republics in return for cash wages.[137]

In 19th century southern Africa two exogenous factors coincided to severely diminish the economic resources of black rural societies: first, droughts and major cattle losses, caused by epidemics of disease, put pressure on the economies; second, European military conquests by the British and Portuguese diminished African landholdings. Also, rural decline and capitalist penetration interacted with and heightened socio-political discontent within many of these societies.[138] In this context, cattle losses were of major importance. Rural resources could no longer supply young bridegrooms with the means to provide their fathers-in-law with the customary marriage payment, the *lobola*. The demands of their culture and their society now compelled young males to seek temporary employment in white societies in return for cash wages.[139] Therefore the initiation of the diamond diggings in the 1870s attracted many young African men, particularly from Mozambique, eager for wages in the highest paying labour market.

After the discovery of diamonds external pressures on these black societies steadily mounted: their rural resources were further depleted by natural disasters and additional European conquests, now including those of the Afrikaner republics; overpopulation on scarce land increased. As dwindling rural resources could no longer produce agricultural surpluses for the payment of European state taxes,

many more Africans were obliged to sell their labour.[140] Even so, the increased supply of African labour did not meet the demands in the 1880s of the industrialising diamond mines. The shortfall in labour obliged the mineowners at Kimberley to intervene. Their aim was to shape the evolving migrant labour system so that it would supply them with enough low-paid unskilled labour. Here the support of the state was invaluable.

One mechanism used to formalise the migrant labour system was the introduction of recruitment in 1886, the year in which gold was discovered on the Witwatersrand. Despite its costs, recruitment had many advantages for management. Applicants who voluntarily presented themselves for employment at the mines were free to leave their jobs when they chose, and they also had some form of bargaining power with regard to wages. But as the recruiters organised contracts for fixed work periods at wages which were lower than those commanded by the volunteers, these relatively forced contractual undertakings were given preference over voluntary engagements. Also, the support given to recruitment by many African chiefs, who were determined to maintain existing tribal power structures, reinforced the strength of the recruiting system.[141] With recruitment, therefore, the migrant labour system by the late 1880s appears to have become a far more coercive instrument of labour supply than the relatively voluntary form of employment which it

largely replaced.

The lives of migrant workers on the diamond mines were strictly controlled. Management housed their black employees in closed compounds,[142] and retained their services for a fixed period by contracts. The employers maintained these controls with the assistance of the state, which had a considerable financial interest in the success of the diamond industry.[143] The legal apparatus of the state ensured that dissidents in the compounds and deserters from their jobs were punished, not as civil offenders, but as criminals within the framework of the rule of law.[144]

The oscillation of workers between their rural homes and urban work centres had distinct economic limitations which even the most ardent contemporary proponents of the migrant labour system conceded. As T. J. Britten, manager of the Wolhuter gold mine, explained:

> It requires considerable time to educate and train a native for any work allotted to him, and in cases of contracts for short periods it invariably happens that he completes such contracts when he is only *becoming* efficient and really useful.[145]

Nevertheless, employers saw distinct advantages from migrant labour at this stage of development. Given over-population in the rural areas they did not, in fact, have to pay black mineworkers much above the rural subsistence level.[146] Even when the costs of recruitment are taken into account, the advantages of

relying on migrant labour were undoubtedly considerable. The migrant labour system in South Africa was shaped by a distinctive feature of the rural economy, namely the social security benefits which were available in the Africans' reserves.[147]

In the context of health, such benefits were crucial. The mineowners, particularly on the Witwatersrand, provided their black workers with minimal medical services of poor quality;[148] and despite mine doctors' denials, many ill and dying Africans returned home.[149] There was a large measure of truth in the public contention, repeated continuously between 1912 and 1926, that management was reluctant to nurse the seriously ill.[150] Instead it daily "shunted" trainloads of incapacitated black workers to their rural homes so that their dependents could care for them or bury them.[151]

The migrant labour system, which proved its worth in the industrialisation of the diamond mines, was to be even more crucial to the success of the gold mining industry. In 1904 without exaggeration the Mine Managers' Association asserted:

> The presence here of a quantity of cheap labour has probably had quite as much to do with the building up of the industry as the presence of the gold in the reef. In fact, it is probably the more important factor of the two, for the gold content is an immutable solid fact which no social or political upheavals or other act of man can alter, while the cost of production is helplessly dependent on the other factor...If these fields are to be fully worked there must be a sufficient supply of unskilled labour.[152]

The same factors which pushed rural Africans to work on the diamond mines propelled them to the gold mines, but in many more thousands. As in the case of Kimberley, Africans often had to travel great distances to reach Johannesburg; and the Tsonga, or "Shangaans", from Portuguese East Africa likewise comprised more than half of the black workforce on the Witwatersrand gold mines.[153] More significantly, for the purpose of this study, these Mozambican Africans were highly sought after for two reasons. First, they were more experienced than most other migrant workers; their one-year period of indenture, which they normally extended by an additional year of service, was considerably longer than the three- to six-month contracts of other black workers.[154] Second, as Patrick Harries has shown, they had a penchant for underground work which in the 1890s was tantamount to an ethnic speciality. The "East Coasters", as they were colloquially termed, comprised the bulk of the underground workforce and they performed tasks which other black workers, particularly Africans from the Cape Colony, shunned.[155] Their preference for underground work rendered them liable to silicosis; and when the disease afflicted black workers, it predominated in this particular group,[156] a phenomenon which health authorities and management overlooked or dismissed.[157]

As at Kimberley, the Randlords also attempted, with the assistance of Kruger's government, to exert similar controls over their black workforce. In 1893

proponents of the gold mining industry encouraged the Chamber to inaugurate such measures notwithstanding their public acknowledgement that this course of action would make virtual prisoners of migrant labourers:

> In the matter of labour also there is every reason to believe that the gold mining industry is in a fair way to occupy a much more favourable position. Several schemes to this end have lately been before the Chamber of Mines, and no doubt one or other of them will come into partial operation. They include some very radical proposals, such as the shutting up of all native labourers for a certain time within the mine area, as is done at the diamond mines at Kimberley, and the conclusion of arrangements with native chiefs for the periodical supply of a certain number of men. There is, we believe, no disposition to act tyrannically towards the kaffir population, but at the same time it is felt that an entirely misplaced regard to freedom for contract and other sentiments quite unknown to the kaffir should not be allowed to check the development of the country.[158]

The high ratio of black to white workers also characterised the industrialisation of diamond mining. Between 1881 and 1884 the numerical gap between black and white mineworkers began to widen. This is not surprising as these year marked the depression in the industry. In 1881 at the De Beers and the Kimberley Mines the ratio of whites to blacks, with whom coloured persons were classified, was one to five; and three years later at the height of the depression it had increased to one to six. On poorer mines the numerical gap was wider: it was one to nine in 1884.[159] The preference of management for low-paid migrant labourers over higher-paid but unskilled

proletarianised whites steadily manifested itself.

The same trend was evident on the gold mines when they began to be systematically worked from 1892. From 1893 to 1898 the ratio of black mineworkers to white employees was approximately seven to one;[160] and in 1899, on the eve of the Anglo-Boer War, it had increased to nine to one. Despite its continued complaints of a shortage of black labourers, management regarded the 1899 ratio as being satisfactory.[161]

This exploration of labour patterns on the underground mines at Kimberley is valuable in demonstrating their precedents for the gold mining industry. First, the gold mining industry's skilled white labour force, although numerically larger than at Kimberley, was similarly deployed in specific artisanal jobs or in specialised discrete mining tasks. Second, on the gold mines, as at Kimberley, low paid migrant labourers constituted a markedly high proportion of the total underground labour complement. All Africans were classified as unskilled labourers and were paid at unskilled wage rates.[162] Slightly more than one-third of the underground black work complement was in practice engaged in unskilled physical tasks, including shovelling, tramming and tipping. But at least 65 per cent of the African underground workers performed semi-skilled drilling jobs, but always at unskilled wage rates.[163]

There was also a relatively small group of unskilled white underground workers, who were paid at semi-skilled rates. They constituted a specific category of supervisors, the gangers, who, as we have seen, were the equivalent of the overseers at Kimberley.[164] The word ganger, originally used as a colloquial term, was transformed in 1896 into an offical job designation defined in the mining regulations. In this way it was extended to include those professional miners who also supervised gangs of black workers, namely the hand drillers.[165] But overseas miners rarely used the official designation with reference to themselves. They did not regard the word ganger as an objective job description, but viewed it rather as a pejorative term. Because of its customary association with the unskilled supervisors, its transference to them appeared to denigrate their skilled standing.[166]

Beginning at Kimberley, black and white mineworkers were artificially divided into separate groups by race and colour, by different control mechanisms, and by artificial definitions of skills which were the bases for wage differentials. Both racial groups as wage-earners shared the workplace with all the hazards attendant on mining. But white workers refused to acknowledge that black workers had a working-class identity in common with their own. On the few occasions of shared conflict with management at Kimberley, white workers encouraged their African

counterparts to join them in presenting a united front. But when the whites had achieved their own ends, they turned away from any further joint participation.[167] In brief, white workers were prepared to involve African workers in their own struggles with the industrialists, but refused to ally themselves with black workers in helping them resolve their particular difficulties with management.

The white workers' perceptions of Kimberley were also different from those of Africans. Given the choice of Kimberley or the Witwatersrand, migrant labourers preferred to work on the diamond mines where their wages, even under reduced contract terms, were higher than those on the gold mines.[168] By contrast, organised white labour on the Witwatersrand gold fields and throughout South Africa despised and detested the management at Kimberley.[169] The De Beers monopoly successfully stifled any form of trade unionism; and white mineworkers with good reason alleged that the company dismissed them for any opposition, including the expression of contrary political opinions.[170]

White mineworkers on the Witwatersrand learned a lesson from Kimberley. One of their major fears was that the mining magnates would gain sufficient power to dominate Johannesburg and its residents as they did at Kimberley.[171] This partly explains white worker loyalty to Kruger. Apart from a tiny radical wi the majority of the large amorphous group of white

mineworkers displayed little worker consciousness or notions of worker solidarity. Even so, they entertained a collective suspicion of the mineowners' intentions towards them. As we shall see later, when miners faced the issue of the Anglo-Boer War, most of them refuse to participate actively. They believed that the Tory government was pursuing the war to promote the interests of the capitalists.[172]

Despite their absence of identity with one another, black and white mineworkers nevertheless together forged a mass-produced industry at Kimberley which was later replicated, on an even more intensive scale, on the Witwatersrand gold mines. In 1911 a commentator, H. Hamilton Fyfe, observed with astonishment that the underground diamond mines were like factories:

> Since I was at Kimberley my ideas have been violently reversed. I now understand that the capture of diamonds is a mechanical process, or rather, a series of processes, carried on in a grim, whirring rapid manner like the getting of coal, or, as I said just now, like the manufacture of boots.[173]

Fyfe would probably have been even more amazed by the mass-production techniques on the gold mines. These were unique in the world, according to the manager of the State Mine, M. H. Coombe, who in 1906 provided the following illustration:

> There is no comparison between Cornish mining and ours, in fact there is no comparison in the wide world with the Rand. We get through more ground here in a week than most miners in other countries do in a month. Here it is push and drive and worry from the time the shift goes down until it

> is up again, whilst in other mining centres there is mostly ample leisure to do things in a more deliberate manner.[174]

In the same way that black and white mineworkers had divergent perceptions of Kimberley, their concepts of the Witwatersrand gold mines probably differed too. But they could not have failed to share similar impressions of the underground workplace, where they laboured in the "foul smelling" and "disease infested shadows".[175]

By 1899 the total workforce on an outcrop or deep level mine of medium size was extremely large when compared to a similar mine in Cornwall.[176] Also, the workforce of such a mine was larger than that of the biggest underground mine at Kimberley. A Witwatersrand mine of medium size had a total workforce of approximately 2 800 black and white workers.[177] Consequently the relationship between management and workers on the gold mines was far more depersonalised than than on the diamond mines.

The autocratic management style on the Witwatersrand was particularly evident underground, where three-quarters of the total workforce were involved in the processes of ore-excavation. On a mine of medium size the underground workers numbered 2 000 in the ratio of twelve African mineworkers to one white.[178] This was almost double the ratio of blacks to whites in the underground diamond mines: in 1892 at Kimberley the ratio of blacks to whites was seven to one.[179] Clearly the underground workforce of the gold mines was far more strictly disciplined to

production demands than its counterpart in the underground mines at Kimberley.

In the subterranean caverns the management of the gold fields mobilised its army of workers more like soldiers than factory hands. Each mine had an enormous underground battalion in which the supervisory white miners acted as the "non-commissioned officers". "Without these long-service men as the backbone," observed an inspector of mines in 1911, "the essential discipline of the regiment must be wanting."[180] The gangers marshalled the units, which in turn accomplished their tasks, as Coombe noted, with the speed of military engagements.

These fast-moving underground units generated greater quantities of respirable silica than mining groups or individuals engaged in similar operations on metal mines elsewhere in the world. In 1935 Lewis Mariano Nesbitt, a first-class graduate from the Camborne School of Mines in Cornwall, graphically recalled his personal exposure to dust on the Witwatersrand gold mines:

> [Dust] continued to be thrown up in clouds at every operation and movement of the miners. Those movements were ceaseless and violent. At some points the striking of the chisels of hundreds of powerful pneumatic drills against the rock face threw up ceaseless waves of the suffocating cloud; while at others many huge charges of dynamite, exploding, brought down thousands of tons of shattered stone. The great heaps of fallen rock were continually being handled. From the place where they came to rest after the explosion, they were worked

> down to the mouth of the chutes, by great gangs of Africans with pickaxes and crowbars. Then they fell in avalanches down the steep sides of the chutes, and through the hole in the bottom into hoppers situated in the galleries of the lower level. These hoppers filled the cars which ran on rails to the shaft; the cars shot their load into the lifts, and the lifts withdrew it to the surface. In this frenzied turmoil of labour only the heaviest of dust could sink to the ground.
>
> Every day the same strenuous activity went on, and the larger any given stope, or excavation, became, the more men could be employed in it; the louder became the din, and the more violent the commotion. It was a nightmare experience...[181]

It should be noted that Nesbitt's recollections were based on his graduate experiences of mining on the Rand between 1912 and 1916, the years during which management and the South African state had begun seriously to implement dust precaution measures on the gold mines. The dust levels then were indeed shocking, as Nesbitt witnessed. But they undoubtedly were markedly lower than those which had existed before 1899 when no dust preventives whatsoever had been in use.

Throughout the period prior to the Anglo-Boer War, and under conditions of continuous and intensive exposure to dust, accelerated silicosis developed slowly and insidiously in miners: it manifested itself in all its malignancy several years later. Indeed, in 1901 management's first reckoning of the disease's casualties was 225, a figure comparable to the loss of life in a major battle.[182] Ironically, the mass-production techniques initiated before the Anglo-Boer War helped the Witwatersrand become the top

producer in the world of both gold and accelerated silicosis.[183]

Notes

[1] *Reynolds Newspaper*, 25 July 1904, letter by T. Bottomley.

[2] TCMA, file W6(a), "Report of Special Committee", [Oct.] 1902.

[3] *Mining Journal*, 23 December 1893, p. 2 426, "Gold Mining in South Africa".

[4] *The Prevention of Silicosis on the Mines of the Witwatersrand*, 1937, p. 9.

[5] Wilson, *Labour in the South African Gold Mines 1911-1969*, p. 33.

[6] Cartwright, *Gold Paved the Way*, p. 127.

[7] *Report of the Council of the Association of Mine Managers*, 1893, "Presidential Opening Address".

[8] *South African Mines, Commerce and Industries*, 9 July 1904, p. 397, "Evolution of Rand Mining".

[9] *Report of the Council of the Association of Mine Managers*, 1893, "Presidential Opening Address"; Goldmann, *The Financial, Statistical and General History of the Gold and Other Companies of Witwatersrand, South Africa*, pp. 66-69.

[10] *South African Mines, Commerce and Industries*, 9 July 1904, p. 397, "Evolution of Rand Mining"; Goldmann, *The Financial, Statistical and General History of the Gold and Other Companies of Witwatersrand, South Africa*, p. 107.

[11] Goldmann, *The Financial, Statistical and General History of the Gold and Other Companies of Witwatersrand, South Africa*, pp. 1-271 passim.

[12] Calculations derived from Goldmann, *The Financial, Statistical and General History of the Gold and Other Companies of Witwatersrand, South Africa*, pp. 1-271 passim. The 140 companies do not include those enterprises engaged only in prospecting work.

[13] Figures derived from Goldmann, *South African Mines*, pp. 1-484 passim.

[14] Hatch and Chalmers, p. 126.

[15] TCMA, file W6(c), S. Jenrings to Secretary of the TCM, 6 Oct. 1902, enclosure in State Mining

Engineer's Report for the Witwatersrand District.

[16] See, for instance, *The Prevention of Silicosis on the Mines of the Witwatersrand*, 1937, p. 3. Blainey, pp. 355-356, also makes this incorrect assertion in his examination of dynamite costs. So do Burke and Richardson, p. 157, who quote Blainey.

[17] Truscott, pp. 195, 365; *The Mining Industry*, 1897, p. 77, evidence of W. L. Hamilton.

[18] Letcher, p. 111; Goldmann, *South African Mines*, p. iv.

[19] Goldmann, *South African Mines*, p. iv.

[20] Goldmann, *South African Mines*, p. vi.

[21] Goldmann, *South African Mines*, p. vii. Letcher, p. 114, notes that in 1895 there were fifty-six producing mines on the Witwatersrand.

[22] Hatch and Chalmers, pp. 5-6.

[23] *JCMMS*, Oct. 1906, "Safety Measures in Mining", p. 114, discussant M. H. Coombe.

[24] Bleloch, p. 35.

[25] *Report of the Council of the Association of Mine Managers*, 1902, p. 4.

[26] TG 2, 1908, p. 43, Annexure 11, Table A, evidence of H. Weldon.

[27] Hutchinson, p. 188.

[28] Anon., "The Gloom of the Mines", p. 268.

[29] Calculations based on TG 2, 1908, p. 89, Annexure L, evidence of H. Weldon.

[30] Bleloch, p. 19, n. 1.

[31] See, for instance, Truscott, pp. 361-363, 408; and *The Mining Industry*, 1897, p. 77, idence of W. L. Hamilton.

[32] TCMA, file W6(c), G. A. Denny to Secretary of the TCM, 9 Oct. 1902.

[33] TG 2, 1908, p. 457, q. 5 060, evidence of T. Mathews.

[34] TG 2, 1908, pp. 111, 161, qq. 805-810, 1 404, evidence of L. J. Reyersbach and E. J. Way; Truscott, pp. 360, 408.

[35] TG 2, 1908, pp. 25, 464, 500, qq. 133, 4 225, 5 745, evidence of H. Weldon, J. W. Bisset and J. H. Bridgman.

[36] *The Mining Industry*, 1897, p. 77, evidence of W. L. Hamilton; Truscott, pp. 288, 395; TG 2, 1908, p. 17, q. 273, evidence of H. Weldon.

[37] BRA, HE, v. 134, L. Phillips to J. Wernher, 27 Aug. 1910, S. Evans to H. Eckstein and Co., 27 Aug. 1910.

[38] See, for instance, *Report of the Council of the Association of Mine Managers*, 1899, p. 4.

[39] *Rapport van den Staats-Mijningengenieur*, 1898, Annexure D.

[40] TCMA, file W6(c), F. Hellmann to Secretary of the TCM, 29 Aug. 1902.

[41] See, for instance, Payne et al, p. 4; and Irvine et al, p. 5

[42] Rosenthal, p. 344, pays scant attention - one paragraph - to the implications of the illness. Neither Wheatcroft nor Cartwright, *The Corner House*, *Golden Age*, *The Gold Miners*, *Gold Paved the Way*, mention "miners' phthisis" or silicosis. Likewise, the centenary celebration volumes of Hocking and Paul Johnson make no reference to the disease.

[43] For biographical details on the Taylor brothers, see Cartwright, *The Corner House*, pp. 2, 4, 5, 30, 143.

[44] Taylor, p. 218.

[45] See, for instance, *JCMMS*, July 1906-June 1907, p. 230, "Mining"; and *Rand Daily Mail*, 23 March 1911, "Company Meetings".

[46] *The Prevention of Silicosis on the Mines of the Witwatersrand*, 1937, p. 4.

[47] TG 2, 1908, p. 203, q. 2 040, evidence of G. E. Webber.

[48] *TCMAR*, 1912, p. 265, table showing "Rock Drills at Work".

[49] PRO, CO, 291/83, despatches, Selborne to Lyttelton, 7 June 1905, 291/90, parliament, 14 March 1905; Fraser and Jeeves, p. 124, L. Phillips to J. Wernher, 26 Feb. 1905.

[50] Jeeves, "The Administration and Control of Migratory Labour on the South African Gold Mines: Capitalism and the State in the Era of Kruger and Milner", pp. 16-18.

[51] Frankel, *Investment and the Return to Equity Capital in the South African Gold Mining Industry 1887-1965: An International Comparison*, p. 28, table showing "Average Yearly Grade of Ore"; Grey, p. 433; Bleloch, p. 34; Richardson, *Chinese Mine Labour in*

the Transvaal, pp. 12, 18, 21. See above, chapter 4.

[52] *The Prevention of Silicosis on the Mines of the Witwatersrand*, 1937, p. 242.

[53] *Mining Journal*, 13 April 1895, p. 428, "A Year's Work in the Transvaal"; van der Horst, p. 127; Worger, p. 119.

