COAL AND BLAYDON
With a foreword by
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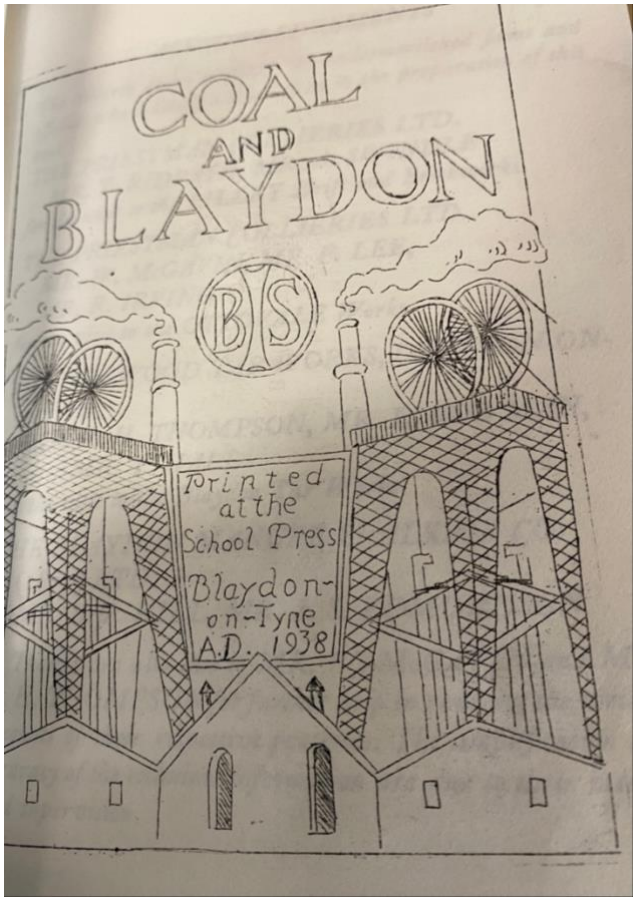
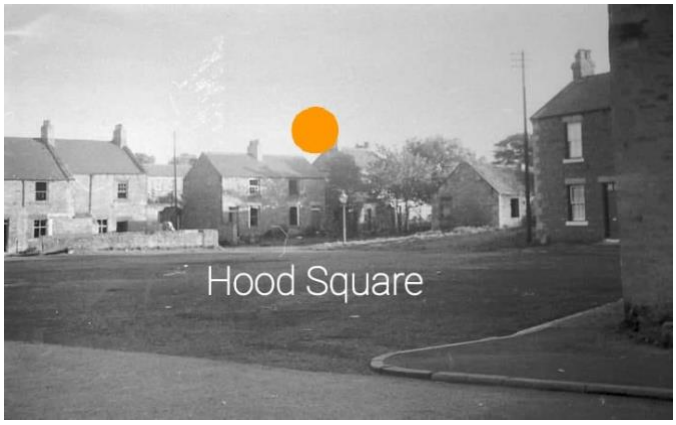
This book describes a number of school visits arranged by Form II of the Intermediate Council School Blaydon on Tyne[1]. Its title describes the nature of these visits. COAL AND BLAYDON has been used to illustrate the interaction of industrial and human elements. The staffs of the industries showed a praiseworthy desire to assist and gave opportunities for individual inquiry.

The inspiration of these corporate activities reveals itself in the written accounts. This work was sectionalised and a large number of children were encouraged to contribute. As preparation for the visits a number of industrial scrapbooks were made and the class concentrated on the working conditions of local miners. Pictures were brought and preserved for reproduction in the finished book. Arrangements with the firms concerned were carried out by the children and the correspondence filed. The artificial class exercise so frequently associated with this form of expression was avoided by the practical application of a branch of English study which was now purposeful and sincere. Throughout the enterprise there was frequent opportunity for discussion and the whole venture must have provoked in the children a new and vital interest in their immediate environment and in the world outside of school.

