A3424 / B1.43.4

EFFICIENCY WAGE EQUATION

Resistance to incr. Output — by Wankies AGM. A Goerz & Co. June 1962

Rand Daily Mail - 29 June 1912 : A Goerz & Co.

WHITE LABOUR

With regard to skilled labour, while 1910, compared with 1909, showed an increase of nearly 3,300 white employes on the mines, there was a small decrease in 1911, namely, 171, as against 1910, but this is of no importance. Many complaints are, however, received relative to the quality of this labour, particularly as to its efficiency. Whether this is due to a want of knowledge on the part of the men, or to other causes, I am unable to venture an opinion, but I would like to express the earnest hope that, on close investigation, allegations such as have reached me lately, which would point to a kind of conspiracy to do so much and such quality of work and no more, will prove wrong; such tactics would certainly not prove to be in the best interests of the white employes on these fields. Notwithstanding what agitators may say, it is a well known fact that the mines have for years shown a keen desire to employ white labour in ever-increasing numbers.

In support of this assertion I will quote the official figures as obtained from the Mines Department. For the period 1907-1909 the ratio of coloured to whites, taken on the yearly average number of employes, is found to be 9.3 coloured to one white, while for the period 1910-1911 this figure was reduced to 7.7 coloured to one white. I think the white employes would be well advised not to make the employers repeal this policy—they (the employes) would be the sufferers from a change.

Miners' Inefficiency of 1907.

White skilled labour more expensive & less efficient
highest wages — Australia 30 - 40% lower & efficiency
greater [H.E. vol 134, Evans Pelle book, S Evans to
F. Eckstein 25. 2. 07.]

Phillips – Efficiency Drive – no wage reductions or contracts – Jan. 1906

Jan 1906

Phillips – Incompetent Miner – Variations in Wages earned – No reduction in Wages or Contracts – Yet!

(CHA, W.L.F. L.Phillips to Lord Selborne, 18 Jan 1906)

Phillips on the incompetent miner:
I find that in mines where contractors are making as much as £70, £80 and£90 per month per man, the cost of winning ore is less per ton than in mines where the contracors are on only making about £30 each per month. The explanation is that where the contractors are doing badly they are extremely incompetent miners, they waste labour and explosive, and derive small benefit themselves, but nevertheless cause and undue inflation of the working cost per ton. The fact is that there is a great scarcity of competent underground miners. The inferior workmen are naturally the confirmed grumblers, and they frorm a considerable army of white men, who are constantly changin their place of occupation. The scarcity of white men is , however, so great that they are able to throw up their billets without hesitiation, because they can immediately get another situation at an adjacent mine.

Agrees with Selborne about attracting a better class of men, and making positions more attractive by having homes and billets on the mines

../.An enterprising contractor, who knows his business can, for a man of his class, do extraordinarily well in the gold mines, and in my opinion all our efforts must be directed at present to securing greater efficiency, rather than to endeavouring to make savings by a reduction of the rate of wages ro the scale of prices for work done by contract...

Efficency equated with wages. – More Wages earned – more efficient miner — 1907.

TG. 2 1908, p. 316, q. 60637, evidence of Eldw... Moore who disputes this.

ELSEWHERE

Cond^ns unparalleled in any other part of the world re enormous mortality Nov. 1916

E.H. D.

SC. 10, 1915, p. 555, q. 3885, ev. Clifford & Wilkinson.

In S.A. we are dealing 'with conditions unparalleled in any other part of the world in regard to the enormous mortality among workers underground'

Beit Memorial Trusts – see Research Fellowships

Irvine & Watt. 1912.

Typical Chronic Disease of England – Miners' Asthma, miners' bronchitis

T.M.J. Sept. 1912, Irvine & Watt, p. 38.

This is the typical history of a case of miners' phthisis as it is seen in the more rapidly progressive type, found especially amongst rockdrill miners. In certain other miners, who have been less exposed to dust but have spent many years underground, the symptoms and signs are less extreme, and approximate closely to those of emphysema with a chronic bronchitic asthma. This is the type of the disease known in England as 'miners' asthma' or 'miners' bronchitis,' and it is more commonly seen in older miners from oversea. It is, however, simply a more chronic form of pulmonary fibrosis.

Dust Cond^{n}s Waste.
Rock Drillers Tut. — Cornwall
47. 4.7 yrs. 17. 8.4 years.

Haldane Com^{n}. p.18.

Oliver — Haldane Cont^d — + Compared Tox. — Cont^d's Cornwall. — 1905

In corroboration of the statement that dust, especially that given off by machine rock-drills, is the cause of miners' phthisis, let us consider briefly the fate of the tin miner in Cornwall. The tin miners of Cornwall have had for many years an unenviable notoriety for a high mortality from lung diseases. [Until 1892 this was specially true of men above 40 years of age, but since that date, and especially within more recent years, there has been an enormous increase in the death-rate from phthisis of the younger men between the ages of 25 and 40.] The cause of the high death-rate of Cornwall miners is to be found in the occupation. Tin miners in drilling a hole upwards have often to breathe an atmosphere containing as much as 14 mg. of dust per cubic foot of air. Machine drills always give off more dust than those worked by hand. The average age at death of Cornwall miners who did not work the machine drills was 53 years, while that of the men who had worked drills was 37.2. [Comparing the death-rate of these men with that of men engaged in other mining operations, it was found by Haldane that the death-rate among machine men from disease of the respiratory apparatus was about thirty times, and the total death-rate about ten times, as great as that among colliers and ironstone miners of the same age.] Of 142 rock-drill men who died in Cornwall, 120 were certified as having died from miners' phthisis and 13 from other forms of respiratory diseases, whereas among the other miners not engaged in rock-drilling, of 178 deaths 68 were ascribed to phthisis and 48 to bronchitis.

