Cheviot Quarry: Radiocarbon dating
By D Hamilton, P Marshall, C Waddington, C Bronk Ramsey, and G Cook

A total of 43 samples were submitted for radiocarbon dating by Accelerator Mass Spectrometry (AMS) at the Scottish Universities Environmental Research Centre (SUERC), East Kilbride and the Oxford Radiocarbon Accelerator Unit (ORAU). These consisted of 20 samples of charred wood, eight samples of carbonised wheat, six samples of carbonised hazelnut shell, and eight carbonised residues adhering to the interior surface of pottery sherds. The samples submitted to SUERC were prepared using methods outlined Stenhouse and Baxer (1983), combusted to CO_2 (Vandeputte *et al* 1996), converted to graphite (Slota *et al* (1987), and measured as described by Maden *et al* (2007). Those submitted to ORAU were prepared according to methods given in Hedges *et al* (1989), apart from OxA-16070 which was pre-treated (UW) following the method described in Wright *et al* (2001). All the samples were converted to graphite and dated by AMS (Dee and Bronk Ramsey 2000; Bronk Ramsey *et al* 2004). Both laboratories maintain continual programmes of quality assurance procedures, in addition to participation in international inter-comparisons (Scott 2003). These tests indicate no laboratory offsets and demonstrate the validity of the measurements quoted.

The results, given in Tables X.1 and X.2, are conventional radiocarbon ages (Stuiver and Polach 1977), and are quoted in accordance with the international standard known as the Trondheim convention (Stuiver and Kra 1986). The calibrations of these results, relating the radiocarbon measurements directly to calendar dates, have been calculated using the calibration curve of Reimer *et al* (2004) and the computer program OxCal (v3.10) (Bronk Ramsey 1995; 1998; 2001). The calibrated date ranges for these samples are given in Table X.1 and have been calculated using the maximum intercept method (Stuiver and Reimer 1986). They are quoted in the form recommended by Mook (1986), with the end points rounded outwards to 10 years. The graphical distributions of the calibrated dates, given in outline in Figures X.1, X.3, and X.5 are derived from the probability method (Stuiver and Reimer 1993).

General Approach
The Bayesian approach to the interpretation of archaeological chronologies has been described by Buck *et al* (1996). It is based on the principle that although the calibrated age ranges of radiocarbon measurements accurately estimate the calendar ages of the samples themselves, it is the dates of archaeological events associated with those samples that are important. Bayesian techniques can provide realistic estimates of the dates of such events by combining absolute dating evidence, such as radiocarbon results, with relative dating evidence, such as stratigraphic relationships between radiocarbon samples. These 'posterior density estimates', (which, by convention, are always expressed *in italics*) are not absolute. They are interpretative estimates, which will change as additional data become available or as the existing data are modelled from different perspectives.

The technique used is a form of Markov Chain Monte Carlo sampling, and has been applied using the program OxCal (v3.10) (http://units.ox.ac.uk/departments/rlaha), which uses a mixture of the Metropolis-Hastings algorithm and the more specific Gibbs sampler (Gilks *et al* 1996; Gelfand and Smith 1990). Details of the algorithms employed by this program are available from the on-line manual or in Bronk Ramsey (1995; 1998; 2001). The algorithms used in the models described below can be derived from the structure shown in Figures X.1 and X.3.

Objectives and sample selection
The four structures with samples suitable for radiocarbon analysis at Cheviot Quarry were both spatially separated and morphologically different, there being two roundhouses and two rectangular buildings. The site also had numerous pit features that contained Neolithic and Bronze Age pottery including sherds of Carinated Bowl, Impressed Ware, Grooved Ware, Flat Rimmed Ware and Beaker.

The objectives of the dating programme were to:

1) establish a chronology for the features on the site,

2) determine the chronological relationship between the Neolithic pits, the roundhouses, and the rectangular buildings,
3) establish the temporal relationship between the roundhouses,
4) establish the temporal relationship between the rectangular buildings,
5) determine whether the internal features relate to the use of the structures,
6) provide precise dates for pottery styles from the north of England.

