Archaeological Excavation Report
E2770 - Kiltotan Collinstown 14, Co. Westmeath

Early medieval furnaces and post-medieval ditches
Final Archaeological Excavation Report,
Kiltotan Collinstown 14
N6 Kinnegad to Kilbeggan
Co. Westmeath

Early medieval furnaces and post-medieval ditches

August 2009

Client:  Westmeath County Council
         Culleen Beg
         Mullingar
         Co. Westmeath

E Number:  E2770
Ministerial Order No.:  A001/09
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i Acknowledgements

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Works were carried out on behalf of Westmeath County Council and were funded by the National Roads Authority under the National Development Plan 2000 - 2006.
1 Non-technical Summary

Three archaeological excavations were carried out in the townlands of Kiltotan and Collinstown on the proposed N6 realignment between Kinnegad and Tyrrellspass in County Westmeath in early 2005. This report details the results of the excavation carried out at National Grid Reference 244773 238655, under ministerial order A001/009, on the site known as Kiltotan and Collinstown. This work was carried out as part of the N6 realignment Kinnegad to Kilbeggan (Figures 1-3). The site included two parallel ditches of relatively recent origin and two pits with evidence of burning. The burnt pits were possibly medieval iron smelting furnaces, and were similar to features uncovered at the other end of the road scheme in Monganstown 1.

2 Scope of the Project

This archaeological services project was carried out on behalf of Westmeath County Council, County Buildings, Mullingar, Co. Westmeath. The project was funded by the National Roads Authority under the National Development Plan 2000-2006. The purpose of the project was to conduct archaeological site investigations within the lands made available for the scheme and to assess the nature and extent of any new or potential archaeological sites uncovered. There were two contracts; Contract 1 (Kinnegad to Tyrellspass) undertaken by Eachtra Archaeological Projects and Contract 2 (Tyrellspass to Kilbeggan) carried out by Valerie J. Keeley Ltd. and Cultural Resource Development Services Ltd.

This report covers results from Contract 1, Kinnegad to Tyrellspass. Phase 1 of the project (archaeological centreline testing of the route) was carried out in June and July 2004 under licence (04E0908) issued by the Department of the Environment, Heritage and Local Government (DoEHLG). The principal aim of this phase of the project was to investigate known and possible sites of archaeological interest along the route of the proposed road scheme and to investigate the remainder of the route. This was done by a programme of centreline and offset testing (Figure 2). In addition Phase 2 included the resolution of identified sites which were excavated in the townlands of Monganstown, Farthingstown, Kiltotan Collinstown and Rattin. This phase of the project was carried out between January and March 2005 and excavations were carried out by two licensed directors under the direction of a senior archaeologist. In total fourteen sites were excavated during this phase of works and were carried out under ministerial order. The sites were situated near the western end of the scheme, in County Westmeath, and were found in the townlands of Farthingstown and Kiltotan Collinstown (in the Barony of Fartullagh) and Monganstown and Rattin (in the Barony of Farbill).

3 Receiving Environment

3.1 Geology

The bedrock geology is mostly comprised of Lower Carboniferous rocks, mainly limestone, which overlies Devonian Old Red Sandstone (Holland 1981; Riada Consult 2003, 58). Some sills of Carboniferous volcanic rocks also pass through the bedrock sequences. The dominant topographical feature of Croghan Hill, 7 km southeast of Tyrrellspass, is comprised of shallow intrusive basaltic and dolamitic rocks formed by volcanic activity (Riada Consult 2003, 59).
Superficial drift deposits overly the bedrock, varying from impermeable clay to permeable gravel (Ria-da Consult 2003). Glacial features such as eskers and kames dominate an otherwise flat landscape; the eskers are punctuated by sand and gravel quarries that provide good quality building materials (Casey 2002).

3.2 Soils and their uses
The soil type encountered in the area (Grey-Brown Podzolic) covers 3.43 % of Ireland, on the southern limit of the north to west Drumlin belt across the northern half of the country (Gardiner and Radford 1980, 91). The lighter Grey Brown Podzolics are ‘good all-purpose soils’ and the heavier Grey Brown Podzolics are better for pasture production (Ibid., 27). Although the soil is technically a fertile type, it has a high clay content which results in poor drainage and peat accumulation in the area is widespread. This is particularly the case along the western portion of the road route, (where the sites from this project were found), which has been covered by the growth of fens and raised bog. These peat lands have generally been worked and, while residual peats are often present, they do not tend to exceed 1 m thickness (Riada Consult 2003, 61).

3.3 Topography
The landscape followed by the route of the new road from Kinnegad to Athlone is generally low-lying, ranging from the low undulating drift cover east of Athlone to the flat plains of the central boglands and moraine near Kinnegad. Only a 4 km stretch of the corridor east of Tyrellspass rises above 100 m in height, most of the land undulating gently along the northern extremities of the Bog of Allen. Outside the area of bogland the landscape is typified by regular enclosed fields, bordered by densely overgrown banks with mature hedgerows of ash, elder and hawthorn. This uniform landscape is broken up by streams, eskers and rivers; the River Brosna and its tributaries drain the western part of the study area, while the land east of Rochfortbridge is drained by the Yellow River and other smaller tributaries of the River Boyne (Casey 2002).

The moist climate combined with the low-lying condition of much of the area ensures seasonal flooding, limiting the land-use capability to livestock grazing punctuated by infrequent tillage. In areas of marginal land close to the edges of the raised bogs the pasture is criss-crossed by drainage ditches without the usual accompanying enclosing bank (Casey 2002).
4 Archaeological and Historical Background
(based on an Archaeological and Historical Background by Orlaith Egan)
The sites within this study area are located in a rich multi-period archaeological landscape (Figure 3) and several monuments have already been assessed in the original EIS report (Riada Consult 2003). Recent excavations along the routes of new roads have added significantly to the list of known sites and the newly discovered sites from this part of the N6 road will add further knowledge to the overall understanding of the area.

