

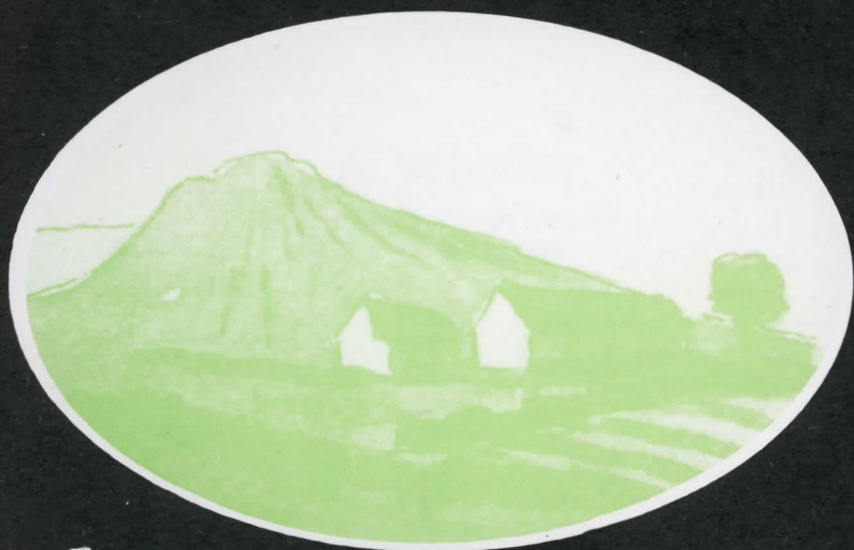
The Finest Place for a Lasting Colliery

Coal Mining Enterprise in Ayrshire

c. 1600-1840

C. A. Whatley

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COAL HILL
3 Miles 7 furlongs from Saltcoats

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The Finest Place for a Lasting Colliery

**Coal Mining Enterprise in Ayrshire
c. 1600-1840**

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It would be 'the finest place for a Lasting Colliery', reflected Peter Walker after a short working visit to part of the Ayrshire coalfield in the early 1720s.¹ The county's coal mining industry had then commenced a phase of expansion which, although uneven in its first decades, would by the beginning of the present century, employ fourteen thousand miners and produce four million tons of coal each year.²

The purpose of this pamphlet is to outline and analyse the pattern of coal mining enterprise in Ayrshire in its formative years from around 1600 to 1840. The subject material has been divided into three sections.

Section I describes the main developments over the period. The pace of exploitation of Ayrshire's coal reserves was at times markedly different from other areas of Scotland. Indeed the county's coal mining industry often had much more in common with west Cumberland, especially where markets were concerned. Both Ayrshire and Cumberland were well-placed to take advantage of the growing demand for coal from Ireland. Historians have long been aware of the uniqueness (in the Scottish context) of Ayrshire's Irish connection and have made frequent passing references to it.³ Yet, while the Cumberland-Ireland coal trade and its impact on the coal mining industry and indeed the wider economy of Cumberland has been the subject of recent investigation, at least in the period up to 1760,⁴ little work has been published on the relationship between Ireland and the development of Ayrshire's coalfield since Lebon's pioneering study half a century ago.⁵ Recently a study has been made of Scottish-Irish trade in the 18th century⁶ and this invaluable material has made it possible for me better to evaluate the data I had previously gathered from Ayrshire's surviving colliery records.⁷

Section II considers the background and careers of a number of entrepreneurs who were tempted to mine coal for sale to Ireland, and raises the question of why so many failed in their enterprise.

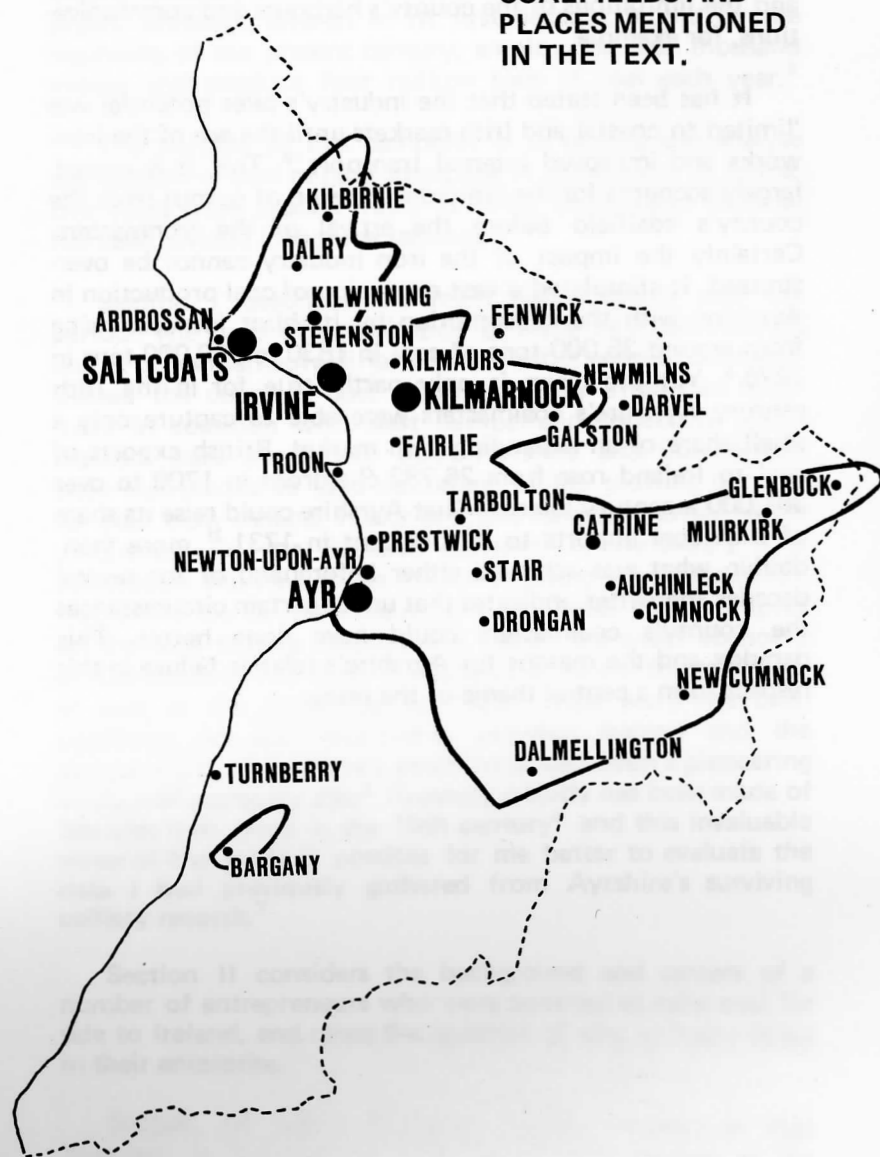
Section III points to some possible answers to that question. It is argued that the seductive attractions of the

Ayrshire coalfield and its market potential could and did all too readily conceal major problems from those who attempted to enter the industry — geological and other natural obstacles, management shortcomings and labour difficulties, and the limitations of the county's harbours and communications, for example.

It has been stated that the industry's sales potential was 'limited to coastal and Irish markets until the age of the iron-works and improved internal transport.'⁸ This, it is argued, largely accounts for the limited expansion of output from the county's coalfield before the arrival of the ironmasters. Certainly the impact of the iron industry cannot be overstressed. It stimulated a vast expansion of coal production in Ayrshire, with the consumption by its blast furnaces rising from around 36,000 tons of coal in 1830 to 900,000 tons in 1876.⁹ Yet the claim is only partly true for in the 18th century Ayrshire's coalmasters were able to capture only a small share of an expanding Irish market. British exports of coal to Ireland rose from 26,782 chaldrons in 1700 to over 301,000 a century later.¹⁰ That Ayrshire could raise its share of Irish coal imports to 22 per cent in 1731,¹¹ more than double what was achieved either beforehand or for several decades thereafter, indicates that under certain circumstances the county's coalmasters could have done better. This paradox and the reasons for Ayrshire's relative failure in this respect form a central theme of the essay.

AYRSHIRE

SHOWING EXTENT OF
COALFIELDS AND
PLACES MENTIONED
IN THE TEXT.



I. AN OUTLINE OF DEVELOPMENTS

i. c.1600-1700

We cannot incorporate Ayrshire within Professor Nef's still useful if occasionally abused concept of an 'early industrial revolution'. The 'great expansion' in output and exports which took place elsewhere in Scotland in the late 16th and for much of the 17th centuries did not occur in Ayrshire.

This is hardly surprising, given that Ayrshire was an overwhelmingly rural county. It was the least densely populated of Scotland's central belt counties in 1691¹² and could boast only three towns of more than 1,000 inhabitants. Of these only Ayr is likely to have contained as many as 4,000 people.¹ Peat and turf was the common fuel of the county's scattered population.

It is true that the county's trade was expanding and that coal was its most important export commodity,¹⁴ but that this was so is perhaps better testimony to Ayrshire's poverty in other respects than to the strength of the coal mining industry. Shipments of coal from Ayrshire to Ireland in the 16th century only reached double figures and even by the mid-17th century only one hundred or so tons were leaving the county's shore in any one year.¹⁵ The increase to something under 3,000 tons by the late 1690s is indeed noteworthy, but comparison with figures from Liverpool or west Cumberland place Ayrshire's achievement in a more modest light. Shipments from west Cumberland had only begun in 1605 but by 1695 had reached 15,000 tons.¹⁶

Industrial demand from within the county was of marginal significance. Salt manufacturing, which was the principal industrial coal use on the Forth, was represented in only a few locations in Ayrshire and even in the second decade of the 18th century, the county's saltworks accounted for less than three per cent of sales of Scottish marine salt.¹⁷ For the most part, Ayrshire's growing manufacturing sectors, primarily textiles, had little or no use for coal fuel at this stage in their development. Lime burning had been carried on

in the 16th century and perhaps continued thereafter but this activity hardly appears to have been widespread.¹⁸

There was some intensification of coal mining activity in the second half of the 17th century, on the Eglinton estates in the 1660s,¹⁹ by Robert Cunninghame of Auchenharvie at the Saltcoats end of his Stevenston properties from 1686,²⁰ while in the same year Irvine Town Council embarked upon an attempt to exploit their municipal mineral reserves.²¹ There are other examples. These efforts were undoubtedly inspired by the growing demand for coal from Ireland, and Dublin in particular, although at both Saltcoats and Ardrossan one cannot ignore the building of saltpans, which is indicative not only of the lack of alternative outlets for smaller pieces of coal but also of the favourable market circumstances for Scottish salt which Scotland's Parliament and Privy Council had created by their imposition of restrictions on the import and use of 'Bay' salt.²² There is no evidence, however, to suggest that these developments were other than small scale and often short-lived affairs. Virtually the sole exception is the colliery at Saltcoats. No Ayrshire coal mine in this period produced anything like the quantity of coal which Nef claimed for the Forth collieries such as Tulliallan which in 1679-80 alone put out 15,000 tons.²³

Indeed, in the light of this evidence, Professor Nef's suggestion that 25,000 tons of coal was mined in Ayrshire in the 17th century seems exaggerated. To cut his figure by half would be entirely reasonable.²⁴

ii c.1700-1760

It was during the first decades of the 18th century that Ayrshire's coal mining industry diverged most sharply from that of the rest of the country. As far as the Scottish coal mining industry was concerned, it was a period in which there was 'little in the way of fundamental change... either in the circumstances of supply or demand.'²⁵ Overseas exports from Scotland's major Forth-side collieries had been sharply reduced in the late 17th century²⁶ and decades of intensive mining of the coastal coal deposits was raising fears about the exhaustion of available reserves.²⁷ The Scottish

economy was in a depressed condition in the first decades of the 18th century and any population increase which did occur may well have been replacing earlier losses.²⁸

In sharp contrast, a sizeable proportion of Ayrshire's hitherto little worked coalfield was to be found near to the coast and within shipping distance of Ireland where market circumstances were extremely favourable. Ireland's population, aided by large numbers of immigrants, was rising relatively fast in the late 17th and first half of the 18th centuries.²⁹ In Dublin there was a large and growing urban market for coal which provided Ayrshire's coalmasters with an outlet which may have had an even greater potential than was Edinburgh for their Midlothian counterparts.³⁰

Such opportunities did not go unnoticed in Ayrshire from where there was a five-fold increase in coal shipments between the 1690s and the 1730s. A peak however was reached in that decade and shipments of coal, which had risen from their late 17th century level of around 3,000 tons to an annual average of 12,000 tons plus in the 1720s, and perhaps a little higher in the early 1730s at least,³¹ fell to an annual average of less than 10,000 tons in the 1750s.³² In this trade Ayrshire was virtually alone within Scotland; in 1744 for example 97% of Scottish coal sent to Ireland originated in Ayrshire.³³

The rapid growth of the industry in Ayrshire and its increase in shipments, largely from Saltcoats, caused deep consternation in west Cumberland. At Whitehaven the Lowthers had long been established in the Irish market upon which their colliery sales were almost wholly dependent.³⁴ Sir John Lowther's agent, John Spedding, reported in February 1723 that the Scots were 'getting away our Trade' and that there were few people 'but think it will be the ruin of this town (Whitehaven) in a few years time.'³⁵ They had good reason to be concerned, as the most significant downturn in coal exports from the Lowther collieries in the years from 1690 to 1750 coincided with a period of intense activity at Saltcoats. While other factors might have contributed to Lowther's short-lived difficulties, the fact that he commissioned several reports on Saltcoats colliery and even

considered buying out his northern rivals suggests that Lowther took the threat from Scotland very seriously indeed.³⁶

The existence of such a buoyant market — at one time it was reported to be three times what could be supplied — had a marked impact on the industry of Ayrshire. If the stagnation of the rest of Scotland's coal mining industry is indeed reflected by the slow spread of the Newcomen engine north of the border,³⁷ then its good health in Ayrshire is reflected by the existence of at least five steam engines in the county by 1750.³⁸ Although it is not clear that it was actually completed, plans were well advanced for the construction of a waggonway to take coal from Fergushill in Kilwinning to Irvine harbour in 1725.³⁹ Even if it was never laid, that it was projected in the first place is a matter of modest importance given that recent research has shown that the first known and unfulfilled scheme belonged to Bo'ness thirty years later.⁴⁰

This more or less continuously growing market offered opportunities to those who were able to sell coal to shipmasters engaged in that trade at considerably higher prices than those available within the county itself. Several attempts were made by Ayrshire landowners and their lessees to enter the ranks of coalmasters supplying Ireland. But such ventures were of short duration and invariably ended in failure.

Even during the highly successful 1720s, there appear to have been relatively few collieries geared to the Irish market and as in the late 17th century it was Saltcoats colliery in Stevenston parish which stood above them all. Other collieries which were shipping coal for export were to be found at Coalhill (Ardrossan), Fergushill (Kilwinning), and Miln-quarter and Milrig, which were near Ayr.⁴¹ According to Peter Walker in a report compiled for Sir James Lowther in 1723, most of the county's coal was going from Saltcoats harbour, principally from Stevenston colliery but also from William Miller's Coalhill pit. Two-thirds of that quantity was going from Irvine, principally from Fergushill colliery, which had the drawback of being three miles from the shore. Ayr's collieries languished in third place, restricted in part by 'an old Pier out of Repair' and the poor quality of their

sulphurous coal.⁴² Confirmation of Saltcoats' pre-eminence is to be found in W. H. Makey's work⁴³ which in turn gives further credence to John Spreull's claim of 1705 that the harbour had '50 or 60 Small Barks and Ships', most of which were engaged in carrying coal.⁴⁴ Even by the middle of the 18th century the situation had not altered to any extent, with Ayr's contribution to the county's coal exports being less than six per cent,⁴⁵ the rest going from the Irvine precinct, and most of that from Saltcoats.

The impact of the Irish market then, in this period, was less widespread than is sometimes assumed; indeed it is worth noting that each of the county's early steam engines was erected in the Saltcoats/Stevenston area. Also, it is important to place Ayrshire's total colliery sales to Ireland in perspective. In 1750 the Lowthers alone sold 118,000 tons, almost twelve times Ayrshire's total for transportation across the Irish Sea.⁴⁶ Great strides had been taken forward within Ayrshire but these have to be measured carefully against both the volume of coal which continued to be put out, often in far less spectacular ways, from Scotland's collieries elsewhere, and the pace and scale of increase which marked the Lowther enterprises in west Cumberland.