The first stage in sample selection was to identify short-lived material, which was demonstrably not residual in the context from which it was recovered. The taphonomic relationship between a sample and its context is the most hazardous link in this process, since the mechanisms by which a sample came to be in its context are a matter of interpretative decision rather than certain knowledge. All samples consisted of single entities (Ashmore 1999). The categories of material selected for dating from Cheviot Quarry were:

- Charcoal from short-lived species - from a context in which it seemed to have been freshly deposited, eg fuel in a hearth
- Charred hazelnut shells — where they formed substantial and discrete deposits likely to represent a single event.
- Residues on well-preserved joining sherds — where the survival of the residue seemed to indicate that the sherds had not been exposed to weathering and the proximity of a number of sherds from the same vessel suggested that the vessel was not redeposited.
- Samples of intrinsic interest — where the context was not the issue, such as residues on pottery sherds to date the pottery style.

Other samples with a less certain taphonomic origin submitted comprised material from the fill of post-holes; interpreted as relating to the use of structures rather than its construction, as suggested by experimental archaeology (Reynolds 1995). Where possible, duplicate samples from these contexts were submitted to test the assumption that the material was of the same actual age.

Model Development and Analysis

Building 4

Duplicate samples were submitted from three postholes, and a fourth which was believed to be associated but is now thought to be a highly truncated feature that is not part of the structure, and has produced a late-Mesolithic date (SUERC-9114; 5740±35BP). Two samples of charcoal were submitted from posthole [346], which forms part of the east-side entrance. The two measurements (SUERC-9109; 2725 ±35 BP and SUERC-9110; 2800±35 BP) are statistically consistent (T'=2.3; v=1; T'(5%)=3.8; Ward and Wilson, 1978) and could therefore be of the same actual age.

One sample of charcoal and one charred seed of emmer wheat were submitted from posthole [363], which forms part of the north-side of the structure. The two measurements (SUERC-9513; 2765 ±35 BP and SUERC-9113; 2745±35BP) are statistically consistent (T'=0.2; v=1; T'(5%)=3.8; Ward and Wilson, 1978) and could therefore be of the same actual age. Two samples of charcoal were submitted from double posthole [348], which lies on the south-side of entrance. The two measurements (SUERC-9111; 2775±35 BP and SUERC-9112; 5015±35BP) are not statistically consistent (T'=1983.7; v=1; T'(5%)=3.8; Ward and Wilson, 1978), suggesting the context contains material of different ages. One sample of charcoal (SUERC-9114) was dated from posthole [369], which appears to form part of the south-side wall. A further four samples were dated from a hearth and pit feature within the structure. A single grain of *Hordeum* sp. and a carbonised residue from [483], a pit feature within the building, produced and could therefore be of the same actual age. Finally, two single grains of carbonised *Hordeum* sp. from the central hearth [342] also gave statistically consistent measurements (T'=0.3; v=1; T'(5%)=3.8; Ward and Wilson, 1978; SUERC-11294; 2795±40BP and OxA-X-2178-15; 2755±55 BP).

The eleven measurements on samples from Building 4 are not statistically consistent (T'=11403.6; v=10; T'(5%)=18.3; Ward and Wilson 1978). However, if the two obvious Mesolithic dates (SUERC-9112 and SUERC-9114) are excluded, the remaining nine measurements are statistically consistent (T'=8.1; v=8; T'(5%)=15.5) suggesting that these samples could all be of the same age.

Building 5

Duplicate samples were submitted from four postholes and a single sample from the hearth [306] of Building 5. Due to the damage caused during the stripping of the site, the four postholes all make up the porch, as these were the best-preserved and most-intact features. One sample of charcoal and one grain of carbonised *Hordeum* sp. were submitted from posthole [489]. The two measurements (SUERC-9101; 2805±35 BP and SUERC-9100; 2850±35 BP) are statistically consistent (T'=0.8; v=1; T'(5%)=3.8; Ward and Wilson, 1978) and could therefore be of the same actual age. Two samples of charcoal were submitted from posthole [312]. The two measurements (SUERC-9094; 2820±35 BP and SUERC-9093; 2795±35 BP) are statistically consistent (T'=0.3; v=1; T'(5%)=3.8; Ward and Wilson, 1978). Two samples of charcoal were submitted from posthole [308], the measurements (SUERC-9092; 2785±35 BP and SUERC-9091; 2735±35 BP) are also statistically consistent (T'=1.0; v=1; T'(5%)=3.8; Ward and Wilson, 1978). Finally the two samples of charcoal submitted from posthole [316] (SUERC-9098; 2855±35 BP and SUERC-9099; 2790±35 BP) are statistically consistent (T'=2.0; v=1; T'(5%)=3.8; Ward and Wilson, 1978) and could therefore be of the same actual age.

