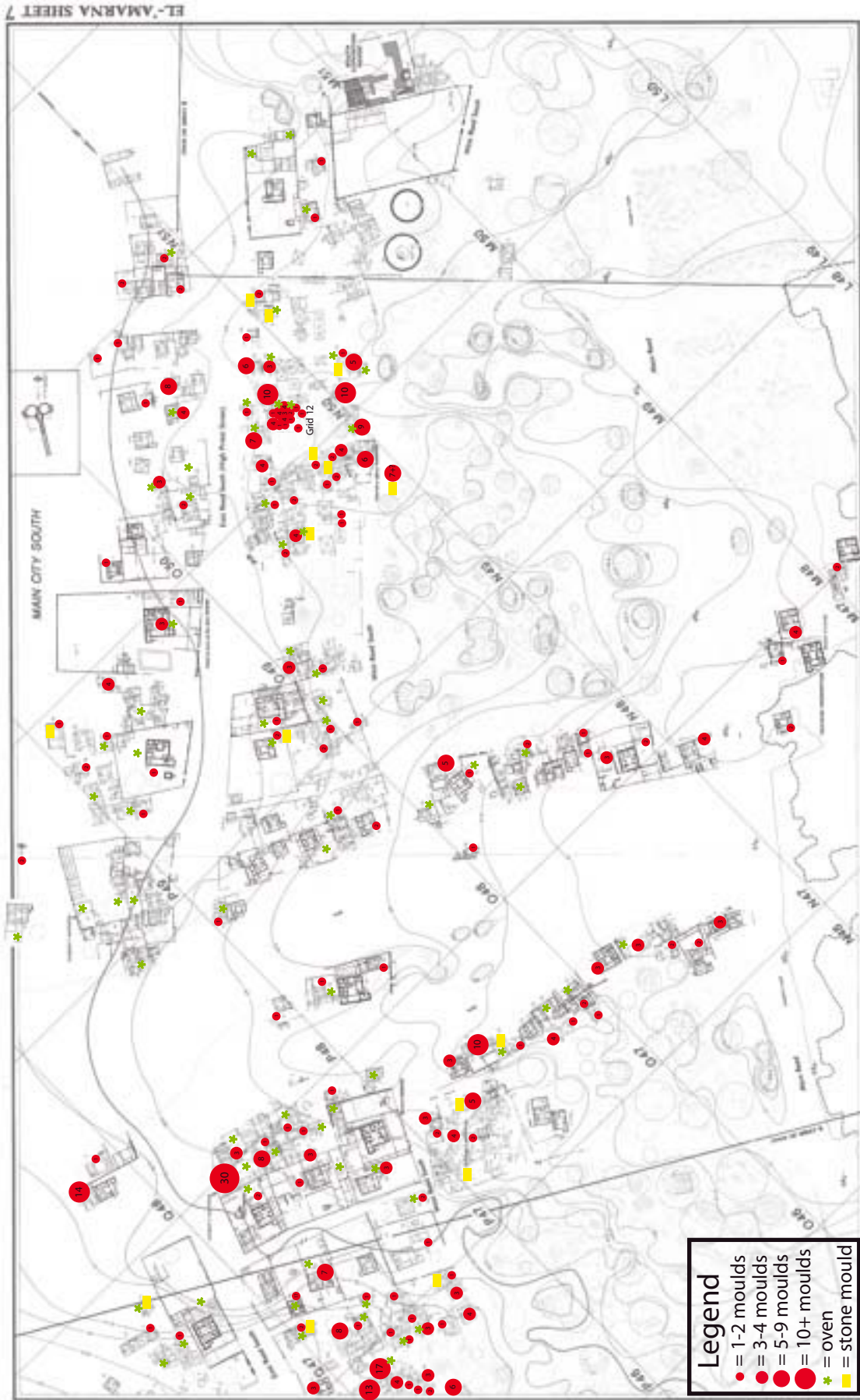


Plate 5 Distribution of faience moulds in the MC (South)

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Plate 6 Distribution of faience moulds in the NC, NP, SS, WV and SV

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