For the rest of the Ayrshire Coalfield the period c.1700-1760 was one of only slight and small-scale advance. Modest price increases from the late 1730s⁴⁷ may be an indication of strengthening domestic demand but the scattered distribution of the population continued to act as a disincentive to anything other than token investment in the inland parts of the county. Even proximity to a larger urban centre such as Kilmarnock was not a guarantee of a sufficiently strong market. A lessee of Dean colliery complained that while there was a shortage of coal in Kilmarnock he could only get 1p per load whereas his more favourably sited counterparts, who could sell at the ports, could get twice that figure.⁴⁸ The distinction between those who could transport their coal to the coast, and the rest, is best exemplified by a comparison of the leases of the inland Kilbirnie colliery and its coastal counterpart at Fergushill. In 1721, the tacksman of the former paid £240 Scots per annum for the right to employ four hewers. At Fergushill, Provost William McTaggart paid

£2,000 Scots for twenty hewers, a considerably higher rate per man. The difference was explained by the fact that in the Kilbirnie area, 'Neither Ye coal nor ye Sale is so good as in other places.'⁴⁹

Rising prosperity in places such as Irvine, whose population may have increased from 1,000 to 2,900 between 1709 and 1750,⁵⁰ did stimulate colliery development in their localities. At Dalmellington in 1755, for example, the inhabitants themselves financed the sinking of a pit from which it was hoped to supply local needs.⁵¹

While there were some signs of increased coal consumption by the industrial sector, this continued to lag far behind the east coast where it has been claimed that the Forth salt-works alone consumed 150,000 tons of small coal at the turn of the 18th century.⁵² Even by mid-century, when Ayrshire's saltmaking capacity had been increased with the addition of pans at Turnberry and Saltcoats, it is unlikely that total coal consumption was in excess of 2,500 tons.⁵³ Other sources of industrial demand are not only hard to find but it is also difficult to put a finger on their likely coal consumption. While J. H. G. Lebon's claim that 'only domestic and craft manufactures existed in Ayrshire by 1750' may be exaggerated he was not too far wide of the mark.⁵⁴ Coal-using industries were rare and it is not certain that the growth of brewing and distilling, best exemplified in the former case by the establishment of the 'publick brewerie for ale' in the Citadel of Ayr between 1733 and 1735,⁵⁵ had any impact on the coal mining sector.

iii c.1760-1840

This was a period of major advance for the Scottish coal mining industry. It was largely inspired by rapidly rising and increasingly intense domestic and industrial demand and involved the resolution of the critical problems of an inadequate supply of labour and the need to pump water from the deeper coal seams.⁵⁶ Ayrshire shared in this advance and indeed faced similar problems. However, there was an important difference. It was in this period, and particularly the second half of it, that the Irish connection

made its deepest and most permanent marks on the coalmining industry and indeed the wider pattern of industrialisation in Ayrshire.

There is a good deal of evidence which points to a resurgence of interest and activity in the coastal collieries in the early 1760s. In the short run the immediate inspiration may have been a sharp rise in the price of coal in 1761, while in the longer run a remarkably high rate of population growth in Dublin in the early 1760s⁵⁷ may have been acting to strengthen the market for coal there. Whatever the reason there can be no doubting its effect. At Stevenston Robert Reid began a search for colliers who had absconded in 1759, on the grounds that they had had no work for months,⁵⁸ and leased the colliery to Alexander Crawford. Mungo Smith of Drongan purchased parts of an old steam engine from Reid⁵⁹ thus suggesting that he was in the process of developing his mineral resources. In 1762 Irvine Town Council set down two shanks on the common green, motivated by 'The sudden and excessive rise in the price of Coalls'.⁶⁰ A little later, in 1764, Newton-Upon-Ayr Town Council agreed that they too should attempt to re-enter the ranks of coal proprietors and diverted town funds for this purpose.⁶¹

There were, as in the previous period, many failures. Indeed of the ventures mentioned above only one, that of Mungo Smith, is known to have maintained production for any length of time. However, in spite of the intense problems which faced potential coalmasters there is no doubt that the county's coal shipments to Ireland did begin to recover after 1761, which was apparently the worst year since the early 1700s.⁶² By the 1790s, when annual average shipments from Scotland were 43,000 tons, of which Ayrshire could claim around eighty-five per cent, there had been a ten-fold increase in coal shipments over the very early eighteenth century levels.⁶³

While there was an increase in the number of collieries supplying coal for shipment to Ireland in the later 18th century, Stevenston colliery continued to stand head and shoulders above the rest. Seasale averaged 9,000 tons annually in the four years from 1780 to 1783,⁶⁴ which is

almost half of the total quantity which left the county's ports in 1784,⁶⁵ the nearest comparable year.

The ascendancy of Stevenston and its harbour of Saltcoats did begin to be challenged before the end of the 18th century. Ayr which for so long had done little to invalidate its description as 'a fine Beauty in Decay' began to make inroads into the Irish coal trade, which her share of the county's coal shipments rising from 4.22% in 1764 to 35.77% ten years later. A resurgence of activity in the Irvine vicinity thereafter caused Ayr's share to fall to just over a quarter of the total by 1794⁶⁶ but even so this should not detract our attention from the major developments which took place at Ayr, with the well-known construction of waggonways from local pits to the harbour⁶⁷ and the erection of steam engines by people such as David Dick, at Newton in 1767,⁶⁸ and John Beaumont who in 1770 erected at Blackhouse a 'great fire engine' which he followed with at least one and probably two more later in the decade.⁶⁹

But it is still necessary to place the achievement in its wider context. It was not until the 1790s that the volume of coal shipments began to equal those which had been attained by the Forth coal exporters a century beforehand,⁷⁰ when their trade had been significantly reduced before it entered a period of sustained depression. Furthermore Ayrshire's share of the British-Irish coal trade was only a relatively modest 10%.⁷¹

Although there were impressive increases in the output of coal for Ireland in the late 18th century — there had been a virtual doubling of the quantity shipped between the 1780s and 1790s for instance — it was in the first decades of the 19th century that the most spectacular increases in the volume of tonnage exported to Ireland took place. This development was intimately bound up with a major shift in the relative position of the county's ports, including the demise of Saltcoats and the construction and rise of altogether new harbours, at Ardrossan and Troon.

Unfortunately, we do not have the same quality of data for the early nineteenth century as we have for the eighteen-

th. In 1811, William Aiton estimated that 90,000 tons of coal may have been going to Ireland from Ayrshire,⁷² which is more than double the 1799 figure. Professor Duckham and W. H. Makey have both shown that even greater totals (in the region of 153,000 tons) had been reached by 1816 and 1825.⁷³ In this last year the county's share of the British-Irish coal trade was around twenty-five per cent, a remarkable improvement upon the 1790 share of 10 per cent.⁷⁴

On the supply side this increase was made possible by the opening up of inland pits most of whose coal was taken by a growing network of waggonways,⁷⁵ especially those to the new ports of Ardrossan and Troon, upon which work had begun in 1806 and 1808 respectively. As early as 1818, customs officials at Saltcoats were becoming concerned about the quantity of unrecorded shipping that was leaving the unfinished port of Ardrossan which even then was described as 'a safe and commodious Harbour and is accessible at all times of the Tide.'⁷⁶ By 1820 one-third of Stevenston colliery's shipments were going from Ardrossan, in spite of the additional costs of transporting coal there.⁷⁷ The construction of a railway added to the port's effectiveness, so that in 1836 60,000 tons of coal was carried there by rail from the Earl of Eglinton's pits in Kilwinning.⁷⁸ Saltcoats harbour became of little consequence.⁷⁹ At Troon similar if not greater progress was made with the construction of the well-known Kilmarnock and Troon waggonway,⁸⁰ which was augmented by branches,⁸¹ and carried 70,000 tons of coal to its port in 1839.⁸² By the end of our period, in 1840, approximately 345,000 tons of coal was being shipped from Ayrshire's ports,⁸³ with the vast bulk of that going from Ardrossan and Troon to Ireland.

Domestic demand too increased after 1760 and most of Ayrshire's inhabitants became regular users of coal fuel. Rapid population increase, growing urbanisation which created concentrated markets for coalmasters, and rising incomes, justified the opening of pits where coal had previously been unworked and where the inhabitants had often relied on peat and turf for fuel. In some parishes however, it was not until late into the 18th century that this shift was effected. The writer of the Fenwick contribution to the *Statistical Account*

noted that the demand for coal was of relatively recent origin, a development which seems to have been inspired by the growing commercial awareness of the farmers who 'thought it more profitable to use coals than to spend time in summer at the moss, and have only a few (peats) for summer use.⁸⁴ It was well within living memory that the inhabitants of Darvel and Newmilns had found their sales of waggonloads of peat adversely affected by the opening of the Countess of Loudoun's colliery nearby.⁸⁵

Care should be taken not to overstate the intensity of domestic demand within Ayrshire itself. It was, on occasion, insufficient to justify the commercial exploitation of known coal reserves. In the Cumnock area for example those deposits, which in the middle and later 19th century were to produce a substantial income for their owners, were in 1804 reported to be 'wrought only on the surface by digging holes and drawing water till the quantity wanted was obtained',⁸⁶ and much of this was taken to the Dumfries House hot-houses. Local demand in Muirkirk, prior to the arrival of the ironwork company there in 1786, was allegedly satisfied by the quantity of coal which could be 'picked out of the crop by one coalier, who was employed one month of the year without the aid of any machinery.'⁸⁷

While larger inland collieries could be found in the later 18th century, these were usually also blessed with additional markets for their output. The role of the lime burning industry here is critical. The colliery at Loudoun, where a steam engine had been fitted, supplied five local lime kilns as well as the small populations of the villages of Darvel and Newmilns.⁸⁸ A steam engine had been erected on a pit which employed a dozen miners in Kilbirnie, and there too a great deal of lime burning was carried on.⁸⁹ In locations where the coalowner could sell his output in the Irish market there are indications that no great importance was attached to the needs of the local inhabitants. At one colliery near Kilmarnock, for instance, when there was no coal 'on the hill' domestic purchasers 'made application to have coals wrought for them' and 'gave an extra hire out of their own pockets to the colliers.'⁹⁰ Where collieries did have an outlet to the sea this was sound business practice for it was in that direction

that the greatest quantities could be sold at prices which were higher than those obtainable within the country. At the Westfield pits belonging to Stevenston colliery for example in the period from 1770 until 1783, 591,290 loads were sold for seasale while less than seventeen per cent of that quantity found a market locally⁹¹ — and Stevenston parish's population was one of the fastest growing in the county in the second half of the 18th century.⁹²

While it is entirely likely that total domestic consumption increased in the years between the compilation of the first and the second Statistical Accounts of Scotland, when the county's population more than doubled from around 75,000 to 164,000,⁹³ even by 1841 it is still fairly clear that demand from this direction exerted, in the main, only a modest influence on the industry's structure. Most pits which were confined to this market remained small and technologically unremarkable. Even Kilmarnock, which was the county's biggest town in 1841, consumed only 25,000 tons of coal produced within its parochial limits.⁹⁴ In terms of population, and therefore potential demand for coal, Ayrshire's major towns, Kilmarnock (20,000), Ayr (8,300) and Irvine (5,200) were in an altogether different league from Glasgow (275,000), Edinburgh and Leith (166,000) and even Aberdeen and Dundee (both 63,000).⁹⁵ Although only a minority of the population was concerned, there were at least eleven Ayrshire parishes whose ministers recorded that peat fuel was still being used in the country areas in the 1840s.⁹⁶

In some parishes and certainly at particular collieries, the impact of industrial development was often substantial. Nowhere was this more apparent than in the case of the iron industry whose voracious appetite for coal revolutionised coal production in the vicinity of the ironworks established at Muirkirk (1786) and Glenbuck (1796).⁹⁷

Within the space of a decade this 'Desart and Inland Place' was to become one of the county's single most important coal producing districts. The 26,000 tons which the furnaces required in 1796⁹⁸ was roughly the same quantity of coal which was then being shipped to Ireland from Irvine and Saltcoats. Demand from the county's iron-

works however is unlikely to have increased much in the first four decades of the 19th century; both Muirkirk and Glenbuck experienced major difficulties and indeed the latter works closed permanently in 1813.⁹⁹ The establishment of furnaces at Cessnock and Dalry in 1838 and 1839 respectively marks the beginning of a major new phase in the history of both the county's coal and iron industries.¹⁰⁰ Within the period foundries were established, in the 1790s, at Ayr, Irvine, and Kilmarnock,¹⁰¹ thus adding to the weight of the industrial sector's demand for coal.

Although not so spectacular in its effect on any one locality, the lime industry, to which reference has already been made, did have major significance for the lateral development of the coalfield. Indeed it was demand from this sector which, argued Lebon, 'rendered permanent working profitable in inland parishes.'¹⁰² There is no good reason to doubt his judgement. Ayrshire's heavy clay soils benefited from heavy applications of lime, and indeed William Aiton claimed that more of that fertiliser had been spread in Ayrshire in the decades preceding 1811 than 'in any district of the same extent in Great Britain.'¹⁰³

In 1829, when interest in liming was still booming, it is possible that the county's agricultural lime needs were in the region of 353,000 tons,¹⁰⁴ which, at a ratio of coal to slaked lime of 1:4, indicates that coal consumption might have been 88,450 tons, or at least twice the quantity that was then being used by Muirkirk ironworks.¹⁰⁵

There were, of course, other industrial coal users, although without exception these were relatively insignificant and in some instances, short-lived. Tar making for instance was introduced in Muirkirk, Stair, and Tarbolton parishes, but what little evidence we have suggests that production was often interrupted and indeed only carried on for any length of time at Muirkirk, whose forty-five kilns were finally abandoned in the 1820s.¹⁰⁶ Potters too were active in Ayrshire, although in this case sustained growth came only when tile draining began to gather momentum amongst the county's farming community. It was not until 1838 that the *Ayr Observer* could report that tile-works 'have risen up like

mushrooms in every quarter.'¹⁰⁷ Salt manufacturing continued to expand until 1823 when the duties which had protected it from English competition were repealed, but uneven production levels and advances in fuel productivity make it extremely unlikely that it ever took more than 4,000 tons of coal per annum.¹⁰⁸

In the final analysis, Ayrshire's economy and society were still rooted firmly in agriculture. Kilmarnock, the county's leading industrial town, derived one-third of its manufacturing income from textiles in the 1790s¹⁰⁹ and none of its industries required significant quantities of coal.

Most manufacturing elsewhere in the county was carried on in small hand, horse and water powered units. The large cotton mill at Catrine was certainly atypical — and while steam power was used there,¹¹⁰ in 1827 two water wheels were added, each capable of producing 120 h.p.¹¹¹ Though Kilmarnock was to become a major engineering centre in the later 19th century, it was not until 1827 that the first steam engine was built for a factory there.¹¹²

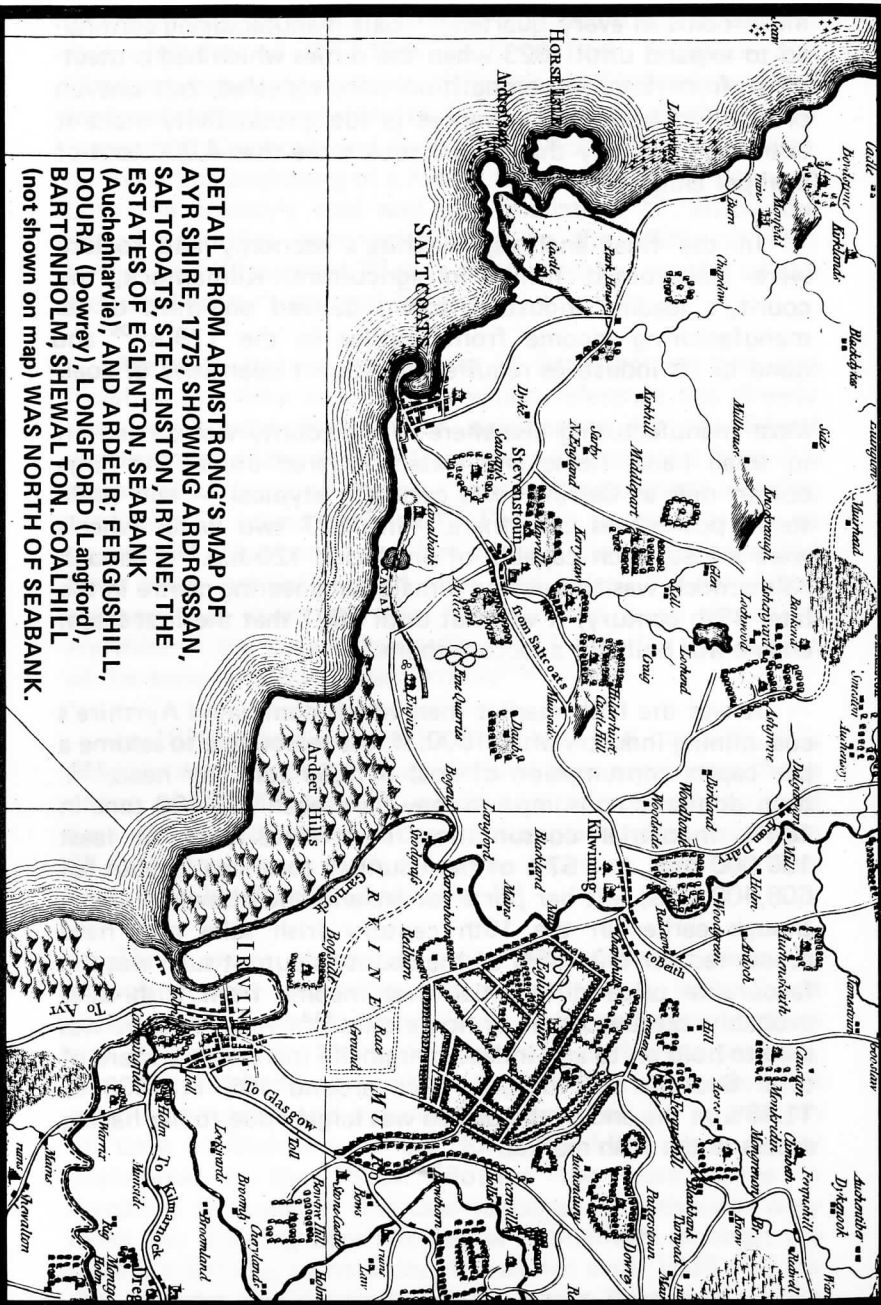
It was the Irish market then which dominated Ayrshire's coal mining industry after 1800. If it is reasonable to assume a per capita consumption of coal of 0.69 tons per head,¹¹³ then domestic consumption may have been 113,400 tons in 1841. Industrial consumption must have been at least 150,000 tons, but 57% of the county's total coal output (of 608,400 tons) left her ports for Ireland and elsewhere. Even though earlier in the 19th century Irish sales may have accounted for only 36% of the county's output such was the favourable price differential that income from Irish sales probably exceeded that of home sales.¹¹⁴ That Ayrshire was able to hold on to and indeed marginally increase her share of total Scottish coal output, from around 10% in 1800 to 11.48% at the end of the period was largely due to her having access to the Irish market.

