DEPARTMENT OF MINES.
SOUTH AUSTRALIA.

VISIT TO NEWCASTLE - AUSTRALASIAN INSTITUTE OF MINING AND METALLURGY, 2nd. - 8th. JUNE, 1957.

by

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INTRODUCTION

The writer was privileged to be an official delegate from the South Australian Mines Department to the annual meeting of the Australasian Institute of Mining and Metallurgy, held at Newcastle from the 2nd. to the 8th. June, 1957.

INSPECTION OF INDUSTRIES.

The following plants and mines were inspected, the writer choosing those of most interest to himself and likely to be of benefit in his duties as Inspector of Mines.

Newcastle Chemical Co. Pty. Ltd.

This Company is jointly owned by B.H.P. and I.C.I.A.N., and manufactures ammonium chloride and sodium sulphate from sulphate of ammonia and common salt, the latter being produced by solar evaporation at Whyalla, S.A. Ammonium chloride is used as a flux in zinc bath galvanising, and in dry battery manufacture. Sodium sulphate is used in the paper and glass industries. The Company also manufactures beta and pthalic anhydride naphthol, the raw materials being naphthalene, ex B.H.P. coke works, sulphuric acid from Cockle Creek, caustic soda ex I.C.I., Osborne, and salt ex B.H.P. , Whyalla. Beta naphthol is used to remove cobalt from zinc electryte in the manufacture of electrolitic zinc , and in the rubber industries. The principal uses of pthalic anhydride are

as bases for paints and varnishes. Some photographs were taken of novel fencing for machinery in motion.

Electric Lamp Manufacturers (Aust.) Pty. Ltd.

It is understood that all the electric light globes used in Australia are manufactured at this plant. Fluorescent lighting tubes are also made. Complicated machinery automatically blows and shapes glass bulbs to the final inspection stage of the finished product, but some manual work is done on reclaiming rejected bulbs. The labour employed is predominantly female. It was considered that the use of sandals and open-toed shoes by the girls on glass strewn floors was a hazard, but it was stated that very few cuts from broken glass were experienced.

Rylands Brothers (Aust.) Pty. Ltd.

Partly owned by B.H.P. Produces all sizes of steel ware from a raw feed of one inch to .212 of an inch hot rolled steel rods. Heat treatment followed by either air or lead quenching, is used dependant on the designed final product. Tungsten carbide dies are used with suitable lubricants such as lime or wet rust. Some wires are drawn after galvanising, and some are finally coated with tin, zinc, or copper. Barbed wire, wire netting, and nails are also manufactured. Photographs were taken of typical fencing for machinery.

Australian Wire Rope Works.

This Company, partly owned by the B.H.P., uses the wires produced by Rylands for the stranding of wire ropes. Stranded wire ropes are made from $\frac{5}{8}$ of an inch circumference to $6\frac{1}{2}$ inches circumference for mining, earthmoving cranes, naval, dredging, and other purposes. Ingenious machines strand the individual wires from their reels around a cotton, jute, or sisal core, suitably lubricated.

Burwood Colliery, B.H.P. N.R. Monger, Manager.

The leases cover 2,007 acres on land, and 1,461 acres of sea under which the coal is mined. A provision of the Mines Inspection Act prohibits mining under the sea except with a rock cover of 120 feet. All coal from this mine is transported to the surface by means of five sections of 42 inch conveyor belt, having an overall length of 2,230 feet, and inclined at 18 degrees to the horizontal. The capacity is 550 tons per hour at a belt speed of 420 feet per minute. The most interesting feature of this mine is the pillar extraction by the trackless (Super 14 B.U.) "Joy" continuous miners in the Victoria Tunnel seam. This unit cuts the coal with a 42 inch cut, the cutter head being moved up and down the face and from side to side by the operator through hydraulic controls, high pressure water jets preventing any dust nuisance. The cut coal is loaded by scrolls to the conveyor, and which discharges to a shuttle car behind the unit. The shuttle cars discharge by integral conveyor to five-ton bottom dump cars on the intermediate haulage, where battery locos take them to the main haulage line, where trolley wire locos transport 90 tons of coal in a rake to the 200 ton bin which discharges to the conveyor to the surface. The seam is being mined over a six-foot depth, and the deposit is practically horizontal. Roof bolting is practised, a band of poor quality coal being left to form the roof, and props are placed in position, closely following the coal extraction. To prevent intermittent operation, one shuttle car is permanetly located behind the continuous miner, and used as a surge car. This enables the miner to continue working while the shuttle car dumps its load and returns to the miner for reloading. Even so, there are smoe delays. Electric power is used throughout, and the coal produced is converted to coke at the B.H.P. steelworks.

