

ART. XI. – *Agricultural Lime Burning – the Netherby example.* By D. J. W. MAWSON.

THE burning of lime for building purposes dates from ancient times. It is said, indeed, that the Romans achieved a mortar mix which was sometimes stronger than the masonry it bonded.¹ Although this sort of quality eluded later generations until the early part of the nineteenth century, medieval builders nevertheless needed considerable quantities of mortar and their contracts often allowed for the erection of a lime-kiln near the construction site.² On the other hand, lime-burning for agricultural purposes, in this country, seems to have commenced much later and the earliest records date from the sixteenth century. In 1523, for instance, John Fitzherbert in noting that burnt lime was then being spread on farmland in many parts of the kingdom, also revealed that coal was replacing wood as the favoured kiln fuel.³ Then, as now, to gain general acceptance, improved agricultural methods had to be cost effective. Haulage of bulk goods was both difficult and expensive and since approximately two tons of limestone and between one third and one half of a ton of coal were needed to produce one ton of quicklime,⁴ the spreading of burnt lime tended to be introduced soonest where both these raw materials were locally available.⁵

In essence, a lime-kiln was little more than a deep stone bowl, dropping to a small opening called the kiln eye which, in turn, was reached from the outside by a tall arched entrance chamber.⁶ The fuel (be it coal, wood, peat or some other local material) and the fragmented limestone were tipped into the bowl from the top in alternate layers and upon the stone being heated to about 1100°, it decomposed and became quicklime. This was then drawn out through the kiln eye at intervals of 24 hours or so.⁷

Apart from improving the soil structure itself, the principal benefit of lime in an agricultural context is to neutralise soil acidity which not only inhibits yields on unmanured lands, but also renders manures themselves ineffective. The last point was never fully appreciated by the early agricultural improvers who, while recognising its benefits, tended to look upon lime as a substitute for organic manure rather than as its partner,⁸ a misconception which, not infrequently, led to improved land being over-limed and under-manured, so that in the course of time it reverted to rough grazing once more.⁹

In the mid-eighteenth century the use of burnt lime as an aid to agricultural improvement was widespread, but there is ample evidence to show that in Cumberland and Westmorland the more enlightened landowners had in fact been conversant with the practice from a much earlier period. The Curwens, for example, were liming their land near Workington in 1634. Similarly, the Flemings were burning lime on their estates at Rydal in 1631, and when John Dalston of Mirkholme died in 1594, he had lime in his barn as well as in his kiln.¹⁰ Even in northern Cumberland, where agricultural improvement had necessarily to await pacification of the Borders and the advent of political stability, the Howards of Naworth were leasing their limestone quarries in 1719,¹¹ while lime was being burnt for use on newly reclaimed land at Harper Hill in Stapleton six years later.¹² In the wilder parts of northern Borderland, however, in Bewcastle, in Solport and along the Liddel Water, the benefits came later. When Dr Robert Graham came to live on the Esk in

1757, for instance, he found "the people idle and bad, still retaining a smack of the feudal manners, scarce a hedge to be seen, and a total ignorance prevailing of coal and lime".¹³ Further to the east, Bewcastle was in a similar sorry state, and although Hutchinson's description of that parish in 1794 as being a place of "poor and scanty enclosures, mean cottages, an indigent race of inhabitants, small cattle and a very ordinary kind of sheep" was hotly disputed by the Dissenting Minister, the Rev William Lauder, there can be no doubt that the latter's contention that "no part of the County has made greater advances in improvements than we have done" reflected a comparatively recent change in local attitudes and prosperity.¹⁴

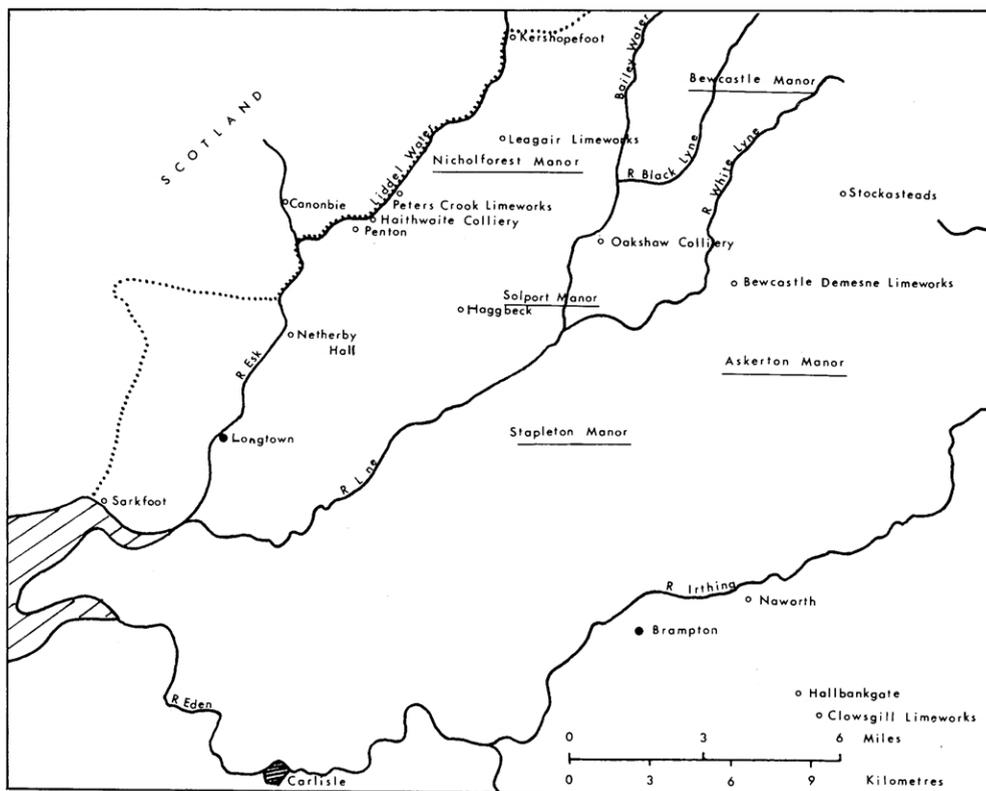


FIG. 1.

It is within this corner of Cumberland, adjoining the Scottish border, that a rich collection of kilns flourished along the limestone outcrops in the valleys and hillsides at the foot of the Bewcastle fells when improved agricultural techniques belatedly reached the area (Fig. 1). Although some of these kilns have long since disappeared, and others are in an advanced state of decay, each site has been visited and recorded. This field work has shown that there are still substantial remains of more than 40% of the 63 kilns depicted on the 1st Edition of the Ordnance Map surveyed in 1862. The drawings in Plate 1 portray a representative cross-section of these survivors, while the Appendix contains a complete list of the kilns surveyed.