By 1840 Ayrshire was well on the way towards becoming one of Scotland's major coal mining regions. But that growth had not been — as some economic historians tend to imagine — inevitable. Indeed it did not take place anywhere near to the rates which might have been expected. Ayrshire's contribution to the Irish coal trade remained rather small — less than ten per cent throughout the 18th century with the exception of the 1720s and a short-lived challenge to Whitehaven's ascendancy.¹¹⁵ Why should Ayrshire's contribution remain so low for so long as it did? And how are we to account for the marked fluctuations which marked the Ayrshire-Irish coal trade? The most rapid increases in Dublin's coal consumption in the 18th century took place in the 1740s, 1750s and 1760s, yet on average the annual shipments from Ayrshire in the 1760s were about a thousand tons less than they had been in the 1720s. Even though exports rose from a trough whose bottom was reached in 1761, by the years 1779 and 1780 shipments were not far above the level they had been in the 1750s. Sustained growth came only in the 1790s, which saw a doubling of exports over the previous decade and after which sales to Ireland grew more or less continuously.¹¹⁶

Another feature which emerges from an examination of Ayrshire's 18th century record is the remarkably high failure rate amongst the entrepreneurs who entered the industry. Examples of coalmasters who continued to supply the Irish market for more than five years at any one time are exceedingly difficult to find in the period before 1780. No Ayrshire coalmaster came anywhere near to matching the profit levels attained by the major Whitehaven collieries whose driving force, Sir James Lowther, died in 1755 the 'wealthiest commoner of his generation.'¹¹⁷

Yet, as we have already indicated, the Irish market, with its high prices, buoyancy and continued expansion, was one of the most favourable in the country. This perception is not based solely on hindsight. Ayrshire was seen by a number of contemporaries as an exceptionally fine location in which to enter the coal mining industry. Admittedly, Peter Walker was

DETAIL FROM ARMSTRONG'S MAP OF AYR SHIRE, 1775, SHOWING ARDROSSAN, SALTCOATS, STEVENSTON, IRVINE, THE ESTATES OF EGLINTON, SEABANK (Auchenharvie), AND ARDEER; FERGUSHILL, DOURA (Dowrey), LONGFORD (Langford), BARTONHOLM, SHEWALTON. COALHILL (not shown on map) WAS NORTH OF SEABANK.



talking about the possibilities of the Stevenston area when he said, in 1723, that 'it would be the finest place for a Lasting Colliery' he had ever seen,¹¹⁸ but feelings not far removed from these can be found amongst others who looked elsewhere along the county's coastline and its immediate hinterland. 'What vast Sums of Money' asked the Glasgow merchant John Spreull in 1705, did Dublin 'and many parts of Ireland . . . lay out upon Coals?'¹¹⁹ At the other end of the century, the coalmasters of the Forth looked enviously at Ayrshire, noting, with an element of exaggeration, that 'it is well known that the Irish market affords an infinitely higher price' than could be obtained in the east.¹²⁰

The lure of Irish gold brought a wide variety of prospective coalmasters to Ayrshire. Not surprisingly, it was landowners who formed the single most important category of entrants to coal mining in the 18th century. Indeed they accounted for 39% of a random sample of those involved in 52 new colliery undertakings in the 1700-1800 period.¹²¹ But the majority of new entrants to the industry came from other backgrounds.¹²² Invariably it was from the merchants, lawyers and others that the most striking advances — and failures — came.

At the major Stevenston colliery for example, aristocratic enterprise ceased to be of any direct significance after 1719 when the colliery was leased by Provost William McTaggart of Irvine, a shipmaster, and his partners.¹²³ Admittedly the Cunninghames of Auchenhavie, by draining their higher seams and constructing the harbour at Saltcoats, had made a major contribution. Stevenston had been transformed from 'a small village clachan of two three Houses' into a 'considerable village' under the period of their management,¹²⁴ but the debts they incurred during this first wave of development emasculated their reserves and left them powerless to carry on coal working.

The McTaggart-led partnership not only brought Scotland its first or second Newcomen engine but also marked the beginning of a long series of short-lived attempts to manage Stevenston colliery. Early in 1721, Daniel Peck and John Potter signed a 31 year lease of the colliery, harbour and

saltpans.¹²⁵ Peck was an Englishman whose earlier career suggests that he is best described as an 'adventurer' or a seeker of fortune for whom the hope of quick gain looked infinitely more attractive than the treadmill of accumulating wealth through the ploughing back of mercantile profits. This Chester-based merchant showed an early interest in the potential gains which were to be had from mineral exploitation, and was engaged in lead mining in north Wales in 1703¹²⁶ before he became the ore purchasing agent for the dubious 'Company of Mine Adventurers in England' in 1707. His mineral searches continued and brought him to Scotland and indeed he was credited with the discovery of a rich vein of silver in the Alva estate belonging to the Jacobite Sir John Erskine of Mar.¹²⁷ By 1719, he had returned to an earlier occupation of his, saltmaking, in Leven this time rather than England, but by 1720 he had apparently become aware of the prospects of shipping Stevenston coal to the Dublin market he knew well.¹²⁸ John Potter, his partner, from Chester-le-Street, was probably the more technically skilled of the two, as it seems probable that he came to Saltcoats in order to build or repair the engines there, and certainly, by 1724, he was the northern agent of the Proprietors of the Invention for Raising Water by Fire, who held the Newcomen patent and extracted rents from those who benefited from it.¹²⁹

Further testimony to the attractions of Saltcoats is found in the arrival in 1721 of Peck's well-connected son Philip 'of the City of London, Merchant'.¹³⁰ Prior to that, Anthony Robinson, Peck's son-in-law, had also joined the partnership. For a number of reasons, which will be looked at later, they were financially unsuccessful, but this relatively detailed survey of their background is justified by their achievement in raising output and sales to a level which worried the Whitehaven interest. That English capital was invested in the concern is confirmed by their working the colliery for some time after their effective failure, on behalf of creditors, who included Chambre Corker of Falmouth and John Jenkins, a London goldsmith.¹³¹

In 1728, the lease was transferred to Emmanuel Walker, the 'Collector at Newport Glasgow', a customs official whose interest in the concern did not extend beyond 1732 when the

colliery was back in the hands of the Cunninghames of Auchenharvie.¹³² Heavily indebted to their near neighbours, the Earls of Eglinton, the three heirs portioners (their brother Robert died in 1733) were forced to accept the appointment of John Cunninghame, a local shipmaster, as manager and factor of the colliery.¹³³ In spite of the 'Great Expence' of further investment there, which included, with the help of 23 Saltcoats shippers, the purchase of a further steam engine, in the five years from Candlemass 1732, sales 'Did not Clear the Expenses and on Coast of the said work.'¹³⁴

A period of mixed fortunes followed. The colliery did revert to the Auchenharvie estate in 1737 with the marriage of Anna to John Reid. Reid however was both a son of the manse and a merchant, so his contribution to the colliery, the addition of a fifth steam engine in 1747 and his achievement of a modest profit (largely dependent upon saltwork sales) of £3,236 between 1749 and 1761,¹³⁵ cannot be considered a 'landed' accomplishment. In 1761, the colliery was leased again, to Alexander Crawford, another Stevenston 'merchant' of uncertain typology.¹³⁶

'Enterprise, vigour and an open attitude to technical change' are characteristics of Robert Reid Cunninghame which have rightly attracted the attention of historians.¹³⁷ It was under his management that Stevenston colliery, after 1770, became one of the most technologically advanced in Scotland, with not only the addition of a great deal of steam pumping equipment¹³⁸ but also the cutting of the first canal in Scotland upon which coal was carried¹³⁹ and the construction of a short waggonway not long after he had made a close examination of the Duke of Portland's Troon railway in 1810.¹⁴⁰ Coal output was more than doubled under his ruthless direction and by the early 19th century, profits, between £1,500 and £6,000 per annum, were far in excess of those obtainable at the vast majority of Ayrshire or Scottish coal mines.¹⁴¹ Yet he was not a fully fledged member of Ayrshire's landed circle. Indeed it was this and that the proven rental of the Auchenharvie lands had been a miserable £405 Scots when his father had purchased the estate in 1756;¹⁴² which undoubtedly provided much of the financial, social and political ambition which drove him through a continually

active, accumulating life. By the time of his death in 1814, he had been appointed a Deputy Lieutenant of the county and road trustee, and had made extensive improvements to Seabank House and its policies. He owned a summer house on Arran. Born plain Robert Reid, he had in 1770 adopted the surname Cunninghame,¹⁴³ with all the prestige which the associations of that old Ayrshire lineage might bring.

It was not only at Stevenston that non-landed enterprise predominated. The Town Councils of Ayr, Newton and Irvine were all engaged in developing burghal minerals at some stage. Especially instructive is the case of the 'Undertakers of Coal at Alloway' in which council and town united in 1728 to search for, mine and sell coal both locally and for export. The largest body of subscribers were the merchants (23 in all) with the rest of the share capital coming from a variety of local sources such as surgeons, customs officers and even the town's two schoolmasters, one of whom was John Moor, 'Master of the English School'. Only one landowner, Sir John Whiteford, was listed.¹⁴⁴ It was a combination of municipal and mercantile enterprise which led Newton-Upon-Ayr's move into the industry in the 1760s.¹⁴⁵ Again, although John Campbell of Wellwood was the leading partner in the coal firm of James Montgomery and Company,¹⁴⁶ who leased Newton colliery from 1769, his estate ownership should not conceal the fact that his occupation was that of a physician who in 1766 had become a partner in the well-known firm of Ayr wine merchants, Alexander Oliphant and Company.¹⁴⁷

Outwith the town lands in the vicinity of Ayr, the most vigorous responses to the opportunities and challenge presented by the Irish market came from persons whose background and experience were very far removed from those of Ayrshire's older landed families. That Ayr began to ship growing quantities of coal after 1760 is largely due to the activities of immigrant coalmasters. The major Blackhouse colliery for example was opened and managed by John Beaumont from around 1770. The estate itself had been purchased by Robert Alexander, an Edinburgh merchant.¹⁴⁸ Beaumont was originally from Newcastle — indeed he brought coal miners from there to Ayr — but had mining

interests in Scotland on the Forth where he was a partner with William and John Cadell in Grangepans colliery, saltworks and ironstone mines.¹⁴⁹ Beaumont's arrival in Ayrshire was significant in that he brought not only additional mining expertise, but also connections with Carron ironworks (via his relationship with the Cadells) with whom engine repairs could be effected, and most important of all, knowledge of waggonways, presumably acquired in Newcastle, which led him to attempt to resolve local coal transportation difficulties by constructing 3,150 yards of track from the pits to the harbour.¹⁵⁰ As in the case of so many hopefuls before him Beaumont was soon bankrupted (by 1781) and in spite of Alexander's continued funding of his efforts, these were not enough to save the estate from being offered for sale in 1784.¹⁵¹

There was however a link between this episode and one of the county's few 18th century examples of major business achievement. One of the lawyers who had been involved in resolving the dispute between Beaumont and his creditors, which included the equally unsuccessful bank of Douglas, Heron and Company,¹⁵² was John Taylor, W. S. It was probably through his connection with this case that he was tempted to enter the coal mining industry in Ayrshire. In 1786 he was certainly one of the 'company of Edinburgh gentlemen' who took over the then defunct Newton colliery.¹⁵³ In 1787 the Ayr Colliery Company bought the Blackhouse estate. Again the inspiration came from the Irish market — as is seen by the Company's erection of two reflecting lights on the north side of the river in 1789, to assist collier boats to find the harbour at Newton-Upon-Ayr.

Taylor himself died in 1810. He had presided over a remarkable period of expansion from his Newton collieries, whose output increased from an annual average of around 1,200 tons in the three or four years prior to 1786, to over 25,000 tons in 1808,¹⁵⁴ thus making him responsible for one of the county's largest mining enterprises. At his death Taylor owned not only Blackhouse, valued at £57,376, but also Nethermaines near Irvine as well as a share in Kilwinning's Redstone colliery. He had been made a freeman of the burgh of Newton-Upon-Ayr.¹⁵⁵ His sons John and George had

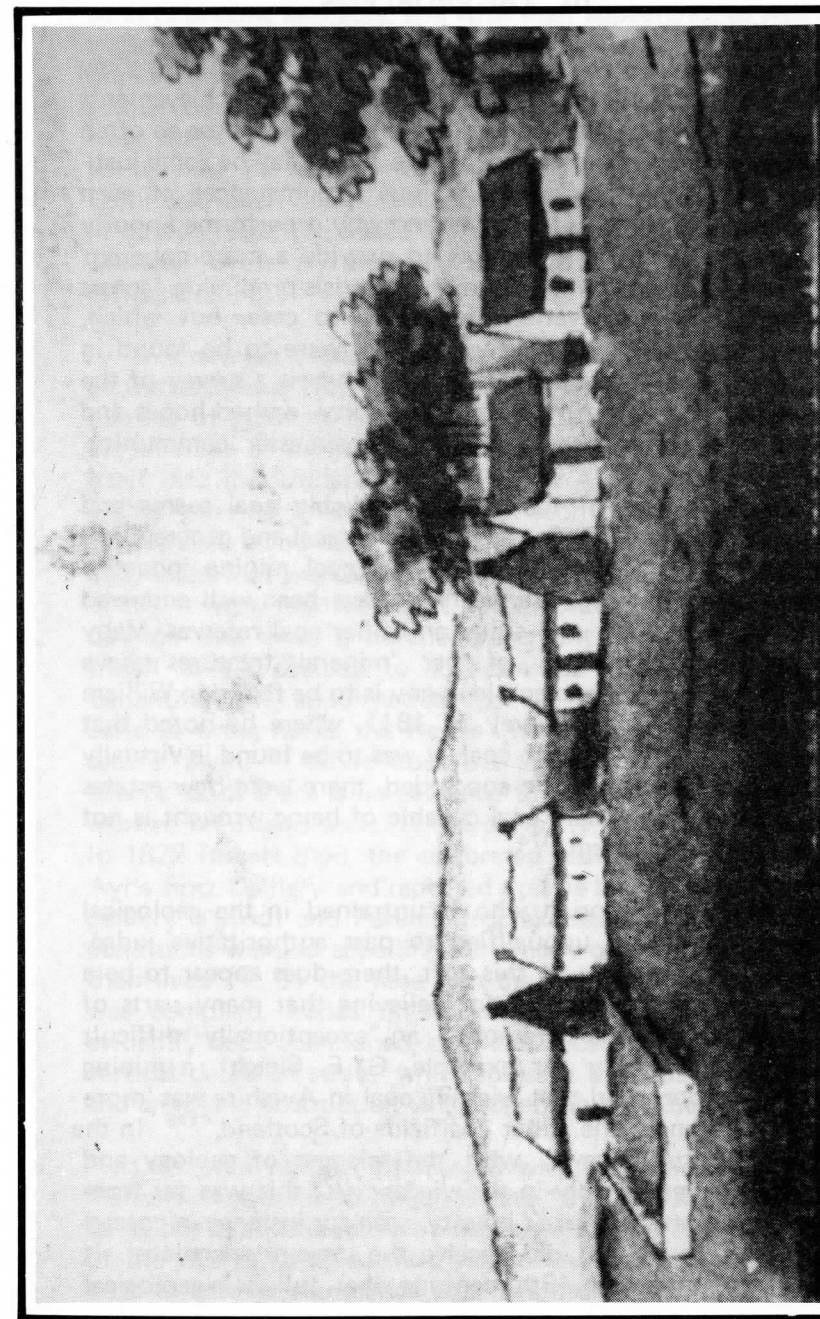
assisted in the expansion of family interests in north Ayrshire, with leases of coal at Bartonholm and Doura. They remained in the industry after 1810, and invested heavily in new pits and equipment including waggonways from their Bartonholm and Shewalton collieries to Irvine in 1811 and 1814 respectively.¹⁵⁶ By 1840 the various mines belonging to John Taylor Gordon's Ayr Colliery were responsible for putting out around 100,000 tons of coal.¹⁵⁷

These brief sketches of some of Ayrshire's 18th century coalmasters and their achievements have rightly emphasised the direct risk-taking role which was adopted by the non-landed sectors. It would be wrong however to conclude that landed enterprise was non-existent. To some extent the lack of landed involvement in the Irish coal trade can be explained by the paucity of coastal coal-bearing estates. There were attempts to move coal to the coast; the Earls of Dumfries (Marquesses of Bute after 1803) had tried this but found that their soft coal could not withstand the punishment which road transport inflicted upon it.¹⁵⁸ And of course there are many examples of the existence of coal mines on inland estates.