To Cornwall just as to Northumberland several miners have returned from the Transvaal, many of them only to die. The average number of years worked by rock-drillers in Cornwall was 8.4. Those who had returned from the Transvaal and worked in the Rand mines alone had only spent 4.7 years in rock-drilling, while the length of time spent in the same occupation by men who had worked both in Cornwall and the Transvaal was 11.6 years. The fact that in the Transvaal the average length of time a rock-driller followed his occupation was 4.7 years as compared with the 8.4 of the Cornwall miner is proof of the disastrous condition of things that until lately prevailed in the Rand mines.

p.8 p.8 p.14 pp.15 16 p.16 p.18 Table 17.

Oliver, An address, 1905, p.920.
B.M.J. 14 Oct. 1905.

Confirms general opinion among miners that the Conditions under wh. rock-drill work has hitherto been carried Out have been far more detrimental to health in Transvaal than in Cornwall mines.

Haldane Commission — NB. effects of Rock drill work in Tvl. — Consid. nos. in Cornwall too Contradictory.

F.R. of Mining Regs. Com^n vol. 2, ev. p. 239, Irvine.

Dr. Haldane and his colleagues, speaking of Cornish miners in 1903, add to the general conclusion that "the recent increase in the death-rate has been due to the deaths of men who have worked rock drills," the important qualification that "the great majority of the deaths were attributable to the effects of rock drill work in the Transvaal and elsewhere abroad," although "a considerable number are attributable to work in Cornwall." Elsewhere they state that "the recent rise in the death-rate is mostly due to the effects of work in South Africa."

} Haldane Commission, p. 9.

On the other hand, an unusual proportion of men who have returned from the Transvaal have been employed in Cornish mines during the last seven years, and this has doubtless increased the death-rate. p 18.

death due to lung disease - Cornwall only 17 — 8.4 yrs. av. rock drill employed
" " " " Transvaal only 47 4.7 yrs " " " "
" " " " Tvl + Cornwall 18 11.6 yrs " " " "

p. 18.

ie rock-drill work in Tvl more detrimental to health than Cornish mines, p 18.

As so many Cornish miners have died, and are dying, from the effects of work in the Tvl mines — ~~& Tvl~~ p. 31.

quartz dust. 1902.

Dangers of Dry Drilling and Promiscuous Blasting - fully recognised
(Mining Journal 19 July 1902, p. 996.

practical miners, engineers. — correspondence. to press.
need for water.
~~deficiency of air~~. even quartz.
air from drills with promiscuous blasting
promotes dust in suspension

Tuberculosis - see Phthisis Box Disease Phthisis + TB.

State Kept since 1875. gt. incr in lung disease Shiner 1908

MINERS' PHTHISIS AT BENDIGO.

From the pen of Walter Summons, M.D., comes an important contribution to the subject of miners' phthisis at Bendigo. The investigation extended over a period of six months, the Trustees of the Edward Wilson Estate bearing the necessary expenditure. The death registers of the district for the last thirty years only were scanned, as prior to 1875 machine rock drills were hardly employed. It is since the introduction of the machine as against the hand rock drill that gold mining has become a dusty and dangerous occupation. Since machine drills have come into use at Bendigo the number of miners dying from lung disease, especially tuberculous phthisis, has considerably increased, as has also the mortality from chronic bronchitis and pneumonia. The total deaths from lung diseases has risen from a rate of 77.0 to one of 191.6 per 10,000, due mostly to an increase in tuberculous diseases which represented by 48.5 in the first period now accounted for to 129.6. The increase is overwhelming and is "out of all proportion to the annual mortality rate from consumption among adult males." The death-rate compares unfavourably with Victoria taken as a whole, where the mortality has been of late diminishing. The mortality compares unfavourably, too, with the death-rate from phthisis among the adult non-mining population in Bendigo. Most of the miners who die from phthisis are men in the prime of life, and in recent years this has been more strikingly the case. The average age at death about 50, is higher than it is in South African miners. Dr. Summons gives brief clinical histories of several of the patients, and alludes to the insidious manner in which the disease commences and silently progresses. Frequent recurring colds and bronchitis are the early symptoms of the disease. The general health, however, remains good, and the miner continues to follow his employment for years, it may be. The men suffer from "black spit," which on examination is found to be teeming with staphylococci and putrefactive organisms; no tubercle bacilli are found in the early stages of the malady. Sooner or later the attacks of bronchitis are followed by dyspnoea, which goes on increasing until finally the breathlessness is so extreme that, despite the general health being good, the miner is unable to follow his employment. The dyspnoea is entirely respiratory and in no way associated with cardiac incompetence. At this stage of the illness the blood frequently contains a little more haemoglobin than usual and the red corpuscles are more numerous than in health. In discussing the physical signs Dr. Summers lays stress in the report upon the deficient expansion of the chest. A true fibrosis in its inception, the disease in the first instance is non-tuberculous. Subsequently tuberculous infection may occur. This reveals itself by an increase in the severity of the symptoms, by a rise of temperature, sweating, the presence of tubercle bacilli in the expectoration, and by the malady generally

