YCCCART 2019 /Y12

An 18th century limekiln at Sanders Down, Priddy: Structure and accounts

YATTON, CONGRESBURY, CLAVERHAM AND CLEEVE ARCHAEOLOGICAL RESEARCH TEAM (YCCCART)

General editor: Vince Russett

The limekiln after clearance by members of CHERT in 2003-4

Page	Contents
3	Abstract Acknowledgements Introduction
4	WARNING: THIS IS A HAZARDOUS SITE
5	Site location Land use and geology
6	The kiln: structure and history
8	Photographic survey
11	Appendix 1: The accounts
17	Appendix 2: Lime and limeburning

Abstract

The unusual limekiln at Sanders Down (CHERT 480; ST52555322) is well-preserved due to its location on the Yoxter ranges: many other limekilns in less well-protected situations on Mendip have been robbed for walling or cleared away as 'eyesores'; its location in an old mining rake, thus set below ground, may have made the kiln less vulnerable, although it may have made lime burning in it unusually hazardous (see Appendix 2: 'Lime and Lime burning').

It is also unusual in that a series of accounts exist for this limekiln in the mid to late 18th century, giving some idea of the running and uses of a lime kiln at that date.

Acknowledgements

This survey could not have been carried out without the permission of Landmark, for the Ministry of Defence. Thanks also to Paul Millard, Range Warden, and Kate Lawrence, Chancellor's Farm, for valuable advice and assistance during the survey work.

Introduction

Yatton, Congresbury, Claverham and Cleeve Archaeological Research Team (YCCCART) is one of a number of Community Archaeology teams across northern Somerset, formerly supported by the North Somerset Council Development Management Team.

Our objective is to undertake archaeological fieldwork to enable a better understanding and management of the heritage of the area while recording and publishing the activities and locations of the research carried out.

The fieldwork for this survey was carried out by members of the Charterhouse Environs Research Team (CHERT).

References beginning SRO refer to documents in the Somerset Record Office, Taunton (now the Somerset Heritage Centre).

WARNING!!

DANGER OF DEATH

THIS SITE IS ON A MILITARY LIVE FIRING RANGE AND MUST NOT BE VISITED WITHOUT PRIOR ARRANGEMENT. THE SITE ALSO CONTAINS DEEP OPEN MINESHAFTS. THERE IS NO PUBLIC ACCESS TO THIS SITE.