Apart from a scattering of kilns along the northern perimeter of the Naworth estate in its outlying manors of Stapleton and Askerton, the research upon which this narrative is

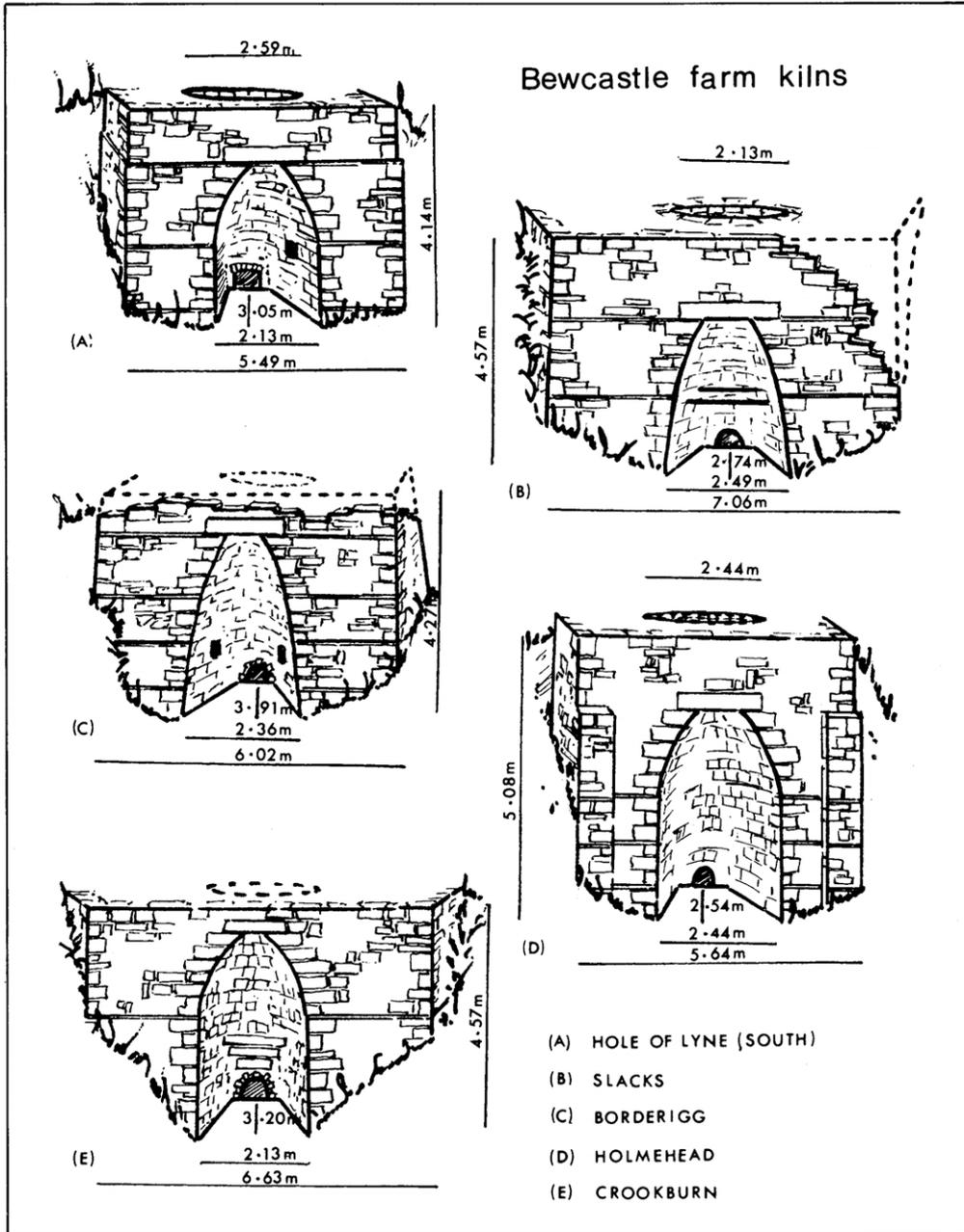


PLATE I.

based relates to the Netherby estate of the Graham family. The nucleus of this estate is the Barony of Liddel, which Sir Richard Graham bought from the Earl of Cumberland in 1628, and to which he added the Manor of Bewcastle in 1630 and the Manor of Solport 22 years later.

Although, due to a more settled agrarian economy, agricultural lime-burning occurred sooner in the neighbouring Naworth estate of the Earls of Carlisle than in the Netherby manors along the Scottish border, the particular interest of the latter lies in the various means adopted by Sir James Graham (1792-1861) to exploit a diversity of mineral resources in different parts of his domain in order to create a great landed property.

The story of Netherby does not begin with Sir James, however, but with his grandfather, Dr Robert Graham (1703-1782) who, upon inheriting the estate in 1757, found even then, a century and a half after the Borders had been pacified, that poverty and neglect remained a continuing legacy of more troubled times. What Sir James would complete, Dr Robert began, and in pressing his agricultural reforms upon a sometimes unwilling tenantry he was well aware that there could be little improvement in the quality of local life without a dramatic change in the underlying economy of his border barony.¹⁵

Much of the land around Netherby, being then little more than unenclosed bog, was pastured in a meagre sort of way by a slothful peasantry.¹⁶ Its transformation into fertile farmland was crucial to the success of Dr Graham's plans. By 1761, therefore, not only had he pioneered the enclosure of Nether Common near Netherby Hall itself, but he had reached agreement upon the enclosure of large tracts of land in neighbouring Solport Manor too.¹⁷ The important part which lime would play in the reclamation of these infertile acres was not overlooked, and wherever limestone was to be had, quarries were set aside for public use. The enclosure agreements were accompanied by a search for fuel to fire the necessary lime-burning kilns, and by 1763 coal had been found on the banks of the Liddel Water at Penton, and a small drift mine, soon to be called Haithwaite Colliery, established there.¹⁸ Although some years would elapse before local lime-burning resources could meet the demands of an expanding agricultural economy, the shortfall was made good during the remainder of the century by small vessels plying between the West Cumberland seaports and Dr Graham's newly built harbour on the Solway at Sarkfoot.¹⁹

