

Victoria County History of Cumbria Project: Interim Draft

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LIME BURNING IN WESTMORLAND

INTRODUCTION

Lime has been produced in Britain since at least Roman times, though there appear to be some hints of its use prior to that.¹ The burning of lime in the medieval era has been attested by archaeological excavation of a sow, or clamp, kiln on the southern flanks of Ingleborough, radiocarbon dated to the twelfth or thirteenth century, and of a similar sow kiln in the Forest of Bowland radiocarbon dated to the thirteenth century. In both cases, given that the sites in question were in very remote agricultural locations, the lime was probably destined for use on the land.² No such evidence has been recorded for Westmorland but it goes without saying that every stone-built structure – church, monastery, bridge, manorial hall or baronial castle – would have needed lime in medieval times and it was common practice to construct a simple kiln at the place where lime mortar was needed. Indeed, this would also have applied in the pre-Conquest era. Kilns prior to the very late seventeenth century were not the masonry-fronted kilns surviving

¹ Strabo (d. AD 23) wrote of tribesmen in what is now north-east Wales coating their hair with limewash and drawing it back thickened with lime so that it differed ‘in no way from a horse’s mane’ (I. Brown, *Discovering a Welsh landscape. Archaeology in the Chrydian Range* Macclesfield: Windgather, 2004, 66-7)

² Radiocarbon dates placed the last firing of the Bowland kiln between cal AD 1202 and 1280 at 93.2 per cent probability or between cal AD 1220 and 1265 at 68.2 per cent (SUERC-26208, GU-19814). See D. Johnson and H. Wallbank, *How Hill, Halsteads, Dalehead, Slaidburn. Excavation of a Clamp Lime Kiln* (Unpublished Report, 2009). The dates returned from the Ingleborough site were cal AD 1043-1225 at 95.4 per cent or cal AD 1117-1225 at 74.1 per cent (SUERC-49563, GU-32194), and cal AD 1026-1162 at 95.4 per cent (SUERC-49564, GU-32195). This site will be published in 2015.

in the landscape today but sub-surface bowls dug into a natural banking: now, they either lie buried and invisible or appear as a shallow penannular grass-covered hollow.³

Agricultural lime was in use in the north of England until the late 1960s and lime mortar was only gradually replaced by cement during the twentieth century: until then lime had been an indispensable product, as will be discussed later.

As far as can be discerned from the documentary record, the widespread use of agricultural lime in Westmorland (and Cumberland) had a later genesis than in the former West Riding, though the above corollary concerning early use of lime mortar must apply. Shap and Furness Abbey precincts will probably have sow kilns hidden somewhere as will the various churches, castles and halls with medieval origins. Pendragon Castle in Mallerstang has a well-preserved earthwork that has not been excavated but bears all the hallmarks of a sow kiln; given its fine state of preservation, it is more likely to date from Lady Anne's renovation of the castle in 1661-62 rather than from its initial medieval construction in stone.

Whether or not the dearth of early archival sources for liming in Westmorland truly reflects a late take-up of liming remains to be proven, though the smaller number of landed estates in Westmorland compared to the North and West Ridings does provide one reason for late adoption. It was frequently the estate steward, charged with looking after the estate on behalf of the often-absentee landlord, who was instrumental in writing husbandry and liming clauses into farm leases.⁴ Furthermore, the proportion of land under monastic control in Westmorland was also far less than in Yorkshire: much early improvement of existing farmland, and organised

³ See D. Johnson, 'The archaeology and technology of early-modern lime burning in the Yorkshire Dales: developing a clamp kiln model', *Industrial Archaeology Review*, 30 (2008), 127- 43.

⁴ See, for example, NYCRO, ZAW 138. Title deeds: Agreement between Wingate Pulleine of Carlton Hall, Co. York and Henry Sayer of Ladymires, Bowes, 12 September 1754, by which Pulleine allowed Sayer £2 per year for laying 180 loads of lime and 60 loads of coal for burning the lime; a similar agreement, dated 1 January 1762, required Sayer to burn and lay a specified quantity of lime with his being granted free access to coal at the Tanhill Pits. In a later tenancy agreement for the same farm – Old Spittle – William Atkinson was required to 'manure with at least 300 bushels of Lime or other manure', 28 February 1842.

incursions onto the so-called waste, were undertaken by monastic foundations. Again, Westmorland was typified by independent but small-scale yeoman farmers – the statesmen – who, it could be argued, lacked the financial means to invest in improvements such as liming. They had other priorities. Nevertheless, lime was still required for mortar in stone structures large and small.

A major constraint holding back lime burning in Westmorland was access to affordable fuel supplies. Early kilns normally relied on timber for fuel but this presupposes that sufficient quantities of suitable wood were available close at hand to minimise transport costs. Long-lived trees (such as ash or oak) were cut for timber if that was the prime source of fuel, but small wood species (blackthorn, alder, willow, hazel) were used as kindling even if coal was the main fuel. Where timber supplies were at a premium peat and even gorse were used as kiln fuel, and there is documentary evidence of this in Westmorland. In 1805 a farmer from east Cumberland, J Dodgson, wrote to the Board of Agriculture with a detailed description of how to successfully burn lime using peat. Peat was available nearby, at a much lower cost than coal, and he extolled the virtues of peat over coal, claiming it to be more fuel-efficient producing better quality lime.⁵

Both peat and gorse had innate disadvantages as kiln fuels: peat burns with a slow, smoky and low heat meaning each firing event was a drawn-out process, whereas gorse burns with a high intensity flame which *could* lead to too quick a firing thereby having a negative effect on the quality of lime produced. Sometimes dual fuels were used, presumably to balance temperature and burning time. The Levens Hall Estate steward wrote to his master in 1694 to the effect that he was ‘now leading peats for another lime kilne’ and that he also intended to ‘get coals for it’.⁶

