Archaeological work on the Fife Water Pipelines, 1995: the excavation of Bronze Age, Roman and medieval sites

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with contributions from Duncan Abernethy, Diane Alldritt, Iain Banks, Mike Donnelly, Robert James, Alan Leslie, Julie Roberts, Eland Stuart, Marcia Taylor and Robert Will

Introduction

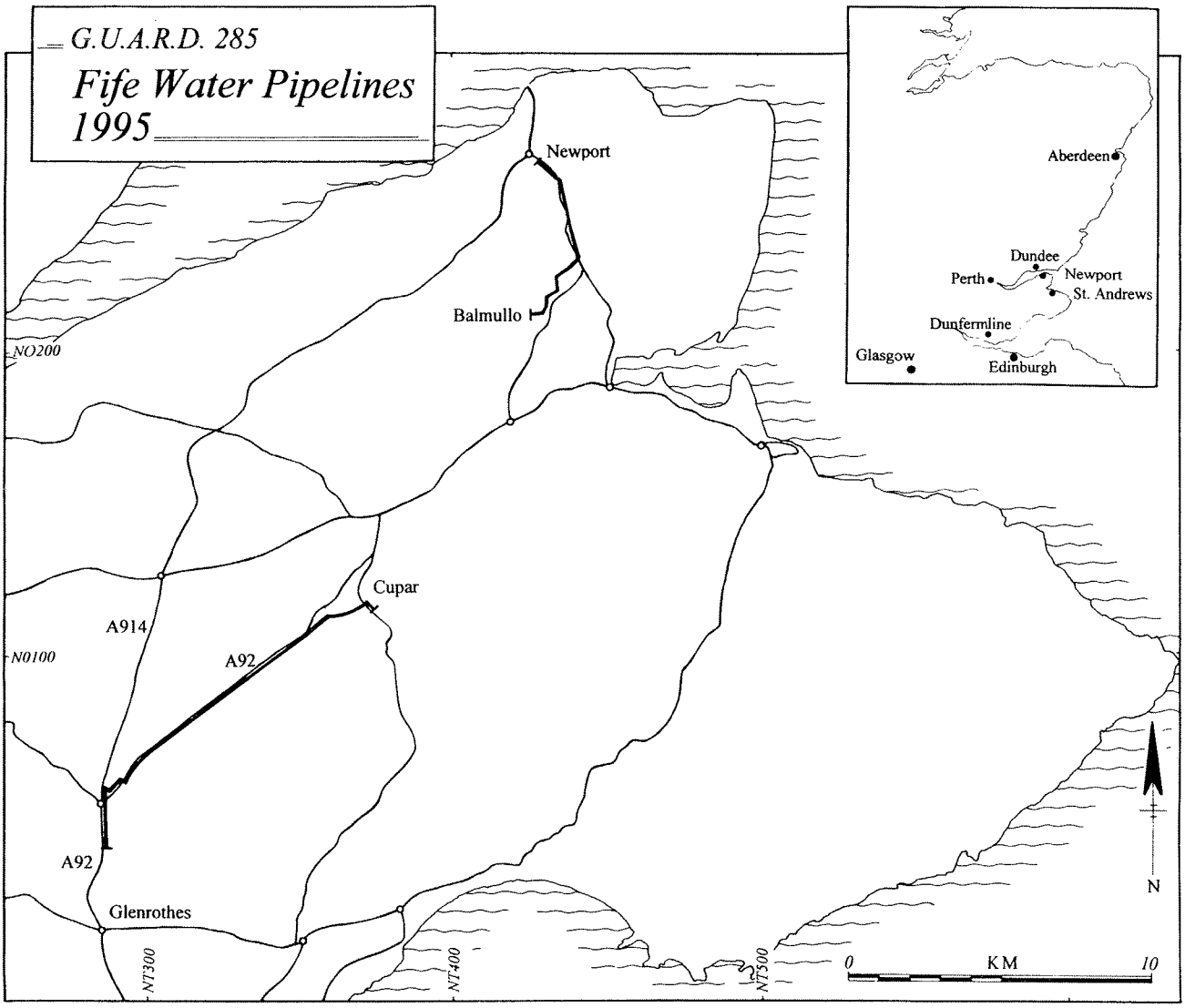
In the summer of 1995, GUARD were commissioned by Fife Regional Council Engineering Department to undertake archaeological watching briefs during programmes of work to install new trunk water mains between New Inn and Tarvit Reservoir, near Cupar, and between Balmullo and Newport, in Fife (Illus 1). The main aim of the project was to monitor construction work and, where appropriate, excavate and / or record any significant archaeological remains encountered. Some scope had also been allowed in the specification for archaeological prospection, prior to the watching brief proper taking place, in order to identify specific areas of potentially high archaeological sensitivity. Scrutiny of the existing aerial photographic coverage, followed up where appropriate by limited geophysical survey was the methodology suggested to achieve this. In the event significant concentrations of sensitive archaeological remains were identified at three discrete locations along the Cupar pipeline route: Kirkton, Scotstarvit and Edenwood. Following consultation with the commissioning body and the local authority archaeologist, a programme of excavation for each of these sites was drawn up and carried out. Along the Balmullo route the only significant archaeological material identified was from post-medieval activity at Forgan Smithy; a short excavation was undertaken here.

The specialist reports which appear here are shortened versions of the originals, which may be consulted in the archive now housed in the National Monuments Record for Scotland. All funding for the work was provided by Fife Regional Council Engineering Department and the project was monitored for Fife Region by the Fife Archaeological Service.