[54] Reunert, pp. 44-45. Gardner Williams, pp. 164-360, traces this technical transformation; and Worger, pp. 191-296, analyses the evolution of the monopoly.

[55] Van der Horst, pp. 79, 81.

[56] Gardner Williams, p. 407. Cf. Worger, pp. 150-151, who claims that the iron-ore miners from Cumberland were coal miners. Little, if any, coal was mined in Cumberland. At Kimberley there were, indeed, a few colliers who, like Robert Barrow, came from Lancashire or other districts in the north of England. See *The Mining Industry*, 1897, p. 172, evidence of R. Barrow.

[57] This is clearly shown by the occupations listed in 1881 for the largest mine, the Kimberley Central. See Worger, p. 149.

[58] Gardner Williams, pp. 337, 422-425. During the 19th century as in the Kimberley underground mines, rock drills in British haematite mines were used only for driving tunnels in development. The excavation of the iron ore was done with hand tools. See TG 2 1908, p. 503, q. 5 819, evidence of J. H. Bridgman. As there are no definitive historical studies of the techniques of deep pit and underground diamond mining practices, this section is based largely on the writings of the contemporary mining engineer, Gardner Williams.

[59] Worger, p. 153.

[60] Worger, p. 109, n. 111.

[61] Worger, p. 149.

[62] Gardner Williams, pp. 220-266 passim.

[63] Worger, pp. 38-43 passim.

[64] Van der Horst, p. 67.

[65] Neither Worger nor Turrell investigates the role of coloured workers on the diamond mines.

[66] Van der Horst, pp. 68, 79.

[67] See, for instance, TCMA, file WG(2), T. Leggett to Secretary of the TCM, 26 Aug. 1902.

[68] It is beyond the scope of this study to

investigate the reasons for prejudice in depth.

[69] Aronson, pp. 179-181. See also Allport, pp. 14-15.

[70] Gould, *The Flamingo's Smile*, pp. 328-329.

[71] Gould, *The Mismeasure of Man*, pp. 73-74, 115-118, 120, 162, 227, 322- 326, discusses the pervasiveness of this philosophy in the 19th and 20th centuries and exposes its fallacies.

[72] CHA, WLF, H. Jennings to R. Schumacher, 1 Jan 1904.

[73] See, for instance, PRO, CO, 291/42, despatches, Milner to Chamberlain, 8 Sept. 1902, minute by H. W. Just, 7 Jan. 1903.

[74] Shareholders were mainly interested in their dividends. Nevertheless, they wanted reassurance that their dividends were not the result of gross malpractices. See, for instance, *Reynolds's Newspaper*, 10 Aug. 1913, letter by C. L. Tuckey.

[75] Bozzoli, *The Political Nature of a Ruling Class*, p. 105, also notes the capitalists' "concession" to Social Darwinism.

[76] CHA, WLF, H. Jennings to R. Schumacher, 1 Jan. 1904.

[77] Worger, p. 149.

[78] Cf. Worger, p. 149. After underground mining had been introduced, Worger incorrectly assumes that the overseers continued to supervise ore excavation. Van der Horst, p. 79, briefly and accurately shows that skilled miners, but not the overseers, supervised drilling and blasting at all times and in all kinds of South African mines.

[79] Worger, p. 148; Gardner Williams, pp. 227, 240.

[80] Worger, p. 149.

[81] Van der Horst, p. 81; Worger, p. 153.

[82] Turrell, p. 50, arrogantly notes that the structural explanation of wage differentials between whites and blacks has now become "orthodoxy". Even the neo-Marxist historian, Legassick, who pioneered the view that economic or class determinants were the reasons for wage disparities between whites and non-whites, is unable, p. 259, to discount satisfactorily the influence of "biological racism". Also, the materialist historians, Marks and Trapido, p. 71, and Bozzoli, *The Political Nature of a Ruling Class*, p. 100, make concessions to the influence of the theory and its rhetoric. See also Welsh, pp. 187-199, who helpfully discusses both the material and

the non-material reasons for wage differentials.

[83] Reunert, p. 35.

[84] Gardner Williams, p. 240.

[85] Gardner Williams, pp. 423-424, describes ore-removal tasks.

[86] Although Worger, pp. 180-181, mentions the collaboration of overseers and miners, he does not provide an insightful reason for it.

[87] See below, chapter 12.

[88] Hatch and Chalmers, p. 113.

[89] Truscott, pp. 123, 125.

[90] Ransome, pp. 280-281; Truscott, p. 340.

[91] Hatch and Chalmers, pp. 122-123.

[92] Denny, p. 58; Hatch and Chalmers, p. 113.

[93] C. Biccard Jeppe, v. 2, pp. 1 001-1 002.

[94] Hatch and Chalmers, p. 132.

[95] Hatch and Chalmers, pp. 133-136; Truscott, pp. 356-364, 367.

[96] Truscott, p. 165.

[97] TG 2, 1908, pp. 472, 891, qq. 5 274, 12 992, evidence of D. Hadenfeld and W. T. Anderson.

[98] Gardner Williams, p. 312.

[99] Gardner Williams, p. 314.

[100] TG 2, 1908, p. 481, q. 5 406, evidence of J. Coward.

[101] TG 2, 1908, p. 227, q. 2 203, evidence of J. B. Roberts.

[102] See, for instance, Levy, p. 29. Cf. Wilson, *Labour in the South African Gold Mines 1911-1969*, pp. 20-21, who emphasises the arduous nature of drilling; by implication he correctly demonstrates its semi-skilled content.

[103] SC 2, 1913, p. 134, q. 1 304, evidence of Dr A. J. Gregory.

[104] *Cornubian*, 15 Nov. 1901, "Notes and Comments".

[105] C. Biccard Jeppe, v. 1, p. 146.

[106] Watkins Pitchford, "The Industrial Diseases

of South Africa", p. 38.

[107] *Cornubian*, 15 Nov. 1901, "Notes and Comments"; Truscott, p. 163.

[108] TG 2, 1908, p. 227, q. 2 203, evidence of J. B. Roberts.

[109] Truscott, p. 161; C. Biccard Jeppe, v. 1, p. 148.

[110] TCMA, file W6(c), T. J. Britten to Secretary of the TCM, 11 Sept. 1902, S. Jennings to Secretary of the TCM, 6 Oct. 1902. See also Jeeves, *Migrant Labour in South Africa's Mining Industry*, p. 105. In the soft blue ground of the Kimberley diamond mines, an African driller was required to bore a hole twelve feet in depth. See Gardner Williams, p. 421.

[111] Truscott, p. 156; *South African Mining Journal*, 4 May 1895, pp. 647-648, "Leading Article".

[112] TG 2, 1908, p. 1 226, q. 17 891, evidence of H. J. Johns.

[113] *GMEAR...30 June 1907*, p. 12.

[114] TG 2, 1908, p. 503, q. 5 819, evidence of J. H. Bridgman.

[115] *South African Mining Journal*, 4 May 1895, p. 648, "Leading Article".

[116] TG 2, 1908, p. 947, q. 14 473, evidence of J. Davies. For a description of the machine drills initially used in Cornwall, see Cd. 2091, 1904, p. 26, n.

[117] TG 2, 1908, p. 309, q. 2 889, evidence of S. S. Crowle.

[118] TG 2, 1908, pp. 309, 528, 667, qq. 2 887, 6 263, 8 454, evidence of S. S. Crowle, E. Moore and S. Richards.

[119] TG 2, 1908, pp. 316, 387, qq. 2 969-2 972, 4 082A, evidence of S. S. Crowle and T. Mathews.

[120] Cd. 2091, 1904, p. 26, n.

[121] TG 2, 1908, p. 665, qq. 8 428-8 429, evidence of S. Richards; *Star*, 3 Dec. 1902, letter by "A. P."

[122] Truscott, p. 195. Cf. Blainey, p. 356, who incorrectly notes that on the outcrop mines hand drilled holes were the norm. Therefore he incorrectly concludes that the outcrop mines required less dynamite than the deep level mines.

[123] Unless otherwise noted, this description is based on C. Biccard Jeppe, v. 1, pp. 148-149; and

Truscott, p. 378.

[124] TG 2, 1908, p. 697, qq. 9 006-9 007, evidence of F. Crean.

[125] *JCMMS*, April 1912, "Accidents in Transvaal Mines", p. 410; discussant J. M. Phillips.

[126] Downes, p. 53, quoting the *South African Typograpical Journal*, July 1899.

[127] Miners, unlike artisans, did not work on the margins of the mines. Nor did the miners have limited contact with black labourers, as Worger, pp. 151, 158, 161, incorrectly assumes. Apart from development work, the miners were in direct contact with the diamondiferous ground and the labourers who excavated it. As Worger does not appreciate the differences in the job content of professional miners and skilled artisans, these mistaken assumptions result. In this respect van der Horst's brief study of the jobs of Kimberley mineworkers, pp. 79, 81, is more accurate.

[128] TCMA, file A1(b), consulting engineer of the Johannesburg Consolidated Investment Company to Secretary of the TCM, 4 Sept. 1907; Jenkins, p. 204.

[129] TCMA, file A1(b), consulting engineer of the Johannesburg Consolidated Investment Company to Secretary of the TCM, 4 Sept. 1907; Jenkins, p. 204.

[130] Gardner Williams, p. 421. Sometimes these gangs of workers consisted of only half a dozen black labourers, as Gardner Williams, p. 423, rather contradictorily notes.

[131] Gardner Williams, p. 422.

[132] *Star*, 3 Dec. 1902, letter by "A. P."

[133] Gardner Williams, p. 421.

[134] Gardner Williams, p. 341.

[135] The neo-Marxist view that the migrant labour system originated in the intent of capital is highly controversial; it is beyond the scope of this study to enter into this debate. But see, for instance, Wolpe, pp. 433-436; and Levy, pp. 8, 24-25, who present the orthodox neo-Marxist view. A dissident radical minority, including Marks and Rathbone, p. 18, support Harries, "Kinship, ideology and the nature of pre-colonial labour migration", pp. 142-143, who locates the migrant system in a variety of alternative and highly complex contexts. See also Elphick, p. 168, who elaborates on the latter view, but from a different theoretical standpoint. Cf. Gann and Duignan, p. 13, who oppose the neo-Marxist contention. In their view the mineowners would have preferred a fully proletarianised black labour force.

[136] Unless otherwise noted, this section on the

Senate Debates, G. G. Munnick, 19 March 1912, cols. 130-131; and *Union House of Assembly Debates*, H. Mentz, 13 May 1913, cols. 2372-2373; *SAMR*, 26 June 1926, p. 284, "Transvaal Mine Medical Officers' Association".

[152] *Report of the Council of the Association of Mine Managers*, 8 Feb. 1904, p. 15. See also Perrings, p. 132, who makes a similar suggestion.

[153] Worger, pp. 84-85, 98-99; Harries, "Capital, State and Labour on the 19th Century Witwatersrand: A Reassessment", p. 32.

[154] TCMA, file W6(c), T. Leggett to Secretary of the TCM, 29 Aug. 1902. See also Harries, "Capital, State and Labour on the 19th Century Witwatersrand: A Reassessment", p. 32.

[155] Harries, "Capital, State and Labour on the 19th Century Witwatersrand: A Reassessment", p. 32; SC 2, 1913, p. 125, q. 1 250, evidence of Dr A. J. Gregory

[156] Calculations based Dr S. V. van Niekerk's case studies of silicosis victims. See van Niekerk, pp. 93-143.

[157] Despite the evidence provided by his case studies, van Niekerk, pp. 93-143, did not draw this conclusion. See below, chapter 12.

[158] *Mining Journal*, 23 Dec. 1893, p. 1 1426, "Gold Mining in South Africa".

[159] Turrell, pp. 58-59.

[160] Calculations based on "Labour Returns" in *TCMAR*, 1893 1894, 1895, 1896, 1897, 1898, pp. 182, 247, 180, 272, 406b, 407.

[161] CHA, WLF, "Report of Special Committee", recorded date 21 Nov. 1902; *ARTCM*, 1899, p. 68, "Returns of Native Labour.

[162] Special allowance was made for 7,5 per cent of the total black complement on each mine to be paid at "special rates". See *Report of the Council of the Association of Mine Managers*, 1898, p. 6, "Classification of Native Wages", 1903, p. 16; and van der Horst, p. 164, n. 3.

[163] CAD, MNW, file MM 1780/1907, T. L. G. to H. Weldon, 10 Aug. 1907, enclosure by "eminent engineer".

[164] Both at the underground diamond mines and the gold mines unskilled white workers were employed as supervisors of black workers in various unskilled surface tasks. As most surface tasks are irrelevant to this study, they are not discussed.

[165] ZAR, *Wetten*, 1896, no. 12, 1897, no. 11,

1898, no. 12, section 11, "Definition of Terms". The Dutch translation of ganger was *ploegvoorman*. See also Merriman Papers, correspondence, F. D. P. Chaplin to JXM, 22 Aug. 1913.

[166] See, for instance, TG 2, 1908, p. 436, qq. 4 717-4 718, evidence of T. Mathews.

[167] Worger, pp. 177-187.

[168] Worger, p. 109.

[169] Ticktin, pp. 27-29, 100-102; Katz, *A Trade Union Aristocracy*, p. 127.

[170] Ticktin, p. 27, quoting the *Social Democrat*, May 1899, p. 28, quoting the *The Standard & Diggers' News*, 11 April 1894. See also Worger, p. 303.

[171] Ticktin, pp. 27-29.

[172] See below, chapter 8.

[173] Houghton and Dagut, v. 2, p. 150, 3.6.2., quoting H. Hamilton Fyfe.

[174] *JCHMS*, Oct. 1906, "Safety Measures in Mining", p. 114, discussant M. H. Coombe.

[175] There are numerous contemporary descriptions of the "nightmare" of underground work. See, for instance, *Evening Chronicle*, 31 July 1913, "The Miner", and 11 May 1914, "Evening Comment".

[176] See, for instance, Cd. 7478, 1914, p. 202, qq. 25 046-25 050, evidence of G. G. Hewitt.

[177] TCMA, file W6(c), S. Jennings to Secretary of the TCM, 6 Oct. 1902, enclosure in State Mining Engineer's Report for the Witwatersrand District. See also UG 34, 1911, pp. 39, 74-75.

[178] Calculations based on TCMA, file W6(c), S. Jennings to Secretary of the TCM, 6 Oct. 1902, enclosure in State Mining Engineer's Report for the Witwatersrand District, F. H. P. Creswell to Secretary of the TCM, [Sept.] 1902; *Rapport van den Staats-Mijningengenieur*, 1898, statement 1; *TCMAR*, 1897, 1898, pp. 406b, 407, "Labour Returns"; and TG 2, 1908, pp, 7, 9, 89, qq. 99, 136 and Annexure K, evidence of H. Weldon.

[179] Calculations based on Reunert, p. 75, Table B.

[180] UG 49, 1912, p. viii.

[181] Nesbitt, pp. 31-32. For biographical details on Nesbitt, see ibid., pp. 9-13.

[182] *GMEAR...31 Dec. 1901*, p. 11.

[183] J. Pratt Johnson, p. 332. Cf. Thorpe, p. 268, who incorrectly states that the incidence of silicosis was higher on the Australian mines than on the gold mines of the Witwatersrand.

CHAPTER 6

THE SUPERVISORY YEARS 1886-1910

> "The term "miner" is becoming obsolete, and the term introduced now is "supervisor", so apparently we are not going to have any more miners."---John Broad Roberts, mine manager, 1907.[1]

> "The history of South Africa is essentially a history of subjection of the native races and the utilization of their services in all departments of unskilled labour."---George A. Denny, Mining Engineer, 1902.[2]

A journalist from Britain, captivated by the white mineworkers' appearance of jollity described how they infected the inhabitants of Johannesburg with their happy spirit:

> One or two Joh'burg scenes remain indelibly imprinted on the memory - every fourth Saturday in the month is pay-day in the mines. The miners crowd into the town to spend their money and have a good time. On these Saturday nights the traffic is stopped - the streets are a solid block of people. All Joh'burg turns out to meet them.[3]

It might be contended that the British visitor's observations reflected the atmosphere of a typical mining town on a festive occasion. Even so, he correctly interpreted the Witwatersrand miners'

general sense of well-being. Miners' carousals on pay-day did, indeed, contrast sharply with their bleak working days on the mines. Nevertheless, they viewed their conditions of service on the mines with satisfaction; and they confirmed this sentiment by returning to the Witwatersrand as soon as they could after the Anglo-Boer War had ended.[4] Their feelings of contentment, however, soon altered; and in 1913 the musings of A. R. McNally, a fitter of twenty years' standing on the gold mines, accurately reflected the disillusion that he and his contemporaries felt with their changed working conditions:

> Ah! for the days of Paul Kruger, the pleasant, glorious days, the days of Freedom, Happiness, Contentment, and Prosperity; the days of bright hopes, optimism, good fellowship, comraderie [sic], gaiety and laughter.[5]

McNally had good reason for nostalgia; he was not romanticising his memories. Nor were his considerations idiosyncratic. As early as 1904, if not sooner, pre-war miners - those who survived death from silicosis - and artisans, who had resumed work on the mines after the war, expressed similar yearnings for the past.[6]

Two inter-related reasons account for the white mineworkers' relative satisfaction with their working conditions during the days of the Transvaal Republic. First, their average money wages were higher on the Witwatersrand than at any other mining centre in the world.[7] Second, they viewed the government of Kruger

as being sympathetically disposed to the working man: it was accessible to delegations from mineworkers, listened to their views with a sympathetic ear and enacted several laws in response to their requests.[8] Of equal importance, the workmen perceived the volksraad as being independent of mining capital.[9] Consequently mineworkers regarded many members of Kruger's administration as their "friends".[10] When the industrialists began to cut working costs and intimated their wish to reduce workmen's rates of pay, mineworkers were convinced that the Republican government's partiality to themselves had kept the mineowners "at bay" from having a "cut in" at their wages.[11]

The industrialisation of the gold mines occurred far more rapidly than that of the diamond diggings. In 1886, as soon as rumours of "free gold" swept across the country, thousands of prospectors from South Africa converged on the Witwatersrand by any means of conveyance.[12] But they discovered "from the first" that the requirements of banket mining precluded any chance of their establishing themselves as independent diggers running small-scale operations. Even so, their numbers were swelled by prospectors from abroad:

> American adventurers were there by the score, toughened men who brought the training, experiences, and vices of the American gold-rushes with them. Tall raw-boned Colonials abounded, and there were many English lads..., a few French and Germans, a smattering of Orientals.[13]

Soon after the arrival of diggers on the Witwatersrand, the government proclaimed several farms as public diggings in 1866; and the prospectors immediately set to work at pegging claims "till the whole country looked like the back of a hedgehog".[14] Although most small diggers could initially find sufficient money to pay for their claims, they lacked the large scale funds necessary to work them. As the average gold mine on the Witwatersrand comprised 100 claims,[15] a few enterprising diggers joined forces and with their combined resources established small companies and syndicates to operate blocks of claims.[16] Even so, such combined efforts needed considerable additional capital: the first mine, the Knights Company floated in 1886, required an initial capital outlay of £210 000, which was raised in Kimberley.[17] Consequently most prospectors had to modify their original aspirations of finding prosperity as independent entrepreneurs. Their options were to sell their claims for a small profit or, if they could raise the capital, to enter into company schemes.[18]

A community of independent diggers existed for an extremely brief period. It could not survive on the Witwatersrand, unlike at Kimberley and at the gold diggings at Barberton in the eastern Transvaal. But the industrialisation of the Witwatersrand gold mines did not bring an end to the era of the small independent gold prospector south of the Limpopo, as

some writers incorrectly contend.[19] Prospectors continued their activities at alluvial diggings in Natal, in the eastern Transvaal at Kaapsche Hoek in the Barberton district, and particularly in Swaziland.[20] Also, the discoveries in the Transvaal of alluvial diamonds in the vicinity of Bloemhof in 1891,[21] and at Mooifontein later, attracted by 1914 more than five thousand independent diggers.[22] All these subsequent digger communities provide a neglected but potentially fruitful area for historical research.