Some coal was mined, dominantly along the Pennine fringe, for example on Barbon and Casterton Fells, on the eastern slopes of Mallerstang and on the hills east of Hartley in

⁵ J. Dodgson, *Communications to the Board of Agriculture; on Subjects relative to the Husbandry and internal Improvement of the Country*, vol. IV (London, 1805)

⁶ A. Bagot and J. Munby (eds.), *‘All things is well here’. Letters from Hugh James of Levens to James Grahme, 1692-95*, CWAAS Record Series, X (1988)

Westmorland.⁷ However, much of the coal was of low quality and fit only for use in lime kilns.⁸ A letter written by Edenhall Estate steward, Christopher Dobson, to Sir Philip Musgrave at his main seat at Kempton Park in 1776, reported that he had ‘a poor fellow trying to get Coals on Hartley Fell’ but that he had ‘little hopes of his making anything out however if he can only procure Limekiln Coals’ it would prove of value for the estate’s own kilns and soil improvement programme.⁹ This ‘poor fellow’ may have been working the myriad of shallow shafts and adits that are strung along the foot of Low Greenside at what was called Greyrigg Pits, centred on NY815 075, where the sheer number of infilled pits and the presence of a much overgrown cart or sled track leading up to them emphasise the scale of operations there, if not the quality of the coal.

Coal was carted in from considerable distances, at great expense, from Stainmore and Burton in Lonsdale, localities where higher-quality coal was mined on a commercial scale.¹⁰ It was the excessive cost of carting coal, for example for over 25km from Stainmore to Orton or from Burton to the eastern parishes of Westmorland, and even further from the Lancashire collieries to Kendal, that militated against the widespread take-up of lime burning in the county. Essentially, it was the coming of the Lancaster Canal in 1819 that brought cheap and plentiful

⁷ J. Nicolson and R. Burn, *The History and Antiquities of the Counties of Westmorland and Cumberland* (London: W. Strahan, T. Cadell, 1777, 5, 250); W.A. Hutchinson, *The History of the County of Cumberland volume 1* (Carlisle: F. Jollie, 1794-97, 182-258 *passim*); Mr Robinson, ‘Account of Kirkby Stephen in Westmoreland (sic)’ *Monthly Magazine* 119, (1804), 103-06; G. Brooks, ‘The East Cumberland Coalfield’ *British Mining*, No. 88 (2009), 124-36

⁸ CAS (K), WD/PP Box 8. Underley Estates: Draft Depositions, 27 April 1843; CRO (K), WDX 603, History of Hutton Quarries and Coal Pits by J.T. Atkinson, (1914), 1; Barker, *A Survey of Limekiln Sites in South Cumbria and North Lancashire*, 25

⁹ CAS (K), WE/Cat/Mus. A2173. Edenhall 1770s, Letter 22 February 1776

¹⁰ A. Pringle, *General View of the Agriculture of the County of Westmoreland* (sic) in J. Bailey and G. Culley, *General View of the Agriculture of Northumberland, Cumberland and Westmorland* (1794) Facsimile edition (Newcastle, 1972), 292-3, 339; J. Hodgson, *A topographical and historical Description of the County of Westmoreland* (sic) (London, 1820), 11; J.F. Curwen, *The later Records relating to North Westmorland or the Barony of Appleby*, CWAAS Record Series VIII (1932), 106 related details of a petition in the Quarter Sessions’ sitting of 8 January 1682-83 concerning the carting of coal from Stainmore to Orton

supplies of coal into Westmorland acting as a catalyst for vastly increased lime production, for both building and agriculture.¹¹

Vernacular uses of lime

A very long list of uses that lime had up to c. 1960 could be drawn up, many of them in industrial contexts, and it had a wide range of uses in rural situations from at least medieval times. The use of lime as mortar has already been mentioned and there is ample evidence from across Westmorland, from estate and farm accounts, of purchases of lime – along with building stone and hair – for use in repairs or new build. Horse hair was often mixed with lime to bind the mortar together as a stronger mix. Building accounts at New Hall in Nether Staveley (SD463 972) for 1762 provide useful detail of constructional methods, in this case on a barn or cowhouse.¹² Payment of 10s. was made for leading (carting) 20 bushels of lime, a further 12s. for purchase of lime at the kiln, and 6d. for ‘leading five stone of haire’. This consignment was used over two days for ‘liming the inside of the barn’, presumably meaning that the interior walls were given a coating of plaster rather than of lime- or whitewash.

In the 1780s the locally-based bailiff for the Dalemain Estate itemised payments made to various workmen on its Mallerstang properties, including purchases of lime, leading lime, walling and hair.¹³ This lime seems to have been sourced from a kiln owned by the Estate as other items in the accounts include payments to stone breakers, cutting and leading peat and limestone to the kiln, and burning lime. As was common practice, limeburner Robert Shaw was paid 6d. a pint for ale consumed at the kiln: lime burning could be a hot and unpleasant job.

¹¹ J. Housman, *A topographical Description of Cumberland, Westmorland, Lancashire and a part of the West Riding of Yorkshire* (Carlisle: Francis Jollie, 1800, 91); C. Hadfield and G. Biddle, *The Canals of North West England*, vol. 1 (Newton Abbot, 1970), 182

¹² CAS (K) WDRY/1/8/3/4, Box 110/29. New Hall Accounts, 1762

¹³ F. Wilkins, *Two thousand five hundred Cumberland and Westmorland Folk* (Kidderminster, 2006, 37)

A century earlier a new barn had been built at Sir John Lowther's Sockbridge Hall (NY503 270) and, out of a total expenditure of £212, £57 was allocated for lime, sand and water in addition to 9s. 6d. paid to the local tanner for '19 Stone of Hare'.¹⁴ The huge scale of this project is made manifest by the consumption of 859 cart-loads of lime in 1699 and 1700; as are the logistical realities of carrying out maintenance on his far-flung properties when repairs to Hartsop Hall in Patterdale, in 1702, required 20 loads of lime to be brought in. There are no limestone outcrops in that valley but there were lime kilns on the lake shore at Blowick and Glenridding burning limestone brought by boat down Ullswater. This trade is under-recorded but one – tragic – entry in the Rydal Hall Estate accounts, dated 14 September 1697, recounts the sinking of a vessel called the 'Great Boat' and the drowning of its four-man crew during stormy weather on Windermere.¹⁵ The boat, 'loaded with Limestones' was, sadly, overloaded.

