PRELIMINARY REPORT ON PHASES 2 AND 3 OF THE SITE ASSESSMENT OF CLATWORTHY RESERVOIR, WEST SOMERSET

APRIL - MAY, 2005

1.0 - INTRODUCTION

This report is the result of field survey and evaluation excavation at the bloomery iron-smelting site at Clatworthy Reservoir undertaken in May 2005 as part of the author's doctoral research on Romano-British metal production in the Exmoor region. The work formed the second and third stages of an assessment of the site, the first portion of which comprised earthwork and field survey of the evidence below the waterline of the reservoir along its south western shore. This phase was undertaken during a period of exceptionally low water levels during September and October 2003 and reported on in Newman (2003) and Bray (2003).

Clatworthy Reservoir is situated on the headwaters of the River Tone in the parish of Clatworthy, West Somerset at NGR ST 040 310, 3 km south of the Brendon Hills and approximately 20 km west of Taunton (Figure 1). The local topography consists of a series of relatively steep-sided valleys which were flooded in 1960 by the construction of the reservoir (Dunning 1985, 31). The southernmost part of the reservoir is situated in a valley that, in Domesday Book is associated with the place name *Syndercoma* (Hill 1914, 48-49). The *Synder-* element of this name is derived from the Anglo Saxon *sinder*, meaning slag, and indeed several deposits of iron-smelting debris were revealed when the reservoir was under construction during the late 1950s. The place name evidence implies this material was known about and was of some antiquity during the 11th century. Finds of Romano-British pottery associated with surface deposits of slag both during the construction of the reservoir (Somerset HER No. 35065) and subsequently by a variety of fieldworkers including M. Aston, S.Ratsey and the author support this.

Archaeological remains are present along at least 500 metres of the southern shore of the reservoir between NGR ST 0335 3055 and 0380 3070 (Figure 2). Phase 1 of

the assessment revealed a number of discrete deposits of iron-smelting waste. These included several (G to K on Figure 2) that had previously been unknown and were revealed by the low water levels at the time the surveys were undertaken. These appeared from the surface evidence to be either heavily disturbed or secondary deposits and will not be discussed further here (see Bray 2003, 6 for a detailed examination) as Phases 2 and 3 of the site assessment focus on the evidence present above the reservoir waterline. Here Phase 1 revealed six deposits of smelting waste (A to F on Figure 2) situated along the same contour of the pre-reservoir valley side. These appear relatively undisturbed and are probably *in situ*, primary deposits of smelting waste although it was not possible to confirm this by field survey alone.

The Phase 1 investigation also highlighted the question of the relative date of the various deposits of smelting waste. At that time Romano-British pottery had been recovered in association with surface scatters of material from E and F suggesting these had been produced by smelting at that time, but none had been confirmed in the vicinity of deposits A, B, C and D. Concluding that all the deposits were the result of contemporaneous activity was thus problematic as it was possible that A, B, C and D were the result of smelting activity either before or after the Roman period. However, subsequent field visits to the site resulted in the recovery of part of a Romano-British flagon handle from the surface at deposit A suggesting it too dated to that period. This ceramic evidence, combined with the arrangement of the slag heaps in a line along the valley side as if they were part of a single working system, strengthens the argument that all the deposits date to the Roman period.

2.0 - PHASE 2 – FIELD SURVEY

2.1 - OBJECTIVES

Phase 2 of the site assessment program consisted of field survey above the waterline of the reservoir with two main objectives.

1) To carry out a reconnaissance survey of the entire reservoir in order to detect any evidence of additional smelting locations around its shoreline.
2) To examine the valley sides above the archaeological remains defined during Phase 1 using more intensive field survey in order to determine the visible limits of the site in this direction and, more specifically, to investigate the finds

of slag and evidence for iron mining reported in the Somerset HER (No: 33469).

2.2 - RESULTS

The survey of the entire reservoir edge undertaken as part of this phase did not discover any further evidence for smelting activity although it must be emphasised that work was only carried out at a reconnaissance level. In particular, the survey was carried out during January 2005 at a time when the reservoir was full. It is thus possible that evidence lying just below the water level may have been concealed. This is particularly the case along the northern shore of the reservoir opposite the area surveyed in Phase1 where S. Ratsey (*pers. comm.*) has reported the recovery of fragments of slag.

More intensive field survey of the valley sides to the south of the area investigated during Phase 1, centring on Waysdown Copse (NGR ST 035 303), was undertaken during April 2005. Part of the objective of this work was to attempt to define the southern limits of activity associated with the smelting on the site and this started by examining the area immediately upslope from the deposits. No further evidence was observed to the south of deposits D, E and F or A and B, except for a single small tap slag fragment in a mole hill to the south of B, although in the case of the latter two the area has been heavily disturbed by the construction and use of the now-demolished Westcott Farm (NGR ST 033 304).

To the south of area C fragments of slag were found in ground disturbed by animals over an area of at least ten metres diameter and in the bed of the stream at this point which flows north and empties into the reservoir just to the west of Deposit C (Figure 3). This area is situated in a wide, shallow platform-like depression in the hill slope that may be artificial and has potentially been obscured by hill wash. Approximately ten metres upstream from the area of the slag scatter the bed of the stream contained no slag, but fragments of quartz, up to 25 cm in size, which could represent debris and waste from ore processing operations, were present eroding from the stream bank. This evidence suggests that Deposit C on the edge of the reservoir may be just the most obvious archaeological expression of a larger working area that may have included both smelting and ore processing that may be relatively well-preserved.

No further evidence of smelting was recovered anywhere in the survey area though the Somerset HER (No. 33469) states that slag was discovered in the area during ditch digging associated with Westcott Farm. It is possible that this reference concerns slag from either the area described above or Deposits A and B.

Another objective of this phase of field survey was to investigate the claim made in the same entry of the Somerset HER of evidence for iron mining in Waysdown Copse in the vicinity of NGR ST 033 303. This area contains a number of large-scale excavations, the largest, at NGR ST 03236 30260, measuring approximately 30 x 30 metres and at least 100 metres deep. Most of these features possessed a distinctive 'balloon-shaped' morphology consisting of a wide and sometimes deep main excavation approached by a narrow, rock-cut trench up to 2-3 metres wide. Adjacent to the largest excavation was a shaft, possibly that referred to in HER No. 33469.

