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JOHN ROBSON'S NOTEBOOK: THE DEVELOPMENT OF RAINTON AND PITTINGTON COLLIERIES IN THE 1820s.

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The history of Rainton Colliery is of interest in itself, contributing to an overall understanding of the growth of the Tyne and Wear coalfield in an important stage in its development. A more major significance, however, derives from the information contained in a thin and once damp-stained volume of notes made by the Rainton Colliery's sometime underground manager, John Robson, who recorded, day by day, the occurrences and developments at the various pits which comprised Rainton Colliery during a period of active development from January 1823 to October 1827. They seem to be a unique survival of their type.[1]

The Rainton Colliery was opened in the mid 1770s to produce coal for a water sale to London, and an older waggonway was extended to connect the new pits with the river Wear, from where river keels were used. By 1778 the vend of coals from Rainton was the largest of the sales of all the 15 colliery concerns on the Wear, while in 1779 the Old Ducks Colliery at Rainton had the largest of the vend among the 17 firms then producing. The extended waggonway to Rainton is shewn on maps of 1787 and 1812, running for some four miles to its Wearside staiths at Fatfield. In 1778, the colliery's owner was John Tempest, esquire, of Wynard and Brancepath Castle, who sat as MP for the City of Durham from 1768. He died in July 1794 and, as his only son and heir had predeceased him, his estates passed to Sir Henry Vane-Tempest, Bart, MP for Durham City from 1794 to 1800. The latter died in August 1813 in his early forties, leaving a 13 year old daughter. She married in April 1819, becoming the second wife of the third Marquess of Londonderry who was then 40 and had been British Ambassador to Vienna. He died in March 1854, aged 76, and his widow outlived him by almost 11 years.

Sir Henry's heiress was still under-age, but his trustees undertook major new colliery developments. The Main Coal seam was exhausted after some 40 years' working and by September 1817, three of the working pits at Rainton; the Plain, Hunter's House and Nicholson, had all been sunk through the Five Quarter, Main and Low Main seams to the Hutton seam, while the Hazard pit was down to the Hutton seam by September 1818 and the Dunwell pit by 1820. The Hutton seam was the one largely worked during the period of John Robson's notebook and was some 4 to 4½ feet in thickness. It was an excellent quality house coal which to some extent replaced even the Wallsend seam both in the London markets and in the public's esteem. Something of its quality may be gauged from the fact that in the early 1820s it brought 22s 6d a ton as against the 17s 6d of the High and Low Main seams. The opening-out of the deeper Hutton seam continued with the sinking of new shafts from about 1816. These were the Adventure Pit (61 1/3 fathoms), sunk between January 1816 and July 1817; the Resolution (58 1/3 fathoms), sunk between January 1816 and May 1817; and the Alexandrina (to 87 fathoms), sunk between June 1821 and June 1824. At the North pit a boring was put down from the Low Main to the Hutton seam in 1821, and in 1829

it was estimated that expenditure since 1820 on machinery, waggonways and new sinkings at Rainton Colliery totalled £34,800.

A number of remarkable explosions also occurred at these pits, where the mine gases were particularly explosive (see page 82). Although John Robson makes scant reference to the latter in his notebook at the time, he does refer in passing to major changes which were occurring as a result of Lord Londonderry's purchase of the nearby Seaham estate. This had been mortgaged by its previous owner for £20,000 upon his daughter's marriage to Lord Byron. The engineer William Chapman had earlier been employed to design a coal port at Seaham, and the project was reconsidered by Lord Londonderry from 1824 as Rainton, and indeed the surrounding coalfields, produced for the London market and a sea-sale trade. As early as 1805 there was no landsale income from the coal mines at Rainton, although of course some proportion - some 6.3% - of production went on internal consumption and the men's coal allowance. The project went ahead and the foundation stone was laid in November 1828. A new railway was opened from the Rainton pits in July 1831 and most of the waggonway to Fatfield Staiths on the Wear was abandoned even though it had been extended in 1826 to serve the new Pittington (alias Londonderry) Colliery at Pittington. The increase in traffic as a result of this extension partly led to the new situation at Seaham.

The pits named in John Robson's notebook were to have long lives, and some were still working in 1889. The Adventure closed in March 1893, however, and the Alexandrina and Meadows pits in November 1896, and formal abandonment of these three pits, in the townships of East and West Rainton, Moor House, Pittington and Moorsley, took place on the last day of 1896. The printed report of the 1821 census commented that West Rainton was greatly increased "*by the extension of the collieries*". As the following table shows, the population of the area had been considerably increased by colliery development up to the 1830s.

	1801	1811	1821	1831
East Rainton township	294	455	671	1600
West Rainton	435	629	1160	1184
Moorsley	36	43	48	748

Besides dealing with geological and engineering difficulties as they arose, John Robson's tasks, as underground manager, were as follows:-

1. Boring for coal, then sinking new shafts and maintaining existing ones, with all their difficulties.
2. Measuring and coping with feeders of water and draining the workings.
3. Working the coal and developing new areas.
4. Transporting the coal below ground.
5. Labour control below ground.

Matters such hiring-bonds, surface transport and brick making were not Robson's direct concern, but he added comments about them as they touched upon the work of

his own department of the colliery's activities. He mentioned, for example, a holiday among the workmen, snow preventing the waggons from getting to the staiths, and the output of the brickworks. He also seemed to add a very few matters solely out of personal interest. The reason why he kept a register of grants is uncertain, but as he finally kept it himself, perhaps it was only an *aide memoire*.