Background

The archaeological work undertaken on the Fife water pipeline construction programmes was called for in the context of National Planning Policy Guideline 5: Archaeology and Planning, Planning Advice Note 42 and the Fife Structure Plan, all of which see archaeology as a part of the environment to be protected and managed. Since it was clear that the new pipelines would pass close to and / or through areas of known archaeology (see below), Fife Regional Council Engineering Department consulted with the council's archaeology service and an appropriate course of action was agreed leading to the preparation of a specification for archaeological works. The principal aim of the project was to ensure the identification and recording of all archaeological material lying in the path of the proposed pipeline. The area to be affected by the pipeline measured c 13km in length between Glenrothes and Cupar, much of which followed the existing line of the A92, and 6.7km in length between Balmullo and Newport (Illus 1). In all cases the working corridor width was 14m.

Several sites of archaeological significance were known to exist on these routes. The Cupar route started 0.5km north-east of Balfarg henge (Barclay and Russell-White 1993), situated within one of the most important prehistoric landscapes in Scotland; and ran close to or through crop marks at Kirkton of Cults, including a souterrain (NO 341 098); a single crop mark at Cults Burn, presumed to rep-



Illus 1. Fife water pipelines – location map.

resent a plough-truncated prehistoric funerary structure (NO 343 100); a crop mark complex at North Scotstarvit (NO 353 108), including a variety of probable prehistoric landscape features; and a Roman military marching camp at Edenwood, across one corner of which the pipeline was due to pass (NO 358 113). Along the Balmullo route important known sites included several crop mark complexes at Strathburn (NO 437 232), Comerton Home (NO 434 251), Leuchars / Wormit (NO 436 226), and South Friarton (NO 432 253), each of which had been provisionally interpreted as representing the remains of settlement.

Along the Cupar route it was agreed that all watching brief activity would be preceded at certain points along the route by programmes of geophysical survey to try to identify those areas along the pipeline route which might contain archaeological remains. In the event, three discrete concentrations of archaeological remains were encountered during the watching brief, prompting an additional phase of rescue excavation. The archaeological work on the Cupar route took place between late June and early September 1995. The archaeological work on the Balmullo to Newport route was undertaken between early September and early November 1995.

The archaeological works

The Fife Regional Council's specification for the Cupar route stipulated that the main construction programme would involve stripping topsoil by machine across an area 6m to 7m wide for the full length of the pipeline, followed by the cutting of a centrally located trench (1m wide by 2m deep) for the water main. It was anticipated that an archaeological presence would be maintained on the basis of one to two visits per week for the duration of the twenty to twenty-five week programme. In the event of the discovery of significant archaeological remains, the trenching work could be stopped in a limited area to facilitate recording for a maximum period of one full day. The only

planned exceptions to this were in the vicinity of the crop marks at Kirkton of Cults and Cults Burn and in the vicinity of the Roman marching camp at Edenwood, where it was stipulated that any reasonable amount of time would be allowed to permit full archaeological recording to take place.

In the event, the pipeline corridor extended to a width of some 9m. Generally, archaeological inspection took place every two to three days, though in areas where sensitive archaeological remains were known to exist, especially at Scotstarvit and Edenwood, a constant presence was maintained during topsoil stripping. Because of the delay between topsoil stripping and archaeological monitoring, which at most extended to three days, there was concern that wind blown sand and the effects of vehicle movement across the stripped areas might mask archaeological material. As a consequence, on several occasions during the watching brief, topsoil-stripping operations were monitored for a full day. At no time during these control exercises were archaeological features observed which would not have been detected during the normal watching brief programme.

In the case of the Balmullo route it was stipulated that a constant archaeological presence would be maintained during the topsoil stripping phase of the construction programme. In the event, the corridor created by the topsoil stripping was on average 7m wide and 0.2–0.3m deep.

There was a high possibility of archaeological remains along the stretch of the pipeline route which lies immediately adjacent to the Leuchars / Wormit crop mark complex. However, due to circumstances beyond the control of GUARD, a 250m long stretch of pipe was inserted by the contractors through the field south-west of St Michaels sand and gravel pit without an archaeologist present. It is therefore impossible to gauge whether or not significant archaeological remains were affected by the construction programme in this area.

Geophysical survey

Robert James and Gavin MacGregor

Method and background. The solid geology of the area comprises sedimentary Old Red Sandstone conglomerate, while the drift geology is composed of recent and Pleistocene morainic glacial deposits, consisting of fluvio-glacial and moundy sands and gravels. Due to the character of the drift geology the survey was conducted, in the main, using electrical resistivity. A Geoscan electrical resistivity meter (RM 15) was used. The survey was conducted over full or fractional 20m by 20m grids according to available space, at a sampling density one metre, giving a good compromise between the criteria of rapid collection and clear graphical resolution. At the Roman marching camp at Edenwood, geomagnetic prospection was employed, with the express aim of locating associated hearths or ovens. Here a Geoscan fluxgate gradiometer (FM 36) was employed. The results of the survey were processed using the software package 'GEOPLOT II'.

In the event it was only possible to undertake geophysical survey at Kirkton, Edenwood and Kettlebridge, Scotstarvit having previously been stripped. At Kirkton an area of 510m x 20m along the route was surveyed, while at Edenwood 288m x 20m was surveyed; at Kettlebridge an area of only 60m x 7m in length of corridor was surveyed.

Results. Geophysical anomalies were identified during at both Kettlebridge and Kirkton but there proved to be no correlation between these and archaeological features. In contrast, the survey at Edenwood identified the length of ditch of the marching camp which ran through the pipeline corridor and a potential area of burning inside the camp. However, as this feature lay outside the stripped area it was not possible to establish its nature. Significantly, the geophysical survey supported the evidence from both aerial photographs and excavation that the south-east return of the ditch was not present at Edenwood (see further, section 3 below).