The area is associated with ancient routeways of unknown date; a large togher discovered by R.A.S Macalister in the nearby townland of Baltigeer in the 1930s may possibly have linked up with the Slighe Dala or Slí Asail, two ancient routeways which led to Tara and Connacht. One of the five great ancient roads of Ireland, the Slí Mór, is also thought to have passed through the area. The earliest indication of archaeological activity within the area was the recovery of a stray Mesolithic Bann flake (IAWU 2002) and a stone axe (SA 1989:17), potentially of Neolithic date (c. 4000-2500 BC), found in the townland of Rattin (IAWU 2001). However, all the archaeological sites excavated in the area have been identified as of Bronze Age date or later.

4.1 Bronze Age c. 2500-500 BC
The earliest known evidence of settlement is represented by an Early Bronze Age (c. 2500-1500 BC) togher discovered by the Irish Archaeological Wetland Unit in the townland of Rattin (IAWU 2001). Finds from the area include a socketed bronze axe head from the Late Bronze Age (1936:1873 NMI) which was recovered near Kinnegad townland (exact location unknown). Bronze Age burnt mounds are also reasonably common; one definite example (CHS 20) and several potential sites were discovered during fieldwalking of the proposed route (Riada Consult 2003, 247). A burnt mound was excavated at Kiltotan Collinstown 12 and at Kiltotan Collinstown 13 an anomalous pit produced a Middle-Late Bronze Age radiocarbon date.

4.2 Iron Age c. 500 BC-500 AD
There is a general dearth of evidence from this period in the Irish archaeological record. However, a site excavated as part of this project at Monganstown 1 produced two Iron Age radiocarbon dates from metalworking contexts.

4.3 Early Historic c. 500-1100 AD
The record of Early Historic activity in the study area and the surrounding countryside is rich. An ancient monastic site founded at Clonfadh (WM27: 067, WM27: 066) to north of the townland of Rattin, consisted of a possible church site, a rectangular enclosure, a graveyard, crosses, and Bishop’s grave. St. Etchen was bishop of Clonfadh or Cluain-fota-Baethain in the sixth century and the annals of Ulster record his death between 578-84 AD. He is reputed to have ordained St. Columcille and St. Colmáin mac Lúacháin of Lynn and many others. The monastery survived into the eighth century AD as Blahmac, an abbott of Clonfad was killed in 799 AD (Gwynn & Hadcock 1970). Sites with evidence for craft/industry from this period include charcoal/metalworking pits at Monganstown 1,
which produced two Early Historic radiocarbon dates, and material from a small metalworking pit at Kiltotan Collinstown 14, which also returned an Early Historic date. The most common settlement monuments of this period are ringforts (also known as rath or lios). These are interpreted as enclosed farmsteads and they generally consist of a circular ditch outside an earthen bank (constructed with the upcast from the excavation of the ditch). Larger examples may have more than one ditch and a bank forming the enclosure. Several ringforts are known from the study area and in Farthingstown (WM033-069) and Kiltotan Collinstown (WM033-066) there were two ringforts located within 300 m of the road-take. These sites are situated on the higher, drier ground at the edge of the bog, to the north and northwest of the site excavated at Kiltotan Collinstown 13. At Kiltotan Collinstown 14 there are four ringforts located within 1 km of the site. The nearest, WM033-061, is situated just 350 m to the north. East of the site are WM033-065 and WM033-066, at distances of 700 m and 400 m respectively. The fourth ringfort, WM033-062, is about 840 m north-northeast of the site. Also within 1 km of the site is a fifth recorded monument, WM033-068, listed as an earthwork. At Monganstown 1 a further two ringforts (WM 027:069 and WM 027:070) are located in the area between the site and the town of Kinnegad, with one just 500 m from the site. The evidence suggests that the area was quite intensely settled during the Early Historic period.

4.4 Medieval c. 1100-1650 AD

The villages of Tyrrellspass and Rochfortbridge both date from the medieval period and are located near the sites examined in this project. Rochfortbridge is located 11 km southwest of Kinnegad within the Barony of Fartullagh. The village is named after the Rochforts, a French family who settled in Ireland in 1243. Before the Rochforts established themselves in the area the Tyrrells, a powerful Anglo-Norman family, held the Barony of Fartullagh. This included the lands around Rochfortbridge and the parish of Castlereagh. In the 13th century (c. 1411) the Tyrrells built a castle that consisted of a motte and bailey (a stone castle came later) in Tyrrellspass, to the northwest of the town. It guarded the western entrance to the Barony of Fartullagh and it remained the centre of power for the Tyrrells until the Cromwellian Invasions (1650). They also built a semi-fortified manorial church on the castle lands which contained an effigy of armoured Knight John Tyrell dating to 1607. The site of another castle (WM 027: 071) and a bridge (WM 028: 003), reflecting further settlement in the later medieval period, are located in the townland of Kinnegad.

A defensive castle was also constructed in Rattin (WM34: 008), built to defend extensive Anglo-Norman territories in the midlands. The lands were owned by Hugh de Lacy but passed into the possession of Sir John Darcy and his descendents when he became Chamberlain and Steward of the household of King Edward III, Chief justice of England and Peer of the realm. In the Insurrection of 1641 Nicholas Darcy forfeited Rattin and the greater part of his estates (Bardon 1913). The remains of a sixteenth century towerhouse (called Rattin Castle) are found in the townland today. Test trenches c. 1500 m to the northwest of the castle failed to produce any archaeological remains (Conway 1999, 298). There is also a recorded earthwork site (WM 34:007) located to the west of the castle but its function and date are unknown.

The only excavated site from this project that dated to the Medieval period was a small furnace at Kil-
Kiltotan Collinstown 14 which produced a fifteenth century radiocarbon date.

