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EXCAVATION AND FIELD SURVEY IN UPPER REDESDALE: PART III

John Day and D. Beryl Charlton

INTRODUCTION

THIS PAPER, which forms the penultimate part in this series, is an amalgamation and expansion of two detailed surveys in Upper Redesdale undertaken by the Field Research Group of the Society of Antiquaries of Newcastle upon Tyne. The initial survey¹ was undertaken in 1974–5 on behalf of the Northern Archaeology Survey and the second² was begun in 1975 at the request of the Ministry of Defence. Part I (AA⁵ 1978) dealt with Prehistoric sites and Part II (AA⁵ 1979) with agrarian field monuments of the post-Conquest period. In this present article it is proposed to examine the remains of early modern industrial activity in particular the winning of coal, the burning of lime and the manufacture of tiles in what is still a remote, rural part of Northumberland. One major local industry, that of millstone manufacture and corn milling, has been omitted from this account, as, together with excavation reports of grain-drying kilns currently being excavated by the Group, it will form the final part of the Redesdale Survey. We are indebted to Margaret Mitcheson and Ronald Charlton for their valued assistance and to Dr. Stafford Linsley for his advice and interest.

Although still centred on the Otterburn Training Estate the area covered by this paper has been deliberately extended from that encompassed in the first two articles to include all of the present civil parishes (local government boundaries as from April 1974) which border on the Ministry of Defence property. Whilst this too is an arbitrary geographical unit, like the MoD area, at least it provides clear cut administrative boundaries which allow comparison with those parishes covered by volume XV of the Northumberland County History. The area thus under discussion includes from the Rothbury District the parishes of Alwinton, Harbottle (incorporating Holystone and Sharperton), Hepple (incorporating Bickerton and Farnham), and Elsdon (incorporating Raylees), and from the Tynedale District the parishes of Rochester (incorporating Horsley, Byrness and Carter Bar) and Otterburn (incorporating Troughend) (fig. 1).

GEOLOGY AND TOPOGRAPHY

Although not the most recent account the chapter on Geology in Volume XV (p. 2–16) of the Northumberland County History provides a concise and useful study

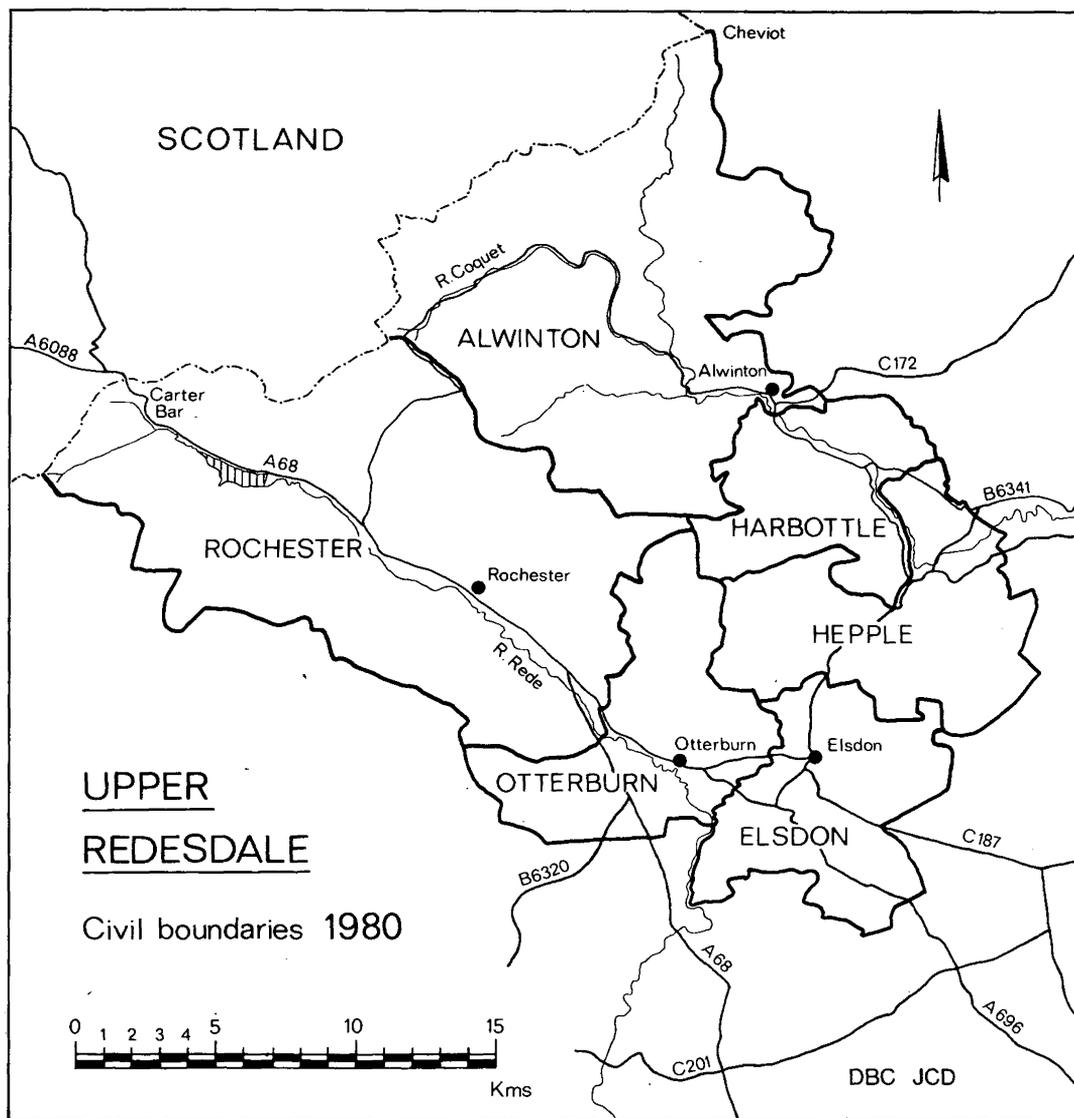


Fig. 1.

of the geology of Upper Redesdale and Upper Coquetdale. Topographically most of the area can be regarded as upland marginal terrain, much of which is over 200 metres above sea level. It includes some of the wildest and most inaccessible parts of the county. The area (fig. 2) can conveniently be divided into three distinct sectors based on the natural drainage pattern.

The most northerly is separated from the rest of the area by the river Coquet.

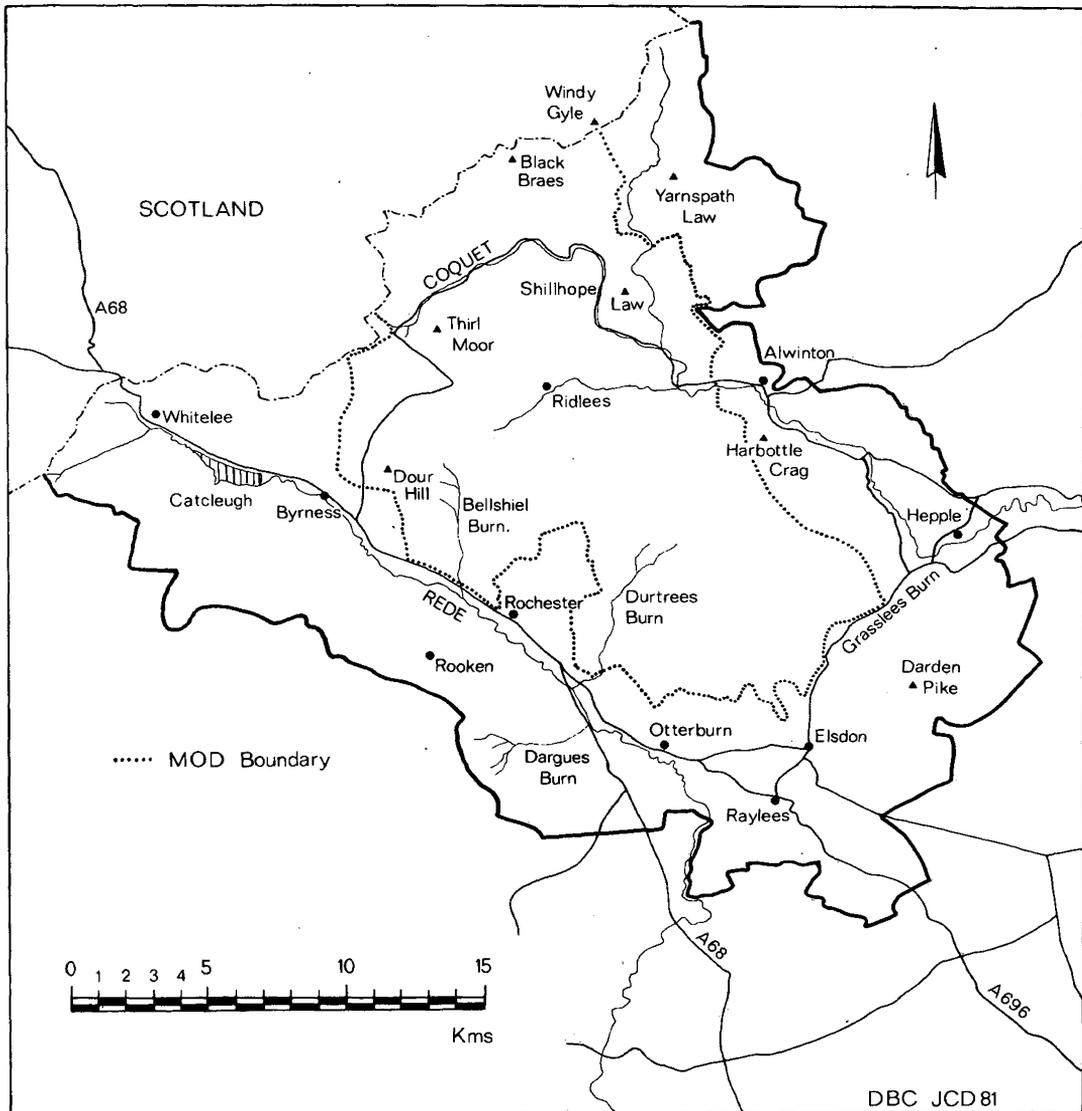


Fig. 2. Upper Redesdale: general topography.

Most of the higher ground, rising to 619 metres on Windy Gyle, lies in this sector. An upland plateau of volcanic lavas of the Old Red Sandstone Period, with numerous rounded hilltops over 500 metres, notably Bloodybush (610 m), Yarnspath Law (540 m), Beef Stand (561 m), Black Braes (506 m) and Shillhope Law (510 m), it is gouged by many fast flowing burns, coursing through narrow, steep-sided valleys.

The central sector is characterized by burns flowing in an easterly direction from

the lower lying land of the Carboniferous strata into the river Coquet and its major tributary in this area, the Grasslees Burn. Here, to the south of the Coquet, the craggy, angular, topography of the Cementstones and Fell Sandstones erupts in a series of prominent rocky outcrops such as Dour Hill (415 m), Yearning Crag (244 m), Harbottle Hills (335 m) and Darden Crag (385 m). This Fell Sandstone ridge forms a watershed between the Coquet and Rede Valleys.

The third sector is centred on the basin of the river Rede, where the limestones, shales and thin coal-seams of the Scremerston Group and the Lower Carboniferous Period make this the most fertile part of north-west Northumberland. The sides of the Rede valley, cut in many places by shallow burns such as the Cottonshope, Bellshiel, Durtrees, Elsdon, Blakehope and Dargues, slope gently down to the river. It is in this area, particularly along the edges of the scarp and on the sloping valley sides, that most of the exploitation of coal and limestone has taken place.

The very topography of the area, however, has caused both its isolation and its slow development, which lasted until the opening of the improved turnpike road from Newcastle to Jedburgh in 1841.³ Nor did the coming of the railway in the nineteenth century open up this area; the nearest railway stations were Rothbury⁴ to the east, and Woodburn⁵ to the south. Consequently agrarian improvement and the inter-related exploitation of coal and lime were very much local developments.