Problems of a very different nature were described in enormous detail in a series of letters from Hugh James, steward on the Levens Hall Estate to James Grahme at Bagshot Park, between 1692 and 1695.¹⁶ The south wing of the hall was being built and James had contracted a number of limeburners to provide the required quantities of lime from the Estate's own kiln in Kitching Flatt (SD5012 8487). They were clearly less than co-operative and, week after week, he moaned about their failure to fulfil their obligations and the way they disported themselves: 'truly the Limes men deales very basely with me', he wrote on 5 June 1693, expressing his utter frustration in a letter dated 1 October that year with the *cri de coeur* 'they are the Greatest villanes upon Earth'!

¹⁴ B. Tyson, 'Building Work at Sockbridge Hall, its Farmyard and Neighbourhood' CW2 83 (1983), 107-24

¹⁵ B. Tyson (ed.), *The Estate and Household Accounts of Sir Daniel Fleming of Rydal Hall, Westmorland from 1688 – 1701* CWAAS Record Series XIII, (Kendal: 2001, 245)

¹⁶ A. Bagot and J. Munby (eds.), *'All Things is well here'. Letters from Hugh James of Levens to James Grahme, 1692-95* CWAAS Record Series X, (Kendal: 1988, *passim*)

Various rural trades relied on a regular supply of lime: tanning and tawing of leather, craft-scale soap and paper making, bleaching and dyeing yarn, being just a few.¹⁷ As far as farmers were concerned lime had a multitude of uses, and not just for sweetening acidic pastures, especially on newly taken-in moorland, or for replenishing the calcium content of soil on arable ground.¹⁸ Several stock diseases were treated (with direct lime mixtures or by top dressing pastures), such as red water,¹⁹ lactation tetany and the degenerative bone disease *Cochexia ossifraga*. There was also a practice common to Westmorland, known as ‘need fire’, whereby cattle were driven through the smoke of a specially-lit fire slowly enough for them to breathe in the fumes.²⁰ Whether it was employed to treat cattle murrain – which may have been foot and mouth – or in a superstitious attempt to keep ‘evil infections’ at bay is immaterial: those who used it believed in it.

Lime kilns in Westmorland

Within Westmorland 77 parishes are known to have had lime kilns,²¹ with a total of 660 discrete kiln sites having been located on the ground, 468 in Westmorland Barony and 192 in Kendal Barony.

¹⁷ D. Johnson, *Limestone industries of the Yorkshire Dales* (Stroud: Amberley 2010, 30-46); D. Johnson, *Liming and agriculture in the Central Pennines. The use of lime in land improvement from the thirteenth century to c. 1900*. BAR British Series 525 (Oxford: Archaeopress, 2010); D. Johnson, ‘Lime burning and the uses of lime in the historic county of Westmorland and along the Pennine Edge of Cumberland’, *CW*3, 13 (2013), 191-213.

¹⁸ This writer has been researching agricultural improvement in Westmorland, including with the use of lime, and it is hoped this will be published in due course. Examples of agricultural liming include CAS (K), WDRY/1/8/4/25, Box 107/33, le Fleming Archive, Receipts for Manure, Ashes and Lime, 1762-64; CAS (K), WDX/94/acc. 463/63, Lease, Hall Intack, Ravenstonedale, 11 February 1779; CAS (K), WD/Hoth/Box 26 (uncat.), Miscellaneous Westmorland leases, eg 1767 to 1791; CAS (K), WD/Cat/Mus. A2173 Edenhall, Letters 1764-89; CAS (K), D/Lons/L8/50, A Valuation of the Estates in Westmorland, 1810

¹⁹ William Fleming of Pennington noted in his diary for 12 June 1809 that many cows had died of ‘of the Redwater’ in Furness, suggesting that it was a scourge to cattle farmers: CAS (B), BDX 584.

²⁰ I am grateful to Jean Scott-Smith for extra information on this practice

²¹ No kiln sites were identified in 12 parishes in Kendal Barony and eight parishes in Westmorland Barony

Locational factors

The production of lime clearly requires limestone and once the raw stone has been through the firing – or calcining – process carbon dioxide and moisture are driven off leaving the resultant product, the quicklime, looking much as it did prior to calcining but *c.* 50 per cent lighter in weight. Thus, logic might dictate that a lime kiln would be sited as close as possible to where the stone was sourced. Indeed, it has been said that the siting of a kiln ‘relates very closely indeed’ to outcrops of limestone.²² However, it is not as clear cut as that. This writer’s Central Pennines survey found that 21 per cent of all kilns were not found in association with such outcrops, as other locational factors had come into play.²³ In some cases kilns were sited at the source of fuel, usually coal, or at the point of end use whether that was at a building complex or within or adjacent to a tract of moorland being newly enclosed and improved. These same factors came into play in Westmorland, too, but the relative number of kilns not closely linked to limestone outcrops is smaller than in the Pennines, being *c.* 12 per cent.

Where limestone is the dominant surface geology, as across much of the central plateau of Westmorland, there is a very close positive correlation between stone sourcing and kiln location. The areas with a negative correlation tend to be within the main Lakeland upland massif and in the South Lakes or in those townships where proximity to coal supplies was deemed more important, as in Mallerstang and Stainmore and to a lesser extent in Ravenstonedale. In a number of instances those who had commissioned a new kiln had gone to extraordinary lengths to find small limestone outcrops within areas of different geology, and the logistics of leading the burnt lime to where it was required, across rough moorland, must have been daunting.

