

CHAPTER 7

KILN EXCAVATIONS AT P47.20 (HOUSE OF RAMOSE COMPLEX)

by

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7.1 Introduction

Since very few pottery kilns are known from ancient Egypt, and, since fewer still have been fully excavated and published, the discovery of two kilns [2984 and 3052] in the 1987 excavations provided a welcome opportunity to increase our knowledge of these structures (*AR V*: Chapters 3 and 4). The excavation of the kilns found in square G4 and associated with building Q48.4 led, in the same season, to the re-excavation of a kiln at P47.22 in order both to clarify the structural details of the kilns in G4 and to determine whether the term "Ofen", as used by the original German excavators, referred to ovens for baking or to pottery kilns ("Topferofen"). It was established that the structure excavated at P47.22 was a pottery kiln (*AR V*: 77–81), and that it had not in fact been fully excavated by the Deutsches Orient-Gesellschaft (DOG) but only planned at the level of its rim.

It was subsequently realised that Borchardt (1933; Borchardt and Ricke 1980: 128–129) had identified a similar structure in house P47.20 (the house of the general Ramose) as a baking oven ("Backofen"), and, since this seemed to have preserved some details of the means by which the perforated floor had been supported, as well as of the original height of the structure, it seemed worthy of re-excavation. It was believed, on the basis of the 1987 excavations, that this could not be an oven but was another example of a kiln.

All unit numbers (given in square brackets) refer to the present excavations.

7.2 The excavation

It was clear from the German plans (Borchardt and Ricke 1980: Plan 23, cf. our Figure 7.1) that there were at least two phases of activity in the workshop areas associated with the house of Ramose at P47.20, and that evidence of these would be encountered in the parts of the two rooms chosen for re-excavation, namely **Raum 1/2** and **Raum 10**. In fact there proved to be more phases of activity than anticipated, and these can be summarised as follows, beginning with **Raum 1** where the earliest features occur.

Raum 1 is situated in the south-easternmost corner of complex P47.20, slightly to the north of **Raum 2**, which may be nothing more than an artificial division of **Raum 1** (see Figure 7.1). The German plan suggests that all the major walls are contemporary, but this is not the case. It would seem from the excavation that the first wall to be constructed was the substantial eastern boundary wall [4164] which defines the eastern limit of both areas excavated. This was followed by the deposition of a trampled mud surface [4161] through which a pit [4123] was eventually cut, probably from a higher level, to receive the structure of the kiln [4122]. It may also be at this time that [4118] was built. This was either a wall dividing **Raum 1** from **Raum 10**, and now demolished, or the remains of a brick floor. The kiln structure makes use of another wall [4164] as its eastern wall, and it may be that the phases of activity so far described took place at no great interval of time.

Somewhat later the kiln in **Raum 1** was abandoned, still containing some of its original burned material, and was built over by a new east–west partition wall [4162] dividing the two rooms. It is probably at this time that wall (or floor) [4118] was demolished and kiln [4102] in **Raum 10** constructed. Likewise a further partition wall [4163] was built running north–south and abutting [4162] to divide **Raum 1** from **Raum 3**. The phase in which the roughly circular structure in **Raum 10** [4104] was built is uncertain but may well be contemporary with the construction of kiln [4102].