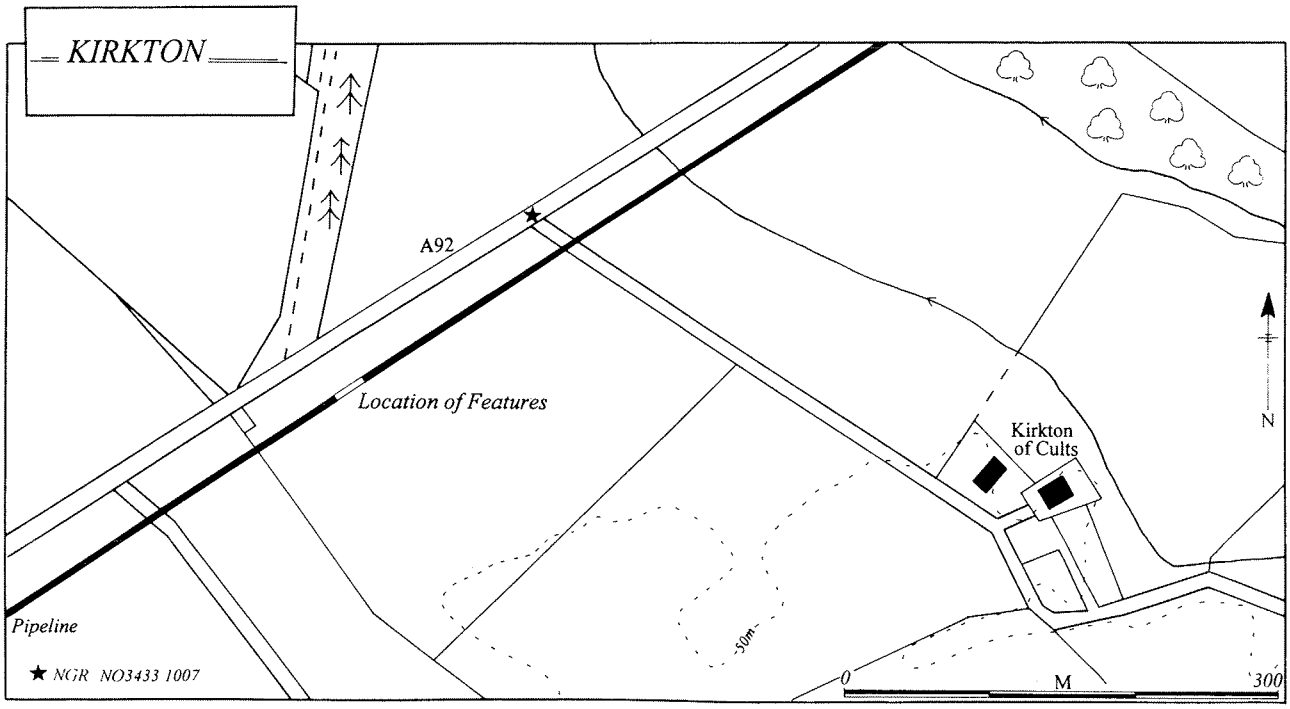
On balance, the geophysical survey was only moderately successful, perhaps due to the nature of the subsoils and the extremely dry conditions.

A Bronze Age cemetery at Kirkton

During the watching brief an archaeological feature [002] was identified at Kirkton (Illus 2). This was half-sectioned to reveal a quantity of cremated bone in a pit. The presence of a burial deposit near a crop mark thought to be a barrow (NMRS NO 31 SW 088) suggested there may have been other associated deposits in the vicinity. Therefore, a stretch of corridor 25m in length was cleaned by hand, centring on the cremation deposit. This revealed another three features [013, 021, 031] within the immediate vicinity of [002] (Illus 3 and 4).

The excavated features

One cremation burial [002] (003) lay in an



Illus 2. Kirkton – location map.

elongated oval pit 0.75m by 1.25m with a maximum depth of 0.25m (Illus 4). The pit had a flat bottom 0.2m by 0.8m.

A heaped deposit of cremated human bone had been placed on the base of a pit, and comprised very large, clearly identifiable fragments of bone including skull, patella, and teeth. The bone appears to have been carefully collected, and the lack of obvious pyre material in the deposit may indicate that it had been washed. Analysis of the deposit (see Roberts below) revealed that it contained a minimum of four individuals: one female aged 25–50 years, one (?) male aged 25–40 years, a child aged 4–7 years and a foetus aged c 7 months.

Amongst the cremated bone was a single unburnt flint point, and two other fragments of flint (see below), together with part of a copper-alloy awl (see below). The rest of the fill was composed of a light-brown sand.