A single measurement (OxA-X-2178-14; 2785±75 BP) came from the residue adhering to the interior of a sherd of Late Bronze Age Flat Rimmed ware, one of 16 sherds from the hearth [306].

All nine measurements from Building 5 are statistically consistent (T'=8.6; v=8; T'(5%)=15.5; Ward and Wilson 1978) and suggests that these samples could all be of the same actual age. A chi-square test of the eighteen measurements on all of the non-residual material from the roundhouses shows that they are statistically consistent (T'=25.6; v=17; T'(5%)=27.6; Ward and Wilson 1978) and suggests that these two buildings might be of the same actual date.

Building 1

Building 1 is made up of nineteen postholes. Duplicate samples were submitted from four postholes, although one sample from each posthole failed at pre-treatment due to yielding insufficient carbon. This was all the suitable material, for radiocarbon analysis, so no replacement samples could be submitted. One sample of charcoal (SUERC-9104) was dated from posthole [029], which forms part of the east gable wall. One sample of charcoal (SUERC-9104) was dated from posthole [037], which is an entrance post in the south wall. One sample of charcoal was dated from postholes [017] (SUERC-9102) and [019] (SUERC-9103), which are positioned next to one another and form part of the north wall.

The four measurements on samples from Building 1 are not statistically consistent (T'=882.0; v=3; T'(5%)=7.8; Ward and Wilson 1978). However, by excluding SUERC-9104 and SUERC-9108, the remaining two measurements are statistically consistent (T'=0.8; v=1; T'(5%)=3.8; Ward and Wilson 1978). The removal of these two Bronze Age measurements in favour of the 'Dark Age' measurements is based upon the spatial proximity and morphological similarity of Building 1 and Building 2, which with nearly twice as many measurements has been attributed to the 'Dark Ages'.

Building 2

Building 2 is made up of twenty postholes. Duplicate samples were submitted from four postholes, although one sample failed from posthole [057]. Two samples of *Hordeum* sp. were submitted from posthole [053], which is centrally located in the south wall. The two measurements (SUERC-8959; 1520±35 BP and OxA-15545; 1517±26 BP) are statistically consistent (T'=0.0; v=1; T'(5%)=3.8; Ward and Wilson, 1978) and could therefore be of the same actual age. Two samples of charcoal were submitted from posthole [047], which lies to the west end of the south wall. The two measurements (SUERC-8960; 1545±35 BP and OxA-15546; 1531±27 BP) are statistically consistent (T'=0.1; v=1; T'(5%)=3.8; Ward and Wilson,

1978) and could therefore be of the same actual age. One sample of charred *Hordeum* sp. (SUERC-8962) was dated from posthole [057], which is centrally located in the north wall. Two samples of charcoal were submitted from posthole [107], which is centrally located in the north wall, next to [057] and opposed to [053]. The two measurements (SUERC-8961; 2315±35 BP and OxA-15547; 2290±29 BP) are statistically consistent (T'=0.3; v=1; T'(5%)=3.8; Ward and Wilson, 1978) and could therefore be of the same actual age.

The seven measurements from Building 2 are not statistically consistent (T'=890.4; v=6; T'(5%)=12.6; Ward and Wilson 1978). However, if the two measurements from posthole [107] are excluded as being residual Iron Age material, the remaining samples are statistically consistent (T'=2.1; v=4; T'(5%)=9.5; Ward and Wilson 1978). The model in Figure X.3 has therefore excluded both SUERC-8961 and OxA-15547. A chi-square test of the seven measurements on all of the non-residual material from the rectangular buildings shows that they are statistically consistent (T'=7.4; v=6; T'(5%)=12.6; Ward and Wilson 1978) and suggests that these two buildings might be of the same actual date.

Pottery

Eight radiocarbon determinations were made on carbonised residues adhering to the interior surfaces of pottery sherds. To test the accuracy and consistency of the residue dates and purported associated material (ie, hazelnut shells), duplicate samples from the same pit fill were submitted. The two contexts that this material came from were clearly single event "structured deposits" with well over 50 pottery sherds and numerous hazelnut shells.