4.5 Post-medieval c.1650-20th century

The post-medieval archaeology examined during the project included the remains of field systems and vernacular architecture. Post-medieval field boundaries and ditches were excavated at Farthingstown 009, Farthingstown 011, Monganstown 2, Kiltotan Collinstown 12, Kiltotan Collinstown 13 and Kiltotan Collinstown 14. The field systems at Kiltotan Collinstown are probably related to a nineteenth century farmstead pictured on the 1st Edition OS map and located immediately adjacent to the site at Kiltotan Collinstown 12. Vernacular architecture was also examined at the site of Rattin 4, where a nineteenth century farmhouse was tested and recorded prior to road construction.

In addition there are two demesnes located within the study area (Farthingstown House and Sidebrook House), both found in the townland of Farthingstown. The term ‘demesne’ originates from Norman French and indicates the portion of an estate retained by a feudal lord for his own use. Most Irish examples typically consist of a big house with associated buildings, ornamental and recreational grounds, and perhaps the remains of an elaborate boundary wall (Riada Consult 2003, 249).

4.6 Placenames and Townlands

The sites were excavated in the townlands of Farthingstown, Kiltotan Collinstown, Rattin and Monganstown. The townland of Farthingstown lies in the parish of Castlelost in the barony of Fartullagh. It covers a substantial area containing c. 1802 acres. It is known in Irish as Baile na Feóirlinge meaning ‘town of the farthing’ (Walsh P. 1957). It was known as ‘Ballyneforlin alias Fardingston’ in the inquisitions of the seventeenth century (Inq. Car. I no. 129). The townland of Kiltotan and Collinstown is also located within the parish of Castlelost and the Barony of Fartullagh. It lies south and southeast of the old mail coach road from Tyrrellspass to Dublin and borders part of the County of Offaly. In 1837 it consisted of c. 320 acres, which was mainly of arable and pastureland but included a narrow stretch of bog, which bordered the parish of Newtown. Kiltotan is known in Irish as Cill Toiteáin meaning ‘the church of the conflagration’. Collinstown is known as Baile Choileáin translated as ‘the town of Collins’. (OS Namebooks). The townland of Rattin is located in the west of the parish of Killucan within the barony of Farbill. It is known in Irish as Rath Aitinne meaning ‘Rath of the furze’. The lands of Rattin were formerly part of the lands of Clonfad, situated to the west. The name Monganstown is derived from ‘the town of the Mongans’ and the townland covers an area of 483 acres.
5 Site Location and Topography

Kiltotan and Collinstown 14 was accessed through Collinstown farm, the entrance of which was located on the existing N6 between Rochfortbridge and Tyrrellspass, and approximately 1.8 km from both. The site was located close to the summit of a relatively gently sloping hill, at chainage 42150 and field 9 of the new route. The hill slopes downwards to the east, where two further previously unknown archaeological sites were situated; Kiltotan Collinstown 12 and Kiltotan Collinstown 13 (the location of all three sites in relation to each other is shown in Figure 4 and Plate 1). The land immediately around the site has been used for a mix of arable and pastoral farming in the recent past (Plate 2).

6 Excavation Results

Three areas of archaeology were identified at the site during the testing phase (Areas A, B and C, Figure 4). No further areas of archaeological activity were found during resolution at the site. Detailed records of the individual contexts are provided at the end of this report in the Context Register (Appendix 1) and the Stratigraphic Matrix (Appendix 2).

6.1 Area A

In the northwest corner of the site (Area A) a small circular pit (C.18) was excavated measuring 0.47 m in diameter and 0.15 m in depth (Figure 5, Plate 3). A large amount of in situ burning was visible, as the subsoil was scorched red on the base and the sides (with the exception of the southeast side). There were two fills within the pit, C.19 and C.20, both contained inclusions of slag and charcoal indicating that this was a furnace for metalworking.

The lower fill of the furnace (C.20) contained cereals (oats) and weed seeds suggesting that domestic refuse such as crop processing by-products were used to fuel the furnace, perhaps as tinder to get the fire going initially (Appendix 3). The charcoal from the sample was very friable and repeatedly broke into small unidentifiable pieces when handled, indicating very high charring temperatures. Identifiable fragments were classified as oak (Appendix 4) and they yielded a radiocarbon date of AD 899-1032. Oak was also identified as the main charcoal type at the metalworking site at Monganstown 1, located 14.5 km to the northeast and excavated as part of the same project (see Figure 1).

There was no evidence of a superstructure around the furnace in Area A (for example, there were no fragments of baked clay in the fills) and the amount of slag found was quite small, in particular in comparison to the amounts recovered from Monganstown 1. This is probably because this furnace was a smithing rather than a smelting furnace. The slag from C.20 included small pieces of broken plano-convex bottoms (PCBs) which are diagnostic of smithing hearths. Small pieces of fluid slag also suggested that the material had to be heated to very high temperatures, suggesting that the metal used was probably of poor quality (Appendix 6).

6.2 Area B

A northwest-southeast orientated ditch (C.3) ran through the centre of the excavation area in Area B. It was 2 m wide and 0.58 m deep, although its full length is not known as the entire extent of the ditch was not excavated. It had two soft clay fills (C.1 overlay C.2) (Figure 6). The ditch appears to have been
made in relatively recent times, and the fills appear to have accumulated gradually by natural processes (Plate 4). No artefacts or dateable evidence were retrieved. The ditch is most likely a boundary or a shallow drainage ditch and it ran along the same alignment as ditches excavated 400 m east in Kiltotan Collinstown 13. This suggests that all of these ditches were part of the pattern of field boundaries in the area. The presence of modern artefacts in the fills of the ditch in Area C (C.13) indicates that the field boundary system is relatively recent, although it is possible that the accumulation of sediment in the ditches could significantly post-date the time when they were initially cut. These ditches are not shown on the First Edition Ordnance Survey maps.