Although almost every nationality was represented in the great rush to the Witwatersrand, most diggers - "men in the prime of life, full of energy and enterprise"[23] - were English-speaking. A British ethos permeated this new gold mining centre from its earliest origins; and in 1887 Queen Victoria's Jubilee and birthday were celebrated with "ostentatious" loyalty.[24] Johannesburg was so British in outlook that visitors to the town found it hard to believe that the Transvaal had recovered its independence from Britain as the South African Republic in 1881. Indeed, in 1893 an article in the *Mining Journal* classified the Witwatersrand mines as "Gold Fields of the British Empire". Significantly it stated:

> It is vain to make regrets, but we cannot help sometimes looking on the past with a feeling akin to it, that such a rich territory passed out of our hands through a policy that was very largely condemned. And yet the British are conquering by a more superior force - that of commerce: and the time may yet come when a united South Africa

> may grow up, welding together the fragmentary settlements of which it is now constituted, and creating a new nation.
>
> We are almost inclined to regard it as a part already of the coming unity, because of the great commercial interests which ally it to those centres under our rule, the capital we have invested in it, and the preponderating British population which now dwells within its borders.[25]

It was not surprising that, when mining operations began in earnest, by far most of the skilled artisans and miners, as at Kimberley, were of British birth. According to official estimates in 1905 - by which time the racial composition of the workforce on the gold mines had altered minimally since the 1890s - 85,4 per cent of mine employees were born in the United Kingdom.[26] Lack of employment opportunities, particularly in Cornwall, obliged some mineworkers to leave Britain. Others did so in the hope of earning higher wages at this new mining centre than they did at home. Although a few American and Australian citizens, whose numbers are impossible to estimate with precision, also migrated to South Africa, most workmen from both these countries, as well as other British colonies, including New Zealand and Canada, were also of British birth.[27] They had some years earlier left their homeland to follow the gold trail; and such rovings frequently took them to the continents of Australian and North and South America before they eventually arrived on the Witwatersrand.[28]

As open-cast mining predominated during the period 1886 to 1890, only a small number of practical

miners and skilled artisans were required:[29] in December 1890 the Witwatersrand mines employed eighty-nine miners and 179 artisans mechanics.[30] But thereafter the industry progressed. In 1892, when systematic mining began in earnest, the certified returns of thirty-six companies, together with the estimated returns of another twenty, showed that the number of white mine employees, at 2 791, had risen ten-fold since 1890.[31]

In the same two-year period the increase in black workers was not as dramatic. From an average of 14 000 in 1890 their numbers rose to approximately 20 000 in 1892, narrowing the ratio of black mineworkers to white mineworkers from fifty-two to one in 1890, to seven to one in 1892. Apart from a brief period in 1899 when the ratio reached its highest point, at nine blacks to one white, the ratio of seven to one became the norm for the rest of the pre-war period.[32]

In the ratio of seven to one the numbers of both black and white mine employees increased annually in absolute terms. From 1893 to 1899 the number of white mine employees rose from 4 064 to 11 137 - an average annual increase of approximately 1 500.[33] One qualification to the statistics for white employees should, however, be noted: they included both salaried staff and workmen. Consequently they are not definitive for white wage-earners, or *mineworkers*. But as the combined surface and underground salaried staff

constituted a small group of employees, its inclusion in the total number of white employees affects the ratios of black to white mineworkers only fractionally.[34]

The growth in the average annual number of black workers was not as even as it was for white workers. In the years 1893 to 1895 the number of African workers rose steadily by approximately 10 000 per annum, namely from 29 500 in 1893 to 50 648 in 1895. A plateau marked the following two years, 1896 and 1897, just prior to and after wages for African mineworkers were reduced. This was at a crucial time; with the first level deeps coming into production, the demand for black labour increased. Finally, during 1898 to 1899, after the new schedule of reduced wage rates had been, implemented, the number of black workers, ironically, swept up sharply.[35] In 1898 black mineworkers on average numbered 67 697; and in June 1899 this figure peaked at 97 800.[36]

For the purposes of this study these statistics indicate several important features pertaining to the underground workforce. The emphasis is on the underground workers as they were exposed to dust and were therefore prone to silicosis. We will first examine the implications of the figures for black underground workers; and this will be followed by an analysis of the white underground work complement. Although all underground workers risked contracting silicosis, the degree of danger was not the same for

all mineworkers. The demarcation of underground jobs and a numerical analysis of each category of job holders will provide the tools for measuring, in subsequent chapters, mortality figures for the disease and for appraising contemporary data for its incidence and prevalence.

As we have seen, before the Anglo-Boer War the average overall ratio of black mineworkers to white mineworkers was seven to one. But this was not the ratio either on the surface or underground. While more than 50 per cent of the whites worked on the surface, this was not so in the case of Africans: less than one-third of the black complement were surface workers. This meant that on the surface the ratio of black to white employees was approximately 3,7:1; but underground it was nearly four times as high, at twelve to one.[37] Of the total underground workforce only approximately 10 per cent were white workers in contrast to 90 per cent who were Africans.[38] Since most black workers laboured in close proximity to white miners, it therefore follows that an exceedingly large number of black workers shared the same unhealthy conditions as white underground workers.

One must avoid jumping to the conclusion that all the black underground workers ran the same risks as miners of contracting a form of silicosis which could disable or kill them. As has been shown, this disease is insidious: it is a chronic and progressively developing condition. Accelerated silicosis manifests

itself after a relatively short period of continuous and intensive dust exposure; and chronic silicosis, which is the result of exposure to less intensive silica concentrations, causes incapacitation after a very much longer period. Consequently only those Africans who worked continuously underground for lengthy periods, or those who served a number of intermittent but relatively lengthy periods of indenture, faced the same danger as their white counterparts of acquiring the disease in a severely disabling or fatal form.

Of all the groups of Africans who worked on the mines the Mozambican Africans from the Delagoa Bay region probably faced the gravest dangers of dust exposure. We have already noted that they had a penchant for underground work. Also, they constituted the single largest assembly of black migrant workers: estimates for the years 1890 and 1898 were 58 and 60 per cent of the total black workforce.[39] Nearly one-third of African mineworkers registered for work on the mines independently of the Rand Native Labour Association. Therefore, as members of the Mine Managers' Association contended, it is possible that the official statistics, which were based on the returns of the recruiting organisation, may have underestimated the size of the Mozambican east coast labour force.[40]

As we have seen, the contracts of the "East Coasters" were at least double the length of the

contracts of Af. icans from other communities and regions, namely "the Transvaal Msutu, the Zulu, or the Southern Basutu".[41] Also, although some Mozambican Africans went home at the end of their one-year contracts,

> ...many thousands stayed for a second year and a third and a fourth, either on the same mine or re-engaging themselves from mine to mine.[42]

"On average" east coast Africans worked for two years at a stretch. But a considerable number of them "came to the fields and stayed from one to five years".[43]

Such long working periods on the gold mines were more usual during the era before the Anglo-Boer War than the one after it. This was because there were no organised transport facilities for contract workers who were, therefore, obliged to make their way to the mines on foot.[44] After the war the recruiting organisation, the WNLA, organised railway transport for contract workers who came from the Portuguese African territories.[45] Consequently during the post-war era most "East Coasters" tended to reduce their stay on the mines to a one-year period, or, often, to eighteen months.[46]

It was also customary for the "East Coasters" to return to the mines and to serve, on average, three independent contracts.[47] Consequently during the period 1892 to 1910 it is probable that many of the Mozambican Africans worked for six years on the mines, either continuously or intermittently.[48]

For these reasons, namely the length of their contracts and the continuity of their working periods on the gold mines, the "East Coasters" to some extent met the criteria for contracting silicosis. We shall, therefore, explore later the incidence and prevalence of silicosis amongst Mozambican Africans, rather than amongst black workers from other regions.[49]

We must now assess the statistics pertinent to the white underground workforce, which comprised roughly 42 to 46 per cent of the total number of white mine employees.[50] These percentages, which provide the basis for many important and valid statistical findings, may be misleading for purposes of this study, unless it is clearly understood that not all underground workers were, in fact, professional miners in the accepted sense of the word. Miners ran a far greater risk of contracting silicosis in both its accelerated and chronic forms than the other members of the underground workforce. When we later assess mortality figures and incidence and prevalance statistics for silicosis it is essential that we define, demarcate and quantify miners, as a distinct category of workers. We must also distinguish and analyse the branches of work in which miners, as opposed to other underground workers, were involved. These important issues have not to date, in terms of present knowledge, been systematically explored.

It is difficult to quantify miners with precision. Neither the annual reports of the Chamber

of Mines nor those of the Mines Department isolate miners, as a discrete category of workmen, from other underground workers. Instead both sources list an annual average number of workers in certain, often ambiguously defined, job categories. The figures from these two sources, alone or in combination, do not provide definitive statistics for the differing categories of underground work, including jobs peculiar to miners. When these official data are used in conjunction with additional statistical compilations and with other disparate evidence, it is possible to estimate, with reasonable accuracy, the number of workmen in each specialised underground task, and consequently the total number of miners employed annually on the gold mines.

Our analysis of these issues begins with an examination of the white underground workforce. Artisans, mechanics and other sundry machine operatives were regarded as surfacemen.[51] A small contingent of these workmen nevertheless constituted part of the permanent underground workforce.[52] An important group of these artisans attended to the cages: firemen, or boiler attendants stoked the engines; engine drivers were responsible for operating the ore-skips and locomotive cocopans; banksmen and onsetters gave the signals from the upper and lower levels of the underground stations to winding engine drivers to release the cages carrying ore and workmen; and the underground winding engine drivers lowered and hoisted

the lifts.[53] But as many of the jobs associated with engine drivers were also performed above ground in various surface operations, all these workmen could alternate between underground and surface work. Unlike miners, the engine drivers, or skipmen, the stationary engine drivers, the firemen and the signalmen were not necessarily confined to underground employment. All the same, a contingent of these operatives was always needed underground; and they comprised approximately 17 per cent of the permanent underground mine complement.[54]

Other artisans, including fitters, turners, boilermakers and blacksmiths, were also employed in underground workshops. They, too, alternated between surface and underground work. In fact, both management and artisans regarded all machine operatives, irrespective of their underground movements, as surfacemen.[55] The same criterion was applied to samplers and assayers and other similar specialist mineworkers. They were also viewed as surfacemen, even though they frequently spent half their working time underground, and were often, though not always, listed in the returns given for underground workmen.[56]

Miners constituted a specific occupational category of workers. Strictly speaking, miners were the underground workers who were directly engaged in mine development and ore production. They comprised

two groups. By far the larger group consisted of developers and stopers. They constituted roughly 18 to 20 per cent of the total white workforce on the mines and comprised approximately 50 per cent of white underground workers.[57] "Semi-skilled" trammers supervised the removal of rock from the face to the cage. They worked in close proximity to the developers and stopers and constituted approximately 9 per cent of the permanent underground workforce. Since these job holders had no practical mining skills, they were not considered to be fully fledged or professional miners.[58]

The smaller group of miners consisted of the specialist pitmen; they constituted just under 10 per cent of the white underground workforce. Most specialist pitmen had originally been trained as practical miners. On the Witwatersrand mines, as at Kimberley, management was not interested in the versatility of miners. Specialist pitmen performed specific tasks which management viewed as verging on "skilled". This generic category of miners included pipe fitters, plate layers, pump minders, and timbermen, who comprised 1,35 per cent, 1,97 per cent, 2,61 per cent, and 4,70 per cent of the underground workmen.[59] This group of specialised miners did not embrace semi-skilled mechanics, including riggers, machine greasers and other general underground workers, who were collectively and vaguely categorised simply as pitmen; such pitmen comprised approximately

6 to 9 per cent of the permanent underground workforce.[60]

For the purposes of this study two important conclusions can be drawn from this delineation of the underground white workforce. First, not all underground workmen were miners. Second, professional miners comprised approximately 30 to 33 per cent of the total number of white mine employees.[61] When the term "miners" embraced specialist pitmen, miners comprised approximately 60 per cent of white underground workers. When the meaning of the term "miners" was restricted to include only developers and stopers - this was its general or every-day meaning after the Anglo-Boer War[62] - miners constituted only 50 per cent of white underground workers. We shall show later that all miners, particularly rock drill developers and rock drill stopers, were at great risk from accelerated silicosis. The remainder of the underground workforce tended to contact chronic silicosis.[63]

Having defined miners we can now appraise their numbers, both in absolute and relative terms, from the time that the industrialisation of the gold mines began to take off, in 1892, until World War 1. Accompanying the annual increase in white mineworkers during the period 1892 to 1899, the number of miners also rose each year. The initial major influx of miners was in 1892, when they numbered approximately 1 600.[64] Between 1894 and 1898 there was no relative

growth in their numbers; but in absolute terms they increased from 2 363 in 1894 to 4 136 in 1899.[65] During this five-year period the largest annual increase, that of 854 miners between 1897 and 1898, took place, ironically, during the height of the depression on the Witwatersrand. This clearly signifies that the slump in the gold mining industry did not affect the demand for skilled or professional miners.

In summary, from 1895 to 1899 miners, that is stopers and developers together with specialist pitmen, constituted approximately 33 per cent of the total number of white .e employees.[66] By 1905, when the mining industry had regained its pre-war production levels,[67] this figure again stabilised at 33 per cent, and remained at this level until the outbreak of World War 1.[68]

If we are to understand why the disease, particularly in its accelerated form, was so prevalent amongst miners, we must examine their conditions of employment in the underground workings. We begin by examining miners' terms of service and the status which the industrialists attached to miners and to their work. This will help us to understand the responses of management - and of the public - to miners, after it was evident that they were being struck down in large numbers by an occupationally induced disease.

From the earliest arrival of the professional miners on the Witwatersrand, the mineowners looked down on them as a distinct class and category of workers. The Randlords also had a low regard for artisans, as members of the working class.[69] But they did not consistently denigrate the craftsmen in the same way that they scorned miners for their fecklessness, thriftlessness, irresponsibility and want of competence.[70] Also, the mineowners complained constantly about the inefficiency of miners as a group.[71] This occurred even after hundreds of professional miners from overseas had augmented the original handful of miners, some of whom may, indeed, have had a "lamentable want of experience".[72]

The general public, whose views were probably influenced by the press, shared such perceptions of the white workforce on the mines in general, and of miners in particular. One of the earliest journalistic descriptions of a miner at work on the Witwatersrand in 1888 was decidedly uncomplimentary:

> But he [the African] digs merrily away on the Main Reef, the dynamite charges explode...; the windlasses whirl round as the boxes descend on the shaft, and the mining overseer who "bosses up" the Kaffirs, smokes his pipe in a sort of regal state. This latter personage feels much more dignified on the four or five pounds a week he is earning, and his grand sense of superiority over the Kaffir, than he probably did in Ruthin [sic][73] or Penzance, presuming he is a Cornish miner...The worst of it all seems to be the disinclination to use their own muscles (brawny though they are), that these white overseers or "gangers" develop when brought to Southern Africa...

> The overseer, in flannel shirt and moleskin breeches, his waist encircled by a leathern belt, and his mouth embellished by a short pipe, sits on a mud-caked tub, and swears at the natives with a fair amount of regularity. This is his chief occupation.[74]

Apart from using his article as a vehicle for expressing his contempt for miners, the writer, Charles Du-Val - a visiting journalist-cum-actor - made three important points pertinent to miners, each of which needs analysis: first, the assumption that all miners were of Cornish origin; second, the inference that miners did specialist work rather than physical labour; third, the allegation that miners received wages that were unduly high and were, therefore, inappropriate to their class and vocation.

Most writers draw attention to the cosmopolitan composition of the white workforce on the mines. Even so, popular and academic historians have steadily embellished and exaggerated the myth that miners on the Witwatersrand were almost exclusively Cornish.[75] This distorted view reached its peak in 1978, ironically, in an academic study written by two historians, who dogmatically assert:

> Cornish miners, or miners of Cornish descent, formed the overwhelming proportion of the skilled labour force of the Witwatersrand gold fields in the first twenty years of mineral exploitation. In 1902-3, the Miners Phthisis Commission of the Transvaal estimated that over 90 per cent of all white miners on the Rand were of foreign origin and the greatest proportion of these were Cornish.[76]

The reference which they provide as the basis for the sweeping statement, paragraph 10 of the *Report of the Miners' Phthisis Commission, 1902-1903*, does not

allude to the origins of the miners: there is no mention of Cornwall in the rest of the report, which is 169 pages in length and includes 147 pages of minutes of evidence. Also, paragraph 10 refers to an appendix, which lists the birthplaces of thirty-three miners. In spite of the small sample, the appendix nevertheless delineates four British regional districts, namely England, Scotland, South Wales and Lancashire. As Cornwall is not identified, it is impossible to assume, as do the historians, that the "greatest proportion" of miners on the Witwatersrand were of Cornish origin.[77]

It is difficult to quantify the number of miners on the Witwatersrand according to their birthplaces. Official statistics did not document this kind of information;[78] and the mines had no interest in recording the nationality of their workmen.[79] Consequently source material on the origins of miners and their ethnic backgrounds is sparse, fragmentary and widely scattered. The following data on the origins of miners - as distinct from artisans - are merely estimates for the period 1898 to 1906. But corroborative evidence, although scanty, suggests that they are reasonably reliable.

From the weighty impressionistic evidence of contemporaries one can with certainty conclude that the miners on the Witwatersrand were a cosmopolitan group.[80] The United Kingdom apart, almost every other European country was represented by a handful of these

workers.[81] Their numbers were swelled by small bands of miners from North America.[82] As a large percentage of North American miners were of British birth,[83] the "aliens", that is miners who were not born in South Africa and Great Britain or her colonies, probably comprised 6 per cent.[84]

British colonials, other than those born in South Africa, constituted a slightly smaller proportion.[85] Groups of miners from Australia - from Ballarat, Bendigo, Mount Lyell, Mount Morgan and Broken Hill - migrated to the Transvaal in the 1890s, largely as a result of "bad times in that part of the world".[86] They were joined on the Witwatersrand by fellow colonials from New Zealand, Canada and West Africa.[87] But as many of these miners, like those from North America, were British born, the total percentage of national British colonials could at most have been approximately 4 per cent.[88]

The Witwatersrand gold mines also employed as miners a small percentage of colonists from Natal and the Cape, and a number of former overseers from Kimberley.[89] Not all the South African colonials were English-speaking: a few were Afrikaners.[90] The case of a former railway worker from Uitenhage, Solomon Johannes Pienaar, typifies this category of Afrikaner who came to the Witwatersrand in the 1890s. Apart from brief intermittent spells as a rock driller, Pienaar spent most of his underground mining career, which spanned twenty-seven years, as a pipe fitter until his

death from chronic silicosis in 1919. His election as a Labour Party member to the Transvaal Provincial Council in 1914 gave him a certain degree of public prominence.[91] Unlike most other locally born miners - and those from overseas - Pienaar did not die from the disease in obscurity.

Contrary to popular belief that Afrikaans Transvaalers did not work as miners on the gold fields before the Anglo-Boer War,[92] approximately 147 burghers from the South African Republic were employed as stopers in 1900.[93] We must therefore dispel the misconception that Afrikaners started to work on the gold mines as miners, as distinct from unskilled labourers, only after their experience as strike-breakers during the 1907 miners' strike.[94] Three months after the beginning of the strike there was indeed an increase in South African born miners of approximately 1 077;[95] and this constituted a large absolute increase in the number of Afrikaners over a very short period. But this sudden increase in the number of Afrikaners in 1907 does not explain why 3 260 South African born mineworkers, comprising 17,52 per cent of the total white workforce - a fair proportion of whom were doubtless English-speaking - were employed on the gold mines on 30 April 1907, that is one day before the strike started.[96]

Afrikaners began working underground on the mines before the Anglo-Boer War; and they continued to do so in small but steadily increasing numbers, after the

hostilities had ended, and for several years before the strike of 1907.[97] This Afrikaner element amongst miners shows why a "few" Afrikaners had worked for an adequate length of time and with sufficient proficiency to merit promotion to mine captains by 1907.[98] More important, it explains why out of a representative sample of white underground mineworkers, who were in the latter part of 1911 diagnosed as being stricken with silicosis, a *slow-developing and chronic illness*, as many as 35 per cent were of South African birth.[99] Although many of them had only "slight signs" of the disease, they undoubtedly had silicosis.[100] The *Rand Daily Mail's* generic classification of these respondents as "Afrikaners", although not definitive, was probably close to the truth.[101] The Secretary of Mines, Herbert Warrington Smyth, verified this when he described "a large number" of them as "South African born men with some experience of farming".[102] The evidence strongly suggests that by 1911 a large proportion of the South African miners - "people from the land", as the vice-president of the Transvaal Miners' Association identified them - were certainly of Afrikaans extraction.[103] Indeed, shortly after the Anglo-Boer War at least 5 per cent of miners were born in South Africa.[104]

The largest group of British miners on the Witwatersrand came from a single English county, that of Cornwall.[105] They comprised approximately 50 per

cent of the miners.[106] But unlike Kimberley, where the majority of British miners had emigrated from metal mining centres,[107] a large proportion of colliers joined the British hard rock miners on the Witwatersrand.[108] They came from all the coal mining centres in the United Kingdom - from Scotland, Wales, the English midlands and the north of England. It must be stressed that on the Witwatersrand the combined percentage of miners from all the other British districts was approximately 35 per cent.[109] Indeed, the mineowners contended that the "North of England" miners, in particular, were as important to the progress of the gold mining industry as the Cornish.[110] There is a strong possiblity, based on the fragmentary evidence of numerous sources, that the miners from the north of England comprised at least one-quarter of the British miners on the Witwatersrand, and were therefore at least half the size of the Cornish group.[111]

The ratio of Cornish miners to other miners from Britain was approximately 1,42:1. But the public disregarded this trend, and "Cornishmen" became the synonym for miners. Management also followed the custom of calling miners "Cornishmen", as Louis J. Reyersbach, a director of H. Eckstein and Company, popularly known as the Corner House, explained:

> Cornishmen...I simply used to mean the white workmen on the fields, whether Cornishmen or from Durham, or Australia, or Irishmen. Cornishman is a wrong term altogether.[112]

Nevertheless, there was enough reason for all miners on the Witwatersrand to be stereotyped as Cornish.[113] It is true that the Cornish miners were self-sufficient and formed a tightly knit brotherhood, as a colonist from Africa described them:

> I am persuaded that Cornishmen (Cousin Jacks we call them) are a very clannish people and exceedingly difficult to know; they might in fact have been a race of foreigners, so little did they mix with others.[114]

But their clannishness, for which they earned a name in all the overseas mining centres, was not unique to Cornishmen.[115] The Scottish and Welsh mineworkers were similarly disposed: they also established formal organisations and informal associations, the Caledonian and Cambrian Societies, which, like the Cornish Association of the 1890s, functioned as social and self-help groups.[116] Also, mineworkers from Wales, Ireland, and the North England counties, combining Lancashire and Yorkshire, formed similar kindred societies.[117]

These strong ethnic ties extended beyond mere social boundaries. As a miner explained, it was customary for British mineworkers to join a mine where their national group predominated:

> Where there are Cousin Jacks on the mine you will find very few Scotsmen, and on the contrary, where you find Scotsmen on the mine you will find very few Cousin Jacks.[118]

Also, when mine captains and managers changed jobs they tended to take with them miners of the same ethnic origins as themselves.[119] Most miners, and not

only the Cornish, had ethnic loyalties and maintained close ties with their brotherhoods in the Transvaal and with their homes in the United Kingdom.