Pit F031 [052] contained 85 Carinated Bowl sherds and over 1000 hazelnut shells. Two samples were submitted, a carbonised residue and hazelnut shell. The two results (OxA-16068; 4999±32 BP and OxA-16069; 4906±34 BP) are not statistically consistent (T'=4.0; v=1; T'(5%)=3.8; Ward and Wilson 1978). They are, however, consistent at the 99% critical value (T'(1%)=6.6), and this slight inconsistency is likely due to random statistical scatter on the measurements. Therefore, it is possible that these two samples could be of the same actual age.

Pit F009 [051] contained 63 Carinated Bowl sherds and numerous hazelnut shells. Two samples were submitted, one each of carbonised residue and hazelnut shell. The two results (OxA-16097; 4933±35 BP and OxA-16162; 4348±34 BP) are not statistically consistent (T'=143.7; v=1; T'(5%)=3.8; Ward and Wilson 1978) and are therefore of different ages. However, the date for the carbonised residue on the Carinated Bowl sherd is much later than would be expected for this pottery type.

The reasons for this are twofold; firstly inaccurate measurements on carbonised residues are still apparent in results that are both too old and too young for the pottery types from which they come. This suggests that we do not still have an adequate understanding of the chemistry of carbonised residues used for dating. This is not a site specific problem at Cheviot Quarry but a methodological problem inherent in the dating of carbonised residues from any site/period. Secondary carbon contamination may have occurred through the absorption of younger humic acids (Hedges *et al* 1992). Secondly, our archaeological understanding of chronological changes in fabric types might be flawed, although this might in part be due to a paucity of excavated sites with large assemblages of Neolithic pottery in this part of the country

Although the Grooved Ware had no visible residues, this pottery style was dated by submitting duplicate charred hazelnut shells from the same deposit, where the hazelnuts were clearly associated and thought to be part of the same depositional event. Pit F2133 [2133] contained 10 Grooved Ware sherds and a small number of hazelnut shells. Two hazelnut shells were submitted for dating from this context. The two measurements (OxA-16070; 4152 ±31 BP and SUERC-11295; 4130 ±35 BP) are statistically consistent (T'=0.2; v=1; T'(5%)=3.8; Ward and Wilson 1978) and could therefore be of the same actual age. Pit F2168 [2168] contained three Grooved Ware sherds and a small number of carbonised hazelnut shells. The two measurements, on hazelnut shells, (OxA-16096; 4177±33 BP and SUERC-11296; 4250±35 BP) are statistically consistent (T'=2.3; v=1; T'(5%)=3.8; Ward and Wilson 1978) and could therefore be of the same age. Pits F031 and F009 were located to the immediate SW of the roundhouses. Pits F2133 and F2168 were located immediately (less than 1 metre) east of Building 3.

Two charred barley grains from a significant amount of charred organic material (including 89 barley grains) were submitted from hearth [342] to date the associated Flat Rimmed Ware ceramic vessel (5 sherds from the same vessel). The two measurements are statistically consistent (T'=0.3; v=1; T'(5%)=3.8; Ward and Wilson, 1978; SUERC-11294; 2795±40 BP and OxA-X-2178-15; 2755±55 BP).

The pottery samples from the MAP excavations are from the Cheviot Quarry South area.

Discussion of Results

The models shown in Figures X.1 and X.3 share the underlying assumption that the samples selected from postholes, hearths, and pits come from continuous phases of activity (ie, the use of individual structures). While the Bayesian models allow us to provide estimates for specific archaeological events, the truncated nature of the archaeological deposits only really allows us to give minimum estimates for the start, end, and span use of individual structures.

Buildings 4 and 5

The model and results for the Roundhouses, Buildings 4 and 5, are shown in Figures X.1–X.2. This model (Fig X.1) shows good overall agreement ($A_{overall}$=109.5%; A'=60.0%) and provides an estimate for the start of use of Building 5 of *1080–920 cal BC* (*95% probability*; *start_Building 5*; Fig X.1) and end of *980-820 cal BC* (*95% probability*; *end_Building 5*; Fig X.1). It was in use for a minimum of *1–210 years* (*95% probability; Span Building 5;* Fig X.2), and probably *1–110 years* (*68% probability*).