Miners Phthisis in Bendigo — Walter Summons

British Medical Journal, Sept 28, 1907, p. 839

Average age [illegible] 1907

(2)

assuming a more serious aspect and running rapidly to a fatal termination. It is stated that 47 per cent. of the cases of miners' phthisis at Bendigo are tuberculous. A comparison is instituted in this respect between the prevalence of tuberculosis in the Bendigo miners and that in other countries. The last word on the relation of miners' phthisis to tuberculosis has not yet been said. The autopsies in every instance showed the presence of fibrosis of the lungs, thickened pleura and in a large number of cases tuberculous excavation. In dealing with the etiology of the disease, Dr. Summons expresses the opinion that the principal cause is dust, but the high temperatures in which the men work and the subsequent chilling of the body, the effects of breathing a vitiated atmosphere when in the mine, and the influence of the home and public resorts are all discussed. In the way of prevention, consumption homes are recommended. If the miners, especially those in whom the disease is well advanced, were sent to these homes, not only would the consumptives themselves be benefited and their life prolonged, but their families would be protected. The conditions in the mine should be improved, dust kept down by the spraying of water during rock drilling, ventilation of the mines made more perfect, and the personal hygiene of the infected miner as well as the disposal of his expectoration carefully attended to. Tuberculous cases should be notified. If suspension from work follows notification, the hardship experienced by many miners will be great unless some fund is provided to keep the infected miner in the sanatorium and to maintain his family while he is there. This, of course, only refers to those cases of miners' phthisis that are undoubtedly tuberculous. Dr. Summons is to be congratulated upon the excellent piece of work he has done, and his valuable contribution to the literature of miners' phthisis.

1 Reports of an Investigation at Bendigo into the Prevalence, Nature, Causes, and Prevention of Miners' Phthisis by Walter Summons, M.D., B.S. Melbourne: Stillwell and Co. 1907.

no H.P. like this. Even Rock drills.

Elsewhere. — head Mines — Laxey & Snaefield Isle of Man.

Milner's Com^{n}, p. 58, q. 44, ev. Dr. E.A. Miller, District Surgeon, Boksburg.

p. 59.

q. 422 There tuberculosis is

q. 425 This Miners Phthisis is totally different.

I

414. Will you make a short statement?—Yes. I was Medical Officer to two lead Mines for nearly ten years at home, the great Laxey and Snaefeld Mines where rock drilling was carried out in practically the same manner as in the Mines here and, during the whole ten years, I never saw a case of Miners' Phthisis such as I have heard described in this country. I have also seen many Rand miners, who went there from the Isle of Man and have worked here for years. They returned to the Isle of Man and many of them returned to die; but in my opinion they simply died of ordinary tubercular disease of the lungs and I have never seen one case of Miners' Phthisis such as I have heard described here. Tubercular disease of the lungs was a most prevalent complaint in the Isle of Man, not only amongst the miners but amongst their daughters, brothers and sisters.

415. The Chairman: I believe, the inhabitants of the Isle of Man are closely related and intermarried?—They are.

416. With regard to the conditions that prevail in the Great Laxey and Snaefeld Lead Mines, I think the miners there use very few rock drills?—There are a great number in the ~~Great~~ Laxey Mine. I have known men work them for ten years, who have been working a long time before that at rock drills.

417. I do not know the District itself very well, but I do not think that the miners do any rising by means of rock drills?—Oh yes, they do.

418. Have they been accustomed to doing that?—Yes, as a rule.

No Phthisis Montana - Mechanical — Mathews — 1907.

TG 2, 1908, p. 387, ev. T. Mathews.

4082A. Have you had any experience of any other country where circumstances are similar to this country or approximate to them in any way?—Not in Cornwall, but in the States. In Montana we had quartz mines there. I have worked in quartz mines in Utah similar to what they are here, and also in Wyoming, but we did not have the phthisis there, nor did we get the diseases which we have got here on the Rand.

Cornwall 1904 – Interim Report of HPPC. compared - 1913.

Cd 7476, pp. 148-149.

It may be useful at this point to refer specially to two interesting experimental investigations that have been carried out in Cornwall and South Africa respectively since Dr. Haldane's Committee reported in regard to the measurement of the amount of dust in mine air. The first investigation was undertaken by Mr. Thomas, one of our members, and Mr. W. P. O. Macqueen, and a paper recording its results was read before the Institution of Mining and Metallurgy towards the end of 1901. These experiments were carried out at Dolcoath mine, and the investigation was undertaken with the object of throwing light on the amount of stone dust present in the air during different mining operations, and, secondly, upon the efficacy of water jets and other means then in use at the mine for preventing the formation of dust.

We do not propose to give full details of the experiments, but the following important points were brought out:

(1) Dust, whether in stopes or elsewhere, arises from certain definite operations, and is not present in appreciable quantity in the general atmosphere of the mine.

(2) Dry holes, when drilled with machine drills, produce the most dust, and there is always more dust produced at the start and for the first few inches, than when the hole is being drilled deeper. Furthermore, the higher up the face of the end the hole is being drilled, the more dust is likely to be inhaled. In this connection it should be remembered that in rises all the holes are of necessity high up.

(3) The dust produced by drilling with a machine drill can be entirely obviated by the use of a proper water jet or spray, if rightly used.

(4) Dust is produced by hand-drilling, where no water is used, but the quantity of dust thus made is inconsiderable in comparison with that in a place which is being developed by rock drills. Furthermore, in places where hand-drilling is carried on there is usually sufficient ventilation greatly to disperse the dust, whereas in confined spaces the contrary is the case.

(5) Dust is produced in shovelling, filling, and rock-breaking. When no steps were taken to damp the broken ore or rock, a considerable quantity – varying from 0·6 to 3·1 milligrams in 10 litres – of dust was present in the air. When the ore was damped by the use of a water blast, no dust was present.

(6) A large quantity of dust is produced by blasting in ends and rises. Where no special measures are taken for ventilation, the rate at which the dust settles is slow, and the investigators point out that this clearly proves that upwards of half an hour should elapse before the men are allowed to return, unless wearing an *efficient* respirator. The authors also stated that the practice of blowing in a jet of compressed air after a blast, even through a ¼-inch aperture, for the purpose of settling the dust cannot be commended. By this means the dust particles are at best distributed over a greater area. It was pointed out, however, that the results obtained by the water blast devised by Mr. William James of Dolcoath, discharged immediately after the firing of the shot, were extremely effective. By far the greater part of the dust was drowned down at once, and the air in the end or rise was practically clear of dust within a few minutes.