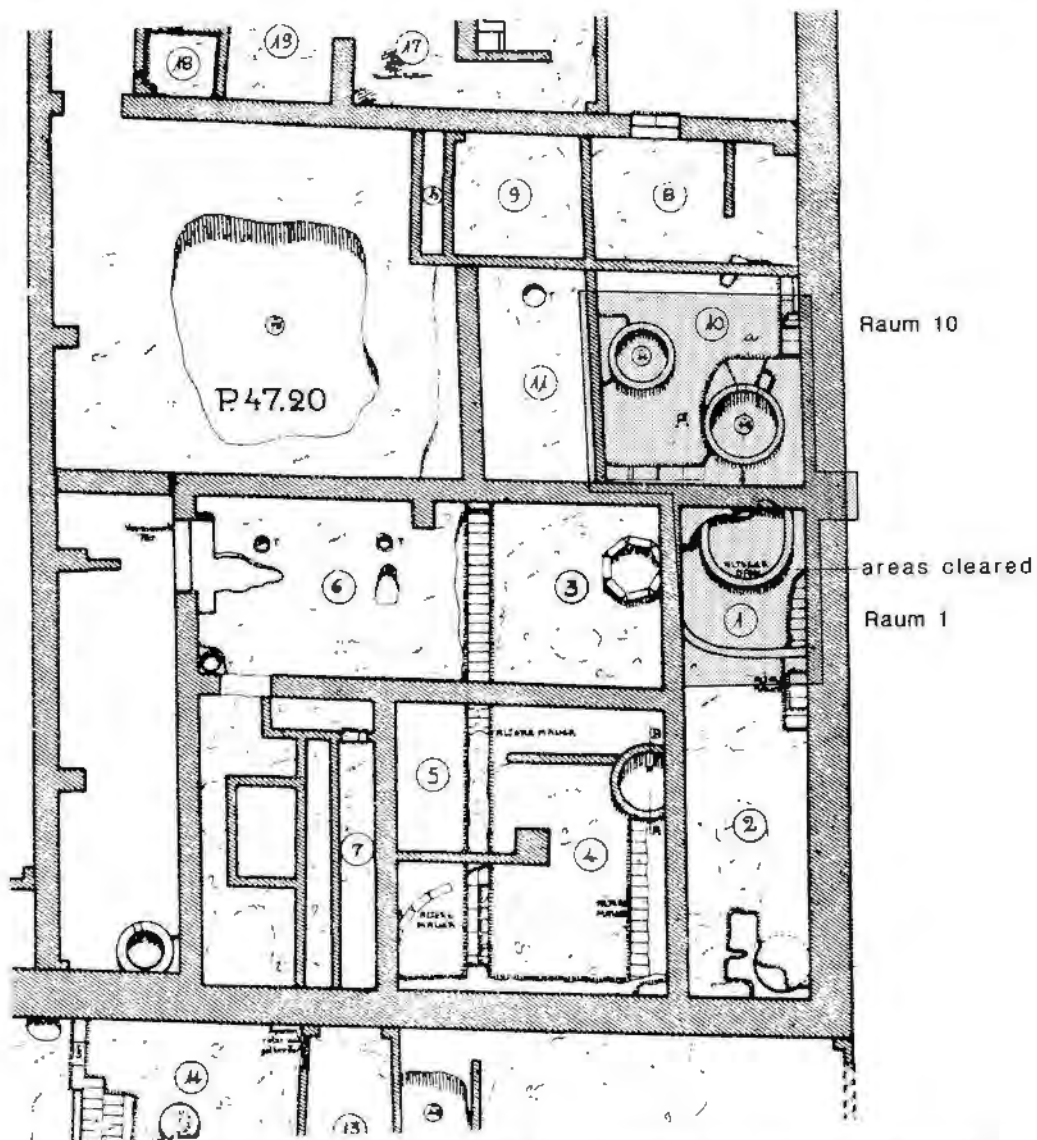


Figure 7.1. Borchartt and Ricke's plan of the south-east corner of P47.20 (after Borchartt and Ricke 1980: Plan 23). The area of the 1987 re-excavation is marked.

The re-excavations then, reveal a rather more complicated picture than that suggested by the German plans, as well as a number of inconsistencies. For example, kiln [4122] in **Raum 1** is not central to the room and free-standing, nor is it horse-shoe shaped as it appears from the plan. Rather it is roughly circular, the northern part running underneath the cross wall [4162], its eastern edge being formed by the lower part of wall [4164].

Borchartt and Ricke recognised this kiln as earlier than that in **Raum 10**, but it is not clear from the plans on what grounds. It now seems that they, too, must have recognised that the structure was roughly circular and ran under the wall, but did not show this clearly. It may also be that the structure was not planned in the field, hence its incorrect positioning in the published plans. Furthermore, as will become apparent from the ensuing discussion of the kilns, it is likely that certain parts of both rooms were not fully excavated.

7.3 The kilns

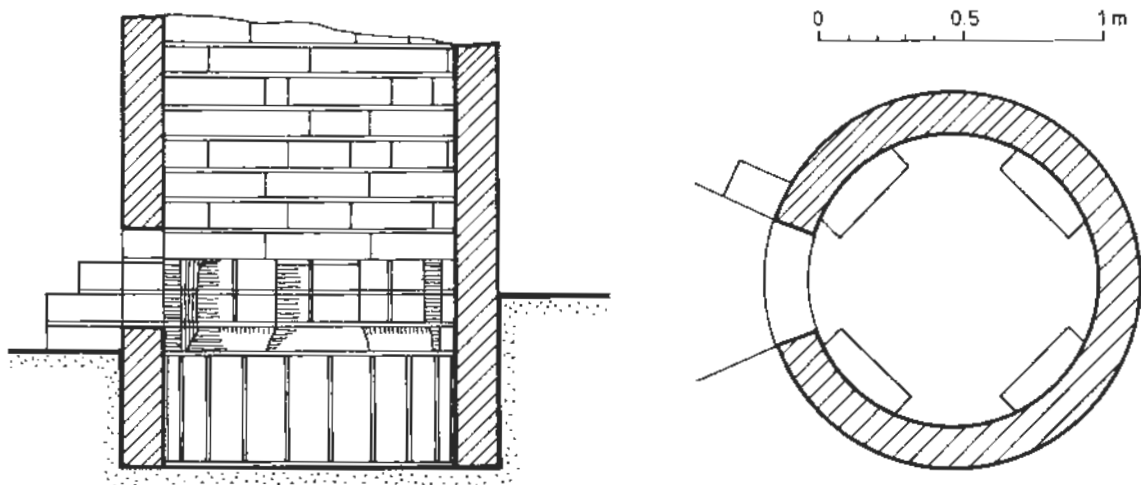


Figure 7.2. Borchardt and Ricke's reconstruction of the kiln in Raum 10 (after Borchardt and Ricke 1980: 128–9, Abb. 17).

The most informative kiln to be excavated was, as expected, that in Raum 10. The reconstruction drawing (Borchardt 1933: 74, Plate IV; Borchardt and Ricke 1980: 128–9, Abb. 17; our Figure 7.2) has been done in such a way as to suggest that it has been idealised, leaving it unclear as to precisely which aspects of the reconstruction were actually to be seen on the original structure.

When cleared (Figures 7.3–7.6), the kiln had internal dimensions, across the top, of approximately 1.20 m north–south x 1.0 m east–west. The original depth of the fire pit floor (cut into natural *gebel*) was approximately 75 cm below ground level (Figure 7.7). It was found to contain similar structural elements to those previously excavated and so confirms the view that there was a standard design for kilns at Amarna, and perhaps for the New Kingdom in general.