Contributors: the following boys and girls assisted in the making of this book:

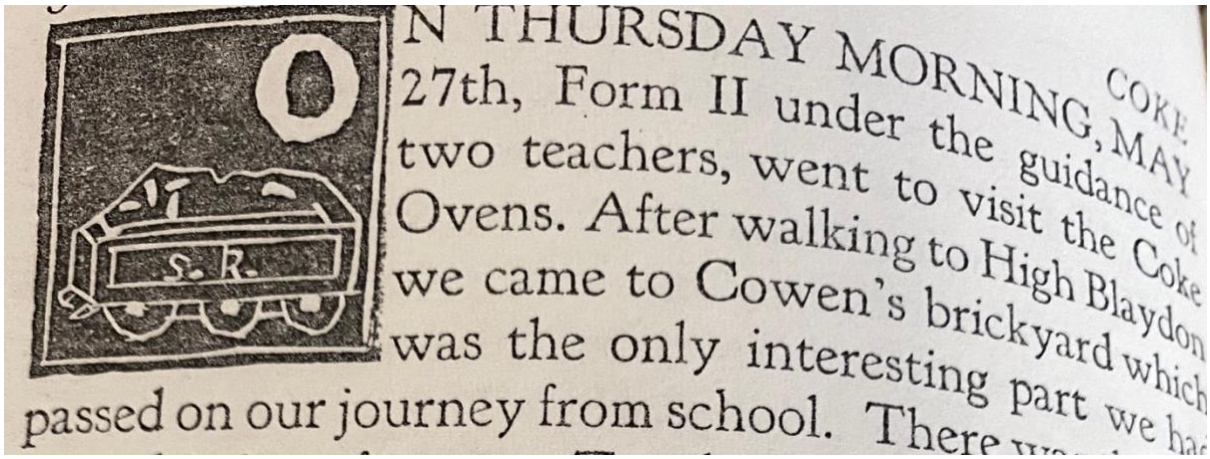


Joseph Turnbull
Matthew Carruthers
Gordon Curry
Raymond Hamilton
Thomas Parker
Raymond Wilson
Sidney White
Gilbert Driver
John Armstrong
William Sparrow
George Bryson
Stewart Dobbie
Robert Forster
Mary Liddle
Dilys Morton[2]
Betty Ross
Jennie Birkett
Jean Pells
Annie Dresser
Dinah Forster
Margaret Forbes
Gwen Short
Caroline Wharton
Mary Sanderson.



Dilys Morton was born in 1921 to pitman Jack Morton and his wife Annie, nee Gilfillan. The family lived in a littles stone cottage in Hood Square, roughly where the library is now, facing the forge. Next door lived Annie Gilfillen's sister with her daughter, Joan Meadowcroft: the cousins are shown in the photo above. The girls were friends with Betty Ross, who lived at Litchfield Terrace.

Information and photographs courtesy of Heather Gilfillan Shukry (who is related to Dilys's mother) and Vyvyian Goodall Webb, whose mother was Dilys's cousin. (Vyvyian's grandfather was the brother of Dilys's father Jack, both pitmen who had been born at 21 Front Street, Winlaton). The family photo shows Dilys bottom left, with her parents, aunts and uncles, including Heather's father.



COKE

On Thursday morning, May 27th, Form II under the guidance of two teachers went to visit the coke ovens. After walking to High Blaydon, we came to Cowen's Brickyard which was the only interesting part we had passed on our journey from school. There was the constant hissing of steam. Trucks were numerous on the lines running through the brickyard and the clanking of the crane and the din of men riveting were terrific.

After walking a little farther we came to a small waterfall spanned by a small wooden bridge. Some of the girls stood at the end of the bridge and looked over it onto the small waterfall. It had not a very tempting smell and the spray was not very high but all the same there were shouts of delight. We went up by the side of a stream which spoilt the colourful scenery around about it. In the treetops in the wood on one side of the stream we could hear birds twittering. We stepped along by the side of a railway line for most of the way and came to another waterfall which was a greenish yellow and then as we looked high up the opposite bank, we saw the Otto Works and realised why the oily water was such a peculiar colour. We also noticed the oily water was boiling hot and turned into cold dirty brown water farther downstream.