6.3 Area C

Two features were excavated in Area C in the southeast corner of the site, a modern ditch (C.13) and an oval pit (C.7) that was interpreted as a furnace (Figure 7, Plate 5). The furnace was partially truncated by the ditch. It measured 0.7 m in length by 0.6 m in width and was 0.24 m deep. The main fill was loose and topsoil-like (C.8) and it was probably a result of soil filling the hollow left after the furnace went out of use. There was a layer of burnt red clay (0.11 m deep) located around the base and sides of the cut (C.10) which is indicative of burning having taken place within the furnace and may have been a clay lining. The burnt clay (C.10) was overlain by a charcoal rich layer (C.9) which included oak and a diffuse-porous wood types (Appendix 4). One charred grain of wheat was also found (Appendix 3). The smithing residues from this hearth included a tuyere fragment, vitrified clay lining fragments, amorphous slag and fluid slag. Similar to the material from Area A, the fluid slag from this hearth suggests that the metal used was being heated to high temperatures because it was of poor quality (Appendix 6).

Charcoal from the furnace returned a late medieval/post-medieval radiocarbon date of AD 1420-1611. These results are much later than the dates obtained from the furnace in Area A (C.18), although in general the material from both furnaces is similar. Like at Area A there is no evidence for smelting residue in this hearth and the industrial residues suggest smithing (Appendix 6). Oak was the main charcoal type used in both furnace and the fuel remains also included cereal grains, suggesting that domestic or crop-processing refuse may have been used as tinder. There was also no evidence for a superstructure around either hearth.

The furnace was truncated by a ditch (C.13) that was 2.8 m wide and 0.45 m deep and it extended beyond the limit of the excavation. It was orientated east-west and ran parallel to C.3, the ditch which was excavated in Area B to the north. The ditch (C.13) contained five fills (C.11, C.12, C.13, C.14, C.15 and C.21, see Figure 8). The base of the cut contained a stony gully (Plate 6), substantiating the suggestion that this was a drainage ditch. This was overlain by a series of clay fills (C.21, C.15, C.14 and C.13). The upper fills of the ditch (C.12 and C.11) were rich in decaying organics, indicating relatively recent backfilling of the ditch. A number of modern finds were uncovered during the excavations, fragments of modern glass (in C.12; A001/009:12:1-3) and a metal horseshoe (in C.11; not retained). These finds further verify that the ditch was filled in modern times, and it is also likely that it was dug in modern times.
6.4 Artefacts

Only modern artefacts were recovered from this site, including glass fragments from one of the ditch fills and an iron object that was recovered on the surface of the site (Appendix 7).

6.5 Environmental Remains

Charred seeds and charcoal from this site were examined by Penny Johnston. Analysis of the charred seeds suggested that cereals and domestic waste were used to light the fires in the furnaces excavated at the site (Appendix 3). Charcoal from the site was identified as possible oak and diffuse-porous wood types (Appendix 4).

6.6 Industrial Residues

The industrial residues from Kiltotan Collinstown 14 were examined by Neil Fairburn (Appendix 6). This material included pieces of amorphous slag, vitrified clay lining, furnace lining, fluid slag, plano-convex bottoms (PCBs) and fragments of a tuyere. The material was indicative of small scale metalworking, primarily iron smithing.

7 Discussion

Several features were uncovered during the testing phase of work at the site and although the site was investigated thoroughly as part of the resolution phase of excavation, no additional archaeological features were discovered. The site was excavated in three parts (Areas A, B and C) and the archaeology comprised a small furnace (C.18) in Area A at the northwest corner of the site, a boundary or drainage ditch (C.3) at Area B, and a boundary ditch (C.13) and a furnace (C.7) in Area C at the southeast corner of the site.

In the absence of evidence for superstructures associated with the two excavated furnaces these features have been interpreted as smithing rather than smelting pits. Analysis of the industrial residues from the site also indicated smithing remains (Appendix 6). The site was located in close proximity to several ringforts (the nearest example, WM033-061, is pictured in Plate 7) and the furnace at Area A produced an Early Historic radiocarbon date, contemporary with the usual period of occupancy at ringforts. This indicates that the archaeological features excavated in Area A may be related to these nearby settlements. The much later date obtained from the furnace at Area C suggests either an unreliable radiocarbon date or a long continuation in use of the general locality for metalworking activities. Ditches excavated at Areas B and C were on a similar alignment to those at Kiltotan Collinstown 13 and they indicated that a field system earlier than the present one existed, organised on a northwest-southeast alignment. Like at Kiltotan Collinstown Site 12, these field systems may be related to a post-medieval farmstead, pictured on the First Edition Ordnance Survey maps and located close to all the sites in this townland (Figure 9). The remains of post-medieval field systems were also found at Farthingstown Sites 9 (A001/083) and 11 (A001/085), and a bank at Monganstown 2 (A001/002). The field systems found at these sites probably represent a combination of boundary and drainage features. At most sites these were of low archaeological significance, but they are evidence of an evolving sequence of land-use within the agricultural landscape.
8 Conclusion

The features excavated at Kiltotan Collinstown Site 14 included the badly preserved remains of two furnaces, possibly used for smithing rather than smelting. Activity at one of these (from Area A) was probably associated with some of the early historic ringforts that are known from the area around the site. The other furnace, from Area C, produced a late medieval/post-medieval radiocarbon date and therefore is unrelated to activity at the ringforts. It does, however, demonstrate that metalworking was carried out in the area over a long period of time. The area of Kiltotan Collinstown Site 14 was crossed by several field boundary ditches and this field system was post-medieval in date and may have been associated with the farmstead that was located on the First Edition Ordnance Survey map close to Kiltotan Collinstown Site 12.
Bardon, P. 1913 Fairbill Topography. Typed manuscript in Westmeath County Council Library.


Ordnance Survey field name Books of the County of Westmeath, 1837.