Location

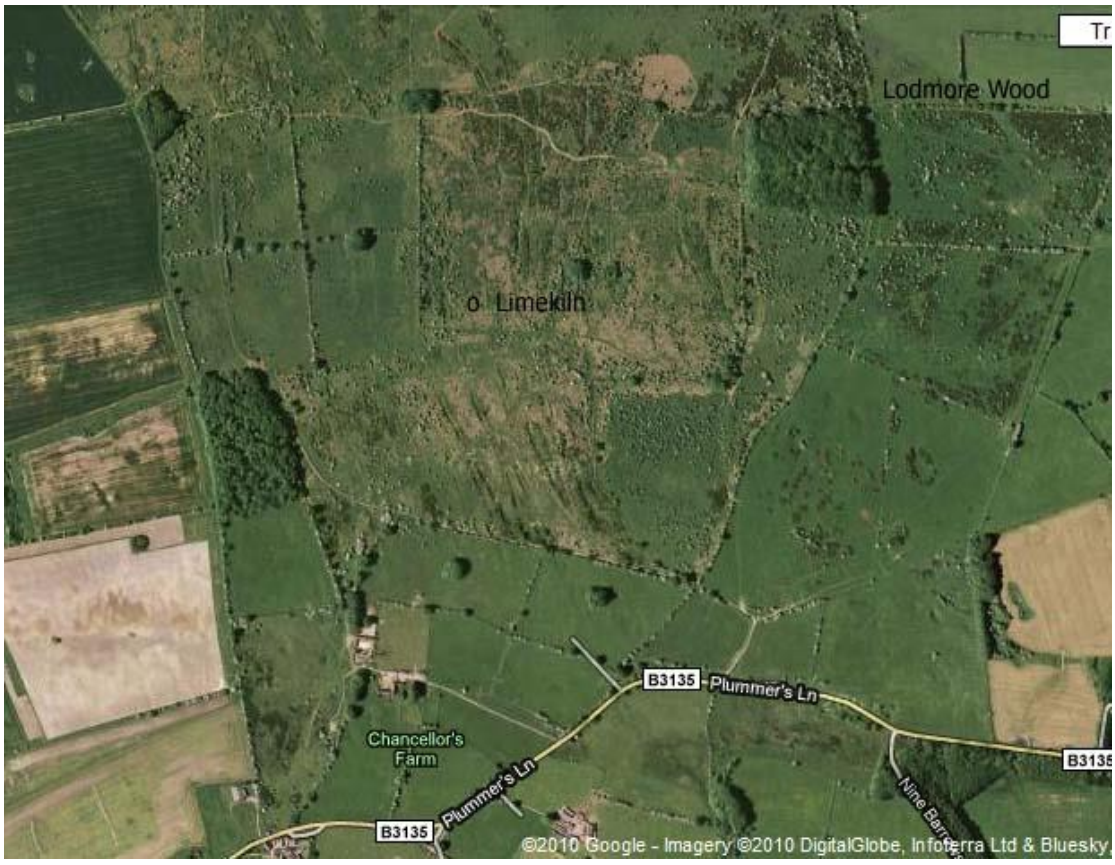

Fig 1: Location

The kiln is sited at ST52565323, some 650m north of Chancellor's Farm, in the parish of Priddy in Somerset. It is constructed in the northern end of a former lead-mining rake at Sanders Down, now part of the Yoxter military firing and training ranges.

Geology and Land Use

It lies close to the junction of the Black Rock Limestone and the Burrington Oolite of the Carboniferous Limestone, and is constructed of the same materials.

The site is used for military training and rough grazing, and there is no public access to this extremely hazardous site.

The kiln: structure and history

Conventional wisdom dates the Mendip limekilns to the period immediately after the enclosures, i.e. 1800-1820, but these smaller kilns are different in appearance.

The kiln is built of coursed roughly squared local Carboniferous Limestone, mortared throughout, and unlike most of the field kilns seen on Mendip, which have a pointed front hearth, this has a stone lintelled opening, making the hearth much larger and wider than normal. Only about 1.2m of its estimated 3m height can be seen, the rest is hidden behind a talus cone of stone from the top and sides of the kiln. Two sets of putlog holes, one on either side of the hearth can be seen in the kiln elevation. The lining of the combustion chamber cannot be seen.

There are flared flanking walls constructed in the same technique, each of which has one very large 'putlog' hole (about 30cm across) in it.

The interest in this kiln is that it can be dated. An accounts book for Chancellor's Farm, to the south, and kept for the Tudway family who owned the farm in the eighteenth century, survives in the Somerset Record Office (SRO DD/TD/17). The book spans the years 1766 to 1794, although the later accounts are terse and contain no detail.

A loose parchment contained in the book, however, details the 'righting' of the kiln, involving the use of 6 quarters of lime (approx 1200kg: so it was substantially rebuilt at that date!) in February 1768. The occasion for this rebuilding was clear: to lime the field then called East Land and in 1829 East Close; it was ploughed twice, to prepare it for the lime and to incorporate the lime, and involved the making and spreading of some 260 quarters (around 52 tonnes) of lime. This involved 11 weeks and 5 days of 'The Limeburner's' work (he is never named in the document, perhaps revealing something of the social status of a journeyman lime burner, as opposed to that of a 'mason'), at a cost of £4/8/9d (£4.44), and the burning of a staggering 125½ quarters (37.65 tonnes) of coal, which at 3/- (15p) per quarter (including carriage), cost a total of £18/16/6 (£18.83).

The purchase of a new wheelbarrow (made from bought board at the farm, and costing 4/6 (23p) and a new shovel for 2/6 (12½p), and the initial work for Richard Roberts ('a Mason') for 6 days, his 'man' for 6 days, and his 'boy' for 2½ days, brought the whole charge to £22/13/3 (£22.66), a colossal amount, considering the weekly wage for the limeburner and the mason was 7/6 (37.5p). Interestingly, 18 days wages were paid for '*halling stones to the limekiln from a wall to make lime*': it is unclear where this wall was.