Arriving at the first flight of steps we climbed them and at the top we could get a good view of the works we were going to visit. Walking to the offices we were divided into two sections, a teacher being with each one. Descending a small flight of stone steps, we entered a small brick building, inside of which were a number of glass bottles and test tubes filled with samples of the by-products from the works. This place was called a laboratory and was the brains of the plant. Samples of the greatest to the smallest pieces of coke were tested before they were sold. In a glass beaker on the side of one of the benches were a number of thermometers being checked because it is essential that all these thermometers should be correct. The guide next showed us a powder called sulphate of ammonia and artificial manure exported to all parts of the world. Lifting two bottles from one of the shelves the guide told us that the liquid in the first bottle was crude benzol and the liquid in the second was refined benzol. The crude benzol was of a clayish colour whereas the refined benzol was as pure as tap water. Before this benzol is ready for motor use it is blended with petrol. On the opposite side of the burn stream could be seen a number of tanks for storing benzol and it was from here that the big benzol motors distributed it to the petrol stations all over the north of England.

To make good coke the works have to mix several different kinds of coal, half of it being local but all of it from Durham. This mixture of coal is ground to a fine powder and taken to the top of a building by a belt fitted with pockets. This is called an elevator. The fine coal is then stored in a big hopper under which runs a light railway and later it is transferred when required to the ovens along the top of which it is run in the small iron trucks. Halting at an oven, the charge hole lids of which are then removed, the fine coal is run from the trucks to the oven beneath.

While we were walking past these big ovens the guide stopped us and said if we waited a few moments we would see one oven being emptied. Along to the oven that was going to be emptied came two men who with hammer and chisel knocked the hard clay away from the sides of the doors. After this was done a crane lifted the doors from their places and there was a red hot chamber 33 feet long and 8 feet high full of red hot smoking coke. From the far end of the oven a great ram pushed the red hot coke onto an iron covered bench in the open air. The gigantic wall of red hot coke moved slowly into the open and it was gradually knocked down by men with long gripes when it was 20 or so feet from the oven into the open air. It was then sprayed with water from several hose pipes and cooled as soon as possible. The water had no sooner touched the coke than there was a sharp hiss and following this a cloud of steam ascended into the sky.

After the coke was cooled it was wheeled away and tipped into waiting trucks. Into the oven were put seven and a half tonnes of coal and out of it came a little less coke. The retort could hold more than seven and a half tonnes of coal but space had to be left for expansion and the evolution of gas. As soon as the oven was emptied it had no time to lose its heat because it was filled straight up again with coal from the little tubs running along the top of the ovens. No sooner had the top of the ovens been lifted than clouds of smoke and huge flames belched forth from the inside and after nine tubs had emptied their contents into the oven the cap was fixed on and the coal was left for thirty hours.

Matthew Carruthers describes the operation from the interior of the rammer. From a kind of railway van a long rod with a slab of iron riveted onto the end is forced into one end of the oven where it pushes out a hazy mass of coke. To prevent it from burning away to ashes a hose with a strong jet is applied. The walls of the now empty oven are sizzling red hot causing the air to quiver as it would in the eyes of a drunken man. These chambers hold seven and a half tonnes of coal but only five and a half tonnes of coke are got out. Now let us have a look at the rammer's interior. Big cog-wheels connected with each other begin to move when power is applied. There is a terrible vibration and clanking as the cog-wheels revolve. The tin covering appears to join in the clatter. Even the electric bulbs dance dizzily from suspended wires. A strange lull overwhelms the ram just like that before the breaking of a storm. The clanking cogwheels are reversed and the ramrod is withdrawn. The power is switched off and the machine is ready to tackle another red hot chamber. Two rams are employed and another is kept in reserve in case one of the others should be disabled.