²² M. Davies-Shiel, ‘A little known Late Medieval Industry, Part 1. The making of Potash for Soap in Lakeland’ *CW*2, 72 (1972), 85-111.

²³ D. Johnson, ‘Lime Kilns in the Central Pennines: results of a field survey in the Yorkshire Dales and contiguous areas of North and West Yorkshire’ *Yorkshire Archaeological Journal*, 82 (2010), 240-42.

In Westmorland 26 per cent of all kilns (183 kilns) were not in any way associated with a nearby quarry. It is possible that some quarry holes have been infilled and levelled since abandonment but even so the overall proportion is larger than one might have anticipated: this statistic quite categorically belies the oft-quoted direct and inevitable spatial link between kiln and source of stone.

Given the varied nature of topography and geology across Westmorland, there is clearly an enormous altitudinal range, from sea level on the shores of Morecambe Bay to the upland massifs. It must follow that the innate quality of soil and vegetation will show marked variations with increased altitude, reflecting rock type, angle of slope and climatic nuances. Further, in very general terms, from the medieval period those areas offering the best opportunities for settlement and farming would have been settled first with marginal upland tracts being left until later.²⁴ In the case of Westmorland this came much later. In 1800 no less than 79 per cent of the land area of the county was classed as unproductive 'waste' compared to a national average of 21 per cent; by 1873 a third of all land in Westmorland was still regarded as unenclosed and unproductive.²⁵

With these facts in mind, it should perhaps follow that there will be a direct link between the distribution of lime kilns and altitude if one accepts that enclosure and improvement came later than elsewhere, as those areas subjected to late enclosure tend to be on higher ground, and that liming and therefore lime kilns were associated with this late improvement. In other words,

²⁴ It should be borne in mind, of course, that many upland areas were occupied, based on permanent farmsteads or seasonally-occupied shielings during the medieval warm period (see, for example, J. Quartermaine and R.H. Leech, *Cairns, Fields and Cultivation: Archaeological Landscapes of the Lake District Uplands* (Lancaster, 2012), 120-21, 134-9, 273-4. As climatic conditions deteriorated, from the early fourteenth century, many upland settlements became unsustainable leading to a retreat from what quite quickly became the margins

²⁵ M. Williams, 'The Enclosure and Reclamation of Waste Land in England and Wales in the Eighteenth and Nineteenth Centuries' *Transactions of the Institute of British Geographers*, 51 (1970), 55-69.

following this train of thought, there should be a positive correlation between the number of kilns and altitude.

The greatest proportion of kilns in Westmorland (47 per cent) occur between 190m and 310m, comparatively few are found above 340m (10 per cent), but 94 sites – nearly 15 per cent – occur below 100m. Out of a randomly-selected sample of 19 enclosure awards post-dating 1840, ten range between 190m and 310m, five are below 190m and four above 340m. Statistically there is an albeit rather weak positive correlation, except that few of the kilns in the lowest altitudinal band were associated with a formal enclosure award. There are acute contrasts between the situation in this survey and that in the Central Pennines: in the former 26 per cent of sites are found above 309m (more or less Natural England's dividing line between uplands and lowlands) compared to 42 per cent in the latter, while less than 3 per cent of the former's sites exceed 460m, compared to 7 per cent in the Pennines.

These discrepancies could be due to geological differences, the Pennines having much more outcropping limestone than the Lake District with its volcanic and Silurian dominance, or to the possibility that by the time the later enclosures were implemented the application of lime had been replaced by artificial alternatives. It may also be that the driving forces behind the later enclosures did not have improvement in mind.

Kiln size

Inevitably there is a significant difference in the overall size of kilns across the county, partly reflecting their purpose and ownership. A kiln producing lime for use on a single farm or for taking in a new enclosure from the waste did not need to have a large bowl volume, and individual farmers would have baulked at the expense of constructing something larger than was needed. On the other hand, an estate kiln supplying all its tenants with agricultural – or building – lime or a commercial 'selling' kiln turning out lime more or less throughout the year would necessarily have been much larger in every dimension.

Small 'field' kilns tended to be worked only when lime was required. This may have been for the initial improvement of newly taken-in moorland and such kilns may have had a very short life; on existing farmland lime was applied either as top dressing of pastures or for treating land lying fallow but only at intervals of anything from ten to 20 years. In both scenarios a kiln would have been fired up and kept running on a continuous basis but only for as many weeks as were needed to complete this initial or cyclic process. For most of the time these kilns lay idle and in their total life span they were only worked on a very intermittent basis.

An estate or selling kiln, however, was kept running day and night month on month. If a commercial or estate limeburner was operating with only one single-bowl kiln, he may have worked it on a batch basis filling the bowl to the rim, firing it all as one event and drawing all the lime in one go meaning such kilns were worked on a short-cycle *intermittent* basis; or on a *continuous* basis filling fresh stone and fuel at the top and drawing burnt lime at the base. Some selling or estate kilns had twin bowls, though in Westmorland less than 2 per cent of surviving kilns have twin bowls, so each bowl would have been fired on a batch basis: as one was in the firing process the other was being drawn (emptied) and packed (refilled).

Within the survey area only 17 kilns have survived with the bowl open to full depth: in the vast majority of extant kilns the bowl had been infilled with rubble and levelled off as a livestock safety measure after abandonment.

There was no 'best' way of designing a kiln's front face and two basic styles cover all extant kilns in Westmorland: they are either squared or rounded, with the squared form being dominant and found in 82 per cent of all sites. One familiar element of the Westmorland fieldscape is the square lime kiln, and it is considered valid to speak of a regional style here. As mentioned, there are considerable variations in kiln size reflected in the number and plan form of the firing bowl and draw eyes.