While it is possible to find a number of east coast examples of vigorous landed colliery enterprise,¹⁵⁹ in Ayrshire, there is the strongest support for Professor Duckham's view that the 'risks of mining very early persuaded some landowners that it was a game most safely played from the touchline.'¹⁶⁰ Indeed there are indications that some were reluctant to let the game go ahead at all, except under the most restrictive rules. The long-established Earls of Eglinton for instance were rarely in the forefront of the county's mining industry in the 18th century though Susanna, Countess of Eglinton, and wife of the 9th Earl, may be something of an exception to this rule. Indeed in the early decades they demanded extremely high rents compared to their neighbours for the restricted number of hewers who were allowed to work in the pits.¹⁷⁰ Of course there were real fears that known reserves would be exhausted if no constraints were placed upon lessees. Even so the failure to work two Fergushill pits in 1798 as 'they were intended for the use of the House of Eglinton' may be indicative of a too careful

husbanding of resources:¹⁷¹ it is worth speculating whether it was the Earl of Eglinton who earned a mild rebuke from the minister of Kilwinning parish in 1792 when he remarked that while there was 'great plenty' of coal there, the high price and scarcity was 'owing entirely to its not being wrought.'¹⁷²

What follows in the final section of this essay suggests that their caution may have been partly justified. Certainly it was not until the later 18th and early 19th centuries that large-scale landed capital and involvement in mining coal for sale in the Irish market was in evidence, with the 4th Duke of Portland's expenditure of £100,000 at Troon and that of a similar amount by the 12th Earl of Eglinton at Ardrossan.¹⁷³ Was this, one wonders, an indication of a new wave of landed entrepreneurial zeal, or perhaps a reflection of the knowledge that the wide range of difficulties which had crippled so many earlier enterprises had been overcome by those who had in less propitious times borne the risks which often accompany the trailblazer?



LONGFORD — showing what are probably colliers' houses beside the farm. From Eglinton Estate Plan Book, 1789.

III. THE PROBLEMS

Having surveyed their backgrounds and sketched in some of the main features of the coastal coalmasters' achievements it is now time to turn to the question of why these so often failed to match expectations. While there may be some justification for looking at the unique circumstances of each colliery in order fully to understand why it performed poorly or indeed failed, it is possible to provide a more coherent analysis by identifying a number of crisis-producing factors whose significance varied from case to case, but which, regardless of their relative weighting, were to be found in almost every instance. What follows then is a survey of the principal causes of frustration, difficulty, dashed hopes and indeed failure amongst Ayrshire's coalmaster community.

The business of identifying workable coal seams and assessing and overcoming adverse geological and geographical conditions lies at the heart of the coal mining industry. Ayrshire, at first sight, appears to have been well endowed in both the extent and situation of her coal reserves. Many optimistic descriptions of her 'mineral treasures' have survived. As good an example as any is to be found in William Aiton's *Agricultural Survey* of 1811, where he noted that Ayrshire 'abounded' with coal. It was to be found in virtually every parish; 'Indeed', he concluded, there were 'few estates of great extent, where coal capable of being wrought is not found in part of them.'¹⁷⁴

While the historian who is untrained in the geological sciences is clearly unqualified to pass authoritative judgments on comments of this sort, there does appear to be a great deal of justification for believing that many parts of Ayrshire's coalfield presented an exceptionally difficult challenge. Recently for example, G. E. Sleight, a mining engineer, concluded that winning coal in Ayrshire was 'more difficult than in the other coalfields of Scotland.'¹⁷⁵ In the 18th century however, with the sciences of geology and mineral surveying only in their infancy,¹⁷⁶ this was far from obvious. Hints of nature's bounty, seen for instance in coastal outcrops, could and did deceive the unwary speculator. It was not until the 19th century that full-scale geological

surveys became available, and with their appearance as well as a generally greater knowledge of what the business of coal mining involved, a mood of realism began to replace the former heady optimism. Many of the contributors to the *New Statistical Account* reflected this change. 'The whole parish may be said to rest on coal' it was noted of Old Cumnock, but a qualification followed immediately, 'though, in many places, the seams are troubled and unworkable.'¹⁷⁷ Thirteen other Ayrshire parish ministers reported similar difficulties.

In a number of parishes, great hopes had been entertained in the 17th and 18th centuries.¹⁷⁸ In Ayr, there had been a number of attempts to find and mine coal prior to the meeting of forty of the town's leading inhabitants which formed itself into the 'Undertakers of Coal at Alloway' in February 1728.¹⁷⁹ In the following eighteen months trial shafts were shifted on a number of occasions but, in spite of the assurances that workable coal would be found, late in August 1729, it was reported that 'the workers give it as their opinion that there is no encouragement to go further' after which it was decided to abandon the search, with David Ballantine being appointed to 'go out to the shank with his carts to bring home the Ropes . . . picks, Wedges etc so to secure them.'¹⁸⁰ While coal was eventually found in the town's lands there is no evidence to suggest that it was ever worked on a large scale. It was certainly never easily mined. In 1822 Robert Bald, the celebrated coal 'viewer', inspected Ayr's Fort Colliery and reported that he had 'not seen in any colliery a Roof and Pavement so exceedingly bad' and that conditions were so appalling that 'many of the workmen lose their lives.'¹⁸¹ By the time that the *New Statistical Account* was compiled, hopes of working coal in the burgh had evidently been abandoned, not least because of the 'dikes, or vertical detached strata' which 'present the most formidable and annoying obstruction to the operations of the miner.'¹⁸²

One of a number of reasons why Ayr's export performance was so poor for much of the 18th century must then lie in the relative scarcity of workable coal on the south side of the river Ayr. Over the river at Newton, coal was found both in greater abundance and in a more favourable condi-

tion. But there too natural obstacles left their mark on the pace of the industry's development. In June 1765, the Town Council had agreed to continue funding a search for coal in their lands as there was 'a very promising Prospect' of finding it.¹⁸³ Yet, early in May of the next year it was clear that while coal had indeed been discovered, its successful exploitation had not got underway as the managers had been unable to control the inflow of water into the seams. By itself this was not a crucial factor. Much investment and a number of partnerships over a period of twenty years eventually led to the resolution of the problem of excess water, 'the principal adversary of the coal miner',¹⁸⁴ but clearly its existence did determine the speed at which the exploitation of burghal minerals could take place. By 1832, Newton's two coal seams were exhausted.¹⁸⁵

It is Stevenston colliery however which provides the best example of the limitations which natural obstacles could place upon a colliery's operations. Here the problems associated with intrusive dykes and other disturbances to the coal seams were compounded by the colliery's low-lying shoreside situation where both sea water and sand proved to be constant and sometimes victorious enemies. For a time, from 1686 until the second decade of the 18th century, Robert Cunninghame's one-and-a-half mile long adit was sufficient to drain the higher parts of the Auchenhavie possessions. In order to maintain the indeed expand production however, it became necessary to sink deeper and to mine beneath the lower parts of the estate.¹⁸⁶ By 1719, it was clear that a crisis was developing, and Robert's son James, who was then responsible for the colliery, was advised to obtain assistance in 'providing the Fire Engine and getting more horses to keipe downe the watter.'¹⁸⁷ Sir James Lowther was informed by his gleeful agent John Spedding that Peter Walker, the engineer who had been working on the steam engine which Provost McTaggart and his partners had purchased, had decided to remain in Whitehaven and that 'the Scotch will be distressed for want of him their Coal being near to an End unless they get their Engine speedily forward.'¹⁸⁸ The erection of a series of Newcomen engines provided some short term relief, but it appears that the early models were not powerful enough to dry this 'wet and

slavish' colliery for long, although their existence clearly accounts for at least some of the success which was achieved in the 1720s. The difficulties and heavy costs of keeping the pits reasonably dry were added to by both the seepage and intruding of sea water. In 1721, Peck and Potter met their first major setback when 'there happened a very Great Inundation occasioned by a violent storm'¹⁸⁹ which not only held up production but also caused the partners considerable financial losses. 'Double Damms 6 foot high' were then erected in order to hold back further intrusions from the sea, although these were by no means permanent as new 'fences' had to be put up in 1728.¹⁹⁰ Although output does not appear to have been materially affected, in January 1796, six coalminers were drowned when a spring tide 'overflowed into the pit mouth', the watchmen it was alleged, 'having found the charms of the alehouse' too powerful and left their posts.¹⁹¹

At nearby Ardrossan operations were never conducted satisfactorily. The coal from one pit was described as 'a black skailly substance good for nothing'. Water from Stanley burn, as well as that from the sea, could be managed neither by water engines nor horse gins. Even saltmaking, which relied on the poorer quality coals, was not carried on continuously.¹⁹²

Sand, which in parts of the Stevenston/Saltcoats vicinity was later found to be 63 feet deep,¹⁹³ was not only extremely difficult to sink pits through but also made overland transportation of coal a much more time-consuming, laborious and costly job, even where the pits involved were not far from the shore. It was this difficulty which had inspired Robert Reid Cunninghame to make cuts through the heavy sand at Ardeer to float coal to the collier vessels at Irvine and Saltcoats. The problem was not confined to Stevenston. In 1777, there was a similar difficulty transporting coal through the sands of Prestwick to the salt pans, from Dr. John Campbell's Newton colliery.¹⁹⁵

While recognizing that natural difficulties made coal mining a precarious and unpredictable business, elsewhere as well, one is acutely aware that obstacles which could sometimes be overcome in other coal producing regions continued to act as a drag upon development within Ayrshire.

We have already argued that large-scale colliery operations were virtually unknown in Ayrshire prior to the late 17th century. The consequence of this was that Ayrshire lacked, to a far greater extent than was the case in Scotland as a whole,¹⁹⁶ mining expertise at every level of the colliery hierarchy. While there were some coalmasters on the east coast, such as the 6th Earl of Mar or the Clerks of Penicuik, who had sufficient inherited and observed expertise to enable them both to risk expanding their undertakings and to advise their neighbours how best to proceed,¹⁹⁷ those charged with managing Ayrshire's coal mines, especially in the first decades of the 18th century, had to learn their business alone and often at great cost.

The 17th century exception was undoubtedly Robert Cunninghame, whose exploits we have already noted. He did not pass on his skills to his son James, who was tactfully advised in 1719 that 'it can't be supposed that your skill and judgement (however good in other things) can be exact in managing so dangerous a Coal worke' and that he should hand over control to others.¹⁹⁸ That the colliery at Stevenston was severely constrained by the absence of skilled management was recognised by Provost McTaggart's partnership which tried in 1720 to persuade Peter Walker, the engine builder who eventually went to Whitehaven, to manage not only their steam pumping equipment but also the colliery. It was a relief to John Spedding that he did not remain in Scotland for as they had 'no body amongst them that understands such of those affairs' he would have been a 'great means' of establishing a threat to the Lowther empire.¹⁹⁹ Other reports on Stevenston colliery amongst the Lowther papers confirm this picture of an enterprise desperately in need of coalmining skills. Walker himself was convinced that the mineral wealth of the Stevenston/Saltcoats area had gone unrecognised by the Scots who he said, 'were very Ignorant of Collierys and discourag'd from proceeding by any little difficulty'. The problem was by no means confined to the northern part of the county. The 'Undertakers of Coal at Alloway' were frustrated in their attempts to find a sufficiently experienced grieve to look after their operations, and even when they did find Andrew Caldwell, lately of Craufordston coalwork, accusations of slackness and his

inability to control the men, either in terms of work-rate or cost, led to his removal after barely one month's employment.²⁰⁰ No-one else was any more successful.

Although the situation improved it was by no means resolved by mid-century, and the vast majority of lessees appear to have been men of no previous mining experience. This was evidently a source of comfort for Christian Unerigg who had begun to mine and ship coal to Ireland from north-west Cumberland in the second half of the 1750s, and who was aware of the potential threat which the Scots would pose 'when they grow more able and cunning to manage their Collieries'.²⁰¹

The arrival of English expertise in the shape of John Beaumont at Blackhouse in 1770 marked a new departure in coal mining in the Ayr vicinity. The Cadells were unhappy with his 'trifling' commitment at Grange on the Forth,²⁰² which is partly explained by the amount of effort, skill and capital which he invested in Ayrshire — inspired no doubt by the prospect of supplying Robert Alexander with at least 30,000 tons of coal per annum, largely for sale in Ireland.²⁰³ As has been reported earlier, his efforts bankrupted him and on his demise only half the anticipated quantity of coal was produced from Blackhouse, but nevertheless his introduction of English colliers (whom it was claimed he mostly employed) and his construction of waggonways were at least useful additions to the county's colliery and associated stock. Although he was no longer there in 1789, Blackhouse was then estimated to have been supplying nine-tenths of the coal shipped from Ayr. This is not to argue that English enterprise and skill alone lifted coal mining in the Ayr district from its former relatively gloomy situation — to do so would be to ignore the efforts of the Town Councils, Dr. John Campbell, and others who came later — but it does underline the scarcity of native talent. It is not without note that the successful coal mining operations of John Taylor were also managed by an Englishman, William Renwick.²⁰⁴

By the later decades of the 18th century, Ayrshire was generating more of its own stock of able mineowners and managers. Into the former category come people such as

Mungo Smith of Drongan and Robert Reid Cunninghame. Amongst the latter was Charles Sherriff, sub-factor to the 10th Earl of Eglinton between 1759 and 1761, and coal manager during the 1760s.²⁰⁵ In 1770, he became the manager of the Muirhouse and Shewalton Coal Company,²⁰⁶ which had access to enough capital to be able to purchase a steam engine for the colliery, and which survived until the 1790s.²⁰⁷ That local smiths and wrights were being called upon to evaluate colliery equipment, and that some of them increasingly bore the title of 'engineer' is an indication of increased expertise.

Thus far our discussion of the limitations which marked Ayrshire's coal mining personnel has dealt almost exclusively with owner-managers, their immediate subordinates, and lessees. It is to the question of the lower ranks that we turn now, and particularly to the hewers of coal rather than to the other ranks within the mining hierarchy which make up the 'oncost' element within colliery accounts and include functionaries such as gatesmen, redsmen and so forth.²⁰⁸

That there was a chronic shortage of coal mining labour in Scotland for most of the period under review has been well established by other authors.²⁰⁹ Ayrshire suffered in this respect. Although the lessees of Stevenston colliery during its period of rapid expansion in the early 18th century did manage to double their labour force, there were said to be 'Several pits laid dry . . . W^{ch} may be carried down to two Several valuable Coals' but which could not be worked 'for want of Coaliers'.²¹⁰ At Kilmarnock's Dean colliery (admittedly further inland) a labour shortage held up progress in 1744,²¹¹ while in 1779 such was Robert Reid Cunninghame's desperation for colliers that he re-employed several men who he had banished 'forever' four years earlier on the grounds that they had been at 'the bottom of all Combinations'.²¹²

The consequences of such shortages should be studied with a full understanding of the collier's role in the operation of a colliery in this era. His serf-like status belies the scope and importance of his function in an age when 'scientific' knowledge of how working underground should proceed was either non-existent or limited to very few mining employers.

Even east coast mineowners, for instance, were often dependent upon the judgment of their colliers in making decisions about where working should take place and in what manner it should be conducted.²¹³ It has already been noted that it was the workers' opinion that a further search for coal would be pointless which had precipitated the cessation of mining operations by the 'Undertakers of Coal at Alloway' in 1729. Clearly, in Ayrshire, where there was only a limited tradition of coal mining it was important for coalmasters to acquire not only colliers, but colliers who were experienced enough to compensate for the lack of systematic understanding of the industry possessed by its leaders. It was the scarcity of knowledgeable labour at all levels which drew from one observer the reflection that if Sir James Lowther was to lease Stevenston colliery he should only do so if this was a long one as it would be necessary to 'introduce amongst them the Art of working Collierys to much greater perfection than they are yet Masters of'.²¹⁴ Thus it was appropriate that the Pecks should have tried to augment their labour force from other mining districts of Scotland, and, given the labour shortage and the upward pressure which this had on wages, there may have been some justification for George Lockhart of Carnwath's complaint that the 'West Countrie' collieries had become what he described as 'receptacles' for 'deserters' from his own and other Lanarkshire mines nearby.²¹⁵

The bottleneck in the supply of coal miners was not overcome, in Ayrshire or in Scotland as a whole, until the early 19th century.²¹⁶ In Ayrshire, as has been hinted at, one consequence was that pits were either unopened, or developed more slowly than might otherwise have been the case, or, as at Stevenston, unworked altogether. Indeed there was hardly a colliery in the period under review which was not affected in this way at some stage.

Another common consequence of the shortage of labour in Scotland's coal mines was its marked effect on the related issues of wages and rewards, control of output and work experience, and the methods by which these matters should be resolved between employers and employed. One Scottish historian has rightly referred to Scotland's 'very unservile

serfs'²¹⁷ and indeed nowhere is the apparent ambiguity of this situation better seen than in Ayrshire. Peter Walker, in his report on 'The Collierys at Saltcoats' (which were mainly in Stevenston parish), referred to the 'severe Laws' without which the colliers, who were very 'Ignorant of their business & turbulent in the Tempers', would have been 'hard to deal with'. But in spite of the existence of the burgh's barony court in which 'mutinous' workers could be punished, other evidence reveals that a framework for ongoing organised collective bargaining had become well established. It is worth reporting what was said in full:

The Prices for Cutting and Delivering the severall Coals on the Bank are Settled and Regulated with the Coaliers as well as the Charge of Carrying the Coal to the Sea.²¹⁸

Acting together in a way which closely approximates Professor Hobsbawm's widely-known concept of 'collective bargaining by riot', the colliers not only negotiated with their masters but also achieved significant advances in their wage rates. They were able to take advantage of their scarcity during the period when attempts were being made to expand output and indeed managed to increase the daily rate for cutting and bearing from an average 1/8d Scots in 1715 to 2/1d Scots in 1723.²¹⁹

These monetary gains were not permanent. What limited wage data there are suggests that hewing rates had returned to their 1715 levels by 1733, which may well in part be a reflection of a downturn in the colliery's fortunes.²²⁰ Wage rates and the intensity of industrial conflict which existed on the coalfield depended to a great extent upon the location of the colliery, the difficulty of the seams, the prevailing demand for coal, and whether or not the mineowner wished to expand output. Thus, wage rates were invariably higher at coastal collieries than their inland counterparts. Labour, where it was organised, was also stronger in those collieries which were close to the sea, or where there was a particularly active local demand. The speed, manner and price at which the search for coal at Alloway was conducted in 1728 and 1729 was largely determined by the workers. In April 1728, it was deemed necessary to find a decent overseer who would

'keep the workers att work' and 'take ane Exact Account of the time' that they went into and then left the shank. In February 1729, bad weather and 'want of Men to Work' put a temporary halt to the operation. By May, rising costs had forced the managers to consider paying the men by the fathoms sunk rather than on a day rate, but, it was reported, 'the Workers would not undertake to dig under Sixteen Pounds Scots p fathom' and any change was deferred until they found a sub-contractor, Robert McCracken, who was prepared to agree to piece rates. For reasons which are not stated, but may be inferred, day rates were being paid again less than two months later.