All the same, group size and propinquity distinguished the Cornish miners from all the other ethnic groups. Although the other British regional groups retained bonds with their communities at home, the villages and districts from which they came did not constitute a single region: the districts were dispersed from Monmouthshire in South Wales through the Midlands and North England as far north as the Lothian Counties in Scotland. In contrast, the Cornish miners came from only one county, isolated from the rest of England by its situation on the south-west peninsula. Consequently the Cornish, with their identifiably different Celtic customs and dialect, constituted a large, tightly knit and distinctive group. As a body the Cornish miners identified with a single region which reciprocated this loyalty largely because of its financial dependence upon its migrant workers. It is therefore not surprising that miners on the Witwatersrand were stereotyped as Cornish.

The migration of the Cornish miners to overseas metal mines was not peculiar to the 1890s. The pattern had begun with a trickle of adventurers in the early part of the 19th century; but after the 1830s cyclical swings in Cornwall's metal mining industry determined the momentum of migration. During the 1860s the tin mining industry began its gradual decline; and Cornish

miners left their county for the gold mines in Australia and the USA.[120] By the 1890s the decline of the industry was so severe that the *Mining Journal* gloomily warned: "Speculation is taking almost its last gasp."[121]

Saved by the introduction of labour saving machinery, a handful of Cornish tin mines continued to carry on operations during this difficult decade.[122] But the few mines which continued to operate were no longer scattered throughout the length and breadth of western Cornwall. During the 1890s two-thirds of the mines were concentrated in one district, that of Redruth:[123] in 1898 its mines provided jobs for a mere 2 749 miners.[124] As there were no alternative job opportunities for miners in Cornwall, Cornishmen had no option but to leave the western county. During the 1890s, when miners migrated to overseas mining camps, including the Witwatersrand, most of them did so to avoid joining the growing pool of unemployed in Cornwall.

By 1901 Cornwall was known as a British county with a "vanishing population".[125] There was ample justification for this statement: during the 1890s approximately 30 000 people emigrated from Cornwall, the majority from Redruth. Although they travelled to Canada, Mexico, the USA, the Argentine and the Malay Straits, they also went to the British South African colonies of Natal and the Cape, including Kimberley.[126] But the single most important

destination for this surplus mining community was the Witwatersrand gold mines, as a mining journal verified:

> The West County would be in a bad way if it had to depend on our mining industry. One would scarcely care to think what might happen if not for the opportunities which South Africa offers to the trained miners of the Duchy.[127]

Cornish miners were not obliged to go to the Witwatersrand. They had other choices. There was a steady market for their skills in all the overseas metal mining centres. Also, despite the disdain of the Cornish hard rock miner for the hewer's craft, good employment opportunities existed for them on the British coal mines.[128] But they chose the Witwatersrand because they preferred its advertised attractions:

> The climate is excellent, the fields are of proved permanence, wages are good and there is a further inducement in the conditions of work, the amount of manual labour falling to the lot of the white hands being reduced to a minimum, owing to the employment of natives.[129]

Throughout the 1890s Cornishmen left for the Transvaal in large contingents. In May 1895 a local Johannesburg mining journal, in enthusiastically reporting the continued influx of white miners to the Witwatersrand from the United Kingdom, added that "thirty from a single Cornish town" had arrived on the Reef.[130] Of course not all Cornish workmen who emigrated were miners: there was a small contingent of surfacemen, artisans and mining professionals, who

constituted approximately 7 per cent of the Cornish mine employees on the Witwatersrand.[131] Also, Johannesburg attracted a sprinkling of Cornish businessmen.[132] But miners preponderated in this exodus from Cornwall.

A handful of emigrants left together with their families.[133] But most miners emigrated as single men. Both bachelors and single married men were migrants rather than permanent emigrants; and both kinds of single men were conscious of their obligation to remit monies to Cornwall for the support of their parents and siblings, or their wives and children. Each week, on Fridays, a crowd waited at the Redruth post office for the train to bring the mail from Cape Town carrying both greetings and postal orders on which dependents of miners were reliant for moral and financial support. In 1895 it was estimated that the Redruth district received on average £8 000 to £10 000 per week from its mining kin abroad.[134] But obviously some miners were more conscious of their responsibilities than others. After a special train had left Redruth in 1899, with all its passengers bound for the Transvaal, a local Cornish newspaper complained that the departure of so many miners would compound the problems of the Redruth Guardians, a body which supported children financially neglected by their migrant fathers.[135]

In this respect, other British mining societies were similar to Cornwall. Families relied on their

migrant menfolk to remit monies from abroad and when in distress such families depended on the help of their communities.[136] There are strong parallels between British migrant miners on the Witwatersrand and the African migrant labour force. As with African rural societies, the British urban and rural communities provided welfare benefits for the families of migrant workmen.

This was particularly evident in the case of medical care. When miners on the gold fields contracted silicosis, it was their desire and practice, if they could afford the passage, to return home to be cared for by their families until they died.[137] In 1912, in evidence to the British Royal Commission on Metalliferous Mines and Quarries, W. Dixon, a miner from Briggig in Cleator, who had recently returned from Johannesburg, illustrated this:

> Up to within the last year or two numbers came back again probably slightly affected [by silicosis], and got work in the ordinary mines, and in the course of a few months or probably a year, as the case may be, phthisis developed and they very readily succumbed to it...comparatively young men are coming in the last stage of miners' phthisis and in a few months or perhaps a few weeks succumb entirely, and they [come home]...to be cared for and healed by England.[138]

By the 1890s the majority of lead and iron-ore mines in Britain were in a state of decline.[139] Consequently these hard rock miners were also obliged to uproot themselves from their villages in order to seek new jobs. Like the Cornish miners, they did not

lack employment prospects on the British coal mines. But the inducements of the Witwatersrand prompted their migrating to the Transvaal as single men: bachelors and grass-widowers preponderated amongst this group too.

As opposed to the metal miners, migration was not a matter of necessity for British colliers: throughout the 19th century and the first two decades of the 20th century the prosperous coal mining industry,[140] which was largely labour intensive,[141] provided ample employment opportunities. The reason that prompted colliers from the United Kingdom to migrate, also as single men, to South Africa was the hope of improving their circumstances. There were reports that the monthly wages of miners on the Witwatersrand ranged from £20 to £30 per month. This seemed a "fortune" in comparison with their average earnings in Britain of £6 per month.[142]

Miners who took the decision to migrate to any mining centres in the world do not seem to have done so impulsively. They carefully appraised potential opportunities elsewhere by consulting newspapers, mining journals and, if they had the means, by initial personal visits.[143] Other sources of knowledge included letters from friends and discussions with migrant miners who returned home at periodic intervals, particularly at Christmas, for short holidays;[144] and the mining fields themselves were also a plentiful source of news and mining gossip.[145]

In brief, miners at virtually every mining centre in the world were reasonably conversant with working conditions elsewhere.

Initially most British miners viewed their prospects on the gold mines of the Witwatersrand with caution. But once the news spread that conditions did, indeed, match the advertised "inducements",[146] they eagerly and in ever growing numbers prepared to go there.

The Witwatersrand gold mines were not unique in offering inducements, particularly high wages, to skilled workers from Europe. All overseas mining camps were obliged to do so.[147] But the demand for artisans, as opposed to miners, differed. At most of the large overseas mining centres - and the Witwatersrand was no exception - the supply of "surface" workmen, namely craftsmen and machine operatives, "was greater than the demand".[148] In contrast, Edward John Way, the consulting mining engineer of Consolidated Goldfields, noted that professional miners were "scarce throughout the world". With specific reference to the Witwatersrand, he added:

> Underground, you have always been faced with the position that you never could get enough good miners, and you had to meet them in all sorts of ways to keep your good men.[149]

Although the Witwatersrand, like other far-flung mining camps, had to contend with the problem of a scarcity of experienced practical miners, it offered them an attractive and novel inducement: freedom from

the drudgery of physical labour, which was customarily an integral ingredient of their every-day work.

The wage-earners of 19th century Britain did not constitute a homogeneous and undifferentiated assembly of workers: and the working class, as such, was highly stratified. At the pinnacle of the hierarchy were the skilled tradesmen. Their craft unions restricted the number of apprentices admitted annually; the practice limited the numbers of specialised workmen in each particular trade and promoted the exclusiveness of each skilled group. Consequently the craftsmen, who were able to preserve their monopoly of skills, were called the aristocrats of labour: they were specialists and their scarcity enabled them to command higher wages than less skilled groups which were far larger.[150]

Miners were not at the top of the labour hierarchy. In overseas mining camps their skills were a crucial requirement and consequently they earned high wages. Unlike the artisans, however, they did not constitute an exclusive group with a monopoly of specific formal skills. Nevertheless, on the Witwatersrand, as opposed to other mining centres, miners were dubbed aristocrats of labour.[151] This was because the conditions under which the Witwatersrand gold mines were industrialised resulted in miners becoming specialists: they did not have to perform their customary unskilled physical tasks.

Virtually from the beginning of mining operations, management on the Witwatersrand, as at Kimberley, organised gangs of African hand drillers, or "hammer boys", under white supervision. Miners took up their duties as supervisors in the open quarries, where Du-Val had observed them in 1888, and also in the original shallow drives, winzes and shafts.[152] In this way the deployment of the labour force elevated miners to a position of superiority in the labour hierarchy customarily enjoyed only by highly skilled craftsmen, and one to which miners elsewhere did not, and could not, aspire. In 1908 the New Zealand manager of the State Mine, M. H. Coombe, confirmed this in his reminiscences. As he had worked as a miner at Kimberley and had, before his promotion to management, also been a pioneer miner on the gold fields, Coombe was able to provide an authoritative explanation:

> As Kafir [sic] labour became more plentiful and miners came to the Rand in greater numbers, the present system of an aristocratic white labour section and a native unskilled labour section became evolved.[153]

On the Witwatersrand - and at Kimberley - the status of miners and the content of their practical work were virtually unique.[154]

But the miners' position of superiority in the labour hierarchy on the Witwatersrand was tenuous: supervision, which artificially elevated miners to a skilled status, in the long run, ironically,

undermined their skilled standing. Linked to supervision was the system of specialisation. On the Witwatersrand management did not require the versatility of miners and restricted them to discrete tasks.[155] Miners had the options of being shaftmen, hand drillers, rock drillers or one of the several kinds of specialist pitmen. They could, if they wished for variety, switch with ease from one branch of mining to another. But having chosen a field of specialisation they attended only to the tasks which the particular job entailed. But supervision and specialisation, which were in many respects mutually inclusive, vitiated the all-round abilities of the overseas miners.

Unlike an artisan, whose skills were strictly defined in terms of his formal apprenticeship and its culmination in an objective trade test, a miner's claim to a similar skilled status was reliant on ambiguous and subjective grounds: his informal training at the hands of his elders; his all-round practical skills; and his years of experience. Therefore when management assessed the skills of miners they tended to use as their yardstick the formal and objective criteria applicable to artisans: it did not take into account miners' less obvious accomplishments. Management's tendency to underrate the skills of miners was far more pronounced on the Witwatersrand than elsewhere: the innovation on the gold mines of supervision and specialisation rendered

the miners' versatility redundant, so ultimately reducing their status, at best – even in the case of rock drillers – to the level of semi-skilled operatives.[156] The opinion of Way, who placed little value on the unapparent skills of miners, illustrates the contention. When the Industrial Commission of 1897 tried to establish the standing and expertise of the 105 workmen employed on the George Goch, Way stated:

> It depends on what line of demarcation you draw between skilled and unskilled labour. The only unskilled men we have are the actual miners.[157]

In his definition of miners Way included specialist pitmen, who functioned in a manner similar to artisans and machine operatives. They were assisted by "one or two" Africans,[158] and were in direct control of their tasks and equipment. Consequently supervision did not fragment the jobs of specialist pitmen. Even so, as in the case of supervisors of hand and rock drills, specialisation crippled their all-round practical abilities, the ill-defined and nebulous criterion in which the skilled standing of professional miners was rooted. As specialist pitmen constituted a mere 10 per cent of miners, most skilled miners were supervisors.

Initially overseas miners welcomed their position as supervisors: they did not recognise its ominous long-term implications. As development and stope supervisors, miners did not have to do any hand

drilling themselves. Their skills were directed to training and supervising their gangs, which comprised approximately twenty-five "hammer boys",[159] to placing the drill holes and to blasting.[160] Nor did they have to shovel and clean: black labourers also performed the unskilled tasks, but under the supervision of the nominally semi-skilled gangers. In essence, supervision fragmented the all-round skills of miners. But the introduction of power-driven machines was not solely responsible for whittling away their expertise. Instead, it resulted from management's employment of black workers, whom the mineowners derogatorily referred to as "muscular machines" lacking "any intelligence".[161]

Rock drill supervision posed similar dangers to the skilled standing of the Witwatersrand miners. When rock drills were introduced in Cornwall and at other mining camps, a pair of miners, who were usually equal in status, operated the machines. Indeed, their work was not overly specialised; in addition to drilling, they did their own timbering and were responsible for other general tasks.[162] But rock drillers on the Witwatersrand were responsible only for drilling. Another Witwatersrand variation was that each operator had two African assistants. One helper, the chucksman, or "spanner boy", helped adjust and change the drills; and the second African, usually the youngest of the party - "piccanin", as he was called - fetched and sorted the jumpers.[163]

Initially the mineowners regarded machine drilling as a skilled task, one which was equal in status to jobs done by skilled artisans. Also, they viewd rock drillers as being superior workmen to hand stopers and specialist pitmen: they paid them according to this criterion. After rock drills had been introduced, most overseas miners chose this form of specialisation because their skilled daily wage of £1 was higher than the rates paid in other branches of mining - these wages ranged from semi-skilled to just under skilled.[164] This was not a distasteful option for miners who, like James Coward, revelled in operating the machines.[165] But others who found hand drilling more congenial than rock drillling resented management's rationale, deeming it, as did Thomas Mathews, ill-conceived. As a professional miner, Mathews claimed that he would do hand stoping "any day of the week", if he could earn the same "cash" as he earned on the machines. Bitterly he added:

> But they have an idea on the Rand that the man on the machine is smarter and more intellectual than the man in charge of hammer boys, but it is not so. It is only their [management's] idea.[166]

It took overseas miners, with their basic training and experience, but who had no previous experience of rock drill work, no more than a few days to master the new accomplishment;[167] and many, but not all miners,[168] looked for machine jobs in preference to hand drill supervision. As novice rock drillers they already possessed the necessary practical skills

and experience to position and to direct the holes, and to judge the requisite amount of explosives.

Unlike rock drillers in other mining camps, the machine operators on the Witwatersrand soon faced job fragmentation. Within two years of the wide-spread use of machine drills, in 1894 management began to experiment with rock drill supervision on several mines; and by 1897 machine drill supervision had become general, but not universal, practice.[169] For an additional 5s per shift, miners agreed to supervise two machines with the assistance of five Africans. Two Africans - the "handle boy" and the "spanner boy" - operated each machine, while the fifth man was responsible for "bossing up the drills" - and for fetching water after its use had been made compulsory by regulation.[170] Indeed, by 1899 supervision became so thoroughly entrenched that management acknowledged that on the Witwatersrand the term miner was virtually "obsolete":[171] it had been superseded by the title supervisor.[172]

Accompanying the view that Witwatersrand miners as supervisors were different from miners elsewhere, the notion rapidly gained ground that their wages were inappropriately high for workmen in such an inferior calling. Management did not consider the intangible skills of miners to be on a par with those of skilled craftsmen.[173] Within a short time the mineowners regarded machine drilling also as a semi-skilled task.[174] Reinforcement for the idea was the ease and

speed with which "yokels", that is men with no previous experience in mining, acquired blasting certificates on the Witwatersrand, particularly after the Anglo-Boer War.[175] The certificate, based largely on book knowledge, was the only qualification workmen needed to become supervisors of either hand or rock drills.[176]

The promotion of miners to supervisors, ironically, did not enhance their status. Instead, in the views of management and the public, it placed them in a paradoxical position.[177] On the one hand the mineowners contended that miners had an onerous duty: the generation of the maximum productivity, at the lowest possible costs, from their unskilled black charges, irrespective of whether they wielded hammers or handled machine drills.[178] But this proved to be an extraordinarily difficult task because of the inefficiency of the whole system; miners identified many of its deficiencies long before the Economic Commission of 1914 reached the same overall conclusion.[179] .

On the other hand, management denied the managerial functions of miners by arguing that a supervisor, unlike a salaried foreman and a shift boss, lacked the qualities necessary for holding down a responsible overseer's job: he was "simply" a *workman*, or "only" a supervisor.[180] In the view of management, miners on the Witwatersrand, as opposed to miners elsewhere, constituted a privileged group of

"labourers" who did "very little work".[181] As such, the mineowners argued - and the majority of craft unionists agreed[182] - that the Witwatersrand miners had reached the top of the labour hierarchy by default rather than through merit. Another rationale for the mineowners' contention was the speed with which black workers learned and mastered so-called "unskilled" drilling jobs.[183]

Therefore when the industrialists - and the public - applied the title supervisor to miners, they often did so with derision: it denoted the Witwatersrand miner's lack of standing in the labour hierarchy.[184] The term also carried derogatory connotations of inefficiency and laziness; shareholders believed that that they were paying a certain amount of money for which "no work" was being done.[185] From the mid-1890s the public and management, as Du-Val had earlier done, unflatteringly stereotyped the miner-as-supervisor as a workman who "wants to sit on the dynamite box smoking his pipe".[186]

It must be emphasised that the description was an unjust caricature of the supervisor; his work was certainly not "light", as an editorial in the *Cornubian* endorsed.[187] The ganger who supervised hand drillers had a dangerous and demanding job. Before drilling could begin, the supervisor was obliged to examine the hanging wall and remove misfired explosives to prevent accidents. Next he directed his gang, giving each member specific instructions.

Hardly a day passed without the necessity for training beginners: fresh recruits continually replaced old hands whose contracts had expired.[188] Drills needed constant attention; and at the end of a ten-hour shift every hole, each thirty-six inches deep, had to be ready for blasting. Unless he ensured that the gang accomplished this task, the miner was dismissed for incompetence.[189] Also, the need for continuous group discipline and motivation prevented the responsible supervisor from slacking physically or mentally during his working day.

Likewise, the rock drill supervisor had an equally demanding and responsible job. Within a single shift each pair of African machine drillers was expected to drill four holes, each six feet in depth, with sufficient time in hand for them to be blasted before the ten-hour shift had elapsed.[190] In the hard rock formations of the Reef this was often difficult. Drilling by machine was often more dangerous than by hand: the jar of one or more heavy drills could bring down large portions of hanging rock during the shift. The preliminary examination of the rock to detect "tender" or "uneasy" stopes was, therefore, an important safety prerequisite, but one which delayed the beginning of drilling.[191] The machines were by no means technologically perfect: frequently they jammed or broke down causing unavoidable waste of time.[192] Insufficient air pressure slowed their operation, as did the inadequate and delayed supply of sharpened

drills.[193] Also, as the machines were invariably "hundreds of feet apart", the supervisor was constantly on the move.[194] For all these reasons there was little time for the rock drill supervisor to relax in the "rush for rock".[195]

Once drilling was under way, supervisors undoubtedly took some time off from their duties to smoke, eat and rest.[196] But there was another significant reason that rock drillers, in particular, retired from the workings, but one which management seldom acknowledged.[197] In the drives, winzes and stopes, supervisors bore the full brunt of the polluted air, vitiated by dust and foul gases. Unlike their charges who handled the rock drills, they did not have the benefit of relatively clean air which the machine compressors provided.[198] By retreating to the fresher air of the alcoves supervisors derived temporary, but much needed, sustenance to continue their work. Indeed, the supervisors in general were not the full-time idlers, as the caricatures misrepresented them.

The incompetence of the isolated lazy supervisors, however, was transposed to the whole profession, so that the inefficiency of a tiny minority of miners became a universal, but not accidental, stereotype. The evidence strongly suggests that the incorrect and exaggerated stereotype of supervisors was deliberately orchestrated by the mineowners so that they could, with public support,

increase the burden of supervision to excessively demanding levels in the name of efficiency. Management's aim was increased productivity: but in practice it was a form of "speeding up" which exceeded the bounds of the average workman's capacities and endurance. It would seem that the overseas miners were, at least at first, naïve participants in a system which fragmented their jobs and caused them to be vulnerable to wage reductions.

As we shall show later, after 1902 management intensified its efforts to increase miners' productivity and to reduce their wages. The attempts by management to reduce working costs coincided with the attrition in large numbers of youthful miners from accelerated silicosis. By this time the mineowners and the state acknowledged the prevalence of the fell disease. But their efforts to reduce its incidence were minimal; and the issue received scant attention in the press. Public sympathy for the miners was negligible. This is one reason why the miners' strike of 1907, in which the prevalenace and mortality from silicosis constituted a primary issue, failed to arouse public understanding and support.[199] The stereotype of miners as underworked and overpaid supervisors was simply too powerful.