Walsh, Rev. P. 1957 *The Placenames of Westmeath*. Dublin
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Figure 2: Portion of the new N6 Kinnegad to Kilbeggan road showing the excavated sites near Kiltotan Collinstown 12 and the outline trenches opened during centreline testing.
Figure 3: Ordnance Survey RMP map showing the location of the new route in respect of known archaeological sites.
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Figure 5: Plan of furnace C.18 (Area A)
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Figure 9: Excavated sites at Kiltotan Collinstown in relation to settlement shown on the 1st edition OS map
11 Plates

Plate 1: Aerial photograph of Kiltotan Collinstown Sites 12, 13 and 14

Plate 2: Aerial photograph of Kiltotan Collinstown Site 14
Plate 3: Furnace C.18 with evidence for in situ burning (Area A)

Plate 4: Section through ditch C.3 (Area B)
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Plate 6: Section through ditch C.13 (Area C)
Plate 7: Aerial photograph of a ringfort located near excavated sites at Kiltotan Collinstown
### 12 Appendices

#### 12.1 Appendix 1: Context Register

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<th>Dimensions (metres)</th>
<th>Type</th>
<th>Finds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>B</td>
<td>Ditch fill</td>
<td>2.3 x unknown x 0.85</td>
<td>Unknown x 2 x 0.58</td>
<td>Light yellowish brown soft clay, moderate sub-rounded to sub-angular fine to medium pebbles, occasional sub-angular small stones. Under C.2. Over C.2.</td>
</tr>
<tr>
<td>2</td>
<td>B</td>
<td>Linear ditch</td>
<td>Unknown x 0.60 x 0.24</td>
<td>Linear ditch</td>
<td>Finds A001/009/12/1-3 Glasses</td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td>Furnace</td>
<td>0.57 x 0.36 x 0.12</td>
<td>Furnace Fill</td>
<td>0.62 x 0.64 x 0.15</td>
</tr>
<tr>
<td>4</td>
<td>C</td>
<td>Ditch fill</td>
<td>0.62 x 0.60 x 0.20</td>
<td>Ditch fill</td>
<td>0.70 x 0.50 x 0.11</td>
</tr>
<tr>
<td>5</td>
<td>C</td>
<td>Ditch fill</td>
<td>0.62 x 0.60 x 0.20</td>
<td>Ditch fill</td>
<td>Unknown x 2.80 x 0.20</td>
</tr>
<tr>
<td>6</td>
<td>C</td>
<td>Ditch fill</td>
<td>0.62 x 0.60 x 0.20</td>
<td>Ditch fill</td>
<td>Unknown x 2.60 x 0.20</td>
</tr>
<tr>
<td>7</td>
<td>C</td>
<td>Ditch fill</td>
<td>0.62 x 0.60 x 0.20</td>
<td>Ditch fill</td>
<td>Unknown x 2.80 x 0.20</td>
</tr>
<tr>
<td>8</td>
<td>C</td>
<td>Ditch fill</td>
<td>0.62 x 0.60 x 0.20</td>
<td>Ditch fill</td>
<td>Unknown x 2.80 x 0.20</td>
</tr>
<tr>
<td>C. No.</td>
<td>Area/grid</td>
<td>Type</td>
<td>Dimensions (metres) L x W x D</td>
<td>Description</td>
<td>Finds</td>
</tr>
<tr>
<td>--------</td>
<td>-----------</td>
<td>-----------------</td>
<td>------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>18</td>
<td>A</td>
<td>Furnace</td>
<td>0.47 x 0.47 x 0.15</td>
<td>Circular furnace. Break of slope sharp at top, sides convex. Orientated N-S. Filled by C.19, C.20.</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>A</td>
<td>Furnace fill</td>
<td>0.36 x 0.30 x 0.09</td>
<td>Mid yellowish brown soft silty clay. Moderate sub-angular fine pebbles, occasional sub-angular medium pebbles, moderate flecks &amp; small charcoal. Over C.20</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>A</td>
<td>Furnace fill</td>
<td>0.43 x 0.45 x 0.07</td>
<td>Dark blackish brown soil. Frequent flecks, small &amp; medium charcoal. Over C.18, under C.19</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>C</td>
<td>Ditch fill</td>
<td>Unknown x 0.40 x 0.10</td>
<td>Light orangish brown firm clay. Occasional sub-rounded fine pebbles, occasional sub-angular medium pebbles, single small branch. Over C.13, under C.15</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>ABC</td>
<td>Topsoil</td>
<td></td>
<td>Find A001/009:22:1. Iron Object</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>ABC</td>
<td>Subsoil</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
12.2 Appendix 2: Stratigraphic Matrix
12.3 Appendix 3: Charred plant remains from Kiltotan and Collinstown 14 (A001/009)

By Penny Johnston

Introduction

This report describes the plant remains retrieved from a site excavated at Kiltotan and Collinstown Site 14 (A001/009). The site was divided into areas A, B and C and plant remains were discovered in small quantities in deposits from two of these areas (A and C). A furnace was found in each of these areas.

Methodology

The samples were collected on site as bulk soil and were processed using a simple flotation method. Each sample was saturated in water to allow carbonised plant material to float; this “flot” (the floating material) was then poured into a stack of geological sieves and trapped in the sieve meshes (the smallest measured 250μm). When all the carbonised material was collected the flot was air-dried in paper-lined drying trays prior to storage in airtight plastic bags. The samples were scanned under low-powered magnification and the results are presented in Table 1 at the end of this report. Sorting and identification of the flots was carried out using a low-powered binocular microscope (magnification x10 to x40) and identified seeds were separated and stored in sealed glass phials. Nomenclature and taxonomic order follow Stace (1997), although in order to facilitate easy reading of this text the scientific names are included only in the table of identified seeds presented at the end of this report (Table 2).

Results

In total, four samples from the site were scanned for charred plant material and environmental remains; one sample was examined from Area A and three from Area C.

Only one sample from Area A contained plant remains, the charred remains of oat grains and some weed seeds (small grass seeds and one seed from Pale persicaria, a common weed). The sample was taken from the fill of a furnace where slag was also recovered. As oats were probably introduced as a crop in very late prehistory or in the early historic period, it is possible that these plant remains assemblages are medieval, although wild oats are known from earlier contexts.