Most obvious, and most typical, of the standard construction was the single row of vertical bricks which make up the lowermost part of the brickwork (Figure 7.6). These are set on end, and arranged as the staves of a barrel. They seem to be intended to slope outwards slightly at the top, though in practice many are truly vertical or slope inwards slightly. This is particularly true of kilns found in private houses, such as P47.20 and P47.22, where the installations seem rather shoddily built, perhaps because they were intended to serve only occasional or small-scale use. These vertical bricks measure approximately 35/36 x 16/17 x 8/9 cm (thickness measured on exposed lower edge) which makes them slightly larger than the bricks serving the same function in kilns [2984] (Square G4) and [3896] (private house P47.22), although this is a size uniform with the horizontal brickwork of the latter and is consistent with the vertical bricks in Raum I.

Above the row of vertical bricks comes a row of horizontal bricks laid in Common Bond. These have approximately the same dimensions as the vertical bricks, and are best preserved on the eastern side of the kiln. However, it is the next row above which is of the greatest significance to our understanding of these structures. This second row of horizontal brickwork preserves, on the eastern side, the remains of two supports for the perforated floor. These are made of bricks of the same size as the vertical bricks, though they have broken where they would originally have projected. It would seem that they originally projected some 8–10 cm into the kiln, not enough to span it but sufficient for fire bars of either clay or stone to be placed across. They would also be sufficient to act as supports for a floor made of bricks and mortar bonded together and incorporating them, a method similar to that employed in Egypt today.

It is clear that a kiln of this size needed no central pillar to support the floor, and the survival of these projecting blocks, correctly interpreted by Borchardt, lends further credence to the view that the two sets of bricks set on edge in kiln [2984] must have been part of similar supports.

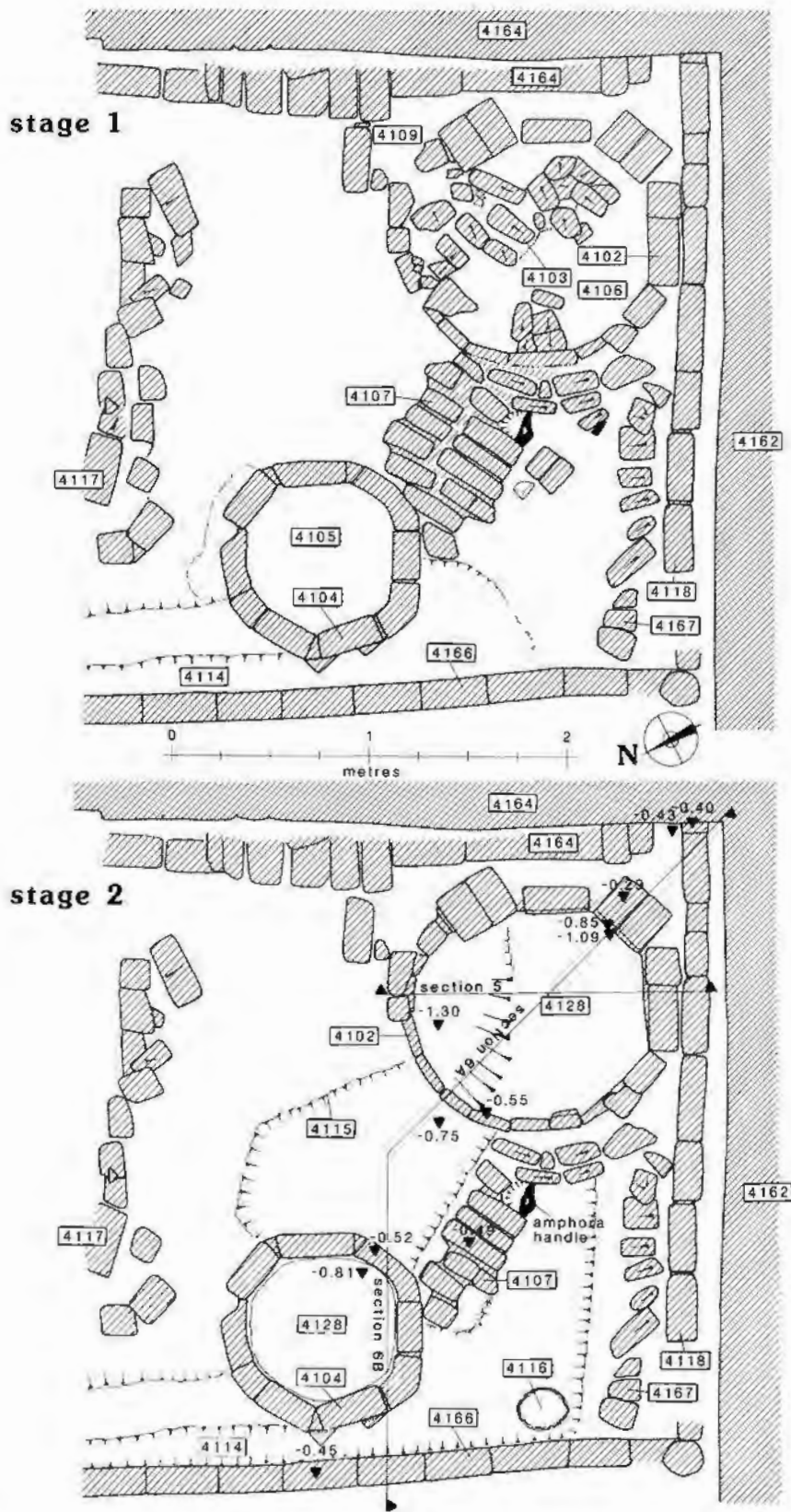


Figure 7.3 (above) and 7.4 (below). Plan of Raum 10 after removal of sand and after further cleaning (originals by P. Nicholson).