Little is known of John Robson, but he was one of two viewers who prepared a schedule and valuation of the equipment of the Pensher and Rainton collieries in August 1818.[2] His name is not on one made in 1814, however, suggesting that he became viewer at Rainton between then and 1818. He survived the power change of 1819, when John Buddle took over the collieries' technical and commercial management, and he was still manager at Rainton Colliery in 1843. By then he got a salary of £200 per year, while the manager of the newer Pittington Colliery got but £150. It was perhaps this John Robson who introduced an ultimately unsuccessful safety lamp which is referred to in the 1835 *Report of the Select Committee on Safety in Mines*, while there are references to a Mr - or perhaps more than one - Robson as agent for the Marquess of Londonderry and of the Hetton and Whitewell Collieries, and as the resident viewer of the Hetton Colliery. Ours was not the John Robson of the North Bailey in Durham City who died in April 1857 aged 48, who was a colliery owner and "*much respected*". A John Robson was also on the organising committee in 1852 of the North of England Institute of Mining & Mechanical Engineers, on its Council until 1855, and died in 1856.

John Buddle became agent for the Londonderry collieries in 1819. Here he not only planned new works, but also acted as overall manager, both on a part-time basis. In Londonderry's case, he also acted as financial adviser, an electioneering agent, and an adviser about the new Seaham harbour and town and connecting railways. Buddle was also prominent in the activities of the Association of Coalmasters which controlled prices and sales. He was a leading member of local society, financially and socially, and a technical innovator and inventor. His opinion was sought both by colliery owners and by Parliamentary committees.

Buddle worked through a hierarchy of officials, of whom John Robson was one. At the head was Buddle, in his mid-forties in 1819, with his assistant George Hunter, and below them were the following:-

sub-bookkeeper
colliery and farming livestock and corn manager
bookkeeper and sub-cashier
under viewer
auditor for the estate Trust
viewers at Rainton & Pittington, including John Robson
engineer in charge of machinery
timber measurer
fitting departments' head at Sunderland
fitting agent at Seaham Harbour, two clerks and Harbour Master and his deputy

Buddle kept in constant touch by letter or visit with the collieries, as he did with their owner. Every fortnight he held a committee meeting of the colliery management, describes a "*Bill and Council day, when all accounts are examined, pit and engineering plans etc. discussed with viewers and engineer, and orders for stores etc. given at Pensher office*". He controlled the managers' wages, subject to discussion with Londonderry, and in 1832 he wrote about Robson having "*frequently applied to me for an increase ...*".

At the end of August 1819, Buddle prepared a "*Memoranda*" illustrating the changes in working methods which he had recently introduced. These included:-

1. the avoidance of all unnecessary narrow work, thus increasing the quantity and quality of the best coals and lessening their getting costs

2. the introduction of underground barriers, to enable full working to occur improvement of underground railways and waggons

3. drainage in the Hunter's House pit, by a new watercourse through the old Upper Main seam workings to the engine shaft

4. the Upper Main workings stopped at Hunter's House pit and five horses thereby laid off (it was expensive to work and produced poor quality coal)

5. the Resolution pit to be worked at a first working

6. the introduction of large, double waggons above ground, resulting in 20 horses being disposed of, and of inclined planes; and the conversion of horse stables at Chilton Moor into houses for the Rainton colliers, some of whom have allowances for travelling a long distance.

7. the construction of a 14 ton capacity oil cistern at Chilton Moor, near the store house.

8. the lessening of labour costs from the next Binding in April 1820, by not taking on again "*many ineffective hands*".

9. the increase in price of the Wallsend coals, which will result in the profit of the Pensher and Rainton collieries rising from £3000 to £4000.

Before considering John Robson's day-to-day concern with the running of his colliery, which it must be emphasised again was from 1819 under John Buddle's entire control and run to Buddle's master plan in its development, however, it is well to consider the situation at the Rainton Colliery overall. This can, usually, be done in some detail, as in 1814, and again more in 1818, detailed inventories and valuations of both Rainton and its sister colliery Renshaw had been made. These enable a comparison to be made between the stages of development which they record, and the developments later recorded by John Robson under Buddle.

At the time of the August 1818 inventory and valuation, the Rainton colliery had recently been, as we have seen, considerably enlarged, and it was over this largely new colliery that John Robson was newly placed as underground manager. The 1814 valuation had listed the:-

Main Engine	North Pit	Old engine
Nicholson's Pit	Plain Pit	Dunwell Pit.

This last was in the course of development and was without, for example, any underground equipment or even a steam winding engine. The North Pit had only 26 yards of tramway and one tram in its workings, which were then in the Low Main coal, and Nicholson's and Plain Pits were the two active pits which constituted the working colliery. In 1814 their underground equipment included:-

	Nicholson's Pit	Plain Pit
hewers' mauls	72	80
shovels	85	97
rakes	0	81
crackets (low seats)	84	98
wedges	161	161
sets of drills	21	35
trams	35	26
single rolley waggons	100 (+2 for water leading)	162
cranes	10	4
20 peck Corf bows	214	
railway sidings, excl points, sidings etc		
rolley ways	970	1023
tramways		1440
mixed	1110	
"straight tramways" 2006	4086	5463
brattice lengths 6' x 4' high	27	57
doors 4' square	9	11

Both pits possessed a steam-powered "*Machine for Drawing Coals*", with boiler, shaft frame, pulley wheels etc., valued at £1353 and £1327 respectively, while the engine at the North Pit was valued at only £539.