A number of other features were associated with these excavations including dumps of broken rock deposited in a down slope direction which, in the case of the excavation at NGR ST 03244 30267, took on the form of an elongated ridge, forming a spur on the valley side which was around 25 metres long. This feature was also associated with extensive dry-stone walling and revetting clustered around its entrance and standing up to 2 metres high which appeared to include the remains of rectilinear buildings. Also present in this area were a number of tracks in various stages of disuse bearing different stratigraphic relationships to the other features in the landscape. One, running east-west along the base of the valley side appeared to be associated with a boundary wall but was concealed under dumped rock from the excavations and also had mature trees growing from its surface implying it was one of the oldest extant features in the landscape. Further south, up the valley side another track, cut into the rock in places and also trending east-west, cuts across the narrow entrance of one of the excavations on an embankment at NGR ST 03370 30315. It then continues, leading to three more excavations in succession, before ending at the largest at NGR ST 03236 30260. This track appears to be associated with the work carried out at the excavations but its stratigraphic relationship with the first suggests all were not in operation simultaneously.

During the survey no evidence of mineralisation of any kind was detected with the exception of a vein of quartz measuring a few centimetres in width in the excavation at NGR ST 03370 30315. In addition, the long axes of the excavations was orientated roughly north-south at right angles to the normal trend of mineralisation in

the Exmoor region which is approximately east-west. Finally, all the workings were in well-cleaved, silver-grey slates with their long axes running parallel to the cleavage planes, suggesting that slate was the resource being exploited, not iron.

2.3 - SUMMARY

While this phase of site assessment did not reveal additional evidence for iron smelting in Waysdown Copse as suggested by Somerset HER No. 33469, it has provided more detailed definition of the southern limits of the smelting area already studied. Although no further evidence was apparent to the south of most of the waste heaps along the reservoir edge, an extensive scatter of slag and also of quartz was located upslope from deposit C suggesting the possible survival of an associated working area and a more extensive waste dump than indicated in the Phase 1 surveys.

The results of Phase 2 also call into question the presence of iron mining remains in Waysdown Copse. Instead an industrial landscape has been revealed involving the reasonably large-scale extraction of slate, although the date of this activity is unknown, the apparent scale would suggest it belonged to the post-medieval period. More intensive survey and research will probably reveal the answers to this question and others.

3.0 - PHASE 3 – EVALUATION EXCAVATION

3.1 – OBJECTIVES AND METHODOLOGY

The objective of this phase was threefold:

1) To examine the degree to which the conclusion of the Phase 1 survey, that slag heaps A to F were primary, *in situ* deposits, was correct.
2) To obtain stratified dating evidence either in the form of artefacts or charcoal suitable for radiometric methods as, even where it was available, all dating evidence thus far had been derived from unstratified finds recovered from the surface scatters of debris associated with the slag deposits.
3) To obtain samples of technological debris for comparison with similar material derived from other smelting sites in the Exmoor region by the work of the Exmoor Iron Project.

The original strategy envisaged for this phase consisted of the excavation of a series of small test pits measuring 1 x 2 metres in as many of the smelting waste deposits as possible with priority being given to heaps B, C and D, from which Romano-British pottery had not been recovered. However, such a strategy would have resulted in unacceptable levels of disruption of other activities occurring at the reservoir and it was decided to concentrate efforts on deposit C, investigating it on a slightly large scale.

Between the edge of the reservoir and the track deposit C was visible as a low, domed earthwork bounded on the west by a small stream and on the east by a shallow depression and a mound of material around 1.5 to 2 metres high thought, but not confirmed, to be associated with construction of the track (Figures 3 and 4). In order to fulfil the overall objectives of the excavation and maximise the information obtained two adjoining trenches at right angles to each other were dug:

1) Trench C1, 4 metres long and 1 metre wide, was oriented north west to south east on the edge of, and running parallel to, the shallow depression bounding deposit C to the east. This position had the advantages of avoiding excessive disturbance of other users of the reservoir and also obtaining a section through the edge of Deposit C parallel to its long axis which, it was suspected, corresponded to the direction of tipping.
2) Trench C2, 5 metres long and 1 metre wide, adjoined Trench C1 at right angles 1 metre from its northern end, running across the shallow depression and into the edge of the mound of material adjacent to the track on its eastern side. This trench allowed the component layers of Deposit C exposed in Trench C1 to be traced in another dimension and an qualitative estimate of the size of each to be made. Additionally it was aimed at investigating the nature of the shallow depression and potentially the edge of Deposit C while simultaneously enabling the nature of the eastern mound of material to be examined.

3.2 – EXCAVATION RESULTS

The excavation cut through a series of well-stratified layers of smelting waste constituting the flank of Heap C, thus fulfilling the first objective of the work by proving the primary, *in situ* character of the deposit. The second and third objectives were met by collecting selected samples from the deposits encountered; the charcoal employed for radiometric dating will be discussed below. Unfortunately, the stratigraphic sequence, with a minimum thickness of 1.8 metres, was deeper than

anticipated and, due to limited time and resources, and safety considerations, it was not possible to reach the natural subsoil beneath the waste heap.

3.22 – The Technological Process

An appreciation of the metal production process is absolutely essential in the investigation of the archaeological deposits it produces. The integration of such an understanding of the stages of the technological process, and the characteristic waste produced by each, into the interpretation of stratigraphic sequences of such material has the potential to add considerable depth to analysis and even provide insight into the nature of the local production process. To this end a notional technological sequence of bloomery iron smelting is outlined below which was used in the interpretation of the stratigraphic sequences encountered during the excavation. It should be emphasised that this sequence is idealised and is unlikely to occur in a perfect, fully-realised form in the archaeological record due to a variety of factors such as local variations in the technological process, dumping of material in different places on the waste heap and disturbance of the deposits during the period of the site's operations.