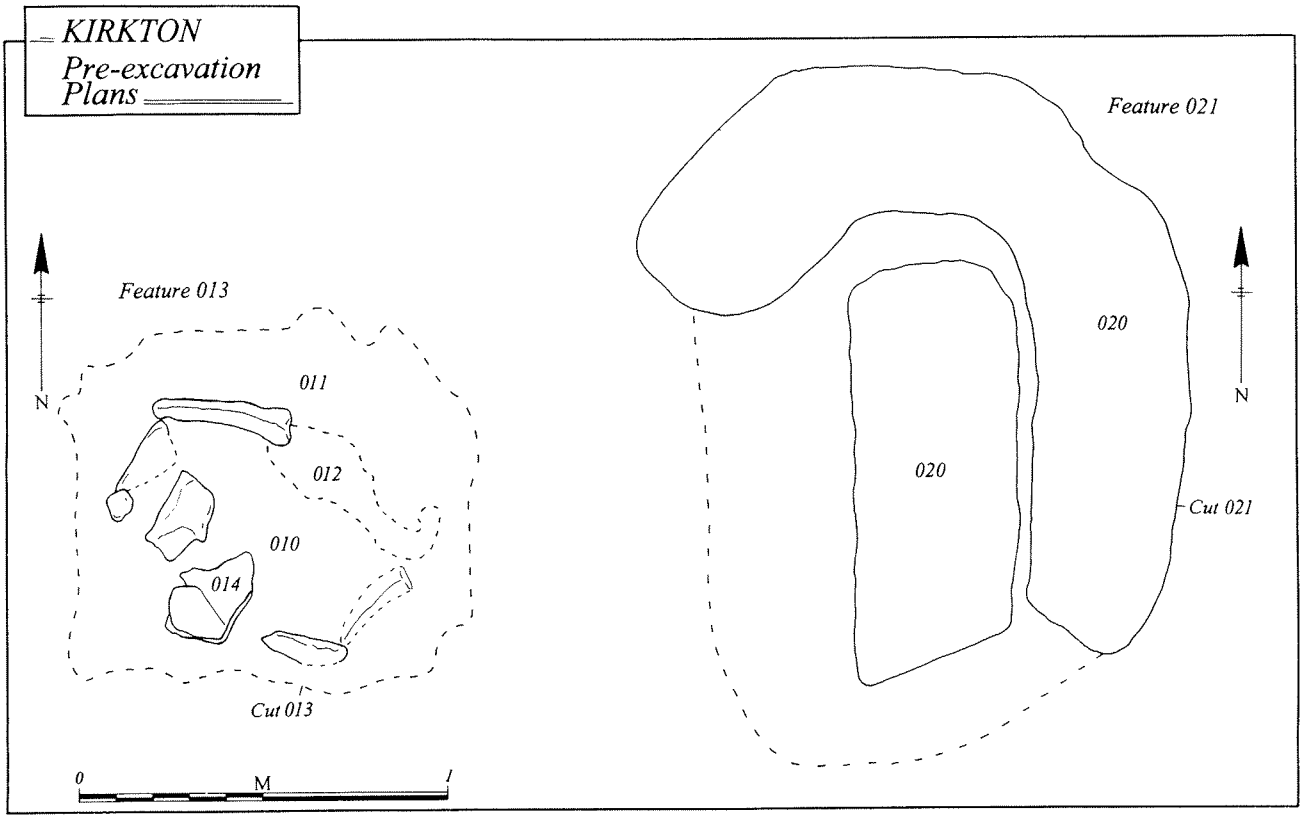
A second small cremation deposit (030) [031] about 0.8m east of [002], had been badly truncated and disturbed by a combination of ploughing and the recent topsoil stripping, which had spread it over an area 0.85m by 0.4m (Illus 4). The deposit (030) had exceptionally well-defined edges, measuring 0.28m by 0.36m. It is possible that the cremated bone had originally been held in an organic container which had decayed. The cremated bone appeared to have been sorted from the pyre material in the same manner as that described above (003). The feature was sectioned and the deposit was found to survive to a maximum depth of 0.05m. No definite cut could be distinguished other than a diffuse and irregular area (031) which may be a product of mineral staining.

The cremation deposit, weighing only 13.3g, was found to contain a minimum of one individual: a mature adult of unknown sex (see Roberts below).

The third feature located was a sub-circular pit [013], measuring 1.2m by 1.1m by 0.3m deep, which contained a setting of medium sub-angular stones (014), each up to 0.4m long (Illus 3 and 4). The stones were set into a moderately compact, dark red-brown sand (011) which filled [013]. Originally seven stones had been set as uprights around a base stone to form a sub-rectangular box 0.85m by 0.6m externally, though ploughing had disturbed the setting, having removed one of the uprights. The fill (010) was a loose red-brown sand.

The function of the stone structure (014) is unclear. The stones were unburnt and the fill (010) contained no charcoal, suggesting that it was not used as a fire box. Similarly, the construction was poor, and having no clay luting, the box could not have served as a water holder. Although no fragments of bone were recovered, its relationship to the other features suggests that it may have served, perhaps even symbolically, as a cist during mortuary rituals. A small cist containing cremation deposits at Barns Farm (Watkins 1982) had similar dimensions to this one.

The fourth feature located was a grave pit [021], though the full complexity of the feature only became apparent after sectioning took place (Illus 3 and 4). In plan the cut [021] for the pit was an irregular sub-oval measuring 2m by 1.7m. The



Illus 3. Kirkton – selected pre-excavation plans.

sides were steeply cut, at points almost vertical, to a flat, if uneven, base some 0.3m deep. In the west side of the pit was an oval scoop 0.08m deep, set within the base. It measured 0.8m by 0.6m.. In the east side of the pit a sub-rectangular slot with near vertical sides [045], 0.4m by 0.12m, was cut into the base to a depth of 0.1m. A Food Vessel (043) had been placed at the western end of the pit. It lay on its side with its mouth to the east and although complete it had been broken in antiquity, probably due to the weight of material above it.