The situation illustrated in the new valuation of 1818 was very different. Nicholson's Pit had now only 367 yards of rolley way and none of tramway, which is a considerable diminution from the situation of 1814, and in Plain Pit there were only 86 rolley way plates, while the numbers of colliers' tools in both of the older pits were together but minute - only three stools, for example, and five mauls. A number of new shafts had been opened, however, and Dunwell Pit had been equipped with a steam winding engine as well as with the usual horse gin, which in this case was 22 feet in diameter. Underground, the new and old pits - some dying, some newly at work, others being developed - were equipped as follows:-

	Dunwell	Hunter's House	Hazard	Plain	Nicholson's
hewers' mauls	49	105	49	5	0
shovels	71	117	71	3	0
rakes	0	207	77	2	0
crackets	0	110	83	3	0
wedges	103	112	103	10	0
sets of drills	45	17	33	2	0
trams	28	37	35		0
rolley waggons	69	77	43		4
20 peck Corf bows	0	0	164		0
railway yards					
rolley ways	1661	570	724		363
tramways	1308	2954	1847		0
Davy lamps	0	1	4		0
yards of air boxes	40	0	0		0

Resolution = Sinking materials only.
Adventure = None
North = None

So, effectively, Robson was managing a new colliery, consisting of the Dunwell, Hunter's House and Hazard Pits. The others were in course of sinking and equipping, or worked out. However, the Resolution already had two engines, the North and South, for winding, valued at £1390 and £1480, and there were large numbers of apparently not yet erected pumping engine parts. The sinking dates which are available from the published *Northumberland and Durham Sections of Strata* show how new the colliery was:[3]

	Bottom of Hutton seam fm ft ins	Sunk between From	To	AOD ft.
Adventure	61 2 0	Jan. 1816	July 1817	206
Resolution	58 1 10	Jan. 1816	May 1819	

	fm ft ins	In existence by August	
Dunwell		1817	
Hunter's House	74 4 9	1814	200
Hazard	113 2 2	1814	300
Plain	81 4 6¾	1814	180
Nicholson's	91 5 0	1814	200
North Low Main*		1814	185

* deepened to the Hutton seam in 1821.

Two new pits were to be opened during the period of Robson's Memorandum Book. These were:-

	fm	ft	ins	Sunk between		
Alexandrina or Letch Pit	77	2	1	Oct. 1823	Aug. 1824	300
Meadows West	87	0	9	June 1821	June 1824	200

At the Alexandrina Pit, the Hutton seam was between 50 and 56 inches thick. At Hunter's House Pit the Five Quarter seam was abandoned in mid 1819, owing to the high cost of working the poor quality coal, and by January 1823 it seems likely that only the Hutton seam, with a little from the Low Main, were being got.

In Robinson's time, the pits were still connected on the surface and with the river staiths, for the new port at Seaham Harbour was not to be opened until 1831. The colliery railways were, by 1818, laid partly in iron rail, and the extension lines to the newer pits entirely so, but wooden ways still formed large lengths of the old main and by waggon ways. The coal was delivered into river keels on the Wear at Easy Doghole Spout, at the staiths, and at Nesham's staith, rented from S.D. Nesham esq., whose waggonway extended to Sunderland itself. There were waggonway branches to the various pits which together formed the colliery, and at Red Burn a 57 yard manure (presumably horse manure) branch, a 52 yard branch to the brickworks and a short branch to serve a house coal delivery point. Another house coal branch existed at Springwell Row, and a further manure branch at Nicholson's Pit. The number of horses employed, all with their own names, was very considerable, and in 1818 at Rainton, so far as can be discovered, there were some 88 horses, plus gin horses and spare horses:

In the pit:	Horses	
Nicholson's Pit	1	
Dunwell	20	
Hunter's House	14	in Hutton seam workings
	14	in Main coal
Hazard	10	

On the surface:	
waggon horses	24
ballast waggon horses	5

In 1818, the brickyard had 341 yards of "*wheeling planks*" and 104 yards of fir plank "*Barroway*", with seven barrows and two sets of brick moulds and a stock of 125,000 bricks and 2500 tiles. Robson recorded the making of 758,276 bricks in the 5½ months to mid September 1823 and of 831,990 in the following year, all at the Rainton brick yard which was worked as part of the colliery.

The men of the colliery - no females were employed - were bound to their work in the customary manner until the mid 1840s. The sole reference in Robson's notebook is

on March 22nd 1823 when he recorded that "*The Pits all Idle on account of the Binding*". While binding continued until 1844, the bond was no part of the official concern of the underground manager. The promotion of the Seaham Harbour scheme was mentioned by Robson, and Rainton Colliery coals would later be diverted there for direct shipping after its opening in 1831. Proposals for a harbour there had been made before Londonderry's purchase of the Seaham estate in 1821, and in January 1823 Robson mentioned that William Chapman, ultimately to be its engineer, was "*Inspecting the Intended harbour near Seaham*", and again in June 1823, when contractors working for Messrs "Noel & Craven" - in fact, Nowell of Dewsbury - were with Chapman.