Three samples from Area C were examined but only one (C.9 (S.4) a furnace fill), contained the remains of charred seeds. This was identified as one badly preserved cereal grain (probably wheat). The other samples that were examined from this area were from C.8 (S.3) and C.10 (S.5), also taken from the furnace fill although they contained no charred seeds. Un-charred seeds were recovered from C.8 and C. 10, generally the remains of common weeds such as Docks, Bramble and Fat hen. There was no waterlogged preservation of organic remains in these two samples and therefore it is likely that these seeds are of recent origin and are unrelated to archaeological activity at the site.
Conclusions

Two samples, both from furnace fills, contained the remains of charred plants, in particular cereal grains such as oats and possibly wheat. These residues may indicate that crop processing by-products were used as tinder when lighting the furnaces. The plant remains assemblages from the site is very small and has limited interpretative value, but the presence of oat grains in one sample may indicate a medieval date.

References


<table>
<thead>
<tr>
<th>Site/Area</th>
<th>Context</th>
<th>S.S. No.</th>
<th>Cereals</th>
<th>Weeds</th>
<th>Charcoal</th>
</tr>
</thead>
<tbody>
<tr>
<td>KC14A</td>
<td>20</td>
<td>10</td>
<td>***</td>
<td>**</td>
<td>****</td>
</tr>
<tr>
<td>KC14C</td>
<td>8</td>
<td>3</td>
<td></td>
<td></td>
<td>****</td>
</tr>
<tr>
<td>KC14C</td>
<td>9</td>
<td>4</td>
<td>*</td>
<td></td>
<td>****</td>
</tr>
<tr>
<td>KC14C</td>
<td>10</td>
<td>5</td>
<td></td>
<td></td>
<td>****</td>
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Table 2: Identified remains

<table>
<thead>
<tr>
<th>Site Context</th>
<th>KC14A</th>
<th>KC14C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pale persicaria</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td><em>(Persicaria lapathifolia)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Possible wheat grains</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td><em>(cf Triticum spp.)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oat grains</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><em>(Avena spp.)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indeterminate grass seeds</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><em>(Poaceae)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indeterminate weed seeds</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Indeterminate seeds from the Dock/Knotgrass family</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><em>(Polygonaceae)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fat hen</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><em>(Chenopodium album)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bramble/Raspberry drubes</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><em>(Rubus fruticosus/idaeus)</em></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* indicates uncharred
12.4 Appendix 4: Identification of Charcoal from Kiltotan Collinstown 14 (A001/009)

Analysis by Penny Johnston

<table>
<thead>
<tr>
<th>Context</th>
<th>Sample</th>
<th>Sub-sample weight</th>
<th>Sub-sample volume</th>
<th>Identifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>10</td>
<td>5g</td>
<td>10ml</td>
<td>Ring-porous possible oak (cf <em>Quercus</em>) 7</td>
</tr>
<tr>
<td>9</td>
<td>4</td>
<td>2g</td>
<td>&lt;5ml</td>
<td>Ring-porous oak/elm (<em>Quercus/Ulmus</em>) 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4g</td>
<td>&lt;5ml</td>
<td>Diffuse porous with obvious rays Willow/Poplar/Alder/Pomaceous fruit (<em>Salicaceae/Alnus/Pomoideae</em>) 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3g</td>
<td>&lt;5ml</td>
<td>Diffuse-porous (not identified) 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10g</td>
<td>10ml</td>
<td>Ring-porous possible oak (cf <em>Quercus</em>) 4</td>
</tr>
</tbody>
</table>

12.5 Appendix 5: Radiocarbon Results from Kiltotan Collinstown 14, Co. Westmeath (A001/009)

Radiocarbon analysis by \(^{14}\)Chrono Centre, Queen’s University Belfast

<table>
<thead>
<tr>
<th>Context</th>
<th>Sample</th>
<th>Charcoal</th>
<th>Lab no.</th>
<th>(^{14})C</th>
<th>14(^{14})C Age</th>
<th>2 Sigma calibration</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>10</td>
<td>Possible oak (cf <em>Quercus</em>)</td>
<td>UB-6933</td>
<td>-26.0</td>
<td>1040+/- 30 cal AD</td>
<td>899-919 949-1032 cal AD</td>
<td>Early Historic</td>
</tr>
<tr>
<td>9</td>
<td>4</td>
<td>Possible oak (cf <em>Quercus</em>)</td>
<td>UB-6934</td>
<td>-26.0</td>
<td>434+/-29 cal AD</td>
<td>1420-1492 1603-1611</td>
<td>Late Medieval</td>
</tr>
</tbody>
</table>
12.6 Appendix 6: Assessment of Industrial Residues from Excavations at Kiltotan Collinstown, Co. Westmeath (A001/009)

By Neil Fairburn
March 2006

Summary
The excavations at Kiltotan Collinstown Site 14, Co. Westmeath have produced a small collection of industrial residues (48 pieces). The slag weighed a total of 1.1 kg and the author examined all the pieces. The industrial residues consisted of material associated with iron working: fluid slag, amorphous slag, smithing PCB's, tuyere fragments and vitrified clay lining and it is suggested that they are all the residues of iron smithing.

Introduction
When an archaeologist excavates a site that has the remains of iron production, the assemblage of finds will mainly consist of burnt ore, charcoal, slag and fired clay. The charcoal, slag and clay form integral and inseparable parts of the metallurgical process. This inevitably means that to understand the site, firstly it is necessary to identify and interpret the slag and burnt clay remains, and secondly one has to understand the basic technology of iron production that has produced the assemblage.

The manufacture of an iron artefact from iron ore can be separated into three distinct processes. The smelting of the ore in a furnace, which will produce a bloom of iron as well as fayalitic slag residues; the primary smithing consolidation of the iron bloom into a billet; and finally secondary smithing - the shaping of the billet into an object. Each of these processes will produce a range of residues.