Figure 7.5. View eastwards in Raum 10 after removal of drift sand.

However, it is noteworthy that, whereas in kiln [4102] the actual supporting blocks are laid flat and rest on a row of horizontal bricks, those in [2984] are constructed as two bricks on edge with one across the top, and it was this upper one which probably carried the perforated floor. It is still unclear as to whether [2984] had a central pillar (cf. *AR V*: 75–76); experimental work may help to determine this.

Borchardt (1933) shows the floor supports projecting into the kiln and reinforced underneath by a kind of cornice. Re-excavation has shown this to be a small curve of mortar, presumably to add to the strength of the structure. Borchardt and Ricke (1980: 113) also speak of an arched (“keilformige”) stokehole for the structure, though this has now gone. It seems that it was located on the north-east, though the plan shows it as almost due north. The latter would seem more likely since the eastern side of the kiln is very close to the boundary wall [4164] and would have been inconvenient for stoking. Though some brickwork had collapsed into the kiln, or been thrown there in backfilling (part of [4103], Figures 7.3 and 7.5), it was not possible to identify any of it with the stokehole.



Figure 7.6. View westwards in Raum 10 after final cleaning of kiln.

More successful was the attempt to estimate the height of the structure. Borchardt and Ricke (1980) show eleven courses of brickwork above the vertical bricks. They also show the floor supports as each composed of four projecting bricks, only two of which now survive. Whether there really were four when originally excavated is uncertain, and traces of mortar on the upper surface of the projecting bricks may have been taken as a sign that they had been double their surviving thickness.

Above the level of the projections Borchardt and Ricke reconstruct eight courses of brickwork, indicating that the top surviving course did not mark the top of the original structure. It would seem that this was based on a fallen section of brickwork [4107] (Figures 7.3 and 7.5) lying in a north-westerly direction between the kiln [4102] and the circular structure [4104] which the Germans also took to be an "Ofen". This fallen section is eight courses high and composed of bricks of various sizes which are quite badly eroded or broken. It is believed that this brickwork was already fallen at the time of the German excavations, since a trench [4114] runs along the western wall [4166] then turns east and runs alongside this brickwork, as well as that of [4167]. This trench is almost certainly part of the Borchardt excavations intended to follow the line of the wall [4166], and it is possible that the excavators removed part of the fallen brickwork [4107]

Kilns at house P47.20

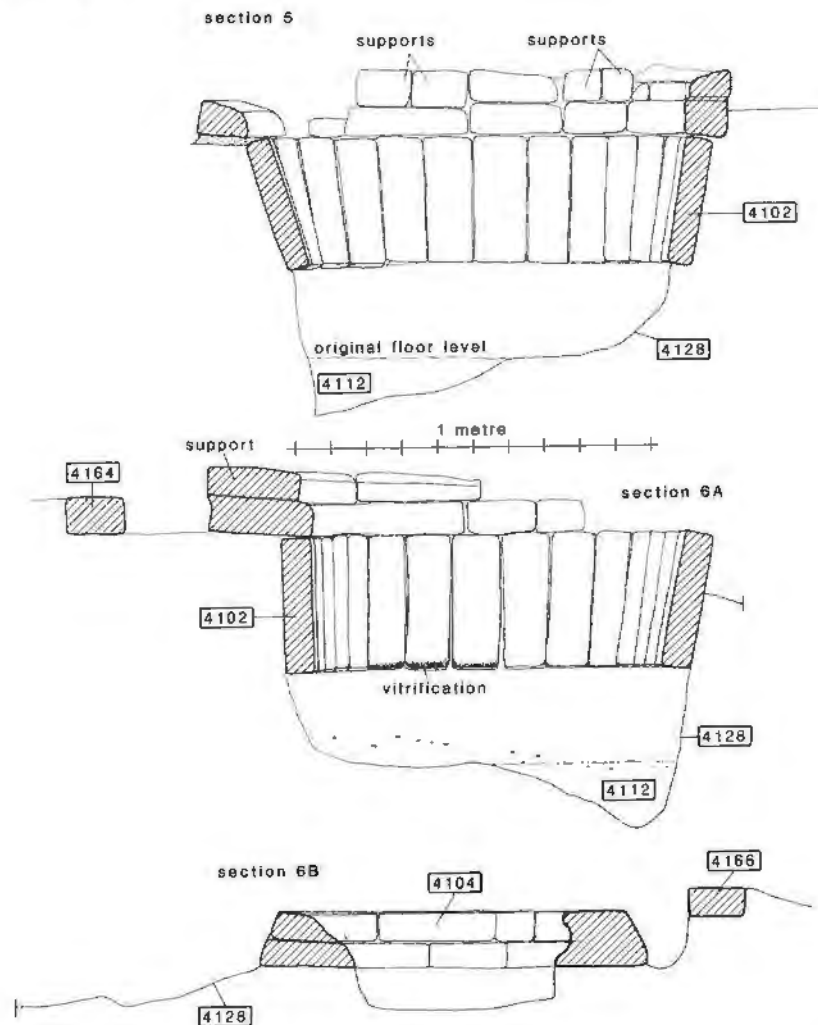


Figure 7.7. Sections of the kiln and feature [4104] in Raum 10 (originals by P. Nicholson).

with the extension of their trench. Similarly in the current excavations half of the fallen section [4107] was removed to examine the underlying deposit [4108]. This appears to be occupation debris and therefore tends to support the view that the wall was already down when the Germans first dug the area. The other half has been left *in situ* as surviving evidence of the height of the structure. There is also a further section of collapsed brickwork [4167] lying at the southern edge of the excavation and this must again be part of the structure of kiln [4102]. It is ten courses high, though it has survived less well than [4107].