COAL-WORKING

There is fragmentary written evidence for extensive, if small scale, landsale coal-working in north-west Northumberland throughout the nineteenth century. While known documentation does not give a complete account of any single working or colliery, it does provide a general picture of the methods and costs involved and of the labour force employed in the industry. In this section numbers in brackets refer to Appendix 1 where a brief table lists the documentary sources for the various coal-workings. The numbers are also reproduced on the appropriate map (fig. 3).

Several factors were responsible for the development of the coal industry in the area studied. The first was the need for coal as a domestic fuel in the Upper Rede and to a lesser extent the Upper Coquet Valley, which became apparent during the late seventeenth century when the wooded areas were depleted. Many authorities⁶ provide evidence of Scots raiding parties foraging for timber, and accounts of areas, once thickly forested, having been laid waste. Although peat was, and still is, an alternative source of fuel in this upland area the outcrops of poor quality coal in the locality were more easily worked and more readily accessible. At the end of the eighteenth century the practice of burning lime to improve the land also required regular quantities of coal.

The cost of acquiring from the Tyneside coal field was prohibitive and therefore the number of local coal-workings at this time increased rapidly. The proximity of limestone to the coal resulted in the establishment of workings at Greenchesters, Closehead and Rookan, for example. A further stimulus to both coal and lime indus-

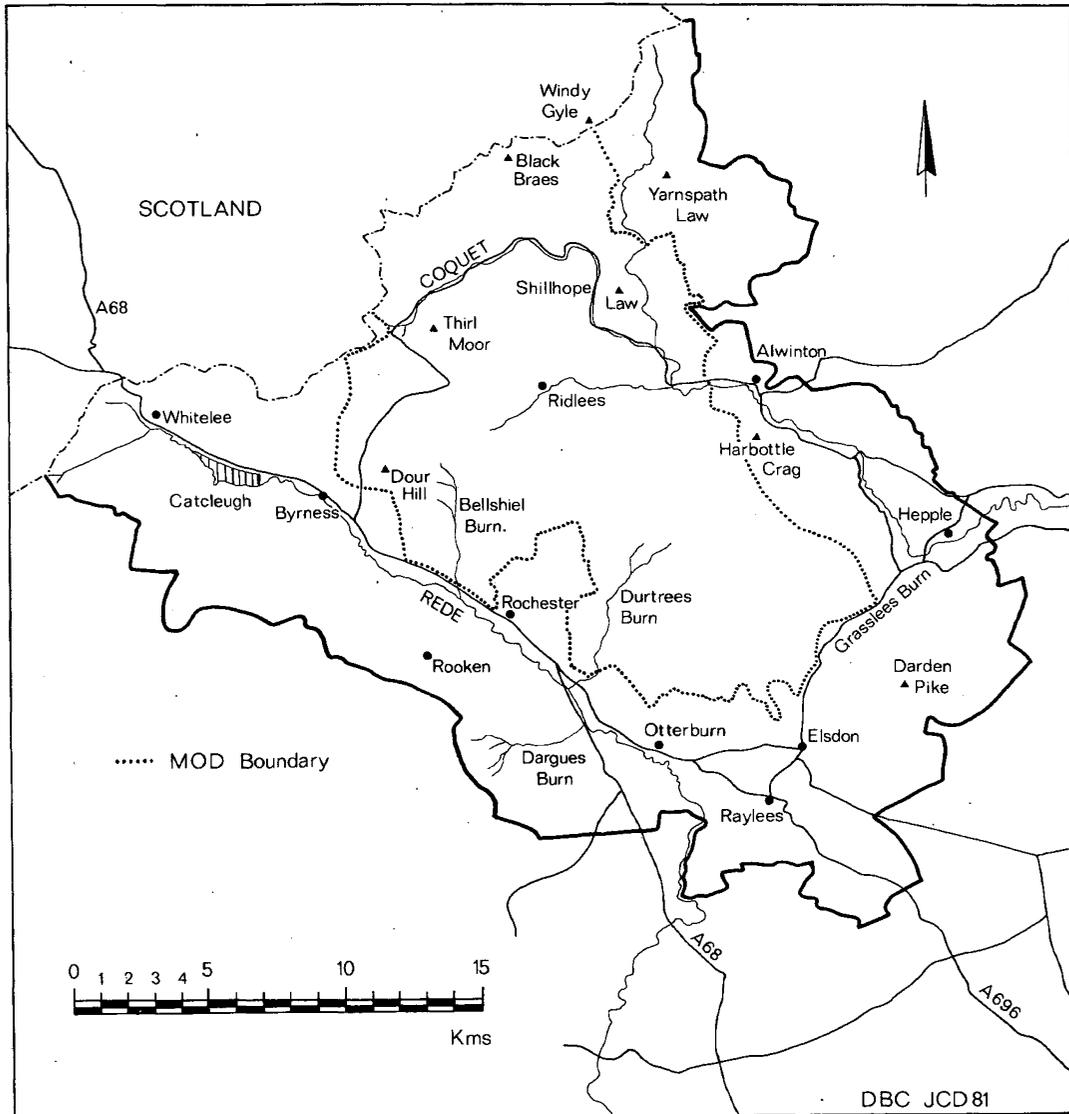


Fig. 3. Upper Redesdale: industrial sites.

tries in Upper Redesdale at the beginning of the nineteenth century was the potential market in Southern Scotland.⁷ For instance the lime kilns in the Bateinghope Valley and their attendant coal workings were specifically developed for the Scottish trade.⁸ Both coal and limestone were also needed for other industries in the region, principally the smelting of iron at Ridsdale and at Hareshaw near Bellingham. Coal was particularly important for the firing of the brick and tile kilns which made their appearance in Upper Redesdale during the 1850s.

Evidence for coal-working 1600–1750.

In the conclusions and valuation of the survey of the Crown Lands in Redesdale and Coquetdale made in 1604,⁹ it is stated that “For the cole mynes; ther is not anie in use at this tyme, the inhabitants having suche store of turf and peate as they will not bestowe their labor in getting of coles, but if the Cuntrie weare inhabited by industrious people and men of trade, the mynes would bee of great value and farr exceede the rate set downe”. The “rate set downe” is given on page 110 of the survey as 13/4 per annum. The first literary reference to coal working in the area, occurs in the Elsdon Parish Register for 1691,¹⁰ where there is a record for the burial of a relative of William Ward, “colyer at Rattenraw” (9). The entry is particularly significant as it gives an occupation, a detail which does not become common in the register until the 1790s. Its very appearance may well indicate the novelty of Ward’s occupation. In the Yatesfield/Bennettsfield area (7) there was also early coal-working, the pits here being the only ones in Upper Redesdale to be shown on Warburton’s map of Northumberland in 1716. The sinking of boreholes at an unnamed site in Elsdon in 1723 was recorded by Richard Peck in his view book and the entry includes a calculation for the profitable working of a colliery there.¹¹ This may have been the colliery in Elsdon later purchased by the Duke of Northumberland from the Howard family in 1750.¹² The land tax returns¹³ which are preserved in the Northumberland Record Office, provide evidence of coal-working before 1750 at three other locations. In each instance the returns refer to “collieries”, though this is a rather misleading term for what, at best, were short adit mines or groups of shallow bell-pit workings. A letter of 1809¹⁴ provides an account of mining activity at Carrick Colliery, which was assessed from 1748 to 1777, and on the neighbouring property of Laingshill (18 & 19). A former miner, Adam Brodie, was said to recollect that Mr. Ward, owner of Carrick, drove a water-level on his land and sank a pit, the workings being managed by one John Smith. In the same account William Ord, whose family moved to Carrick in 1762, recalled that Ward had sunk several pits some time ago. In the course of Ward’s mining activities the neighbouring Laingshill land was encroached upon and Gabriel Hall, who farmed the Hill, approached the Duke of Northumberland for permission to dig for coal. Both Brodie, who was a collier on the Hill field and Ord, agreed that two pits were in operation before 1762.

To the north of Elsdon, coal-working is recorded at Raw and High Shaw (21), an area where the extraction of coal continued until the end of the nineteenth century. Raw Colliery was assessed from 1749 to 1752 and High Shaw Colliery in 1753 only. If the assessment relates to size of the activity then Raw is only rated at a quarter of that for Carrick. It is perhaps also significant that the rate for High Shaw £0 5s 7½d in 1753, a year when all the assessments were down, is not dissimilar to the rating for Raw Colliery in 1752 at £0 6s 7½d. The third locality where coal was being worked in 1750, is in the Rede Valley at Blackblakehope Colliery (2). It was assessed from 1749 at £0 10s 11½d to 1765 at £0 11s 2d, but continued to work beyond this date as subsequent literary sources show.

The documentary evidence for coal-working in Upper Redesdale in the later eighteenth century comes almost exclusively from the Land tax assessment returns

and from the parish registers for Elsdon, Alwinton and Birdhope Craig Presbyterian Chapel. The earlier workings at Blackblakehope, Carrick and Raw were still in production, although at Raw the pits appear to have been worked out quite rapidly. From about 1760 exploitation of coal in that area was centred instead at Grasslees and Pengeford (20). About this time the "collieries" at Rochester (4) and Hillock (6) in Redesdale, and Wilkwood (24) near Barrow, were first recorded. Not until the last decade of the century however did some of the larger pits become operative, in particular those at Rookan (3), Brownrigg (9) and Swindon (22). Apart from the documentary sources already noted above there is a newspaper advertisement from the Newcastle Journal for 15th August 1761 relating to the sale of Blackblakehope Estate. It includes as Lot 9, a colliery, worth £12 per annum. There are also references amongst the Bell Collection of papers,¹⁵ to the sale of coal at Brownrigg and Carrick Collieries. The Brownrigg reference, dated 1793, is a receipt from John Potts, farmer at Hatherwick, for 17 fothers of coal at 2s per fother, supplied by John Finley of Brownriggfield. The accounts from Carrick are dated 1786 and 1788. The first is from John Allen to James Storey for leading 370 fothers of coal, and the second is from James Storey to William Bell of High Carrick for Allen's delivery of 495 cart loads of cill (i.e. kiln coal) at 1s 6d per fother, and 81 carts of "feir" coals at the same price. The Carrick document (ZHE 14.7) mentions that William Bell was also a successor to Gabriel Hall at the Laingshill workings. Boring for suitable coal seams at Ottercops¹⁶ and Pengeford¹⁷ are recorded too during this period.

It is from 1800 onwards however that coal-working becomes really significant in the area. Documentary sources reveal that a number of landowners engaged the services of reputable colliery viewers and cite the use of winding and pumping engines, a steam-engine, the sinking of deeper shafts and the outlay of considerable sums of money on both coal and lime ventures. The occupations of pitman, banksman, hewer and engineman occur in the church registers and the census returns show that many farms in the area had colliery workers as lodgers. In several places many of the "old workings" were reopened and the drilling of test bores for workable seams was continued. With the exception of Yatesfield, the existing mines remained in use, although many "pits" were worked out within a few years. The seams varied in thickness, ranging from four feet near Dunshiel and three feet at Monkridge, to less than nine inches on the Sills Burn and thirteen inches at Wilkwood.¹⁸ On the whole the quality of the coal was rather poor, much of it was splint coal i.e. mixed with bands of shale, and useful only for firing kilns. However the larger workings at Brownrigg, Elsdon/Soppitt and Pengeford did produce coal more suitable for domestic consumption. Many of the seams were heavily faulted and even in the shallower workings flooding was a major problem. The viewers reports, all in the first three decades of the century, indicate that many of the workings were "troubled" and that the life expectancy for economic extraction was short.

Two viewers who were engaged by various landowners in Upper Redesdale were amongst the most capable and eminent colliery surveyors of their day, with considerable experience of the rural coal winnings in Northumberland and Durham. Perhaps the best known of the two was John Buddle, junior, who, in 1805, at the request

of Sir John Riddell of Hepple Whitefield surveyed the old Swindon Burn workings (22) and made suggestions for the reopening of the Woodhead Pit, Rimpside.¹⁹ His colleague, John Watson, visited many of the workings in the area during the period 1803 to 1830.²⁰ On the instructions of several landowners he reported on the feasibility of working coal on various estates; in 1803 to John Davidson, lessee of the Duke of Northumberland for Garretshiels (11), in 1830 to Lord Redesdale on the workings on the Blackblakehopeburn Estate (2), in 1804 to Mr. Beresford on the Shittleheugh Estate (12) and again in 1816 for Raw Colliery (21). Further surveys were undertaken by Watson at Birdhope Craig (5) between 1804 and 1806 for Colonel Reed of Chipchase Castle and on the Rooking Estate (3) for Robert de Lisle between 1827 and 1828.