By 1769 a traveller on his way from Scotland was able to observe that at Netherby there were now "limestones to be had and coal to burn them", while the land thereabouts had been "finely reclaimed from its original state, prettily divided, well planted with hedges and well peopled: the ground originally not worth sixpence an acre [being now] improved to the value of thirty shillings".²⁰ By draining and manuring 1,000 acres at a time, and creating on each occasion some 8 to 10 new farm units, and by then allotting these, often rent-free from a year or so, to his more industrious tenants, Dr Graham's annual rent receipts, which had amounted to barely £2,000 upon his accession in 1757, were advanced to no less than £13,000 when he died 25 years later.²¹

As the century drew to its close, there were proposals to improve Sarkfoot so that it might give safe anchorage to somewhat larger vessels. Already substantial warehouses on the quayside catered for what had now become a two-way traffic. Flour from the Netherby corn-mills, as well as other agricultural produce, found a ready market in Lancashire, but although limestone imports were still considerable,²² self-sufficiency in coal appears to have been achieved from an early date. Certainly by the mid-1790s Peters Crook limeworks near Penton was being supplied with coal from the adjoining colliery at

Haithwaite, and Netherby Hall itself was obtaining an average of 278 tons annually from the same place.²³

Of Nicholforest it was now said "In general agriculture is much upon the advance, and has been so for some time past",²⁴ while even in outlying Bewcastle, which until then had probably remained in the worst condition of all the Border properties, matters were on the mend. Certainly the burning of lime for agricultural use in this remote rural manor during the latter part of the eighteenth century can be inferred from the existence of a small land sale colliery at Oakshaw by 1794, for in an earlier age transport costs alone ensured that coal was seldom mined unless some specialized demand lay close at hand.²⁵

The Bewcastle coal-measures were worked throughout the ensuing century. Haithwaite Colliery at Penton, on the other hand, was never more than a modest affair wrought in a fitful manner by a mere handful of pitmen. In 1798, indeed, prompted by the fact that there was barely sufficient coal in the existing Haithwaite workings to meet the combined needs of Netherby Hall and Peters Crook limeworks for another two years, the colliery tenant, Matthew Mitchell, proposed that £690 be spent on sinking a new pit nearby. The agent at Netherby sought outside advice. A new pit, he was told, could not be recommended, for the capital outlay would add so considerably to the price that it would become cheaper to buy coal from the Duke of Buccleuch's Canonbie Colliery on the opposite side of the river. The report went on to suggest that drainage of the present level, so that it might be worked to a greater depth, was to be preferred, but advised that the pumps should not be powered by a steam engine, for this would also be too costly and a waterwheel on the riverside would be cheaper both to instal and to operate. Meanwhile, to safeguard Netherby's immediate domestic needs, coal deliveries to Peters Crook must be halted, the limeworks being left to compete for whatever inferior coal happened to be locally available.²⁶

With output at Haithwaite colliery now severely curtailed, there came a disturbing report that the 18 in. seam at Oakshaw pit in Bewcastle was also nearly exhausted. The twin pressures of expanding agricultural demand and diminishing fuel resources led in 1804, therefore, to an urgent search for more productive measures. The resultant survey was not a success, for although trial borings at Penton, in Bewcastle, and on the west bank of the Black Lyne in Solport established the presence of thin seams in several places, no substantial coal deposits were found.²⁷ Fortunately, however, Netherby's concern for the immediate future seems to have been misconceived, since in spite of this unsatisfactory survey, Bewcastle's coal reserves subsequently proved sufficient both to fulfil local needs and fuel a public kiln at Leagair (474794) in Nicholforest too,²⁸ while within a few years belated implementation of the 1798 drainage proposals had also enabled full production to be resumed at Haithwaite.²⁹

The early part of the nineteenth century was the great period of enclosure in north Cumberland. Longrigg Common in Stapleton had been enclosed by 1801, and an awareness that other commons would soon be dealt with in similar fashion must have been a contributory reason for the Netherby estate's 1804 mineral explorations. Liddel Common followed Longrigg in 1810, while the Bewcastle wastes of Baileyhope and Highstone were enclosed in 1814 and 1815 respectively. Mallshill in Solport came next, in 1817, with Black Lyne in Bewcastle three years later.³⁰ It is significant that wherever limestone existed in workable quantity, a quarry was set aside for public use. The Baileyhope award reserved no less than six, and in almost every case a kiln was later constructed nearby.

It has been asserted that in north-east Cumberland by 1825 “scarcely a bit of low common could be found in its original state”.³¹ With hindsight, however, it is evident that throughout the kingdom the high price of grain during the Napoleonic Wars and the years which followed had sometimes encouraged the enclosure of unsuitable land. This in turn led to over-production, and when, between 1817 and 1821, a series of bumper harvests led to the collapse of corn prices, the agricultural boom suddenly ended. If, as a result, many farmers faced ruin, all too often their landlords, encumbered with wartime debts, were in little better shape.

During this critical period Netherby was in the hands of Dr Robert Graham’s son, an ineffective man who found business irksome and entrusted his affairs to an indolent agent. In 1821, beset by mounting debt and diminishing income, he was persuaded to transfer control to the next generation. The young James Graham, his heir, was a man of quite exceptional talent. Later to become a leading figure in national politics, he brought to bear upon the management of his father’s estates a professionalism which had hitherto been lacking. The task which faced him was a daunting one. He found finances in total confusion, the good land exhausted by non-rotational cropping and heavy liming at the expense of regular applications of organic manure, and on all sides a spectacle of ill-drained waterlogged farmland, with dilapidated buildings, ruinous fences, and appalling roads. Most of Dr Robert’s work was in disarray. It has been said, indeed, that Netherby then afforded an excellent example of the extent to which some of the country’s landed estates had been allowed to degenerate during the war years.³²

Ellis, the resident agent, resenting the new regime, soon resigned, and a Scotsman, John Yule, was appointed in his place. Together he and his employer embarked upon the reclamation of their derelict property. Improvements were already under way when James inherited the baronetcy upon his father’s death a few years later, and by 1845 the outlay on buildings, drainage, roads, bridges, afforestation, flood defences, liming and mineral exploration had exceeded £93,000. The story of Netherby’s redemption has of course been told elsewhere,³³ its relevance to this account is merely to demonstrate that the tenure of the second Sir James Graham from 1818 to 1861 was a period of outstanding agricultural achievement.