The use of Building 4 is estimated to have started in *1020–850 cal BC* (*95% probability*; *start_Building 4*; Fig X.1) and ended of *910-790 cal BC* (*95% probability*; *end_Building 4*; Fig X.1). The model suggests it was in use for a minimum of *1–200 years* (*95% probability; Span Building 4* Fig X.2), and probably *1–110 years* (*68% probability*).

Further analysis of the results shows it is 86.9% probable that Building 5 was constructed before Building 4 and 88.8% probable that it went out of use first as well. Although Building 4 was probably constructed before Building 5 went out of use (65.7% probability).

Buildings 2

The model and results for the Rectangular Buildings 1 and 2 are shown in Figures X.3–X.4. This model (Fig X.3) shows good overall agreement ($A_{overall}$=116.6%; A'=60.0%) and provides estimates for the start of activity associated with Building 2 of *cal AD 330–570* (*95% probability*; *start_Building 2;* Fig X.3) and end of *cal AD 450–700* (*95% probability*; *end_ Building 2*; Fig X.3). The structure is estimated to have been in use for a minimum of *1–310 years* (*95% probability*; *Span Building 2;* Fig X.4), and probably for *1–140 years* (*68% probability*).

Pottery

The model shown in Figure X.5 assumes a simple typological sequence from Carinated Bowl to Impressed Ware, Grooved Ware, Beaker, and eventually Flat Rimmed Ware. The model has poor agreement ($A_{overall}$=0.0%). This is because of either the late date on a sherd of Carinated Bowl (OxA-16162) or an early date on a sherd of Impressed Ware (OxA-16099). If either result is excluded from the model, for reasons stated above, then the model does show good overall agreement. With the current data it is not possible to confidently determine that one or both results is incorrect, but these data are an excellent beginning to the development of a absolutely dated typological sequence for Neolithic–Bronze Age pottery in north-eastern England.

Table X.1: Radiocarbon dates from Cheviot Quarry

Laboratory Number	**Sample ID**	**Material**	**$\delta^{13}C$ (‰)**	**Radiocarbon Age (BP)**	**Calibrated Date (95% confidence)**	***Posterior density estimate (95% probability)***
Building 1						
SUERC-9104	2029/520/2	charcoal, *Salix/Populus* sp.	-24.6	2795±35	1030–840 cal BC	–
SUERC-9108	2037/315/1	charcoal, *Corylus avellana*	-26.2	2735±40	980–800 cal BC	–
SUERC-9102	2017/413/1	charcoal, *Corylus avellana*	-26.9	1620±35	cal AD 340–540	–
SUERC-9103	2019/340/1	charcoal, *Corylus avellana*	-27.0 *	1565±50	cal AD 390–610	–
Building 2						
SUERC-8959	2053/274/1	hulled *Hordeum* sp.	-23.8	1520±35	cal AD 430–620	*cal AD 430–600*
OxA-15545	2053/274/2	*Hordeum* sp.	-24.4	1517±26	cal AD 430–610	*cal AD 430–600*
SUERC-8960	2047/322/1	charcoal, *Corylus avellana*	-29.0	1545±35	cal AD 420–600	*cal AD 430–580*
OxA-15546	2047/322/2	charcoal, *Salix/Populus* sp.	-25.4	1531±27	cal AD 430–600	*cal AD 430–590*
SUERC-8961	2107/376/1	charcoal, *Salix* sp.	-24.9	2315±35	410–260 cal BC	–
OxA-15547	2107/376/2	charcoal, indeterminate	-26.2	2290±29	400–230 cal BC	–
SUERC-8962	2057/400/2	hulled *Hordeum* sp.	-22.7	1575±35	cal AD 400–570	*cal AD 430–570*
Building 4						
SUERC-9109	346/117/1	charcoal, *Betula* sp.	-27.9	2725±35	970–800 cal BC	*930–820 cal BC*
SUERC-9110	346/117/2	charcoal, *Corylus avellana*	-25.6	2800±35	1050–840 cal BC	*970–840 cal BC*
SUERC-9111	348/69/1	charcoal, Pomoideae	-25.5	2775±35	1010–830 cal BC	*970–830 cal BC*
SUERC-9112	348/69/2	charcoal, *Corylus avellana*	-26.2	5015±35	3950–3700 cal BC	–
SUERC-9513	363/81/3	charcoal, *Corylus avellana*	-25.6	2765±35	1010–820 cal BC	*970–830 cal BC*
SUERC-9113	363/82/2	Emmer	-23.0	2745±35	980–810 cal BC	*940–830 cal BC*
SUERC-9114	369/89/2	charcoal, *Quercus* sp., twig	-27.1	5740±35	4690–4490 cal BC	–
SUERC-11294	342/2	*Hordeum*	-24.9	2795±40	1050–830 cal BC	*970–840 cal BC*
OxA-X-2178-15[1]	342/1	*Hordeum*	-28.3	2755± 55	1020-800 cal BC	*960-830 cal BC*
OxA-16066	483/1	*Hordeum*	-25.4	2759±30	1000–820 cal BC	*940–830 cal BC*
OxA-16067	483/2	carbonised residue	-25.9	2693±30	910–800 cal BC	*920–820 cal BC*
Building 5						