As a result of the viewers' reports, a number of the landowners invested considerable sums of money in mining ventures. Watson estimated in 1806, that the initial outlay for establishing a colliery at Birdhope Craig would be £556 10s 0d.²¹

	£	s	d
Sinking a pit 16 fathoms, 5½ feet in diameter	48	0	0
Brattice to be put into said shaft	8	0	0
a whimm ginn 14 feet diameter with shaft and pulley wheel and ropes	31	0	0
Horses to go in same with geer	20	0	0
Jack roll with standards and sinking geer	5	10	0
Water wheel—20 feet diameter	65	0	0
Two beams with gudgeons and brasses	18	0	0
Building walls for the wheel and a pillar for beams to work upon	12	0	0
Two setts of pumps each 16 fathoms long	178	10	0
Spears, spear plates, bolts, etc.	43	0	0
Workmanship for fixing wheel, etc.	8	0	0
Leading materials during the winning, etc.	37	10	0
Cutting 260 yards of water race etc.	19	10	0
150 yards of trough	37	10	0
Working utensils for colliery	15	0	0
sundry little charges	10	0	0
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	556	10	0

Plus making roads to the pits

On the Hepple Whitefield Estate, Buddle's estimate in 1805 for sinking a shaft thirty-two fathoms deep and using a steam-powered pumping-engine was £1,200. The work was undertaken, although not using a steam-driven pump, at a cost of £667 by the lessee Donald Cummings, with Riddell the landowner, contributing £325 of the total sum, for pumping machinery. This was after £152 had been spent in the previous twelve month period on an abortive attempt at reopening some old coal workings on the Swindon Burn.²²

Once established the running cost of the pit was frequently high, being determined by such factors as depth of shaft, ease of working the coal and the upkeep of machinery and equipment. A number of annual accounts has been preserved although some are less detailed than others. The cost of running the Rooking Pit for ten months in

1827–8 was £177 14s 6d, with the search for new seams and boring costing £78 15s 0d. The coal sold in that period only fetched £145 12s 0d and even when the income from the associated lime kilns was included the workings were still uneconomical.²³ The annual statement for Davidson's Pit at Garretshiels in 1803 indicates a more profitable mine, with running costs at £480, whilst the total value of the coal sold amounted to £666 13s 4d—²⁴

Years expenses to November 1803.	£	s	d
Hewing and putting	251	13	4
Overmans wages	2	12	0
Drawing props	1	8	0
House rent and pitmens coal	9	0	0
Labouring work and road maintenance	17	0	0
Props	35	0	0
Nails	2	0	0
Drawing coals, banksman and gin driver	58	0	0
Equipment maintenance	4	10	0
Sinking pits	12	0	0
Cesses and taxes	10	0	0
Colliery rent	58	6	8
Miscellaneous	2	8	0
Ropes, etc.	16	2	0
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	480	0	0

Accounts for the Rimsdale colliery have also survived and running costs exist for the period 1815 to 1818. In both 1816–17 and 1817–18 the annual costs were similar £175 5s 2 $\frac{3}{4}$ d and £198 2s 10 $\frac{1}{2}$ d respectively, but in the year 1815–16 expenses were somewhat higher—²⁵

	£	s	d
Banking and drawing coals	57	14	0
Leather for the pumps	3	6	11
Oil and candles	9	4	3
Sundrie days work	1	5	8
Coal tubs	7	18	0
Wood	7	10	7 $\frac{1}{2}$
Lewis Proudlock for opening an old pit	10	0	0
Coals worked—wages	107	11	5 $\frac{1}{4}$
Work in the old drift	40	3	2
Boy for driving engine (horse)	7	5	0
Shift work at the water engine pit and air course	6	15	4
Joiners account	2	12	0
Blacksmiths account	4	15	8
Poor rate	1	16	0
Paid to colliers on account by house rents	11	6	0
Horse keep during the year	20	0	0
Horse leading stones from drift	10	0	0
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	309	4	0 $\frac{3}{4}$

Regarding the method of working the various collieries in Upper Redesdale, there is little documentary evidence. Examination on the ground would suggest that most of the coal was worked in simple bell- or crop-pits i.e. single, shallow shafts in which the colliers worked outwards to the limit of safety once a workable seam had been reached. In the deeper pits probably the board and pillar method of working, virtually universal in the north of England at the beginning of the nineteenth century, was in use.²⁶ There are several references to this method of underground working in north-west Northumberland. In Adam Brodie's description of the workings at the Laingshill Colliery, in about 1800, we learn that "Dixon's operations have been principally confined to the opening out of the old pits, and working away the pillars of coal formerly left standing. He is now working in that manner at the pit G [on the accompanying plan], which was an old pit reopened."²⁷ There are other references in the draft lease for Birdhope Craig Pit and the lease for RimpSide Colliery²⁸ stating that a sufficient number of pillars must be left to support the roof.

The poor quality of most of the coal, and the relatively small amounts produced did not encourage investment in complicated or expensive machinery. The horse-operated gin for drawing coals to the surface of the shaft is noted or implied at several collieries. At Birdhope Craig (5) the estimates for sinking a shaft²⁹ in 1805 include the provision of a fourteen foot "whimm ginn", and the accounts for Garretshiels Pit (11)³⁰ in 1803, record payment to the banksman and the gin driver. There are references to a gin at RimpSide (22) in 1805, which cost £14 0s 0d,³¹ with additional expenses for driving the gin horse. RimpSide's annual accounts for 1815 and 1816³² mention payments made for the upkeep of the engine horse. From two collieries come references to water-wheels for pumping. The first is at Birdhope Craig in 1805 where two estimates have survived for the supply of a wheel 20 feet in diameter and the construction of a long water-race.³³ The other wheel is noted at RimpSide in 1805 and is again listed under annual expenditure in 1815-16 and 1816-17. Experiments with wind-driven pumps were attempted at Laingshill Colliery (19) in about 1800. Brodie recalls that "there is plenty of coal on the Hill allotment . . . but it cannot be got without an engine to draw the water . . . a wind mill was erected to raise the water, but it did not answer".³⁴ For RimpSide Pit in 1805 Buddle suggested that "the winning of any considerable tract of coal would require a pit of great depth, with a powerful steam-engine, the expense of which would be more than the produce of the seam could supply".³⁵ Later in his account for the cost of sinking a new shaft he states that "the above estimate is for a common engine, as from the simplicity of their construction, any ordinary workman may keep them in repair, which is not the case with the improved engines". Richard Peck in his view book³⁶ refers to "an engine" at Elsdon in 1723. This may perhaps be the same engine set up by John Liddle & Co.³⁷ However the only reliable evidence for the use of a steam-engine in the early nineteenth century in Upper Redesdale is given by the historian John Hodgson.³⁸ He commented in 1824, that there was a steam-engine at the Duke of Northumberland's Brownrigg Colliery. The next record does not occur until much later, in the census returns for 1871. The entries include a James Temple, engineer at the Colliery, lodging at Bleakhope, and a William Forster, engineman, lodging at Brownrigg itself. The

pumping-engine building itself is named on the second edition Ordnance Survey map issued in 1898.

Where the quantity of coal was difficult to ascertain, the commonest form of lease adopted by the landowners in Upper Redesdale was that of certain rent, whereby the landowner received a fixed annual rent, irrespective of the amount of coal worked. The number of years varied from twelve to twenty-one and the quantity to be won before overworkings became chargeable also differed considerably.

TABLE 1 Table of certain rent leases in Upper Redesdale

Site	Year	Proposed or Actual lease	Item No. in Watson 10	No. of years	Annual certain rent £	No. of fothers to be worked	Charge per fother overworked in pence
Blakehopeburn	1830	Actual	unnumb.	21	200	6,000	8
Rookan	1827	Prop.	37	12 or 14	175	6,000	7
	1827	Actual	40	12	242	6,240	8
	1828	Actual	46	14	40 for first 5 years then 100	1,600 400	6 6
						(all coal used in kilns rent free)	
Birdhope Craig	1806	Prop.	30	21	183	4,000	11
Shittleheugh	1804	Prop.	4 & 5	14	None in first year All coals raised 9d a fother Then 100	2,666 $\frac{2}{3}$	9
Raw	1816	Prop.	6	14	None in first year All coals raised 6d a fother Then 100	4,000	6
Rimside and Whitefield	1805	Actual (coal & lime)	ZRW 403	20	200	cart loads to the value of £100 at rates of 9d for load of fire coals & 4d for smalls Overworkings at same rates.	

One colliery appears to have been let on a basis of rent per fother raised, that at Garretshiels in 1803. The annual account for the pit³⁹ states that £58 6s 8d was paid in rents based on payment of 3½d per fother sold. Two other collieries at various times in their history were let for a set annual rent, in one case with substantial charges for overworkings. The earliest of these was Blackblakehopeburn let in 1761 at an annual rent of £12.⁴⁰ The other pit was Rimpside where in 1856 a lease was drawn up for an annual rent of £20 to work 400 fothers of coal primarily for the lime kilns. Coals sold to tenants on the Hepple Whiteside Estate were charged at 1s a fother but anyone else had to pay 5s a fother.⁴¹ The only other lease traced for workings in the area was that relating to the pits operated by George Green on Raylees Common (16) in 1849. As the landowner, he paid 1s per annum in royalty to the Swinburne Estate on a 21 year lease.⁴²

In the table of leases above, the detail relating to the number of fothers to be produced, requires some clarification, as the measurement at each pit varied. For Blackblakehopeburn in 1830 Watson states⁴³ that a tub contains 2 bushells = 4 kennen = 16 gallons; 12 of which = 1 fother = 192 gallons; and that 2 bushells = 1 boll, and 2 tubs a horse load. However Watson notes in a letter⁴⁴ to Lord Redesdale in September 1831 that these figures are incorrect. At Rookan the measurement of a fother in 1827 was stated⁴⁵ as 8 coal bolls, (1 boll is 36 gallons Winchester, 1 fother is 12 tubs), whilst at Shittleheugh in 1804 a fother was 16 tubs of 4 pecks each.⁴⁶ At Raw in 1816 a fother was adjudged⁴⁷ to be 8 bolls Winchester—this aligns with Rookan. The measurement at Rimpside in 1805⁴⁸ is given as 12 Winchester bolls to 1 fother and even more complicated, in 1856 the lease allowed the production of 600 double-horse fothers of 12 bolls each—presumably a cart drawn by two horses, containing fothers measured at 12 bolls each.

Unfortunately there are few figures for coal production relating to nineteenth-century workings in Upper Redesdale. At Garretshiels in 1803⁴⁹ 4,000 fothers were sold at 2½d a boll or 3s 4d a fother (16 bolls to the fother !!). At both Rookan and Rimpside where accounts have survived the amounts of coal sold are not distinguished from the quantities of coal used in associated lime burning activities. At Rookan in 1828⁵⁰ 945 fothers and 2 corves are stated as being sold at 3s 4d per fother, the coal used in the kilns was rent free and not listed. Similarly at Rimpside in 1815–16⁵¹ 1054.8 fothers were delivered to the kilns at 4s a fother but the amount of coal sold was not stated.