1) *Furnace Construction/Repair*. This stage may involve excavation of settings for furnaces and the processing of clay for the construction of furnace walls. Deposits that may result from this included re-deposited natural sediments and rock and unused clay, with technological debris of any sort being largely absent.
2) *Smelting*. The evidence from Clatworthy Reservoir and other Roman-period smelting sites in the Exmoor region, such as Brayford, Sherracombe Ford and Blacklake Wood, is unanimous in indicating that iron was produced in furnaces that permitted the slag to be tapped during smelting. This may have occurred several times during the operation, creating a build-up of tap slag close to the furnace that it may have been necessary to break up and discard. This would result in deposits in which the major component consisted of fragmented tap slag.
3) *Bloom Extraction*. When smelting was complete the resultant iron bloom was extracted from the furnace. Again, by analogy with furnaces of the period both locally and in Britain generally, this was accomplished by breaking the furnace open, partially destroying it. This would produce deposits dominated by fragmented, fired clay showing oxidation and reduction colours and, potentially, vitrification, accompanied by furnace slags and charcoal.

4) *Cleaning.* Furnaces and their settings were often re-used for multiple smelting operations so, after the iron bloom had been extracted and the major detritus cleared, it may have been necessary to complete the process by sweeping away the finer debris. Such material would create deposits of smaller fragments of slag and furnace wall, dominated by fine charcoal.

Of course it should also be remembered that other stages of the iron production process may have occurred at Clatworthy Reservoir including ore roasting, bloom smithing or even artefact production all of which have the potential to leave their archaeological trace. However, field observation suggested that the stratigraphic sequence investigated was dominated by debris from smelting though further, more intensive, analysis of samples may detect evidence of other processes.

3.22 – Deposit Classification

The contexts uncovered can be divided into two general categories:

1) Those that are the direct result of iron smelting and are thus dominated by technological debris.
2) Those that are the result of other activity.

Examination of the character of the deposits in the first group revealed some compositional patterns that permitted them to be classified as below and interpreted in terms of the stage of the iron smelting process that produced them. It should be noted that the percentages quoted are assessments made visually in the field and are not based on quantitative analysis which may eventually yield more information than is available here.

I. *Slag Dumps*. These deposits are typically composed of at least 50% inclusions which consist of at least 60% fragments of slag and are also characterised by frequent of voids. The tops of such contexts were often finer than the remainder and rich in charcoal though, except in the case of context 23, this pattern was not sufficiently consistent to warrant separation of this material into separate contexts. Such dumps are interpreted as material discarded during or shortly after smelting operations in a single event of short duration.
II. *Furnace Debris Dumps*. These contexts again represent a well-defined portion of the smelting process. They comprise at least 70% matrix consisting of homogenous sand which shows strong orange and grey oxidation and

reduction colours. Concreted lumps of this material form inclusions within the matrix and imply that the latter is the result of post-burial composition of fragments of furnace wall and lining. Other inclusions consist of stone, slag and charcoal. This material in interpreted as the result of bloom extraction as described in section 3.21 (above).

III. *Charcoal-Rich Mixed Debris Dumps*. Two contexts, 3 and 23, of this general type were encountered. Both consisted of at least 60% matrix which contained a high proportion of charcoal while the inclusions were composed of slag, and furnace lining but were dominated by larger fragments of charcoal. As has been noted, context 23 appears to be a well-developed form of the finer, charcoal-rich material that often forms the very tops of the slag dump contexts described above. As such it may also represent a single event during the smelting process, perhaps the cleaning up and discard of fine material at the very end of the smelting process (see Section 3.21 above), before another is started. This conclusion is supported by the position of 23, and similar material, overlying slag dump contexts that are composed of coarser debris, and underneath context 21 which appears to be a laid floor (see below).

IV. *Slag-Rich Mixed Debris Dumps.* These deposits are similar to the slag dumps already described (see I above) but contain a higher proportion of fine material consisting of at least 60% matrix. Inclusions also tend to be smaller though still dominated by slag and voids are rare. These deposits are difficult to interpret, but perhaps represent longer term events in the sequence of activity on the site. One possibility is that they represent a period during which direct dumping of waste material was occurring outside the area of the excavation and they are the result of a more gradual accumulation through smaller-scale discard or tumble from larger, 'purer' deposits of technological debris. Alternatively they could be the result of disturbance of the waste heap and consequent mixing of deposits of different character.

V. *Furnace Debris-Rich Dumps*. Only one such deposit was encountered; context 20. This was a highly heterogeneous layer that was dominated by furnace debris but varied considerably but inconsistently on a local scale. As with slag-rich mixed debris deposits (IV above), this material possibly represents a more gradual accumulation of debris from a variety of sources or was formed by disturbance of the waste heap.

The deposits that constitute the second group are more disparate in their physical characteristics and their probable origins and are classified as follows:

VI. *Re-deposited Natural Subsoil or Bedrock.* One deposit of this type, context 22, was uncovered which consisted of 70% fragments of the local slate with minor quartz in a matrix of gritty clay. This material was remarkably free of any technological debris and is the result of excavation into the local bedrock somewhere nearby, possibly for the construction of a furnace setting or even a building (see below).

VII. *Possible Floor*. This material, context 21, consisted of a thin layer of hard, compact clay containing abundant fragments of slate with a consistent horizontal orientation, and rare inclusions of slag, charcoal and quartz. The best interpretation of this layer is as deliberately laid floor of some kind, trampling explaining its compactness and possibly the orientations of the slate inclusions. However, the relative lack of inclusions of technological debris would imply the floor was not closely associated with the smelting process and may even have been laid to stabilise the loose surface of the waste heap.

VIII. *Miscellaneous Deposits*. Contexts 13, 17 and 18 fall within this category and occur as a sequence at the eastern end of trench C2 where they appear to be tipping into the depression marking the edge of the deposit C from the opposite direction to the smelting debris deposits (Figure ???) They consist of clayey silts of differing colours with up to 20% small inclusions dominated by charcoal but including slag and stone. The origin of these deposits is difficult to determine but the presence of technological debris proves smelting was occurring on the site at the time of their creation. It is possible these contexts are the result of some part of the smelting process occurring further to the east of deposit C.

IX. *Topsoil*. Context 1 is the modern topsoil, an homogenous clayey silt which comprised the large mound of material to the east of deposit C, proving it to be the result of modern activity, probably associated with the construction of the anglers' track around the reservoir edge. The creation of this mound probably also resulted in the formation of context 4, similar in character to context 1 but with a more compact texture, which was the result of its burial by the mound.