The gas from the coal is led from the ovens by an ascension pipe and then into a hydraulic main. In this hydraulic main some of the gas condenses to liquid form and it is led by a pipe to a tar well. Collecting on the top of the tar is a quantity of ammonia liquor which is skimmed off.

After passing the tar wells the gas is still warm and it is passed into air coolers. These are long cylinders about forty feet high and nine feet in diameter. Large pipes run through these cylinders. As the gas passes through the cylinder the air in the pipes becomes heated and rises upwards. Cool air enters at the bottom and flows upwards just as air does in a chimney. The air circulating through the pipes cools the gas in the cylinders. Leaving the air coolers the gas passes into the water coolers. The gas now passes over pipes in which cold water circulates and the gas is thus cooled to a temperature of twenty degrees centigrade.

We proceeded into a large brick building with a tiled floor. Not a sign of old tackle and not a sign of old litter lay around. In short everything was “spick and span”. Big massive and modern machinery was working incessantly. One machine never stops pumping gas through the pipes. If it did a reserve machine would carry on. Pistons moved with scarcely a sound, creak or groan. Oil could be seen listening and rippling on vital parts. A modern and enthusiastic mechanic who takes a pride in his work and machinery would feast envious eyes on such structures. This was the heart of the plant for gas was drawn from the ovens and also pumped farther on its way.

The scrubbers are used for taking ammonia out of the gas. Each scrubber is a tall iron tower twenty-five feet high. At the top of the tower is a tank full of water which is used for washing the gas and at the bottom is a tank in which the ammonia is collected. The sink at the bottom can be lifted off and inside can be seen the ammonia liquor which has an unbearable smell. Inside each scrubber are wooden boards arranged in crisscross fashion. Here the gas passes up the tower and as it zig-zags upwards the water from the tank drips slowly. This extracts the ammonia which dissolves very quickly in the water. The gas passes out at the top flows down a pipe and into the bottom of the next scrubber. The ammonia liquor collects in the ammonia well.

The benzol scrubbers on the same principle as the ammonia scrubbers. In the ammonia scrubbers water is run down to take out the ammonia but in the benzol scrubbers creosote oil is pumped to the top of the tower and run down. As it is running down the gas is going up and as the gas passes through the creosote oil the oil takes out the benzol. Before the creosote- soaked oil is taken to the benzol scrubbers it is cooled by running through water cooled pipes.

The guide next showed us how the gas is burnt beneath the ovens to carbonise the coal. When we entered the passage underneath the ovens the heat was fierce. The guide told us that farther along the passage the heat was greater. In the roof of the stone passage were many small openings. Through this large iron tubes were passing. They carried the gas to the ovens and burned like a bunsen burner. When we looked up the heat above was simply terrific. All the time we wiped our foreheads. Even the man in charge found the heat unbearable. The air was simply suffocating. Some children thought they would faint. There was a heavy haze in the passage. The man down there had to stay down a whole shift.

We next come to the Benzole Plant where oil from the benzol scrubbers has the benzol taken out the oil is passed into a heat exchanger where it flows through pipes which run through hot oil. The heat exchanger heats one oil and cools another period the creosote oil with the benzol in it is then passed through three stills it gets hotter and hotter as it passes through. In the first still, benzol is given off; in the second still toluol and xylol are given off and in the third still naphthas are produced. The creosote oil is then cooled in the heat exchanger and moves to the benzol scrubber to take more benzol from the gas. The crude products are: benzol, toluol, xylol, solvent naptha, heavy naptha, naphthalene.

The products are then washed with sulphuric acid and neutralised with caustic soda to refine them and to remove all the acid. This is done in a washer lined with sheet lead because the acid would eat through the iron. The products are again distilled and are now known as refined benzol, toluol, etc. The products are then stored in tanks. Later they are pumped to the Benzole Distribution Depot. One of the first places to make Benzole mixture was the Otto Vale Works.