One of the most striking facts which has emerged from this survey is that throughout the nineteenth century in this geographically isolated area, the various coal-pits were worked by the same families of miners. Certain families regularly occur in the ecclesiastical registers,⁵² census returns⁵³ and directories,⁵⁴ often moving from one pit to another over a period of years. Examples are numerous, let it suffice to note that four individuals of the Brodie family were employed at Laingshill,⁵⁵ Wilkwood and Garretshiels between 1750 and 1811; similarly five miners from the Turnbull family were working at Brownrigg, Highshaw and Rooking between 1792 and 1841. There is a particularly interesting reference to the Hamilton family in the census returns of 1871. Michael Hamilton, his three sons and his fifteen-year-old daughter,

Janet, are listed as miners at Monkridge Hall. Three other families appear even more regularly in the documentary sources. Between 1828 and 1902 the Armstrong family (7 miners) are associated firstly with Wilkwood and Soppit, and from 1860 onwards exclusively with the Brownrigg Pit. Before the Armstrongs at Garretshiels and Brownrigg, was the Temple family (10 miners) who had been working the pits from about 1798 to 1861 before moving to the workings at Monkridge and Closehead. It was the Proudlock family (13 miners) however which was the most consistent, working between 1808 and 1871 at Swindon, Low Carrick and then Ovenstone, with one member of the family at Whitelee Pit (1) in 1828. It would seem that the lease was normally agreed between the landowner and the head of one of these mining families, who, in turn, engaged his own family and close relatives in the workings. Documentary evidence would suggest that the larger families operated their mining leases with success as the Temple, Armstrong and Proudlock families are referred to both as farmers and colliery owners, or simply as farmers and landowners in the later nineteenth-century county directories. However the number of men actually engaged in the winning of coal in north-west Northumberland should nevertheless be put into perspective. Of the total male population in the area studied, only 22 out of a total of 852 males were engaged in mining in 1841, 25 out of 808 in 1851, 17 out of 762 in 1861 and 28 out of 758 in 1871.

Some of the leases and accounts referred to also provide information about the housing and terms of tenancy agreed between the landowner and the miners. The provision of two cottages with a stable and a small dairy were stipulated at Rookan⁵⁶ in 1827, while at Birdhope Craig⁵⁷ in 1806, whoever leased the workings was to have the old mill house and three cottages. At Swindon⁵⁸ the accounts for the erection of six miners' cottages have survived:

	£	s	d
For Mason work of 6 cottages	79	12	4
164 feet of skewes	2	14	8
6 chimneys	9	0	0
digging foundations	1	9	0
quarry tools	1	2	1
700 bolls of lime	11	13	4
For flooring six cottages	3	0	0
For carting lime and sand		4	4½
For thatching six cottages with heather	36	4	0
Carting wattles for thatching	5	9	9½
Carting heather	10	4	0
For carting flags	4	4	0
For glazing 18 windows	5	1	8
For carriage of masons tools from Kelso	3	0	0
Value of timber cut at Rimpside	40	16	9
For carpenters work	37	19	1
For cutting and loading timber	16	16	0½
For 6 chimney fire places	2	9	4
Plastering		5	6

	£	s	d
Three cow houses	6	0	0
Masons work	17	11	0
1 chimney and a grate	1	10	6
Enclosing gardens	10	8	0
Lime for gardens and cow pasture	28	5	0
	<hr/>		
	335	6	5½

Pit cottages were also erected at East Wilkwood, Brownrigg, Raylees, Closehead and Monkridge. Most of the leases also incorporated small plots of land for the use of the miners, although they were frequently at an additional rent. At Birdhope Craig the lessee was to have "grass for a horse and cow and a close to pay for". At Rookan five stints of land, at £2 10s 0d a stint, were to be made available and the building account for Swindon noted above, records the erection of cow houses and the provision of a cow pasture.⁵⁹ There is also evidence from Rookan and Garretshiels⁶⁰ that the colliers received a free allowance of fire-coals.

Unfortunately little documentary evidence has survived relating to miners' wages. The earliest reference is in 1803 at Garretshiels where the overman received 1s per week. However the wage bill for Swindon/Rimside workings in 1815 and 1816 has been preserved:⁶¹

1815-16	£	s	d
Miners paid wages: G. Proudlock, jnr.	23	10	1¾
J. Proudlock	16	0	7½
Rub. Proudlock	12	7	5¼
Lewis Proudlock	21	17	1
Robert Proudlock	25	15	4
Benj. Redshaw	7	15	4
G. Proudlock, sen.		5	6

Rates in the old drift: Wm. Waugh at 3s per day
(5 other colliers listed at the same rate)
James Batey at 1s 4d per day

The accounts for the same pit in 1817 and 1818 are fuller, and record payments to two individual miners. That given below for George Proudlock is for the year 1818.

The payment to George Proudlock on 29 June consisted of the following items:

Viz.	£	s	d
Rent for two cottages & cow pasture to May 1818—2½ years rent	40	00	0
2½ new bolls of barley from Whitefield crop 1816	1	15	0
13 do. do. 1817	7	3	1
6¾ do. of wheat 1816	4	1	0
15 do. do. 1817	12	4	6

	£	s	d
14 old bolls of oats 1817	16	7	6
4 new bolls of Barley from Tosson 1817	1	18	0
1 boll of potatoes from Tosson		4	0
	83	13	1

The cost of working the coals at Rimpside in the same period was £167 7s 0d but there is no information about the number of miners on the payroll. By 1910 all of the smaller workings had ceased to function as commercial ventures. After that date only two pits, Bellshiel and Elsdon, continued to operate in the area, producing sufficient to meet all the rural demands. Bellshiel ceased working in 1935 and the Elsdon Colliery (which commenced about 1885) went into voluntary liquidation in 1972.

The only vestiges of coal-mining in Upper Redesdale now are the grass-grown waste tips and silted up bell-pits and air-shafts. At Bellshiel, Brownrigg and Pengeford they are quite substantial and cover many acres of ground. The spoil heaps around the bell pits may be up to three metres in height and the overall diameter of the pit and mounds often exceeds fifteen metres. Foundations of buildings and roadways can also be identified at many of the sites e.g. Ovenstone, Monkridge, Bellshiel, and some of the original pit cottages—notably three at Swindon—are still occupied.

LIME

The evidence for lime burning activities in Upper Redesdale and Upper Coquetdale is based more on the surviving field monuments than on the meagre documentary sources. Twenty-one kilns for burning lime have been identified, and, at eleven of these sites, much of the kiln is still visible. At the others, only the areas of quarrying, now grass-grown, and old cart tracks are still to be seen. (The kilns are tabulated in Appendix 2 and marked on fig. 3).

The lime produced in this area was particularly suitable for agricultural purposes and an early reference to this agrarian usage is made by Wallis¹ who noted in 1769 that “near a small village called Paunch-ford is a hill of indurated argillaceous earth, resembling Roman mortar, used with success in husbandry”. Bailey and Culley² in their agricultural report confirm this practice of using lime and state that it was introduced into the northern part of Northumberland about 1750. They further describe the draw kilns which were of the inverted cone type, and also the quantities and methods employed by the farmers in using lime. In fact the practice of liming was carried out at a much earlier date in the county. Entries relating to the cost of acquiring “coals for lime” and “to tenants for limestone and coles for the improvement of the ground” have been found in the register of Roman Catholic estates in Northumberland³ in 1717. B. C. Skinner⁴, however, states that even before this time, in the 1620's, lime was being used on the land in the Border counties, while at Berwick,⁵ lime kilns were operating as early as 1561. As Skinner notes however, these early references do not necessarily mean that draw kilns were in use at that time, since the forerunner of the draw kiln was the simple clamp or sow kiln which

usually sufficed for small-scale production. None of these much smaller “cairn-like” kilns described by Jobey⁶ and more recently by Skinner⁷ were located in the area surveyed for this paper. Excluding Wallis’s statement of 1769 the documentary evidence for the use of lime burnt locally in Redesdale covers the period 1785 to about 1887, with the greatest activity taking place between 1810 and 1830.

With the exception of the kilns at Whitelee, Rookan and Greenchesters all of the kilns in the area were intended to provide lime primarily for the estate on which they were sited. Any surplus was sold to farmers in the immediate vicinity. The accounts⁸ for Hetchester Kiln on the Hepple Estate, have survived for the period 1815–18. They record sales from Hetchester Kiln (Hepple Kiln) to Sharperton, Castron, Holystone, Bickerton, Flotterton and Woodhouses—all within a radius of two miles. In the same way as for coal workings, the lease between landowner and lessee was based on the quantity of lime to be produced annually. At the Hepple Whiteside Kiln for example, a 20 year lease was drawn up between Donald Cummings and the landowner Sir John Riddell in 1805.⁹ Cummings was to pay £100 for the lime rental of Whiteside Kiln and Tosson Kiln, and for each cart load over and above 2,000, he was to pay 1s per cart load from Whiteside and 9d per cart load from Tosson.

The terms relating to lime production in Cummings’s lease were part of a wider agreement which also gave him the authority to work coal on the Riddell Estate. This combination of working both the coal and lime was not unusual. In 1856 John Wilson was the lessee of the Hetchester Kiln and for an annual rent of £20 was allowed to work 400 fothers of coal solely for use in the kilns.¹⁰ The sale notice for Dunshiel Farm¹¹ in 1843 states that the limestone kiln and colliery had been leased to Mr. J. Pye for a modest rent of £30, but it gives no indication of the number of fothers to be produced. Perhaps the best illustrations of estates where the landowner leased both the limestone and coal rights together, are the three kilns which were built to cater for the Scottish trade. The largest venture was that at Greenchesters where two kilns were in operation before 1803.¹² The land tax assessments for the period 1806–18 show that John Davidson, who was the proprietor of these kilns, also leased the Garretshiels/Brownrigg colliery. On a smaller scale than Greenchesters, but still operating two kilns each, were the Rookan Kilns and the Whitelee Lime Works (Bateinghope Burn). Whilst both had a ready supply of coal (Appendix 1, No. 1 and 3), in each instance the coal and limestone resources were being worked uneconomically by the 1840s.¹³ On the other hand Greenchesters continued to supply small quantities of lime up to the 1880s.¹⁴

A detailed account of the basic structure of lime kilns can be found in Skinner¹⁵ and many early agricultural manuals provide descriptions and plans of kiln construction.¹⁶ The draw kiln for lime burning consisted basically of a central cavity—the pot, bowl or furnace—within a substantial retaining wall. In this wall, on the exterior face of the kiln, were a number of large vents or eyes. At the base, and to the rear of each eye, was a draw-hole through which the burnt lime was extracted from the bottom of the pot. The kiln was usually built against a natural embankment, which allowed easy access to the top of the pot for loading purposes. All the extant kilns in the area studied display this feature. However the shape of the kiln and pot, and the

number of vents varies considerably (see Table 2). This would seem to reflect local preference rather than a progressive development in the methods used to burn lime. It is the vent which shows the widest variation. The shape appears to be directly related to the overall height of the kiln, to the general form of the face of the kiln and to the ease of access to the draw-hole. Three of the kilns nevertheless show remarkable architectural uniformity—those at Dunshiel, Bowershield and Grasslees, and it seems not unreasonable to attribute them to the same builder. All but one of the kilns are constructed entirely of local stone, the exception being Greenchesters Kiln 2 where the draw-holes and the pot-lining are of fire-brick, a later innovation which would indicate a longer working life for this kiln. The bricks, supplied by the Radcliffe Coal Company, Amble, had been transported 35 miles to Greenchesters. No kiln furniture such as the grate at the base of the pot, has survived in any of the kilns although short tubways from the working face of adjacent limestone quarries to the pot head were known to exist at Greenchesters and Closehead. The lack of detailed structural evidence however must be tempered by the fact that all the kilns have collapsed to some extent, and the pot and vents have, in many cases, been filled with farm debris. At both the Whitelee Kilns and at Greenchesters 2, exterior buttresses were erected at a later stage. This is a common strengthening feature required to overcome the structural stresses produced by the considerable heat generated in the furnace. The most impressive of the surviving draw kilns is that near Low Alwinton, on the former Selby Estate. Architecturally it is unlike any of the others and it is to be regretted that there seems to be a total lack of documentary data for it.