Now let us discuss the underground situation as Robson recorded it. The pits were shallow enough to allow surface water to enter, so that constant pumping was needed. In February 1823 the North Pit pumping engine was got to work and drew the water from the sump in about 20 minutes, while work was begun on a new watercourse from that shaft in the Hutton seam. More water standage was created here in March 1823, at 20 yards from the shaft and five feet wide and three and a half feet deep, which was able to hold a day's water from the feeders, and which could be pumped by the engine in 1¼ hours. A set of 10 inch diameter pumps were put down the Resolution Pit shaft from the Main Coal to the Hutton seam from March 1823, and got to work in the following month. At the Meadows Engine, the water had to be pumped from February 13th to April 20th 1823, and for 10 hours a day at nine strokes a minute, to clear the pit, which was being sunk at this time and flooded during sinking. The pumps there proved too small during what was a very wet sinking, and a larger, 16 inch diameter set were got to work in June 1823. Water from the Resolution, percolated into the Adventure Pit headings in August 1823 when the pumps into the lower, Hutton seam workings had been stopped to draw water from the old, and presumably disused, Upper or Main Coal workings. Work at the faces in the headings was stopped for three days before the water could be got out again. In September 1823, water at the Adventure Pit, water was drawn by water tubs worked by the winding engine, rather than the pumping engine, but this was presumably only on a temporary basis. Reference was made in December 1823 to that immense nuisance in coal mining, a creep - in this case in the Low seam - in which the pillars are forced downwards by the weight of the strata above, and the floor rises to close up the working passages.

Nicholson's Pit and the Plain Pit were the two shafts - and each appears to have consisted of but one shaft - the sinking at which had preceded the sinking of new pits from the end of the Napoleonic Wars. At the valuation of 1814, Nicholson's was fully equipped with a winding engine - described as a machine "*for Drawing Coals*", with its boiler, shaft frame, pulley wheels etc, valued at £1353, a whim gin with a pair of double swingle-trees, a coal screen, and, on the pit bank, five bank sledges and a hay crib for the sledge horses, as well as a couple more for the waggon horses, and nine heap lamps. Two 90 gallon tubs were apparently available for lifting water, and there was a "*Clippess*" hook on the gin. In the pit was a long list of items of equipment, the most significant including five cranes, 35 trams and 100 single waggons - apparently rolleys - and two more to lead water. Some rails, called rolley way plates, had high ledges, and some were described as common, some mixed with tram plates. There

were also 17 sets of points, crossing plates and turn plates; and the tram rails were in three yard sections. There were four candle chests, four stones of grease, and 27 lengths of brattice, six feet by four feet high. Timber on the surface was Scotch and Oak. The shaft had metal tubbing for some 90 feet, below some 62 feet of timbering and dry stone walling. It was 551 feet to the bottom of an 11 feet 2 inch sump, and the Hutton seam was 4 feet 3 inches of good coal, with one foot of bottoms below it. The pit had gone out of use for coal working by the time of the first detailed reference to it in Robson's notebook in 1824, but then a furnace was built in the Hutton seam to draw air through the Plain Pit, and an eight feet diameter "*Tube*", apparently a chimney in brick of the type which the writer recollects seeing on Pontop Pike forty years ago, was built to provide an even better draught as the Nicholson's Pit became an upcast shaft. The shaft had a small water feeder, measured at 15 gallons per minute in 1826, pumped by the North Pit engine to the Main Coal level and then to the surface by the "*Old Main Engine*".

The Plain Pit also had a steam winder in 1814, valued at £1323, plus a 21 feet diameter whim gin and a horse net. There were four trams on the heap and a new 20-peck measured tub for use in case of disputes with workmen or customers, and five heap lamps. Below were rolley ways and 62 single rolley waggons, 26 trams, four cranes, 368 loose six-quarter props (at 3d each), 3 prop drawers, 80 mauls for the colliers, 97 shovels, 661 wedges, 35 sets of drills, and 98 hewers' crackets. It is also worthy of note that both inventories list American, Oak, Scotch, Norway, deals, fir, Scotch fir and beech planks at the collieries.

Underground stowage of coal was begun in the Plain Pit at the beginning of 1823, and the direction of air in the pit was changed in May 1823, losses of air at doors and stoppings having been considerable. The valuation refers to 11 brattice doors below ground in 1814. It was at the Plain Pit that the colliery's worst fatal accident occurred, with 11 men and 16 boys killed in December 1817, when it was said that if all the workmen had been in the pit, there would have been 160. Another, worse, accident occurred in November 1823, when 59 (or perhaps 53) lives were lost, despite safety lamps being in use. The latter accident is only alluded to by Robson in his notes in that he refers to the re-lighting of the furnace some days later, and the coals in the SE District had started to be worked again in September 1824, the District having lain idle since November 3rd 1823, the date of the explosion. In June 1826 the first, or NE, District was worked again.

Hunter's House Pit did not exist in August 1814, but was working by September 1817. The August 1818 valuation shows two winding engines, valued at £1850 and £1640, rather greater in value than the big new winders at the Resolution Pit, which opened in 1819 (£1390 and £1480) and at the Hazard, which opened about 1818 (£1550). There were apparently two shafts here, the north and south, and seven trams on the pit surface or bank, with 122 yards of tram plates, plus turns, and below ground 77 rolley waggons (50 of them having wooden bodies, the rest wrought iron), 37 trams (22 of wood), with workmen's tools including 52 mauls, 95 wedges, 53 shovels, 110 rakes and 110 crackets. The valuation suggests the cost of equipping the new Hunter's House Pit as being some £5840.