We next moved into the ammonia house. An awful smell of sulphur reached our noses as we entered. The floor was covered with green oil and I was slipping across the greasy floor at every step. A small blackboard screwed on the wall was covered with orders and most of the girls thought we were back at school. The air was stifling and we all began to cough because the ammonia was

irritating our throats but our guide was quite used to it. He began to explain the ammonia process to us. First of all the ammonia liquor was led through large pipes into two great tar covered tanks known as stills. The first still was heated by steam only and the second was treated with lime and heated with steam. At the far end of the room there were two sets of stairs or ladders onto a landing similar to a small wooden bridge across a stream. The guide asked us if we would like to go up onto the landing. We all agreed and as we tramped up the steps one by one I felt very excited. Near the top there was a large tar-covered tank. The top was open so that we could see what was happening inside. Inside there was a great amount of yellow substance. Our guide explained to us that the vapours passed into the tank which was full of suphuric acid. The whole mass of yellow liquid was heaving and boiling owing to the chemical action. As this part was very interesting we all stood round with our ears and eyes wide open. The thing that took my attention was that near the top of the tank was sticking a large mass of yellow substance. This looked just like yellow fungus.

Another thing that we were very interested in was the place where the sulphate of ammonia was being ejected from the tank. The sulphate of ammonia ran into the tank and when the sulphate of ammonia set, the acid ran back into the tank to be mixed with the other ammonia. After we had seen everything of importance, we walked along the platform to where two men were mending a metal tub. I wanted to stay and see what was happening but I was told by the people behind to hurry up because there was not much time to linger and they wanted to see as much as possible. We descended the next set of ladders and as we were behind, we had to run into the next compartment where the guide and the rest of the party were waiting.

All around the three sides of the room were sacks filled with ammonium sulphate and ready to be sent to the Blaydon Manure and Alkali Works. There our guide told us that when the ammonium sulphate was wet the workmen shovelled it into a drier. We were then shown the drier which was busy drying some ammonium sulphate. This machine consisted of a large metal cylinder in which hot steam pipes revolved. As it was impossible to allow every person in our party to look up the inside works of the drier and see how the ammonia was dried, the guide allowed some to see the process while we were left to stand by. One thing I noticed was that at one side of the machine there was a small shovel. The bags were fitted onto the drier and when the lever was pulled back the ammonium sulphate was allowed to flow down the chute into the bag. Not far away from the drier was a small weighing machine on which the banks of ammonium sulphate were weighed. Having seen everything of importance and interest and as our teacher was talking to the guide, the boys were standing on the machine to see what weight they were. Much to their disappointment the boys could not move the weights because they were so heavy. As the time was late we were conducted back to the office and after thanking the officials and our guide for the enjoyable afternoon we left the Otto Vale works with our minds filled with the processes we had recently seen.

TAR

On Thursday May 27th 1937, a number of school boys and girls of Form II visited the Tar works at Blaydon Burn. Marching from the school in crocodile formation they passed a party of workmen pulling down houses at the entrance to the Horsecrofts and on either side of the road stood hideous works. People who saw this band of pupils stood amazed. The girls were a little shy and commenced to walk in threes and fours while the boys walked ahead of the girls, probably afraid to be seen walking with them. Passing through the Horsecrofts, the children under the care of two teachers came in sight of the Blaydon Brick Works with its smoking chimneys and large almost toppling stacks of white bricks. The girls, who walked well behind the boys, were careful they did not dirty their shoes or clothes on the rusty railway lines. Once or twice the teachers halted the boys because they were ahead of the girls. The fragrant smell of the country air, the smell of leaves, the golden sunshine and soft breezes were all very pleasing to the company. In the distance on top of a green hill was the base of the Garibaldi monument.

On we marched leaving the brickworks behind till at last we came to the steep wooded hillsides of the Burn Wood where we crossed a tiny narrow bridge that spanned a small rippling stream with a waterfall laughing merrily as the water passed over the cataract and went on its way to join the River Tyne. On we trod talking and laughing amongst ourselves passing small bridges, miniature waterfalls and tiny streams running down wooded hills into the main stream till a flight of wooden steps came in view. When we reached the top of the steps we were greeted by a group of smiling work men. We were just about to cross the railway lines when an engine puffing and snorting came past and we stopped until it was safe enough to cross the railway lines. The ground was sodden with tar but at length we reached the wooden laboratory and it was there we were warned about walking carelessly about the Tar Works.