That Scottish coal miners in the 18th century were able to obtain higher wages than most of those paid outside the industry is well-known.²²¹ It is also fairly well established that those obtainable in Ayrshire were comparable with Scotland's other mining districts.²²² Indeed at times of expansion they may have exceeded those payable elsewhere, although their doubling over the course of the 18th century²²³ indicates that in the long-run they conformed with the national experience. What is also clear is that Scottish miners' wages were higher than those paid to their English counterparts.²²⁴ That this was so may have been of little consequence for, say, the coalmasters of Midlothian who had a virtual monopoly of the rising market for coal in Edinburgh, but it was a matter of the greatest importance for Ayrshire's coastal coalmasters that their workers could command Scottish wage rates when they were competing in the Irish trade with coal mined by English colliers. Just how far relatively high wages and the power which collectively organised labour could influence over the direction of a colliery slowed or restricted the growth of the Ayrshire industry in the first six decades of the 18th century is difficult to assess. What is beyond dispute is that it was perceived by many coalmasters as a major obstacle which would have to be removed if output was to be expanded for sale at competitive prices.

While customary or established working relations and patterns were continued at many collieries, there were instances where masters appeared to be prepared to attempt

to break with tradition and take the managerial initiative. In 1749, for example, when a new grievance was appointed at the Eglinton's Millburn pit, it was alleged by the workers that he had cut the hewing rates to the extent that they had to work like 'Severest Slaves' for 14 hours a day, six days a week in order to make a living wage and pay for the upkeep of their tools and candles.²²⁵ This, it was claimed, exhausted them to the extent that 'when they come up they are so faint that they can scarcely keep hold of the rope'.²²⁶ What is significant is that they left the work collectively to appeal not only to their landed mistress, Susanna, Countess of Eglinton, but also sought justice by submitting their grievance to the 'independent view' of neighbouring coal grieves and indeed coal miners. Their plight received little sympathy, certainly from the Countess, who demanded that each individual sign a disclaimer in her presence, and from the grieves, including John Cunninghame of Saltcoats, who jointly declared that the colliers were being paid the going rate for 'shoar coal' and that allowances for difficult conditions should be made at the discretion of the manager.

By the later 1760s, it appears that a crisis of major proportions was beginning to develop in labour relations at Ayrshire's coastal collieries. It was of course a period of renewed hope for this sector of the industry, well reflected in Galt's Reverend Micah Balwhidder's reflection that in 1765 mining in the Irvine area was no longer viewed as a 'gowk's errand'.²²⁷ There are clear signs however, at this stage, that organised labour was exercising enough power within the industry to damage seriously the interest of coalmasters with expansive ambitions. The root of the problem, it was thought, by a growing number of coalmasters both within Ayrshire and elsewhere, was 'the stigma of slavery' and the laws which served to restrict the entry even of 'free' miners.²²⁸ George Glasgow was both an Irvine coalmaster and a fervent advocate of reform of the existing legislation, and so his evidence must be treated with caution, but even the frustration and venom which his language reveals is instructive. The Earl of Eglinton, he reported, owned a valuable colliery which he had given up in 1766 on the grounds that its profit potential was reduced to almost nothing by 'a set of vagabonds' who 'rarely worked above 2 or 3 days a Week . . . & if they only worked 2 days they received their full perquisites

of fire Coalls . . . & a Weekly imposite or Charge called onCost & that each of them had from a shilling to half a crown whether they had done anything for it or not.'²²⁹ He claimed it was not uncommon for colliers, to 'bring masters to their terms', to leave him to 'Draw watter with his Horses, and keep the Clicks men and watermen Attending for several days in a week and that for weeks together'. The men had 'a Judge or Judges in every Coalierie', who could call meetings to discuss grievances, after which 'they all go in a Body or some times send a Deputation of two or three of the greatest vagabonds to Insist on their demands.' In spite of the labour shortage, in 1775 Robert Reid Cunninghame and his partner Patrick Warner had felt compelled to dismiss three colliers on the grounds that they had allegedly prevented 'the Coaliers from putting out more Coals than what came to two shillings a day, And in inflicting severe fines when any of them, exceeded that Stint', amongst other offences, which included 'neglecting the safety of the work' and 'preventing all in their power Foreign Coaliers coming to the work, Besides having the assurance to direct the Master, whom to appoint for Oversman, Engineman, etc.'²³⁰

It would be wrong to claim that the movement for the freeing of the labour market in the Scottish coal industry began in Ayrshire or that the weight of the county's political interest was strong enough to have played much part in the eventual carrying of the Act of 1775 abolishing serfdom in collieries.²³¹ There is however enough evidence, which has hitherto gone unnoticed, to suggest that a good deal of the inspiration for the reform movement may have come from this county. There are also grounds for disputing Professor Duckham's view that the attainment of low wages was not a principal objective of the masters,²³² as far as Ayrshire's experience was concerned. In any case, what Duckham sees as the prime aim, the recruitment of more colliers, would almost inevitably have pushed wage levels down. The truth is that many Scottish colmasters, and certainly those at Ayrshire's coastal locations, wanted more, cheaper and less-effectively organised coal miners.

Before we do move to the central argument it is worth recording, for example, George Glasgow's opinion as to why

it was vital that his colliers' wages should be reduced by ending a system in which 'the Slaves in this Country . . . Continue to receive ten pence and a shilling for what the free men in England only receive 5 pence and sixpence'. Glasgow was aware of the competitive environment in which Ayrshire's seasale collieries operated, and argued 'that the smallness of the Export of Coal' was largely attributable to the relatively high wages which Scottish colliers were paid.²³³ In Whitehaven, he claimed, weekly wages did not exceed 7/- or 8/- for nine or ten hours of work per day, whereas the daily rate in Ayrshire was over 2/6d. It was the masters who were the 'Dupes and Slaves of their Coaliers', as was seen by their having to pay 'double and Triple the Wages for their work, that is performed by the Free Men in England'. Beneath the hyperbole is the realisation that wages costs would have to be reduced in coal mining, as, he claimed, they had been in the Glasgow and Kilmarnock shoe and saddle making trades, so that the Scottish product could compete in a wider market place.²³⁴ While wages may have been lower in Cumberland, closer inspection would have revealed that in spite of the existence of free miners there, labour shortages were still a major problem for coalmasters.²³⁵

It is to the vicinity of Ayr that we must turn in order to explore the possibility that there was a connection between the circumstances of Ayrshire's coal mining industry and the organised drive, which began in 1772, for a major change in the legislation relating to the coal miners. Given the small scale of mining operations at both Ayr and Newton-Upon-Ayr prior to the 1760s it is clear that attempts to open collieries and obtain significant increases in output would be likely to run into major problems of labour recruitment and control. Such a bottleneck did apparently manifest itself at Blackhouse in 1770. As has been indicated earlier, John Beaumont's response had been to bring in colliers from Newcastle. Beaumont himself had connections with Carron ironworks whose labour policies broke the 'cake of custom' in the east.²³⁶ Of equal importance is the fact that Beaumont, and his aggressive style of labour management, was linked with Robert Alexander, the owner of Blackhouse estate, and the latter's brother William, who had made arrangements for the sale of their coal at Ayr.

John Clerk of Penicuik, reflecting later on the 'Coaliers Bill', noted that the agitation had been begun by a group of people who had gone 'Coal Mad', thinking that it 'would be a good means of making Money' without appreciating the difficulties involved, including that of procuring Coaliers'. One of the most 'restless' of these new entrants to the trade was Mr. Wm Alexander then a Merchant in Edin^r.²³⁷ There can be little doubt that he was referring to Robert Alexander of Blackhouse's brother, William. It was the tension between, on the one hand, the pull of the Irish market and the hopes of Alexander and other that they could profit by selling in it, and on the other, the forces within Ayrshire which acted to inhibit the rapid exploitation of its coal seams, which may have helped to spark off the critical period of agitation for a change in Scotland's long-established coal mining labour laws.

Neither in Ayrshire nor in the rest of Scotland was the labour supply bottleneck broken through by the Act of 1775. Coal mining was seen as an unattractive industry by workers throughout Britain. In Ayrshire, periods of critical shortage continued to be resolved in ways we have already seen. In 1813, for instance, a queue of twenty vessels waiting for coal in Ayr harbour had allegedly inspired George Taylor of the Ayr Coal Company to send a man to 'entice' colliers from pits elsewhere. Taylor himself admitted that it was his custom to send 'his own servant with a horse and cart', to convey his new employees' belongings to Ayr.²³⁸ Indeed it was not until the arrival of the Irish in large numbers in the 1820s that the problem of labour shortage was effectively overcome.²³⁹

Disputes and strikes also continued to take place after 1775. Some appear to have been serious, such as that at Newton colliery in 1777, when 'differences' between Dr. Campbell and his colliers had led to some of them leaving while 'those that Remain put out little or no more . . . than serves to supply their two Engines.'²⁴⁰ There are indications however that there was a general strengthening of employees' resolve to inhibit labour's control of the productive process. Robert Reid Cunninghame's actions in dismissing three colliers in 1775 appears to have been partly an attempt to establish the principle that the owner or manager should

determine both who should be employed and who should direct operations, particularly underground. George Glasgow abandoned the right which his lease had given him to the lifelong servitude of a dozen or so colliers. His motive for doing so was clear. Ownership involved obligations from the master, whereas free labour was entitled to no rights, and had no income unless it was earned. Thus Glasgow claimed, 'I have at present 4 or 5 or the most Riotous fellows that was in Scotland . . . But there is no Man I have quieter than they are', for if they attempted to levy fines, or 'sett the works', 'he that comes first up, if he does not go down immediately, Must work no more.' It was little wonder that one of his colliers recalled 'what fine Days they had while the Earl carried on this Coalliery.'²⁴¹

How successful the masters were in their attempts to limit the effect of collective action is not clear. Work patterns, it appears, did become more regular, and customary rewards, such as the provision of drink on the completion of difficult tasks, were far less common. The fact that miners' wages rose markedly in the last two decades of the 18th century, as they did elsewhere in Scotland,²⁴² is perhaps an indication that coalmasters were unable to exercise much power here. Further legislation was passed in 1799, the main intention of which was to suppress combinations amongst coal miners.²⁴³ That the climate of industrial relations was perhaps becoming more overtly hostile may be demonstrated by the increasing tendency amongst the employers to enlist the support of the law, where previously matters were far more likely to have been resolved at pit level. In January 1822, for example, several 'putters' (who shifted coal underground) at the Saltfield pit, part of Taylor's Ayr Colliery enterprise, resisted the introduction of 'contracters' who had agreed to work more cheaply than those on day wages, by tying the new men's feet together and throwing them head-first into a corf. On the same day as the alleged offence, they were incarcerated in Ayr Tolbooth, charged with assault and illegal combination.²⁴⁴ Nine colliers from Fairlie colliery were imprisoned in 1828, on the grounds that, by striking, they had been in breach of their contracts.²⁴⁵ Indeed the picture of the Ayrshire coal mining industry in the early 19th century, from those sources which are currently available, is

one of an increasingly grim and bitter struggle between masters and their employees.

Thus far our examination of the factors which may have inhibited the expansion of coal output from Ayrshire for sale in Ireland has been concerned with those which were common to each of the county's coastal collieries, although their impact was not similar in every case. One major and perhaps too easily overlooked problem, and one which had very specific local effects, was the condition of the county's harbours. That Saltcoats harbour was superior to Irvine's which in its turn far surpassed that at Ayr, in no small measure accounts for the differences in the relative fortunes of the collieries in the immediate hinterlands of these three places. Related to the question of the condition of Ayrshire's harbours is that of the shipping trade and the power which the coal shippers could exert on the county's coalmasters and especially upon the prices at which coal was purchased from the latter.

The construction of the harbour at Saltcoats in the 17th century, an integral part of Robert Cunninghame's expansionary programme, was an important turning point in Ayrshire's economic history. Saltcoats, in the mid-17th century, had comprised a few houses on the shore road, whose inhabitants had been predominantly fishermen.²⁴⁶ At the end of the century it had become the county's major coal exporting port. While the county's overseas trade was expanding in the second half of the 17th century, neither the volume nor the direction of this was sufficient to encourage improvements at the formerly dominant port of Ayr, which was seriously affected by the loss of French markets, a development which was exacerbated by the outbreak of the French wars in 1689, which further disrupted her trading links.²⁴⁷ While there may be good reasons for doubting the extent of the poverty which the Scottish burghs reported in 1692, the description of Ayr's harbour as 'ruinous'²⁴⁸ carries a great deal of strength as far as its suitability for shipping coal was concerned.

There is no readily obvious reason why those English observers of the threat which Ayrshire's coal industry pre-

sented to Whitehaven in the 1720s should have deluded themselves as to the state of their rival's abilities to ship coal to Ireland. Peter Walker, for example, reported that Ayr's pier was old and 'out of Repair' and 'no Ships can go there but in Summertime', while at Irvine the harbour was safe but 'it is difficult getting over the Barr'. Saltcoats on the other hand was 'capable of holding 30 Sail of Ships, has 10½ or 11 foot water at a spring Tide, is well secur'd & may be further Improv'd with a Moderate Expence'.²⁴⁹ For virtually the whole of the 18th century, coalmasters in the vicinity of Ayr paid the price of that burgh's longstanding inability to fund harbour improvements. Irvine's coalmasters found that the sand, which Thomas Tucker in 1656 had noted 'the Western Sea' beating into the harbour mouth, placed them in a less favourable competitive position vis-a-vis those who could ship coal from Saltcoats.

It was at Ayr that the drawbacks of inadequate harbour provision were most obvious. The inaccessibility of the harbour during the winter months meant that they were unable to share in the rich rewards which shipment to Dublin during that season could bring. During the summer months Dublin was frequently glutted with coal,²⁵⁰ and consequently only the lowest prices could be obtained. Dr. John Campbell's frustration is clearly reflected in a letter he wrote to William Alexander of Blackhouse in 1770:

We have seen some Seasons, Two months together, when not a Vessel could be got out of the Harbour . . . In every Winter there are weeks together when none can be shipped: and indeed the Bulk of it must, and will of Necessity be shipped in Summer . . .²⁵¹

Campbell was convinced that there was a large market for coal, but would only agree to take 25,000 tons from Blackhouse since any more would overstretch the capacity of the wharf.²⁵² Improvements did follow, but in order to move his coal from Ayr early in the 1790s Mungo Smith of Drongan claimed he had to sell at 9/—, which was 3/— per ton less than similar coal could fetch at Irvine.²⁵³ Although the price differential was reduced, in 1798 the overseer of Blackhouse colliery had to admit that Saltcoats coal could fetch more in

the Irish market, although there was 'little difference in quality' between the two.²⁵⁴

The condition of the harbour was only one aspect of the shipping problem. The trade in coal from Scotland to Ireland was in the hands of the masters of the vessels who carried it across the Irish sea.²⁵⁵ It was they who could largely determine which ports to carry coal from, and, in the absence of organised selling practices amongst Ayrshire coastal coalmasters, what price they would pay for it. One of the many problems which the Cunninghames of Auchenhavie had to overcome, in the early 18th century, was a combination of shipmasters with whom the 9th Earl of Eglinton was involved. What the nature of this connection was is not clear, but certainly by 1719 James Cunninghame was being advised to get the shippers of Irvine to 'end their contract with my Lord Eglintoune' and get them on his side.²⁵⁶ The struggles which Sir James Lowther had with the shipmasters at Whitehaven had an indirect effect on Ayrshire in both 1728-9 and 1734. Faced with a price rise in 1728 they had refused to take Lowther's coal and instead turned to Scotland, which may in part account for a small increase in the quantity shipped in 1729,²⁵⁷ while in 1734 Sir James Lowther informed John Spedding that there was an 'abundance' of coal arriving in Dublin from both Scotland and Wales, compared to what had been the case three or four years beforehand, and that this was 'owing to the Combination at White'n which will never be forgot in our own time'.²⁵⁸