The accountant debated the wisdom of calling the costs of this work a charge, as he asserted '*To deduct for the Cost of burning the Lime & Coal for Eastland 18 acres, which is charged in the general account of the 6th August 1768 and which by no means could not be of any benefit to the estate in that year and the yeare following it was let so that this charge must be entered if at all to the improvement of the estate, as done by me as Landlord*' so he was obviously very clear about the improvement of Mendip fields by liming and its value.

The origin of the kiln must have been earlier, if it was being 'righted' in February 1768, and it seems most likely to have originated at the time of enclosure of the fields immediately adjacent, which are surrounded with carefully mortared and battered stone walls. At present, we can only date this to between 1712 and 1766 (in 1712, the area of Sanders Down was still simply 'a sleight', but by 1768, all the new enclosures around its edge were already in place (SRO DD/TD Box23 Label51), and it is inconceivable that the work would not have been accounted in the book if this had happened after 1766). It most likely then served to lime the newly enclosed fields, once the mining rakes in them had been levelled, and would have produced probably hundreds of tonnes of lime even before it became visible in the documents.

Many references to lime burning occur in the rest of the accounts book, especially a further 'righting' in May 1777, and again on 17 July 1780, although the costs are subsumed in others, so it is not clear how drastic these 'rightings' were. The final references in the book date to 1787, but by this time, the entries were becoming sketchy and vague, and the lime burning may have been lost in the general 'labour' accounts.

Notably, a further 24 tonnes of lime were produced in July 1776 with a further unknown quantity that autumn (there is no mention of lime burning between the first record and this date in the book). 25 tonnes were produced in summer 1777, 18 tonnes in April 1778, 60 tonnes in May, an unspecified amount in August, and a further 40 tonnes in October. In July 1779, the last exact record in the book, 206 quarters (41 tonnes) were burned. The logistics of making and spreading this much lime are interesting, and the kiln must presumably have been operating continuously for long periods in order to produce this much. The practical difficulties of the work are illustrated by the 'joining and lengthening of the Kill Bar', which was presumably the iron bar used to clear obstructions in the delivery hole at the base of the hearth.

It is not known when the kiln went out of use, but while the enclosed fields were being used as arable (which they were being in 1829) there would have been need for occasional limings, so the kiln may have burned into the 19th century. The kiln is not recorded on any map until the 1885 OS plan, where it is simply described as 'Old Limekiln'.

Photographic record

The structure was photographically recorded in detail in February 2004, after clearance of bramble and light scrub. The series of photographs are stored in the CHERT archive.

Fig 2: Face and cheek walls of kiln from S (scale in ½m)