The other investigation to which we wish to refer is that made by the South African Miners' Phthisis Prevention Committee. An account of their experiments is published in their Interim Report dated 15th June 1913.* The Committee observe that investigation has shown that the dust found in a miner's lungs is exceedingly small in size. The majority of the particles in it are ·001 millimetre or less in diameter. Consequently all their determinations have been directed only to fine dust. They point out:–

> In 1912, at the Jumpers Deep Mine, comparative experiments were made when dry drilling was being carried on, the sides of the drive being also dry, when an average of nine estimations showed 59 milligrams† of fine dust. Another nine estimations, when drilling wet, and with the sides of

* This report can be obtained from the Government Printing and Stationery Department, Basement of Parliament House, P.O. Box 28, Capetown. Price 6*d*.

† Quantities of dust are stated in milligrams per cubic metre of air.

the drive wet, gave 13 milligrams. Four other series of experiments (made chiefly at the City Deep Mine in 1912) where water was used, showed averages of from four milligrams to eight milligrams of dust in the air.

The Committee is quite satisfied that dust catchers are of little value in drilling, and that the only way to keep the atmosphere reasonably clear of floating dust is to prevent its formation by the abundant use of water *into* the holes whilst being drilled.

Immediately after blasting in a drive a sample taken 200 feet from the face gave 151 milligrams; and an experiment, where two sprays were installed, showed that the air contained 91 milligrams of dust after passing the sprays, in one hour after blasting the amount had become reduced to eight milligrams, and in two hours to two milligrams. In another experiment, where a water-blast was used, two estimations, 30 minutes after blasting, gave eight milligrams and 16 milligrams of dust in the air, respectively; one hour after blasting six milligrams were found. These experiments show that, although with the free use of water much the greater proportion of the dust is quickly laid, a certain amount remains in suspension in the air for a longer period.

Other experiments were made which confirmed the view that blasting creates a large amount of fine dust which remains for a long period in the air in suspension.

Another interesting paragraph in the report is the following: —

> "Repeated microscopic examinations of the lungs of silicotic victims have been made, and comparisons have been instituted between the physical characters of the extraneous mineral matter in these lungs and those of dust arising from various mining operations. At the present time it may be provisionally stated that the dust originated by blasting most closely resembles the dust incarcerated in the silicotic lung, and that in the order of similarity this is closely followed by that arising from drilling operations—both hand and machine."

The investigations of Mr. Thomas and Mr. McQueen, and of the Miner's Phthisis Prevention Committee in South Africa, have confirmed the view, which has already been expressed, that the chief mining operations in which miners are exposed to dust inhalation are those of drilling and blasting, but the South African Committee tend to give greater importance to the dangers arising from blasting. It must be remembered, however, that in South Africa the rock is very dry, and that blasting is carried on on a much larger scale than in this country owing to the much greater output and the pressure of production; and that therefore in that country attention has been more particularly directed to the dangers arising from working in mine air directly after shots have been fired.

Elsewhere — development not great pressure in Cornwall. — time after blasting.
Cornwall — upward drilled holes. returns before dust + blasting.

'Speeding up' Criticized by Haldane Commission — implicit criticism 1904.

Haldane Commission, p. 25.

Cornwall dust exposure for rock drill men from 2 sources — upward drilled holes (2) returning to face after blasting before air cleared ~~up~~ of dust.

'In Cornish mines, where development work is not usually carried out under great pressure, the men, as a rule, allow considerable time to elapse before returning after blasting, so that the air in ends and nooses has sufficient time to become fairly clear of dust and noxious gases.'

Over here — work a life time — Smith — 1907.

TG 2, 1908, p. 341, q. 3319, ex. C. E. Smith

A man here, if he is continuously employed in rock drilling work, cannot stick to it for more than seven years. Over there the work continues for a life time.

p. 347, CC. Smith

3422. Is miners phthisis unknown in Australia?—Practically.

3423. I understood you to say that a man could go rock drilling all his life there?—That is true.

3424. You say that miners phthisis, to all intents and purposes, practically does not exist there?—It does not.

3425. [illegible]

Elsewhere - healthy, secure, permanent - Smith 1907.

TG 2, 1908, p. 338, statement C. G. Smith.

In the United States, Mexico, Chili, Tasmania, New Zealand and Australia there is better efficiency—better efficiency is evidently performed simply because the miners there are given only a fair amount of labour to perform, and the working conditions are more healthy and conducive to a sense of security and permanency than they are here. [illegible] I would like [illegible]

Suicide here - not Victoria or W. Australia - Crowle — 1907

TG. 2, 1908, p. 324, ev. S. S. Crowle.

3097 It is suicide without a doubt to be developing on those [sic] mines.

3098. Would you use the same expression with regard to the Australian mines, the mines of Victoria or West Australia?—No.

Elsewhere – Australia – 'Miners live here until they die from old age or something else'

TG 2 1908, p. 690, q. 8845, ev. F. Crean.

U.S.A - more efficient with supplies - Mathews ___ 1907.

Cheap labour but inefficient.

TG 2 1908, p. 440, qq. 4782-4784, ev. T. Mathews

water & drills handy.

Efficiency of Black Wattles - Doubtful 2/- ater less than in Australia

TG 2, 1908, p. 520, q. 6088, ev. E. Moore.

EMPHASIS
– ROCK DRILLS

Emphasis on Rock-drills — Napier. 1903

Milner's Commission, evidence, Dr. F. Napier, p 8 Trl. Med. Soc. Report.

Rock drill work in the stopes is not exposed to such great disadvantages [rock drill work in raises & drives] and few dry holes are [now necessary] [my italics] unless "over-hand" stoping is employed.