With the possible exception of deposit type VII, the clay floor, no structural remains were encountered by the excavation so the location of the working area in which the furnaces were situated is unknown. By analogy with the contemporary smelting site of Sherracombe Ford it is possible that it was situated upslope from the debris dump, perhaps in the area of the track or the slop to the south. However, the phase 2 field survey described above observed slag in the stream bed and soil of the field to the south suggesting the waste heap may extend this far. An alternative option is that Deposit C is infilling the original gully cut by the stream and that the working area may have been more linear in shape and situated along its banks. This is suggested by the course of the stream which flows in a relatively straight north-south course down the slope until it reached the slope immediately south of the excavation area when it is deflected to the west and from here flows along the western edge of deposit C. In addition, trench C2 is cut across the depression forming the eastern side of deposit C and its section (Figure ??) suggests waste material was being deposited from both eats and west. It seems likely that this depression is the remnant of the stream gully that has subsequently been filled with smelting waste.

3.23 – Stratigraphic Sequence

Analysis of the stratigraphic matrix for Trenches C1 and C2 combined with an assessment of specific relationships between various contexts on the sections (Figure ????) has enabled the sequence to be divided into eleven phases, including at least five cycles of smelting. The latter are visible as semi-cyclic repetitions of Type I and II contexts (see Section 3.22 above) occasionally including other context types, which are reminiscent of those described by Cleere (1971) on Roman iron smelting sites in the Weald.

1) *Phase 1.* The contexts assigned to this phase, one of the earliest on the site, also comprise the best example of a single smelting cycle seen during the excavations. At the base was a layer (context 26) dominated by large fragments of loose slag containing many voids which was overlain by a context (24) containing a high proportion of furnace debris. This was in turn covered by a charcoal-rich layer of fine material. As discussed above this sequence is interpreted as representing smelting (context 26) followed by bloom extraction (context 24) and the final clearance of the smelting site (context 23).
2) *Phase 2.* The first smelting phase (phase1) was followed by the creation of a floor of compacted clay (context 21). The absence of technological debris in this material implies it was not closely associated with the smelting process

and may even have been intended merely to stabilise loose debris on the waste heap.

3) *Phase 3.* The phase 2 floor is overlain by the debris from another smelting cycle. This commences with a well-defined dump of re-deposited and heavily fragmented local slate (context 22) that may represent the excavation of a furnace setting, though other interpretations may be possible. This is followed by a slag-rich context (19) which is directly overlain by furnace debris (25) (Figure ??). Context 20 may be the result of more distant contemporary smelting, disturbance or merely less uniform dumping of material from the same smelting phase.
4) *Phase 4.* Stratigraphically phase 4 is contemporary with phases 1, 2 and 3 although the latter is probably slightly later (Figure ??). It consists of deposits containing some debris that are being tipped from the east and may represent waste from other technological processes occurring on the site in this area.
5) *Phase 5.* Phase 5 is a third smelting cycle, consisting of a slag-rich context (16) followed by a dump of furnace wall debris. It is stratigraphically coeval with phases 4 and 6 (see below) though in reality probably later than both (see Figure ??).
6) *Phase 6*. This phase is represented by context 9 a slag-rich, mixed deposit that may represent a period of inconsistent dumping, disturbance or deposition of material outside the area of excavation.
7) *Phase 7.* This is the fourth cycle of smelting on encountered and comprises a slag-rich dump (context 11) followed by two furnace debris-rich contexts (10 and 12). Although the latter contexts are separate they probably represent the same phase of dumping as they bear a conformable relationship with context 11, suggesting they are part of the same period of activity.
8) *Phase 8.* Phase 9 is a further smelting cycle displaying the same cyclic pattern of deposition of slag-rich context (8) followed by dumping of furnace debris (context 5 and 27). In this case context 5 has a conformable relationship with context 8 once more suggesting they are part of the same period of activity. Context 27 is more problematic as its relationship with context 8 is not as conformable. It could represent an isolated deposit of furnace debris but has been incorporated into phase 8 due to its stratigraphic relationship with and 3 which is a charcoal-rich mixed deposit that possibly represents a final cleaning phase of this cycle of smelting (Figures ?? and ??).

9) *Phase 9*. Phase 9 is represented by another slag-rich mixed deposit similar to context 9 in phase 6.
10) *Phase 10*. Context 2, a slag-rich layer may represent a sixth cycle of smelting although the absence of any other type of deposit and the concentration of ceramic finds within it casts some doubt on this. It is possible this may be a residual deposit of slag spread thinly across the surface of Deposit C, a conclusion supported by the extensive area it covers and its heterogeneous character which varies locally. However, although this may be the case slag fragments reach 25 cm in size, arguing against disturbance on a large scale which would result in a greater degree of fragmentation.
11) *Phase 11*. Phase 11 consists of the modern disturbance on the site in the from of the construction of the track around the reservoir which resulted in the creation of the mound of material to the east of deposit C and the concomitant formation of context 4. It also includes the formation of the modern topsoil (context 1).

3.24 – Dating

Two forms of dating have been applied to the evidence from Clatworthy Reservoir; that derived from artefacts largely, but not exclusively, in the form of pottery; and radiometric dating of charcoal samples.

Several artefacts provide dates sufficiently precise to permit the construction of a basic framework for dating the stratigraphic sequence that can be supported by the remainder of the evidence. In stratigraphic order the first is a fragment of the base of a glass drinking vessel dating from the late 1st to mid 2nd century (J. Price *pers. comm.*) that was recovered from phase 3 (context 20). Next was the stamped base of a ceramic vessel from phase 6 (context 9) the foot ring of which suggested a similar date range (V. ??, *pers. comm.*). Finally, a fragment of a decorated Dr. 37 samian bowl was recovered from phase 8 (context 3) the decoration on which suggested a Trajanic or Hadrianic date (Oswald ????). This evidence suggests the activity that produced the smelting waste comprising the part of Heap C in which the excavations took place during the first half of the 2nd century, possibly beginning in the late 1st. However, the ceramic material recovered from phase 10 (context 2) which is dominated by sherds of thumbprint-decorated storage vessels extends this date range into the later 2nd century. These vessels form a distinct tradition within the east Devon and southern Somerset area which has its origins in the later Antonine period (Holbrook and Bidwell 1991, 175).