Although limestone was abundant, particularly in the eastern part of the estate, and thin coal seams were to be found in various places, unhappily Netherby never enjoyed the mineral wealth of its more richly endowed neighbours. Efficient exploitation of what limited resources it did possess was thus a matter of particular importance. Graham and Yule soon discovered that the limestone and coal measures throughout the barony were leased to one man, Joseph Sayers, an industrious but somewhat under-capitalized entrepreneur, who also had lime-burning interests in Lord Carlisle’s neighbouring territory. They questioned the desirability of this monopoly. Was Sayers conducting his various ventures to the best advantage of the estate? How, indeed, might methods be improved and production increased? In 1822 they brought in Robert Bald, a distinguished Edinburgh mining engineer to advise.³⁴

In the north-eastern part of the estate, where there was no great demand for coal other than for agricultural lime burning, Bald saw little purpose in interfering with the existing arrangements. The output from the Bewcastle colliery at Oakshaw was ample for the needs of the lime burners at Leagair to fuel another commercial kiln which Sayers had recently built at Bewcastle Demesne (555747) (Pl. 2) and to fulfil the farmers’ requirements as well.

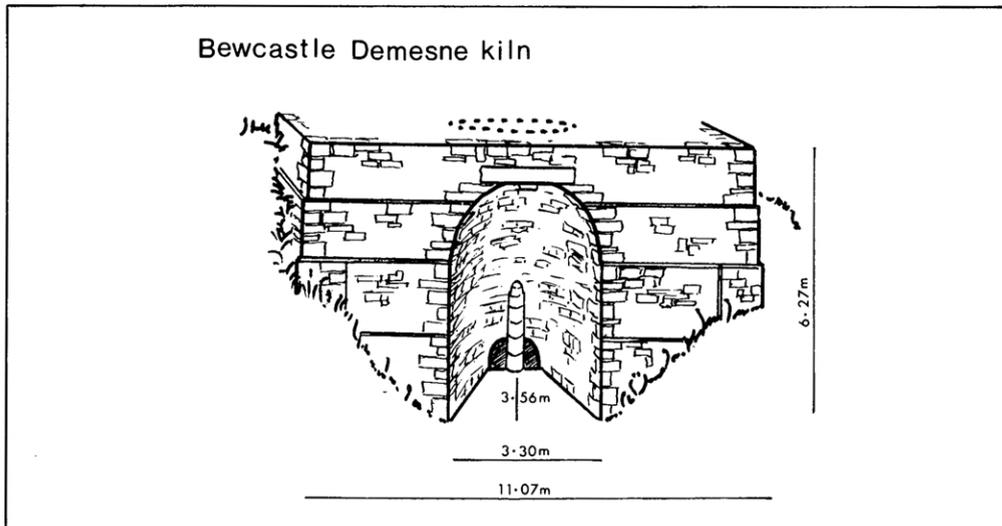


PLATE 2.

On the contrary, priority, he felt, should be afforded to reorganizing the mineral workings at Penton, where not only was the colliery at Haithwaite well placed to serve the nearby Peters Crook limeworks, but the potential for retail coal sales was also considerable.

Bald accordingly recommended the immediate modernisation of this colliery. In particular he considered that the means of haulage from the coalface was grossly inefficient; that a pitman creeping through the mire on his hands and knees should have to drag a sledge laden with one hundredweight of coal behind him on each trip was absurd, since, quite apart from humanitarian considerations, at least four times that amount could be hauled along a properly constructed wagonway. Such a wagonway should therefore be built. The pit pumps, moreover, were inadequately powered by the adjoining corn-mill's waterwheel, and not only would a small steam engine be vastly more efficient, but in his view it could also be used to hoist coal to the surface.

If drainage of the Haithwaite coal workings was a perennial problem, flooding also presented difficulties at Peters Crook, where the limeworks were compelled to close down during the wet winter months. Bald believed that the installation of a waterwheel in the adjoining river to replace the horse gin which then powered the quarry's pumps should nevertheless enable continuous production to be achieved quite easily; but drainage apart, he had no doubt that a substantial increase in output could be achieved only by replacing the existing 10-ton and 4-ton kilns with larger plant. A sizeable kiln ought therefore to be built just above flood level on the waterside, so that coal could be brought down to it from Haithwaite colliery by an inclined railway laid along the face of the steep slopes above the river.

The closer association of colliery and limeworks was indeed fundamental to his proposals, but on a more personal level he also viewed with suspicion Sayers' lime-burning interests elsewhere, and was convinced that he should be called upon to surrender Lord Carlisle's leases. If he were willing to implement these recommendations, Sayers' rental and royalty payments for the Bewcastle and Leagair tenancies might be reduced, but if he were not, the estate would be well advised to take the various enterprises back into its own hands and operate them under management.

Significantly Sayers did not remain at Penton for much longer, and by 1827 Luke Punshon had acquired the tenancy of Peters Crook and of Haithwaite too. From periodic entries in his accounts relating to the carriage of coal, it would seem that Bald's inclined railway was never built, while the scheme for draining the quarry must also have been shelved, for throughout Punshon's tenure the limeworks continued to close during the winter.³⁵ Bald's 1822 report was nevertheless a document of some importance, since it shaped the policy at Netherby in relation to the exploitation of its mineral resources for many years to come. Never again, for example, would a mineral monopoly throughout the entire estate be granted to a single individual, while every effort was henceforth directed towards achieving such measure of self-sufficiency in agricultural lime as local resources might permit. In the northern uplands where limestone was plentiful many farmers burnt their own, and it is more than likely that that by 1827 most of the farm kilns shown on the 1st Edition of the Ordnance Survey Map were already in use. The farmer's own production was supplemented by commercial lime-burning at Leagair and Bewcastle Demesne, and the whole of this northern part of the territory relied upon the colliery at Oakshaw for its coal. By contrast, neither coal nor limestone was commonplace elsewhere,³⁶ so that the limeworks already established at Peters Crook, where the only substantial natural resources to serve the fertile southern part of the estate occurred, had of necessity to be expanded. Dispersed domestic lime-burning in one area, therefore, when combined with centralized commercial production in another, sustained a common purpose, and the practical implementation of this strategy is clear when the farmer's kilns throughout Netherby territory at the end of Sir James Graham's time are plotted alongside the recorded destinations of lime sales from the Peters Crook kilns in 1829³⁷ (Fig. 2).