It may be concluded that the kiln stood at least eleven courses high (above the ground; i.e. at least ten fallen courses plus one *in situ* on the kiln structure), so that the above-ground portion of the kiln would be at least 1.20 m in height.

The kiln fills are themselves of some interest since it is clear from them that the DOG did not fully excavate the structure. It seems that they dug almost to the bottom of the vertical bricks without quite reaching them. This can be suggested on two counts: firstly the reconstruction drawing (Borchardt and Ricke 1980: 113, Abb. 17) shows the bricks as slightly longer than they actually are, and secondly there is a change in the nature of the kiln fill at about 2 cm up from the bottom of these bricks. The overlying deposit [4103] consists of sand and probably some backfill, since some of the bricks collapsed into the kiln could have been thrown there rather than fallen. Below this, however, is a darker sandy layer [4106] which, though loose, seems to be

undisturbed and was probably the limit of the German excavations. Also, wedged under the lower edge of the bricks, is a deposit of charcoal and ashy material [4110] which was removed for analysis.

Below [4106] was a further dark layer which contained large amounts of charcoal and is certainly undisturbed [4111]. Samples were also taken of the charcoal from this. Finally at the northern end of the kiln a layer of small stones was removed to reach the compact surface of the *gebel*. However, it is clear from the section that this deposit [4112] was entirely natural and had formed the bottom of the kiln during the last phase of its use along with the more normal *gebel* surface in the southern part of the structure.

Of the other features in **Raum 10** the small circular structure [4104] and truncated pit [4116] are the most significant. The first of these was thought by Borchardt and Rieke (1980: 112) to be a further "Ofen". This seems unlikely since its upper edge is well plastered and appears finished, so that it survives today to its original height. Similarly it is unlike any other kiln excavated at Amarna, and unlike any of the structures currently accepted as baking ovens. No traces of burning are to be found on this structure, and its purpose remains uncertain. The pit near the south-west corner has been truncated by the German trench [4114] running along the western wall [4166] but is probably to be interpreted as a pit to support an upright pottery vessel, perhaps as a water container. The collapsed brickwork [4107] is lying on a large sherd of Egyptian amphora shoulder, and it is possible that this was part of the vessel which originally stood in the pit.

The kiln in **Raum 1** is more difficult to reconstruct. This is largely because of its much poorer state of preservation, only the row of fifteen vertical bricks being preserved (though several more run into the section under wall [4162], Figures 7.8–10). These are interesting in that they project for between half and two thirds of their height above the level of the surface through which the kiln pit [4123] was cut. This would make the laying of the horizontal brickwork, which must have come above, extremely difficult and very unstable. It must therefore be suggested that the level from which we now view these bricks is not that at which the laying of the horizontal bricks would have been carried out, and there is some evidence to support this view. It would seem that during the course of excavation the DOG removed floor levels between the bottom of wall [4163] and the present level [4161], so leaving the upper part of these vertical bricks exposed. At the same time they seem to have removed the fill of the trench on the western side [4125] which cuts, or is cut by, the kiln pit [4123] and is probably an ancient (but not a geological) feature.

There are at least two possible interpretations of the sequence of building events for this kiln. It is possible that the pit [4123] was cut from a higher level, incidentally truncating the present mud trampled surface [4161], after which the vertical bricks were inserted so that their tops were level with the rim of the pit (or slightly below it if there was to be a row of horizontal bricks also below ground), and the above-ground horizontal bricks were added. Alternatively, the pit may have been cut at the level of [4161] at which we now see it, the vertical bricks inserted and floor level built up until it reached the top of these bricks; then the horizontal bricks would have been added. The first explanation is perhaps preferable in that it requires fewer steps. Whatever the sequence of events, it is clear that floor level at the time the horizontal bricks were laid was higher than we now see it. This was probably the level to which the kiln was later demolished and walls [4162] and [4163] were constructed. One of the vertical bricks, that at the point where the western side of the circle runs under the division wall [4162], preserves a clear imprint of a human foot.

This kiln is also interesting for its lack of depth (Figure 7.11). This implies either that there were several courses of horizontal brickwork before the floor supports, as was found in the kiln at P47.22 [3896] (*AR V*: 77–81), or that it was considered satisfactory to begin with a shallow fire pit probably not more than 55 cm deep and allow it to deepen with use. An alternative would be to argue that the structure was unfinished, and therefore unused, and that the vertical bricks were inserted before the pit was dug to its full depth. This latter hypothesis is, however, entirely inconsistent with the evidence of the fills and the state of the structure (below).