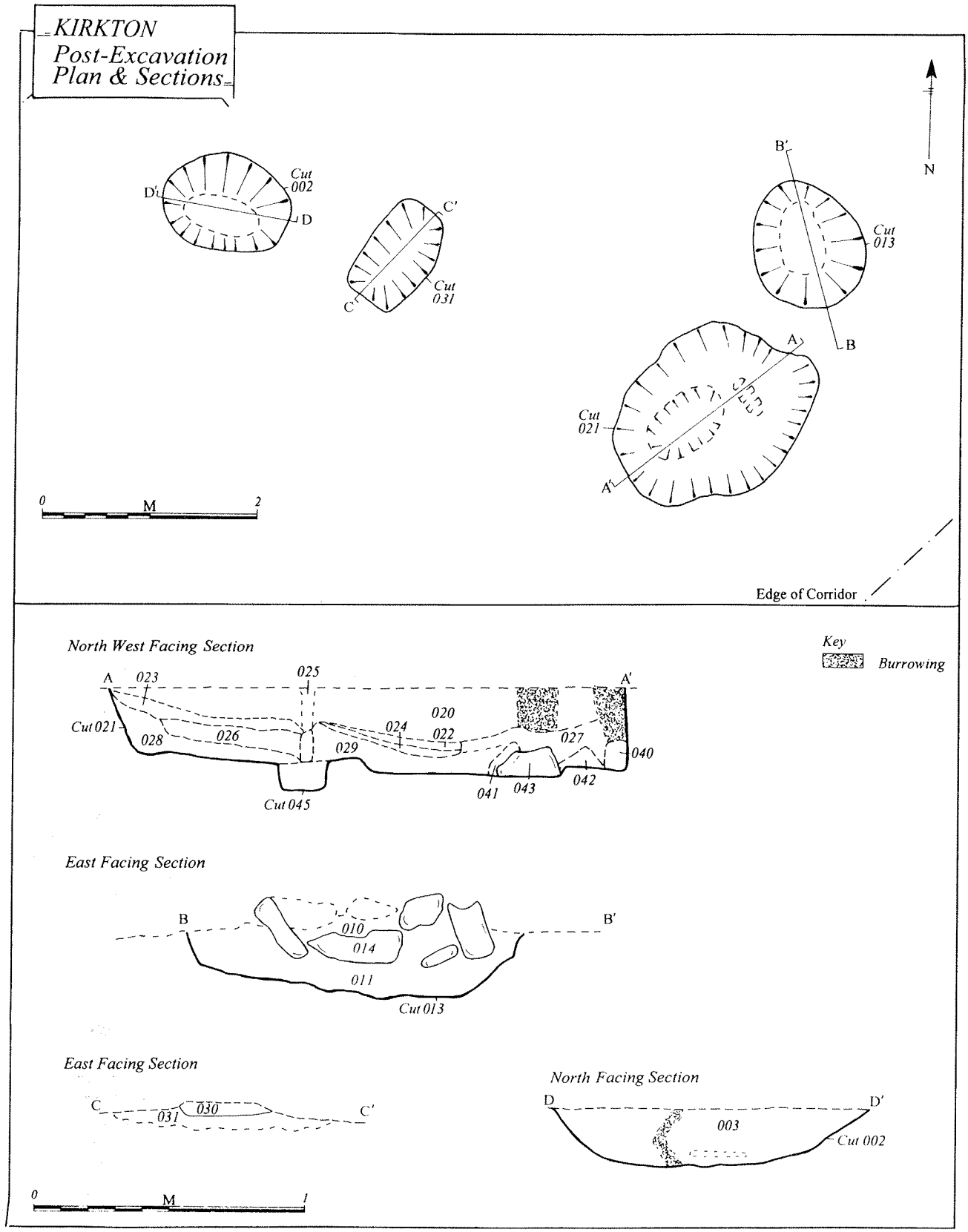
The fill of the pit was clearly composed of two elements, at one time, perhaps, separated by an upright plank (025) inserted into a slot [045] (Illus 4). The eastern portion had been back-filled with several layers of sand tipped in towards the centre from the east (023, 026, 028) and (022, 024, 027, 029) tipped in from the west.

Bronze Age graves have been found elsewhere in Fife, such as the three graves excavated at Barns Farm (ibid, 70–9). Notably, grave 2 at Barns Farm also contained a simple bi-partite Food Vessel crushed on its side at the edge of the grave (ibid, 76). It is possible that an inhumation had been placed in the Kirkton pit, of which no visible trace has survived even as a soil stain. Time constraints precluded sampling for phosphate analysis, which may have indicated whether an inhumation had been placed in the grave. Excavation of Bronze Age graves has shown that they frequently contained coffins, but in this case the only indication of a coffin was the sub-rectangular feature observed in plan after the initial cleaning. If it represents the traces of a coffin, it is somewhat smaller than many of the other previously excavated examples. Although this could be due, in part, to heavy truncation of the feature, two other factors may account for the small size of the putative coffin. The first is that it may have been intended to accommodate the body of a child or small person; the second is that the profile of the coffin may have changed with depth, as has been suggested for grave 2 at Barns Farm (ibid, 75, fig 11).

The cremations

Julie Roberts

Deposit 003. This deposit contained large fragments of bone, in good preservation, including several complete skeletal elements. The size of the fragments ranged from c 2mm to 100.7mm in diameter, and almost all skeletal elements were represented, with the exception of the sternum, which may have been present but was too fragmentary to be recognised. Selective burial of certain bones does not appear to have been practised and the under-representation of some elements is likely to have been due to pre- and / or post-depositional taphonomic processes rather than deliberate choice (Roberts 1995). A minimum number of four individuals can be identified within the deposit: one female aged 25–50 years, one ? male aged 25–40 years, a child aged 4–7 years and one foetus aged c 7 months.



Illus 4. Kirkton – post-excavation plans and sections.

Cremation and burial practice. The majority of the bones from deposit 003 were white in colour, indicating that they had been cremated to a temperature in excess of 700°C. The exceptions to this included three fragments of occipital bone; two were dark grey in colour and joined together to form the (?)male occipital protuberance, and one, thought to be female, had a brown / grey nuchal area (the posterior part of the skull). In addition to the occipital fragments, part of an

ethmoid (nose) bone and the posterior part of a calcaneus (heel) bone were also dark grey in colour. The darker colour of these fragments indicates that they were not completely cremated, probably because they did not receive an adequate oxygen supply during the cremation process. The ethmoid bone would have been protected by the outer bones of the cranium, whilst the other elements mentioned may have been in contact with a surface through which the oxygen could not circulate. The particular bones affected, ie the back of the head and a heel, might be an indication that the bodies were laid on their backs at the time of cremation, possibly with the funerary pyre built over them.