Hunter's House was much beset by geological faulting in its SE District. For example, near the crane which lifted the coal corfs onto the rolleys, three faults were discovered in three months. The pit was 421 feet to the four foot Hutton seam, with a 27 feet 9 inch sump below, the depth of which suggests the dangers of sudden flooding. The ingate was 18 feet 6 inches high. The First West District's pillars were worked out in July 1823 when the West Mothergate, the West Way Workings and the Incline Way are mentioned. This demonstrates that underground inclined planes were being used. Air was drawn via a furnace at the Main Coal level, 38 yards from the shaft. The First District in the West Way, of eight acres, was worked out in February 1824 and the Second District, of 11¼ acres, in November 1824, the winnings being 13 yards by 22 yards in the latter, with coal produced in 20 peck corfs, 21 corfs to the score, from a 4 feet 2 inch seam. Hunter's House was given up as a working pit "*for the present*" at the beginning of July 1824. Nevertheless, only a month later, a furnace was built in the Hutton seam there. This was presumably to keep the pit, and perhaps adjoining pits, aired as this was the time of the chain-airing connecting up at least four of the other pits. Finally, the engine from Hunter's House, perhaps that from the north pit there as the other had no specified pumping function in the valuation of 1818, was removed to pump at North Pittington in May 1826.

A NW District was being prepared for opening-up by the driving of crosscuts in August 1824, after "*being laid off since Nov 3. 1823 Misfortune.*" The Second or SE District, of 22a.0r.6p, was finished in July 1826, and in January 1827 working at the Plain Pit was again abandoned. The other pits were able to supply the vend, with the Plain Pit's men divided between them. One wonders, incidentally, if new iron tubbing 10 feet in height, with 20 feet of wall set in cement above it, put in in 1824, resulted from damage caused by the explosion.

The Resolution Pit is the most frequently mentioned in John Robson's notebook. Sunk to the Hutton seam between January 9th 1816 and May 2nd 1819 to some 349 feet 10 inches (plus a 12 foot sump), the pit took some three years and four months to open up. By 1813, it had a "*North Machine*" without headgear and pulley and a South Machine, valued at £1390 and £1480 respectively. The pumps parts were listed, too, including 38 fathoms of six inch and 60 fathoms of four inch spears, an eight foot and a 20 foot diameter gin, two windbores, and a lower and an upper working barrel of 16¼ and 15½ inches respectively. There was a well-equipped blacksmith's shop here, but no working tools. Robson refers to an older Resolution Pit, five feet four inches only in diameter, which was widened to eight feet in 1824 and deepened to the Hutton seam and a furnace built into it. Later the pit had two furnaces for ventilation. A rolley way had suffered a creep and in June 1823 a new one was started to the north. A pit horse was killed in 1825 by its limmers (shafts) running into it, and by 1826 District No.6 was fully worked out. One District had worked seven and a half acres, another two 13½ acres between them. At the end of 1826 the timber and small coal around the settle boards, i.e. the platform at the shaft top above ground level, on which the corves were received, caught fire, supposedly by the fire lamp which stood there. The fire was discovered at about 11pm by the engineman, who got assistance and put it out.

Of the North Pit, relatively little is recorded. It had a boring put down from the Low Main to the Hutton, probably in 1821. There was a pumping engine early in 1823, and a single accident in July 1821, but working of the Low Main seam was resumed in September 1823, shaft repairs having been made, although the working of that coal was given up again after only almost exactly six months. Hewing was paid for at six shillings a score of coal got and the winnings were 11 yards and the pillars 22 yards. Work seems worthwhile to have continued following the earlier boring to the Hutton seam by sinking to it during 1826, although the work seems not to have been completed when Robson's book ends in the early part of 1827.

The Meadows West Pit was sunk to a depth of 522 feet 9 inches, including 11½ feet of walled sumpage, between June 1st 1821 and June 12th 1824, the exact dates of sinking being recorded in the volumes of printed sections of the Northumberland and Durham coalfield. The Hutton seam here was four feet thick, with seven inches of bottoms below it. During the sinking, however, the engine had stood unworked for nearly four months. In this time, the water rose 28 feet 6 inches in the shaft and, when the engine began to draw again in February 1823, it had to work for 18 hours daily at nine strokes per minute for two months to get the water level down and reduce the flow of the large feeders. Larger, 16 inch pumps were put in and cast iron shaft tubbing had to be used in the shafts, of which there were an East and a West. At the end of July 1825, a great 25 foot throw dip fault was found in the workings and a rolley way was cut through it, dipping west at 3½ inches in the yard (5½°). Coal working at this pit was stopped "*for the present*" in February 1826. One might tentatively suggest the possibility of the nationwide depression, which had just begun, had a dampening effect upon the colliery's market.

The Hazard Pit was 650 feet 6 inches deep to the Hutton coal and had been opened-up just before the August 1818 valuation. It had a steam winder (valued at £1150), a 17 foot whim gin and, below ground, 1322 six-quarter coal props, 35 trams, 43 rolley waggons, 1847 yards of tramway, 723 yards of rolley way with mortice and tenon joints, four of Sir Humphrey Davy's lamps at nine shillings each, and colliers' tools, including 77 mauls, 103 wedges, 71 shovels, 33 sets of drills.