Sir James Lowther had begun to make determined efforts to break the shippers' grip of the coal trade from 1728, by buying shares in vessels.²⁵⁹ It was not until the 1790s however that Ayrshire's coalmasters began seriously to challenge the Scots shippers. Robert Reid Cunninghame's accounts show that he was receiving dividends from small shares in eight vessels by 1796. Later on he justified this action on the grounds that vessels had been going 'to other ports to load, even at the same prices, in order to distress Stevenston colliery',²⁶⁰ while two years later he observed that some of the shippers had considered the colliery 'an Appendage . . . and that the price was to be at all times regulated as it might answer their purpose'.²⁶¹ Although he does not appear to

have had a majority holding in more than one vessel, the 'Industry', the cries of protest from the shipmasters, including the charge that 'Mr. C. wishes to monopolise the whole carrying trade' and 'distress those that have been so unfortunate to have embarked their Capital in the Trade', suggests that he had gone a long way towards shifting the balance of power in his favour.²⁶² Indeed he admitted that he was able to charge 1/2d per ton more than the Irvine coalmasters. The existence of the bar there necessitated the loading of ships by lighters, which cost money for wages and provisions while the ships waited off Irvine for their coals.²⁶³ Cunninghame was not alone in tightening his grip on the sale of coal from Ayrshire in Ireland. William Taylor, for instance, son of John Taylor of Blackhouse, had extensive mercantile connections in Dublin, and employed his own ships in a two-way trade with Ireland, sending coal westward and bringing back grain, other commodities, or simply cash.²⁶⁴

Another difficulty was the relatively small carrying capacity of the average vessel engaged in the coal carrying trade. While Philip Peck could boast that thirty-three vessels belonged to Saltcoats in 1723,²⁶⁵ a figure which compared favourably with Workington, their average burden was 66.60 Dublin tons, with only one vessel, the 'Jean', of over one hundred tons. At Whitehaven, there had been thirty-nine vessels of over one hundred tons as early as 1702.²⁶⁶ Not only were the Scots vessels smaller, but unlike the 'floaty' custom-built collier ships favoured by Sir James Lowther, which drew little water in relation to their carrying capacity, the Scots' ships were invariably drafted in from other purposes, including, on occasion, fishing.²⁶⁷ The size of vessels engaged in the Scottish-Irish trade did become markedly larger in the last two decades of the 18th century,²⁶⁸ and Ayrshire's coalmasters did begin to exert considerable pressure on the shippers in the 1790s.²⁶⁹

Clearly, much of the weakness associated with Ayrshire's coal shipping provision was because of a shortage of overhead capital. How far the growth of the industry itself was restricted by a shortage of other forms of capital is an extremely difficult matter upon which to pass a definitive judgement. There are examples to be found where either lack of further

investment funds or short-term credit appear to have been the immediate cause of the difficulties or indeed the failure of an entrepreneur or partnership. It was said to be 'want of money' which drove the Pecks into leaving the Stevenston/Saltcoats area, and indeed Philip Peck was apparently jailed for a short time in 1726 'on acc't of Scots Bank notes'.²⁷⁰ It was cash difficulties which brought John Beaumont's activities at Blackhouse to a halt in 1781, and, after a brief resumption again in 1784. Indeed the vast bulk of Court of Session records which relate to Ayrshire's collieries in the 18th century represent the actions of creditors who sought to obtain some recompense from coalmasters who found themselves in straightened circumstances. This, however, should not be interpreted as a lack of credit. On the contrary, it is an indication that it had been fairly readily available but perhaps unwisely granted.

In fact a notable feature of both of the collieries mentioned above is the extent to which capital had been invested in them. In their first two years at Stevenston the partnership led by Daniel Peck spent over £1,670 on a new steam engine, refitting old pits and improving saltpan capacity.²⁷¹ Judged by Scottish standards this was a huge investment when many small collieries could be won for 'as little as £60-£75'.²⁷² Yet, as we have seen, there did exist, at that colliery, problems which no amount of capital investment in that period could overcome. Similarly at Blackhouse, Beaumont had not spared himself in equipping the colliery with expensive capital equipment. While the fact that Blackhouse's colliers were not being paid their full wages at the time of Beaumont's final demise points to a shortage of circulating capital — and this was undoubtedly in short supply — there is not enough evidence to suggest that lack of capital was a major deterrent either here or for the potential coastal coalmaster elsewhere in Ayrshire. What can be said is that in the last quarter of the 18th century, when of course some of the former restrictions on the industry's growth had been or were in the process of being removed, the application of large sums of capital over several years could and did produce high returns, as the examples of Robert Reid Cunninghame and John Taylor demonstrate — and this was in an era when Scottish colliery profitability was thought to be generally

poor.²⁷³ While Professor Duckham is inclined to take a more optimistic view of this matter, the evidence from Ayrshire for the first three-quarters of the 18th century provides strong support for Robert Bald's judgement that, 'upon the whole, there has been more loss than gain.'²⁷⁴

There were other, less tangible ways in which it can be said that Ayrshire, certainly in the first decades of the 18th century, was an inhospitable environment in which to embark on major coal mining ventures. Even in the wealthier northern half of the county, where some signs of agricultural improvement had been evident in the 17th century, the lands in the vicinity of Saltcoats/Stevenston were 'very little' enclosed, and would, it was reported in 1724, require several years attention 'so as to make provision for keeping a good Number of Horses in winter, W^{ch} is a thing they take very little care of'.²⁷⁵ The provision of feed for horses was of course critical if horse-gins were to be used for either pumping, winding or hauling coal. This was clearly recognised by John Hamilton of Bargany in 1761 when his coal was let along with grass for three gin horses, with hay in winter.²⁷⁶ While this particular problem was removed as extensive agricultural improvement got under way from the mid-18th century, the coalmasters' dependence on hired part-time farmer-carters left them vulnerable to the needs of the agricultural calendar as coal transportation was brought to a halt for weeks during the spring and harvest seasons. A regular supply of horses and carts was a useful addition to a colliery's stock, as William Robertson, a lessee of Fergushill colliery, had recognised, arguing that they had given him an advantage at Irvine, because while 'shipmasters prefer Shewalton coal to the Fergushill coal, yet, as they would be supplied with it more readily, they have taken mine rather than be detained waiting for the other.'²⁷⁷ The unreliability of the part-time carters, and their relatively high cost, were amongst the factors which encouraged Robert Reid Cunninghame to cut a canal as well as to provide his own horses and carts.²⁷⁸ Poor transport facilities, as well as the lack of local manufactures, caused problems for the undertakers of Coal at Alloway who had to send to Glasgow for a 'roap', which a month after it had been ordered, had not arrived in Ayr, 'Occasioned', it was minuted, 'by the Badness of the weather and the want of Carriers for these two weeks.'²⁷⁹

In the light of these circumstances then, it is hardly surprising that Ayrshire's coalmasters were unable to achieve more than a small proportion of the market for coal in Ireland for so much of the 18th century. Conversely, the achievements of Robert Cunninghame and the Pecks in the late 17th and early 18th centuries respectively, appear all the more remarkable. While measured against those leaving Whitehaven, Ayrshire's coal shipments may have been modest, they were such in the period c.1760-1784 to make Irvine (including Saltcoats) the second most important port in Scotland, in terms of tonnage shipped outwards.²⁸⁰ Most of that was coal. Indeed Dr. Cochran has calculated that just under ninety per cent of the ships which cleared Irvine and Ayr were carrying coal alone.²⁸¹

POSTSCRIPT

In the decades leading up to 1840 it was the existence of Irish demand which largely determined the location of most of the county's major collieries and inspired many of the outstanding entrepreneurial responses within the coal mining sector. Both directly and indirectly it had a marked impact upon the pattern of urban settlement and growth. In 1791, for example, Ardrossan had been a predominantly agricultural parish, whose 1,412 inhabitants were scattered especially thinly near the coast. Between 1801 and 1831, during which time the harbour was partly constructed, its population increased from 1,800 to 3,500. The rate of increase in Dundonald parish (which included the new coal port of Troon), was even more noteworthy, rising from 1,200 to 5,600 in the same period. This represented an increase of 367%, at a time when the county's population increased by 72%, and that of Scotland by 47%. Even in Stevenston parish, where coal mining had long been carried on, renewed activity there in the second half of the 18th century underlay what was almost a doubling of the population between 1755 and 1791, with a further increase from 2,400 to 3,500 by 1831.²⁸² Growth was not uniform. Reverend Dr. Peebles of Newton-Upon-Ayr estimated that he was responsible for 1600 'souls' when he first arrived there in 1778, but that 'For some years afterwards the number rather decreased, owing to the failure of the coalworks.'²⁸³ In some parishes, coal mining, or the establishment of facilities for shipping it, encouraged other sectors, such as shipbuilding and ropemaking, thereby diversifying and strengthening their economic base.

Whilst the output from the inland collieries was growing, it was not until around 1840 that parishes outwith the reach of Ayrshire's ports began to experience the effects of expansion. The twin thrusts of the railway and the iron industry 'revolutionised' the distribution of the county's collieries.²⁸⁴ Muirkirk, the sole remaining representative of the 18th century iron industry, was joined by other works. These were Cessnock at Galston (1838), Blair at Dalry (1839), Glegarnock by Kilbirnie (1840, Kilwinning (1844), Lugar by Auchinleck (1844), Nithsdale at New Cumnock (1845),

COALHILL from Eglington Estate Plan Book, 1789.



Dalmellington (1846), Hurlford by Kilmarnock (1846), and Ardeer at Stevenston (1852). By 1854, their combined furnaces were consuming around 747,000 tons of Ayrshire's coal.²⁸⁵

Low mineral prices and royalties in Ayrshire, added to a growing fear of their exhaustion in Lanarkshire, provided the inspiration for ironmasters to scour this county for suitable locations for their blast furnaces. By 1871, three Lanarkshire iron companies were responsible for 70% of Ayrshire's rateable value of minerals and associated undertakings.²⁸⁶ There was hardly a coal-bearing parish in Ayrshire whose minerals were not worked, to some extent, either for or on behalf of, an iron company. In less than three decades Ayrshire became a major coal and iron producing county, second only to Lanarkshire, and indeed by 1854, was responsible for around one-third of Scotland's iron output.²⁸⁷ One firm, the Bairds of Gartsherrie, Scotland's premier iron and coal masters, was producing 62% of its iron in Ayrshire in 1865.²⁸⁸

The county was being transformed and raised to an altogether new level of economic and industrial activity. Observers noted, in the northern parts of Ayrshire in particular, the surge of 'active industry' which was 'raising iron-works and young cities, where before there was only the green heather and peesweeps',²⁸⁹ a faintly poetic vision which conceals the dislocating social consequences of the rapidity with which some towns, such as Dalry, Dalmellington and Kilbirnie, grew.²⁹⁰ Steam pumping engines have been used as a crude measure of the advance of the coal mining industry, and perhaps 25 had been erected in Ayrshire in the 18th century. In Auchinleck parish where local demand for coal in the late 18th century had been satisfied by working outcrops, by the 1830s, there had been two steam engines erected there; forty years after, and clearly connected with the opening of Lugar ironworks in 1846, 80 steam engines were being used for mining operations in the parish.²⁹¹

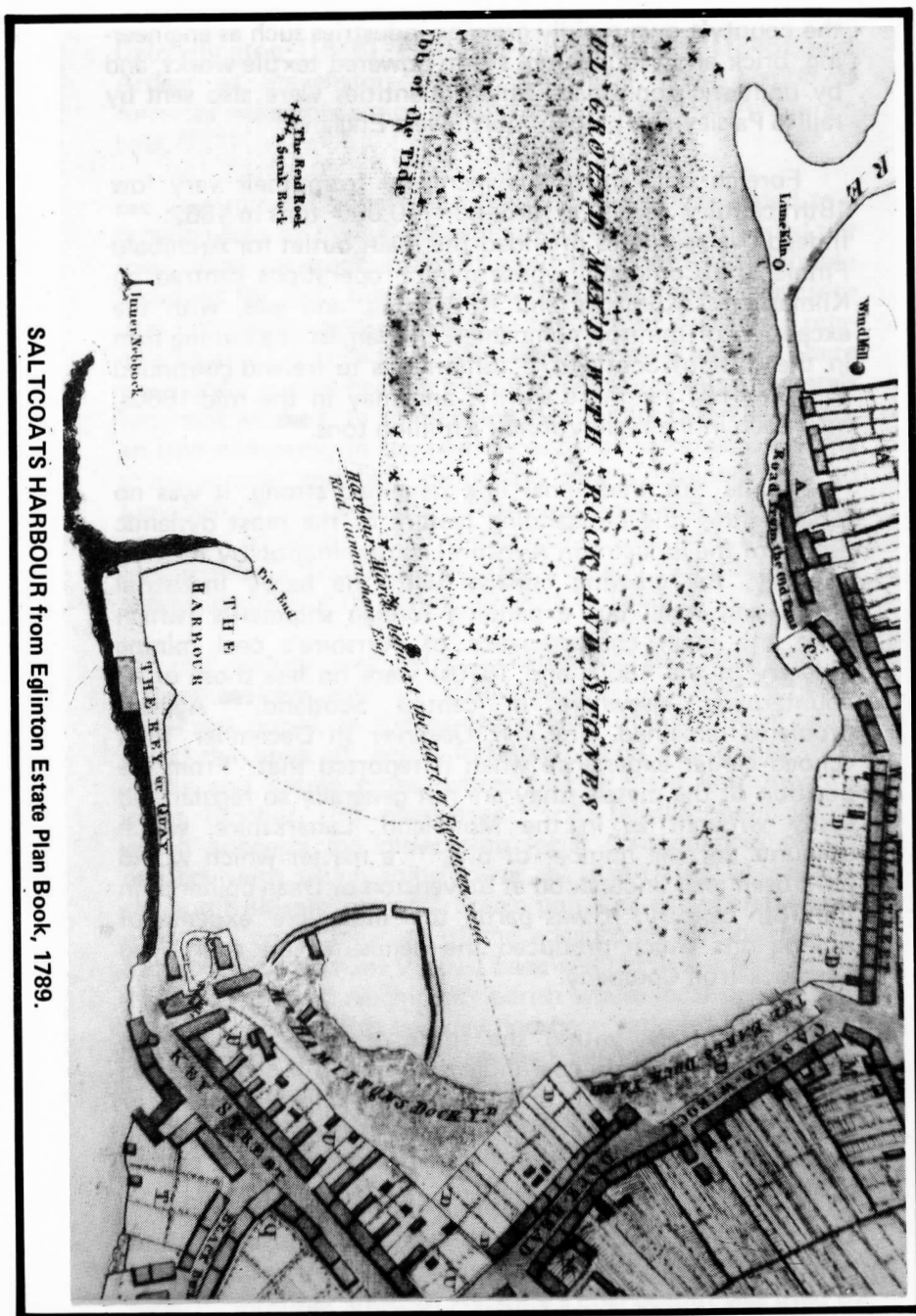
By 1871, the iron industry was very much the single most important consumer of Ayrshire coal, using not much less than one-third of the county's total output of 3 million tons.²⁹² Another third of Ayrshire's coal output was used by

the county's own rapidly growing industries such as engineering, brick and tile making, steam-powered textile works, and by domestic consumers. Small quantities were also sent by rail to Paisley and parts of north-west England.

Foreign coal shipments increased from their very low 18th century levels to around 150,000 tons in 1862.²⁹³ Indeed overseas sales provided the main outlet for Archibald Finnie and Company, whose mining operations centred on Kilmarnock, Kilmaurs and Kilwinning, and was, with the exception of the iron companies, the largest coalmining firm in the west of Scotland.²⁹⁴ Shipments to Ireland continued to grow, but far more slowly, and may in the mid-1860s, have been in the region of half a million tons.²⁹⁵

While this traditional link remained strong, it was no longer either the outstanding feature or the most dynamic aspect of the industry in Ayrshire. Its domination by the iron industry, the growing linkages with the heavy industrial sector and small but expanding foreign shipments (which were the main characteristics of Ayrshire's coal mining industry in the 1860s and 1870s) were no less those of its counterparts elsewhere in central Scotland.²⁹⁶ Age-old problems remained. The *Ayr Observer* in December 1846 echoed earlier experience when it reported that, 'From the position of the metals, they are not generally so regular and easily wrought as in the Monkland, Lanarkshire, which accounts for the number of pits,²⁹⁷ a matter which would have been well understood at Stevenston or Dean collieries in the 18th century. It was partly the 'incredible' expense of sinking pits which produced the demise of the short-lived Cessnock Iron Company.²⁹⁸

Nevertheless, within the space of three decades, the fortunes of Ayrshire's coal industry, which for centuries had been largely dependent upon either weak local demand or its special connection with Ireland, became sharply and irrevocably bound up within those of industrial west central Scotland.