When we entered the laboratory, we noticed rows of bottles with some very peculiar liquids in them which we were told were some of the products from tar. First of all we were shown a dark brown liquid called crude naphtha. We were allowed to smell this and it was very strong and peculiar. This crude naptha has in it benzine, solvent naptha and toluene. Benzine or as it is commonly called, benzol, is used as motor spirit and it is very popular among motorists. Nitro-Benzine, manufactured from benzol, has an almond-like smell and is used for both scenting soap and high explosives. Aniline is produced from nitro-benzine and is used for dyes and drugs. From toluene, which was mentioned before, we get TNT, a high explosive. Next we were shown solvent naptha used for paint varnish and rubber solution and high flash naptha which is something similar to the former. Another product is carbolic oil from which is produced naphthalene, carbolic acid and light creosote. The former is used for mothballs and dyes but it has to go through many processes before it is ready to use. When it is first got from tar it is in solution in the carbolic oil. The oil is cooled and the Napthalene is deposited in crystals. These are put into a whizzer which removes any oil clinging to them. After this it is put into bags where it is kept until needed for refining. Anthracene, another product, goes through the same process as the Naphthalene but is a light green coloured crystal and is used for dyes.

It is necessary to wash the carbolic oil with caustic soda to extract the tar acids it contains. It sounds rather funny washing a liquid but it is quite true. The two liquids are shaken together and when the product has been properly washed the caustic soda solution, which is heavier, goes to the bottom and the oil comes to the top and so they are separated. The caustic soda solution contains the tar acids and on adding mineral acid this combines with the caustic soda and releases the tar acid from solution and they separate in the same way as the oil does on washing with the caustic soda. We were shown many other products some of which are:- crude tar bases, crude pyridine, picric acid and creosote which is used for pickling timber. The crude tar acids consist of carbolic and cresylic acids which are used for explosives, disinfectants, drugs and artificial resins such as Bakelite from which cups, saucers and ashtrays are manufactured.

When we passed from the laboratory I thought it would be impossible to learn anything about the tar works because of thousands of thick and thin pipes running overhead and along the ground and here and there appeared to be a leaking joint where the steam was hissing out with great force. This and the noise of the machinery made it very difficult to hear our guide talking. The party was split up into three smaller parties each led by its guide. The first thing we saw was the large tank in which was stored all the tar from the coke ovens until it was needed. We then walked down the path leading to the preheaters and stills. The path was covered with soft waste tar which made it very comfortable to walk upon.

When we reached the pre-heaters, we found that the crude tar from the Otto Ovens is pumped into them and then into the still like a big dome upside down where it is heated by a very hot fire until vapours are given off. The vapour comes back through the pre-heater in a circular pipe which goes round and round the inside of the pre-heater so that the vapour is cooling but it is also heating the crude tar which has just entered the pre-heater. The vapour that has not condensed then goes into the condensers where after condensing it runs into storage tanks through various pipes according to the fraction being collected. At different temperatures various gases and products are given off. After the first products have been driven off the pipe along which these were running is closed and at a higher temperature another fraction comes and this goes along a different pipe. This procedure is continued until all the oil fractions have been distilled from the tar and collected in the various storage tanks.

There is then left in the still molten pitch which is run out by means of pipes into a pitch bed where it sets hard on cooling. Some special pitch is used in Norway where aluminium is made. It is used to make carbon electrodes along with other carbonaceous materials which can stand the great heat of the electrical process which is needed to make this metal. Fortunately a bed full of this special pitch was set and we were able to walk on top of it. The fumes from molten pitch are very irritating to the nose and throat. As we walked over the pitch bed we made a noise just like people walking on frozen snow. The ordinary pitch is often sent to countries abroad. The pitch is crushed to a powder then mixed with coal dust and heated until it becomes pasty. It is poured out into moulds and allowed to set as small bricks. This mixture is used instead of coal and the fuel blocks are known as briquettes. Some of the pitch can be made into Sett Grout which is used for repairing roads. The Sett Grout is moulded into blocks and can be melted down when needed. Tar is also used in the manufacture of tarmacadam for road making and also for spraying on road surfaces granite or Whinstone chippings being spread on the coating of tar to form a good non-skid road surface.