As in all the other kilns excavated, and in common with the houses in the Main City, the bricks used for the kilns in P47.20 are of poor quality and contain large pieces of limestone which burns out, flakes with exposure to heat, and subsequently hydrates. These bricks are typical of those in kiln [4102] though those in [4122] are of rather better quality. In both structures,

Kilns at house P47.20

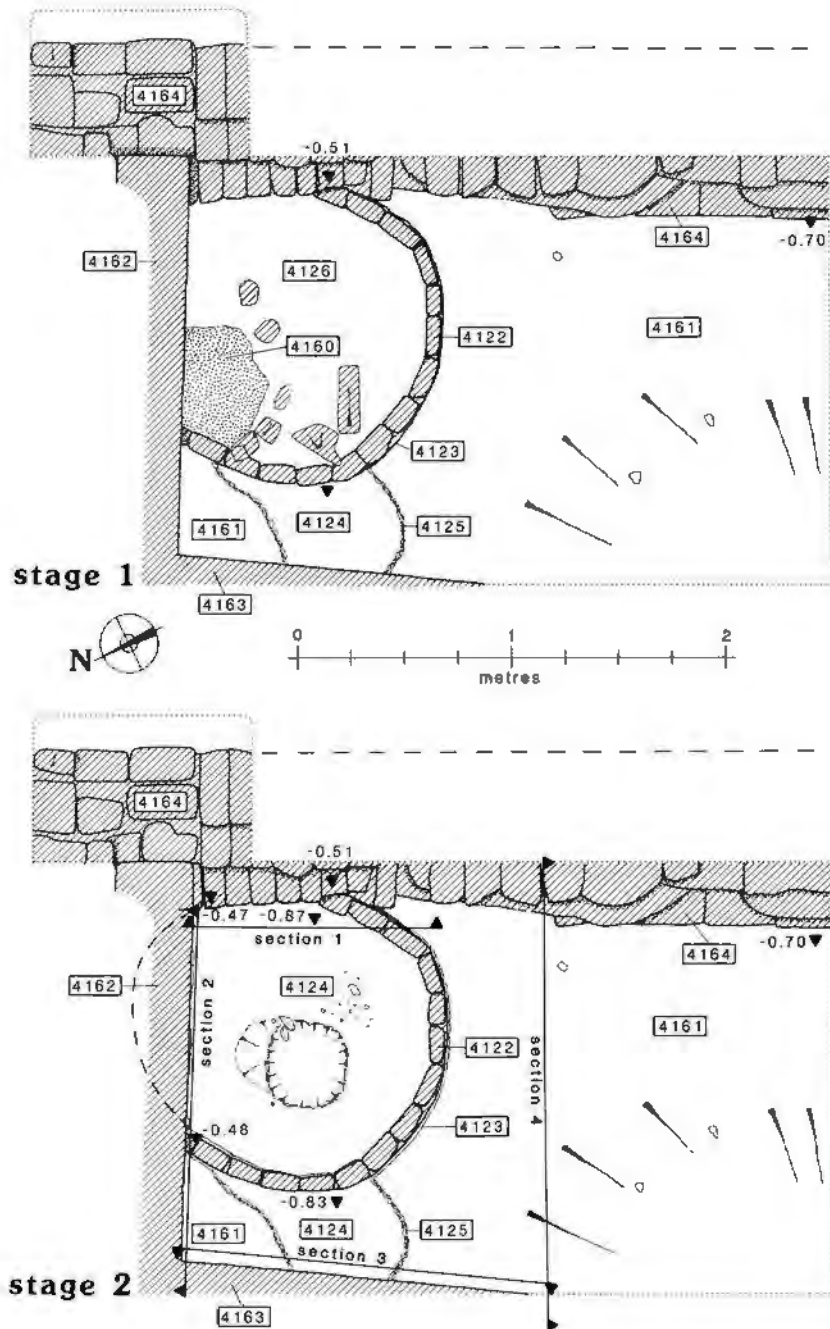


Figure 7.8 (above) and 7.9 (below). Plan of Raum 1 after removal of drift sand and after further clearance (originals by P. Nicholson).

however, the bricks show clear signs of burning and are both reddened by the heat and blackened by smoke. Kiln [4102] shows severe burning and vitrification at the lower edges of some of the vertical bricks, presumably as a result of their exposure to heat when the pit deepened.

The fills of kiln [4122] pose some interesting problems. The earliest preserved deposit is [4160], a very dense concentration of charcoal, burned bone and some blackened pottery which, in the north-western quadrant of the kiln, extends from the top of the vertical bricks to the *gebel* floor. It is scarcely preserved at all to the south where it slopes steeply to the *gebel* though it



Figure 7.10. View northwards in Raum 1, showing kiln.

slopes more gradually toward the east and reaches across to the north-eastern wall of the kiln in its northern third. This deposit is typical of undisturbed material found in the other kilns excavated and can be regarded as original to the last episode of the use of the structure.

The rest of the kiln is filled by deposit [4126], a loose sandy layer which, in the north-eastern quadrant, overlies [4160], and, in the southern part, lies directly on *gebel*. This is to be seen as blown sand and backfill after the German excavations had removed whatever was originally there — probably the rest of [4160].