The cost of erecting a draw kiln at the beginning of the nineteenth century was considerable. Skinner¹⁷ notes the sum of £300 in 1801 for a simple kiln, with the cost of multiple kiln blocks being very much higher. In Upper Redesdale the account for the building of Bickerton Lime Kiln in 1805–6 can be found in the Riddell archives.¹⁸ Unfortunately this is one of the kilns which has been almost totally destroyed so that it is no longer possible to ascertain what shape it was or the number of vents and draw holes it possessed. The mason employed for the work was John Anderson who had been engaged to erect the miners' cottages at Swindon¹⁹ and it is interesting that he was a general mason rather than a kiln specialist. The account reads:

	£	s	d
Expencc of Lime Works.			
Anderson for 540 cubic yards of mason work in the lime kiln	189	0	0
Do. for 42 sq. yards of arching in the eyes	6	6	0
Assistance at the Frame [?]		5	0
Carpenter fixing a centre for do.		1	10 0
Cumming for filling up the back of the kiln 2,380 yds. at 6d	59	11	8
Proudlock for 1,084 bolls lime for do. at 4d.	18	1	0
	<hr/>		
	274	14	0
Cumming for forming a road from the coal works to the lime kiln at Bickerton	33	9	4

TABLE 2 Kilns still standing.
All built of local stone; all abutting natural banksides

Name	Overall shape	Present height (metres)	Shape of pot(s)	No. of vents	Shape and height of vents (metres)	No. of draw holes per vent	Earliest documentary date
Whitelee 1	Bank of 2 rectang.	5	4 circular	2 + 2	low circular arch obscured	1?	1827
Whitelee 2	Bank of 2 trapezoid.	6.5	2 circular	3 + 2?	triangul. 3	1	1827
Low Alwinton	Semi-circul.	6.75	oval	3	high circular arch 4.25	1	1827
Hetchester	Semi-circul.	c. 4	circular	3	low circular arch obscured	1?	1815
Dykehead	Rectang.	3.75	oval	2	low circular arch 2.75	1	1827
Greenchesters 2	Semi-circul.	6.5	circular (brick lined)	3	triangul. 4.5	1 (brick built)	1803
Closehead	Semi-circul.	6	circular	3	high pointed arch 4.25	1?	1828
Dunshiel	Rectang.	c. 4	oval	2	low pointed arch obscured	1?	1843
Bowershield	Rectang.	4	oval	2	low pointed arch 2.75	1	1864
Grasslees	Rectang.	4.5	oval	2	low pointed arch 2.5	2	1858

The account continues with a statement on the cost of building four lime-workers' cottages (£128 1s 1d) and preparing small gardens for the inhabitants. In this instance the lessee of the workings was instructed to obtain estimates for the cost of erecting the kiln,²⁰ and the landowner was responsible for paying the bill. Lime-workers' cottages were also built near to other kilns in the area. At Whitelee the foundations of four small rectangular structures can be seen beside the kiln at the head of the valley, while parish registers²¹ make reference to Rookan Kiln House and Greenchesters Kiln House. There is an additional building at Greenchesters which was presumably a combination of office and store-house. It lies immediately west of the old kiln mound which is in turn some 200 metres south of Greenchesters 2. The building is a solidly constructed, single-roomed structure, with a barrel-vaulted roof, measuring internally 3.75 by 4.75 by 3 metres in height. Around the walls are a number of elaborately lintelled niches, but to a modern observer the presence of two fireplaces is an argument against the proposition that it was the original powder magazine for the nearby, extensive quarries.

Only three accounts giving annual figures for lime production by the Redesdale kilns have been preserved, those for the Hetchester Kiln for the years 1815–17, Rookan Kiln for part of 1828 and Hepple Whitefield Kiln for 1815. The smallest operation was that by George Ross at Whitefield, where the account for 1815²² records:

	£	s	d
Arrears for lime sold 1814	2	0	0
recd. for lime burnt 1815	8	17	0
laid on Whitefield Estate	90	18	0
303 at 6s [a fother]			

The cost of operating the kiln for the same period was £76 6s 6½d. At Rookan in 1828, Forrest and Bonner were working both coal and lime on a lease from Robert de Lisle. The accounts²³ indicate that all the small coal produced was rent free and was to be used for the kilns. During the period 12th July to 18th August 1828 some 365 fothers and 6 bolls of lime were sold at 5s a fother, returning a total of £91 7s 6d. The cost of production in the same period was £59 1s 6d. However, the expense of operating a kiln is better indicated perhaps by the annual accounts that have survived for Hetchester.²⁴ For 1815 the statement was:

<i>Income</i>	£	s	d
Arrears 1814		18	0
Lime sold 959 loads	287	18	0
Mr. Wilson 115 loads	34	10	0
Hepple township 27 loads	8	2	0
<i>Expenses</i>	£	s	d
Coal leading by Israel Redshaw	101	7	0
carts to Tosson		6	0

Prime costs of coal from Rimpside	135 11 4
677 loads of 10 bolls at 4s	
Masons account	3 0
Blacksmiths account	12 11
Joiners account	2 11 0
Geo. Ross for burning	55 18 5½
Mr. Miller for leading stone	7 16 11
Expenses	2 16 0
Horse for leading 1,101 loads of lime	11 9 3
	<hr/>
	318 12 4½
less joiners account £1 1s 0d	
plus expenses of filling up back of kiln	29 12 0

Figures for 1816 and 1817 indicate that in 1816, 873 fothers at 5s 6d each were sold for a total of £240 1s 6d, the annual expenses being £184 1s 4d, but in 1817, the income for an unspecified number of fothers was only £127 10s 1d, whilst the production costs were £123 5s 7d. The kiln does not appear to have been functioning in 1818.

The small scale nature of these one- and two-man, rural, limeburning operations can be put into perspective by examining the output of the large scale commercial limeworks such as those at Seahouses on the Northumberland coast. The banks of kilns came into operation here about 1796²⁵ and whilst there was a small landsale output most of the lime was shipped to other ports on the east coast. The accounts²⁶ for the period 1840–46 show that the kilns sold the following quantities:

	Number of cargoes	total no. of fothers (1 fother = 24 imperial bushels)
1840	127	9,333
1841	111	7,926
1842	99	6,707
1843	73	5,634
1844	84	6,085

A more detailed breakdown for 1846 shows that the output was valued at £3,181 7s 9½d and was made up of 9,188 fothers shipped
 1,403 fothers landsale
 384 fothers to the trustees
 812 fothers to estate tenants
 165 fothers of small lime

The landsale lime was being sold over a much wider area than that from Hetchester, with some farmers, from as far as fifteen miles away, purchasing the Seahouses lime. It is unfortunate that for the three "commercial" kilns in Upper Redesdale no accounts have survived. The quantities of lime which passed over Carter Bar into

Scotland²⁷ must have been considerable. An advertisement for the sale of Elishaw Farm which appeared in the Newcastle *Courant* for 2nd October 1802 notes the presence of coal and lime and states that, since Jedburgh was only 20 miles away, the erection of a kiln would be very advantageous for the Scottish trade.

The price of lime in Upper Redesdale appears to have been somewhat higher than in other parts of the county. This was partly due to the poor quality of the coal which yielded a smaller proportion of burnt lime per fother used. Bailey and Culley record²⁸ in 1797 that lime at the northern kilns cost between 3s and 4s 6d a fother, whilst in 1827 Hollingsworth²⁹ noted that agricultural lime was 4s a fother in rural south-east Northumberland. Redesdale prices in 1815–16 vary from 5s 6d a fother at the Hetchester Kiln to 6s at the Whitefield Kiln,³⁰ whereas at the “commercial” kiln at Rookan the price in 1828 was 5s a fother.³¹ Comparative prices for Scottish lime are given by Skinner³² from Carmichael’s analysis, which notes that in 1837 there was a price range of between 5s 6d and 13s 6d a fother (24 imperial bushels to a fother). The price of lime was an important consideration for the tenant farmer, as he was responsible for paying the total cost of liming his land. Macdonald³³ records a number of eighteenth century farm leases which specify the quantities of lime to be applied by the tenant. By the early nineteenth century however the lime clause was beginning to disappear from leases, as landowners became aware of the dangers of repeated applications of lime. Only one farm lease containing a lime clause has been found for Upper Redesdale and the date of the lease seems to confirm that agricultural change and innovation in this part of Northumberland was very slow. The lease, made in 1808, was between Donald Cummings and Sir John Riddell.³⁴ It stipulated that, over a period of 25 years, Cummings was to “plow, improve and lime not less than 250 acres during the said term”.

Accurate numbers for workmen engaged in the lime industry in Redesdale in the nineteenth century are difficult to obtain. The census returns for 1841 and 1851 do not record anyone specifically engaged in the industry although in 1861 two lime manufacturers are noted at Dueshill and Swindon, and in 1871 three lime burners are mentioned at Swindon, two at Bickerton and one at Hatherwick. Other documentary sources show that the Wilson family (John, William and George) were actively engaged in lime burning from 1854 to 1894³⁵ at Hetchester and the Brown family were working the Greenchesters Kiln from 1806 to at least 1823.³⁶ Many of the smaller kilns were undoubtedly operated by the tenant farmer and his labourers, and burning would have been a seasonal occupation in all save the “commercial” ventures.

It is interesting that as recently as 1977 local inhabitants of Coquetdale could still recall draw kilns in operation. Mr. Brydon of Otterburn was operating the kilns at Whitton Glebe (NU 0525 0059) and Capheaton (NZ 0173 7858) in the early 1950s. At the same time W. Bathgate of Rothbury was burning lime at Wards Hill (NZ 0848 9722) and only ceased to burn lime at the Greenleighton Kilns (NZ 0345 9165) in 1967. Mr. Bathgate acquired the lease for lime burning at the two kilns from Thomas Proudlock who had formerly worked the Hetchester Kiln. The kilns were not only supplying local farmers in Redesdale and Coquetdale but also sending

lime by both road and rail to Berwickshire and the Lothians. The process of burning adopted in these kilns appears to have changed little from the methods used in the early nineteenth century. One amusing anecdote recalled by Mr. Bathgate was that he and Mr. Brydon were each fined 2s 6d for breaches of the blackout regulations during the Second World War, even though they had both erected temporary covers over their kilns to conceal the furnaces.³⁷

BRICK AND TILE WORKS

The first literary reference found for a rural brick and tile works in Northumberland is for the remarkably early date of 1762.¹ By 1825 Mackenzie² was able to note the existence of three rural tileries in the county (i.e. excluding the present Tyne and Wear area). Four years later an advertisement in the Newcastle *Courant*³ specifically mentions the production of "malt kiln squares and draining tiles" by a large commercial brick works on Tyneside. Prior to the use of tiles for drainage purposes in the upland areas of the county, the common form of drainage, if any was employed, was either by shallow surface trenches⁴ which were a feature in the Cheviot foothills until the late 1840s,⁵ or by the more traditional method of ridge and furrow preferred by most Northumberland farmers until well into the nineteenth century.⁶ Indeed, tile drainage in Northumberland on the heavier upland soils was virtually neglected until the middle of the century.⁷

An early use of tiles in the north of England is recorded at Netherby in Cumbria in 1821.⁸ Here the tile drains were constructed by standing an inverted "U" shaped tile on a flat tile or sole. However these "two-piece" tiles were cumbersome to lay and if carelessly placed had a tendency to clog rapidly with soil and roots. The introduction in the late 1830s of machines for making drainage pipes provided not only a cheaper product but a more effective drainage system.

The impact of the drainage pipe on the farming community can be gauged by the amount of contemporary literature on the subject. Between 1830 and 1850 some 40 patents relating to brick and tile manufacture were taken out,⁹ and in the Transactions of the Highland Society for 1839¹⁰ no less than nine articles on tile drainage and tile making machines appeared. The Drainage Act¹¹ of 1846 and subsequent acts gave impetus to land improvement by providing money at low interest rates to both landowners and to commercial associations such as the Yorkshire Land Drainage Association¹¹ which was advertising in the Newcastle newspapers in the early 1840s.¹²

The growth of tile works in Northumberland, after the Drainage Act was considerable. It is no coincidence that in November 1847 the Duke of Northumberland asked his agents for a statement on the tileries on his estates,¹³ and by 1855 Whellan's directory lists forty rural tile works in the county. Even more impressive is the figure of ninety-two rural tile works named on the first edition of the six inch Ordnance Survey between 1864 and 1867.