Fig 3: Close-up of kiln face and lintel at top of arch from SW

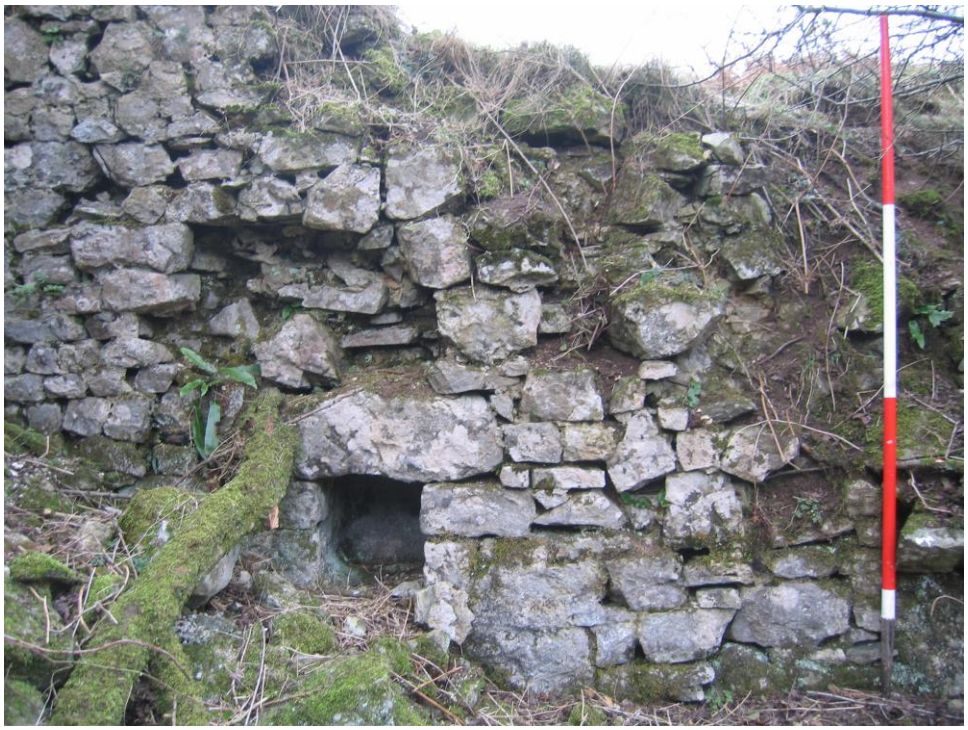

Fig 4: East cheek wall with large recess, from W

Fig 5: West cheek wall, from E, showing evidence of return at S end

The above two pictures show the surviving 'cheek' walls on either side of the kiln face, with the large recesses in each side, possibly for socketing a timber beam or other wooden elements of the site.

Fig 6: Junction of west cheek wall with kiln face, from E

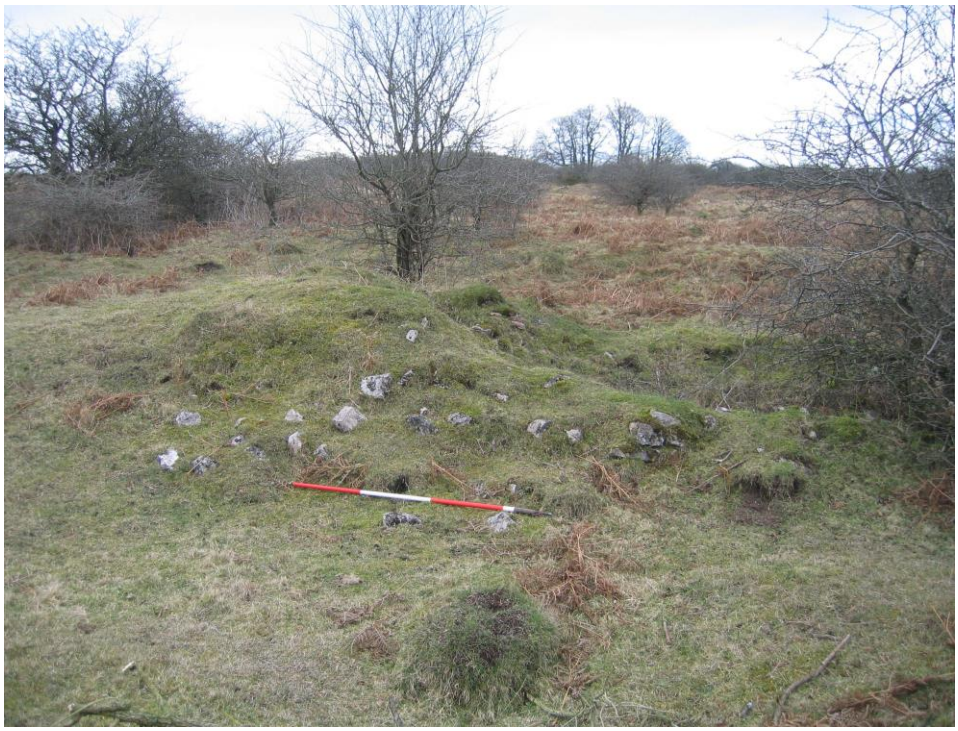

Fig 7: Rear of kiln structure from NW, showing hollow of the firing chamber

All photographs were recorded with a Canon Powershot S50 digital camera (5 megapixel). The images are here presented as downloaded.