The Hazard was actively at work by 1823 when a potentially dangerous situation arose when two wastemen set fire to three planks forming a part of a crossing taking return air over a roadway. Fortunately the return air was not explosive here and the matter was soon rectified. The seam was 4 foot 2 inches thick. Ventilation again concerned Robson, the airing being newly routed in 1824 so that part ascended via the Dunwell Pit furnace. The Second and Fourth Districts were exhausted together in the late autumn of 1823, and in June 1824 a drift in stone (ie not in the coal) was opened into the Dunwell Pit. There are no more references to the Hazard Pit in the MS, and it was certainly closed down in October 1824.

The first reference to the Dunwell Pit suggests it had been at work for some time before January 1823. Its shaft was lined with the old-fashioned wooden tubbing, rather than the cast iron which was soon to be used throughout the colliery. Indeed, the Dunwell was apparently being sunk at the time of the valuation in August 1814, when it had a

whim gin with a pair of double swingle-trees for four horses, bratticing in the shaft from the Main Coal to the Hutton seam, four trams, 180 sleepers and 340 tramplates and a pair of ropes. At the valuation of August 1818, the pit was fitted-up with a winding engine (valued at £1510) and a variety of working equipment underground - 69 rolley waggons, two prop waggons, 838 loose six-quarter props, 48 yards of brattice, 40 yards of air boxes and workmen's tools - 19 hewers' mauls, 103 wedges, 71 shovels and 45 drills.

In January 1823, the tubbing of the shaft gave way, through a fault in the wedging crib on which it was based. One plank sprang out, but fortunately released only a small amount of water. It was repaired and strengthened by new internal cribs and new wooden cladding, but upon detailed inspection, the lower wedging crib was found to be allowing the passage of water, and so temporarily, and curiously, the Dunwell winding engine was given extra power by passing hot water from the Hazard Pit engine until such time as the tubbing was made watertight again.

In May 1823 the practice of riddling the coal below ground in the Main Coal seam was given up in the Dunwell Pit, and possibly this was the last pit, to judge from the references available, to work the Main Coal at Rainton, all other pits now working the lower Hutton seam. The Dunwell was, however, already sunk to the Hutton, at 580¼ feet, and the seam here was four feet two inches thick. The Hutton began to be worked in the specific area of the first, or SE, District in October 1822 and the District had been worked out one year later, being an area of 8a.1r.18p. Deducting perhaps one-sixth for unsaleable small coal, the SE District had produced 870 chaldrons, or some 2300 tons, of shippable coal per acre.

The Dunwell Pit was so unfortunate as to suffer a creep in the Hutton seam workings, creep occurring where pillars were left too small in size and sank into the floor owing to the superincumbent weight, closing the working passages and destroying the coal in much of the pillar at least. Foul air came off this creep and a special drift had to be driven to bring this foul air into the shaft, well above the level of the furnace drift which also fed into the shaft. In fact, foul air was a recurring problem in the Dunwell Pit and, in August 1825, Robson noted the introduction of a new, changed system of airing the exhausted coal areas, or wastes, in a chain of the Rainton pits, including Nicholson's, Plain, Meadow West and Dunwell. For whatever reason, and perhaps the creep at the end of 1823 played some significant part in the decision, the Second District's pillars were got in its 13½ acres in September 1824 and the pit was closed for coal working in the following month - "*Laid Inn the Dunwell Pit for working of Coals*" as the MS says. Only some 15 months later, however, at the end of 1825, the shaft was repaired, although no reference is made to a new working there before the volume recording the colliery's working ends in January 1827.

The Beverage Pit was sunk from July 1825. As usual, water was soon found - at 24 feet - and a horse gin replaced a jack roll and drew the water in 40 gallon tubs. The flow increased to fill 65 tubs an hour and then decreased to a low of 30 tubs before rising again to 75, when sinking - then down to 75 feet - was stopped until a steam winding engine was fixed. Work seems to have gone on slowly and perhaps sinking

was abandoned for some time, as in September 1825 work was begun on driving winning headings in the Hutton seam towards the bottom of this shaft from the Meadows Pit, preparatory to the Beverage being fully sunk. There are no further references in the notebook to the Beverage Pit, however, up to its ending in January 1827 and the pit is not shewn on the first edition of the 1/10560 Ordnance Survey sheet of c1857.

The whole of the process of colliery development in the 1820s is shewn in detail in Robson's notebook, and nowhere more than in his recording of the whole opening up of the new collieries sunk at Moorsley and North Pittington, where the pits were during the course of their development named respectively the Alexandrina (at Moorsley), the Londonderry and the Adolphus: Adolphus was the name of the Marquess's third son, and Alexandrina that of his second daughter.

A 405 foot deep borehole had been put down to the 6 foot thick Main Coal at Moorsley in 1790 and it was apparently now thought that the Hutton seam, which lay below, would also be present. Only a shallow boring, intended to test a quicksand which was anticipated, was put down prior to the start of sinking. On October 21st 1823, the ground was broken for the new colliery at Moorsley Letch, to be called later the Alexandrina. The first sods were cut by Mr John Legg, possibly of the firm of Lewis P. Legge & Co., brewers, maltsters and corn millers at Rainton Brewery, and by John Robson junior. The sinking of the easternmost of the two pits, which together comprised the new colliery, was begun on the 27th, when the line of a waggonway to the Meadow Engine Pit was also surveyed, although the cutting of the railway was not begun until April 1824. The westernmost of the new pits was begun on November 12th. Each shaft was to be seven feet in diameter and, as they were only 13 feet 6 inches between centres, at their closest, they were only 6 feet 6 inches apart.