Little artefactual evidence was available from phases 1 and 2 with the exception of a fragment of window glass from phase 1 (context 24) that could date from any time between the 1st and 3rd centuries (J. Price *pers. comm.*). This, combined with the failure of the excavation to reach the base of the sequence, makes it difficult to determine the start date of the activity on the site though this probably is at least as early quite possibly extends back into the later years of the 1st century.

Additional support for this broad chronology is probably derived from the coarse, greyware sherds recovered from phases 7 (context 11) and 8 (contexts 8 and 3) that bear acute-angled lattice decoration. This form of decoration is common on vessels of both South Western and South-East Dorset Black-Burnished Ware in which it dates to the before the later years of the 2nd century. The greywares from Clatworthy Reservoir were manufactured in the same region as these fabrics, particularly the former which, during the second century, dominated the local coarseware markets (Holbrook and Bidwell, 1991, 93-94). It thus seems reasonable to presume that acute lattice decoration on greywares are contemporary with those on the Black-Burnished Wares.

Radiometric analysis of charcoal provided the other source of dating evidence for the stratigraphic sequence. A total of 37 samples of charcoal were taken during the excavations which were analysed for the purposes of species identification and assessment for suitability for dating. Unfortunately, relatively little of this material was suitable for radiocarbon dating as a large proportion was derived from heartwood. Consequently the samples finally selected for dating were small in size, decreasing the accuracy of the analysis, and increasing the error range of the results. The resultant calibrated dates are shown in Table ??. As can be seen they broadly confirm the chronology derived from the artefactual evidence providing calibrated date ranges from the iron age to the 3rd C AD at 95% probability. Only in the case of the phase 7 (context 11) date (Beta – 206987) is there major disagreement with the artefactual evidence. In this case it seems that the radiocarbon date is significantly early. Given the consistency and agreement of dates from other sources it seems likely this date is erroneous, perhaps derived from residual charcoal or charcoal produced from old wood.

3.3 - FINDS

3.31 – Pottery

3.311 – Introduction

The Roman pottery assemblage recovered from Clatworthy Reservoir since its construction is considerable, the majority being unstratified having been recovered from the surface from eroded material from the reservoir banks. This material is also rather dispersed, some in the collection of the Somerset County Museum in Taunton and some in the possession of the private individuals who have collected it. For this reason this report will focus mostly on the only stratified assemblage from the site; that recovered by the 2005 excavations.

Within this assemblage no large groups were recovered, thus it will be treated as a single group. The assemblage was derived from a minimum of 12 vessels and consisted of 126 sherds in at least 11 fabrics, weighing 2277.97 grammes (WEIGHT NEEDS INCREASING DUE TO SHERD AWAY FOR PETROLOGICAL ANALYSIS). As discussed in Section 3.24 the assemblage suggests a date range for the activity at deposit C beginning possibly as early as the late 1st century AD and ending in the second half of the 2nd century.

3.312 – Methodology

The Sherracombe Ford ceramic material was analysed by Lee Bray in accordance with the guidelines laid out by Fulford and Huddleston (1991) in three main stages:

1) Fabric identification. The assemblage was divided on the basis of the fabrics present. These were then identified as far as possible by comparison with the Exeter fabric series housed in the Royal Albert Memorial Museum in Exeter and described by Holbrook and Bidwell (1991), and with the Tanglebray Barn assemblage housed in the North Devon Museum in Barnstaple. The latter was analysed by Paul Bidwell, Alex Croom and Ray McBride of Tyne and Wear Museums Archaeology Department (Bidwell, *et al*, 1, *unpublished*) also with reference to the Exeter series.
2) Form identification. Where possible, the ceramic forms present in the assemblage were identified for each fabric using the data published in Holbrook and Bidwell (1991). The same volume provided dating information for each form.
3) Quantification. Each fabric was quantified using three different techniques:
    a) Weight.

b) Sherd Count.

c) Minimum Vessel Equivalent. Vessels were identified on the basis of the proportions of the various rim forms present in the assemblage, though at least one vessel is assumed to be present in the case of those fabrics for which no rims were recovered.

3.313 – Identified Fabrics

As already mentioned, in order to facilitate comparison and analysis the following fabrics correspond closely to those defined by Bidwell *et al* (*unpubl.*) for the Tanglebray Barn assemblage. It will be noted where this is not the case.

Unknown Greyware - This is a variable fabric usually ranging from light to mid grey colour, but can also shade into yellowish or buff. The fabric is soft with a feel that varies from smooth to rough, depending on the number and size of inclusions, and has a smooth to slightly irregular fracture. One or two sherds show the remnants of what might be a black slip. Inclusions are common, constituting 5 to 15% of the fabric and display fair to good sorting. Most common are translucent to white quartz most of which are < 0.5 mm in diameter, though some reach up to 1mm. Rock fragments are also present as inclusions and are dominated by shale though fine sandstone also occurs. Very fine grains of white mica are also present in most specimens.

The specimens assigned to this fabric are representatives of the a range of ceramic industries which produced greyware ceramics in east Devon and south Somerset probably during the 2nd and 3rd centuries (Holbrook and Bidwell 1991, 19). The products of these industries are difficult to distinguish in hand specimen and thus have been grouped together here for clarity though it is possible that representatives of more recognizable fabrics have been included with them.

South-West Storage Jars - This fabric also includes considerable variation and ranges in colour from light to mid grey and buff or reddish brown. It is soft with an irregular fracture and a rough or dusty feel. The number of inclusions is very variable, ranging from sparse to abundant while the type is also highly diverse, medium to coarse, angular to sub angular quartz grains displaying good sorting being perhaps most common. Rock fragments, fine mica and ferruginous grains are also found as inclusions.

Invariably this fabric occurs in a thick-walled form which have been interpreted as large storage vessels and represent a local tradition in pottery manufacture dating from the late 2nd to the mid 4th centuries AD. Only one production site has so far been identified at Woodbury near Axminster in Devon (Weddell *et al* 1993, 97) but the variation in fabric suggests production at multiple locations spread, according to the distribution of finds, through East Devon and South Somerset (Holbrook and Bidwell 1991, 175).