The miners' lack of status in the workers' hierarchy helps explain why the craft unions, in particular the Transvaal Engine Drivers' and Firemen's Association, refused to strike in sympathy. In 1907

the craft unions associated with the mines did not realise that their underground members were also prone to silicosis. Consequently the absence of a shared background and a cause common to all mineworkers were crucial reasons for the sectionalism of the miners' strike, ones which historians have failed to identify.[200]

Supervision also rendered miners prone to job displacement by their black subordinates. But most overseas miners, who were initially willing participants in a system which relieved them of labouring tasks, paid scant attention to the potential competitive dangers from Africans. During the 1890s there is little evidence to suggest that miners perceived that the system of supervision was providing Africans with the same kind of informal apprenticeship that they themselves had received at the beginning of their mining careers. Nor did they reason that the Africans' acquisition and mastery of the basic but essential mining requirements would equip them to become, like themselves, practical miners. In contrast to their bitter opposition to indentured Chinese labour, the overseas miners did not initially regard African contract workers as serious economic competitors whose docility and cheapness threatened their jobs. In their opinion African migrant workers constituted an "inferior" workforce which lacked the "intelligence and industry" of the Chinese.[201]

During the 1890s management's policy towards African migrant workers, in which its rhetoric coincided with its actions, reinforced the miners' sense of complacency towards supervision and specialisation: the mineowners viewed the black migrant workforce as unskilled labourers and paid them accordingly.[202] In brief, although the mineowners paid black migrant workers very low wages, they did not threaten nor did they attempt to displace miners by employing African migrant workers as substitutes for them in semi-skilled positions, but at unskilled wage rates. These developments, as we shall see, came later.

During the 19th century white mineworkers were undoubtedly faced with encroachment on their skilled preserves. This competition came not from members of the black migrant labour force, but from a small group of semi-skilled and skilled Africans, as well as from Indians and coloured persons.[203] Their employment on a semi-permanent and permanent basis distinguished them from the huge assembly of black unskilled migrant and temporary workers.

Between 1892 and 1897 the permanent group of black workers showed signs of significant growth. It comprised small congregations of Africans, some of whom had their families with them, housed in locations on virtually every mine property.[204] But two interlinked occurrences in 1897 stultified the growth

of the permanent African workforce: the revised wage schedule for black mineworkers; and state support for migrancy.

As Norman Levy argues, because of its cheapness to themselves, in 1897 the mineowners opted for the migrant labour system in preference to a permanent and proletarianised African workforce.[205] A combination of factors made this option feasible. Acting collectively for the first time on the question of wages for black mineworkers, in 1897 management introduced its new wage formula, which was drawn up by the Association of Mine Managers.[206] The revised wage schedule lowered Africans' wages by 30 per cent, so saving the mines an estimated £1 000 000 annually.[207] Reduced wages did not cause appreciable numbers of black workers to withhold their labour from the gold mines;[208] and the immediate African labour shortage was only temporary.[209] State support for the industry ensured the successful entrenchment and the perpetuation of the migrant labour system even at reduced wage rates.

In 1897, as Patrick Harries has shown, Portugal extended firm and harsh labour controls over Southern Mozambique's labour force; and almost simultaneously the local Portuguese authorities negotiated an agreement with Kruger's government which in principle facilitated and regularised the emigration of Mozambican labour to the Transvaal. Shortly after the implementation of the new wage rates there was a

significant increase in the number of migrant mineworkers.[210] The largest single group - 60 per cent - came from Portuguese East Africa south of Latitude 22° South.[211] This phenomenon persisted: in 1913 the "East Coasters" constituted 35 per cent of the migrant workforce[212] - one-half of the African underground workers.[213]

Through both its special rates and ordinary rates the revised wage schedule promoted migrancy. Its special rates were limited to a tiny "prescribed" group, which comprised a mere 7,5 per cent of each mine's total black work complement.[214] The special rates ranged from £4 to £5 per month;[215] and to prevent mines from competing with one another for skilled African workers, they were pegged at a maximum level of £5 per month.[216] As the number of black workers entitled to special rates was on each mine approximately only one in thirteen, mine managers naturally tended to confer this privilege on their experienced employees.[217] The underground workers who were recipients of these special rates were usually "boss-boys", who assisted gangers, or were informally trained but experienced and "intelligent" operatives,[218] including "winch boys", who single-handedly operated ore-bearing cages, and pump drivers.[219]

Ordinary rates for underground black workers ranged from 1s 2d to 2s 6d per day, namely 35s to 75s per month;[220] and the ordinary average monthly rate of

pay for all categories of underground workers, was 50s per month for 30 shifts.[221] When compared to the ordinary rates, the special rates provided a greater inducement for Africans to remain permanently on the mines.

In the view of a number of mine managers, by 1899 approximately 20 per cent of black workers merited the payment of special rates.[222] They included the "Boss boys" and the operatives, as we have noted, as well as "Shaft, Timber and Station boys".[223] But the quota system allowed management to pay only one-third of them in accordance with their merits.[224] Although a relatively small number of rock and hand drillers remained on the mines for as long as five to seven years without being promoted to special rates,[225] in the main the ordinary rates provided little incentive for experienced and skilled Africans to remain in permanent employment. The revised wage schedule therefore promoted migrancy rather than permanency. This was the contention of Thomas H. Leggett, consulting engineer of S. Neumann and Company:

> Under the present allowance of 7.5% to be paid higher rates, it is impossible to make provision for boys engaged in positions of trust for which special training and skill are required. The boy who becomes skilled in drilling, tramming, running rock drills, track work, etc. is undeniably worth more than the raw kaffir, and this should be recognised in his rate of pay. As things are when the raw boy becomes useful and able to do good work, his contract expires; and then we practically drive him from our employ by offering him no greater pay than that which he received as a raw, unskilled laborer. His own commonsense [sic] tells him his services are more than when he first

came.[226]

In this significant way management's revised wage schedule in conjunction with its tiny permissible fraction of special rates helped entrench the migrant system.

For purposes of this study there is another dimension of importance to the Africans who were paid at special rates: their liability to silicosis. From their job categories, which we earlier noted, it is clear that underground workers predominated in their ranks. As opposed to the "East Coasters", who served several intermittent contracts, a probable two-thirds of the small complement of semi-permanent and permanent workers were exposed to dust for continuous unbroken periods of service. Consequently when we try to assess incidence data for silicosis amongst African workers, prominence will also be given to this small but significant group of "long service" Africans.

As we shall see later, the mortality from disease amongst black migrant workers in the prime of life was enormous. Even after the introduction, at the end of 1903, of improved health care for Africans, the average annual death rate from disease was approximately 45 per thousand.[227] In 1913, although respiratory diseases accounted for approximately 55 per cent of the mortality,[228] the offical statistic for silicosis was a mere 0,167 per cent.[229] Health officers conceded that African migrant workers contracted silicosis. Even so, they contended that the degree of fibrosis in these workers was so slight

as to be negligible.[230] Unlike white miners, black mineworkers seldom succumbed to a rapidly progressive form of silicosis:[231] such cases generally occurred only amongst the small group of "long service" Africans, who worked continuously for at least five to twelve years.[232]

For this reason most doctors did not believe that the extension of the contracts for African migrant workers would be at all advisable, as George Turner junior, the medical officer of health for the WNLA, illustrated:

> A man would not contract that [miners' phthisis] in eighteen months...Three years at a stretch would be too much...I think that the natives have less Miners' Phthisis than Europeans, owing to the fact that they are continually breaking their work and spending some months in their kraals...They do not get the same opportunities of contracting Miners' Phthisis because they are away at different intervals.[233]

But Alfred John Gregory, a doctor of controversial views and temperament, had misgivings about the conventional view. As the retired Cape Medical Officer of Health, from 1891 to 1910,[234] he was asked to chair the Tuberculosis Commission of 1912 which simultaneously investigated "The Health of Natives on the Witwatersrand Mines". Unlike the other three medical commissioners, two of whom came from the Witwatersrand, Gregory was highly critical of the medical services on the mines. As a result of his disagreements with his fellow-commissioners he acted in a singularly unorthodox way. He took it upon

himself to compile single-handedly those aspects of the report which dealt with the mines' health services for Africans. Also, in the report he publicly justified this action by alleging that the "intimate" association of the Transvaal doctors with the "existing system of control" made it impossible for them to judge impartially the case for "improved mine health supervision".[235]

Gregory's sections of the report criticised the mineowners for not making adequate arrangements for submitting the African "to the same careful methods of diagnosis for it [silicosis]" as the "European". Also, Gregory found the "universal opinion" of the mine medical officers that intermittent periods of service had a beneficial effect on the health of Africans to be a weak and unwarranted assumption. He proved his point by showing that the WNLA and the mines kept no records of Africans' contracts, and that there were "no figures of a kind to be relied on, and which can be calculated with certainty".[236]

F. H. P. Creswell, the parliamentary leader of the South African Labour Party, held views similar to those of Gregory. Before Gregory presented his report, Creswell had argued that the conventional wisdom of the mine doctors provided the mineowners with

> the comfortable doctrine that the periods of rest between the expiry of one contract and the commencement of another, greatly mitigates the evil effect of the present mining conditions on the health of the native.[237]

The Randlords did, indeed, take advantage of the orthodoxy of the mine medical officers.[238] The mineowners disregarded the sentiments of Gregory and the other few like-minded dissidents.[239] The apparent low prevalence in black migrant workers of an incapacitating and fatal silicosis provided the mineowners after 1912 with an additional reason for perpetuating the migrant labour system.[240] The Randlords' apparent concern with the health of its African mineworkers was a disingenuous rationalization for advocating the migrant labour system, but one calculated to gain the approval of the industry's shareholders.

Notes

[1] TG 2, 1908, p. 226, q. 2 175, evidence of J. B. Roberts.

[2] TCMA, file W6(c), G. A. Denny to Secretary of the TCM, 9 Oct. 1902.

[3] *Newcastle Weekly Chronicle*, 13 Dec. 1902, "The Passing of Joh'burg".

[4] PRO, CO, 680/1, despatches, Milner to Chamberlain, 28 April 1902, telegram 3; *Cornubian*, 9 May 1902, "Notes and Comments".

[5] *Evening Chronicle*, 4 Aug. 1913, letter by A. R. McNally.

[6] See, for instance, TG 2, 1908, pp. 447-448, q. 4 915, evidence of T. Mathews; and Katz, *A Trade Union Aristocracy*, pp. 61, 96, n. 134.

[7] See below, chapter 8.

[8] Ticktin, pp. 76-78; Katz, *A Trade Union Aristocracy*, p. 24.

[9] Katz, *A Trade Union Aristocracy*, p. 24.

[10] TG 2, 1908, pp. 447-448, q. 4 915, evidence of T. Mathews.

[11] *SATJ*, Nov. 1900, p. 10.

[12] Kemp, pp. 15-16.

[13] Taylor, p. 217. See also Kemp, p. 17.

[14] Carl Jeppe, p. 117.

[15] Bleloch, p. 74.

[16] Letcher, p. 160.

[17] Letcher, p. 80; *Report of the Council of the Association of Mine Managers*, 1893, "Presidential Opening Address".

[18] Letcher, p. 80.

[19] Richardson and Van-Helten, "Labour in the South African Gold Mining Industry, 1886-1914", p. 77.

[20] Letcher, pp. 116-117; UG 34, 1911, pp. 15, 16; SC 10, 1916, p. 45, q. 261, evidence of H. W. Smyth; Reunert, p. 114.

[21] TAD, MM, file 3693/02, enclosure, "Proclamation", 17 July 1891, in Staats Courant, no. 551, 22 July 1891.

[22] UG 34, 1911, pp. 16, 20; UG 49, 1912, pp. ix-xi; UG 40, 1913, pp. 19-20, 29; SC 4, 1914, p. 10, q. 41, evidence of H. W. Smyth.

[23] Sauer, p. 116.

[24] Mathers, p. 254.

[25] *Mining Journal*, 26 Aug. 1893, p. 943, "Gold Fields of the British Empire".

[26] PRO, CO, 291/82, despatches, Selborne to Lyttelton, 29 May 1905, enclosure, "Statement showing number and percentage of British born workmen employed by the mining industry of the Transvaal".

[27] Katz, *A Trade Union Aristocracy*, pp. 16-18, 483, 485, Appendix A and Appendix B. Calculations are also based on *Report of the Miners' Phthisis Commission, 1902-1903*, Appendix A, table 2.

[28] See Katz, *A Trade Union Aristocracy*, pp. 16-18, 483, 485, Appendix A and Appendix B.

[29] *Report of the Council of the Association of Mine Managers*, 1893, "Presidential Opening Address".

[30] Calculations derived from *TCMAR*, 1890, p. 95, table showing white wage-earners.

[31] Calculations derived from *TCMAR*, 1892, p. 106, "Return of Stores".

[32] Calculations derived from *TCMAR*, 1890, p. 95, table showing "Number of Natives coming from each District"; *TCMAR*, 1893, p. 106, "Return of Stores". See also *TCMAR*, 1893, 1894, 1895, 1896, 1897, 98, pp. 182, 247, 180, 272, 406b, 407, "Labour Returns"; ibid., 1899, p. 68, "Returns of Native Labour"; CHA, WLF, "Report of Special Committee", recorded date 21 Nov. 1902.

[33] *TCMAR*, 1893, 1894, 1895, 1896, 1897, 1898, pp. 182, 247, 180, 272, 406b, 407, "Labour Returns"; TCMA, file W6(c), F. H. P. Creswell to Secretary of the TCM, [Sept.] 1902, Appendix A.

[34] The salaried staff comprised approximately 11 per cent of the total number of white employees. Calculations for this percentage are based on the returns provided in the *Rapport van den Staats-Mijningengenieur*, 1896, 1897, 1898, statement 7; *GMEAR...30 June 1905*, Table 7; and *TCMAR*, 1905, p. 221, "Distribution of White Employees". Ratio

calculations, excluding the salaried staff, for the period 1894 to 1898 are based on the "Labour Returns" of the Chamber of Mines.

[35] For an explanation of this phenomenon, see Harries, "Capital, State and Labour on the 19th Century Witwatersrand: A Reassessment", pp. 42-43. See also Levy, p. 92.

[36] *TCMAR*, 1893, 1894, 1895, 1896, 1897, 1898, pp. 182, 247, 180, 272, 406b, 407, "Labour Returns". For the return of June 1899, see TCMA, file W6(a), "Report of Special Committee", [Oct.] 1902; and *TCMAR*, 1899, p. 58, "Returns of Native Labour".

[37] TG 2, 1908, p. 879, qq. 12 687-12 688, evidence of W. T. Anderson. See also *TCMAR*, 1911, p. 360; and SC 9, 1913, p. 111, q. 1 440, evidence of J. G. Lawn; and Letter Book of City Deep Limited, 1910-1911, J. Whitford to H. S. Martin, 15 Dec. 1910.

[38] *JCMMS*, March 1912, "Accidents in Transvaal Mines", p. 369, discussant R. Barry.

[39] Calculations for 1890 derived from *TCMAR*, 1890, p. 95, table, "Number of Natives coming from each District". For 1898 figures, see *Report of the Council of the Association of Mine Managers*, 1899, p. 4.

[40] *Report of the Council of the Association of Mine Managers*, 1899, p. 4. See also TCMA, file W6(c), T. H. Leggett to Secretary of the TCM, 29 Aug. 1902.

[41] TCMA, file W6(c), T. Leggett to Secretary of the TCM, 29 Aug. 1902.

[42] TCMA, file W6(c), T. Leggett to Secretary of the TCM, 29 Aug. 1902; *Rand Daily Mail*, 3 April 1903, "Labour Association".

[43] TCMA, file W6(c), T. Leggett to Secretary of the TCM, 29 Aug. 1902; *Rand Daily Mail*, 3 April 1903, "Labour Association".

[44] TG 2, 1908, p. 175, q. 1 589, evidence of H. R. Skinner; Young, p. 72; *Report of the Council of the Association of Mine Managers*, 1902, p. 8.

[45] *Report of the Council of the Association of Mine Managers*, 1902, p. 8; Jeeves, *Migrant Labour in South Africa's Mining Economy*, pp. 41, 55.

[46] SC 9, 1913, p. 200, statement of C. H. Spencer, presented by J. G. Lawn; SC 2, 1913, pp. 114-115, qq. W(1 168)-1 170, evidence of Dr G. A. Turner.

[47] I thank Patrick Harries for this information.

[48] SC 9, 1913, p. 200, q. 2 424, evidence of J. G. Lawn.

[49] See below, chapter 12.

[50] *TCMAR*, 1895, 1896, 1897, 1898, pp. 180, 272, 406b, 407, "Labour Returns", and 1904, 1906, 1907, 1908, 1909, 1910, 1911, 1912, 1913, 1914, pp. 492, 221, 379, 423, 370, 276, 340, 312, 288, 300, "Distribution of Employees"; UG 34, 1911, UG 49, 1912, UG 40, 1913, UG 21, 1914, Table 4; Praagh, p. 526; *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 241, evidence of Dr L. G. Irvine.

[51] *Report of the Council of the Association of Mine Managers*, 1902, pp. 6-7; TG 2, 1908, p. 711, qq. 10 101-10 103, evidence of W. H. Andrews.

[52] Calculations based on TG 2, 1908, p. 259, Exhibit No. 1, evidence of S. J. Jennings; and TCMA, file T1B(c), Francis Aitken, "Transvaal Miners' Phthisis Sanatorium", Appendix D, in circular 176/15, 4 Dec. 1915.

[53] TG 2, 1908, pp. 83-84, Annexure E, evidence of H. Weldon. See also UG 19, 1912, p. 14, par. 27, for categories of underground workers.

[54] Calculations based on TG 2, 1908, pp. 83-84, Annexure E, evidence of H. Weldon.

[55] *Report of the Council of the Association of Mine Managers*, 1902, pp. 6-7; TG 2, 1908, p. [illegible], qq. 10 101-10 103, evidence of W. H. Andrews.

[56] TG 2, 1908, pp. 83-84, Annexure E, evidence of H. Weldon. After 1912, in terms of legislation awarding compensation for silicosis, a miner was arbitrarily defined as a workman who spent more than half his monthly working time in underground employment. See CAD, MNW, file MM, 2737/12, Secretary of the TCM to Secretary for Mines, 25 Jan. 1913; and SC 4, 1914, p. 170, qq. 1 038-1 039, evidence of E. L. R. Kelsey.

[57] Calculations based on TG 2, 1908, pp. 83-84, Annexure E, evidence of H. Weldon; *GMEAR...30 June 1905*, Table 8; and BRA, HE, v. 134, S. Evans to F. Eckstein, 11 Dec. 1905.

[58] *Report of the Miners' Phthisis Commission, 1902-1903*, p. vii. par. 10; *Rand Daily Mail*, 6 March 1912, "White Labour Debate".

[59] TCMA, file A1(b), consulting engineer of the Johannesburg Consolidated Investment Company to Secretary of the TCM, 4 Sept. 1907.

[60] TG 2, 1908, pp. 83-84, Annexure E, evidence of H. Weldon; UG 34, 1911, UG 49, 1912, UG 40, 1913, UG 21, 1914, Table 4.

[61] This percentage is congruent with the figure given by Johnstone, p. 55, derived from the 1918

census and later official statistics.

[62] See, for instance, *Report of the Miners' Phthisis Commission, 1902-1903*, p. vii. par. 10; and *Rand Daily Mail*, 6 March 1912, "White Labour Debate".

[63] UG 19, 1912, pp. 14, 15, 18, pars. 27, 31, 42, 43.

[64] TCMA, file W6(c), F. H. P. Creswell to Secretary of the TCM, [Sept.] 1902, Appendix A.

[65] *TCMAR*, 1893, 1894, 1895, 1896, 1897, 1898, pp. 182, 247, 180, 272, 406b, 407, "Labour Returns"; TCMA, file W6(c), F. H. P. Creswell to Secretary of the TCM, [Sept.] 1902, Appendix A.

[66] Calculations based on *TCMAR*, 1895, 1896, 1897, 1898, pp. 180, 272, 406b, 407, "Labour Returns"; *Rapport van den Staats-Mijningengenieur*, 1896, 1897, 1898, statement 7; TG 2, 1908, pp. 83-84, Annexure E, evidence of H. Weldon; and TCMA, file W6(c), F. H. P. Creswell to Secretary of the TCM, [Sept.] 1902, Appendix A. Cf. Richardson and Van-Helten, "Labour in the South African Gold Mining Industry, 1886-1914", p. 83, who state that 83,54 per cent of white mineworkers were employed underground in 1897. This figure is totally illogical. Also, it is inconsistent with the "Labour Returns" of the Chamber of Mines from 1895 to 1898 and the *Rapport van den Staats-Mijningengenieur*, 1896, 1897, 1898, statement 7. The reliability and accuracy of their sources, or of their calculations, are therefore highly questionable.

[67] *GMEAR...30 June 1905*, p. 13. See also Grey, p. 68.

[68] Calculations based on TG 2, 1908, pp. 83-84, 259, Annexure E and Exhibit No. 1, evidence of H. Weldon and S. J. Jennings; and TCMA, file T(c), Francis Aitken, "Transvaal Miners Phthisis Sanatorium", Appendix D, in circular 176/15, 4 Dec. 1915. There is no definitive evidence to suggest that between 1911 and 1914 the numbers of white miners fell in either absolute or relative terms, as Richardson and Van-Helten, "Labour in the South African Gold Mining Industry, 1886-1914", p. 85, contend. Their invalid conclusion stems partly from their incorrect demarcation, p. 82, of surface and underground workmen and an inability to distinguish miners, *per se*, from other members of the underground workforce.