In the north-west corner of Raum 1, lying on the remains of the mud surface [4161] and therefore butting against the upper part of the vertical bricks at this point, is a layer of burned material and charcoal [4120] which rises over the kiln wall and rests on the upper surface of deposit [4160], from which it is not easily distinguishable. It is not possible that this is really an undisturbed part of [4160] since that deposit runs under the northern wall [4162] whereas [4120] abuts it, and is, therefore, later. One is led to conclude that the Germans did not excavate the north-western quadrant of the kiln. Support for this is found in their plans (Figure 7.1) where this part of the kiln, as well as part of the corner of the room, is shown as a white triangle

Kilns at house P47.20

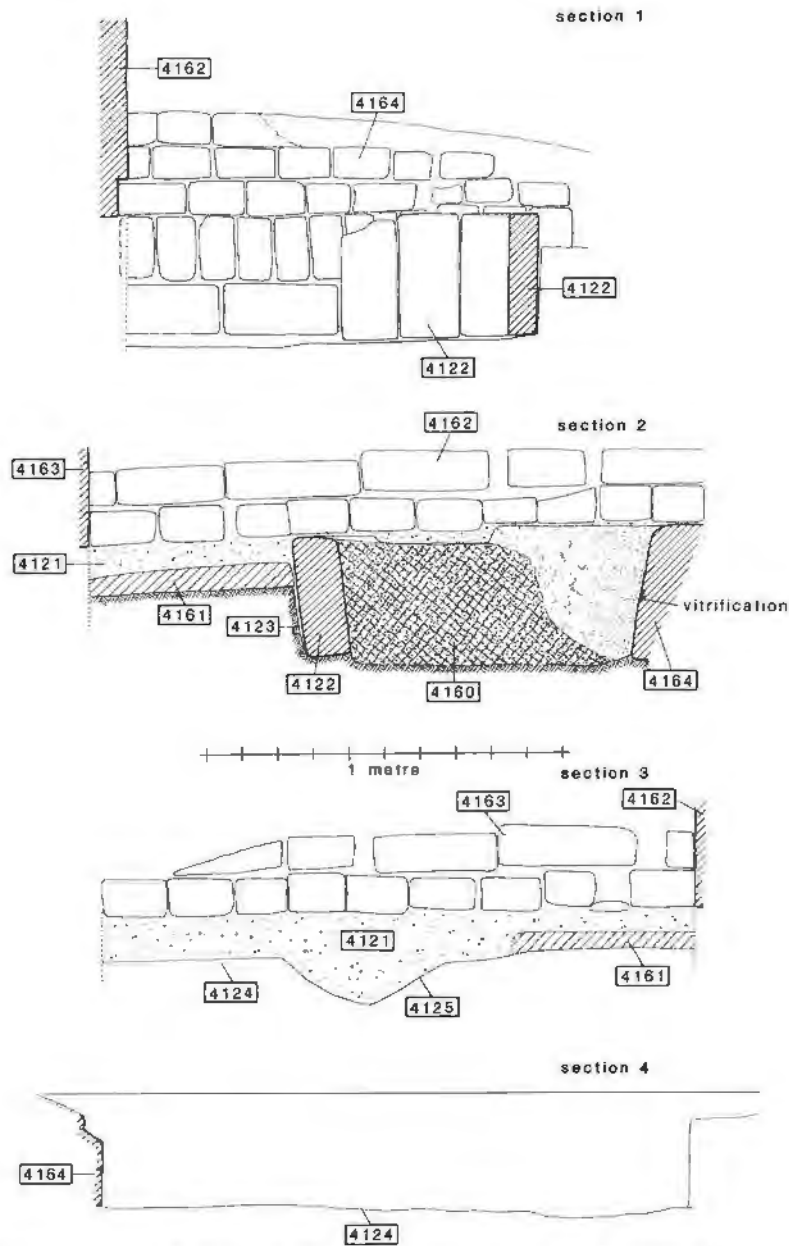


Figure 7.11. Sections across features in Raum 1 (originals by P. Nicholson).

overlapping the kiln, presumably a convention for “unexcavated” (that this is probably slightly larger than the actual unexcavated area can also be demonstrated, see below). It must be assumed that, at some time after the construction of the northern wall [4162], a pit was dug in the north-west corner of the room and either a fire or dumped burned material placed there. This layer is covered only by the blown sand [4119] and it is possible that the Germans, though they did not actually excavate this quadrant of the kiln, cleared this corner of the room down to the level of the trampled mud surface. This would also be consistent with their policy of trenching along walls (in this case the western wall [4163]), and would explain why the ancient trench [4125] is filled only by blown sand at this point, rather than its original fill which can be seen in section under wall [4163]. Likewise, it makes more intelligible their statement on the plans that this is an “Alterer Ofen”, since at this point it would be clear that it ran under wall [4162]. The layer

[4120] can then be explained as the remains of [4160] dug out of the southern part of the kiln and thrown on top of the part-excavated northern area. This is again consistent with what seems to have been the German policy of establishing the purpose of industrial features, but not fully excavating them. It also makes clearer the similarity of deposits [4120] and [4160]. The white triangle on the DOG plans can then be regarded as slightly misplaced, which is not difficult to accept, given the similar misplacement of the kiln itself and of white patches shown in **Raum 10** which are in fact excavated.

7.4 Finds

As one might predict, the main find from the excavations carried out in this area of P47.20 consisted of pottery, and some of this was of considerable interest. From **Raum 10** came a number of indisputably unfired sherds and objects. The surface cleaning of this area [4101], which included the uppermost surface of the kiln structure, produced five unfired sherds. Four are undiagnostic, though one of them is likely to be a closed form, and the diagnostic piece is from a simple rimmed bowl (group 5 in the Amarna classification). Also from this unit come numerous poorly fired pieces often with rather patchy and matt-finished red slip. Elsewhere in this room, but outside the kiln itself, a few other poorly fired sherds were also discovered.