Blasting dust is not as great as in machine rock-drill development work — still a factor.

Haldane Com^n. deaths in Cornwall Mines.

Emphasis on Rock Drill men – hand picked men in prime of life 1904.

Haldane Commission, p. 26.

These deaths are also nearly all among picked men in the prime of life, whereas in the case of other men employed underground the extra mortality is chiefly among much older men. We have, therefore, directed special attention to measures for dealing with the unhealthy conditions under which machine-drill men work.

States reason why emphasis on rock drill men.

Milner — Medical Com^{n} — $\frac{172}{187}$ = 91.98% — rock drills — suffering

Penn 1904

p. 874.

No machine Drills - no Miners' Phthis - JXM. 1912.

Union House of Assembly Debates, 15 April 1912, col. 1896, JXM. Victoria West

If they had no machine drilling, they would have very little miners' phthisis or other respiratory diseases in the mines. It was chiefly attributable to the use of machine drills. That they found in this report [medical commission]

Miners Phthisis Bill — 1912 - Select Committee (Part.) 1912.

Focus on Rock-drill work because Cornwall too —
but ignore implications of all miners — not covered — as was
Br. focus on acute silicosis & its eradication. Br. emphasis
on silicosis in general — heightened social awareness in Br.
least disruptive course of action to take. Rest of
mine walk ed. continue as before. minimum disruption.
that's why minimum attention to new mining
regns.
change houses
sanitation.
Ventilation.
nitrous fumes.

Because this deflected away from S.A mines being solely responsible
the implications not taken to logical conclusion — emphasis placed
on rock drills as rapid exculpating cause — no other
mining occupations considered — & impression for many years
that rock drilling in S.A the cause. in certain occupations
also brought disease with them from mining in metalliferous
mines elsewhere p. viii, par 10.

Emphasis on Rock Drills — 1st Precautions only for Rock Drillers.
very limited reaching.
not as far as Haldane's.

Contradiction because as early as 1902-3 once dust established as causative factor other occupations recognised as being at risk.
eg. masoning.
∴ Emphasis in Tvl. only on acute silicosis
+ chronic silicosis underplayed / neglected.
prevalence same as elsewhere even Ireland.

Dangers of Rock Drill Work —

UG, 1937 [Art 1], pp. 3-4.

GHE. attributed it to being 'peculiar to men employed on rock drill work' (GHE. p. 8, 1902)

p. 4. this statement too extreme ie not peculiar. — by 1937 some 70% of silicosis occurs in men employed on machines.

Milner's Com^{n}? Emphasis on Rock Drills
92%. Ignored others.

Prevalence — M.C. — Why Emphasis on Rock Drills. 1902-3.

para. 10

1210 out of 4403 employed — examined without X Rays.

187 15,5% had silicosis

88 7.3% suspected. viii

91,8% p. viii

172 of the 187 — ie ~~42%~~ had worked on rock drills — average 6½ yrs. pp viii - ix.

average age 35.5. ~~p viii~~ p viii - 'matter of keen regret' (table)

[expanded (on more in Haldane Com^{n} — Prime of life - loss to country]

seamless — 1 - 2 yrs affected. Cancl. 66. p. xx.

[Enough on its prevalence to show the very serious nature of it
plus its insidious character.
diff^{t} to diagnose early so men can leave occupation

ignored evidence of doctors in handling & removal. pp 8-9. q. 3 ev. Dr. Francis Napier

p.9. We wish to emphasise this fact, as we believe it has hitherto been almost overlooked, and the quantity of dust raised in handling the ore in a dry stope is very great.

Emphasis on Rock Drilling — dust disseminated blasting not taken up. 1906

Irvine, et al p. 9.

The idea remained that the main cause of trouble was rockdrilling and that rockdrill miners were almost the only sufferers. The very dangerous conditions produced by the widespread dissemination of blasting dust received quite inadequate attention.

Other Occupations — Milner's Com^n. — Emphasis on Rock Drills — 1903.

Milner's commission, evidence p. 4 Dr. Francis Napier, Sec. Tel had solely

3. In the more chronic forms, seen perhaps more typically in the miners of many years' standing, who as a rule are not rock drill workers, chronic bronchitic and asthmatic symptoms are perhaps more prominent, and in them dilatation of the heart and accelerated pulse rate are more common.

Emphasis on Rock Drills — Milner's Commission — 1903.

Milner's Commission, p. VIII, par. 10.

of 187.

172 or 91, 8% employed on rock drills

W. T. Andersen – Mine Manager
Sulo Coal. Co of M. } ordinary hand stoper
no fear of explosives

1907

TG 2, 1908, p. 886, qq 12893-12984, ev. W. T. Andersen.

Emphasis on Rock Drills.

SAMR. 14 Feb. 1914

p. 39.

Watkins Pitchford.

From ignorance of the necessity for associating its working with the systematic use of water, or because of wilful neglect of the precaution, the common type of mechanically operated rock-drill has acquired an evil reputation, which is not confined to the Rand. An increase in the industrial mortality on the Cornish tin mines has been attributed to the introduction of the rock-drill, and the same statement has been repeatedly made with respect to its intensive use in the gold mines of the Transvaal. Our Miners' Phthisis Commission, of 1912, found that the occupation of machine-drilling, of all occupations in the mine, was the most important in producing miners' phthisis. It is certain that if a rock-drill be operated in a dry, or inefficiently wetted, hole it becomes a formidable weapon for the destruction of human life; but it is equally certain that the rock-drill is no more harmful than any other machine-tool if a simultaneous and efficient irrigation of its work be maintained. ....