Author: Vince Russett September 2010 (v3 February 2019)

Appendix 1

The accounts

This transcript contains all the account entries relating to lime and lime burning at the lime kiln at Sanders Down.

SRO DD/TD/17

[Cover of book inscribed:]

Chancellor's Farm
Acct Book, beginning
at Lady day 1766
No. 2

1 Detached piece of parchment in book, written on both sides [image 115_1540 & image 115_1541; 13 Feb 2004]

An. Acct. of the Expense of Righting the
Lime Kiln, & of the cost of the Quantity of Lime
made there

20th Feb 1768		
Pd for 6 Quarters of Lime to		
Right the Kiln, at 2s per Q	0:12: 0	
Pd Richd. Roberts a Mason for 5 days work		0: 7: 6
Pd his Man for 6 days work	0: 9: 0	
Pd his Boy a tender 2 days & ½ at 8d	0: 1: 8	
27th		
Pd Richd Roberts for one day abt. the Kiln		0: 1: 6
9th April		
Pd for 3 Quarters of coal ~~& Expences~~		
for the Limekiln at 1/4 ~~P~~ Quarter	0:12: 0	
Pd the limeburner for a weeks work		0: 7: 6
16th		
Pd for Board and making a wheelbarrow for Limekiln	0: 4: 6	
Pd for a new shovell for the kiln	0: 2: 6	
Pd 3 Quarters of coal for do.		0: 4: 0
Pd the Limeburner for One Weeks work	0: 7: 6	
23rd		
Pd for 6 Quarters of coal	0: 8: 0	
Pd the Limeburner for a Weeks Work		0: 7: 6
7th May		
Pd for 13 Quarters & ½ of coal at 1/4 ~~P~~ Q		0:18: 0
Pd the Limeburner for a Weeks Work		0: 7: 6

14th
Pd for 11 Quarters & 2 bushells of coal at 1/4 ₱
Quarter; and for the Carriage 1/8 ₱ Quarter, In the whole
3s ₱ Quarter 1:13: 9
Pd the Limeburner for one Weeks ~~Coal~~ Burning 0: 7: 6
21st
Pd for 6 Quarters & 3 bushells of Coal and Carriage 0:19: 1½
Pd the Limeburner for a Weeks Work 0: 7: 6
28th
Pd for 4 Quarters & 7 bushells of ditto and Carriage 0:14: 7½
Pd the Limeburner for 2 days only 0: 2: 6
4th June
Pd for 12 Quarters & one bushell of ditto
and Carriage – 1/8 ₱ Quarter 1:16: 4½
11th
Pd for 10 Quarters & 11 bushells of ditto at 1/4 ₱ Quart &
For the Carridge at ½ ₱ Qua 1:12: 7½
Pd the Limeburner for a Weeks Work 0: 7: 6
Carried Over 14: 8: 7½

[page 2]
Brought Over Lime Acct. 14: 8: 7½
18th June
Pd for 7 Quarters & 5 bushells of Coal
at 1/4 ₱ Q: & for the Carriage at 1/8 ₱ Q 1: 2:10½
Pd the Limeburner for a Weeks Work 0: 7: 6
25th
Pd for 9 Quarters & ½ of coal 1/4 ₱ Q &
for the Carriage 1/8 ₱ Q 1: 8: 6
Pd the Limeburner for a Weeks Work 0: 7: 6
Pd for Joining & Lengthening the Kill Bar 0: 4: 6
2nd July
Pd for 9 Quarters and a ¼ of coal at 1/4 ₱
Q: & for the Carriage 1/8 ₱ Q 1: 7: 9
Pd the Limeburner for a Weeks Work 0: 7: 6
9th
Pd for 7 Quarters of Coal at 1/4 ₱ Q & for
Carriage 1/8 ₱ Q 1: 1: 0
Pd ~~for~~ the Limeburner for 3 days 0: 3: 9
16th
Pd for 8 Quarters & 6 bushells of Coal at
1/4 ₱ Q - - - & for Carriage 1/8 ₱ Q 1: 6: 3
Pd the Limeburner for a Weeks Work 0: 7: 6
22:13:3
~~Sold 20 Quarters at 2s ₱ Q 2: 0: 0~~
~~13:3~~