As stated earlier, Westmorland has well over 600 kiln sites. Of the combined total, 159 (24 per cent) survive more or less intact and structurally stable, with a further 39 classified as semi-ruinous showing some collapse but a still recognisable form. These totals compare favourably with the Central Pennines which have only 16 per cent standing complete. A further 15 per cent have been classified in this survey as ruined (*cf* 16 per cent in the Central Pennines). Of the balance 35 per cent are classified as 'site only' (*cf* 36 per cent), while 22 per cent have left no trace whatsoever on the ground (*cf* 24 per cent). All three latter sets of data are remarkably similar.

Many kilns have simply collapsed as age has taken its toll, but easily accessible disused kilns were a ready source of building stone to be recycled elsewhere.

Lime kilns and liming

There are understandable contrasts in the category of land that kilns are located on between the two county areas: across Westmorland 26 per cent are sited on open moorland or commons, and only 13 per cent within a large quarry, while the greatest proportion (47 per cent) are within or on the edge of enclosed improved grassland or arable land. Many of these sites are on land taken in and improved during the era of parliamentary enclosure but there are significant numbers on what enclosure maps mark as 'ancient enclosures'. This is particularly apparent in the South Lakes and close to township centres in certain parishes in the Barony of Westmorland such as the Meaburns and Appleby.

The fact that a kiln is located on moorland does not necessarily equate with use of the lime on nearby ground. It is obvious, for example, that the enormous scale of lime burning along the Pennine edge emphasises that lime was being produced in large quantities for despatch to lower ground, either in the Eden valley or on newly taken-in enclosures on the lower west-facing slopes.

Whereas farm leases confirm that agricultural liming was practised, they do not give much indication as to when such provisions became commonplace, but various contemporary sources do provide hints that can tie down the period of use of certain kilns or, perhaps, wider lime-burning localities. Trade directories list significant occupations in each township, including limeburners, though they tend to be conspicuous by their absence as lime burning was not necessarily a full-time occupation. Rarely, there are indications concerning the use of lime: for example, a directory published in 1829 noted that lime was ‘first used ... as manure about forty years ago’ putting its use back to the 1780s; while one from 1849 claimed that lime was ‘now pretty generally burned’ for use in farming.²⁶ If these comments can be taken at face value, they confirm the assertion made earlier in this essay that liming in Westmorland had a later genesis than in the Yorkshire Ridings.

Dating

Enclosure awards are a useful source of dating detail. Out of 93 Westmorland awards, 13 set aside public limestone quarries without specifying what the stone was to be used for, and 41 areas covered by these awards have lime kiln sites on the ground. Of course, it is impossible to know how many of these kilns resulted from formal enclosure. For a further six awards it is possible to draw meaningful conclusions as they spelled out that limestone could be worked and burned in public quarries either for repairs, building or *for agricultural improvement*.²⁷ In four of these cases it has been possible to relate actual kilns to the awards.

Estate papers and maps, and early Ordnance Survey mapping, occasionally marked kilns by name, either naming them after the quarry they were part of, or after their location, such as Waitby Limekiln or Knock Lime Kiln or as ‘belonging to Smardale Hall’. What can be drawn

²⁶ W. Parson and W. White, *A History, Directory and Gazetteer of Cumberland and Westmorland* (1829), 59; P.J. Mannex, *History, Topography and Directory of Westmorland* (London, 1849), 47.

²⁷ The awards relate to Orton in 1779, Burton-in-Kendal, Holme and Dalton in 1815, Casterton Moor in 1816, Maulds Meaburn in 1858, and Great Musgrave Common in 1859.

from these annotations is that those kilns were still in use at the time the maps were surveyed, or papers drawn up, but they do not indicate how old the kilns were or for how long they were operational.

Farm sale or letting notices can be equally vague in providing firm dates. Aikbank Farm (SD549 810) in Farleton was advertised for sale in 1824 with two lots containing rights to get limestone and to build a kiln in addition to a half-interest in a kiln on the north side of Farleton Knott.²⁸ On the fellside opposite Aikbank (SD549 810), alongside Puddlemire Lane, there are remains of five kilns with a further three on the northern snout end of the Fell. Which kilns were within this sale is not known. Catholes Farm (SD594 792), near Pellsyeat west of Kirkby Lonsdale, was up for re-letting in 1835 with a 'LIMESTONE QUARRY and LIME-KILNS thereon'.²⁹ Close by there is a kiln and a small quarry but the use of the plural form would suggest that the kilns in question were at Tearnside just to the west where five kilns are known. Again, the wording on this notice only confirms that those kilns were fully operational at that time.

Kilns were certainly being worked at Tearnside before and after the 1835 transaction though. James Harrison, a local yeoman farmer, took on three parcels of land there in 1809 specifically for the 'use and purpose of building a lime kiln or lime kilns thereon';³⁰ in 1842 his widow conveyed back to the estate the same land 'on part of which a lime kiln hath been erected'. This dates at least one of the Tearnside kilns to that 33-year period. Interestingly, an Irishman known as Paddy O'Reilly was said to have been a limeburner there in the run up to the Great War which puts lime burning at Tearnside very late indeed.³¹

²⁸ *The Westmoreland (sic) Advertiser and Kendal Chronicle*, 4 Sept. 1824.

²⁹ *Lancaster Gazette*, 15 Aug. 1835.

³⁰ CAS (K), WD/U/30/6, Articles of Agreement, 2 October 1809.

³¹ W.R. Mitchell, *A Cumbrian Blacksmith. Jonty Wilson of Kirkby Lonsdale* (Clapham, 1978), 14.