John Darling Colliery.

Continuous miners are used in this colliery as well as the conventional coal cutting machines which undercut the coal, which is then bored and fired singly. Jeffrey L400 loading machines load the coal into 5-ton skips which are hoisted to the surface through circular vertical shafts. The section seen on the visit was fairly closely timbered, the roof not having good holding qualities. A fault with a displacement of about 40 feet adds somewhat to the mining problems. The seam being worked (Victoria Tunnel seam) is about ten feet six inches thick, and more or less horizontal. Electric power is used to operate the boring, cutting, and loading machines. The coal from this colliery also makes a good metallurgical coke. At the surface, stone and shale is hand-picked and discraded.

Newston Colliery.

This mine has been taken over by the Joint Coal Board, and fully mechanised. The seam is about 20 feet thick and dips at about 30 degrees, outcropping at the surface, the present operations being at a vertical depth of about 250 feet. The roof is conglomerate with good standing qualities, so much so that in the old hand mining days, 80 per cent of the coal was extracted, which is a high figure for the Newcastle field. Timber is only used for the purpose of attaching hessian brattice so that ventilation may be controlled. Trackless mining is the order, the coal cutting machines being caterpillar tracked and connected to power lines as are the shuttle cars which discharge to the conveyor system to the surface. Man cars are battery operated. The guide (a deputy) stated that it was intended to attain 100 per cent extraction, but this would be difficult with the good standing roof, and it was most likely that the roof would have to be fired to ensure caving, otherwise with an unsupported area, sudden collapse could occur, endangering

life with the subsequent air blast. The deputy did not know whether hydraulic filling had been considered nor whether there were any large dune sand deposits in the vicinity which could be used for the purpose.

The coal is high quality steaming fuel and from the main conveyor ex underground the coal passes through a washing plant which incorporates heavy media separation, the shale and stone being automatically removed. Employee comfort has been well catered for and the neat and clean offices and changehouses, and the spacious lawns and bowling greens have a most pleasing appearance, contrary to the generally accepted ideas of colliery environment.

Aberdare Extended - Cessnock.

This section of the field was not included in the official programme of visits, but Mr. A.J. Hargraves, lecturer in Mining at Sydney University, organised a trip. The writer was accompanied by Messrs. G.F. Mead of the Bureau of Mineral Resources, Melbourne, T.L. Knight, Senior Geologist, Victorian Department of Mines, and H.F.C. Nevill, Senior lecturer in Mining , University of Melbourne.

The seam of high quality gas making coal being mined here is about 20 feet in thickness and dips at about 35 degrees. The headings or bords are driven at about ten foot height and the mechanical extraction of pillars plus the further ten feet of roof coal is now being done. The refusal of the miners' union to work afternoon shift is the subject of a case now before the Coal Tribunal. In the Cessnock field particularly the coal is subject to spontaneous combustion under pressure, therefore the rapid extraction of pillar coal is essential for maximum recovery. Mining is by the conventional boring and firing of breat holes in the roof, the cutting of coal in the pillars, and mechanical loading into shuttle cars which discharge to a belt conveyor. The conveyor discharges into skips or tubs at a central location, and tubs are hoisted up an incline by endless rope haulage.

A most interesting feature was the device by which man cars are raised and lowered on the incline. The cars are attached in tandem to a winding rope, and the driver in a unit attached to the man cars operates the winder at the surface through a 32 volt overhead trolley wire, rendering the employment of a winding driver unnecessary. The Joint Coal Board is opening up a quarry and crushing plant with the intention of obtaining material for hydraulic fill. It is hardly conceivable that the quarrying, crushing and transport of this material will be economic from the point of view of the individual mines, and alternative schemes have been suggested, e.g.,

1. A conveyor to Newcastle to transport coal one way and return silt dredged from the harbour.
2. The pumping of sand in suspension from dunes on the coast.

However, any scheme which will increase the past low per cent of extraction from this field will be warranted from the National angle of conserving the country's natural resources. Many millions of tons of coal in pillars will never be recovered.

B.H.P. Steelworks.

A half day was spent on a visit to this plant. A further blast furnace is in course of construction, and it was noticeable that all employees engaged on this work wore safety hats. Apart from the installation of further units, the operations appeared to be the same as seen some 16 years ago. It was felt that the time could have been put to better use by a visit to Stockrington, or Stockton Borehole Colliery.

TECHNICAL PAPERS.