Within the fills of the kiln, too, were found poorly fired sherds [4106, 4113] and also in the upper fill [4106] fragments of a large vessel with unfired clay adhering to the inside and a small rim sherd (possibly of a group 17 vessel — simple biconical jar) also with adhering clay. In the lowermost layer of the kiln [4111], below the limit of the German excavations, was found an unfired object, possibly a plaque. These unfired pottery objects are sufficient to show, had there been any doubt, that the kiln in **Raum 10** is indeed for pottery and not a "Backofen", as Borchardt originally thought.

The only other common finds were of bone and charcoal, the latter to be expected in a kiln, the former well known from the other kilns excavated. It can be suggested that bone was commonly burned in kilns, though whether for any particular purpose is unclear.

In **Raum 1** the picture is much the same, with quantities of bone and charcoal and also pottery, much of it very poorly fired, although there are no truly unfired pieces. Among the poorly fired sherds are several which react with hydrochloric acid and must therefore contain at least some marl clay. From outside the kiln [4121] comes a single overfired, highly vitrified sherd. This is not of itself significant, in that a single sherd can be vitrified long after it was originally fired and is not necessarily a fragment of kiln waster. Nonetheless it does draw attention to an important point. It was at first thought strange that pottery kilns should be found without heaps of wasters and broken sherds, though the pottery from P47.20 perhaps provides an answer to this. It can be suggested that overfired sherds and waster vessels are not found because they were not produced here, that is, misfirings took a different form. Though it is not possible to quantify in any meaningful way the proportions of low-fired sherds to properly fired, there does seem to be a higher percentage of poorly fired sherds from this assemblage than is usual. It seems likely that these kilns were fuelled on wood and waste agricultural products, and since the former would be relatively scarce and since both would probably be transported from the west bank, they would be used as sparingly as possible. For this reason firing temperatures were probably minimal and any mistakes in firing would tend toward underfirings rather than overfirings — hence the lack of waster vessels.

Furthermore, given the location of these kilns in a private house complex, they probably served only an occasional or small-scale need and so never produced huge quantities of misfirings anyway. It is more likely that better-fired vessels might be produced by what is believed to be the state-operated pottery workshop which includes the kiln in square G4 [2984].

7.5 Conclusions

The excavations at P47.20 have provided rather more information than might originally have been expected. Firstly, the reconstruction by Borchardt (1933) and Borchardt and Ricke (1980) can be shown to be substantially correct, although idealised and not showing the true depth of the kiln. The archaeological evidence on which this reconstruction was based is also now clearer.

Kilns at house P47.20

Secondly, some further light has been shed on the working methods employed by the DOG during their excavations. There seems to be good evidence that their main concern was to identify the purpose of structures as quickly as possible and to define their limits, rather than to study them with a view to understanding their technology. It can similarly be suggested that not only were such structures not fully excavated but spoil from excavated parts was sometimes dumped onto the unexcavated ground. This may have been a source of confusion when structures were planned, since the draughtsman could no longer see their relationship to other structures. This may account for the misplacement and mis-shaping of kiln [4122] in **Raum 1**.

Thirdly, it is now virtually certain that the pairs of upright bricks in kiln [2984] of square G4 (*AR V*: Chapter 3) were for supporting the perforated floor, and there is now some clue as to how far they originally projected. Similarly, some confirmation can be found for the view that [2984] was, indeed, at the end of its period of use and was to be replaced, presumably by the unfinished structure [3052]. This can be argued from examination of the depths of the structures so far excavated below the vertical brickwork. It seems from kiln [4122] that a new kiln had a shallow fire pit, the bottom of which was marked by the base of the vertical bricks, the fire-pit top usually coming one or two horizontal courses above this and including the supports for the floor. Over time the pit would become deepened through erosion, as seen in kiln [4102] and [2984]. It follows from this that in the P47.20 complex the kiln in **Raum 1** [4122] was used for only a short time before the layout of this part of the complex was changed, and the longer-lived kiln [4102] was installed in the adjoining **Raum 10**.

The problem of how the kiln floors were supported is still the subject of experimentation, but a number of comments can be made. It seems likely that the circular kilns of small diameter, such as those described here, probably did not, after all, have a central pillar supporting the floor, but rather had slabs of stone or simple vaults of mud brick spanning them. The slabs or vaulting would have rested on, or sprung from, the projecting bricks. This reconstruction without a pillar is made more likely since it has now been shown by experimental rebuilding and firing that even the large oval kiln [2984] *could* have had a simple vaulted floor (Chapter 8). A reconstruction using a vaulted floor was successful and was easier to fire than a reconstruction which in which a central pillar was used. The central pillar, though not detrimental to the firing overall, did make stoking and fire control more difficult than in the reconstruction in which it was not used.

Acknowledgements

I am particularly grateful to Sue Cole and Tony Thomas for their assistance with spot heights for the plans and for their comments on stratigraphy. I am also grateful to Barry Kemp and Sue Cole for suggestions regarding the interpretation of feature [4112]. SERC funding for research into firing technology of Amarna pottery is gratefully acknowledged.

References

- Borchardt, L. (1933). "Ein Brot." *ZÄS* 68: 73-79.
Borchardt, L. and H. Ricke (1980). *Die Wohnhäuser in Tell el Amarna*. 91. Wissenschaftliche Veröffentlichung der Deutschen Orient-Gesellschaft. Berlin.