The above was 125 and ½ Quarters of Coal
W^ch^ I supposed burnt a^bt^ 280 Quarters
of Lime out of which was sold 20 Quarters
So that there remains 260 Quarters to Lime
the ground called Eastland, w^ch^ is 18 Lug acres
which is a^bt^ of 14 Quarters & half to an acre;
but I think there was abt half an acre that was
not Limed, but dung'd in stead thereof, So that will
make it very near to 15 Quarters to the acre; The
plowing the Land to receive the Lime, & Plowing in of the
Lime, & Hallage of the Lime from the Kill to the field, &
Halling the stones ^to^ ~~from~~ the Lime Kiln is abundance more
than all the other Charges; but it is not charged any where

2 Scattered references extracted from 'General accounts' in the book

[This section not photographed: punctuation not copied]

Rec'd of myself for three quarters of lime
carried to my house at Wookey Hole at 2s per quarter 6s
Rec'd for th carrage of lime 3s
Rec'd for 17 quarters of lime and one bushell of lime sold to several people throughout the course of burning 1.14.3
To deduct for the Cost of burning the Lime & Coal for Eastland 18 acres, which is charged in the general account of the 6th August 1768 and which by no means could not be of any benefit to the estate in that year and the yeare following it was let so that this charge must be entered if at all to the improvement of the estate, as done by me as Landlord.

To deduct for making a sallow and ploughing in the lime in the Ground called East Close, it being 18 acres worth 20s per acre ... 18.0.0
To halling stones to the limekiln from a wall to make lime 18 days at 6d per day.... 5.8.0
To Halling lime from the kiln to the ground 22 days at 6s per day..6.12.0
To Halling dung from the barton to East Close 3 days at 6s per day..18.0
To the Halling 37 quarters and half of coal with my own waggon at the first onset in burning lime at 1/8 per quarter
3.2.6
To one years rent of the field called Eastland it being fallow for one year in order to receive Lime...
18.0.0

[115_1542] 13 Feb 2004

1776

July
Bishop for carrying 8 q^{rs} Lime Coal 0:12: 0
Do. for Do. & burning 60 q^{rs} Lime 1:15: 6
Do. for 16 q^{rs} 1: 4: 0
Do. & Labour 2:18: 0
Do. 1:18: 0
Do. burning 60 q^{rs} Lime &c 2: 8: 0
[Labours including a mule Driver 2: 3: 0]

Sept
Labour burning Lime, Coals, Mule Driver &c 31:10: 0

Nov
4 weeks labour, Lime, Coal, Mule driver &c 20:12: 7

[115_1543] 13 Feb 2004

1777
May 3
Righting the Lime Kiln &c 1: 6: 0

(May) 24
To Labour & burn^{g} 60 Q^{r} Lime at 5^{d} 2:16: 6

June 7
To Labour & burn^{g} 60 Q^{r} Lime 2:10: 6

(June) 21
To the Coal Bill, burn^{g} 6 Q^{r}
Lime & Labour 5: 6: 3

From 28th June to ye 9th Aug^{t} quarrying stones, burning
Lime, shearing sheep mowing, making Hay, Hire
of Ploughs &c &c 34: 6: 1
…
[115_1544] 13 Feb 2004

From 16th Aug^{t} to ye 27th Sep^{t} burning Lime Labour &c 24:10:9 1/2

1778
Jan^{r}
Mr Long's bill for Lime Coal 8:16: 0

Apr^{l} 4
Burn^{g} 90 Q^{rs} Lime 1:17: 6

1778-9

[This section not photographed: punctuation not copied]

burning 300 qrs Lime to 13th May 6. 5. 0

August. Labour burning lime ... And carriage of coals to Lime Kiln..37.15. 6

October 8 weeks labour and burning 197 Qrts Lime 36. 1. 8
October Lime coal bill.... 10. 5. 9