In Bewcastle alone there were at least 38 active kilns during the mid-nineteenth century, and since these served only 53 farms of the more substantial sort,³⁸ Whellan's comment in 1860 that practically every farmer burnt his own lime, is undoubtedly correct.³⁹ Most of these kilns, as well as those in the neighbouring manor of Solport, were built along the White Lyne and its tributaries, but there were also a few on the Black Lyne, as well as some upon either side of the Bailey Water valley. Many still survive in tolerable condition, and for the most part are revealed as small structures, 4 to 5 metres high, built solely to serve a single holding. On the other hand, to judge from their larger size, the extent of their associated quarries and well developed track systems, others seem to have been co-operative kilns, worked by several neighbours for their mutual benefit. Just such a building, which may also have been put to commercial use, still stands to its full height on the eastern bank of the Black Lyne, near Dapplymoor (497739), where the Harbin family, whose name occurs often in the annals of Bewcastle lime-burning, tenanted two neighbouring properties between 1829 and 1847.⁴⁰

At first glance it seems strange that in an area so well served by domestic kilns, Joseph Sayers built a public limeworks at Bewcastle Demesne some time prior to 1822,⁴¹ particularly so when, although there were pockets of land within Bewcastle manor where limestone was not to be had,⁴² there can hardly have been sufficient demand from these places to justify the establishment of a limeworks there, let alone sustain it in business for the next 60 years. Sayers' market, therefore, plainly lay elsewhere. With Solport supplied from Peters Crook, and northern Nicholforest looking to Leagair, the only other localities devoid of limestone deposits of their own were Stapleton and Askerton, the northerly manors of the Naworth estate. In these two manors together were to be found as many

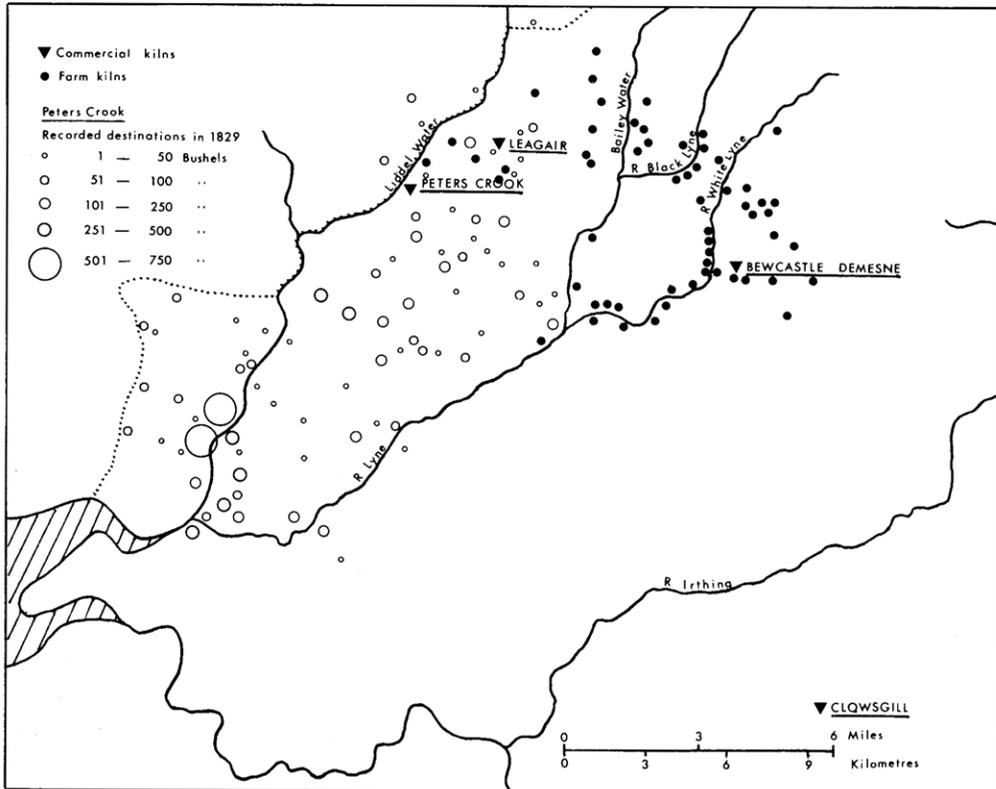


FIG. 2.

farms as in the whole of Bewcastle,⁴³ and significantly, they nearly all lay more than 9 miles away from Lord Carlisle's own Clowsgill limeworks near Hallbankgate, so that the Demesne kiln, being within half that distance, was ideally placed to capture their custom. That it did so appears to be confirmed by Dr Alan Harris's recent examination of the lime trade on the Naworth estate, for in plotting the destination of kiln head sales from Clowsgill in 1824, he has shown that, in that year at least, no direct sales were being made to these northerly Naworth manors.⁴⁴

As the eighteenth century progressed, the application of guano and chemical fertilisers to farmland, in preference to lime, became so widespread that by 1852 a contemporary commentator reported "Lime is sparingly used now compared with the period of forty years or more over which the enclosure of the commons extended";⁴⁵ and while many private kilns were apparently still in use ten years later,⁴⁶ their importance to the region's agrarian economy had by then plainly diminished. Little domestic quarrying was undertaken after 1862,⁴⁷ and it is quite apparent that within a few years farm lime-burning on any significant scale had ceased.⁴⁸ That public kilns at Peters Crook, Leagair and Bewcastle Demesne continued to trade until the 1880s suggests indeed that the fall in overall demand was accompanied by a reluctance on the part of the farmers to burn their own lime, so that the commercial limeworks were able to survive on a substantially increased share of a shrunken market.

Although there seems always to have been plenty of coal in Bewcastle during the lime-burning years,⁴⁹ this satisfactory state of affairs did not apply on Liddelside, where restricted fuel resources remained a persistent problem until the arrival of the North British Railway in 1860. Leagair, which although in Nicholforest nevertheless relied upon the Bewcastle pits, was unaffected by this shortage, as were Hudshole (444786), a freeholders' kiln on the banks of the Liddel just north of Peters Crook,⁵⁰ and Haggbeck (473737) a commercial kiln in Solport,⁵¹ both of which relied upon thin on-site coal seams of their own. When Haithwaite colliery closed down, some time prior to 1845,⁵² Peters Crook was also compelled to rely upon a 12 in. seam nearby which had hitherto merely supplemented its fuel supplies.

By the late 1850s the imminent arrival of the North British gave fresh impetus to the development of Netherby's minerals, for whereas in previous decades a sufficiency of lime to meet local needs had seemed an adequate enough objective in itself, it was now plain that just as earlier railways had opened up Dumfriesshire to the limeworks of Cockermouth and Clowsgill,⁵³ the North British line could enable Netherby's lime to be marketed far beyond the boundaries of the estate. The competitive capability of Peters Crook was never in doubt, since lime could be loaded into railway wagons at the kiln head there for as little as 5s. a ton, and not only was this cheaper than the Duke of Buccleuch's lime at the Canonbie terminus of the Caledonian Railway, but it was also less than the prices currently being charged by other limeworks supplying south-west Scotland.⁵⁴

There were, in addition, early expectations of finding indigenous coal both to serve an expanded lime industry and, hopefully, to be traded on its own account too, but in the event these were not fulfilled,⁵⁵ and in 1861 Sir James Graham, having reluctantly accepted that coal for lime-burning would have to be imported from the Duke of Buccleuch's collieries, abandoned his own trial borings, and sought agreement on freight rates with the North British directors.⁵⁶ Thus commenced a new era for Liddelside lime-burners, one in which increased lime production would be dependent upon outside resources and the railway for its staple fuel requirements.