Four brick and tile kilns have been identified in the area covered by this survey, but the documentary evidence gathered for them is sadly inadequate. The kilns at Garretshiels and Ovenstone appear to have been erected in the early 1850s, whilst

those at Knightside and Farnham are first recorded in the 1870s (see Appendix 3 and fig. 3). Like almost all of the rural tileries in Northumberland¹⁵ the kilns used at these four sites were of the horizontal-draught type, perhaps better known as Newcastle kilns. These consisted of a barrel-vaulted chamber approximately three metres high, with a doorway and two fireholes at one end and a chimney with two, three or four flues at the other end. The chamber in the rural kilns measured approximately 3.75 × 5 metres. The exterior of the kiln was normally of dressed stone while the interior of the chamber was lined with brick. Only the foundations of the kilns at Knightside and Ovenstone have survived and their overall dimensions¹⁶ would suggest that at both sites a double kiln block was in operation. At Garretshiels the two kilns are still standing, although they have been allowed to fall into a state of disrepair and have been converted into piggeries. No trace whatsoever of the kiln(s) at Farnham has been found.

The erection of tile kilns was an expensive venture for the landowner, especially as a ready supply of suitable clay or shale and fuel was essential. With the exception of the Farnham works, which were nine miles away from the pits at Elsdon and Pengeford, the rest of the sites were located near suitable clay or shale deposits and had coal workings within a few hundred yards of the kilns. Whilst no records have been found to indicate the building costs of any of the four kilns, some idea of the sums of money involved can be found for other rural Northumbrian tileries. Those at Ponteland,¹⁷ built between 1847 and 1849, and extended in 1852 and 1853, cost a total of £698 17s 11½d. The Melkridge kilns,¹⁸ built between 1860 and 1862, cost £747 11s 2½d. The outlay at Melkridge included not only the cost of the kilns but the cost of constructing a workman's cottage, which is still occupied, the purchase of all tools and machinery, and the laying of a short stretch of rail to the clay pit. Near each of the four kilns in Redesdale similar dwellings were built. The single storey dwelling at Garretshiels continues to be lived in but the more substantial house at Farnham stands empty.

Extensive shallow quarrying is evident beside each of the Redesdale kilns and apart from Farnham, much burnt debris and many broken pantiles and drain pipes still litter the ground. As production figures for the area are lacking it would seem relevant to quote figures for contemporary kilns in similar areas of Northumberland. Below is tabulated the output of three such kilns for the year 1865. These kilns, at Matfen,¹⁹ Melkridge²⁰ and Ponteland,²¹ produced a range of drainage pipes from 2 in to 6 in in diameter and appreciable quantities of common bricks:

	2 in	2½ in	3 in	4 in	5 in	6 in	common bricks	pantiles
Matfen	394,510	21,990	21,240	21,806	9,185	5,679	24,379	800
Melkridge	411,390	—	40,040	25,957	7,161	5,846	4,870	—
Ponteland	171,440	—	13,894	14,454	4,252	—	94,205	—
Total output	Matfen		499,589					
	Melkridge		495,264					
	Ponteland		298,245					

No doubt the same range of drainage tiles was produced in Redesdale and undoubtedly common bricks would also have been needed for lining the pit shafts in the local coal mines. The working dates for the Redesdale kilns coincide with the sinking of deep shafts at Pengeford (Ovenstone tillery), Elsdon (Knightside) and Bellshiel (Garretshiels tillery). Whether the quantities produced by these kilns are comparable to those quoted above, however, is open to question. The evidence for the use of locally produced drain pipes in Redesdale is slender. Two references to agricultural drainage were found, the first for Overacres farm²² in 1848, when the Duke of Northumberland's valuer noted that the farm had not yet been drained, and the second an instruction from Lord Redesdale to C. H. Bell, the tenant farmer at Cottons-hope Burnfoot in 1857²³ to obtain his drainage tiles from Garretshiels tillery. In Upper Coquetdale, Farnham tillery, also known as Clennell's tillery, did not commence operations until about 1878,²⁴ presumably as the nearby Burradon tile works (NT 9800 0680), producing drainage tiles and common bricks primarily for the Har-bottle Estate from 1840 to 1865, could meet all local demands.²⁵

The working life of the four Redesdale kilns was somewhat limited (see Appendix 3). Garretshiels and Ovenstone, which both commenced in the 1850s, appear to have ceased functioning by the mid-1870s. Knightside tillery began operations as the two earlier sites were declining, but was itself described as disused before 1887. At Farnham the works continued until about 1910, although from the 1890s, possibly due to the decline in demand for tiles, it also functioned as a sawmill.

Whilst the manufacture of bricks and tiles was normally a seasonal occupation, the skill needed to fire a kiln was only acquired by practice. Not surprisingly the workmen engaged in this industry in Redesdale, can be found associated with similar rural kilns elsewhere in Northumberland. John and David Hall, noted at Garretshiels in the census returns for 1861 and 1871, moved presumably when the tillery ceased to function, to Mitford brick and tile works, (NZ 1765 8650) where they are listed in the directories in 1873 and 1889.²⁶ Similarly James Sanderson, who succeeded Henry and James Clark at Ovenstone sometime between 1861 and 1870, is later recorded in 1879²⁷ at Hesleyside brick and tile works (NZ 0955 9715). Just as in coal-mining, family interests were also well represented in the brick and tile industry. There seems to have been a family link between J. Thornton who was working the Low Hedley Wood tile works (NZ 1405 9825) as early as 1858,²⁸ James Thornton operating the Knightside works between 1871 and 1879 and Thomas Thornton who managed Farnham tile works from 1879 until 1890.

CONCLUSION

The industrial activity and field monuments discussed in this paper indicate that agricultural improvement was not confined to the mixed and arable husbandry of the coastal plain and lower valleys of Northumberland, but was to be found even on the marginal lands of Upper Redesdale and Upper Coquetdale. Precisely because the rural industries owed much of their impetus to contemporary agrarian advances, their development was both restricted in size and of limited duration. Once they had satis-

fied the domestic needs of the immediate locality they began to decline. The demand for lime diminished when farmers realized the danger of over-liming their land; a similar falling off in the production of drainage tiles took place because the land suitable for cereal production was minimal. The demise of these two industries in turn reduced the demand for coal, although some workings which could be run economically continued to provide fuel for local domestic consumption until the twentieth century.

APPENDIX 1

Coal-workings

(key to abbreviations will be found following the appendices) MoD signifies workings on the Ministry of Defence Estate
Grid references are centred on sites

Site

No.	Name	
1	Whitelee Colliery (Bateinghope Burn) NT 680 033 Border line NT 671 035	1769 Armstrong, Map of Northumberland: 1827 Hodgson, P. 136n: 1827 Greenwood: 1828 BCR: 1828-30 Watson 13A. p. 16: 1838 ZHE 48-9:c. 1845 Clough, C. T. Geological memoir. Plashetts. 1889, p. 39: 1864 OS 1 no coal workings shown 1979-80 5 old workings at head of valley 11 old workings on Border See also Whitelee Lime Kiln. App. 2
2	Blackblakehope NY 756 997 Ralph's Cleugh NY 752 989	1749-65 QRP: 1761 Newc. <i>Journal</i> 15th Aug: 1780 Watson 13A. p. 20: 1800-03 BCR: 1830 Watson 10. unnumb.: (1831) Miller. 1887. p. 28: 1841 BCR: 1864 OS 1 1979-80 over planted
3	Rookan Colliery NY 798 960 Rookan Pit House East NY 791 978	1795-1841 BCR: 1803 ByCR: 1810-15 QRP: 1827 Hodgson. p. 85: 1827-8 Watson 10. 36. items 35-48: Watson 13A. p. 6-8: 1841 Census: 1861 Census: 1864 OS 1: 1897 OS 2 "old" 1979-80 over planted See also Rookan Lime Kiln. App. 2
4	Rochester Colliery Bellshiel MoD NY 816 995	1771-4 QRP: 1827 Hodgson. p. 85: 1827 Greenwood: 1828 Watson 13A. p. 15: 1829-33 BCR: 1841-51 Census: 1864 OS 1: 1897 OS 2 "old" 15th April 1935 workings abandoned NCB 1979-80 waste tips and shafts visible, foundations of both High and Low Bellshiel cottages visible
5	Birdhope Craig Colliery MoD NY 828 988 NY 828 983	1804 Watson 10. 36. items 8-31 1979-80 waste heaps visible

- 6 Hillock
(including Bush)
NY 831 991
Huel Crag
NY 833 996
Sills Burn
NT 834 022
Christie's Bog
NT 837 005
Petty Knowes
NY 836 983
Part MoD
- 7 Yatesfield
Bennettsfield
NY 855 965
NY 857 957
Hare Cairn
NY 879 984
Part MoD
- 8 Long Lea
NY 813 970
Kelly's Pike
NY 807 959
Blackwool Law
NY 803 977
Wind Burn
NY 811 976
- 9 Brownrigg
NY 848 936
- 10 Bleakhope/Rattenraw
Common
NY 853 946
NY 847 950
- 11 Garretshiels
Dargues
- 12 Shittleheugh
NY 870 945
- 13 Closehead
Girsonfield
NY 891 936
Monkridge Hall
NY 902 924
- 1774–7 QRP: 1806 QRP: (1819) Hodgson. 1827. p. 85:
(1820s) Miller. 1887. p. 25–6: 1864 OS 1 “old”
1979–80 many grass grown mounds visible
See also Dykehead Lime Kiln. App. 2
- 1716 Warburton. Map of Northumberland: (pre 1820)
Miller. 1887. p. 29: 1864 OS 1: 1871 QRA 17–19 pits
marked: 1897 OS 2 “old”
- 1979–80 7+ old waste heaps. Foundations of stone built
steading visible
- (c. 1800) Miller. 1887. p. 29: 1866 OS 1 marked
- (1787) Miller. 1887. p. 49: 1792–1843 BCR: 1793 ZHE
73: 1806–19 QRP: 1808–12 EPR: 1827 Hodgson. p.
85: 1835 BCR: 1841–71 Census—many miners lodging
in neighbouring farms: 1866 OS 1: 1898 OS 2—22 old
shafts, old air shaft, pumping engine house: 1902 Kelly's
directory
March 1905 workings abandoned NCB
- 1801–11 EPR: 1803 ZHE 48:32: 1803 Watson 10. 36.
Items 1–2: c. 1810 ZHE 48. 4–31 “old” pits marked near
Rattenraw
1979–80 many old workings visible
The early documentation does not enable a clear distinc-
tion between Brownrigg and Garretshiels to be made.
All the coal workings were to the west of the A68 road.
n.d. Borings. No. 1811: 1804 Watson 10. 36. Items 4 & 5
- 1851 Census: 1857 Borings. Nos. 8–11: 1858 P.O. Direc-
tory: 1871 Census: 1879 Kelly's Directory: 1887 Miller.
p. 63—“deserted workings”: 1898 OS 2–4 old shafts
1979–80 large spoil heaps near Davyshiel and Girsonfield
See also Closehead Lime Kiln. App. 2