Once accepted that 'dust' cause - attention focused on other occupations

W. Cullen. Journal of CMM

W. Cullen Cent M Soc - proceedings Vol II 1902-1903

p 224

But in view of the dust generated by lashing it is evident that miner's phthisis cannot be peculiar to the drillers of dry holes; it is only a matter of time for the ordinary stoper to acquire the disease, notwithstanding that he is seldom called upon to drill such holes

lashing ie shovelling — C, M & M. Soc. 1902-1903.

W Cullen C and M soc - proceedings Vol III 1902-1903 pp 224

If dust is the causative agent in miner's phthisis—and I believe that it is generally admitted to be so—a liberal use of water in conjunction with the drilling and lashing will lay the evil. The dust put into suspension in the mine atmosphere by lashing, *i.e.* shovelling,

All

1904

Occupations Susceptible to Rock Drilling, 1904 - most severe disease -

[Irvine, 1904, p. 222]

see also Miners' Phthisis Commiss 1902 - General conclusions.

Shovelling seen as dangerous as Rock-drilling 1903.

Mr. Yates. (J of CHM Soc 1902-1903, p. 226.

Shovelling overlooked.
more diffused not so harmful as nice.
but will get disease.

Doctors see under Personalities – Doctors

Emphasis on Rock Drill Work - Focus on Acute Silicosis.

June 1901-1902 — Considerable attention to cond^ns of rock-drd miners — 1901-1902.
G.M.E.

Yearly Report of G.M.E... June 1902, p. 8.

June 1902

During the past year considerable attention has been directed to the conditions under which rock-drill miners have to carry on their work, and to the disease now commonly known as "miners' phthisis," which seems to be peculiar to men employed in rock-drill work.

MINERS' PHTHISIS.

THE findings of the Commission appointed to enquire into the cause, effect and remedy of the dread disease which exerts such a heavy death toll from the miners of the Rand, are published in this issue. Miners' phthisis, silicosis or fibrosis of the lung, is a complaint which is specifically of comparatively recent date. Years ago the labourer in the mines who had to climb many hundreds of feet of ladders a day, work in veritable cataracts of water, and fire his holes with gunpowder, if afflicted, was said to be suffering from "Miner's Complaint." To-day the disease assumes the scientific name of "Phthisis." The cause of the illness which is almost plague-like in its virulency has, of late, received the attention of medical men, mining men and engineers in various parts of the world, and in conjunction with the ankylostomiasis of Westphalia and Cornwall, forms a subject complicated in diagnosis and difficult in remedy.

Of silicosis it may be said that the disease has specifically dated from the advent of the rock-drill as an all-important mining factor. On the Rand the hard sandstone drilled and the insufficient quantity of water used have idealised the conditions under which the disease makes its ravages. In consequence, an alarming number of British miners die each year in Africa and at Home of a complaint which is very properly called in the kraals of the north, "Johannesburg Sickness." Nearly every village in Cornwall possesses a considerable number of men well on the youthful side of the prime of their life, cursed with this affliction. In such a man one clearly sees the sandstone of the Rand. Taken literally the sentence is hardly exaggerated, as the specimen of a miner's lung silicified to adamant and shown to Lord MILNER evidences. In the Duchy of Cornwall, Mr. R. ARTHUR THOMAS and Dr. HALDANE have carefully investigated the matter and have read an important paper on the subject before the Institution of Mining and Metallurgy. Dr. J. S. HALDANE'S commission recommends the use of a water jet in connection with the rock-drill and other safeguards. In the mines of that County comparatively few drills are used, and water in abundant supply is available. The findings of the Home Commission may accordingly be different from those of the Rand doctors and miners, each being best suited for the conditions existing in the two countries.

Mr. BRITTEN'S atomiser receives the prize of the Chamber of Mines, with a Water Drill, the Leyner, second, as being the best

SA Mines, Commerce + Industries, 2 May 1904, p. 286 (Mines' Phthisis)

Emphasis on Rock Drills — Chronic Silicosis of little account 1904 1944
Conditions of Industry prior 2nd May

Mineowners in the period before Milner's Commission. April 1902.

BUT ALL MINER

Clouds of Dust in Stopes — lashing — no wetting or provisions for wetting — 1907

TG 2 1908, p. 526 99.6219–21 — E. Moore

6219. That shows you have got good air in a mine, and it would be a great help to draw that to the development faces, which generally are badly ventilated?—I say they are well ventilated, but I do not say they are particularly good. There is a good current of air, but there are gases and impurities in that air.

6220. What kind of impurities?—The natural gases from explosives and dust. If you have not got a wet footwall or a hanging wall in your stope when the boys are lashing, you have a cloud of dust in the stope and there is no provision made for wetting the stuff in the stope.

6221. Of course, I would not go into a stope to get my air from, but into the drive below the stope and I would detract some of the fresh air from there and draw it to the development faces?—When your air comes through the stope that carries the dust with it, and you are to put that down to the development faces.

Ventilation.

— Irvine & Macaulay.

Emphasis on Rock Drills — Shovelling & Tramming much dust 1906

J. of the CMM. Soc. of S.A., April 1906, p 298 Macaulay & Irvine, Safety Measures in Mining.

The dust caused by shovelling and handling the broken rock is also considerable. Where the water blast is applicable, no further means is necessary, where it is not, means should be taken to wet the rock.

Mr Cullen has mentioned points of interest regarding miner's phthisis, and I trust what I have to say will not sound like repetition. Mr Cullen thinks too much is laid to the charge of miner's phthisis. Possibly so, but if the death of a miner is brought about by unfavourable underground conditions, it matters little whether it is miner's phthisis or some other disease. What is required is to guard the workmen, not against miner's phthisis only, but against premature death.