Work by Brian Scott (1991) has indicated the range of material that might be found on early ironworking sites in Ireland, and recent work by Peter Crew and Thilo Rehren on material from the excavations at Ráith Na Ríg, Tara, Co. Meath has highlighted the types of industrial residues that are diagnostic of both iron smithing and non-ferrous metalworking (Crew and Rehren 2002). However, aside from this recently published work, very little analytical work has been carried out on early Irish ironworking sites. Edwards (1996) notes that in past excavations in Ireland the slag was often not recorded systematically or rarely analysed to provide additional information about the activity that produced it.

Experimental and analytical work on iron production and iron working residues in Britain, particularly work by Peter Crew, Snowdonia National Park, at Bryn y Castell, Crawcwellt and Llwyn Du, Wales, (Crew 1986, 1989, 1990, 1991, 1998, Crew and Crew 1995) and Gerry McDonnell, Bradford University (1988), along with work in Europe by Radomír Pleiner (Pleiner 2000), has clearly shown the nature of the archaeological evidence for iron production and for secondary smithing, and archaeologists can now identify the range of metalworking activity on sites in Ireland and Britain more confidently.
The Ironworking Process - Smithing

The final product of iron smelting, besides the residues of ash and slag, is called a bloom. This is a rough, often spongy mass, containing metallic iron flakes and nodules that have sintered together, mixed with bits of slag, partially reduced ore, charcoal and parts of the furnace clay. The bloom gives the early production technology its name of “the bloomery process”.

The bloom has then to be refined. This is done by hammering the bloom into a smaller piece, consolidating the iron particles and this is part of the primary smithing process.

Primary smithing requires that the iron bloom is heated again until red-hot and soft, and subsequently hammered to squeeze out remaining slag and consolidate the fragment into a workable shape. This piece of iron, called a billet, can then be worked on again and made into an artefact. The slag that is squeezed out during the primary smithing of the bloom will end up in the bottom of the hearth, and it differs from smelting slag in that it is more or less magnetic and less fluid. These slags forming just above the bottom of the hearth are very characteristic and are often described as smithing hearth cakes or more frequently as Plano Convex Bottoms (PCB’s). These slags are sub-circular convex-convex shaped and usually magnetic. The smithing process hardly changed from the Prehistoric period through to the medieval period, leaving similar residues.

The smithing of the bloom can be done anywhere. Quite often this primary smithing was carried out on the smelting site. The bloom is heated in a hearth or forge. The hearth doesn’t need a purpose built structure but would require a shelter from the elements for the smith and also so as to provide low light for the smith to be able to judge the temperature of iron. Early ironworking hearths were situated at ground level, while some Roman, and later, medieval, hearths were positioned at waist height. The anvils, positioned close to the hearth, to strike the red hot bloom quite often utilised a large flat topped stone or a large wooden block.

The hammering of the metal bloom produces further waste products; slag spheres, solid balls or vesicular balls of slag that can fly for a considerable distance; hammer scale, small flat and thin pieces of magnetic metal. Hammer scale is usually a prime indicator of smithing and can be used to locate where the process was taking place. However hammer scale can also be produced during the consolidation of the bloom.

If a large amount of smithing has taken place, the residues from this process can become trampled in to the floor around smithing area and form a cemented smithing pan. The pan is a conglomerate of highly magnetic material, dust, hammer scale, slag spheres and some other non related material. A small quantity of hammer scale was identified amongst the material recovered from the excavation at Kiltotan Collinstown Site 14.

Secondary smithing is the process that turns a refined billet into an artefact or implement and is carried out in the same way as the primary smithing and leaves the same sort of residues described above. This is the sort of small scale smithing work is the sort of work that would be expected to be undertaken within the small nucleated farmsteads and enclosures. It has been suggested that many people were using basic iron technology to make and repair simple artefacts (secondary smithing), but the actual production of iron and manufacture of complex iron artefacts were still being produced by specialised smiths (Mytum 1992). Documentary evidence from the Irish Annals suggests that the
blacksmith was held in high esteem and that the forge was a central part of the community (Scott 1987, Edwards 1996 86).

Analysis
All of the material was washed and cleaned by the author and visually examined by eye. The slags were weighed and were assessed on a typological appearance which has been outlined by the work of Bachmann (1982) and Crew (2002). Where surfaces had been fractured and a clean break could be observed, these were examined by using a x30 hand lense and then additionally examined under a microscope with x70 and x400 objective lense. The slags could not be cut open for examination, as there was not a licence to alter issued by the National Museum of Ireland.

Quantification of the industrial residues from Kiltotan Collinstown Site 14

<table>
<thead>
<tr>
<th>Context Number</th>
<th>Find No</th>
<th>Description</th>
<th>Qty</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface</td>
<td>C.20</td>
<td>Amorphous Slag</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Small pieces of fluid slag</td>
<td>10</td>
<td>110</td>
</tr>
<tr>
<td>Surface</td>
<td>C.20</td>
<td>Vitrified Clay Lining</td>
<td>1</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Small broken PCB</td>
<td>1</td>
<td>166</td>
</tr>
<tr>
<td></td>
<td>C.20</td>
<td>Small Broken PCB</td>
<td>2</td>
<td>158</td>
</tr>
<tr>
<td></td>
<td>C.20</td>
<td>Amorphous Slag</td>
<td>1</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>C.20</td>
<td>Furnace Lining</td>
<td>1</td>
<td>154</td>
</tr>
<tr>
<td></td>
<td>Surface</td>
<td>Tuyere Fragment</td>
<td>1</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>C.7</td>
<td>Amorphous Slag</td>
<td>26</td>
<td>145</td>
</tr>
<tr>
<td></td>
<td>C.7</td>
<td>Fluid Slag</td>
<td>1</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>C.7</td>
<td>Vitrified Clay Lining</td>
<td>3</td>
<td>130</td>
</tr>
<tr>
<td></td>
<td>C.7</td>
<td>Tuyere Fragment</td>
<td>1</td>
<td>80</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td>48</td>
<td>1119</td>
</tr>
</tbody>
</table>

Amorphous slag
As with most assemblages there is a quantity of material that is difficult to classify and is termed ‘amorphous’. Amorphous slags are usually fayalitic and do not have any distinguishing characteristics and are amorphous in shape and are often small. They could be from either the smelting or the smithing process, but it is more likely, as no diagnostic smelting slag was found at Kiltotan Collinstown Site 14, that they are from the smithing process.