- (includes Cross House and Overacres)
Davysiel
NY 889 963
- 14 Soppitt
NY 923 936
NY 926 935
Folly
Part MoD
Elsdon
NY 933 932
- 15 Monkridge
Birky Gill
NY 906 906
- 16 Raylees Common
NY 926 904
- 17 Knightside
Hillhead
Gallow Hill
NY 933 919
- 18 Carrick Colliery
- 19 Laingshill Colliery
NY 922 965
Dunshiel
NY 927 947
Part MoD
- 20 Ovenstone
NY 958 987
Pengeford
NY 937 976 to
942 975
Loaning Burn
NY 944 941
Grasslees
Pattenshiel
NY 954 983
Part MoD
- 21 Raw Highshaw Craig
Red Burn
NY 942 996
MoD
- 1722–53 Borings. Nos. 776–8: and Inst. of Mining. Shelf 49. Vol. 5. p. 27a–b: 1827 Hodgson. p. 85: 1841–61 Census: 1846 Borings. Nos. 1,839 & 2,674: 1887 Miller. p. 59
1979 old bell pits visible
1886 Directory (Bulmer): 1887 Miller. p. 58: 1873–1905 N.R.O. EP. 99/18 leases: 1890–1938 Directories: 1897 OS 2—colliery marked: *c.* 1964 N.R.O. 578/65 & 66 Armstrong Papers—plan of workings
1972 Ev. Chronicle 6 May Liquidation noted March 1972
1979–80 pit buildings dismantled
- 1861–71 Census: 1898 OS 2–8 “old” coal pits
1980 21 old pits and waste tips, foundations of pit cottage to west of road and a patch of lazybeds
- 1847 ZHE 14:14: 1849–63 ZSW Box 10: 1887 Miller p. 54: 1898 OS 2 “old”
1980 13 small and 4 large waste heaps
- 1834 BCR: 1851 Census: 1887 Miller. p. 54 “old”
1980 9 shafts and waste tips visible
See also Brick and Tile Kilns—Knightside. App. 3
- 1748–77 QRP: *c.* 1750 ZHE 14:7: 1786–8 ZHE 73:
1807–10 EPR: 1809 ZHE 14:7: (1810) Hodgson 1827. p. 99: 1831 ZHE 48:6: 1841–51 Census: 1843 ZHE 48:22: 1887 Miller. p. 59–62: 1898 OS 2—old pits marked
1979 40 + old pits and shafts visible
See also Dunshiel and Laingshill Lime Kilns. App. 2
- 1762 Borings. No. 1,511: 1765–72 QRP: (1824) Hodgson 1827. p. 85: 1841–71 Census: 1855 Directory (Whellan): (1880) Directory (Bulmer) 1886: 1887 Miller. p. 23–4, 123: 1898 OS 2—all pits in area are “old”
1980 many old slag heaps and shafts—
Pattenshiel—5 +
Ovenstone—20 + and foundations of buildings
Pengeford and Loaning Burn—40 + and buildings
See also Grasslees Lime Kiln. App. 2
See also Ovenstone Brick and Tile Works. App. 3
- 1749–53 QRP: 1801 ZHE 48:32: 1808 EPR: 1815–18 HPR: 1816 Watson 10. 36. Items 6 & 7: 1866 OS 1 “old”: 1887 Miller p. 23:
1978 Red Burn 6 + old workings
See also Raw Lime Kiln. App. 2

- 22 Swindon 1801–18 ZRW 246–302, 403: 1806 QRA 51: 1808
 NY 978 992 EPR: 1828 Greenwood: 1841–71 Census: 1843 DT 234:
 Rimpsey 1846 ZRW 405–6: 1866 OS 1 “old”: 1887 Miller. p. 22,
 NY 964 986 124 “old”
 1980 5 + Rimpsey
 Swindon over planted
- 22a Hepple Whiteside 1861 Census: 1866 OS 1 “old”
 NY 990 994 1979 5 + old workings
 See also Hepple Whiteside Lime Kiln. App. 2
- 23 North Yardhope 1887 Miller, p. 24 “old”: 1898 OS 2–5 “old” shafts
 NT 925 015 1977 45 + shafts and waste pits—mostly over planted
 NT 917 013
 MoD
- 24 East Wilkwood 1778–1810 APR: 1816 ZAN 59/17-4: 1817 ZAN 60-1:
 NT 900 028 1828 Greenwood: 1828–30 HPR: 1851 Census: 1866 OS 1:
 Watty Bells Cairn 1887 Miller. p. 24, 66: 1898 OS 2–8 “old” shafts marked:
 NT 892 020 noted AA⁵ vol. 6. p. 154
 Ramsey Cleugh 1978 50 + old shafts and heaps. Foundations of Pit
 NT 867 017 House visible
 Crigdon Hill
 NT 852 058
 MoD

APPENDIX 2

Lime kilns in Upper Redesdale and Coquetdale

(Key to documentary sources follows the appendices)

<i>Name of Kiln</i>	Documentary sources. (Census returns and directories excluded)
Whitelee 1 NT 6820 0344	1827 Hodgson p. 136n: 1828 Watson 11. p. 16: 1829–32 BCR: 1838 ZHE 48-9: 1864 OS 1: 1889 Clough, C. T. Geological memoir. Plashetts. p. 39, 54.: 1890–91 BNC. 13. p. 293.
Whitelee 2 NT 6880 0392	See also coal workings. Appendix 1. No. 1
Low Alwinton NT 9254 0560	1828 Greenwood: 1858 OS 25 in: 1866 OS 1 “old”: noted AA ⁵ , vol. 6. p. 156 See also coal workings. App. 1. No. 24
Newton NT 9374 0639	1858 OS 25 in: 1866 OS 1: 1887–8 BNC. 12. p. 38: 1887 Miller. p. 12
Hetchester (Hepple) NT 9817 0155	1815–56 ZRW 287, 301–2, 403–6: 1827 Greenwood: 1866 OS 1: 1887 Miller. p. 12–13
Rookon NY 7816 9652	1801–3 ByCR: 1810 BCR: 1810 QRP: 1827 Watson 10. items 35–48, 11. p. 6–11: 1864 OS 1: 1887 Miller. p. 52, 122 See also coal workings. App. 1. No. 3
Dykehead NY 8440 9850	1827 Greenwood: 1852 Maclauchlan, H. Memoir of Watling Street. p. 35 “old”: 1864 OS 1 “old”: 1866 QRA 44 See also coal workings. App. 1. No. 6

- Greenchesters 1 1803 ZHE 48:32: 1806–18 QRP: 1807–23 BCR: 1828 Macadam, J.
 NY 8727 9416 Map of proposed new turnpike road. N.R.O. QRU p. 22: 1866 OS 1:
 Greenchesters 2 1887 Miller. p. 63, 122
 NY 8728 9427
 Potts Durtrees 1864 OS 1
 NY 8752 9777
 MoD
 Closehead 1828 ref. as Greenchesters: 1864 OS 1 “old”: 1887 Miller. p. 91
 NY 8972 9315 See also coal workings. App. 1. No. 13
 Overacres 1785 ZHE 48:1: not on OS 1
 NY 9066 9328
 Dunshiel 1843 Bell Collection. Gibson section. NRO. ZGI xviii 15b (also ZHE
 NY 9256 9418 48:22): 1864 OS 1 “old”
 See also coal workings. App. 1. No. 18
 Laingshill 1827 Hodgson p. 100n: 1850 ZHE 48:23: 1864 OS 1
 NY 9301 9631 See also coal workings. App. 1. No. 18 & 19
 MoD
 Hoggers Cleugh 1858 25 in OS “old”
 NY 9373 9768
 MoD
 Bowershield 1864 OS 1
 NY 9388 9432
 Raw 1858 OS 25 in: 1864 OS 1: 1887 Miller p. 60
 NY 9460 9790 See also coal workings. App. 1. No. 21
 MoD
 Grasslees 1858 OS 25 in
 NY 9597 9833 See also coal workings. App. 1. No. 20
 MoD
 Hepple Whiteside 1806 QRA 51 (2 kilns marked): 1815 ZRW 302: 1866 OS 1
 NY 9901 9928 See also coal workings. App. 1. No. 22
 Bickerton 1805 ZRW 246, 302: 1833 ZAN 78:1: 1866 OS 1: 1936 Fowler, A.
 NZ 0008 9985 Geological memoir. Rothbury. p. 347

APPENDIX 3

Brick and tile works

- Farnham Not on OS 1 or 1871 Census: 1879–1910 directories: 1887 Miller
 (Clennell's) p. 124: OS 1930 disused
 NT 9710 0345 (1894–1910 also noted in directories as a saw mill)
 1979 shallow quarrying only, two storey cottage now untenanted
 Garretshiels OS 1: 1861 and 1871 Census
 NY 8590 9276 1979 two Newcastle kilns still standing but now converted to pig-
 geries, shallow quarrying
 Tilery cottage still occupied

Knightside NY 9290 9215	Not on OS 1 or 1861 Census: 1871 Census: 1879 directory: 1887 Miller p. 56 and 124 "old" 1979 foundations of two Newcastle kilns, shallow quarrying, Knightside cottage in ruins
Ovenstone NY 9592 9868 MoD	1855 Whellan directory: 1858 Post Office directory: 1861 Census: OS 1: 1871 Census: not named on OS 2 1979 foundations of two Newcastle kilns, shallow quarrying, foundations of workmen's cottages 400 yards east of tilery

Key to bibliographical references

APR	Alwinton parish register. 1720–1812. Typescript. Newcastle Central Library
BCR	Birdhope Craig Presbyterian Chapel register. 1728–1850 (baptisms only). Typescript. Northumberland Record Office
BNC	Trans. Berwickshire Naturalist Club. Vol. 1, (1831) to date
ByCR	Byrness Chapel register. 1797–1810. <i>In</i> PSAN 3. Vol. 3. 1907–8. p. 23–9
Borings	An account of the strata of Northumberland and Durham such as proved by borings and sinkings. North of England Institute of Mining and Mechanical Engineers. 7 vols. 1878–1910
DT	Tithe award maps. Northumberland Record Office
EPR	Elsdon parish register. 1672–1812. Society of Antiquaries. 1903
Greenwood	Greenwood, C. and J. Map of the county of Northumberland. 1828
Hodgson	Hodgson, J. History of Northumberland. Part 2. Vol. 1. 1827
HPR	Harbottle parish register. 1803–56 (marriages only). Typescript. Newcastle Central Library
Miller	Miller, H. Geology of the country around Otterburn and Elsdon. Memoirs of the Geological Survey. 1887
NCB	National Coal Board. Catalogue of plans of abandoned mines. 1960
OS 1	Ordnance Survey. First edition six inch series. 1864–67
OS 2	Ordnance Survey. Second edition six inch series. 1897–99
QRA	Inclosure award maps. Northumberland Record Office
QRP	Land tax assessments. Northumberland Record Office
Watson 10	Institute of Mining. Watson Collection. Shelf 10. Vol. 36. Papers relating to Raw, Rookan and Garretshiels. 1803–30
Watson 11	Institute of Mining. Watson Collection. Shelf 11. Vol. 13A. Watson's notebook.
ZAN	Bell Collection (Society of Antiquaries section). Northumberland Record Office
ZBL	Blackett Collection. Northumberland Record Office
ZGI	Bell Collection (Sir W. Gibson section). Northumberland Record Office
ZHE	Bell Collection (W. P. Hedley section). Northumberland Record Office
ZRW	Riddell of Whitefield papers. Northumberland Record Office
ZSW	Swinburne family papers. Northumberland Record Office

NOTES: COAL

¹ Charlton, D. B. and Day, J. C. "Upper Redesdale, Northumberland: an archaeological survey" *In Archaeology in the North*. 1976.

² Charlton, D. B. and Day, J. C. *An archaeological survey of the Ministry of Defence training area Otterburn, Northumberland*. MoD 1977.

³ Lawson, W. "The Newcastle to Carter Bar road" *In AA*⁴ vol. XLIX. 1971. p. 187–209.

⁴ Rothbury station opened 1870. Dixon, D. D. *Upper Coquetdale*. 1903. p. 47.

⁵ Woodburn station opened 1865. Thomas, J. *The North British railway*. Vol. 1. 1969. p. 245.

⁶ John Leland in 1538. *The itinerary*. 1910. p. 68; Bowes and Ellerker in 1541. A view and survey of the ... Marches *In* Hodgson, J. *History of Northumberland*. Part 3. Vol. 2. 1828. p. 205; Robert

Carey in 1598. In Bain, J. ed. *Border papers*. Vol. 2. 1896. p. 551; *Survey of the debateable and border lands*, 1604. Sanderson, R. P. ed. 1891. p. 108.

⁷Mackenzie, E. *History of Northumberland*. Vol. 2. 1825. p. 486.

⁸Hodgson, J. p. 136n.

⁹Sanderson, R. P. *op. cit.* p. 112.

¹⁰EPR 17 July 1691.

¹¹Inst. of Mining. Shelf 18. View book 1710-1753, p. 27; and Shelf 49. Vol. 5. Forster Collection. p. 27a-b.

¹²ZHE 14.13.

¹³QRP 1748-1820.

¹⁴ZHE 14.7 Recollections of Adam Brodie in a letter from John Bell to William Smith, 1809.

¹⁵ZHE 73 bundle of unnumbered items.

¹⁶Borings. Vol. 2. No. 1,493-6 in 1759.