All efforts were now directed towards putting Peters Crook on a businesslike basis. Edmund Gibson, a mining engineer, recommended that the existing system of opencast quarrying be supplemented by underground limestone workings, and that inclined railways and hoists, powered by a stationary steam engine, be installed to haul stone to the kilns. These ancillary works, he considered, could be undertaken at a cost of £350, but a further £400 would be needed to build four new kilns. If, on the other hand, prudence dictated that development be matched to demand, two kilns and secondhand haulage equipment might suffice, and the inclusive cost could then be as little as £500.⁵⁷ When the railway company, which had already agreed to lay in sidings from the permanent way, also offered rolling stock and guaranteed freight rates, building commenced,⁵⁸ and by the summer of 1862 the new Peters Crook limeworks were ready to trade. Caution had prevailed, however, and for the time being two kilns were considered sufficient. Massive structures by local standards, these still stand to their full height of 9.6 metres a little above flood level on the river bank about a quarter of a mile north of Peters Crook farmhouse (442781) (Pl. 3).

That Peters Crook prospered during the period which followed completion of the railway is evident from the extent of its adjoining quarry.⁵⁹ In common with all ancillary industries, however, lime-burning depended for its profitability upon the well-being of the community it served, and when towards the 1880s the grim realities of agricultural

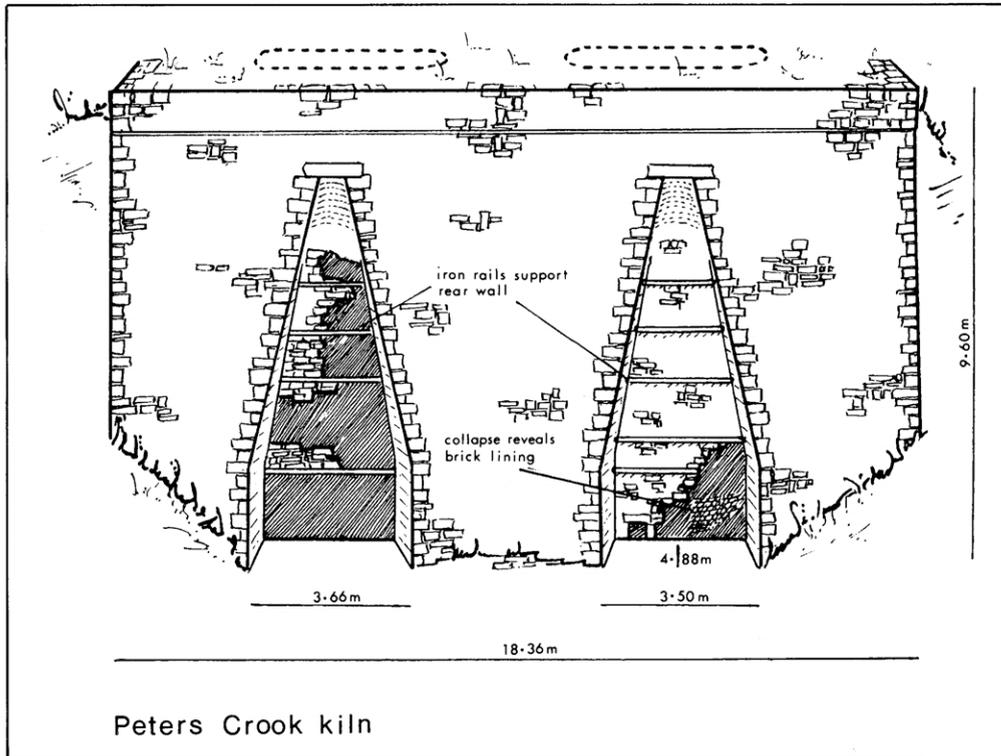


PLATE 3.

recession beset the farmers, the commercial lime-burners suffered too. One by one the local limeworks closed, Bewcastle Demesne in 1883,⁶⁰ Hudshole (the freeholders' kiln) probably during the following year,⁶¹ and Leagair and Peters Crook in 1885.⁶² Although these closures really mark the end of serious lime-burning in the area, there were exceptions. At Kershopefoot on the Scottish border, lime was manufactured as a complementary activity to the roadstone quarrying there during the last two decades of the nineteenth century,⁶³ while in the late 1940s government subsidies gave a new lease of life to the Peters Crook kilns. An old farm kiln at Stockasteads in Bewcastle (564770) was also refurbished for commercial use at this time, but neither this nor the Peters Crook venture lasted long.⁶⁴

The survivors of the nineteenth century lime-kilns may still be seen on the river banks and fellsides of this most northerly part of Cumbria, no more than gaunt gravestones now of a rural industry which in its time contributed much to the pattern of our landscape and to the making of a great agricultural estate.

Appendix

The public kilns

Bewcastle:

Demense (556747). In production from before 1822 until 1883, this kiln was worked by the proprietors of Oakshaw Colliery.

Stockasteads (564770). In production from about 1948 until 1951, this was an early nineteenth-century farm kiln re-built in brick and concrete and put to commercial use.

Nicholforest:

Leagair (474494). In production until 1885, this limeworks was worked by the Proprietors of Oakshaw Colliery. There was a kiln here in 1793. The 1810 Enclosure Award restricted the use of the adjoining quarry to landowners and farmers within the manor.

Peters Crook (442781). The double kiln illustrated on Plate 3 was in production from 1862 until 1885, and again in 1948. This extensive limeworks was worked by the Proprietors of Haithwaite Colliery until the latter's closure c. 1840. There was a kiln in the vicinity, however, in 1793, and sometime after 1862 another kiln was built nearby at 439774.

Hudshole (444786). In production periodically from before 1822 until 1884, this was a freeholders' kiln which obtained its fuel from a thin on-site seam.

Kershopefoot (474827). In production from about 1884 until about 1894. The proprietors were Kershopefoot Lime and Road Metal Works.

Stonegarthside (482814). In production in 1887 for a short time, this was an early nineteenth-century farm kiln re-lined and converted to commercial use by the proprietors of Kershopefoot.