Fluid Slag
The small pieces of fluid slag recovered from the excavations, are not from the smelting process and would seem to indicate that iron was either being heated to high temperature to create these runs, or was of poor quality and that excess slag was expunged during the high temperature smithing process. The absence of other material associated with smelting activities i.e. ore supports this.
Smithing PCBs

Smithing PCBs or Plano Convex Bottoms (PCB’s) are diagnostic of the smithing process. The smithing process produces as well as hammer scale and small slag spheres, residues that consolidate in the bottom of the hearth as PCB’s as fayaltic slag lumps. These fayalitic slags are similar in composition to furnace slags but are distinguishable by their shape, a curved base and a level contorted surface. Their production is still poorly understood but the process that produces them is well documented.

The Kiltotan Collinstown Site 14 PCB’s are small and suggests that intensive smithing was not taking place, and they represent small scale activity. One of the PCB’s, with an indented surface, indicates that the air into the hearth was from above rather than from than side. Which is interesting as the tuyere fragment may suggest that it was blown from the side, but possibly there may have been a raised clay wall to reflect heat through which the bellows blew the air on to the upper surface of the hearth and this has resulted in the clay tuyere being used.

Vitrified Clay Lining

This material consists of clay that has been vitrified on one side in the high temperature area of the furnace or the smithing hearth. Vitrified lining is produced by a high temperature reaction between the clay lining and the alkaline fuel ashes or slag.

It can be difficult to identify if pieces of vitrified clay come from a furnace or a hearth structure. Smelting sites usually produce significantly larger quantities than smithing sites, because of the difference in the size of the structures.

The lining has probably been made from the local clay and has oxidised to a grey, orangey red colour. Where one face of this lining has been exposed to high temperatures, it has started to vitrify to a slightly vesicular vitreous material. This vitrified surface varies in colour on different fragments from black through to olive green, which in turn reflects the temperature conditions.

Tuyeres

A tuyere is a nozzle into which the outlet tube of a blowing device was inserted, so as to deliver to the interior of the furnace or smithing hearth a blast of air. Their use dates back to Bronze Age for the smelting of copper and heating of crucibles. Tuyeres are almost exclusively made from clays with a refractory nature. The shape of tuyeres can very greatly, from tubular, to block, to circular panels (like discs) and these differences are probably linked to different methods of supplying the air to the furnace or the smithing hearth.

The tuyere fragments that were found at Kiltotan Collinstown Site 14 were incomplete tubular fragments probably used to provide protection for the bellows nozzle. This is the most common form and it appears on sites all over Europe and were used until at least the Middle Ages. The inner surfaces of one piece was heavily vitrified with some slag adhering to it.

The tuyeres that were found at Kiltotan Collinstown Site 14 are an important addition to the small but growing examples of tuyere types.
Hammer Scale
Magnetic bluish-grey flakes of iron oxides formed on the surface of iron when heated for smithing. Primary and secondary smithing produces hammer scale when a hot iron object is struck. It is usually found in the area where the smithing was carried out.

Discussion
The only certain indications for an iron smelting site are primarily the presence of ores and tap slags and also the presence of pieces of the furnace superstructure. Without either of the two reliable indicators, a site should be considered to be an iron smithing site. Slag is not datable in itself, but it is an important indicator of the site activities. At Kiltotan Collinstown Site 14 only a small quantity of industrial residues was recovered and this material has primarily been interpreted as the product of iron smithing. The presence of small quantities of fluid slag containing iron oxide is not enough to suggest that rest of the material is also from the smelting process, but suggests that the metal being was heated to high temperature and may have been of poor quality.

The small quantity of material found at Kiltotan Collinstown Site 14 would not be indicative of any large scale work as there are insufficient quantities of slag. However, as the feature that contained the slag was on the edge of excavation area, it is possible that further deposits of slag and iron working features lie in the area beyond this.

It is also possible that the ironworking material from Kiltotan Collinstown Site 14 may be associated with work that has taken place within the vicinity, such as the nearby site of Monganstown (Fairburn 2005).

Further follow up work at Kiltotan Collinstown Site 14 would be useful in attempting to pinpoint the extent of the metalworking site, if there is one, and look for the characteristic dump of waste slag. Ideally if at all possible this should be done with a combination of non-invasive geophysics and perhaps augmented with trial trenching. Work by Peter Crew et al has shown the benefits of using geophysics to pinpoint metalworking sites and also to obtain archaeomagnetic dates from them (Crew 2002 and Crew, Smekalova and Bevan 2002).

Conclusion
The excavations at Kiltotan Collinstown Site 14 have produced a small amount of industrial residues from the iron working smithing process. This material has provided additional evidence for iron working in the rural landscape and this site will make a small contribution to our understanding of the cultural sequence of the metalworking in the region and in the country.
Bibliography


Crew, P. 2002 ‘Magnetic mapping and dating of prehistoric and Medieval iron-working sites in North-West Wales’ *Archaeological Prospection* 9, pp.163-182.


### 12.7 Appendix 7 Finds Register for Kiltotan Collinstown Site 14 (A001/009)

<table>
<thead>
<tr>
<th>Find no.</th>
<th>Context</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>A001/009:22:1</td>
<td>22 (Surface find)</td>
<td>Iron object</td>
</tr>
<tr>
<td>A001/009:12:1</td>
<td>12 (Ditch fill)</td>
<td>Glass fragment</td>
</tr>
<tr>
<td>A001/009:12:2</td>
<td>12 (Ditch fill)</td>
<td>Glass fragment</td>
</tr>
<tr>
<td>A001/009:12:3</td>
<td>12 (Ditch fill)</td>
<td>Glass fragment</td>
</tr>
</tbody>
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