[1] This sample yielded only 129 micrograms of carbon from the combustion of just under 10mg of pretreated material which is at the absolute limits of ORAU smallest sized graphites. The graphite produced yielded low target current during measurement of 4.7 microAmps which resulted in a higher than usual standard error.

SUERC-9101	489/161/2	hulled *Hordeum* sp.	-24.2	2805±35	1050–840 cal BC	*1010–900 cal BC*
SUERC-9100	489/161/1	charcoal, *Corylus avellana*	-27.6	2850±35	1130–910 cal BC	*1030–910 cal BC*
SUERC-9094	312/156/2	charcoal, *Salix/Populus* sp.	-25.8	2820±35	1060–890 cal BC	*1010–900 cal BC*
SUERC-9093	312/156/1	charcoal, *Corylus avellana*	-27.0	2795±35	1030–840 cal BC	*1000–900 cal BC*
SUERC-9092	308/127/2	charcoal, *Corylus avellana*	-26.4	2785±35	1020–830 cal BC	*1010–890 cal BC*
SUERC-9091	308/127/1	charcoal, *Corylus avellana*	-25.4	2735±35	980–810 cal BC	*1000–870 cal BC*
SUERC-9098	316/150/1	charcoal, *Corylus avellana*	-27.5	2855±35	1130–910 cal BC	*1030–910 cal BC*
SUERC-9099	316/128/2	charcoal, *Corylus avellana*	-27.7	2790±30	1020–840 cal BC	*1010–900 cal BC*
OxA-X-2178-14[2]	306/2	carbonised residue	-31.6	2785±75	1130-800 cal BC	*1020-880 cal BC*

* assumed $\delta^{13}C$

[2] This sample produced a low carbon yield (245 micrograms) and low target current of 8.3 microAmps.

Table X.2: Radiocarbon results from carbonised residues and charred plant remains associated with specific depositional events that included pottery from Cheviot Quarry

Laboratory Number	**Sample ID**	**Material & Pottery Type/ Associated Pottery Type**	δ^{13}**C (‰)**	**Radiocarbon Age (BP)**	**Calibrated Date (95% confidence)**	***Posterior density estimate (95% probability)***
OxA-X-2178-14	306/2	carbonised residue; Flat Rimmed Ware	-31.6	2785±75	1130-800 cal BC	*1020-880 cal BC*
OxA-16066	483/1	*Hordeum;* Flat Rimmed Ware	-25.4	2759±30	1000–820 cal BC	*940–830 cal BC*
OxA-16067*	483/2	carbonised residue Flat Rimmed Ware	-25.9	2693±30	910–800 cal BC	*920–820 cal BC*
OxA-X-2178-15	342/1	*Hordeum;* Flat Rimmed Ware	-28.3	2755± 55	1020-800 cal BC	*960-830 cal BC*
SUERC-11294	342/2	*Hordeum;* Flat Rimmed Ware	-24.9	2795±40	1050–830 cal BC	*970–840 cal BC*
OxA-16163[3]	MAP/Pot 1	carbonised residue; Beaker	-25.8	3625±40	2140–1880 cal BC	
OxA-16070	2133/1	Hazelnut; Grooved Ware	-23.7	4152±31	2880–2600 cal BC	
SUERC-11295	2133/2	Hazelnut; Grooved Ware	-24.4	4130±35	2880–2570 cal BC	
OxA-16178	MAP/F219/1	carbonised residue Impressed Ware	-27.2	4148±32	2880–2580 cal BC	
OxA-16098*	MAP/F219/2	carbonised residue Beaker	-27.8	4155±33	2880–2580 cal BC	
OxA-16096	2168/1	Hazelnut; Grooved Ware	-23.3	4177±33	2890–2630 cal BC	
SUERC-11296	2168/2	Hazelnut; Grooved Ware	-26.0	4250±35	2920–2760 cal BC	
OxA-16097	051/1	Hazelnut Grooved Ware	-26.5	4933±35	3790–3640 cal BC	
OxA-16162	051/2	carbonised residue Carinated bowl	-27.4	4348±34	3090–2890 cal BC	
OxA-16099*	MAP/F204	carbonised residue Carinated bowl	-27.4	4870±40	3710–3530 cal BC	
OxA-16068	052/1	Hazelnut; Carinated bowl	-24.2	4999±32	3940–3700 cal BC	
OxA-16069*	052/2	carbonised residue Carinated bowl	-27.2	4906±34	3770–3630 cal BC	