¹⁷*Ibid.*, No. 1,511 in 1762.

¹⁸Miller, H. p. 27 *et seq.*

¹⁹ZRW 402.

²⁰Watson 10 and 11.

²¹Watson 10 item 29.

²²ZRW 246 and 402.

²³Watson 10 items 43 and 45.

²⁴*Ibid.*, item 1.

²⁵ZRW 302.

²⁶Dunn, M. *Treatise on the winning and working of collieries*. 1848. p. 117 *et seq.*

²⁷ZHE 14.7.

²⁸Inst. of Mining. Shelf 8. Vol. 2. p. 154-7; and ZRW 403.

²⁹Watson 10 item 29.

³⁰*Ibid.*, item 1.

³¹ZRW 246.

³²*Ibid.*, 302.

³³Watson 10 items 27-9.

³⁴ZHE 14.7

³⁵ZRW 402.

³⁶Inst. of Mining. Shelf 18. *op. cit.* p. 27; and Shelf 49. *op. cit.* p. 27a-b.

³⁷Borings. Vol. 2. No. 777.

³⁸Hodgson, J. p. 85.

³⁹Watson 10 item 1.

⁴⁰Newcastle *Journal* 15th Aug. 1761.

⁴¹ZRW 406.

⁴²ZSW Box 10; and ZHE 14.14.

⁴³Watson 11 p. 21.

⁴⁴Watson 10 unnumbered item.

⁴⁵*Ibid.*, items 37, 38 and 46.

⁴⁶*Ibid.*, items 4 and 5.

⁴⁷*Ibid.*, item 6.

⁴⁸ZRW 402 and 406

⁴⁹Watson 10 item 1.

⁵⁰*Ibid.*, item 38.

⁵¹ZRW 302.

⁵²APR 1792-1800; BCR 1729-1839; EPR 1798-1811; HPR 1815-31.

⁵³Census returns 1841-71.

⁵⁴Directories—Post Office 1858; Bulmer's 1886; Kelly's 1890-1902.

⁵⁵ZHE 14.7.

⁵⁶Watson 10 item 40.

⁵⁷*Ibid.*, item 30.

⁵⁸ZRW 246.

⁵⁹Cf. the evidence in Cumberland on colliery leases which includes land for grazing a cow. Harris, A. *Colliery settlements in East Cumberland*. In CW. Vol. 74. 1974. p. 118-46. Similar leases were also common for the lead miners in the south-west of Northumberland.

⁶⁰Watson 10 item 2.

⁶¹ZRW 302.

NOTES: LIME

¹Wallis, J. *The natural history and antiquities of Northumberland*. Vol. 2. 1769. p. 61.

²Bailey, J. and Culley, M. *A general view of the agriculture of the County of Northumberland*. 1797. p. 114-17.

³Surtees Society. Vol. 131. 1918.

⁴Skinner, B. C. *The lime industry in the Lothians*. 1969. p. 10.

⁵Scott, J. *History of Berwick*. 1888. p. 156.

⁶Jobey, G. A note on "sow" kilns In Jnl. of the University of Newcastle Agricultural Society. Vol. 19. 1965. p. 37-8.

⁷Skinner, B. C. The archaeology of the lime

industry in Scotland In *Post medieval archaeology*. Vol. ix. 1975. p. 225.

⁸ZRW 302.

⁹ZRW 403.

¹⁰ZRW 405-6.

¹¹ZGI xviii 15b.

¹²Newcastle *Courant* 19th Nov. 1803.

¹³Rooker—Watson 10 items 45 and 46. Whitelee—BNC Vol. 13. 1890-1. p. 293.

¹⁴Miller, H. p. 63.

¹⁵Skinner. 1969. *op. cit.* p. 13-20.

¹⁶Stuart Menteath, C. G. On the construction of lime-kilns In *Prize essays and trans. Highland*

- and Agricultural Soc. of Scotland. N.S. Vol. 2. 1831. p. 127–31; Wallace, J. Account of the method of calcining lime. *ibid* N.S. Vol. 5. 1837. p. 441–5.
- ¹⁷Skinner. 1969. *op. cit.* p. 27
- ¹⁸ZRW 246.
- ¹⁹*Ibid.*
- ²⁰ZRW 404.
- ²¹ByCR 1801–3; BCR 1807–21.
- ²²ZRW 302.
- ²³Watson 10 items 42–6.
- ²⁴ZRW 302.
- ²⁵Crewe Mss. D. 9/9 Northumberland Record office.
- ²⁶*Ibid.*, D 9/43–45.
- ²⁷Dodgshon, R. A. Land improvement in Scottish farming *In Agricultural History Review*. Vol. 26. Part 1. 1978. p. 7.
- ²⁸Bailey and Culley. *op. cit.* p. 117.
- ²⁹Hollingsworth, N. J. A letter to the Rev. John Dod ... relative to the sale ... of Ridley-Hall Estate. 1827. Appendix.
- ³⁰ZHW 302.
- ³¹Watson 10 item 42.
- ³²Skinner. 1969. *op. cit.* p. 58.
- ³³Macdonald, S. The development of agriculture ... in Northumberland 1750–1850. PhD thesis. Newcastle Univ. 1974. p. 156–9 and 371.
- ³⁴ZRW 383.
- ³⁵1854—ZRW 338. 1855–94 county directories
- ³⁶1806–18 Land tax assessments; BCR.
- ³⁷Information from W. Bathgate November 1977.

NOTES: TILERIES

- ¹ At Cocklaw p. 385, with a second begun at Tweedmouth in 1788 p. 386 *In Fuller, J. History of Berwick upon Tweed*. 1799. The references do not however specify drainage tiles.
- ² Mackenzie, E. *History of Northumberland*. Vol. 1. 1825, p. 323—Tweedmouth; p. 394—Wooler; p. 442—Alnwick: Ford brick and tile works were also in operation from about 1766—ZDE 2.63, Northumberland Record Office.
- ³ Newcastle *Courant* 3rd Jan. 1829. Sale of malt tiles and drainage tiles from Bell's Close Brick and Tile works.
- ⁴ Bailey, J. and Culley, M. *General view of the agriculture of the county of Northumberland*. 1797. p. 111–12.
- ⁵ Macdonald, S. The development of agriculture ... in Northumberland 1750–1850. PhD thesis. Newcastle Univ. 1974. p. 356.
- ⁶ *Ibid.*, p. 359–60.
- ⁷ *Ibid.*, p. 367.
- ⁸ Prize-essays and trans. Highland and agricultural society of Scotland. N.S. Vol. 1. 1829. p. 388–400.
- ⁹ Abridgements of specifications. Drain tiles and pipes 1619–1855. 1857.
- ¹⁰ Prize-essays. *op. cit.* N.S. Vol. 5. 1839.
- ¹¹ 9 & 10 Victoria Chapter 101; and in particular further advances of money in 1850 13 & 14 Victoria Chapter 31.
- ¹² Newcastle *Courant* 16th Feb. 1844.
- ¹³ ZHE 34.3—tileries at Alnwick, Brockleyhall, Hitchcroft, Horsley, Longhoughton, Newburn, Newham, Rothbury and Warkworth. This is not a complete list of ducal tileries as it does not include the works at Belford, erected in 1846—*Builder* 13th June 1846.
- ¹⁴ Whellan, W. & Co. History, topography and directory of Northumberland. 1855.
- ¹⁵ The authors have visited over 150 of these sites in the county.
- ¹⁶ Ovenstone exterior measurement of kiln block foundations—11.0 × 8.0 metres: Knightside—12.3 × 5.2: Garretshiel—11.5 × 5.65.
- ¹⁷ ZBL 281.1.
- ¹⁸ ZBL 50 and 281.4.
- ¹⁹ ZBL 281.4.
- ²⁰ ZBL 50.
- ²¹ ZBL 281.1.
- ²² ZHE 14.13.
- ²³ ZHE 14.14.
- ²⁴ Kelly's directory 1879.
- ²⁵ Information from C. P. Forster of Burradon Hall, February 1980.
- ^{26–28} Kelly's Directories.

CORRECTION TO VOLUME IX (1981)

Editors Note

Owing to an error in the press, figure 2 was substituted for figure 3 on page 271 of Volume IX (1981) in this series. The correct figure is reproduced below.

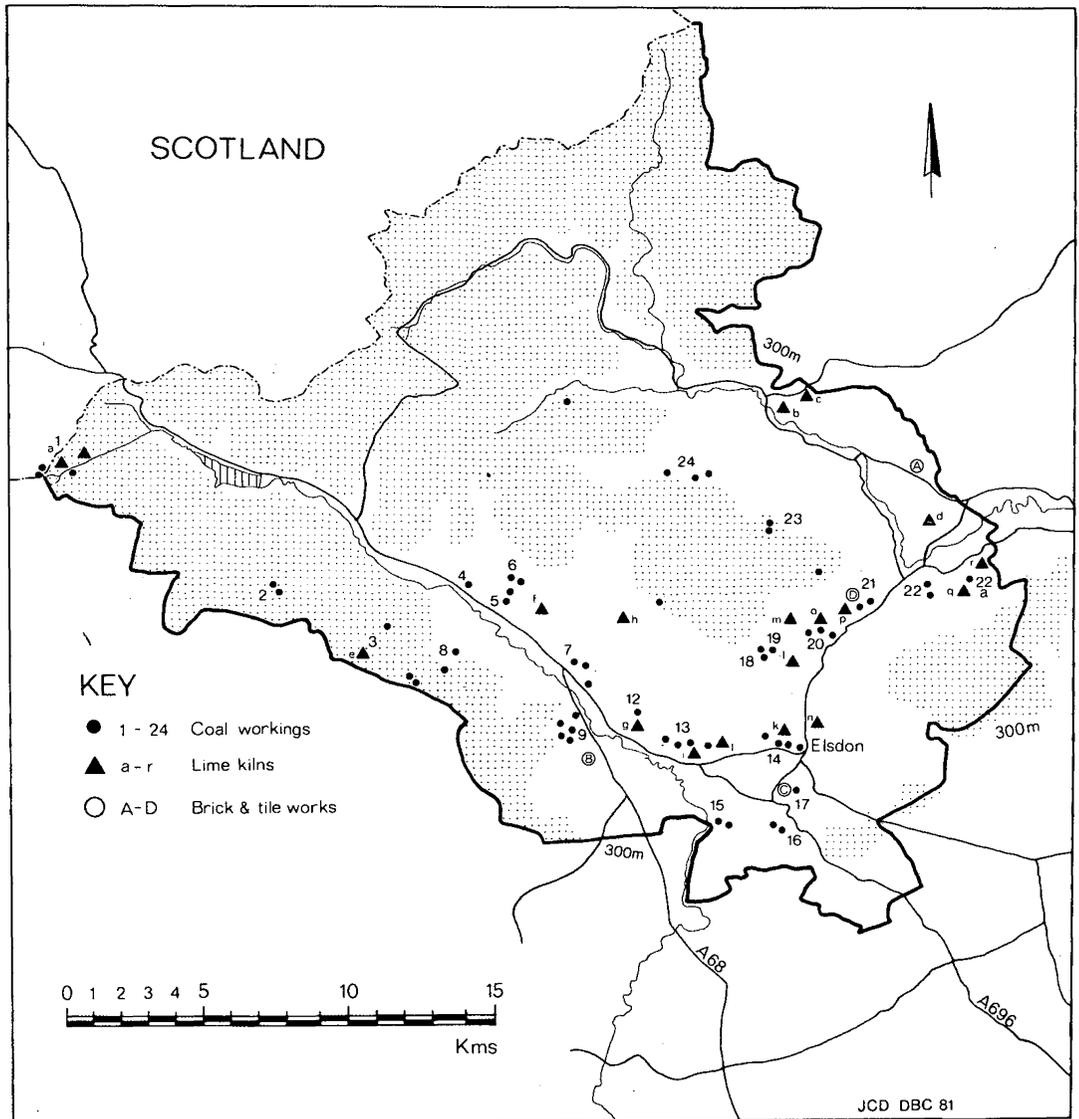


Fig. 3. Upper Redesdale: Industrial sites.