Next we went into a little cabin which has two vertical pumps but only one of these pumps was working because the other is held in reserve. These pumps pump 600 gallons of water an hour to the boiler from the dam below in the burn. The man who was in charge of the boiler was busy stoking it and the wind caused the smoke to gush back out in thick clouds from the boiler door and nearly choked the boys. The girls escaped by running out into the open air at first sight of the smoke. On the front of the boiler is a water gauge in a glass tube which shows the level of the water in the boiler. Gas is also burned in the boiler furnace at the rate of 5,500 cubic feet per hour to get the necessary heat to produce steam under pressure for driving machinery. Below the fire grates of the Tar Stills is a steam pipe which forces steam along at great speed to create a draught to make the furnace burn brightly.

After having a good look at the blazing boiler furnaces we passed outside into the most refreshing air. “Phew! What a relief!” said our party as our noses sniffed the sweet air after being in that exhausting boiler room. We then moved along a path which ran through the most horrible smelling shed we could have possibly encountered. The hot boiling tar, the tarry fumes and the filthy water

made matters much worse. This smell did not trouble our noses very long for the glorious sunshine greeted our eyes again after about a three minutes journey through that most torturing atmosphere.

Getting out of the shed we crossed over a long narrow path and into the crushing mill. Entering the mill we saw a huge machine made-up of wheels and belts. The mill is used for the grinding of limestone. When the limestone is properly ground it is like a fine face-powder. At this stage the limestone is put into hundredweight bags and sent to be sold at the big road-repairing firms. Bitumen from the Trinidad pitch lakes is also ground in the mill and it is then mixed with limestone and pitch to make Sett Grout which is used for the laying of the wooden blocks and granite setts on the roads. There are some on Scotswood Road, Newcastle. We then went into the neighbouring room where we saw the high-powered electric motor which drove the mill. Our guide told one of the workmen to set the motor going. The noise was terrible when the motor was whirring at 1,400 revolutions per minute. We were glad when we passed out of the mill to leave the deafening noise of the revolving machinery. Our teachers had a little talk with our guides, thanking them for what they had done for us. We scuttled away from the smell of tar to the smell of fresh air.

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[1] This school opened in 1891 as Blaydon Board School, Boys Department. Following the transfer of responsibility for schools from School Boards to Local Education Authorities in 1904 it became a Council School. In 1909 Blaydon schools were reorganised when new Junior schools were opened to accommodate children aged 7-11. This school then became Blaydon East Council Senior Boys. In 1929 Blaydon East Senior Boys and Senior Girls merged to form Blaydon Council Intermediate. Following the 1944 Education Act the school's name was changed again, to Blaydon East County Secondary Modern. In 1967 the school merged with Winlaton County Secondary Modern Mixed to form a first stage comprehensive school, and Winlaton County Secondary closed. The change to fully comprehensive education was completed in 1971 with the merger of Blaydon East with Blaydon Grammar School to form Blaydon Comprehensive. Blaydon East ceased to exist as a separate school but the new Comprehensive continued to operate on 2 sites, and the Blaydon East site became known as the Bank Department.

Tyne and Wear Archives: https://discovery.nationalarchives.gov.uk/details/r/de4526e1-2a5c-4dda-9e7c-b8234a25548f

[2] After an appeal on Facebook, two relatives of Dilys Morton came forward provided the information and photos on page 2. Hopefully relatives of other children will be found.

A copy of this book is held in Gateshead Archive
Transcribed by Val Scully, November 2023