Solport:

Haggbeck (473737). In production from 1822 until 1861, this limeworks probably manufactured building lime. It was worked during the early part of the nineteenth century by the proprietor of Haithwaite Colliery, and there was a small coal mine nearby where coal was still being wrought in 1861.

The farmers' kilns in the Netherby manors

	<i>Where substantial remains exist</i>		<i>Where insubstantial remains enable the site to be identified</i>		
<i>Bewcastle</i>	Scotstown	543742	Nunsleugh	541739	
	Kilnstown	535735	Steppings	543748	
	Holmehead	541782	Nixonstown	546756	
	Hole of Lyne (S)	543783	Underwood	558776	
	Hole of Lyne (W)	544787	Raw	556770	
	Mire	539778	Rack	546775	
	Slacks	538777	Crook	543770	
	Flatt	560790	Crosshill	552783	
	Langleyburn	507814	Bellevue	527788	
	Hollin Cleugh	526804	Hillhead	509807	
	Crookburn	505785	Hillhead	506784	
	Cleughside	517791	Corner House	508806	
	Craigs	518791	Cuddys Hall	519811	
	Kirkbeckstown	548746	Parkhead	564765	
	Stockasteads	564770	Parknook	556767	
	Ashycroft	565771	Low Grains	577751	
	Borderigg	568758	Park	548759	
	<i>Nicholforest</i>	Liddelpark	468774	Liddel Lodge	471792
		Stonegarthside	482814	Pike	470791
	<i>Solport</i>			Nookfoot	457789
			Luckens	494723	

The 1st Edition O.S. Map also records these kilns in Bewcastle: Noblestown, 544743; Knowe, 536777; Saughs, 508796; and in Nicholforest: Peppermoss, 472777; Kilnholme, 437775, but there is now no trace of any of them on the ground. All but the first are shown to be "old kilns" in 1862.

The farmers' kilns in territory immediately adjoining the Netherby manors

	<i>Where substantial remains exist</i>		<i>Where insubstantial remains enable the site to be identified</i>	
Askerton	Bogside	551742	Fawcettles	556742
	Woodhead	583739	High Floweryhirst	526727
			Low Floweryhirst	523723
			Collin Bank	575730
		Oakstock	570740	
Stapleton	Kaysbank	511729	Lynecrook	504732
	Dappleymoore	497739	Cumcrook	500753
	High Parkfoot	506732	Low Parkfoot	505734
			High Mossthorn	512733

Notes and References

- ¹ R. A. Buchanan, *Industrial Archaeology in Britain* (London, 1972), 185.
- ² J. B. Blake, "The Medieval Coal Trade of North East England: Some Fourteenth-Century Evidence", *Northern History*, ii, 1-26.
- ³ M. Havinden, "Lime as a means of Agricultural Improvement: The Devon Example", *Rural Change and Urban Growth 1500-1800*, 111-2
- ⁴ *Ibid*, 110; Department of Palaeography and Diplomatic, Durham, HN C607/4 (William Benson's report 23 August 1873) and B. C. Skinner, "The Archaeology of the Lime Industry in Scotland", *Post Medieval Archaeology*, 9, 225.
- ⁵ D. J. Robinson and R. V. Cooke, "Lime Kilns in Surrey: A Reconstruction of a Rural Industry", *Surrey Archaeological Collections*, 59, 23.
- ⁶ R. W. Brunskill, *Vernacular Architecture of the Lake Counties* (London, 1974), 102. Kilns built during the second half of the nineteenth century were generally lined with firebrick.
- ⁷ A contemporary account of lime-burning may be found in a letter of 1845 addressed to Andrew Hudleston of Hutton John, C.R.O. D/Hud/Box 6/Limekilns 1845.
- ⁸ M. Havinden, *op. cit.*
- ⁹ J. Bailey and G. Culley, *Agriculture of Northumberland, Cumberland and Westmorland*, 1805, 239, and J. D. Marshall and M. Davies-Shiel, *The Lake District at Work* (Newton Abbot, 1971), 38.
- ¹⁰ C.R.O., C. Phillips, unpublished thesis, *The Cumberland and Westmorland Gentry*, 166. Contemporary recognition of the important part which lime played in good husbandry is also evident from a passage in John Bankes' 1638 survey of Thursby Manor. A longstanding commons dispute had prevented the tenants from improving their land, and in urging a settlement he pointed out that if only "they maie have lime it will doe theire land much good". C.R.O. D/Lons/L/Burgh Barony, Survey of Thursby Manor, 1638.
- ¹¹ HN C77/18, (Lease of Silvertopp and Castle Carrock limestone quarries, dated 1 February 1719).
- ¹² HN C4/7.
- ¹³ T. Pennant, *A Tour in Scotland*, 1769, 64.
- ¹⁴ Hutchinson, 1, 76 and 2, 562.
- ¹⁵ R. T. Spence, "The Pacification of the Cumberland Borders, 1593-1628", *Northern History*, xiii, 153.
- ¹⁶ T. Pennant, *op. cit.*
- ¹⁷ C.R.O. Cumberland Enclosure Awards, D/MBS/1/29; D/MBS/1/40 and QRE/1/144.
- ¹⁸ Netherby MSS, John Grieves' mineral report, 13 February 1798. Coal and limestone resources were also being developed on the Duke of Buccleuch's adjoining Canonbie estate in the mid-eighteenth century; I. Donnachie, "The Lime Industry in South West Scotland", *D and G Trans.*, 49, 147.
- ¹⁹ Hutchinson, 2, 551.
- ²⁰ T. Pennant, *op. cit.*, 64-5.
- ²¹ *Gentleman's Magazine*, November 1785, 844.
- ²² Hutchinson, 2, 554.
- ²³ Netherby MSS, John Grieves' report.
- ²⁴ Hutchinson, 2, 551.