[69] See, for instance, Sam Parker's evidence to the Economic Commission in 1914, quoted in *ASEMJ*, April 1914, p. 12.

[70] See, for instance, TG 2, 1908, pp. 108, qq. 760-761, evidence of L. J. Reyersbach; *East Rand Express*, 4 Feb. 1911, letter by "Miner"; *Rand Daily Mail*, 31 May 1911, "Miners' Phthisis".

[71] See, for instance, *The Industrial Commission*, 1897, p. 42, evidence of E. J. Way.

[72] *Report of the Council of the Association of Mine Managers*, 1893, "Presidential Opening Address".

[73] Fraser has probably incorrectly transcribed Ruthin for Redruth.

[74] Du-Val, pp. 14-15.

[75] For examples of popular historians, see Letcher, p. 143; Cartwright, *Doctors of the Mines*, p. 136; and Rosenthal, p. 344. Cf. Dickason, p. 60, whose evaluation of the Cornish contributions to South Africa avoids this pitfall. For examples of academic historians, see Grobler, p. 32; and Grey, p. 130.

[76] Burke and Richardson, p. 148. Miners predominated amongst the Cornish mineworkers. But miners did not constitute an overwhelming proportion of the "skilled labour force".

[77] *Report of the Miners' Phthisis Commission, 1902-1903*, Appendix A. Katz, "Silicosis on the Witwatersrand Mines with particular reference to the Miners' Phthisis Commission of 1902 to 1903", p. 7, pointed out this misconception at the conference where Burke and Richardson presented their paper. Nevertheless, the two historians allowed their unamended conference paper to be published twice, in 1978 and 1979, but under different titles. Both subsequently modified their views. Richardson, "Miners' Phthisis in the Transvaal Gold Mining Industry, 1886-1918", p. 4, concedes that miners came to the Witwatersrand from other parts of Britain. Burke, "Disease, Labour Migration and Technological Change: The Case of the Cornish Miners", p. 80, arbitrarily declares, without reference to any source, that during the late 19th and early 20th centuries Cornishmen comprised 25 per cent of the Witwatersrand *"workforce"*.

[78] The one and only census taken during the era of the South African Republic, that of the Johannesburg Sanitary Board in 1896, does not define the occupations of the working population. Nor does the Transvaal Census of 1904. See *Census, 15 July 1896. Report of the Director of Census*, 1896; and *Result of the Census of the Transvaal Colony and Swaziland...17 April 1904*, 1906.

[79] I could find no official statistics of this kind in the archives of either the Chamber of Mines or in the archives of H. Eckstein and Company. Nor did individual mines seem to record such data. See, for instance, Letter Book of City Deep Ltd, 1910-1911, 1913.

[80] *TCMAR*, 1900-1901, p. 63; Taylor, p. 217; Cope, p. 43; Ticktin, p. 2, quoting Olive Schreiner.

[81] *TCMAR*, 1900-1901, p. 63; SC 4, 1914, pp. 34-35, evidence of R. G. V. de Witt Hamer.

[82] *TCMAR*, 1900-1901, p. 63; *JCMMS*, Aug. 1906, "Safety Measures in Mining", p. 43, discussant M. H. Coombe. Nearly 50 per cent of the engineers on the Witwatersrand before and just after the Anglo-Boer War were Americans. See *Mining Journal*, 12 July 1902, p. 963.

[83] *Report of the Miners' Phthisis Commission, 1902-1903*, Appendix A.

[84] Calculations based on *TCMAR*, 1900-1901, p. 63; and *GMEAR...31 June 1907*, p. 13; and previous calculations of proportion of miners to total white mine workforce.

[85] Calculations based on *TCMAR*, 1900-1901, p. 63; and *GMEAR...31 June 1907*, p. 13; and previous calculations of proportion of miners to total white mine workforce.

[86] *Mining Journal*, 23 Dec. 1893, p. 1 427, "Gold Mining in South Africa". See also Colquhoon, p. 405; Kennedy, *A Tale of Two Mining Cities*, pp. 1, 6; and *JCMMS*, Aug. 1906, "Safety Measures in Mining", p. 43, discussant M. H. Coombe.

[87] *Report of the Miners' Phthisis Commission, 1902-1903*, Appendix A; *JCMMS*, Aug. 1906, "Safety Measures in Mining", p. 43, discussant M. H. Coombe.

[88] *GMEAR...31 June 1907*, p. 13; and previous calculations of proportion of miners to total white mine workforce.

[89] TCMA, file W6(c), T. Leggett to Secretary of the TCM, 26 Aug. 1902.

[90] *Worker*, 12 March 1914, "Pienaar for Denver"; TCMA, file W6(c), T. H. Britten to Secretary of the TCM, 5 Sept. 1902.

[91] *Worker*, 12 March 1914, "Pienaar for Denver"; *Labour World*, 6 September 1919. I thank David Ticktin for this clipping obtained through access to the private papers of James Trembath.

[92] It is usually assumed that Afrikaners who worked on the mines before the Anglo-Boer War did so as "labourers". See Grey, p. 232; and Davies, *Capital, State and White Labour in South Africa, 1900-1960*, p. 53.

[93] Calculations based on the following confidential letters in TCMA, file W6(c), addressed to the Secretary of the TCM: T. H. Leggett, 29 Aug. 1902, F. Hellmann, 29 Aug. 1902, T. H. Britten, 5 Sept. 1902, F. H. P. Creswell, [Sept.] 1902, G. A. Denny, 9 Oct. 1902. See also *TCMAR*, 1900-1901, p. 63.

[94] Walker and Weinbren, p. 25; Andrews, p. 20; Merriman Papers, correspondence, J. de Villiers to J.X.M., 30 May 1907. Cf. Yudelman, pp. 67, 75, who correctly indicates that by 1907 a large proportion of semi-skilled underground workers were Afrikaners.

[95] *GMEAR...30 June 1907*, p. 39; *Transvaal Leader*, 18 Aug. 1910, "Labour Notes"; TG 2, 1908, p. 670, q. 8 533, evidence of S. Richards. See also Grey, p. 249, who in quoting *TCMAR*, 1907, pp. 39-40, states that "Some" Afrikaans strike-breakers of 'mature' age were dismissed after the strike.

[96] *GMEAR...30 June 1907*, p. 13.

[97] TCMA, file W6(c), T. J. Britten to Secretary of the TCM, 11 Sept. 1902, file A1(b), Secretary of the TCM to J. Erasmus, 15 June 1907, enclosure, confidential letter from the Association of Mine Managers, 6 May 1905; BRA, HE, v. 134, S. Evans to J. Wernher, 24 Sept. 1906; CHA, WLF, L. P. Cazalet to L. Phillips, 27 Oct. 1906; TG 2, 1908, pp. 826, 899, 999-1 000, qq. 11 931, 13 164-23 165, 14 777, evidence of R. Raine, R. N. Kotze and G. H. Somers; SC 4, 1914, p. 99, q. 581, evidence of J. Hindman.

[98] TG 2, 1908, p. 899, q. 13 164, evidence of R. N. Kotze.

[99] UG 19, 1912, p. 23, par. 23.

[100] SC 10, 1915, p. xv, par. 3(n).

[101] *Rand Daily Mail*, 28 March 1912, "The Miners' Phthisis Commission".

[102] SC 4, 1914, p. 11, q. 43, evidence of H. W. Smyth.

[103] SC 4, 1914, p. 99, q. 581, evidence of J. Hindman.

[104] TCMA, file W6(c), T. H. Leggett to Secretary of the TCM, 29 Aug. 1902.

[105] See CAT, Boksburg Branch Minutes, 20 March 1912-30 Nov. 1915 passim. This source has data on four mines at Benoni which formed part of the East Rand Proprietary Mines group. In conjunction with Dickason, pp. 87-112, it provides useful supplementary information on Cornish surface and underground mineworkers.

[106] Calculations based on *GMEAR...31 June 1907*, p. 13; Ticktin, p. 3, quoting *South African Review*, 26 Nov. 1909, p. 26; *TCMAR*, 1900-1901, p. 63 and *TCMAR*, 1904, 1907, 1909, pp. 492, 379, 370, "Distribution of White Employees"; CAT, Boksburg Branch Minutes, 20 March 1912-30 Nov. 1915 passim; *JCMMS*, Oct. 1906, "Safety Measures in Mining", pp. 114-115, discussant J. Yates; BRA, HE, v. 134,

S. Evans to F. Eckstein, 11 Dec. 1905; and previous calculations of proportion of miners to total white mine workforce.

[107] A few coal miners from Britain also went to Kimberley. See, for instance, *The Mining Industry*, 1897, p. 172, evidence of R. Barrow.

[108] For evidence of migration from hard rock mining centres in Britain, see *Report of the Miners' Phthisis Commission, 1902-1903*, p. 58, q. 414, evidence of Dr E. A. Miller and Appendix A, Table 2; Irvine, p. 225; Cd. 7478, 1914, p. 201, qq. 24 989-24-994, evidence of W. Dixon; and *East Rand Express*, 2 March 1912, "Obituary Notice". For evidence of emigration from coal mines in Britain, see *The Mining Industry*, p. 172, evidence of R. Barrow; *Report of the Miners' Phthisis Commission, 1902-1903*, Appendix A, Table 2; *Newcastle Daily Chronicle*, 30 Oct. 1902, "Miners' Phthisis"; Oliver, "An Address on Rand Miners' Phthisis...", p. 919; CHA, WLF, Lord Selborne to L. Phillips, 13 Jan. 1906; Gitsham and Trembath, p. 67.

[109] Calculations based on *GMEAR...31 June 1907*, p. 13; Ticktin, p. 3, quoting *South African Review*, 26 Nov. 1909, p. 26; *TCMAR*, 1900-1901, 1904, 1907, 1909, pp. 63, 492, 379, 370, "Distribution of White Employees"; CAT, Boksburg Branch Minutes, 20 March 1912-30 Nov. 1915 passim; *JCMMS*, Oct. 1906, "Safety Measures in Mining", pp. 114-115, discussant J. Yates; BRA, HE, v. 134, S. Evans to F. Eckstein, 11 Dec. 1905; and previous calculations of proportion of miners to total white mine workforce.

[110] CHA, WLF, Lord Selborne to L. Phillips, 13 Jan. 1906, enclosed memorandum, L. Phillips to Lord Selborne, 24 Jan. 1906. See also Gitsham and Trembath, p. 67; and Sellars, p. 3.

[111] Apart from colliers, many iron-ore miners on the Witwatersrand came from the north of England. For the geographical location of British coal and hard rock mines, see Tatham, pp. 156, 160-161; Rosen, p. 219; and *Report of the Miners' Phthisis Commission, 1902-1903*, p. 58, q. 414, evidence of Dr E. A. Miller.

[112] TG 2, 1908, p. 107, q. 759, evidence of L. J. Reyersbach.

[113] Lewsen, p. 48, M. T. Steyn to JXM, 11 Sept. 1907; *Evening Chronicle*, 1 Aug. 1913, "Opinion in England".

[114] Anon., "The Gloom of the Mines", p. 271.

[115] D. B. Barton, *Essays in Cornish Mining History*, v. 1, p. 49.

[116] *Cornubian*, 21 Oct. 1902, "Notes and Comments", and 24 Oct. 1907, "Cornishmen Abroad";

Star, 21 Jan. 1902, "Announcements"; *Star Weekly Edition*, 19 July 1902, "Social Events"; Praagh, p. 268; *East Rand Express*, 22 April 1911, "Boksburg Notes".

[117] Praagh, p. 268, refers to these organisations as "patriotic" associations and mentions, in addition, clubs comprising New Zealanders and Hollanders. See also CAT, executive minutes, 19 Aug. 1918; and *East Rand Express*, 13 Jan. 1912, "Germiston Notes", 22 April 1911, "Boksburg Notes".

[118] TG 2, 1908, p. 627, q. 7 688, evidence of S. A. Smit. See also *The Mining Industry*, 1897, p. 41, evidence of E. J. Way; and CAT, Boksburg Branch Minutes, 20 March 1912-30 Nov. 1915 passim.

[119] *Rand Daily Mail*, 16 July 1912, "Mr. Malan and the Miners".

[120] D. B. Barton, *A History of Tin Mining and Smelting in Cornwall*, p. 223.

[121] *Mining Journal*, 19 July 1902, p. 998, "Cornwall and Devon".

[122] Jenkin, pp. 306-307. See also D. B. Barton, *A History of Tin Mining and Smelting in Cornwall*, pp. 173-175; and Burke and Richardson, p. 158.

[123] Cd. 2091, 1904, p. 13. The Redruth district comprised Camborne, Redruth, Illogan, Phillack and Gwennap.

[124] D. B. Barton, *A History of Tin Mining and Smelting in Cornwall*, p. 175. See also Cd. 2091, 1904, pp. 5, 13.

[125] *Cornubian*, 26 April 1901, "Notes and Comments".

[126] Michell, p. 208.

[127] *Mining Journal*, 19 July 1902, p. 998, "Cornwall and Devon". See also D. B. Barton, *A History of Tin Mining and Smelting in Cornwall*, p. 231, quoting from the *Mining Journal*, 13 Feb. 1904.

[128] D. B. Barton, *Essays in Cornish Mining History*, v. 1, p. 49. In the 1860s, for instance, a number of Cornish mining families emigrated to coal fields in the the Midlands and in the north of England. See D. B. Barton, *Essays in Cornish Mining History*, v. 1, p. 61; and Hannan, *Travels and Heartaches of a Mining Family*, pp. 46-47.

[129] Hatch and Chalmers, p. 253. See also *The Mining Industry*, 1897, p. 299, evidence of A. B. Fyffe.

[130] *South African Mining Journal*, 4 May 1895, p. 648, "Leading Article".

[131] Cornish surfacemen comprised the following: semi-skilled operatives, including drill sharpeners; skilled artisans, including fitters, turners, blacksmiths, boilermakers, firemen and engine drivers; and a handful of the salaried staff, including assayers and metallurgists. Calculations based on CAT, Boksburg Branch Minutes, 20 March 1912-30 Nov. 1915 passim; and Dickason, pp. 87-112. See also *Mining Journal*, 19 July 1902, p. 998, "Cornwall and Devon".

[132] Dickason, pp. 61-62.

[133] Michell, p. 204.

[134] Michell, p. 202.

[135] Michell, p. 204.

[136] Hannan, *Travels and Heartaches of a Mining Family*, pp. 98-99; Hannan, *Letters of a South African Miner 1888-1904*, pp. 6-26 passim.

[137] See, for instance, *Report of the Miners' Phthisis Commission, 1902-1903*, p. 58, q. 414, evidence of Dr E. A. Miller.

[138] Cd. 7478, 1914, p. 201, qq. 24 989-24-994, evidence of W. Dixon.

[139] Tatham. pp. 150-151.

[140] Nef, v. 2, pp. 18-22 passim; Court, p. 233.

[141] Hunter, pp. 1 033-1 034; Haddock, p. 127.

[142] D. B. Barton, *A History of Tin Mining and Smelting in Cornwall*, p. 231, quoting *Mining Journal*, 13 Feb. 1904. See also *Cornubian*, 18 Oct. 1901, "West Africa". For information on the wages of colliers, see Hannan, *Letters of a South African Miner 1888-1904*, p. 11, n. 10.

[143] TG 2, 1908, p. 309, q. 2 889, evidence of S. S. Crowle; *Cornubian*, 18 Oct. 1901, "West Africa".

[144] See, for example, Michell, p. 201; *The Mining Industry*, 1897, pp. 251, 300, evidence of T. H. Leggett and A. B. Fyffe; TG 2, 1908, p. 516, q. 6 034, evidence of E. Moore. See also Kennedy, *A Tale of Two Mining Cities*, p. 1.

[145] TG 2, 1908, pp. 338, 516, q. 6 034, statement and evidence of C. C. Smith and E. Moore.

[146] Hatch and Chalmers, p. 253.

[147] *Cornubian*, 18 Oct. 1901, "West Africa"; TG 2, 1908, p. 782, qq. 11 083-11 085, evidence of C. Locke.

[148] TG 2, 1908, pp. 162, 165, qq. 1 434, 1 530, evidence of E. J. Way.

[149] TG 2, 1908, pp. 162, 165, qq. 1 434, 1 530, evidence of E. J. Way. See also ibid., pp. 690, 1 225, qq. 8 846, 17 872, evidence of F. Crean and J. H. Johns; SC 9, 1913, pp. 320-321, q. 2 168, evidence of R. N. Kotze; and *The Mining Industry*, 1877, p. 42, evidence of E. J. Way.

[150] Phelps Brown, pp. 147-148; Clegg et al, p. 96.

[151] See, for instance, Merriman Papers, correspondence, J.X.M. to J. Smuts, 16 July 1909; Markham, p. 300; and TG 2, 1908, p. 509, qq. 5 946-5 961, evidence of J. H. Bridgman.

[152] *Report of the Council of the Association of Mine Managers*, 1893, "Presidential Opening Address"; Du-Val, p. 15; Coombe, p. 38.

[153] Coombe, p. 39.

[154] Apart from its practice in Kimberley, whites supervised "coloured labour" in the Straits Settlement and "half-caste" labour in Mexico. See TG 2, 1908, pp. 109, 1 161, qq. 780, 17 288-17 293, evidence of L. J. Reyersbach and G. W. Sullivan. Supervision seems to have occurred in white-dominated societies in which "coloured" labour was abundant.

[155] TG 2, 1908, pp. 162, 221, 497, 890, qq. 1 435-1 436, 2 202-2 203, 5 709-5 710, 12 950, evidence of E. J. Way, J. B. Roberts, J. H. Bridgman and W. T. Anderson.

[156] TG 2, 1908, p. 226, q. 2 718, evidence of J. B. Roberts.

[157] *The Mining Industry*, 1897, p. 41, evidence of E. J. Way.

[158] TCMA, file W6(c), F. Hellmann to Secretary of the TCM, 29 Aug. 1902.

[159] TCMA, file W6(c), F. Hellmann to Secretary of the TCM, 29 Aug. 1902.

[160] Cf. Bozzoli, *The Political Nature of a Ruling Class*, p. 81, who incorrectly notes that African members of gangs performing hand drilling did the blasting, too.

[161] Management frequently used such expressions during this period. See, for instance, Merriman Papers, correspondence, 1914, no. 274, enclosure, "The Economic Commission"; Cd. 1897, 1904, pp. 403-404, pars. 15, 21; TG 2, 1908, p. 1 462, q. 21 067, evidence of F. D. P. Chaplin.

[162] TG 2, 1908, pp. 316, 489, 518, 699, qq. 2 917, 5 547, 6 072, 9 000-9 008, evidence of S. S. Crowle, J. Coward, E. Moore and F. Crean.

[163] TCMA, file W6(c), F. H. P. Creswell to Secretary of the TCM, [Sept.] 1902; TG 2, 1908, p. 342, qq. 3 344-3 345, evidence of C. C. Smith.

[164] Calculations based on *Rapport van den Staats-Mijningengenier*, 1896, 1897, 1898, Statement No. 7.

[165] TG 2, 1908, p. 478, q. 5 386, evidence of J. Coward.

[166] TG 2, 1908, p. 436, qq. 4 717-4 718, evidence of T. Mathews.

[167] TG 2, 1908, p. 34, q. 609, evidence of H. Weldon.

[168] TG 2, 1908, p. 497, q. 5 709, evidence of J. H. Bridgman.

[169] TCMA, file W6(c), F. H. P. Creswell to Secretary of the TCM, [Sept.] 1902; TG 2, 1908, pp. 176, 192, 497, 920, qq. 1 614, 1 855, 5 709, 13 577, evidence of H. R. Skinner, G. E. Webber, J. H. Bridgman and P. Harvey.

[170] TG 2, 1908, p. 512, q. 6 005, evidence of E. Moore. See also TCMA, file W6(c), F. H. P. Creswell to Secretary of the TCM, [Sept.] 1902. Cf. Bozzoli, *The Political Nature of a Ruling Class*, p. 100, who incorrectly notes that, when management increased the number of machine drills from two to three under the miner's supervision, each drill was manned by fifteen to twenty Africans. A gang of this size operated the hand drills. Two A'ricans operated each machine drill under white supervision.

[171] TCMA, file W6(c), T. H. Leggett to Secretary of the TCM, 29 Aug. 1902.

[172] TG 2, 1908, p 226, q. 2 178, evidence of J. B. Roberts.

[173] See, for instance, SC 9, 1913, p. 53, q. 3 855, evidence of J. T. Bain.

[174] TG 2, 1908, pp. 108, 226, qq. 769, 2 178, evidence of G. Albu and J. B. Roberts; BRA, HE, v. 134, S. Evans to H. Eckstein and Company, 11 Dec. 1905; Fraser and Jeeves, pp. 189-191, L. Phillips to F. Eckstein, 13 April 1908.

[175] *JCMMS*, Oct.1906, "Safety Measures in Mining", pp. 111-112, discussant H. Saner; See also ibid., April 1912, "Accidents in Transvaal Mines", p. 412, discussant J. M. Phillips.

[176] *African Review*, 25 Oct. 1902, p. 118, "The

Miners' Association"; *Final Report of the Mining Regulations Commission*, 1910, v. 2, pp. 14, 153-155, 236, evidence of T. Mathews and M. Trewick, J. Yates and Dr L. G. Irvine; *JCMMS*, April 1912, "Accidents in Transvaal Mines", p. 412, discussant J. M. Phillips.

[177] See, for instance, *Union Senate Debates*, W. E. M. Stanford, 16 July 1913, col. 761.