* Pot residues extracted from the surfaces of these samples produced very high yields of carbon (between 42-63% on combustion) which is much higher than usual.

[3] The measurable carbon obtained from combustion of this sample was very low (480 micrograms) and there was an offset between the δ^{13}C value measured on the AMS and that measured on the mass spectrometer.

Figure X.1: Probability distributions of dates from Cheviot Quarry Roundhouses: each distribution represents the relative probability that an event occurs at a particular time. For each of the radiocarbon dates two distributions have been plotted, one in outline, which is the result of simple radiocarbon calibration, and a solid one, which is based on the chronological model used. A question mark (*?*) indicates that the result has been excluded from the model The large square brackets down the left hand side along with the OxCal keywords define the model exactly.

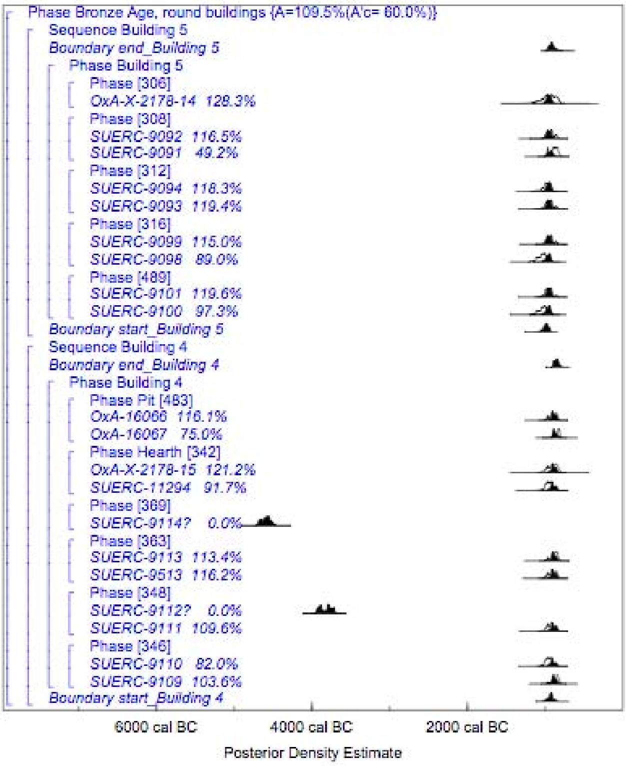


Figure X.2: Probability distribution of the number of years during which the Cheviot Quarry Roundhouses were in use. The distribution is derived from the model defined in Figure X.1.

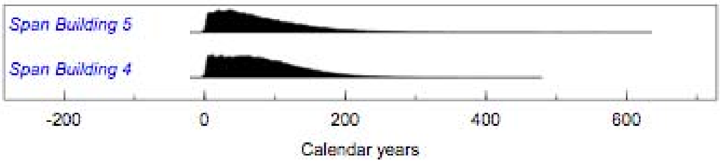


Figure X.3: Probability distributions of dates from Cheviot Quarry Rectangular Buildings: each distribution represents the relative probability that an event occurs at a particular time. For each of the radiocarbon dates two distributions have been plotted, one in outline, which is the result of simple radiocarbon calibration, and a solid one, which is based on the chronological model used. A question mark (?) indicates that the result has been excluded from the model The large square brackets down the left hand side along with the OxCal keywords define the model exactly.