NOTES

1. Carlisle Record Office (hereafter CRO), Lowther MSS.D/Lons/W, Misc., Peter Walker's Acc't of the Collierys at Saltcoats, c.1723.
2. J. Strawhorn, *Ayrshire: The Story of a County*, Ayr, 1975, 169.
3. For example, H. Hamilton, *The Industrial Revolution in Scotland*, 1966, 169; R.H. Campbell, *Scotland Since 1707; the Rise of an Industrial Society*, Oxford, 1965, 130; B.F. Duckham, *A History of the Scottish Coal Industry, Vol. 1. 1700-1815*, Newton Abbot 1970, 37.
4. J.V. Beckett, *Coal and Tobacco: the Lowthers and the Economic Development of West Cumberland, 1660-1760*, Cambridge, 1981.
5. J.H.G. Lebon, 'The Development of the Ayrshire Coalfield', *Scottish Geographical Magazine*, XLIX, 1933, 138-154.
6. L.E. Cochran, 'Scottish Trade with Ireland in the Eighteenth Century', unpublished Ph.D. thesis, University of Stirling, 1980, 2 Vols. I am indebted to Dr. Cochran for allowing me to have access to and draw from her thesis. Some of Dr. Cochran's work is now available in a more accessible form, 'Scottish-Irish Trade in the Eighteenth Century', in T.M. Devine and D. Dickson (eds.), *Ireland and Scotland, 1600-1850*, Edinburgh, 1983, 151-9.
7. C.A. Whatley, 'The Process of Industrialisation in Ayrshire, c.1707-1871', unpublished Ph.D. thesis, University of Strathclyde, 1975, 35-192. A copy of this thesis has been deposited on loan in the Carnegie Library, Ayr.
8. Duckham, *Scottish Coal*, 155.
9. Whatley, 'Industrialisation', 61; also Appendix 2 in this pamphlet.
10. L.M. Cullen, *Anglo-Irish Trade, 1660-1800*, Manchester, 1968, 79. The figure for 1700 relates to England alone.
11. Ibid, 83.
12. M. W. Flinn (ed.), *Scottish Population History from the Seventeenth Century to the 1930s* (Cambridge, 1977), 188.
13. Ibid., 191. Calculated by multiplying the data for paid hearth tax by 4 or 5. This may well overstate Ayr's population. See Strawhorn, *Ayrshire*, 52-4.
14. T.C. Smout, 'The Overseas Trade of Ayrshire, 1600-1707', *Ayrshire Archaeological and Natural History Collections* (hereafter AANHS), 6 (1958-60), 64.

15. W. H. Makey, 'The Place of Whitehaven in the Irish Coal Trade, 1600-1750' (unpublished MA thesis, University of London, 1952), 214, 231.
16. Beckett, *Coal and Tobacco*, 38-61; Cullen, *Anglo-Irish Trade*, 82-4.
17. C. A. Whatley, 'Scottish Salt Making in the Eighteenth Century: A Regional Survey', *Scottish Industrial History* (forthcoming, autumn 1983)
18. M. H. B. Sanderson, 'The Mauchline Account Books of Melrose Abbey, 1527-1528', *AANHS*, 11 (1973-6) 92; Strawhorn, *Ayrshire*, 49; T. C. Smout and A. Fenton, 'Scottish Agriculture before the Improvers: an Exploration', *Agricultural History Review* (XIII) 1965, 82-3.
19. Scottish Record Office (hereafter SRO), Eglinton MSS, GD 3/E 63/4226, Licence to work coal, 1660.
20. Various dates are given for the commencement of these operations. Robert Cunninghame inherited the lands in 1678 and it may well be that work began then.
21. I am indebted to Dr. John Strawhorn for this information.
22. C. A. Whatley, 'An Early Eighteenth Century Scottish Saltwork: Arran, c.1710-1735', *Industrial Archaeology Review* (forthcoming, 1983).
23. J. U. Nef, *The Rise of the British Coal Industry* (1932), 2 vols., I, 48.
24. Professor Smout has demonstrated that Nef's figures for Scottish coal exports can be halved; my own, as yet unpublished, work suggests that his figure for coal used in salt making can also be halved. If, as well be shown below, exports from Ayrshire were around 4,000 tons in 1700, another 21,000 tons remains to be accounted for. It seems highly unlikely that so much would be used within Ayrshire.
25. Duckham, *Scottish Coal*, 14.
26. T. C. Smout, *Scottish Trade on the Eve of the Union, 1660-1707* (1963), 229.
27. A memorandum, dated 1702, amongst the Hamilton MSS, records; 'It is evident as Sun Shine that ffour parts of ffive of all the Coals of Scotland . . . is exhausted . . .'. This question will be more fully dealt with in material I am preparing on the coal industry in late 17th century Scotland.
28. There is a full discussion of Scottish demographic history in the period in Flinn, *Scottish Population*, 241-50.
29. R. Mitchison, 'Ireland and Scotland: The Seventeenth-Century Legacies Compared', in Devine and Dickson (eds.), *Ireland and Scotland*, 7-8.
30. D. Dickson, 'The Place of Dublin in the Eighteenth-Century Irish Economy', *Ibid.*, 178-81. The significance of Edinburgh as a coal consumer has of course been long recognised.
31. Cochran, 'Scottish Trade', II, 552. Dr. Cochran rightly urges that caution should be exercised in using her figures as there was not a uniform measure for coal in the 18th century.
32. *Ibid.*: see too appendix 1, herein.
33. *Ibid.*, 325.
34. Beckett, *Coal and Tobacco*, 39.
35. CRO, Lowther MSS, John Spedding's Letter Book, 20 and 23 February 1723.
36. Beckett, *Coal and Tobacco*, 41, 48-56.
37. B. Lenman, *An Economic History of Modern Scotland, 1660-1976* (1977), 63.
38. C. A. Whatley, 'The Introduction of the Newcomen Engine to Ayrshire', *Industrial Archaeology Review*, II, 1977, 69-77.
39. CRO, Lowther MSS, D/Lons/W, Note from John(?) Bowman, 31 December 1726. More evidence about this may come to light when the current listing of the Eglinton MSS in the SRO is completed.
40. C. J. A. Robertson, *The Origins of the Scottish Railway System, 1722-1844* (Edinburgh, 1983), 12.
41. Cunninghame District Council (hereafter CDC), Auchenharvie MSS Misc., A Calculation for Delivering 46,080 Load of Coals, 1729. Since I worked on this collection a re-listing has been carried out. I have however continued to use the former itemisation as I have not been able to re-examine the papers, which are now held in the Library Headquarters, Ardrossan.
42. CRO, D/Lons/W, Misc., Peter Walker's account, 'The Collierys at Saltcoats', c.1723.
43. Makey, 'Whitehaven', 136-140; Cullen, *Anglo-Irish Trade*, 83-5.

44. J. W. Burns (ed.) *Miscellaneous Writings of John Spreull* (Glasgow, 1882), 54.
45. Cochran, 'Scottish Trade', 328.
46. Beckett, *Coal and Tobacco*, 59.
47. Whatley, 'Industrialisation', 57-59, for a discussion of the selling prices of Ayrshire coal.
48. Dick Institute, Kilmarnock, Misc. legal papers, Robert Barclay v Dalrymple and others, 1748, Information for Charles Dalrymple.
49. CDC, Auchenharvie MSS, Misc., 'Offers for accommodating of Differences Renewed by Mr. Warner', nd.
50. Signet Library (hereafter SL), Court of Session Papers (CSP), 69; 14, Petition of the Provost, Baillies and Town Council of Irvine, 1762.
51. Duckham, *Scottish Coal*, 173.
52. Nef, *Coal Industry*, I, 208; Lenman, *Economic History*, 62.
53. I am currently working on a history of the Scottish marine salt industry. Hopefully, this, with estimates of coal consumption, will be published in due course.
54. J. H. G. Lebon, 'The Beginnings of the Agrarian and Industrial Revolutions in Ayrshire', in J. Strawhorn (ed.), *Ayrshire at the Time of Burns* (Ayr, 1959), 165. See also Whatley, 'Industrialisation', II, 323-4.
55. Carnegie Library, Ayr, Misc., David, Earl of Cassillis v the Magistrates and Town Council of Ayr, 1789.
56. Campbell, *Scotland Since 1707*, 128.
57. Dickson, 'The Place of Dublin', 178.
58. CDC, Auchenharvie MSS, Misc., Instrument of Protest, Robert Mitchell for John Reid v Samuel Mitchell, 1759; Note on Coal Workers, 1760.
59. Ibid., The Gen¹¹ Ball^{ce} of the Coal and Saltworks of Stevenston, 1749-1761.
60. Irvine Town Council Minutes, 16 May 1761; information from Dr. J. Strawhorn.

61. Whatley, 'Industrialisation', 70; SRO, B6/27/1, Newton-Upon-Ayr Council Minute Book, 24 April 1764.
62. Cochran, 'Scottish Trade', II, 552.
63. Ibid., 323. The rate of increase claimed here by Dr. Cochran may be a little exaggerated; see Appendix 1, herein.
64. West Register House (hereafter WRH), Court of Session Papers (CS), CS96/3085, P. Warner v R.R. Cunninghame, 1799, Abstracts From the books exhibited by the defender.
65. Cochran, 'Scottish Trade', II, 325.
66. Ibid., 328-9.
67. For a recent study of Ayrshire's waggonways, see H. Broad, 'Rails to Ayr: 18th and 19th century coal waggonways', *AANHS* (1981), 99-144.
68. SRO, B6/27/1, Newton-Upon-Ayr Council Minute Book, 18 August 1766 and 9 February 1768.
69. WRH, CS 236/1 McNeill D/5/1, Douglas, Heron and Company v John Beaumont, 1784. There is a great deal of invaluable information relating to the equipping of this colliery amongst these papers.
70. Duckham, *Scottish Coal*, 2229-30.
71. Makey, 'Whitehaven', 272.
72. W. Aiton, *General View of the Agriculture of the County of Ayr* (1811), 50-3.
73. Duckham, *Scottish Coal*, 226; Makey, 'Whitehaven', 272.
74. Ibid.
75. Broad, 'Rails to Ayr', 103; Robertson, *Scottish Railway System*, 21-5; Whatley, 'Industrialisation', 55, 114-5, 146.
76. SRO, Customs and Excise Records, CE 71/5/4, Letter Books, Saltcoats Customs House, 17 October 1818, 14 November 1823.
77. CDC, Auchenharvie MSS, Stevenston Colliery Accounts, 1817-23.
78. SRO, Eglinton MSS, GD3/E 64/4241 and 3, Ardrossan Harbour Dues, 1840.
79. *Ardrossan and Saltcoats Herald*, 13 August 1864, 6 January 1866.

80. For a little known but valuable study of this enterprise, see D. Taylor, 'The Kilmarnock and Troon Railway' (unpublished BA dissertation, University of Strathclyde, Department of History, 1970).
81. That belonging to Robert Reid Cunninghame, built in 1812, for example.
82. Duckham, *Scottish Coal*, 216.
83. Strawhorn, *Ayrshire*, 100.
84. *Old Statistical Account* (hereafter *OSA*, 1982 edition, with introduction by J. Strawhorn), VI, 202.
85. *Ibid.*, 442.
86. Dumfries House MSS, Box 23, Mineral Report of James Taylor, 1804.
87. SL, CSP 220:20, J.L. McAdam v Muirkirk Iron Company, 1802, Petition of the Trustees of Admiral Keith Stewart.
88. *OSA*, VI, 442.
89. *Ibid.*, 262.
90. SL, CSP 365; 10, Petition, Mungo Smith v Lord Glenlee's Interlocutor, 1796.
91. WRH, CS 96/3085, Warner v Cunninghame, 1799, Abstracts.
92. See figures in J. Strawhorn, 'Ayrshire's Population', *AANHS*, 8 (1967-9), 9-43.
93. *Ibid.*, 23.
94. *New Statistical Account of Scotland* (hereafter *NSA*, 1845), V, 537.
95. See S. G. E. Lythe and J. Butt, *An Economic History of Scotland, 1100-1939* (1975), 245.
96. Ballantrae, Barr, Colmonell, Coylton, Kilbirnie, Kilwinning, Kirkmichael, Mauchline, Muirkirk, Straiton and West Kilbride.
97. For studies of these ironworks, see J. Butt and J. R. Hume, 'Muirkirk, 1786-1802: the Creation of a Scottish Industrial Community', *Scottish Historical Review*, 45 (1966), 161-83; J. Butt, 'Glenbuck Ironworks', *AANHS*, 8 (1967-9), 68-75.

98. See appendix 2 herein.
99. Butt, 'Glenbuck', 72.
100. A lengthy survey of the development of the iron industry in Ayrshire is to be seen in Whatley, 'Industrialisation', 216-97; see also R. H. Campbell, 'The Iron Industry in Ayrshire', *AANHS*, 7 (1961-6), 90-102.
101. Whatley, 'Industrialisation', 288.
102. Lebon, 'Ayrshire Coalfield', 140.
103. Aiton, *Agricultural Survey*, 377.
104. Whatley, 'Industrialisation', 313-4.
105. Muirkirk ironworks were, in 1830, likely to have been using in the region of 36,000 tons of coal.
106. A. and H. L. Clow, *The Chemical Revolution* (1952), 414.
107. *Ayr Observer*, 24 July 1838.
108. For a survey of the salt manufacturing industry see Clow, *Chemical Revolution*, 46-64.
109. *OSA*, VI, 290.
110. J. Tann, *The Development of the Factory* (1970), 79; Whatley, 'Industrialisation', 349.
111. J. R. Hume, 'Mills of the River Ayr', *AANHS*, 8 (1967-9), 48.
112. *Kilmarnock Standard*, 1 January 1870, report of a speech by James Armour.
113. S. Pollard, 'A New Estimate of British Coal Production, 1750-1850', *Economic History Review*, XXXIII (1980), 217.
114. Whatley, 'Industrialisation', 56.
115. Makey, 'Whitehaven', 272; see also Cullen, *Anglo-Irish Trade*, 82-6; Beckett, *Coal and Tobacco*, 41, 49.
116. Cochran, 'Scottish Trade', 552. Cullen, *Anglo-Irish Trade*, 84-5, also noted that the Scots had experienced difficulties in the mid-18th century.
117. Beckett, *Coal and Tobacco*, 201.

118. CRO, Lowther MSS, D/Lons/W, Misc., Peter Walker's 'Account' c.1723.
119. Burns (ed.) *John Spreull*, 53.
120. SRO, Henderson of Fordell MSS, GD 172/496/37, Copy of a Paper delivered . . . to . . . the Meeting of the Coal Owners, 1799.
121. Whatley, 'Industrialisation', 67.
122. Ibid.
123. Whatley, 'Newcomen Engine', 69-74; for a case study of Stevenston collieries from the late 17th century until 1871 see Whatley, 'Industrialisation', 116-58; Duckham, *Scottish Coal*, contains many references to these enterprises.
124. WRH, CS 233/W/1/53, William Warner v William Miller, 1719, Petition and answers for Alexander Hamilton of Grange and Warner of Ardeer.
125. CRO, Lowther MSS, D/Lons/W, Misc., Notes Concerning the financial circumstances of Daniel and Philip Peck etc., c.1724.
126. Chester City Record Office, CR 352, Letter Book of Daniel Peck, 1703-4.
127. W. R. Scott, *The Constitution and Finance of English, Scottish and Irish Joint Stock Companies to 1720* (Cambridge, 1910) 2 vols., II, 451; T. C. Smout, 'Journal of Henry Kalmeter's Travels in Scotland, 1719-1720', in *Scottish Industrial History: A Miscellany*, (Edinburgh, 1978), 38.
128. His letters of 1703-4 indicate that he was conducting a great deal of trade in Dublin.
129. L. T. C. Rolt and J. S. Allen, *The Steam Engine of Thomas Newcomen* (Hartington, 1977), 61, 69.
130. CRO, Lowther MSS, D/Lons/W, Misc., Agreement between Philip Peck and James Cunninghame, 1722. Peck bought out Potter's interest in the concern for £400.
131. Philip Peck appears to have been largely responsible for raising money for the venture through his London connections.
132. Whatley, 'Industrialisation', 131.
133. Ibid.
134. CDC, Auchenharvie MSS, Box 1, bundle 15, misc. papers in the case Eglinton v Cunninghame, 1747.

135. CDC, Auchenharvie MSS, Misc., Gen'll Ball^{ce}, 1749-1761.
136. CDC, Auchenharvie MSS, Misc., missive, John Reid to Alexander Crawford.
137. B. F. Duckham, 'Mining Technology at a West of Scotland Colliery 1770-1800: A Case Study', *Industrial Archaeology*, 10 (1973), 35. In spite of numerous references to Cunninghame in the literature, and general acceptance of his business capacities, no published study of his wide-ranging activities exists. There are, in the Auchenharvie MSS, ample materials for such a study.
138. Duckham, 'Mining Technology', 27-33.
139. OSA, VI, 592.
140. CDC, Auchenharvie MSS, holograph notebook (Robert Reid Cunninghame), Calculations and Observations, Troon Harbour, 14 August 1811.
141. For a table showing profits and losses at Stevenston Colliery from c.1770 until 1844, see Whatley, 'Industrialisation', 138.
142. This of course excluded the colliery, salt pans and harbour.
143. Duckham, 'Mining Technology', 37.
144. SRO, B6/28/5, Minute Book of the Undertakers of Coal at Alloway, 1728-1729.
145. SRO/B6/27/1, Newton-Upon-Ayr Council Minute book; for a brief study of this municipal enterprise, see Whatley, 'Industrialisation', 161-5.
146. SL, CSO F 28; 12, Robert Alexander v James Montgomery and Company, 1773; Newton-Upon-Ayr Council Minute book, 9 December 1776.
147. SRO, GDI/306, Letter Book, Alexander Oliphant and Company, 1766-1771.
148. SL, CSP F 28; 12, Alexander v Montgomery, 1773.
149. B. F. Duckham, 'English Influences in the Scottish Coal Industry 1700-1815', in J. Butt and J. T. Ward (eds). *Scottish Themes* (Edinburgh, 1976), 38.
150. WRH, CS 236/1 McNeill D/5/1, Douglas, Heron and Company v Beaumont, 1784, Inventory of the Machinery and Utensils belonging to Blackhouse Colliery, 18 June 1784.