[178] BRA, HE, v. 133, S. Evans to J. Wernher, 12 June 1905, v. 134, S. Evans to H. Eckstein and Company, 11 Dec. 1905; TG 2, 1908, p. 34, qq. 608-610, evidence of H. Weldon.

[179] TG 2, 1908, pp. 440, 520, 687, qq. 4 782-4 784, 6 088, evidence of T. Mathews, E. Moore and statement of F. Crean; UG 12, 1914, p. 38, par. 35. See also *JCMMS*, April 1912, "Accidents in Transvaal Mines", pp. 410-411, discussant J. M. Phillips.

[180] *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 143, evidence of M. Fergusson; TG 2, 1908, pp. 107, 149, qq. 754, 1 219, evidence of L. J. Reyersbach and E. J. Way.

[181] CHA, WLF, P. Upton to ecretary, Maritzburg, 22 June 1906; TG 2, 1908, pp. 149, 715, qq. 1 219, 10 185, evidence of E. J. Way and R. Raine.

[182] *SATJ*, July 1908, p. 5.

[183] TG 2, 1908, pp. 34, 176, qq. 608-609, 1 615, evidence of H. Weldon and H. R. Skinner.

[184] *SATJ*, July 1908, p. 5. See also TG 2, 1908, p. 107, qq. 757-759, evidence of L. J. Reyersbach.

[185] TG 2, 1908, p. 715, q. 10 185, evidence of R. Raine.

[186] TG 2, 1908, p. 116, q. 897, evidence of L. J. Reyersbach; *South African Mining Journal*, 4 May 1895, pp. 647-648, "Leading Article"; SC 9, 1913, p. 12, q. 147, evidence of H. R. Skinner.

[187] *Cornubian*, 10 July 1913, "Red Days on the Rand".

[188] *South African Mines, Commerce and Industries*, 17 March 1906, p. 3, "The Inflation of Working Costs by Inefficient Labour".

[189] *JCMMS*, April 1912, "Accidents in Transvaal Mines", pp. 440-441, discussant, J. M. Phillips.

[190] CHA, WLF, P. Upton to Secretary, Maritzburg, 22 June 1906; Truscott, p. 380.

[191] UG 40, 1913, p. 115. See also ibid., pp. 129-130.

[192] *South African Mines, Commerce and Industries*, 17 March 1906, p. 3, "The Inflation of Working Costs by Inefficient Labour".

[193] TG 2, 1908, p. 687, statement of F. Crean.

[194] TG 2, 1908, pp. 116, 191, qq. 899, 1 834, evidence of L. J. Reyersbach and G. E. Webber.

[195] UG 40, 1913, p. 115.

[196] *South African Mines, Commerce and Industries*, 10 March 1906, p. 1 209. "Leading Article".

[197] TG 2, 1908, p. 381, qq. 3 985-3 986, evidence of T. Willis; *JCHMS*, Sept. 1906, Oct. 1906, "Safety Measures in Mining", pp. 81-82, 113, discussants, E. M. Weston and M. H. Coombe.

[198] TG 2, 1908, pp. 320, 325, 357, 426, qq. 3 030, 3 '10-3 112, 3 559, 4 530, evidence of S. S. Crowle, K. B. Greer and T. Mathews.

[199] Thorpe's detailed treatment of the 1907 strike, pp. 261-485, fails to observe this phenomenon.

[200] See, in particular, Thorpe, pp. 261-485 passim.

[201] *South African News*, 11 July 1903, "Labour Notes". See also Katz, *A Trade Union Aristocracy*, pp. 19-20, 109-152 passim; and Grey, p. 224.

[202] Merriman Papers, correspondence, 1914, no. 274, memorandum, "The Economic Commission".

[203] The scope of this study is limited to Africans, and therefore excludes the roles of Indians and coloured persons.

[204] Tantalising glimpses of these skilled permanent African mineworkers are found in fragmentary evidence. But their role has not yet been researched. See, for instance, *The Mining Industry*, 1897, p. 43, evidence of E. J. Way; and TCMA, file W6(c), T. J. Britten to Secretary of the TCM, 11 Sept. 1902.

[205] Levy, pp. 7-8, 22-26, 29.

[206] TCMA, file W6(c), R. M. Catlin to Secretary of the TCM, 29 Aug. 1902.

[207] TCMA, file W6(c), F. H. P. Creswell to Secretary of the TCM, [Sept.] 1902.

[208] Palmer and Parsons, pp. 14-15.

[209] Van der Horst, p. 137; Levy, p. 92; Grey, p. 115.

[210] Harries, "Capital, State and Labour on the 19th Century Witwatersrand: A Reassessment", pp. 42-45.

[211] *TCMAR*, 1897, p. 453, "Natives Received and Distributed".

[212] Van Niekerk, p. 28. Cf. Jeeves, *Migrant Labour in South Africa's Mining Economy*, p. 266, Appendix 1, who estimates them at 34,3 per cent.

[213] SC [illegible], 1913, p. 200, statement of C. H. Spencer presented by J. G. Lawn.

[214] See also van der Horst, p. 164, n. 3.

[215] TCMA, file W6(c), T. H. Leggett to Secretary of the TCM, 29 Aug. 1902.

[216] TCMA, file W6(c), T. J. Britten to Secretary of the TCM, 11 Sept 1902.

[217] TCMA, file W6(c), T. J. Britten to Secretary of the TCM, 11 Sept. 1902.

[218] TCMA, file W6(c), G. A. Denny to Secretary of the TCM, 9 Oct. 1902; *GMEAR...31 Dec. 1902*, p. 1; TG 2, 1908, p. 175, q. 1 595, evidence of H. R. Skinner.

[219] TCMA, file W6(c), G. A. Denny to Secretary of the TCM, 9 Oct. 1902.

[220] *Report of the Council of the Association of Mine Managers*, 1898, p. 6.

[221] TCMA, file W6(c), T. H. Leggett to Secretary of the TCM, 29 Aug. 1902. "Piccanins" were also employed at approximately 6d to 8d per shift. See TCMA, file W6(c), T. J. Britten to Secretary of the TCM, 11 Sept. 1902. But as there were only a few of them, they were not included in the schedule of wages. See *Report of the Council of the Association of Mine Managers*, 1903, p. 17.

[222] TCMA, file W6(c), T. J. Britten to Secretary of the TCM, 11 Sept. 1902, T. H. Leggett to Secretary of the TCM, 29 Aug. 1902.

[223] TCMA, file W6(c), T. H. Leggett to Secretary of the TCM, 29 Aug. 1902. This also applied to a number of categories of surface workers.

[224] TCMA, file W6(c), T. J. Britten to Secretary of the TCM, 11 Sept. 1902, T. H. Leggett to Secretary of the TCM, 29 Aug. 1902.

[225] Van Niekerk, pp. 111-141 passim.

[226] TCMA, file W6(c), T. H. Leggett to Secretary of the TCM, 29 Aug. 1902.

[227] PRO, CO, 291/133, parliament, minute by H. Lambert, 18 Nov. 1908.

[228] PRO, CO, 551/43, despatches, Gladstone to Harcourt, 11 Sept. 1913, enclosure, "Comparative Statement of Mortality among Natives Employed on Mines and Works in Proclaimed Labour Districts of the Transvaal, including Natives Employed by Contractors".

[229] Van Niekerk, pp. 30-31.

[230] PRO, CO, 291/138, despatches, Gladstone to Harcourt, 10 Feb. 1910, enclosure, Dr G. H. Coke to the Acting Director of the Government Native Labour Bureau, 12 Dec. 1909; van Niekerk, pp. 30-31.

[231] Van Niekerk, pp. 111-141 passim.

[232] *Final Report of the Mining Regulations Commission*, 1910, v. 1, p. 150; SC 2, 1913, p. 126, q. 1 261, evidence of Dr A. J. Gregory; SC 4, 1914, p. 7, q. 443, evidence of Dr S. V. van Niekerk; van Niekerk, pp. 111-141 passim.

[233] SC 2, 1913, pp. 117-118, qq. 1 204-1 209, evidence of Dr G. A. Turner.

[234] For biographical details on Dr A. J. Gregory, see, for instance, *South African Medical Record*, 22 July 1911, p. 203, "British Medical Association".

[235] UG 34, 1914, p. 258, par. 2.

[236] SC 2, 1913, p. 126, q. 1 261, evidence of Dr A. J. Gregory. See also Merriman Papers, correspondence, R. Barry to JXM, 1 April 1912.

[237] SC 9, 1913, p. xli.

[238] Packard, pp. 200-201, argues that the same rationalisation applied to tuberculosis. But, surprisingly, Packard does not note the relevance of this rationalisation to silicosis, particularly with regard to progressive massive fibrosis, in which pulmonary tuberculosis was the important morbid ingredient.

[239] SC 2, 1913, pp. 123-124, q. 1 252, evidence of Dr A. J. Gregory; Fern, p. 874; *Evening Chronicle*, 2 June 1913, letter by E. J. Moynihan.

[240] See, for instance, CHA, WLF, "Memorandum on White Labour Experiments", recorded date 30 Jan. 1913; and *Rand Daily Mail*, 24 Sept. 1912, "The Scourge of the Mines". See also Wilson, *Labour in the South African Gold Mines 1911-1969*, p. 136.

CHAPTER 7

THE COLOUR-BAR YEARS 1892-1914

> "If a man works eight or ten hours on the top he is breathing God's air. Down below he is breathing the devil's."---Alfred Edmund Musson, miner, 1907.[1]

> "I suppose that any Act which confers benefits upon white persons in the T[ransJvaal, in a negative way imposes disabilities on natives."---Col. J. E. B. Seely, Colonial Under-Secretary, 1909.[2]

During the 1890s overseas miners and artisans on the Witwatersrand shared few common interests. But by 1912, for two main reasons, the artisans who worked underground on a semi-permanent or a permanent basis began to forge closer bonds with the miners. This was particularly true of the firemen - also known as boiler attendants - and the engine drivers who belonged to the South African Engine Drivers' and Firemen's Association. First, the mineowners, partly as a result of the electrification of the mines in 1910, were gradually upgrading experienced African migrant workers to semi-skilled and skilled categories

of work, but at unskilled wage rates.[3] Second, in 1912 the Van Niekerk Commission, or the Medical Commission, which investigated "miners' phthisis and pulmonary tuberculosis", concluded that all workmen, who set foot underground, were at risk of contracting silicosis. This finding applied to all mine employees, including the supervisory staff, irrespective of the daily length of their underground service.[4] The twin fears, those of displacement by African workers and of their vulnerability to silicosis, gave underground artisans and miners, for the first time, a tangible identity of interests.

Although miners and artisans shared these fears, both these threats were far more ominous to miners than to artisans and subjected them to greater pressures. Unlike artisans, miners had no alternative employment prospects. From 1902 they were aware that their livelihoods caused them to be vulnerable to rapidly progressive silicosis and premature death in the prime of life - before they reached forty years of age. Notwithstanding this occupational hardship, from 1905 the mineowners, in their efforts to reduce working costs, made concerted attempts to take advantage of the tenuous position of miners, whose jobs had been fragmented since the 1890s. Faced with a double threat to their job security, from 1907 miners actively and militantly sought state intervention against the cost-cutting efforts of the mineowners. White mineworkers wanted the state both to implement

measures to protect them from the hazard of silicosis and to secure their jobs through the formal extension of the colour bar. We shall analyse later the state's methods of tackling the problem of silicosis. In this chapter we focus on the state's legislative actions with respect to the colour bar in the mining regulations.

Frederick Johnstone argues that the *origins* of the so-called "job colour bar" were rooted in the white mineworkers' needs to prevent the industrialists wresting from them as many jobs as possible, and transferring them to "ultra-exploitable labour", namely the "cheap" and "quasi-servile" African migrant workforce.[5] The facts, however, controvert Johnstone's thesis, which enjoys wide support amongst radical historians.[6] From 1892 to 1899 neither the inception of the migrant labour system nor its entrenchment provided white mineworkers with a dominant motive for demanding the introduction of the colour bar. Also, during this period white mineworkers were not the sole proponents of the colour bar. In certain selected job categories, both the state and the mineowners favoured it, too.

All the parties that supported the colour bar reasoned that whites, whom they perceived as being intellectually superior to and more responsible than non-whites, were best fitted to hold jobs which affected the lives and safety of other mineworkers. Notions of class and racial superiority were,

therefore, important reasons that miners and artisans sought legal colour bars as a barricade against the encroachment of non-white mineworkers. No doubt some of the workmen's requests for this form of protection were motivated by the "unfair" competition of informally trained but low-paid, non-white workers in certain mine jobs. Even so, in such instances the spurious and racist safety rationale of the white mineworkers coexisted with their fears of job displacement. Also, in this context it must be stressed that the competitors confronting the white mineworkers were not the low-paid and temporary African migrant workers. Instead, their main rivals were the members of the small, permanent and proletarianised section of the non-white workforce on the mines.[7] Amongst the African proletarianised workforce there was, indeed, a sprinkling of migrant workers, who, by constantly renewing their contracts, remained on the mines in a semi-permanent capacity for continuous periods which varied from five to eleven years.[8]

The safety rationale, which underpinned the reservation of jobs for whites, was consistent with each and every colour bar inserted in the mining laws promulgated in the 1890s. The only jobs reserved for white workmen were those in which the job-holders' tasks directly involved the lives and safety of other mineworkers.[9] As we have seen,[10] a small number of Africans, as timbermen, pump drivers and track layers,

performed semi-skilled tasks.[11] Yet organised labour did not petition the government to reserve such jobs for whites: in performing these tasks job-holders did not place the safety of other workers at risk. State support for the safety rationalisation partly explains why the British administration of the Transvaal re-enacted the South African Republic's colour-bar laws in the mining regulations of 1903.[12]

We cannot fully explore the origins of each colour bar: a few illustrations will be used to prove the argument. The original colour bar, which restricted the job of blasting to whites, was enacted in 1893, when the the South African Republic's first mining regulations were promulgated.[13] A dual motive probably prompted the Labour Union's request for the law:[14] the need to prevent accidents; and miners' fears that management's employment of skilled or experienced non-whites blasters, including coloured persons, in particular,[15] would diminish their job opportunities. The Chamber did not object to the law, despite its requests to Kruger to change some of the other mining regulations.[16] In tacitly supporting the colour bar in blasting, the mineowners clearly colluded with the workmen's rhetoric concerning safety.

In its revised mining law of 1896 the Transvaal republican government amended the regulations for blasters; and they remained in force in the laws of 1897 and 1898. The new blasting law of 1896, by

substituting "person" for "white", dropped the 1893 racial qualification. But a new requirement for miners was inserted - the possession of a blasting certificate, which they could acquire only after undergoing a proficiency test conducted by an inspector of mines.[17] Although no racial qualification was stipulated for the award of blasting certificates, another related provision made it clear that certificates would be awarded only to white miners: this permitted a skilled and reliable "person of colour" to assist the blaster.[18] Again, as in 1893, the Chamber lodged no objection to the colour bar, which was now covert. An unquestioning acceptance of the white status of miners was implicit in the Chamber's response: it criticised the certification of miners as a bureaucratic and unnecessary procedure for the reason that it would delay "a miner just arrived in the country" from starting work immediately.[19] Indeed, as late as 1907 management argued that only white persons were responsible enough to handle the intensified safety measures entailed by "large scale" blasting on the Witwatersrand. Management was prepared to entrust experienced coloured persons with blasting, but only as assistants under white supervision.[20]

The remaining colour bar provisions were linked to the operation of the skips. In view of numerous accidents connected with engines and hauling during the early 1890s,[21] the need had arisen for upgrading the qualifications of those winding engine drivers who

were in charge of man-hauling cages. As these engine drivers were intimately involved with the protection of all underground workers' lives, the Transvaal Engine Drivers' Association successfully petitioned the volksraad to allow only certificated workmen, as was the practice in the United States,[22] to operate the man-hauling cages. Also, in accordance with the union's wish,[23] the certification law debarred non-white operatives from taking the test.[24] The inception of the test, however, was directed primarily at precluding incompetent white workmen from operating the man-hauling skips.[25] Even before the volksraad enacted the law, it is highly unlikely that management on the large central mines had employed skilled but informally trained non-white workmen in this capacity.[26]

The safety rationale, namely that whites were innately more responsible than persons of colour, prompted the engine drivers' racist appeal. This motive overrode the engine drivers' fears of job displacement by non-white mineworkers. The mineowners, who did not object to the colour bar,[27] undoubtedly shared the view of the engine drivers' union that only whites should be entrusted with such a responsible job.[28] As in the case of blasters, the safety rationale of both the winding engine drivers and the employers coincided.

The engine drivers' union also requested the volksraad to introduce certificates, to which the

colour bar was attached, for workers in allied jobs, including engine drivers in charge of ore cages and locomotive cocopans.[29] In these instances, the union's petition was tied to to two interlinked imperatives: the responsibility of the job-holders for the safety of the lives of other workers;[30] and the artisans' need for protection against non-white competition.[31] But as management on many mines often entrusted such tasks to Africans, Indians and coloured persons,[32] the Chamber did not endorse the union's racist safety rationale for these occupations. Nor did the Chamber sanction the union's petition that banksmen and onsetters should be whites. Although banksmen and onsetters were not eligible for membership of the engine drivers' union, they worked in close conjunction with the winding engine drivers by giving them the signals to lower and raise the cages. The jobs of banksmen and onsetters were reserved for whites only in the law of 1896.[33] The contentions of the mineowners obviously carried more weight with the volksraad than those of the union; and in 1897 and 1898 the colour bars were not again applied to the jobs.[34]

This summary illustrates that safety considerations underpinned each request by the white mineworkers for the establishment of colour bars. It might be contended that the safety rhetoric deliberately concealed the mineworkers' fears of displacement by non-white workers. Even so, it can be

strongly argued that "irrational racial prejudices" were also closely tied to the mineworkers' materialism.[35]

This study therefore rejects Johnstone's contention that the initial motivation by white mineworkers for the colour bars was a rational economic response to the mineowners' exploitative use of the migrant labour workforce. The colour bars, which white mineworkers selected, were for jobs which required a relatively lengthy period of experience. Such jobs precluded the employment of migrant workers who, as yet, had served too few intermittent indentures to meet this requirement. Despite its scantiness, the evidence of contemporary miners suggests that during the 1890s the presence of the vast assembly of black migrant workers minimally disturbed the complacency of the overseas miners.[36] Instead, the white mineworkers regarded as their "unfair competitors" the low-paid, but proletarianised, semi-permanent and permanent Africans, Indians and coloured workers. The initial demands for the colour bars were not therefore "a particular class response to a particular situation", as Robert Davies, in uncritically following Johnstone, asserts.[37] Clearly before the Anglo-Boer War overseas miners did not perceive the temporary African migrant workers as posing a significant competitive threat to their job and wage security.

During the 1890s overseas miners on the Witwatersrand had other reasons, too, for enjoying job security. Besides the ease with which they could always find jobs,[38] the overseas miners on the Reef faced minimal white "competition from below",[39] as occurred at other mining centres,[40] By relegating to black workers the basic physical jobs, management precluded South African residents from receiving an informal apprenticeship: such apprenticeship customarily provided miners with the basis for their all-round skills, so ensuring their recognition as professionals. Instead, South African whites began working on the mines as supervisors of unskilled work, including shovelling and tramming.[41] As has been noted, within a short period, which was often less than two months, many residents acquired the necessary theoretical knowledge to obtain their blasting certificate, the only requirement, prescribed by official regulation, for entry into skilled work, namely supervising drilling and doing blasting.[42] Consequently, and probably with just cause, management and overseas miners invariably held the locally trained miners to be "second-rate",[43] incompetent workmen.[44]

During the 19th century the secure position of overseas miners on the Witwatersrand remained virtually inviolate. But the position for them - and the locally trained miners - changed shortly after the end of the Anglo-Boer War. When the mines reopened in

1901, for a variety of reasons there was a large shortage of African migrant workers.[45] A major motive for Africans withholding their labour, as many mine managers and consulting engineers confidentially acknowledged, was the revised wage schedule of 1900: it reduced the average wages of black workers from 50s per month of thirty shifts to a mere 30s.[46] Although the 1897 wage schedule, in a more complicated form,[47] was reinstated in April 1903, the shortage in the supply of black labour continued. The shortfall proved to be only temporary: gradually in the years following 1904 Africans returned to the mines in their pre-war numbers.[48] But between 1901 and 1904 the mineowners faced a labour crisis in the industry and did not anticipate an eventual fortuitous outcome. They needed an immediate solution, despite its complexity. In 1904, with the support of Alfred Milner, Governor of the Transvaal and High Commissioner of the South African colonies, the Randlords imported unskilled indentured Chinese labour, as they had earlier planned to do.[49]

Chinese contract labourers enjoyed a world-wide reputation for their productivity and industry.[50] The rapidity with which they acquired skills in conjunction with their indentured terms of employment rendered them, in the view of industrialists throughout the world, both a capable and a compliant workforce. Also, Chinese labourers were all the more valuable to the industrialists because they had the

potential for being upgraded to semi-skilled and skilled positions, but at unskilled contractual wage rates.

Skilled workmen on the Witwatersrand were apprehensive that the "intelligent" indentured Chinese labourers, unlike the "inferior" black migrant workers,[51] would pose a strong competitive threat to their skills and job security, as had occurred in Australia and America: with the strong support of organised labour in Britain and her colonies, the Reef mineworkers vociferously opposed the mineowners' plan. Milner and the mining magnates eventually secured the workmen's luctant acquiescence to the scheme, but only after they had partly allayed white mineworkers' fears that the Chinese would not displace them. Eventually the government and the industry mollified workmen by debarring the Chinese from performing numerous mining jobs. These jobs were inserted in a special schedule in the Labour Importation Ordinance of 1904.