The warpage, curved cracking and transverse checking present on the majority of the bones is an indication that they were fleshed at the time of cremation, and the dark grey / brown colour of the few less burnt fragments is further evidence that they were not left exposed prior to this event. It can be stated, therefore, that the four individuals from deposit 003 were all cremated shortly after death, before their flesh was allowed to decay. The circumstances surrounding their actual death and interment are less clear. The archaeological evidence shows that they were buried together in a single event, which presupposes one of two scenarios. The four may have all died at the same time, possibly of some illness or trauma which left no trace on the skeletal record. They were then all cremated shortly afterwards, either together or separately, and their bones were collected, mixed together and buried in a single grave. Alternatively, the four died at different times and each individual was cremated shortly after his or her death. Their bones were then stored until they could be buried all together in a single grave. There is no way of knowing how long the bones might have been stored, but there is no evidence of weathering on their surfaces, suggesting that they were protected from the elements during this phase of the mortuary ritual.

The inclusion of the foetus in the burial may have been incidental if it had belonged to the female member of the group and was in utero at the time of her death. Alternatively, it may represent a formal burial. Past cultures are known to have differed in their attitudes towards the formal burial of infants under a certain age. For example, it is well attested that the Romans inhumed rather than cremated infants before the age of teething, usually beneath the floors of buildings. This was because it was considered that until a child could walk and talk it did not possess a soul and therefore did not require special burial rites (Philpott 1991).

Pathologies. Among evidence for pathologies was porotic hyperstosis on the foetal / neonatal and the female adult; ante-mortem tooth loss in the male and female adults; trauma to the right thumb of the male; degenerative arthritis of adult vertebrae, probably due to strenuous lifting and hauling, and periostosis of the juvenile's long bone.

Deposit 030. This poorly preserved deposit consists primarily of fragments of long bone, rib and unidentified trabecular bone, in fragments ranging from <2mm to 19.4mm maximum diameter. There were no repeated skeletal elements in it and no great differences in the size and robusticity of bones which might distinguish a child from an adult, and therefore it was possible to identify a minimum number of only one individual.

The presence of a third molar with fully developed roots indicated that the individual was an adult of over 21 years of age. Slight sclerosis of the apex of the root of a mandibular incisor and the presence of osteophytes around the facet of the atlas, which articulates with the dens, suggested that the adult may have been mature or elderly, ie 40 + years; however, there is no further evidence to support this conclusion.

There were no sexually dimorphic elements present on which to base an estimate of sex, although the third molar and the incisor root were both quite small. The sex of this adult therefore remains unknown.

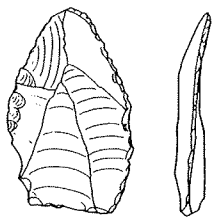
As with deposit 003, the predominant colour of the bones was white, indicating that they had been heated to temperatures in excess of 700°C. Most of the fragments were too small to show signs of warpage and cracking, although one was slightly 'checked'.

Pathologies. The only pathology identified was the degenerative change to the atlas, which may have been a result of the normal ageing process.

The lithics
Mike Donnelly

Three pieces of struck flint were recovered from the cremation deposit (003). One flake (Sf 03), a small piece of knapping debris, has been burnt severely producing a gloss over much of its surface. Another piece (Sf 04) appears to have undergone some form of surface alteration; it has an orange brown surface in two places, entirely distinct from its own colour which is light grey. This piece may originate from a larger polished object. The evidence of direction of applied force, the shape of the piece and in particular the orientation of the discoloured surfaces suggest that it originates from close to the end of a larger object. Furthermore, the fracture observed at the proximal end of this removal suggests impact rather than snapping, resembling the 'step bending fractures' discussed by Fischer (1985).

By far the most impressive piece is the re-



Illus 5. Sf 05 retouched flake. Scale 1:1.

Illus 6. Copper-alloy awl. Scale 1:1.

touched flake (Sf 05) (Illus 5). This small, leaf-shaped flake has had its entire right edge and two-thirds of its left edge carefully retouched. This retouch has partially invaded the main body of the object. The right edge has more accomplished retouch while that on the left edge appears more random and crude by comparison. The piece has a large flat bulb and a wide but narrow platform edge, suggestive of having been struck with a medium hammer such as an antler baton. The retouch has been applied through pressure flaking. Clearly this piece did not accompany the individual(s) during their cremation, as it is totally unaffected by fire. Furthermore, it appears to have seen little use prior to deposition, if any.

Lithics from funerary contexts. Throughout Fife, lithics have occasionally been recovered from similar funerary contexts. However, they often have been seen as of secondary importance to the much discussed pots that also frequently accompany and often define burials. Those lithic objects chosen to accompany the dead are often particularly fine examples of arrowheads, knives or scrapers, for instance (Mears 1937, 276). Examples include an unburnt flint knife from a cremation in a Food Vessel at Callange near Ceres in Fife (Cowie 1978, 120), while at Brackmont Mill ten scrapers were found in association with three fragmentary urns (Spence 1949, 228), and a snapped flint flake, retouched down one side, was discovered with urn XII (Mears 1937, 263). The flint artefacts chosen as grave goods have also occasionally been burnt. This occurred at Brackmont with urn VIII (ibid, 268), while outwith Fife at Balrownie, Tayside a scraper and crude knife were reconstructed from fragments of severely calcined flint recovered from a cremation in another Food Vessel (Cowie 1978, 109).