151. Ibid. Information for Douglas, Heron and Company.
152. The Ayr Bank appears to have been fairly heavily involved in backing local coal mining ventures; John Campbell, one of its directors, for example, had been able to borrow £11,500.
153. There is a brief survey of the background and achievement of John Taylor in Whatley, 'Industrialisation', 166-171.
154. Ibid., 166.
155. Ibid.
156. SL, CSP 524; 1, John Neilson and others v the Earl of Eglinton, 1819, Memorial for Neilson; CSP 528; 16, Petition, William Taylor v Lord Cringlette's Interlocutor, 1818; Kelburne Castle MSS, Deed Box 8, bundle marked 'Railways', undated contract, Colonel John Boyle and John Samson; *Ayr Advertiser*, 14 September 1815.
157. J. E. Shaw, *Ayrshire, 1745-1950: A Social and Economic History of the County* (Edinburgh, 1953), 17.
158. Dumfries House MSS, Box 23, Mineral Report of James Taylor, 1804.
159. See, for example, Duckham, *Scottish Coal*, 144-54.
160. Ibid., 159.
170. Whatley, 'Industrialisation', 87. They were restricting the numbers of hewers who could be put into their Ardrossan pits as late as 1755.
171. SRO, Eglinton MSS, CD3/E60/4164, Information Concerning Fergushill Coal, 1798.
172. OSA, VI, 360.
173. For a survey of the economic activities of many of Ayrshire's landed families, see J. T. Ward, 'Ayrshire Landed Estates in the Nineteenth Century', *AANHS*, 8 (1967-9), 93-145.
174. Aiton, *Agriculture*, 44.
175. G. E. Sleight, 'Ayrshire Coal Mining and Ancillary Industries', *AANHS*, 7 (1961-6), 103.
176. Duckham, *Scottish Coal*, 39.
177. NSA, V, 477.

178. In as many as ten parishes where coal was known to exist, at the time of the NSA no working was taking place.
179. SRO, B6/28/5, Minute Book of the Undertakers of Coal at Alloway, 3 February 1728.
180. Ibid., 30 August 1729.
181. WRH, Coal Board Records, CB 27/5, Reports of Robert Bald, 'Report Regarding Mining Operations at Fort Colliery, Ayr', 22 April 1822.
182. NSA, V, 13.
183. SRO, B6/27/1, Newton Council Minute Book, 27 June 1765.
184. Duckham, *Scottish Coal*, 73.
185. NSA, V, 88.
186. Makey, 'Whitehaven', 136-9; OSA, VI, 587-8.
187. CDC, Auchenharvie MSS, Box 1, Misc., James Montgomerie to James Cunninghame, 7 March 1719.
188. CRO, Lowther MSS, John Spedding's letter books, 21 February 1720.
189. CRO, Lowther MSS, D/Lons/W, Misc., Robert Stephens' Report, Saltcoats, September 1725.
190. SL, CSP 1; 47, John Potter and others v Earl of Eglinton, 1731, Petition for pursuers.
191. NSA, V, 427.
192. SL, CSP 99; 15, Petition of Alexander, Earl of Eglinton and others, 1764; CSP 132; 13, William Orr and Samuel Mitchell v Earl of Eglinton and others, 1764.
193. T. H. Mottram, 'Description of the Sinking of Shafts through Sand at Ardeer, Ayrshire, by the Pneumatic Process', *Trans. of the Mining Inst. of Scotland*, 28 (1905-6), 16; around 1720 Peter Walker had noted the 'great Sand Feed' about three fathoms from the surface 'w^{ch} they Dam out of their pitts wth Hewen Stone & Clay'.
194. OSA, VI, 592.
195. NLS, Cadell of Grange MSS, Acc. 5381, 39, I, State of Maryburgh and Craigie Salt pans, 1777.

196. For a full discussion see Duckham, *Scottish Coal*, 39-72.
197. Though even Mar had enlisted the assistance of an English engineer in 1710, see Duckham, 'English Influences', 31.
198. CDC, Auchenharvie MSS, Box 1, Misc., Montgomerie to Cunningham, 7 March 1709.
199. CRO, Lowther MSS, Spedding's letter books, 22 November 1719.
200. SRO, B6/28/5, Minute Book, 12 May 1729.
201. Quoted in E. Hughes, *North Country Life in the Eighteenth Century: Vol. 2, Cumberland and Westmorland* (1965), 142.
202. Duckham, 'English Influences', 38.
203. WRH, CS 236/1 McNeill D/5/1, Douglas, Heron and Company v Beaumont, Information for pursuers.
204. On his departure from Newton-Upon-Ayr Renwick apparently asked for an Honorary Burgess's Ticket as a mark of the burgh's esteem for his contribution to the coal mining industry in the area.
205. *Ardrossan and Saltcoats Herald*, 29 November 1889, list of Eglinton factors since 1726. He was also cited in the legal cases mentioned in note 192 above.
206. Kelburne Castle MSS, Wooden Box marked 'I.H.', jotter belonging to Mr. Boyle, 1770-1774; Whatley, 'Industrialisation', 80-81.
207. Ibid.
208. For a full discussion of Scottish colliery management, see Duckham, *Scottish Coal*, 113-40.
209. B. F. Duckham, 'Serfdom in Eighteenth Century Scotland', *History*, LIV (1969), 178, 193-4; Campbell, *Scotland Since 1707*, 128-9; Lenman, *Economic History*, 132, and many others.
210. CRO, Lowther MSS, Misc., D/Lons/W, Misc., Report on the Colliery at Saltcoats, November 1723.
211. B. Graham, 'William Boyd, 4th Earl of Kilmarnock', in *The Boyds of Kilmarnock* (Kilmarnock, 1980), 24.
212. CDC, Auchenharvie MSS, Misc., Discharge, 27 November 1775; Petition to the Sheriff Depute of Ayr, 1779.
213. For example, Hamilton MSS, Lennoxlove House, Proposals concerning ye State of ye Coalworks of Kinneil & ye Coalhewers Advice concerning ye Same, 18 February 1703; Wemyss Castle MSS, Diary of David, 2nd Earl of Wemyss, 1677. 'Sinkers', as distinct from colliers or hewers of coal, were also in relatively short supply in Scotland: Duckham, *Scottish Coal*, 45-6.
214. CRO, Lowther MSS, D/Lons/W, Misc., 'J. S. Observations of Mr. Pecks proposal . . .', June 1724.
215. WRH, CS 230 Currie-Dalrymple 1/27, G. Lockhart v D. Peck, 1726, State of the Process.
216. Lenman, *Economic History*, 132; Whatley, 'Industrialisation', 183-183-5.
217. Lenman, *Economic History*, 132.
218. CRO, Lowther MSS, An Account of the Harbour, Colliery etc., 1724.
219. N. M. Scott, 'Documents relating to Coal Mining in the Saltcoats District in the First Quarter of the Eighteenth Century', *Scottish Historical Review*, 19 (1922), 92-3; CRO, Lowther MSS, An Account . . . 1724.
220. CDC, Auchenharvie MSS, Misc., Notebook, in Robert Reid Cunningham's hand, relating to Stevenston coal seams, undated.
221. Duckham, 'Serfdom', 188-9.
222. Duckham, *Scottish Coal*, 263, 272. Rates of course varied over time, and indeed within the county itself: see Whatley, 'Industrialisation', 173-4, 178-81.
223. Duckham, *Scottish Coal*, 33; Whatley, 'Industrialisation', 180.
224. Duckham, *Scottish Coal*, 262.
225. WRH, CS 271 10,000, Bill Chamber Process, the Colliers of Eglinton v their grievance, 1749, pursuer's claims.
226. Duckham, *Scottish Coal*, 268.
227. J. Galt, *Annals of the Parish* (1821, 1967 ed.), 31.
228. Duckham, 'Slavery', 194.
229. WRH, CS 238/S/10/9, W. Scott v Dewar of Vogrie and others, 1781, copy letter, George Glasgow to Walter Scott, 2 March 1774.
230. CDC, Auchenharvie MSS, Discharge.

231. Accounts of the agitation are to be found in Duckham, 'Slavery', 193-6; T. C. Smout, *A History of the Scottish People, 1560-1830* (1969, 1981 ed.), 405-6.
232. Duckham, 'Slavery', 193.
233. WRH, CS 238/S/10/9, Scott v Dewar, copy letter, from George Glasgow, 'Anent Emancipating Coaliers', 21 February 1774.
234. Ibid.
235. Hughes, *North Country*, 174-7, for example.
236. Duckham, 'English Influences', 37; for a study of Carron Iron-works see R. H. Campbell, *Carron Company* (Edinburgh, 1961).
237. SRO, Clerk of Penicuik MSS, GD18/1123, 'Some Observations on the Coaliers Bill', 1775.
238. SL, CSP 304; 1, William Dixon of Calder Coal and Iron Works v George Taylor, 1816.
239. Smout, *Scottish People*, 406-7; Whatley, 'Industrialisation', 184. Note too the importance of the employment of under employed and poorly paid handloom weavers in Ayrshire pits, notably as strike-breakers.
240. NLS, Cadell of Grange MSS, Acc. 5381, John Alexander to William Cadell, 21 May 1777.
241. WRH, CS 238/S/10/9, Scott v Dewar, Glasgow to Scott, 2 March 1774.
242. Whatley, 'Industrialisation', 181; Duckham, *Scottish Coal*, 271-3.
243. 39 Geo III, c LVI. The act did remove the last vestiges of legal binding, but its granting of powers to JPs to fix colliers wages, and its specific anti-combination clauses, do not justify a liberal interpretation of its supporters' motives.
244. WRH, Lord Advocate's Department, AD 14/22/84, Petition of Alexander Murdoch . . . against John Mathieson and others . . . 29 January 1822.
245. *Ayr Advertiser*, 26 June 1828.
246. Report by Thomas Tucker, 1656, in J. D. Marwick (ed.) *Miscellany of the Scottish Burgh Record Society* (Edinburgh, 1881).
247. Smout, 'Overseas Trade', 59, 67.
248. Reports on the 'State and Condition of the Burghs of Scotland', 1692, in Marwick (ed.) *Miscellany*, 78.
249. CRO, Lowther MSS, D/Lons/W, Misc., Peter Walker's Account . . . 1723.
250. Cullen, *Anglo-Irish Trade*, 122.
251. SL, CSP F 28; 12, Alexander v Montgomery, 1773, respondent's case.
252. Campbell wrote to Alexander that, 'I was apprehensive that Quantity, with what may be expected from the other Coal Pits, would be as much as could possibly be in the present State of our Harbour be shipped in Twelve Months', *ibid.*
253. SL, CSP 365; 10, Mungo Smith v Lord Glenlee's Interlocutor, 1796, Petition.
254. WRH, CS 96/3085, Warner v Cunninghame, 1798, defender's proof; some aspects of this case are described in W. D. Kerr, 'Notes on the Local History of Stevenston and Saltcoats at the end of the 18th Century', *AANHS*, 1 (1947-9), 106-14.
255. Cullen, *Anglo-Irish Trade*, 122.
256. CDC, Auchenharvie MSS, Box 1, Misc., Montgomerie to Cunninghame, 7 March 1719.
257. Beckett, *Coal and Tobacco*, 88-9; Dr. Cochran's Scottish-Irish coal shipment figures show a rise from 10,852 tons in 1727, to 13,096 in 1729.
258. CRO, Lowther MSS, D/Lons/W, 3 bundles of estate correspondence, 1730-1732, James Lowther to John Spedding, 4 February 1734.
259. Beckett, *Coal and Tobacco*, 90-1; Cullen, *Anglo-Irish Trade*, 123.
260. CDC, Auchenharvie MSS, Misc., copy letter, Robert Reid Cunninghame to W. Lindsay, 10 August 1804.
261. CDC, Auchenharvie MSS, Box 1, bundle 17, 'Note Respecting Coals Shipped from Saltcoats, 29 March 1806.
262. CDC, Auchenharvie MSS, settlement of Journal, 1807; Whatley, 'Industrialisation', 149.
263. CDC, Auchenharvie MSS, Misc., copy, 'Arguments for Mr. Crawford', 8 July 1805. Cunninghame noted that even a vessel of 80

tons was 'obliged to take two lighter's cargoes over the Bar from the small depth of water.'

264. SL, CSP 528; 16, Taylor v Cringlette's Interlocutor, 1818, answers for Samuel Little of Tyrone.
265. CRO, Lowther MSS, D/Lons/W, Misc., 'A List of the Shipping of Saltcoats Belonging to Mr. P. Peck', 13 August 1723.
266. Beckett, *Coal and Tobacco*, 83.
267. Cullen, *Anglo-Irish Trade*, 132.
268. Cochran, 'Scottish-Irish Trade', II, 335. By 1794 the average tonnage of Saltcoats' vessels had risen to 92 tons, those of Irvine to 74 tons. I am grateful to Dr. John Strawhorn for this information.
269. Cullen, *Anglo-Irish Trade*, 127.
270. CRO, Lowther MS, D/Lons/W, letter books, James Lowther to John Spedding, 13 April 1726. Philip Peck may well have arrived in Scotland in dire financial straits. It was alleged, for example, that he had had a Statute of Bankruptcy taken out against him in England, WRH, CS 271/52005, J. McEwan v P. Peck, 1727, answers for J. McEwan.
271. CRO, Lowther MSS, D/Lons/W, Misc., An Account of the Harbour . . . 1721. This is the minimum figure, as some of the amounts referred to in this source are current valuations, and may not represent their cost.
272. Duckham, *Scottish Coal*, 87. Duckham is talking about very small collieries; the 5 pits sunk prior to the arrival of the Peck-led partnership cost on average £82, without gins or engines.
273. R. Bald, *A General View of the Coal Trade of Scotland* (Edinburgh, 1808), 25.
274. Ibid.
275. CRO, Lowther MSS, D/Lons/W, Misc., 'J. S. Observations . . .', June 1724.
276. SRO, Bargany MSS, GD 109/3709, Missive, 1761.
277. WRH, CS 96/3085, Warner v Cunninghame, 1798, defender's proof; also quoted in Duckham, *Scottish Coal*, 108.
278. Whatley, 'Industrialisation', 142.
279. SRO, B6/28/5, Minute Book . . . Undertakers, 23 March 1728.

280. G. Jackson, 'Scottish Shipping, 1775-1805', in P. L. Cottrell and D. H. Aldcroft (eds.) *Shipping, Trade and Commerce: Essays in Memory of Ralph Davis* (Leicester, 1981), 119.
281. Cochran, 'Scottish Irish Trade', II, 331.
282. This has all been based upon figures from Strawhorn, 'Ayrshire's Population', 23-9.
283. SRO, B6/27/25, MS Notes upon Newton-Upon-Ayr, by the Rev. Dr. Peebles, 1800.
284. Lebon, 'Ayrshire Coalfield', 143; see too Campbell, 'Iron Industry', 92.
285. Whatley, 'Industrialisation', 61.
286. SRO, VR 90/46 and 47, Valuation Rolls, Ayr, Kyle, Carrick and Cunninghame, 1871-2.
287. Whatley, 'Industrialisation', 218.
288. A. Slaven, *The Development of the West of Scotland, 1750-1960* (1975), 120-4; R. D. Corrins, 'William Baird and Company, Coal and Iron Masters, 1830-1914' (unpublished Ph.D. thesis, University of Strathclyde, 1974), appendix B.
289. See, for example, *Ayr Advertiser*, 15 September, 27 October 1846, and the *Ayr Observer*, 23 June, 22 September 1846 and 30 March 1847.
290. See Strawhorn, 'Ayrshire's Population', 28-9.
291. NSA, V, 328; H. J. Steven, *Auchinleck, Its History and Associations* (Kilmarnock, 1898), 69-79; *Ardrossan and Saltcoats Herald*, 12 October 1878.
292. Strawhorn, *Ayrshire*, 100; Whatley, 'Industrialisation', 40, 61-2.
293. Ibid., 63.
294. Slaven, *West of Scotland*, 124; Whatley, 'Industrialisation', 82-3.
295. Ibid., 43.
296. Campbell, *Scotland since 1707*, 130-2; Lythe and Butt, *Economic History*, 192-5; Slaven, *West of Scotland*, 111-34.
297. *Ayr Observer*, 1 December 1846. There were 12 complete failures amongst partnerships who entered the iron industry in Ayrshire.

The problems they encountered were often similar to those met by the 18th century coalmasters. See Whatley, 'Industrialisation', 241-70, 382, in particular.

298. *Ayr Observer*, 12 November 1844.

APPENDICES

1. *Annual average coal shipments, Scotland to Ireland, 1700-1799.*

Period	Tons	Period	Tons
1700-4	6,028	1750-54	10,213
1705-9	8,956	1755-59	9,400
1710-14	7,285	1760-64	7,296
1715-19	8,285	1765-69	14,806
1720-24	11,622	1770-74	18,469
1725-29	13,022	1775-79	15,489
1730-34	?	1780-84	18,011
1735-39	?	1785-89	29,864
1740-44	?	1790-94	45,819
1745-49	7,964	1795-99	39,618

Source: derived from L. E. Cochran, 'Scottish Trade with Ireland in the Eighteenth Century' (unpublished Ph.D. thesis, University of Stirling, 1980), 2 vols., II, Appendix, 552.

2. *Ayrshire ironworks, estimated pig iron output and coal consumption, selected years, 1796-1876.*

Year	Pig iron output (tons)	Coal consumption (tons)
1796	2,878	25,902
1806	4,543	47,287
1830	4,000	36,000
1846	79,872	235,008
1854	249,000	747,000
1876	360,924	900,310

Source: C. A. Whatley, 'The Process of Industrialisation in Ayrshire, c.1707-1871' (unpublished Ph.D. thesis, University of Strathclyde, 1975), 61.

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