- ²⁵ B. Bracegirdle, *The Archaeology of the Industrial Revolution* (London, 1974), 137. Although coal could be had at the Bewcastle pit for as little as 6d. a horse-load ($4\frac{1}{2}$ Imperial bushels) in 1794, Hutchinson, 1, 95, there were some who still preferred peat for lime-burning, both on account of purity and of expense. W. Dickinson, *An Essay in the Agriculture of East Cumberland*, 1853, 20.
- ²⁶ Netherby MSS, John Grieves' report.
- ²⁷ Netherby MSS, John Stead's sundry mineral reports, 1804.
- ²⁸ Netherby MSS, the estate rent rolls show that there had been a limekiln at Leagair since 1793, at which time Matthew Mitchell, the tenant of Oakshaw Colliery in Bewcastle, rented it.
- ²⁹ Netherby MSS, Robert Bald's mineral report, 29 September 1822.
- ³⁰ C.R.O. Cumberland Enclosure Awards, QRE/1/88; SRDB/AL/32; QRE/1/84; QRE/1/13; D/Ha/1/13 and QRE/1/22.
- ³¹ W. Dickinson, *op. cit.*, 10.
- ³² A. B. Erickson, *The Public Career of Sir James Graham* (Oxford, 1962), ch. 4.
- ³³ *Ibid.* and J. T. Ward, *Sir James Graham* (London, 1967), ch. 3; D. Spring, "A Great Agricultural Estate: Netherby under Sir James Graham 1820-1845", *Agricultural History*, xxix, 73-81.
- ³⁴ Netherby MSS, Robert Bald's report. Robert Bald (1776-1861) was by this time the best known of all the Scottish mining consultants, and although his zeal for social reform did not always endear him to the great coal owners, few of them in Scotland failed to consult him at one time or another. An honorary member of the Geological Society of London, a founder member of the Wernerian Society, and Fellow of the Royal Society of Edinburgh, it was largely due to his efforts that Scotland's coal industry was placed upon a sound practical and scientific basis. Baron F. Duckham, *A History of the Scottish Coal Industry* (Newton Abbot, 1970), 1, 137.
- ³⁵ C.R.O. D/Cart (Peters Crook lime accounts) which show that between 1827 and 1831 Luke Punshon was both lime-burning at Peters Crook and coal mining at Haithwaite and Haggbeck.
- ³⁶ Geological Survey, 1 in. Series, Sheet 12.
- ³⁷ C.R.O. D/Cart, Luke Punshon's day books for 1829 indicate a relatively modest output of 10513 bushels, with peak sales in the months of March, June, July and August. 22% of production was invoiced to Netherby. Figure 2 records the destination of all sales except those to Netherby, and should be read in conjunction with Dr. Harris's study of lime sales from the Naworth kilns at Clowsgill during 1824, in CW2 lxxvii, Art. xv.
- ³⁸ Mannix and Whellan's *Directory of Cumberland*, 1847, 588-9.
- ³⁹ Whellan, 629.
- ⁴⁰ Parson and White's *Directory of Cumberland and Westmorland*, 1829, 466 and Mannix and Whellan, *op. cit.*, 627.
- ⁴¹ Netherby MSS, Robert Bald's report.
- ⁴² Highstone Common, which comprised the greater part of Belbank Township, was devoid of limestone, for example.
- ⁴³ Parson and White, *op. cit.*, 440, 446-7.
- ⁴⁴ A. Harris, "A Traffic in Lime", CW2, lxxvii, 151, (fig. 2). 71% of output was delivered to Brampton staith, however, and its ultimate destination is not known.
- ⁴⁵ W. Dickinson, *op. cit.*, 20.
- ⁴⁶ Both the 6 in. and 25 in. O.S. sheets distinguish between "limekilns" and "old limekilns".
- ⁴⁷ When the 2nd Edition (1899) 25 in. O.S. sheets are compared with the corresponding sheets of the 1st Edition (1862) it is apparent that hardly any quarries associated with farm kilns increased in size during the intervening period.
- ⁴⁸ P.R.O. Cres. 34: X/LO 7889. A note on the Economic Geology of the Parish of Bewcastle, 1888, indicates that there had been no domestic lime-burning in the area for many years. The decline of this agricultural by-industry in the Netherby manors was paralleled in the Earl of Carlisle's adjoining estate. A. Harris, *op. cit.*
- ⁴⁹ The census returns show that there were 9 pitmen in Bewcastle in 1841, 14 in 1851, 9 in 1861, and 18 in 1871, but *Kelly's Cumberland Directory*, 1906, 35-6 only shows 2. I am informed by local people that coal mining ceased in the late 1930s.
- ⁵⁰ Netherby MSS, Robert Bald's report.
- ⁵¹ *Ibid.* Bald reported that the Haggbeck limestone was coarse and sandy and of little agricultural value. Perhaps, therefore, the lime burnt here was for building use. The kiln seems to have closed down in 1861, for it is referred to in *Morris Harrison and Co.'s Cumberland Directory*, 1861, 63, but is shown as an "old limekiln" on the 1st Edition O.S. Map 25 in. Sheet VII/6. There was also a small colliery here employing 6 pitmen in 1822 (C.R.O. D/Cart Peters Crook lime accounts) and the 1861 census records a single pitman living nearby.

- ⁵² Netherby MSS, Samuel Stutchbury's mineral report, 1845, indicates that the mine had been abandoned by then.
- ⁵³ J. F. W. Johnston, *The Use of Lime in Agriculture*, 1849, 242.
- ⁵⁴ Netherby MSS, Messrs. Cadell Johnston and Robson's mineral report 1858 and Edmund Gibson's mineral report 1860.
- ⁵⁵ Exploration was at first concentrated at Inch Farm, which lay within 1½ miles of the Duke of Buccleuch's colliery on the Scottish side of the river. Netherby MSS, Correspondence files, 1858-60.
- ⁵⁶ Netherby MSS, Correspondence file 1861.
- ⁵⁷ Netherby MSS, Edmund Gibson's report.
- ⁵⁸ Netherby MSS, Agreement of 3 November 1858, North British Railway Company and Sir James Graham, and correspondence file 1861.
- ⁵⁹ O.S. Map, 25 in. Sheets 111/9 and 111/13. 1st Edition and 2nd Edition compared. Another kiln was built after 1862, a little to the south of Peters Crook farmhouse (439774).
- ⁶⁰ Demesne kiln is referred to in *Parker's Postal Directory of Cumberland*, 1882, 609, but not in *Bulmer's Directory of East Cumberland*, 1884.
- ⁶¹ A lime-burner lived nearby until 1884, *Bulmer op. cit.*, 447.
- ⁶² Netherby MSS, Letter 14 December 1885, W. Armstrong to M. Brown. A contributory reason for the closure of Peters Crook must have been the loss of its quarry bought in 1885 by North British Railway Company, to safeguard the permanent way. Letter, 1 May 1885 refers.
- ⁶³ *Bulmer op. cit.*, 445, and *Kelly's Directory*, 1894, 181.
- ⁶⁴ Both these kilns were operated by the firm of Jos. Millican and Son. Stockasteads had a chequered existence. After a spectacular explosion in 1948 it was re-built, but when in 1951 quality fell short of Ministry specification it was closed down. At Peters Crook, since there was no longer a quarry nearby (note 62) limestone had to be brought across the river from Scotland by cableway.

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