Crag House Farm (SD557 765) in Burton-in-Kendal was up for re-letting in 1843 along with ‘an excellent and well-accustomed LIME KILN’.³² It is, perhaps, indicative of the value attached to liming that in these two latter instances the term ‘lime kiln’ was in upper case: to be able to offer a farm with its own supply of stone and its own functioning kiln was seen as positive spin by the selling agents. Much later than these notices, and at a time when farming across the country was mired in depression and tenancies were being given up by tenants who could not make ends meet, two properties in South Stainmore were put on the market.³³ Barras, or maybe Barras Farm, on the now dismantled South Durham and Lancashire Union Railway, and Duckintree, were advertised as having a private kiln and access to the nearby ‘Public Lime Works’ alongside the railway, at NY8439 1167, with its very large twin kiln. This reference is of importance in confirming that lime was still being produced in that part of Westmorland, as well as in Tearnside, towards the end of the nineteenth century when the industry had gone into terminal decline in many other areas. However, lime burning was not dead and at least two kilns in Ravenstonedale were fired up again either side of the First World War (pers. comm. Helga Frankland, 2006), one around 1910 by Needle House and the other in the 1920s by Studfold Farm. This kiln lay at the southern end of Stennerskeugh Clouds and was almost certainly one of the two surviving kilns close to the roadside between Studfold and Cold Keld. The reuse of this kiln was a case of happenstance: the farm had hired a young Irish labourer for the season and he had worked at a lime kiln elsewhere and knew how to operate them.

Contemporary records at the other end of the date spectrum confirm the production of lime and the construction of kilns within the eighteenth century. Two examples will suffice: the manor court book for Crosby Garrett bears an entry, from 1741, reaffirming that all customary tenants

³² CAS (K), WD/PP/Box 2, Sale and other Posters, Crag House, 21 January 1843.

³³ CAS (K), WD/HH, Box 2, uncatalogued, Sale Particulars, Duckintree and Barhouse, 8 August 1887; M.E. Shepherd, *From Hellgill to Bridge End. Aspects of Economic and Social Change in the Upper Eden Valley 1840-95* (Hatfield, 2003), 118, wrote that Westmorland avoided the worst of the agricultural depression that began in the 1870s

enjoyed the liberty of getting limestone on the common fell for building and for ‘improveing their ... lands’.³⁴ There are two kilns on the higher part of the common, one at Bents Hill and one above Hazzler Brow Scar, as well as three just south of the village, so which of them relate to this ruling cannot now be determined.

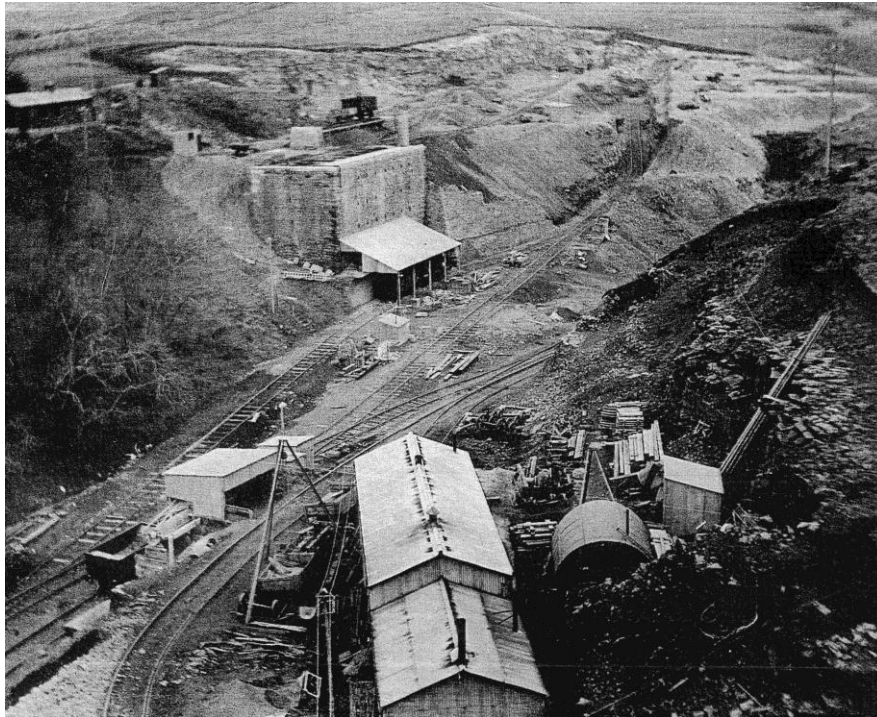
Two decades later Gilpin Gorst, of Appleby Castle, took on a 21-year lease from the earl of Thanet of all coal pits in Stainmore, Mallerstang and Knock.³⁵ The lease included the liberty to ‘Gett Limestones and erect Limekiln or Limekilns for the burning of lime’. As discussed earlier, there was a close link between coal mining and lime burning in Westmorland so it is highly likely that Gorst did erect kilns but there are so many kiln sites in all three areas that their precise location also cannot be determined.

Large-scale lime burning

Selling kilns and small-scale commercial operations are peppered across Westmorland but large-scale limeworks were relatively rare compared to other limestone districts such as Craven, Wensleydale or the Penrith area. Westmorland does not have the same concentrations of major limestone quarries, though there are exceptions, notably Hartley Quarry to the east of Kirkby Stephen, Kendal Fell, Sandside Quarry in Beetham parish and, arguably, Smardale Quarry in Crosby Garrett parish.

³⁴ CAS (K), WD/HH/82, Crosby Garrett Manor Court Book, 10 December 1741.

³⁵ CAS (K), WD Hoth Box 25, Stainmore Coal Leases, 14 August 1763.