South-East Dorset Black-Burnished Ware (SEDBB) - The colour of this fabric ranges from black to grey with occasional variations in the margins and core of the sherds. It is a hard fabric with a characteristic 'hackly' fracture and a smooth feel on un-abraded examples. It contains abundant well-sorted, sub-angular, white to translucent quartz grains with rare fragments of red shale. Many of the sherds recovered are abraded and these often have a 'pimply' surface due to the inclusions.

This fabric is the product of a major pottery industry in the Wareham – Poole Harbour area of Dorset (Tomber and Dore 1998, 127). It is almost ubiquitous in many parts Roman Britain having evolved from Late Iron Age Durotrigan pottery and gained a widespread distribution in Britain through its extensive use by the Roman military during the first century and continued in production probably into the fifth century (Holbrook and Bidwell 1991, 90-94).

South-West Black-Burnished Ware - At first sight this fabric is similar to SEDBB described above but on closer inspection there are a number of differences. The most obvious are the less abundant, more poorly sorted and finer quartz inclusions, the fabric often having a more homogenous, 'clayey' appearance. In addition, this fabric lacks the 'hackly' fracture of SEDBB and its slip often a distinctive deep, glossy black in colour.

SWBB has probably has its origins with groups of potters following the Roman army as it moved into south Somerset, Devon and Cornwall during the mid first century (Holbrook and Bidwell 1991, 91). It rose to local prominence during the second century, eclipsing SEDBB in importance before production, at an unknown centre or centres in west Dorset or south Somerset, ceased, probably by the mid third century (Holbrook and Bidwell 1991, 91-94).

Fine Micaceous Greyware - This fabric is hard with a mid grey surface colour, sometimes varying in the core and margins to dark grey or buff. It has a smooth feel and a smooth, linear fracture. Inclusions are sparse and fine being composed of varying proportions of well-sorted quartz grains and mica plates.

The origin of this fabric is unknown, though it appears similar to the Unknown Greyware fabric group discussed above and is probably related.

Exeter Sandy Greyware - This fabric has a grey to buff colour, and has been distinguished on the basis of its sandy feel. Where not abraded it displays a linear to irregular fracture. Inclusions are common consisting of medium to coarse, sub-angular quartz grains, rock fragments and fine flakes of mica. In addition, ferruginous particles up to several millimetres in diameter are common.

This fabric has been tentatively identified by comparison with the Tanglebray Barn assemblage. Most sherds are highly abraded and identification of other examples relied on assessments of colour, feel. It is possible that other examples may be present among the Unknown Greyware category of the assemblage. The fabric was produced at Exeter during the 1st century military occupation and continued afterwards, production ceasing probably during the second half of the 2nd century (Holbrrok and Bidwell 1991, 155).

Unknown Oxidised Ware - This fabric is actually a catch-all group for a small number of sherds with oxidized appearances and as such corresponds only loosely to the fabric defined by Bidwell *et al* at Tanglebray Barn. It is therefore possible that oxidized examples of other fabrics are included in this category.

Dressel 20 Amphora - A uniform buff fabric with a fairly smooth feel and a linear frature. Inclusions are common to abundant and include well-sorted, finely-grained quartz and mica.

Dressel 20 amphorae originated in the province of Baetica in the south of modern Spain and were used largely to transport olive oil, but also preserved olives (Tyers 1996, 87). They were produced from the first century and occur at Exeter in military contexts where, by the second century they comprise almost 82% of the amphora assemblage by weight (Holbrook and Bidwell Table14). Production of Dressel 20

amphora ceases in the mid third century, though the fabric continues to occur residually into the fourth century at Exeter.

Samian – Three sherds of samian were recovered during the excavation all of which are decorated and two of which are adjoining sherds from a Dr. 37 bowl.

Samian ware was imported from southern Gaul starting with the conquest in the mid first century and continues into the second century the major production centres then shifting to central Gaul. Although samian continued to be made into the mid 3rd century in eastern Gaul, its products are rare in the south-west (Tyers 1996, 112-114).

Indeterminate – The single sherd in this category recovered during the excavation was too small and abraded to permit a reliable identification to be made.

Table 1: Fabric quantification for the Sherracombe Ford assemblage.

Fabric	**Weight (g)**	**Sherds**	**Min No of Vessels**
Unknown Greyware	14.18% (323.06)	17.6% (22)	18.19% (2)
Fine Micaceous Greyware	1.03% (23.36)	1.6% (2)	9.09% (1)
Exeter Sandy Greyware	1.44% (32.86)	3.2% (4)	9.09% (1)
SW Storage Jar	44.56% (1015.57)	64.8% (81)	18.19% (1)
SW Black-burnished	1% (22.85)	0.8% (1)	9.09% (1)
SE Dorset Black-burnished	4.94% (112.4)	3.2% (4)	9.09% (1)
Unknown Oxidized Ware	0.37% (8.52)	1.6% (2)	9.09% (1)
Dressel 20 Amphora	29.7% (676.37)	3.2% (5)	9.09 (1)
Samian	2.66% (60.49)	2.4% (3)	9.09% (1)
Indeterminate	0.11% (2.49)	0.8% (1)	-
Totals	***99.99% (2277.97)***	***99.2% (125)***	***99.99% (11)***

3.314 – Discussion

3.3141 – Data Limitations

The small size of the Clatworthy Reservoir pottery assemblage imposes considerable restrictions on the information that can be inferred from it as the degree to which it is representative of the pottery actually used on the site is potentially limited. In addition the degree of conventional domestic activity that occurred on the site is not certain as no evidence for permanent settlement as been recovered. Thus it is difficult to know the degree to which comparisons drawn with contemporary sites in other parts of the South West Peninsula are valid, although such can be made with a greater degree of confidence with assemblages from other iron smelting sites at of similar date at Tanglebray Barn and Sherracombe Ford. Having said this, the assemblage is the only stratified material so far recovered from the site and thus any conclusions that the conclusions drawn from it are invaluable.