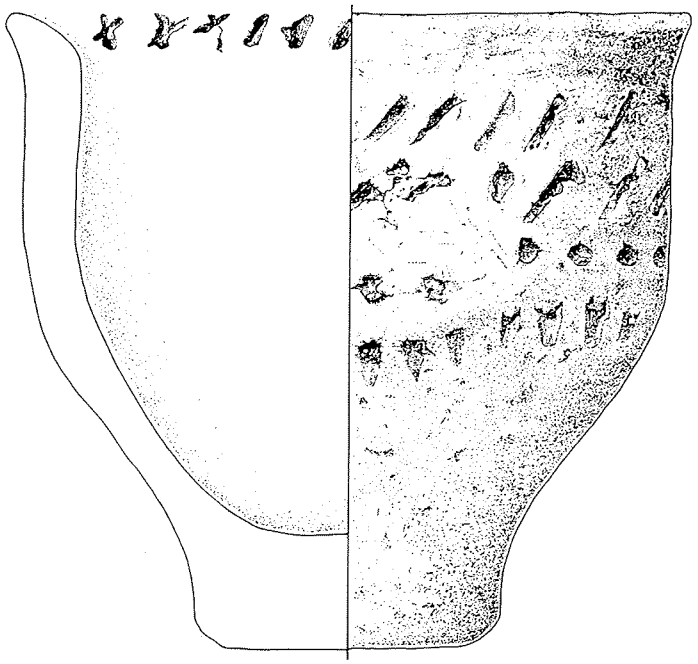
This practice does not originate with urned cremations; lithic objects were also chosen to accompany individuals buried in cists during the early part of the Bronze Age. Many examples are known from Fife, with lithics occurring in 20 of the 136 recorded examples (Donnelly 1991). These include knives at Rumgally (Tenant-Gordon 1932; 1933), discoidal scrapers at Barns Farm, Dalgety (Watkins 1982) and four barbed-and-tanged arrowheads at Dairsie (Anderson 1887).

Although many pieces of flint have been recovered in association with Bronze Age burials, small, carefully worked flakes or knives are rare; most pieces recovered measure around 40–50mm in length. Perhaps the best comparison for the flake from Kirkton is the snapped flint flake discovered with urn XII at Brackmont Mill (Mears 1937, 263). The piece from Kirkton appears not to have been used in any fashion that would leave a macroscopic trace. This is not a universal trait, as many pieces included in burial or votive contexts have been utilised. Clearly the practices involving the accompaniment of lithic material alongside cremated individuals are many and varied. However, the rules, if any, governing these practices are unclear or vague at best. Lithics from unaccompanied cremations are extremely rare although pieces burnt along with the individual are often fragmentary and extremely difficult to spot (McKinley 1994), and it may well be that many such examples have been missed in the past.

The copper-alloy fragment
Gavin MacGregor

A fragment of copper alloy was found during the sieving of bulk samples of the cremation deposit (003) at Kirkton. The size and form of the fragment suggest it represents the middle portion of an awl. The piece (0.2g) is 11.6mm long and changes shape from square in cross section at one end, widening slightly in the middle and by the opposite end is circular in section (Illus 6). It is 1.6mm wide at the square end, 2.2mm wide at the midriff, and 2mm wide at the round end. It is likely that the end with the square profile was hafted in a wooden or bone handle and the end with the circular profile terminated in a point. Within the terms of Thomas's (1968) classificatory system developed for copper-alloy awls, the Kirkton awl would be best considered as a type 2D. Although a variety of forms of copper-alloy awls are known throughout the Bronze Age, dated comparable examples are predominantly from the early Bronze Age. The radiocarbon dates associated with two other Scottish examples suggest a currency of the first half of the 2nd millennium BC (Peltenberg 1982; Stewart and Barclay 1997).

There are 17 certain or probable early Bronze Age copper-alloy awls known from Scotland. However, the small size of many of them and the unlikelihood that they would survive in a recognisable state if cremated, combined with unsystematic excavation of many burials, will mean that



Illus 7. Kirkton – Food Vessel. Scale 1:2.

the number actually deposited in these contexts is under-represented.

The closest geographical example can be found relatively nearby at Kirkcaldy (Childe 1944 109). Copper-alloy awls are found as frequently accompanying inhumation as cremation burials. They are typically found incorporated in funerary deposits in flat cemeteries. Copper-alloy awls have been found in association with a range of different forms of pottery vessel, but most frequently with Food Vessels. Where an awl is not associated with pottery vessels, it may be found accompanied by a jet necklace. Awls associated with Food Vessels and / or jet necklaces account for nearly half (47%) of all known examples. In two other cases (Kirkton and Dalgety Bay) the awls were unaccompanied by pottery vessels but were found in Food Vessel cemeteries.

The Food Vessel

Gavin MacGregor

The Food Vessel has a simple, bi-partite form and an everted, rounded rim with a simple internal bevel (Illus 7). It has a height of 167mm, with an internal rim diameter of 174mm and weighs 2022g. The base is 30mm thick with the wall thickness varying between 10–14mm. Although complete, the vessel had broken post-depositionally and is currently represented by 30 sherds.

The outer surface ranges from pale orange to buff in colour, while the interior is grey. The firing profile suggests that the vessel was fired upside down in an open fire. The fabric comprises a coarse clay with fairly well-sorted inclusions of angular to sub-angular rock fragments (c 15%, up to 5mm) and poorly sorted sub-angular grog (less than 5%, up to 4mm). The inclusions are distributed medium to medium / densely. A smooth slip, c 2–3mm thick appears to have been applied to the surfaces, although it is less continuous on the interior where inclusions protrude through it.