1779

July 17 8 weeks labour burning 206 Qtr lime... 30. 9.10½

Nov A coal bill for ye limekiln 9.17. 0

1780

July 17 4 wks Labour, burning lime, righting lime kiln.... 19.10. 2
10 weeks labour burning lime....[etc] 57.10. 4
October 3 weeks labour burning lime etc ... 17. 8. 4
8 weeks labour burning lime , catching moles etc ... 41. 0. 6
For six weeks labour and lime coal from
2nd December to 12th January 23.16. 2

Sept 1784

Labour mowing repairs, burning lime etc ... 69.15. 6
...burning lime..... 9. 5. 0

1784-5 [general account]

Labour etc 4 weeks & coal for lime kiln 13.15. 6

October 6th 1785
11 weeks labour burning lime, reaping,etc etc... 88. 0. 1

Nov. Stock & Co. Coal for lime kiln 9. 9. 0

(1786)

June 24th
13 weeks labour...digging well..burning lime 58.15.11
July 29th
..burning lime...

7 weeks labour Lime burning etc... 43. 1. 8

Nov.
7 weeks labour lime burning, sheep etc 55. 2.8½

Dec 1786
Stock & Co. Coal for ye Lime Kiln 10. 7.6½

July (1787)
5 weeks labour....burning Lime... 22.19. 1

August
8 weeks labour....burning lime.. 30.19. 2

October
6 weeks labour...burning lime.. 65.14.1

Nov
6 weeks labour, coal bill... 28.10.0

[This is the last entry that specifically mentions lime or limeburning. The records have by this point become cursory and lack detail. While there is no evidence otherwise, lime burning could be continuing and simply not be recorded separately]

Appendix 2

Lime and limeburning

Mendip grey Carboniferous Limestone makes good, pure lime, for which it is still in demand by the modern steel industry, where used as a flux. Limestones are composed of calcium carbonate ($CaCO_3$), which on heating (in this case, with coal), breaks down into lime and carbon dioxide:

$CaCO_3$ = CaO (lime) and CO_2 (carbon dioxide)

The limestone and coal are added to the kiln in layers, and as the stone lumps break down in the hopper of the kiln, the lime can be extracted from below. It takes a skilled limeburner to prevent blockages.

The lime is used for three principal purposes at the date of operation of the Saunders Hill limekiln.

1. As the basis for mortar, a mixture of lime, sand and / or gravel and other neutral agents and water. The lime, when wetted, gradually begins to re-absorb CO_2 from the atmosphere, and eventually hardens back into something resembling a limestone, holding the stones around it firmly together

2. For 'liming' fields, a process designed to 'sweeten' the acid Mendip soils. Thin soils like those of Mendip are acidified by rain, naturally slightly acid, due to the presence of carbonic acid (H_2CO_3) formed by CO_2 combining with atmospheric water. This dissolves out the $CaCO_3$ they naturally contain by converting it to soluble calcium bicarbonate ($Ca(HCO_3)_2$), and the quality of the soil for arable falls. Liming the soil puts this back (by converting the carbonic acid to $CaCO_3$ again), and also allows soils to hold plant micronutrients more successfully

3. For whitewash / limewash. This simple paint, annually used to whiten houses, barns and other stone buildings, is made by dropping lumps of lime into water, converting it into calcium hydroxide: ($CaO+H_2O=Ca(OH)_2$). When this is painted on a wall as a white slurry, it gradually hardens by absorbing CO_2 and changing back to $CaCO_3$. The reaction of lime and water is profoundly exothermic (gives off a great deal of heat) and the water usually boils during the making of limewash.

The CO_2 given off from limekilns normally disperses into the atmosphere, but as it cools, it becomes much denser than air, and tends to pool in any hollow, where its tasteless odourless presence can suffocate living things, and there

are many known instances of tramps bedding down by still-warm limekilns and being asphyxiated in the night. In the hollow in which the Saunders Hill limekiln sat, it may have been quite dangerous to work on still, warm nights.

Lime is also extremely caustic, and due to the exothermic nature of its reaction with water, will burn watery parts of human bodies like eyes and mucous membranes severely. This makes it a dangerous material to use, so it is often 'cured' before spreading on fields by letting it sit around in the rain for months, converting it to the much less dangerous, but just as effective

s
l
a
k
e
d

l
i
m
e

($Ca(OH)_2$