*Fig. 1 Hartley Quarry showing the 1935 kiln bank on the far side and workshops nearer the camera.
The late G W Simpson Collection.*

Though lime was burned in field kilns at Hartley for many years the commercial quarry was enlarged as Sir Hedworth Williamson's Limeworks Ltd in 1925 or 1926.³⁶ During its later life two new state-of-the-art gas-fired Priests kilns were erected, to add to the existing batteries of traditional, vertical stone-built kilns, with their two elongated firing bowls, as well as crushing and hydrating plant: Williamson was a pioneer in the use of this latter technology in Britain. The first kiln battery was erected in 1935 (Figs. 1 and 2). Two years later the battery was doubled in size, with a capacity of up to 400 tons per week, added to meet the increased demand for agricultural lime, and 20 new staff were taken on.³⁷ By 1996 the gas-fired kilns had been demolished. In time, the quarry began selling other products such as coated stone (tarmac) and crushed stone and a valuation of the holding company in 1986 gave the site a working life of 50 years.³⁸ It was not to be, though. The quarry lies dormant, though with sufficient reserves for another 40 or so years, and the only work there now is converting burnt lime from a quarry at

³⁶ *The British Limemaster* 1 (6), March 1927, p. 138.

³⁷ *Cement, Lime and Gravel* 10 (8), 1936, p. 244.

³⁸ NYCRO. ZHV. Hargreaves Group of Companies, Uncatalogued, Box 3, Valuation of assets for Hargreaves Quarries Ltd, 1986.

Dove Holes in Derbyshire into bagged hydrated lime for onward despatch to water-treatment plants across Scotland. The original stone-built kilns still stand (Figs. 3 and 4), each battery having a prominent datestone (Figs. 5 and 6).

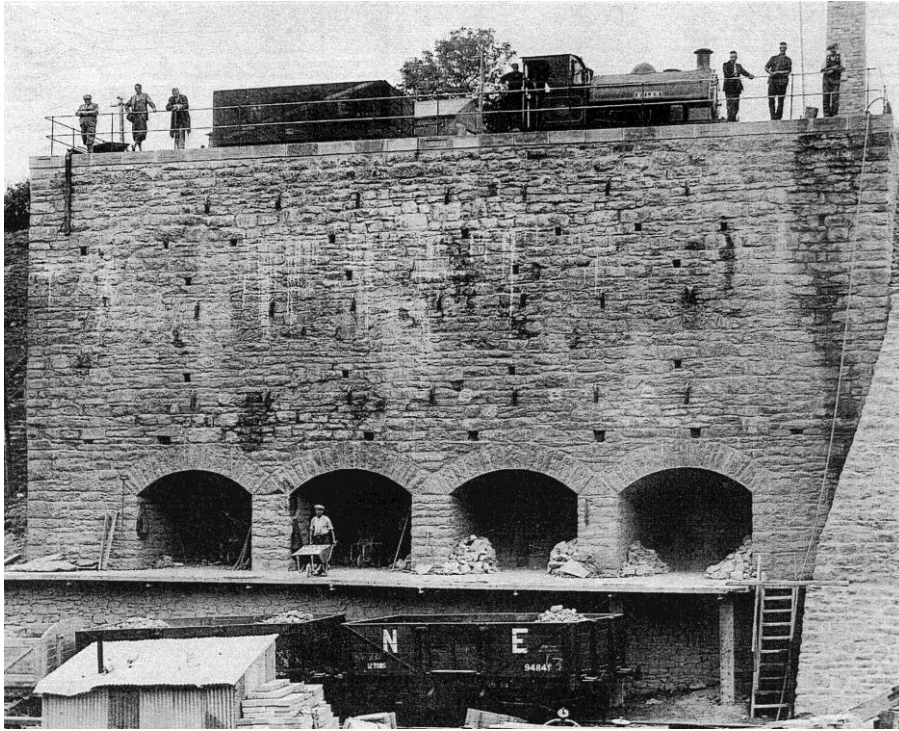


Fig. 2 The 1935 vertical, top-fed kiln battery in Hartley Quarry, with burnt lime being barrow-loaded into mainline rail wagons. The late G W Simpson Collection.



Fig. 3 The kiln batteries in Hartley Quarry, with the older set on the right, photographed in March 2014. © David Johnson. Included with the kind permission of CEMEX UK.



Fig. 4 The elongated oval bowl of the 1935 battery, photographed in March 2014. © David Johnson. Included with the kind permission of CEMEX UK.



Fig. 5 Datestone – 1935 – on the first kiln battery, photographed in March 2014. © David Johnson. Included with the kind permission of CEMEX UK.



Fig. 6 Datestone – 1937 – on the second kiln battery, photographed in March 2014. © David Johnson. Included with the kind permission of CEMEX UK.

The Kendal Fell complex of quarries had a long history and the three parcels of land into which it was divided were probably worked on a commercial basis from the eighteenth century though extant Kendal Fell Trust accounts and minute books only start in 1820 when two limeburners were listed each operating one of the two parcels then opened up.³⁹ Mapping from 1812 marks no kilns on the Fell⁴⁰ so, presumably, the two kilns being worked in 1820 had been erected since then, possibly with the coming of the canal in 1819. Attempts to regulate stone getting and lime burning on the Fell were enshrined in a set of bye-laws and in the Kendal Fell Act, 1861, though the first set of legislation concerning these trades was contained within the original Enclosure Act of 1767 which had granted consent to allotment holders within the township to ‘get Limestones and to burn the same into Lime’ for their own use. The Kendal Fell Act Amendment, 1849, removed this right on common land except for existing commoners, and authorised the Trustees to ‘erect and maintain in, upon, or near the public quarries ... such and so many lime-kilns’ as they deemed necessary and to charge rents for them. They were also given the power to remove any pre-existing kilns.⁴¹ The 1861 Act and the bye-laws were designed to put an end to abuses by limeburners which included straying beyond their allotted space, failing to declare and pay full royalties to the Trust, and failing to clear up waste material.⁴²

By this time lime burning had developed into a set of profitable commercial enterprises with Joseph Robinson & Company (Fig. 7), Moses Hully, and William Dixon (Fig. 8) prominent among them, respectively from 1856, 1849 and 1823.

³⁹ CAS (K). WSMB/K. Kendal Fell Trust. Kendal Fell Lands Account Book 1820 -1850.