The exterior has been decorated with four rows of stabbed decoration probably using a rod of bone or wood. The upper two rows comprise triangular stabs, between 15–18mm long, applied at an angle. The third row consists of circular stab marks, 6mm wide. The lowest row consists of oblique stab marks, 6mm wide, applied from beneath the shoulder. The internal bevel of the rim is decorated with a single row of angular stabs. For part of the circumference the decoration has been reapplied, creating a cross motif. It would appear that two different tools were utilised during the decoration of the vessel, with the rim decoration and upper two rows of body decoration made with one implement and the lower two rows with another, probably a split bone.

The interior of the vessel is partly encrusted with black carbonised material. It is likely that this deposit relates to the use of the vessel, either from 'cooking' or from the presence of liquids in the vessel during burial (Barclay no date). Of the other examples of staining on the interior of Food Vessels only one has patches on opposite sides of the pot, which is also from Fife, at Kirby Green Farm (PSAS 1970; pers comm, G Barclay). In some cases interior stains on funerary vessels may have developed post-depositionally through the adsorption of liquids. In contrast, however, it is almost certain that where carbonised remains are

found on the interior of funerary vessels, they derive from pre-depositional processes. There has, therefore, been some debate over whether Bronze Age funerary vessels were constructed specifically for use in the burial context or whether they were appropriated from other contexts (MacGregor, forthcoming). Samples were, therefore, taken from the Kirkton Food Vessel for analysis of any chemical residues present (see Taylor below).

Parallels and date. The Kirkton Food Vessel represents another addition to the rapidly increasing number of Food Vessels known from the east coast. Locally, the form of the urn can be compared to that found at Greenhill, Balmerino (Hutcheson 1902). Closer parallels for both the form and decoration can be found in the Food Vessels from cists II and XI at Almondbank, Perthshire (Stewart and Barclay 1997, 26, illus 3, SF 1 and 10). The geographically closest radiocarbon dated example of a Food Vessel is that from Aberdour Road, Dunfermline (Close-Brooks 1972). Here a date of 3581 ± 40 BP (SRR-292), which calibrates to cal BC 2032–1773 at two sigma (calibrated on OxCal v2.01), was obtained from collagen within bone from the associated crouched inhumation (ibid, 135). Farther afield, a similar date of cal BC 2129–1684 (3556 ± 80 BP; SRR-590) was also obtained from human bone from Almondbank cist II (Stewart and Barclay 1997). It is probable that the Kirkton Food Vessel is of a comparable date to the above examples.

Residue analysis of the Food Vessel

Marcia Taylor

Residue analysis was undertaken on the Food Vessel with the intention of establishing whether it had been utilised prior to burial. Analysis was undertaken on three samples from sherds from the base (sherd K), middle (sherd H) and rim (sherd C) of the vessel using the technique of gas liquid chromatography (GLC) and gas liquid chromatography / mass spectrometry (GLC/MS).

Sherd C: GLC/MS spectra shows the presence of 22 identifiable compounds within the sample taken from Sherd C. This includes 17 saturated and unsaturated lipids. Of these, 10 lipids are present in sufficient quantities to make identification possible without speculation. As well as the lipids there are five discernible alkanes. One other partially identified compound is present, which appears to be a naturally occurring quinone with a molecular weight of 212. Efforts to trace this peak to a certain substance have been unsuccessful.

Sherd H: GLC/MS spectra shows the presence of 11 identifiable compounds in the sample taken from Sherd H. This includes nine saturated and unsaturated lipids. Of these, three lipids are present in sufficient quantities to make identification possible. As well as the lipids there are two discernible alkanes. The rest of the compounds displayed on the graph are accounted for by trace lipids and alkane compounds, impurities and / or phthalates. One such compound which is present in sufficient quantities to discern is Bis (2-ethylhexyl) Phthalate.

Sherd K: GLC/MS spectra shows the presence of 26 identifiable compounds within the sample taken from Sherd K. This includes 22 saturated and unsaturated lipids. Of these, 14 lipids are present in sufficient quantities to make identification possible. As well as the lipids there are four discernible alkanes, one of which is identifiable. The compound with the molecular weight of 212 is present in larger quantities but still without any more specific detail as to its true nature. Its structure consists primarily of dominant ions 212, 197, and 155. As with the previous sherd samples, the rest of the compounds displayed on the graph are accounted for by trace lipids and alkane compounds, impurities and / or phthalates.

Conclusions. The nature of the residues suggest that at some time in the life history of the vessel it had been used as a container. Lipids associated with leaf waxes and seed oils and other vegetable matter are present in the residue samples analysed. Lipids associated with waxes, rather than fats, are present in good degrees of preservation. This suggests they are associated with the vessel's use. A logical method of sealing a porous clay vessel is to smear the interior surface walls with waxes or fats. This is most commonly done when the vessel is to be used to hold or store liquids. Residues resulting from animal sources are not excluded from the Kirkton samples analysed. Lipids indicative of milk and milk fats are present in the samples, although these can equally be attributed to seed oils.

This leads to some speculation that the encrusted deposit visible on the interior is not associated with the use of the vessel but results from depositional or post-depositional process. The unusual opposed pattern of the visible residue tends to support this conclusion. If this patterning is a true reflection of the deposit and not a result of preferential survival conditions then we must seek another explanation for its deposition.

A possible indication of the source of the encrustation could be inferred from the presence of 6-Pentadecenoic acid and Margaric acid. Both these fatty acids have been found to be present in human hair fat along with Arachidic acid (Weitkamp et al 1947). However, some doubt has been cast upon this, with the possibility of Penta-