3.3142 – Basic Classification

A brief examination of the assemblage will reveal that it is dominated by two basic vessel types, storage jars and amphorae. Together, these comprise 74.26%, by weight, and 68%, by sherd count, of the assemblage respectively. This is probably a function of the small size of the assemblage as storage jars and amphorae are both large vessel types and thus their relatively high weights and the potentially large numbers of sherds they can produce upon breakage. There is a also a temporal aspect to this bias as storage jars were only recovered from the upper few contexts of the stratigraphic sequence, presumably because these vessels do not occur before the later part of the 2nd century AD.

Aside from these two vessel types, as might be expected, the assemblage is dominated by coarsewares with a minor proportion of finewares, although no mortaria were recovered by the excavation. This compares well with the assemblages from Sherracombe Ford and Tanglebray Barn although it should be noted that sherds of mortaria have been as surface finds from Clatworthy Reservoir suggesting their absence in the excavated assemblage is the result of it small size.

3.3143 – Function

Storage jars and amphorae have already been mentioned as forming a significant proportion of the assemblage. If permanent settlement was present either on or close to the site it is likely that both vessel types were employed for their intended purpose.

Although what was stored in the storage jars is unknown, in this case the amphorae, all of the Dressel 20 type, probably arrived on the site serving as containers for olive oil. However, it is also possible, as at Sherracombe Ford (Bray 2005, 11), that these vessels were employed for secondary purposes in the same way as the storage jar from Sherracombe Ford which had been used to hold liquid for quenching during iron artefact production.

Although it is difficult to be certain as few rim sherds survived, a high proportion of the coarse ware fragments in the assemblage were derived from cooking vessels suggesting at least some degree of domestic activity on the site. This is perhaps supported by the presence of a decorated samian Dr. 37 bowl which, assuming it was used for its intended purpose, implies an environment in which fine tableware was employed.

3.3144 – External Contacts

That Clatworthy Reservoir had at least some distant contacts is implied by the presence of decorated samian, from Gaul, and Dressel 20 amphorae, from Baetica in southern Spain. It is unlikely such contacts were direct and more probable that the presence of these ceramics imply links with at least one port, the most likely known candidate in this area being Exeter. This suggestion is also strengthened by the recovery of possible sherds of Exeter Sandy Grey Ware, a coarse ware produced in the vicinity of the city.

The majority of the assemblage is derived locally in the form of the greywares and storage jars in the assemblage that are believed to have been produced in southern Somerset and east Devon. Slightly more distant are the few sherds of South-East Dorset Black-Burnished Ware from the area of Poole.

This evidence suggests the site looked very much towards the east and the rest of Roman Britain and perhaps also towards Exeter in the south for its contacts; links with the west are conspicuous by their absence.

3.3145 – Status

The Clatworthy Reservoir assemblage contains between 2 and 3% finewares by weight and sherd count, a proportion very similar to that from other sites in the South-West Peninsula and comparable with those from Sherracombe Ford and Tanglebray Barn. This suggests the site's occupants were not unusually poverty-stricken. Indeed,

the presence of Dressel 20 amphora, produced in southern Spain and predominantly employed to transport olive oil, implies a degree of wealth and perhaps status as such an imported commodity cannot have been easy of cheap to acquire. This conclusion is supported by other finds from the site.

3.3146 – Surface Finds

As mentioned a considerable assemblage of pottery retrieved by different workers has been recovered from the surface of the site as the reservoir has eroded material from its banks. It has not been possible to subject this material to rigorous examination but it has been noted that it appears to encompass a similar range of fabrics and vessels to those found during the excavation including; samian, greywares, black-burnished wares and storage jars. In addition mortaria, bowls and at least one sherd derived from a flagon has been recovered adding further support to the conclusion that significant domestic activity occurred on the site. Although this material is unstratified, fuller analysis would undoubtedly add valuable information to analysis of the site.

3.32 – Glass

Also recovered during the excavation were two fragments of glass. The first consisted of part of the base and body of a drinking vessel of the late 1st to mid 2nd century (J. Price *pers. comm.*) retrieved from phase 3 (context 20). The presence of such a vessel is a good indicator of wealth and status and supports the conclusion suggested by the pottery analysis. The second sherd of glass is derived from a cast window pane produced, by analogy with other sites, between the 1st and 3rd centuries. This artefact also implies affluence as it suggests the presence of a building using Roman-style architecture at an early date given its discovery in phase 1 (context 24) of the stratigraphic sequence.

3.33 – Building Material

As discussed in Section 3.32 the fragment of glass recovered during the excavation raises the possibility of a building using Roman-style architecture and materials somewhere in the vicinity of the site. Weight is added to this hypothesis by the discovery as surface finds of other architectural material. These include a fragment of tegula and one of hypocaust flue tile from the vicinity of deposits E and F and also the corroded remnants of nails. It is of course possible that the latter could derive from Glass's Cottage, a building close to the location of deposits E and F demolished during the construction of the reservoir though, as they were recovered from among

the surface slag scatter associated with the smelting debris heaps, it is also possible they are of Roman date.

In addition, the excavation of heap C yielded a fragment of oxidised ceramic material, possibly brick that has a smooth, worn surface and a right-angled edge that may be a tessera although this is not certain.

The nature of the building from which these fragments were derived is not certain. The main possibilities are a villa, such as that discovered at Yarford south of the Quantock Hills around 10 kilometres to the east (REFERENCE), or a bathhouse similar to that at Whitestaunton on the northern edge of the Blackdown Hills (REFERENCE), which is also associated with evidence of iron working.

It is also worth noting that the finds of building material can be divided into two groups. The tegula and hypocaust tile fragments are from the eastern end of the site and while the glass and possible tessera are from heap C 400 metres to the west. Given this separation it is also possible that there were actually two buildings on the site, though of course there is no reason for them to have been contemporary.

Finally, the steepness of the valley sides restricts the possible location of any buildings. At the eastern end of the site the only visible area in which the gradient is less steep is in the vicinity of the fishing lodge car park. It seems possible that a pre-existing platform that may have held a building during the Roman period was exploited by the constructors of the car park. To the south of deposit C, as discussed in section 2.2, a scatter of slag was discovered on the hill slope above the site of the excavation. This was located in a broad area, bisected by the stream, in which the gradient of the slope was significantly less than that of the surrounding valley side. Once more, it is possible this is the surface expression, blurred by hill wash, of an artificial platform created as the site of a building.