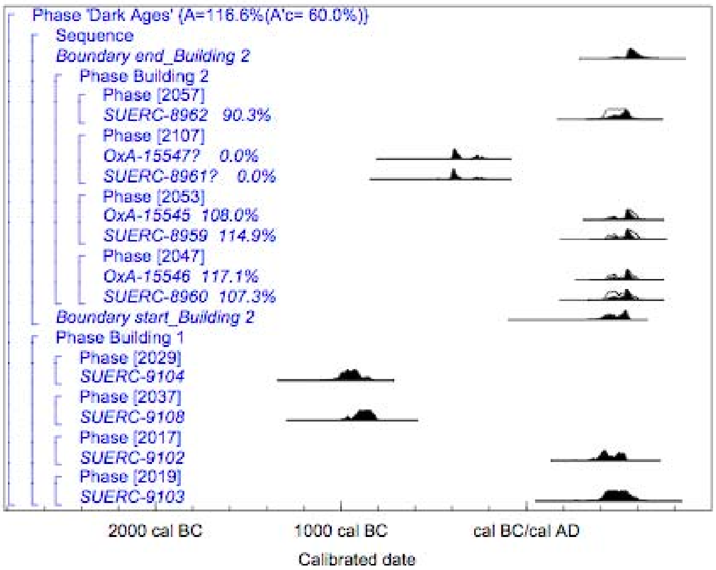


Figure X.4: Probability distribution of the number of years during which the Cheviot Quarry Building 2 was in use. The distribution is derived from the model defined in Figure X.3.

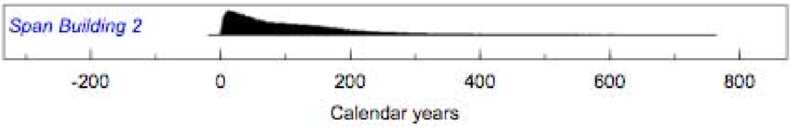
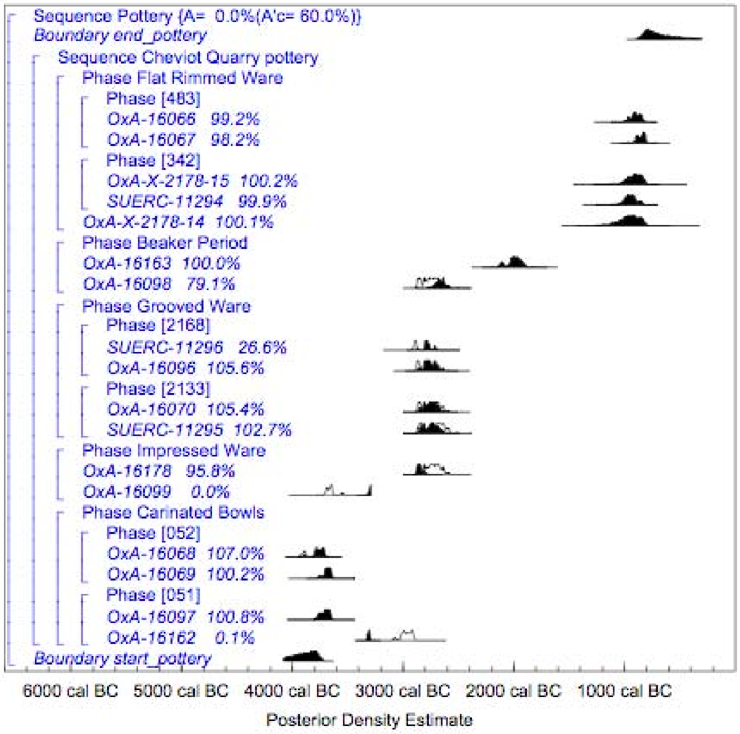


Figure X.5: Probability distributions of dates from Cheviot Quarry ceramics: each distribution represents the relative probability that an event occurs at a particular time. For each of the radiocarbon dates two distributions have been plotted, one in outline, which is the result of simple radiocarbon calibration, and a solid one, which is based on the chronological model used. The large square brackets down the left hand side along with the OxCal keywords define the model exactly.



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