General

Two afternoons and one evening were devoted to the presentation and discussion of technical papers. As the

subjects of geology, mining, and metallurgy were concurrent, choice was made of the following mining subjects:-

Continuous Miners in Pillar Extraction. N.R. Monger and C.H. Martin.

This was a most interesting technical paper and also described how the Company prepared for the work while gradually wearing down resistance of the miners to the mechanical extraction of pillars.

Cable Belt Conveyor and its Application. E. Hewett.

This most interesting paper and accompanying film described the application of the Cable Belt Conveyor. This unit is designed for long continuous belt conveyors. One unit in Scotland, 2,400 feet in length has replaced three conventional conveyor belts. Units up to 8,500 feet in length are in operation. The capital cost is such that they are only economic when replacing several conventional units. The principle of the invention is that the steel cables serve as the transmission media, and the rubber belt only has to carry the material being transported. The belt has a thick moulded edge into which grooves are formed to receive the steel cables. These grooves are on both sides to take the loaded belt and the empty return. At the head and tail pulleys, the ropes leave the belt and are guided over separate tension units, picking up the belt on the return. It is considered that the belts may well have their advantages on the coal fields.

Tungsten Carbide in Mining. A. Howard and C.T. Gunderson.

This paper traced the advances made in the technique of the manufacture, use, etc., of tungsten carbide inserts in both detachable bits and integral steel. Actually the paper was a highly technical engineering and metallurgical subject, and the problems still facing the makers were also discussed. The writer regrets that he was unable to visit

the Titan works to see the manufacture of these bits.

Symposium on Safety. J.E. Lewis, of B.H.P.,Newcastle, G. Dey, late Safety Officer B.H.A.S.,Port Pirie, and L.L. Mansfield, Inspector of Mines and Quarries, S.A. Mines Department.

These papers were well received and evoked a wealth of helpful discussion. Mr. Lewis spoke on the results of safety campaigns at the Steelworks. Mr. Dey spoke on the moral responsibility of the employer to protect the workers, and the writer on the economic advantages of safety, claiming that safety could not be divorced from efficiency, and that the accident statistics of a mine were a measure of the efficiency of the management.

SOCIAL FUNCTIONS.

The social side of the gathering was not neglected, and included a welcome at the Newcastle City Hall by the Institute President and Branch Chairman; a Civic Reception and Presidential address; official dinners given by B.H.P. and the Northern Colliery Proprietors Association, at the latter a lecture was given by Sir Ian Clunies Ross; and a further concluding buffet dinner and dance by the Institute. Advantage was taken at these functions of meeting other mining men and the discussion of problems and achievements. Lunch was also provided at visits to John Darling Colliery, the Steelworks, Newston Colliery, and Aberdare Extended Colliery.

SYDNEY VISITS

Mines Department, Sydney.

The morning of the 10th. June was spent with the Inspectors of Mines - Mr. Whalan, Chief Inspector, Mr. Hadley, Senior Inspector, and Mr. Reid, Inspector of Mines.

The New South Wales Department has been working along similar lines as the South Australian Department on the question of the seismic effects of quarry blasting in built-up areas, some homes in Sydney suburbs being in very close proximity (100 feet), necessitating limitations being placed on the quantity of explosives per delay by the Inspectors. Results in Sydney confirm the work by the Inspection Branch in this State. The Sydney Inspection Branch is very satisfied with the operation of their scheme for powder monkeys' certificates, and the South Australian Branch is now considering the question of incorporating such a scheme in the new regulations being prepared. The New South Wales Department were particularly interested in the water spray method of suppressing dust in crushing plants in South Australia.

Division of Industrial Hygiene.

The afternoon of the 10th. June was devoted to a discussion with Mr. H.M. Whaite, Scientific Officer of the above Department. The Mines Department Inspectors in New South Wales, particularly Sydney, do little or no work on dust counting, this duty being attended to by Mr. Whaite's department. In Adelaide, however, Mines Department officers have been called on to do dust sampling for other State Departments, and in two cases for Commonwealth Departments. It was satisfactory to know that the South Australian Department had purchased and adopted dark field illumination of the Watson-Victor Konimeter before the Division of Industrial Hygiene in Sydney.

ACKNOWLEDGEMENTS.

The writer wishes to express appreciation of the recommendations of the Chief Inspector and the Director of Mines that he be an official delegate to the Conference, and of the action of the Hon. the Minister of Mines for his approval of those recommendations. The visit was highly instructive and enjoyable.

21.6.57

INSPECTOR OF MINES AND QUARRIES.