3.34 – Technological Debris

One of the objectives of the excavation was to obtain representative samples of technological debris for comparison with contemporary material from other sites in the Exmoor region. Rigorous analysis if this material was does not form part of phase 3 of the site assessment and will instead occur as part of the Exmoor Iron Project. However, it is possible to make some general, impressionistic remarks concerning the technological debris encountered during the course of the excavation.

3.341 - Slag

The most obvious form of technological debris recovered, was tap slag which was easily recognised due to its characteristic ropey surface texture. This material dominated the slag assemblage and is diagnostic of the direct method of iron smelting and, of course, the use of furnaces from which it was possible to tap the accumulating slag during operation. Other forms of slag were also present but these were not examined closely and were probably derived from other stages and locations during the iron production process. Possibilities include the interior or base of the furnace or from smithing iron produced. As mentioned more intensive analysis will reveal more precise classification and may permit more detailed conclusions to be drawn concerning the precise nature of the technological process employed on the site.

3.342 – Furnace Debris

The assemblage of slag recovered during the excavation does not differ in an obvious way from those encountered on other Roman-period iron smelting sites in the Exmoor region. However, furnace debris forms a category of evidence that does display some variation to that seen elsewhere. On contemporary sites such as Sherracombe Ford, furnace debris is dominated by fragments of fired and vitrified clay often with a sandy texture and usually containing abundant fragments of rock. At Clatworthy Reservoir furnace debris appears to have contained a much higher proportion of well-sorted sand and fewer inclusions and has usually not survived as discrete fragments of furnace wall. Instead it has largely decomposed into mixed layers of reduced and oxidised sand (see section 3.22) containing occasional fragments of vitrified and thus more concreted material. The reason for this difference is currently unclear but the availability of local resources for furnace construction may be one influential factor. In addition, it should be remembered that the walls of a furnace often play a part in the chemistry of the smelting (REFERENCE?), particularly in aiding the process of slag formation. It is thus not impossible that the furnaces at Clatworthy were constructed of carefully chosen material in order to improve the smelting process in some way. One possibility is that the ore being smelted was particularly pure in which case, due to the lack of impurities, slag formation may have been difficult. The use of sandy material to instruct the furnace walls may have eased the process of slag formation by providing a ready source of silica during smelting. At present this is just a possible explanation for the difference in furnace wall material at Clatworthy, but further analysis of the furnace debris and

also the ore fragments recovered by the excavation may confirm this or suggest an alternative.

3.343 – Charcoal

A third category of technological debris recovered by the excavation was charcoal. In total 35 samples containing 241 fragments of charcoal were analysed the results of which are shown in Figures ?? and ??.

Two main observations emerge from this data. Firstly, the assemblage is strongly dominated by oak (94.61%) with minor occurrences of alder (1.75%), birch (2.9%) and holly (0.83%). This could be the result of selection of wood for the production of charcoal for use in smelting but it is also likely that charcoal species distribution reflects a high proportion of oak in the comprising the local woodland.

Secondly, only a low proportion (8.71%) of the charcoal analysed was derived from sapwood, most of the assemblage (84.65%) having been produced from heartwood. This implies that the wood used to produce the charcoal used in smelting was not derived from fast-grown, managed woodland. However, the situation may have been more complex than this as some of the samples show signs of rapid growth raising the possibility of some component of management in the woodlands from which the wood for charcoal production was derived.

3.35 – Conclusions

As described (section 3.1), the excavation at Clatworthy Reservoir had three objectives each of which was successfully achieved.

1) Firstly, well-stratified deposits of material were encountered in both trenches C1 and C2, proving that deposit C can be considered as an *in situ*, deposit of smelting waste. This confirms the conclusions of the phase 1 survey (REFERENCE) and, given the similarity between the character of the surface scatter of material associated with deposit C and those linked with A, B, E and F, it seems likely that these are probably also primary deposits.
2) The artefactual and radiocarbon dating evidence derived from heap C suggests that the deposits uncovered were the result of iron production commencing, at the earliest in the late 1st century and continuing into the late 2nd century. However, as the natural subsoil was not reached, it is possible the start date of activity could be earlier. These dates are contemporary with those obtained from the smelting sites at Sherracombe Ford and Brayford

although these latter continue at least into the 3rd century, a degree of longevity for which there is no evidence at Clatworthy.

3) The technological debris from Clatworthy Reservoir confirmed that the smelters used the direct method of smelting and employed a slag-tapping furnace design. This suggests similar technology to that being used at Sherracombe Ford although there may be some differences in the material used for furnace construction. The precise nature of the technology employed on the site will be investigated further when the technological debris is subjected to more intensive analysis as part of the Exmoor Iron Project.

The presence of decorated samian vessels and finds of glass ware suggests the site's occupants possessed a degree of affluence and possibly status. This is supported by finds of building material including, nails, window glass, tegula and a possible tessera which suggest the presence of a building constructed using Roman architectural material and style.

3.36 – Further Work

As stated, more work remains to done on the material recovered from the excavations at Clatworthy which will be carried out as part of the Exmoor Iron Project. A major part of this will include analysis of the technological debris in comparison with that retrieved from other smelting sites in the Exmoor region.

However, more work is also required on the ceramic assemblage, especially that recovered from the surface since the construction of the reservoir. This material must to be collated, analysed and assessed both in relation to the stratified material recovered during the excavation and in comparison with other contemporary assemblages, particularly those from contemporary smelting sites in the region.

In addition, further field work is required to more fully explore the site. For example other, small-scale excavations could be undertaken to investigate the other deposits of smelting waste. More fundamental perhaps is more intensive survey to detect and characterise any other remains that may be present and, in the process, more definitely delineate the limits of the site. At the most basic earthwork survey should be undertaken above the waterline in order to complement that undertaken in the reservoir bed. This would hopefully detect the full surface signatures of the waste deposits and possibly the potential locations of buildings and other features. Such

areas could then be investigated using geophysical survey in order to obtain more information.

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FIGURE LIST