⁴⁰ T. Keates. 1999. ‘Lime burning on Kendal Fell’, *The Cumbrian Industrialist*, 2, pp.33-49.

⁴¹ CAS (K). WSMB/K/5, Kendal Fell Trust. Box 20.

⁴² CAS (K). WSMB/K/5, Box 20.

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KENDAL FELL LIME KILNS.

Mr. Richard Parker

JOSEPH ROBINSON & COMPANY, &c.,
Lime Burners &c.

1870			
Aug	16	4 Bushel Lime at 10 ⁰ / ₂	3 6
Sept.	18	4 ¹ / ₂ do	3 11 ¹ / ₂
"	24	4 9 do	4 10 ⁰ / ₂
"	29	4 ¹ / ₂ do	3 11 ¹ / ₂
Oct.	1	4 9 do	4 10 ⁰ / ₂
"	3	4 9 do	4 10 ⁰ / ₂
"	4	4 9 do	4 10 ⁰ / ₂
"	5	4 9 do	4 10 ⁰ / ₂
"	6	4 9 do	4 10 ⁰ / ₂
"	7	4 9 do	4 10 ⁰ / ₂
"	10	4 8 do	4 0
"	11	4 9 do	4 10 ⁰ / ₂
"	12	4 9 do	4 10 ⁰ / ₂
£			4 9 5 ¹ / ₂

Oct 12 1870

Wm. S. Robinson

Fig. 7 Invoice, dated 12 October 1870, from Joseph Robinson & Company of Kendal Fell Lime Kilns to Richard Parker of Borrowdale (Author's collection)

FELLSIDE,			
Kendal, <i>Nov</i> , 1878			
<i>Mr. R. Parker</i> To WILLIAM DIXON, Dr., BUILDER & LIME BURNER.			
1878			<i>£ s d</i>
Sept 2.	10	Bushells of Lime	10.
" 4.	10	Bushells of Lime	10
" 5.	10	ditto ditto	10
" 7.	10	ditto ditto	10
" 10.	10	ditto ditto	10
" 13.	10	ditto ditto	10
" 18.	10	ditto ditto	10
" 19.	10	ditto ditto	10
" 20.	10	ditto ditto	10
" 21.	5	ditto ditto	5
" 23.	10	ditto ditto	10
" 24.	10	ditto ditto	10
" 26.	10	ditto ditto	10
" 27.	10	ditto ditto	10
" 28.	5	ditto ditto	5
" 30.	10	ditto ditto	10
Oct 1.	10	ditto ditto	10
" 2.	10	ditto ditto	10
" 4.	10	ditto ditto	10
" 5.	5	ditto ditto	5
Nov 8.	10	ditto ditto	10
" 9.	5	ditto ditto	5
			<i>£ 10 " "</i>

Fig. 8 Invoice, dated November 1878, from William Dixon of Fellside, Kendal, to Richard Parker of Borrowdale (Author's collection).

It is many years since Sandside Quarry produced any lime, but the massive pair of masonry-built kilns still stands at the side of the minor road between the quarry and Milnthorpe Sands (Fig. 9).



Fig. 9 The 19th-century kiln battery at Sandside Quarry, photographed in April 2010. © David Johnson.

Conclusion

For many centuries, until its production was largely phased out very abruptly in the 1960s, lime was an essential product across the country, for vernacular and high-status building, in a range of rural trades and in farming. Agricultural liming was practised widely and enjoyed a pre-eminent position – along with draining and paring and burning – in the improvement of acidic soil on existing farm land and in the winning of new land from the ‘waste’. Wherever limestone outcropped it was quarried and burned in lime kilns ranging in size and complexity from small-scale sow kilns through small masonry field kilns to large estate and commercial selling kilns. Limestone or burnt lime was transported over considerable distances in the county to where it was needed, and this essay has demonstrated its use here from at least the seventeenth century. Lime was produced in most parts of Westmorland, apart from in the high fells of the Lake District. The essay has also provided a comprehensive summary of lime kilns and lime burning across Westmorland, and has drawn together a variety of archival sources: it is accompanied a

detailed gazetteer, and has sourced and collated data from farm and estate records, manor court books, early mapping, and contemporary accounts and records.

In very recent times lime has only been produced in Westmorland at Tata Steel's battery of four kilns at Shapfell, and quicklime on the land has been almost completely replaced by chemical alternatives or by pulverised limestone dust or, increasingly, by the use of lime-rich paper or sewage sludge. Apart from a small resurgence of lime mortar in the renovation of traditional buildings, cement has fully taken its place. Lime burning is an almost defunct industry now, and not just in Cumbria.

The Excel Spreadsheets

A summary of all lime kiln sites identified in this writer's field survey can be found in a series of Excel spreadsheets accompanying this essay. Kiln sites have been arranged on a parish basis within the Barony of Kendal and the Barony of Westmorland respectively. Column A lists the series number allocated to each site in the field survey while Columns B and C give the Historic Environment Record number for either the County Council or the Lake District National Park Authority, as appropriate and as listed at the time the spreadsheets were compiled. Columns D and E provide an 8-figure grid reference for each site and G names the actual or nearest locality. Column I gives the status of each site, as determined by this writer:

C indicates that the kiln has survived more or less intact with minimal damage,

PR shows that the kiln has survived with some loss of stone, but that its original form can be readily understood,

R means that the kiln is ruinous, substantially or totally collapsed,

SO indicates that the actual kiln was gone – the stone has been robbed out and taken away – but there is sufficient ground evidence that a kiln stood on that spot,

NT means that no trace of the kiln can be seen on the ground but cartographic or documentary sources confirm there had been a kiln at the precise locality.

Column K states whether or not a kiln was depicted on First Edition Ordnance Survey mapping, surveyed in the 1850s or 60s; Column M provides evidence from other archival sources.