In the public discussion of miner's phthisis, little attention seems to be given to a point of considerable importance. Mr Cullen leaves it unnoticed also, but if he had been through some of the "dry" mines of the Rand, I am sure he would have mentioned it. In a stope where there is no water, and the material has to be turned over and over again, an enormous amount of dust goes into the atmosphere, so that every man working in the neighbourhood is affected by the dust. Some seem to think that the machinemen are the only ones liable to contract miner's phthisis, but I firmly believe that in a mine where water is scarce, as happens in some deep levels, every one working continuously in the mine will eventually contract the disease. Of course men working on machines are in much greater danger than others, but when dust is distributed freely all workers are in danger. Very likely some of you have been surprised, on coming to the surface from a part of the mine where you thought there was no dust, to find on expectorating how mistaken you were.

It is this phase of the subject which is serious, for I do not see how you can prevent having dust in a mine with no water, and flat stopes which require a great deal of shovelling.

Impressionistic evidence of T.L. Carter - a former (or present) practical miner shiftboss? man of CMM. Soc. 1903

All p/q - rock drillers worse - spit.

The Journal of the CMM Soc, 1903, p 246, T.L. Carter, Discussion at April meeting, 1903. Miners' Phthisis: Some Notes & suggestions.

Manager of the French Rand

Gense. Com^n. Shows all miners — Well Known. but ignored — 1403

Rumours - Only known in S.A. — NO.

Worked elsewhere in metalliferous mines par. 13, p. ix.

par. 9 prevails amongst miners who have never worked rock drills
p vii Indeed in districts in England where families have for many generations been engaged in metalliferous mining the disease under various names such as "Miners' lung", Miners'. Complaint, and "Miners' Rot", so fully recognised, & has been known to exist long before rock drills were employed in mines

par. 10, p viii Of the 187 certified as being silicotic - 164 in S.A worked on rock-drills av. 4-8-9 years
61 have worked 4 76 yrs on rock drills in countries outside S.A.

[Because this deflected away from S.A. mines being solely responsible the implications not taken to logical conclusion — emphasis placed on rock drills as sole exculpating cause — no other mining occupations considered — & impression for many years that rock drilling in S.A the cause. in certain occupations]
— also brought disease with them from mining in metalliferous mines elsewhere p. viii, par 10.

Miners who have never worked rock drills get disease — Milnes Com^{n} 1903.

Milnes Commission, p. VII, par. 8.

Other Workers. Handling & Removal of Ore — 1903

Milner's Com^n. pp. 8-9 q. 3 ev. F. Napier.

p.9. Ignored evidence of doctors in handling & removal. pp 8-9. q. 3 ev. Dr. Francis Napier

We wish to emphasize this fact, as we believe it has hitherto been almost overlooked, and the quantity of dust raised in handling the ore in a dry stope is very great.

Non rock-dwellers advantage of 10 to 15 years. 1904

Irvine, 1904, p. 223.

No class of Miners Exempt Irvine — 1904.

Irvine, 1904, p. 222.

Lashing — As you Have from Machine to Machine —
TG2 1907. pp 1002 99 14,797. Evidence. MR GYSBERT Henyr
! Machine advocated. SOMERS - miner

1 by

14,799. According to that, the organisation underground is very deficient?—Absolutely. Then another thing in connection with the machine is that I would sooner stay on my one machine than be knocked about and looking after half a dozen machines, because I hold there is more danger, not from impure air, but from dust, from knocking about and getting into contact with the lashing, because the lashing is principally where the dust comes from. There is no dust from a machine where you use water, unless you have dry holes, but this lashing should be sprayed, and if you knock about you are more liable to get dust into your lungs that if you stood over one machine.

14,800. I see. I suppose this statement is going in, Mr. Chairman?

14,801. (*Chairman.*) I have not put it in, but I will if you wish.

Importance of dust from blasting; not just duties; need for water

TG 2. pp 1215 qq 17821 (1907) ev Mr Alfred Edmund Munro = Munee

..... Now, the blasting in drives and stopes. This is a question which has got a lot to do with the previous question on the Rand. I contend they should be the same as in town or city; water pipes laid from the surface to every part of the mine, the same as our pipes are laid, and all stopes, drives, or winzes should be properly sprayed with water before they are allowed to be blasted out. This should be made absolute law. There is no doubt that the dust caused in these mines is due to the blastings blown about by air pipe ventilation. The more it is blasted about the more it is spread about the mines all blastings should be done while it is wet; it ought to be sprayed with water before it is allowed to be touched. ..... It is not only the machines.

that cause the phthisis, it is the dashing of dry stuff all about. I have seen it from the one end of the Rand to the other. I think there should be more fans with more air drawn into the places where we I think there should be more air drawn into the places where the men are working. Not only would you have better men but they would live longer, and you would get more work out of them

Miners - Occupations Susceptible to - Shovelling. 1910

[ItE, 258, File 154 M, dated 15 Nov. 1910] → dust report of Sub Com^E on Health of Mining Reg^n's Com^r of Tol Ch. of Mines - Irvine + Macaulay.

Shovelling & lashing.

The workers who shovel the broken rock into the trucks are known as "lashers"—a word which, as I am informed, is probably a Kaffir corruption of a Dutch word derived from "laaien," to load—and those who push these trucks along the tram-tracks to the shaft are the "trammers." The occupations of "lashing" and "tramming" are the second most dangerous in the mine, owing to the fine dust which may arise from the dry surfaces and crevices of the broken rock when this is shovelled, trammed, and tipped into the ore-bins and skips. The thorough wetting of the rock both before and during its shovelling reduces the danger to the minimum, and, if quite efficiently performed, entirely removes it.

Miners - Occupations hashing — 1910 dust clearing

[It E, 258, File 154M, dated 15 Nov. 1910 — report of Sub Com^e of Health of Miners Reg^n's Com^e of T C of V.]

But other dusty occupations.