The expected quicksand was found in sinking, and work was consequently concentrated upon the easternmost pit, with a cast iron crib being put in and 8 feet 3 inches in height of cast iron tubbing mounted on it. The wall above being built using cement rather than ordinary mortar. This work was successfully completed early in December 1823 and, on the day following, work was given up on this shaft to concentrate effort upon the other, where the tubbing-off of the quicksand was successfully accomplished just before Christmas 1823. Work was then resumed on the east pit from the depth of 45 feet 6 inches below the surface or 52 feet below the surface platform, "*the Settleboards or Top of Outsett*", which was a raised staging above the pit top at the level at which shaft sinking refuse could be raised and adequately taken away, and at which the coal would later be delivered at a height - in this instance of 6 feet 6 inches - to allow off loading into railway waggons below it. On Christmas Eve 1823 work on the sinking of the west pit was recommenced with the use of an ordinary roller winch, or jack roll, and on January 2nd 1824 a horse-powered gin was brought into use in its stead. The Three-Quarter seam was "*got*" or reached on January 1st at 81 feet 4 inches and an air drift was put in between the two pits. Further tubbing was required and a boring was put down to the Five-Quarter seam at 192 feet 6 inches. This, the Main Coal, had been worked in this area earlier, and the old workings had to be carefully insulated from the new shafts going down through them. Two major feeders of water were dealt with,

one beginning with 348 gallons an hour, a later one with 675 gallons. At last, early in August 1824, the Hutton seam was reached in the west pit, shewing 4 feet 4½ inches of good coal and a further nine inches of bottom coal at 464 feet to the floor of the seam, but now again the water flooded the workings and only after the building in of more tubbing could the invading water be drawn, with the use of a 100 gallon tub. At last, on March 18th 1825, workings in the coal in the new Alexandrina pits began, headings being driven north and south from the shaft. A 20 foot sump had already been sunk. An air furnace was built in the east shaft from August 8th 1825 and first lit on the 27th. A main rolley way, 6 feet 2 inches high and 5 feet 6 inches wide, was walled for 28 yards at the end of 1825 and in April 1826 coals were first brought to the shaft from the underground cranes - one in each worked section of the pit - by horses. Nine horses were required for this work. The SW headings had reached 440 yards from the shaft by May 1826, when two faults were found, with a total dip of 33 feet, and a drift, driven as usual through stone rather than through coal, 6½ feet wide and 6 feet high, was begun in June 1826 to take the rollway way through the faults. Two further faults were worked through by Christmas 1826, the drifts inclining at 1½ and 1¾ inches in the yard, so presumably being worked by horses rather than with inclined plane machinery. The Alexandrina Pit was now actively at work, and was not to be officially abandoned until 1896.

The Adventure Pit, in West Rainton township, had been sunk to the Hutton seam between January and July in 1816. It was 368 feet deep to the bottom of the seam, which was 4 feet 3 inches of good coal and seven inches of bottoms. The pit seems not to have been worked until 1824, however, apparently a case of preparing a new colliery some time earlier than events ultimately suggested was necessary. A winding engine was put up in the middle of 1823 and a waggonway extension was completed in June 1823. One shaft at least - and there were two, the east and west pits - was not walled until 1823. This was from an external diameter of 11 feet 3 inches. There had probably been earlier shaft sinking difficulties because, late in 1823, the pit was cleaned out as the water was drained off by a borehole put through to the Resolution Pit workings. Sinking continued in 1824 and coal was worked from the Hutton seam only in February 1824, horses being used below ground to draw coal to the east shaft, the feeder barrowmen's pay being 2s 3d per score for barrowing the 60 to 80 yards, called a renk, to the rolleyway. By March 1825, the first hitches, or minor faults not exceeding the thickness of the seam, were found in the headways, 850 yards from the shaft. Underground, the main ways, or rolley ways, had headways at right-angles to them, and narrow working bords from these. A barrier of 34 yards was left between the workings from the west pit of the Adventure Pit and the workings of the Resolution Pit. In November 1825, there is a reference to working away the pillars in the west pit, and in February 1826 to finding a 51 foot fault down in the south winning headways of the east pit at 1223 yards from the shaft.

The suggestion that the Adventure Pit was left unfinished in 1816 is borne out by the valuation of 1818, which shews only 264 feet of brattice and a 20 foot diameter whim gin, and an injection cock in the pit. Water was almost certainly the temporary master here.

Robson's notebook records not only the process of development of the deeper Hutton seam at Rainton, where earlier, large-scale working of the Upper Main Coal had occurred, but also details of the initial stages of the development of a new adjacent coalfield, in Moorsley and North Pittington. A curious connecting factor between the two is the early use of a locomotive engine, about which very little is known. In September 1827, during the sinking of the Pittington Colliery, it was visited by the Duke of Wellington, accompanied by Lord and Lady Londonderry, Sir Thomas Lawrence, the painter, and a number of other persons of national note. The party travelled from the level crossing at New Pittington to the new colliery, a distance of some 600 yards, in a procession of fourteen coal waggons lined out with green baise and a specially built carriage,this last drawn by colliers. Lord Londonderry's colliery band, in uniform, played '*See the Conquering Hero Comes*'. There were banners with the names of Wellington's victories, and a salute of cannon was fired. The Iron Duke saw the pumping and winding engines and then, returning via the waggonway, descended on the line to Pittington, rose to Pittington Bank Top, descended to Hetton Lane, rose again to Benkridge Bank Top, descended that bank and passed via Meadows and Plain Pits to Chilton Moor, where he inspected a locomotive. Subsequently, the Duke and his party passed on by the waggonway to Penshaw and later walked to view the staiths on the banks of the Wear. The reference locomotive is interesting, as only a year earlier, in 1826, Robson had recorded what was presumably the same locomotive, going through its preliminary trials:

> "*Made a trial of the Travelling Engine from the Plan Pit Switch to Top of Dub Mire Incline 1150 yards 2300 yards per Gate, half this distance or 575 yards are Ascent of 3/16 of an inch per yard the other half nearly Level. The Time of Travelling with 16 Full Waggons was 15 minutes & had to wait 15 minutes more of the empty Waggons - The wheels surged much in the bank, so that she will not be able to take more than 8 Waggons at a time regular - she Broke 5 three feet rails, 1 four feet rail, & 1 Crossing Rail this Trial. Same day made a second Trial with 12 Full Waggons which took 12 minutes the Wheels Surged*". (Dubmire Cottages were at Chilton Moor).

The sinking of the North Pittington Colliery is recorded in some detail from the end of September 1825, when a boring was begun at Letch Side to prove the Five-Quarter seam, close to an old pit. The borehole was finished in ten days, but a couple of months later another $2^{3}/_{4}$ inch borehole was begun. Here, the wimble, or cylindrical borer used in clay, broke at only 18 feet 6 inches, and another hole had to be started. The chisel broke in this hole at a depth of only 18 feet. A third hole was begun three days after the first, but, after 18 days' work in boring and reaching 94½ feet, the hole filled and closed on Boxing Day 1825. "*It run full and closed*" as Robson recorded. Thereafter, a knowledge of the existence of at least the upper seams seems to have been relied upon, and further boring was abandoned in favour of shaft sinking.

Early in 1829 ground was broken for the new North Pittington Colliery and work was begun on sinking an eight foot diameter shaft there. At 39 feet from the surface a feeder of water was cut and the water rose 12 feet in the shaft so that sinking was stopped until a horse-winding gin, which had already been erected but had blown

down in a January gale, was got back into working order. The water was then drawn by it in tubs, as usual. Another feeder was found in March 1826 and two larger tubs, carrying two 67 gallon tubs as against the earlier 40 gallon ones, were introduced to deal with it, and while three horses were put to work the gin. A borehole was put down in the shaft bottom, which was 69 feet deep. It proved the Five-Quarter and the Main coals, while a 4½ foot square water delivery drift was begun from the shaft to the nearest burn, to avoid having to lift the water later by steam-powered pumping to the surface. The drift was 2 feet 4 inches wide, paved with limestone, arched and with side walls two feet high, giving it sufficient size to allow its being cleared out when necessary by man power. Work was begun on a second shaft, 37 feet south of the elder shaft, in April 1826. It was 10 feet in diameter and apparently larger than any previously in use at Rainton. A blacksmith's shop was started, and in July 1826 Wm Coulson of East Rainton took charge there. An engine house for the pumping engine on the 10 foot shaft was begun in May 1826 and the engine from Hunter's House Pit was moved to North Pittington. A shallow staple pit, 6½ feet in diameter, was sunk from surface to just below the delivery drift to pump water for the ponds which served the new engine's boilers etc. Sinking work on the new engine pit was stopped in mid-April 1826 until a gin was got up, then sinking re-commenced in mid-May. The sinking work, as before, was let on contract to George Lee and his partners at £4 10s 0d a fathom. Water was a continuing problem until the pumps were attached to the newly re-erected engine and the water pumped out in July 1826, although later in that month the work of the engine had to be increased from the usual 8 to 10½ then 12 and eventually 13 strokes per minute to keep the water down. As the sinking progressed, an extra pump and connecting spear were needed, along with a new bucket or valve. The engine had to be stopped for 2¾ hours for this work, during which time the water rose some 20 feet in the shaft. The engine, working at 20 strokes per minute, drained this accumulation in 1½ hours. A week later, the pumps needed another change of bucket, and this time the engine took 6½ hours at 22 strokes to clear the water. The inflow of water increased and overwhelmed the engine which had been working at 22 strokes. For some days, therefore, the sinkers were taken out and put to work in the North Pit. By constant pumping, the engine slowly lowered the water and the number of strokes per minute was reduced to ten. This was despite another stoppage of 11 hours to put in new pumpwork, during which the water rose 14 feet 6 inches.

On the surface, the heapstead wall and the winding engine house were both started in July 1826. In October 1826, Lord Londonderry let it be known that he wished the new shafts to be known as the Londonderry (the pumping pit) and the Adolphus after his third son. The Five-Quarter and the Main coals were reached in November 1826, but water was still causing concern, particularly as it was feared that the new shafts might drain water from Mr Fenwick's old workings. One of these old pits was opened to see if this was happening. The shaft was six feet in diameter, walled with limestone down to the roch head, and below that tubbed in timber. The new shafts were not taking appreciable quantities of water from the old workings. The North Pittington pits were completed after the termination of the notebook with which we are here concerned.

The story which this notebook tells is an unusually detailed one, although one apparently reflecting the typical concerns of any colliery official in John Robson's position. The day-to-day responsibilities appear to have been his, subject only to the overall and probably detailed supervision of John Buddle. Perhaps, indeed, these notes were made for the fortnightly conferences with Buddle and his own confrères which it is known Robson attended. His book provides an unusually detailed view of his work in an industry, and indeed in a colliery, which made a major contribution to the economy of the North East of England.

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