Emphasis on ~~Rock~~ - Drills - Reasons why - longer contact with drills 1905
in confined spaces, imperfect ventilation

Oliver, an address, 1905, p 919.

while most of this dust is created during machine drilling by the dry methods, we must also minimale the dust that arises during the dislodgment & breaking up of stone, by the use of explosives, and the shovelling aside of the débris of fallen stone. There is a danger in all mining operations where there is much dust.

Washing

.....

(8) Washing: Freshly broken ground is of necessity covered with dust. This can be arrested by saturating the broken ground before handling it, and by constantly applying water as lower surfaces are exposed. The roof and sides in the vicinity of washing operations must, according to the Regulations, also be kept continually wet. It is by this means possible to almost entirely eliminate dust from this source.

Van Niekerk, p. 245.

Shovelling, hashing etc.

Cd 7476, p. 149.

1904 Investigation Cornwall.

(5) Dust is produced in shovelling, filling, and rock-breaking. When no steps were taken to damp the broken ore or rock, a considerable quantity—varying from 0·6 to 3·1 milligrams in 10 litres—of dust was present in the air. When the ore was damped by the use of a water blast, no dust was present.

Trimming defn

Assisting the machines u/g Supervising the conveyance of the ore u/g from the working places to the shafts.

SC. 9, 1913, p. 130, q. 967, ev. L. G. Irvine.

Lashing Defn. of.

Van Niekerk, p. 8.

is the process of removing the broken rock from the stopes, and is a corruption of the Dutch word laden (Cape Dutch laaien) meaning to load.

Lashing — Def.

Shifting rock out of the working places to the tramlines by which it is taken to the shafts.
SC 9, 1913, p. 130, 1q. 968, L. G. Irvine.

Mines

11. G. — operations — Removing broken ore — Shovelling

— to bottom of stope — depends on nature of stope.
overhand less — steep dip very little — gravity → boxes
trucks run in.
incline — down into boxes. (Truscott pp. 356-357)

shovel boys under contractor keep at work in stopes till
fuse lit or blasting commences (Truscott p 364)
records of no. of trucks per shovel boy (also hanger boy) (ibid

trucks

shovelling into shaking shoots which conveys ores from slopes to 1906.

(Praagh. p.534) illustration.

Afs + Eight Hours Day See Afs + Hours of Work

Shovelling + Tramming.

Milner's Com^{n} pp. 8-9 q. 3. ev. F. Napier.

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ig/nored evidence of doctors in handling + removal. pp 8-9. q. 3 ev. Dr. Francis Napier

p.9. We wish to emphasise this fact, as we believe it has hitherto been almost overlooked, and the quantities of dust raised in handling the ore in a dry stope is very great.

Shovelling & Tramming — transporting mineral to shaft.
Haldane Com^{n}. p. 13.

All Occupations — Where dust — eg ore-removal blasting Penn 1904.
Warning.

Penn, p. 874.

Emphasis on Rock Drilling — Sawyer — vs this 1903.

Miners Commission, p. 40, evidence Arthur Robert Sawyer.

We were recently informed that it is best to allay the dust at the bottom of the hole, on the principle that prevention is better than cure, because a damp atmosphere at the face, which, no doubt, combined with great heat sometimes caused by want of ventilation, is objectionable, would thus be avoided. But it seems to have been overlooked that drilling is not the only source of dust, and that blasting, breaking and falling of quartz also produces dust. Blasting is especially obnoxious in this respect, as it disturbs the finer particles from the floor and sides of the headings and winzes, which then float in the air for some time, and are inhaled by all those working in these blind ends. To state that they are carried away by the ventilating air current, except in rare instances, is bordering on the imagination, as already explained.

Drs. Evidence — Dry mining – pronounced blasting —

(pp. 9-10, Hilner's commission) –

Dry mining should as far as practicable because wet mining generation & inhalation of dust primary factors.

Blasting — Tram hashing —
UG 19, 1912. pp 3-4. par 4.

The average number of holes placed in the
"end or face of a drive is thirteen, each 5feet, six
"inches in depth. After these holes are drilled they
"are filled with blasting gelatine, which is exploded
"by means of a fuse and detonator. The average amount
"of explosive used at each blast is about 50 lbs. A
"large quantity of dust is created at each blasting,
"and the finer particles remain in suspension in the air
"for considerable periods. The gases generated by the
"explosion of the gelatine also vitiate the mine atmos-
"phere. Not infrequently the blasting of the develop-
"ment face is performed in two stages, separated by a
"short interval, but in the same shift. This practice
"of necessity exposes the miner to a greater risk of
"the inhalation of dust and fumes.

"The effect of the explosion of an average
"charge is to dislodge from about 12 to 16 tons of
"rock, much of it in a fine state of division, from the
"face of the drive. After the fumes have been dispersed
"the broken rock is removed from the drive. This
"operation is termed "lashing" or "shovelling", and in
"this process, unless precautions are taken, more dust
"is thrown into the air and breathed by the workers.

EMPHASIS
ON
WHITES

blacks climatic.

Whites only disease — Irvine. — Whites occupational; 1908.

Final Report of the M.R.C". 1910, ev. h.G. Irvine, p 256.

It was an unfortunate conjunction that the heavy mortality amongst white miners on the Rand in 1902 and 1903 should have coincided with an alarming high d-r. amongst native mine labourers during the same period, and particularly during the rigorous winter seasons of these two years. The two facts combined to suggest that occupational conditions on the Witwatersrand mines ~~bad~~ must be extremely prejudicial to health. Prima facie, this conclusion of facts, however, did not in general have the same causation. The high death-rate amongst the white miners was, as we have seen, directly due to occupational conditions. The high death-rate amongst the native workers, on the other hand, was due much more to climate, than to occupational causes, while, in the latter respect also, the conditions then prevailing were entirely susceptible of great improvement.

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