As Peter Richardson has demonstrated, the reasons for the successful impact of the Chinese on the industry were complex;[52] the significance of the Chinese was not solely related to their provision of unskilled labour. We shall extend this argument by showing that the experience which management derived from the employment of indentured Chinese labourers significantly altered its perceptions of the utility and advantages of African migrant labourers.[53]

The Chinese adapted rapidly to the requirements of the gold mines. Also, because of their relatively lengthy three-year contracts, the untrained labourers were able to consolidate their skills. Management took advantage of the growing experience of the Chinese by increasing their responsibilities, but without infringing the colour bar. In this respect miners were more vulnerable than artisans to Chinese encroachment: miners' skills had already been fragmented by specialisation and supervision.

From 1905, in their determination to reduce working costs, the mineowners made concerted efforts to increase the size of the gangs and the number of rock drills under the miners' supervision, in this way acknowledging the competence of the Chinese.[54] These actions aroused the miners' earlier fears that the Randlords intended using the Chinese to oust them. The miners resisted the innovations, but with only partial success, as we shall see later.[55]

Management also applied the cost-saving exercises to African underground workers. Shortly after the arrival of the Chinese, large numbers of Africans began to return to the mines, where they were employed in conjunction with the Chinese, but in separate groups. Many African mineworkers were "old hands", who had served several contracts and were therefore, like the Chinese, relatively experienced. Management, likewise, attempted to increase both the size of the

black hand-drill gangs and the number of machine drills operated by Africans under a single supervisor. [56] Also, even before the Chinese labour experiment had been formally terminated in 1907,[57] the mineowners began to affirm the competence of migrant labourers, particularly in drilling.[58] Unlike the 1890s, when the industrialists had stressed the "raw labour" qualities of the migrant workforce,[59] by 1906 the mineowners' rhetoric promoted them to being "skilled" and "efficient" *labourers*.[60]

Management's altered considerations regarding the skilled potential of the migrant workforce eroded the former confidence of miners in their job security with respect to the temporary black contract workers. In brief, within two years of the introduction of Chinese labour, the rhetoric and actions of the mineowners caused miners to reappraise the migrant labour system. They no longer viewed it with complacency and dismissiveness, but with apprehension.

African migrant workers challenged the miners' monopoly of skills in two ways. First, a number of Africans, who had served several underground indentures, particularly as drillers, and who had been trained in the informal traditional way were, like the Chinese, ready to accept more responsibility. They confirmed the mining adage that: "The smart trammers become the miners of the future."[61] Significantly, too, most of the experienced African workers, who emerged as rivals of the skilled miners, came from the

Portuguese east coast territories, south of latitude 22° South. By 1913, 77 per cent of these Mozambican Africans were "old mine boys", whom management viewed as "the most valuable portion" of the underground black complement.[62] The skills of this particular group of Africans and its proneness to silicosis, as we have noted, were inextricably related. Relatively lengthy spells of underground work was the criterion for each of these work-related occurrences.

Second, the vast majority of African workers comprised an enormous assembly of low paid "docile" workers. Rendered amenable by harsh contractual conditions and by repressive state controls, experienced migrant workers constituted a formidable body with which white miners could not compete on equal terms. E. J. Moynihan, a private consulting engineer and an outspoken antagonist of the mineowners, was no friend of the trade unionists and was not a supporter of the Labour Party. Nevertheless, organised labour, for both benevolent and economic reasons,[63] would have endorsed his rejection of the migrant labour system:

> [There is] a lot of legislation that practically compels natives to work more or less on the mine owners' terms, on terms that give the mine owner much more control over the native, as a labourer, than he has over the white man. If the white man does not want to go to work he does not go, and there is no law by which you can compel him to work; but if the nigger does not want to work he is quickly shambokked or put in the stocks, or he can be brought and charged with an offence in a police court, which a white man cannot be.[64]

As Moynihan indirectly illustrated, the coercive strictures which bound low-paid African contract mineworkers to their jobs made it well-nigh impossible for white workers, particularly miners, single-handedly to compete economically with them.

In this respect the South African Labour Party, newly founded in 1910, could not offer the miners a suitable solution for their dilemma. Unlike the artisans,[65] in 1907 most miners did not approve the principle that the mines be run on an all-white labour basis. This was the majority recommendation of the Mining Industry Commission, which was strongly influenced by one of its commissioners, the former mine manager, Frederic Hugh Page Creswell.[66] Nor did most miners support the "White Labour Policy" of the South African Labour Party, which was dominated by the craft unions and motivated by its parliamentary leader, Creswell.[67] The Transvaal Miners' Association eventually joined the Labour Party in December 1912, nearly three years after its inception.[68] But it did so mainly because it hoped to promote industrial legislation, particularly with respect to compensation for silicosis and the strict implementation of measures for the prevention of the disease.[69] Clearly the Transvaal Miners' Association did not have a whole-hearted commitment to the "White Labour Policy" in the form mooted by the craft unions.[70]

Most overseas miners supported the idea of local novice miners doing manual labour because in this way

they received a sound and traditional training.[71] But they viewed a local apprenticeship of physical labour as only a stepping-stone to skilled work, which they regarded as being the preserve of white practical miners.[72] The employment of blacks as labourers did, indeed, free professional miners from doing unpleasant physical tasks, as an Australian, Kerrie Cahill, explicitly stated.[73] But this was not the primary reason for their rejection of the all-white labour policy. More important, the miners' opposition to the policy stemmed from sound economic and practical realities. They believed correctly that its implementation would result in all-round wage reductions.[74] As a result they resisted, too, the suggestion, which the artisans and the majority of the Mining Industry commissioners strongly endorsed, that machine-drill assistants should be white workmen.[75]

Miners, therefore, had to find their own solution to the problem of African competition, but it had to be one which did not dispense with African mineworkers. As opposed to the "White Labour Policy", the miners favoured the retention and extension of the colour bar: it would safeguard them from displacement by members of both the small permanent non-white group and the huge African migrant workforce. All the non-white mineworkers - for reasons of choice or because of contractual bonds - received wages which were far lower than those which overseas and local miners were prepared to accept. Even so, virtually

all the miners who gave evidence to the Mining Industry Commission of 1907 displayed notions of white cultural and racial superiority.[76] Indeed, these notions co-existed with the miners' material opposition to "unfair" non-white competition.

The confidences to the Mining industry Commission of a miner from Lancashire, James Henry Bridgman, both typified the cultural and racist discrimination of overseas miners against Africans and identified their economic fears:

> I don't say it is free competition. In this country w. have always kept the black man in his place, and every man who is a Britisher will keep the black man in his place. I will not allow a black man to get beyond a certain latitude.[77]

And when one of the commissioners enquired, "How are you going to prevent that black man from robbing the white man of that labour?" Bridgman's swift and laconic rejoinder was, "I would prevent it by law."[78]

After the Anglo-Boer War the numbers of overseas miners on the Witwatersrand began to dwindle: many died from silicosis,[79] while the notoriety of the disease gradually began to deter other potential immigrants.[80] But after 1910, because of state protection, overseas miners who remained in the Transvaal, together with the South African trained miners, continued to enjoy a tenuous job security. In the mining regulations, framed in terms of the Mines and Works Act of 1911, many covert, namely customary *de facto*, colour bars, which extended back through the

British administration of the Transvaal to the South African Republic of the 1890s, were now made overt;[81] in particular, the redefinition of gangers and blasters as *white* persons made them explicit.[82] The unskilled person, the African mineworker, was the "man who was being supervised", and the semi-skilled and skilled persons, the white overseers and miners, were those who were working "practically without supervision".[83]

The result was that experienced but informally trained black workers, on the basis of their colour and race and not on their skills, were restricted to jobs arbitrarily classified as unskilled. Edward Way in evidence to the Mining Industry Commission clearly demonstrated the capriciousness of the classification:

> It has been the custom to speak always of coloured labour as unskilled, but a great deal of work done by coloured labour is, of course, skilled labour. The question is where you draw the line between what is skilled and unskilled. It is taken to be unskilled where there is immediate supervision by a boss over a gang of coloured labourers.[84]

The colour bar obviously prevented black advancement. All the same, in the opinion of Richard Barry, the mine manager of the Nourse,[85] there was yet another factor. He claimed that the prescriptive low wages - the "rotten schedule of rates"[86] - were as effective as the colour bar, if not more so, in restricting black advancement. In a letter to his uncle, John X. Merriman, Barry perceptively made the

observation:

> Although the Mine Owner shouts at the Government about withdrawing "The Colour Bar", he proves himself absolutely insincere by his restriction of pay on every class of native worker - thus setting up a far stronger and wider "bar" than any provided by the Regulation.[87]

Barry's regular and intimate correspondence with his uncle provides an important source of information for the inner workings of the mining industry. Barry's aptitude and conscientious commitment to his job led his Corner House directors to appoint him as their Chamber of Mines representative on numerous commissions and parliamentary select committees. The position gave him both access to highly confidential Chamber information and provided him with a thorough knowledge of the industry's operations. Because of his intimate association with the mineowners he learned rapidly that most of the industrialists were concerned solely with "monetary expediency".[88] Consequently his initial delight with his appointment as manager, in 1911,[89] and his enthusiasm for the policies of his group altered radically:[90] he became thoroughly disillusioned with the mineowners' capacity to conceal numerous practices and service conditions which they knew to be detrimental to the health and safety of the workforce.[91]

Barry was not a compliant servant of the mining houses. In his determination to prevent the mineowners "from shaping the facts to suit their desires", he persisted in "crabbing" his employers.[92]

His directors, who were anxious to promote a benevolent image of the industry, dispensed with his services as their public representative.[93] They were embarrassed by his "independent views",[94] particularly with regard to their policies regarding silicosis. In this respect one of his major antagonists was Lionel Phillips, whom certain historians have disingenuously singled out as being genuinely committed to improving health conditions on the mines.[95]

The obsession of the Randlords with profits - the "Tickey Snatchers", as Barry called them[96] - resulted in their neglecting numerous basic health needs of both the black and white members of the workforce.[97] In particular, the negative attitudes of many mining-house directors to preventing silicosis appalled Barry. He claimed that their attempts to "*dodge expense*" were obstructing the reform movement's commitment after 1914 to "wipe out" silicosis.[98]

Significantly, like his uncle, J. X. Merriman, Barry was initially unsympathetic to the white supervisors. He viewed them as being "idle" and overpaid workmen who in 1913 had minimal grounds for striking.[99] But in 1914, after serving on a sub-committee of the Chamber of Mines, which prepared evidence for the Economic Commission of Enquiry investigating the grievances of the 1913 strikers, his opinion altered dramatically: he was prepared to confront the "snags" and to discard his "preconceived notions".[100] Barry conceded that the high cost of

living resulted in "most workmen saving nothing".[101] He also discovered that supervisors confronted an enormous dilemma.[102] He asserted further that miners, whose jobs had been fragmented, had good reason for regarding the colour bar, "The Chinese Wall of Exclusion", as he called it,[103] as their only effective barrier to job displacement.

Finally, Barry acknowledged that the industrialists, despite their early and continuous rhetoric until 1914 to the contrary,[104] viewed the colour bar as being minimally dysfunctional to their operations and profits.[105] The African wage schedule so effectively reduced the mineowners' working costs, with respect to black workers, that the abolition of the colour bar was not at this time, unlike the later period,[106] a matter of urgency.[107]

Until 1914 management had successfully upgraded black labourers to semi-skilled drilling jobs, but at the unskilled rates of pay, prescribed by the African wage schedule. Consequently from 1910 to 1914 management was able to achieve even further cost reductions in drilling, but within the framework of the colour bar and without the need to substitute black workers for white miners holding blasting certificates. The mineowners accomplished this feat by two inter-related measures: the extension of the supervisory duties of miners; and the increase in the ratio of black underground mineworkers to semi-skilled and skilled white gangers.[108] In this connection, a

technological innovation helped the mineowners to increase the number of African-operated rock drills under white supervision. This was the introduction after 1910 of light, hand-held hammer drills.[109] Management's gradual implementation and extension of these measures caused a relative decrease in the number of white supervisors. But because of the continued expansion of the industry, from 1899 to 1914 the number of miners remained virtually constant in absolute terms. The statistics controvert the inaccurate contentions of a number of historians, who state that the number of white miners decreased in absolute terms.[110]

In the final analysis the colour bar afforded miners-as-supervisors, as opposed to skilled artisans, only partial protection from black competition: the miners' initial and sole reliance on the colour bar proved to be misplaced. Creswell, who had far earlier recognised the fallibility of the colour bar, refused to commit himself or the "White Labour Policy" to its extension.[111] But many miners, who did not sincerely endorse the "White Labour Policy", viewed the colour bar as vital to their continued existence as "labour aristocrats". In order to entrench their job security against black competition and to prevent management from reducing their numbers, miners pressed their need for an additional form of state protection: a fixed ratio of white supervisors to black subordinates.[112] Of course the mineowners refused to countenance the

demand; after the outbreak of World War 1 the industrialists pursued a steady course of increasing the numbers of black drillers under white supervision, but within the framework of the colour bar.

For sound economic reasons the mineowners decided in 1914 not to contest the legal validity of the colour bar. During the exigencies of World War I this ploy enabled them to pose as "Protectors of Whites". The trade-off for the mineowners' "perpetuation" of the colour bar was the miners' consent to graded rates of pay, in which the *maximum* rate, and not the minimum rate, was pegged at £1 per day. Barry grasped the implications of this manoeuvre, and called it "a rotten ill founded scheme": it debarred blacks from rising above their "present" status; and it "unjustly" squeezed "the Wage Earner". In so paring their white wage bill the mineowners' gained a clear victory: in the view of the overseas miners - and of Barry - after 1914 they had depressed the average wage rates for miners to below-subsistence levels.[113]

In summary, the supervision system on the Witwatersrand obliged the majority of miners to be overseers. It also provided black migrant workers, particularly those from the Mozambican east coast territories, with a basic training enabling them to acquire mining skills. In these ways the system promoted the vulnerability of overseas miners to both job displacement by Africans and to wage reductions by management. Consequently after the Anglo-Boer War,

when the mineowners made concerted efforts to increase white worker productivity, their target group was miners rather than artisans. This onslaught by management on the élitist standing of overseas miners - not surprisingly it had tacit public support - coincided with the miners' awareness of their susceptibility to accelerated silicosis. This combination of dangers created amongst miners a climate of militancy which in 1907 erupted in a strike which involved virtually all the Witwatersrand mines. Significantly, the skilled and semi-skilled artisans and operatives, who did not view themselves as being directly affected by the threats, and who had at this stage little, if any, identity of interests with the miners, could not be persuaded to participate in the strike. It was therefore only a sectional miners' strike.[114]

Underground artisans and operatives were not supervisors and were, therefore, not, in the same way, as vulnerable to job fragmentation as were the miners.[115] Also, unlike miners, particularly rock drill supervisors, they did not perceive themselves as being prone to dust exposure. Therefore they did not realise that they, like miners, were also vulnerable to silicosis, not in its accelerated form, but in its chronic form. The appreciation of their own morbidity came slowly and only after the publication, in February 1912, of the report of the Medical Commission.[116] Hesitantly the artisans and operatives

formed closer links with the miners in the knowledge that they shared an occupational health hazard. On 9 September 1911 the Government Mining Engineer, Robert Nelson Kotze, pre-empted the findings of the Medical Commission, when he issued an ominous public declaration: "Sooner or later every worker underground on these mines will contract miners' phthisis."[117]

During the 1913 general strike, as in the past, all white mineworkers, namely both the artisans and the miners, pressed the government to enact legislation to protect them from displacement by African mineworkers.[118] But another important unifying factor in the strike, with drew together both sections of the white workforce on the gold mines, was the threat of silicosis.[119] All underground white workers, irrespective of whether they were miners or operatives, demanded that the government and the mining houses implement an important dust precaution measure, namely the strict application of the eight-hour day.

All the white underground mineworkers opposed the legislative provision of the 1911 Mines and Works Act, which stipulated that the eight-hour day commence at the face of the mine instead of at the surface, also known as the bank of the mine.[120] This explains why during the 1913 general strike both underground artisans and miners clamoured for the insertion in the Mines and Works Act of the "bank to bank" principle.[121] The vulnerability of all the underground

workers to silicosis underpinned their grievance that the eight-hour day was not from "bank to bank".

In 1913 the immediate cause of the general strike was a dispute between underground artisans and management over hours.[122] Even so; an apparently trivial matter, which helped promote the militancy of both the underground artisans and the miners, had deep-seated health implications, as the *Evening Chronicle* noted perceptively:

> The mining houses and the country have to realise that they are not fighting Mr. Tom Mathews and his friends [the artisans] in the business. They are fighting an enemy that will, if not overcome, cut the life threads of this country with shears sharper than those of the Fates...Phthisis must be destroyed or it will destroy the mines and with them the Rand. This is where the length of the miners' working day comes into the discussion.[123]

In 1913 a grievance, common to all white mineworkers, was the encroachment by low-paid African contract workers in semi-skilled and skilled categories of work. All the same, as the *Evening Chronicle* understood clearly, another important bond between the underground artisans and the miners was their proneness to the "white death".

Notes

[1] TG 2, 1908, p. 1 215, q. 17 822A, evidence of A. E. Musson.

[2] PRO, CO, 291/138, despatches, Methuen to Crewe, 4 Sept. 1909, minute by Col. J. E. B. Seely, 2 Oct. 1909.

[3] SC 9, 1913, pp. 556-577 passim, evidence of R. B. Waterston.

[4] UG 19, 1912, p. 18, pars. 43, 44.

[5] Johnstone, pp. 58-59, 67 ff. This was an expression frequently used by F. H. P. Creswell, the former mine manager who became the parliamentary leader of the South African Labour Party in 1910. See, for example, SC 9, 1913, p. xi.

[6] Although Cammack commits herself to a class analysis in her published doctoral thesis, *Class, Politics and War: A Socio-Economic Study of the Uitlanders of the Witwatersrand, 1897-1902*, p. x, she is ambivalent about committing herself to either Johnstone's thesis or the so-called "liberal" view. It is possible that she has difficulty in reconciling her evidence with the limitations of her methodology and hesitates to confront the Johnstone thesis.

[7] Hatch and Chalmers, p. 254; *GMEAR...31 Dec. 1902*, p. 1; *South African Mining Journal*, 4 May 1895, p. 648, "Leading Article"; *South African News*, 2 May 1908, "Labour Notes", quoting a resolution from the Johannesburg Trades and Labour Council of 1899. See also Katz, *A Trade Union Aristocracy*, p. 27.

[8] See, for instance, TCMA, file W6(c), T. H. Leggett to Secretary of the TCM, 29 Aug. 1902; and van Niekerk, pp. 111-141 passim.

[9] PRO, CO, 291/53, individuals, E. P. Rathbone to Chamberlain, 3 March 1903. Cf. Simons and Simons, pp. 55-56, who view the safety rationale as being entirely disingenuous.

[10] See above, chapter 6.

[11] TCMA, file W6(c), T. H. Leggett to Secretary of the TCM, 29 Aug. 1902; Hatch and Chalmers, p. 254; *GMEAR...31 Dec. 1902*, p. 1.

[12] PRO, CO, 291/53, individuals, E. P. Rathbone to R. Bromley, 8 March 1902. See also Katz, *A Trade*

Union Aristocracy, pp. 139-142.

[13] ZAR, *Wetten*, 1893, No. 3, section (65). Cf. Thorpe, p. 93, who incorrectly notes that the first statutory colour bar was enacted in 1896.

[14] The role of the Labour Union in requesting the law is inferred by Simons and Simons, pp. 55-56, and by Rose, pp. 29-30.

[15] I thank Richard Mendelsohn for this information.

[16] *TCMAR*, 1893, pp. 70-73.

[17] ZAR, *Wetten*, 1896, No. 12, section (89), 1897, No. 11, section (89), 1898, No. 12, section (87).

[18] ZAR, *Wetten*, 1896, No. 12, section (92). See also ibid., 1897, No. 11, section (90), 1898, No. 12, section (90). Cf. Bozzoli, *The Political Nature of a Ruling Class*, p. 81, who incorrectly notes that African members of gangs performing hand drilling did the blasting, too.

[19] *TCMAR*, 1896, p. 62.

[20] TG 2, 1908, p. 175, q. 1 597, evidence of E. J. Way.

[21] Rose, pp. 29-31.

[22] TG 2, 1908, p. 435, q. 4 688, evidence of T. Mathews.

[23] Katz, *A Trade Union Aristocracy*, p. 23, quoting the executive minutes of the Transvaal Engine Drivers' Association, 4, 18 June 1894, 7 July 1895, 1 May 1902.

[24] ZAR, *Wetten*, 1896, No. 12, section (106), 1897, No. 11, section (106), 1898, No. 12, section (104).

[25] Rose, p. 31.

[26] TG 2, 1908, p. 175, q. 1 597, evidence of E. J. Way.

[27] *TCMAR*, 1896, 1897, 1898 passim.

[28] TG 2, 1908, p. 152, q. 1 252, evidence of E. J. Way.

[29] Katz, *A Trade Union Aristocracy*, pp. 23, 139-142.

[30] TG 2, 1908, p. 349, q. 3 458, evidence of C. C. Smith.

[31] Katz, *A Trade Union Aristocracy*, pp. 23,

139-142.

[32] TCMA, file W6(c), T. H. Leggett to Secretary of the TCM, 29 Aug. 1902. See also, Hatch and Chalmers, p. 254; and *GMEAR...31 Dec. 1902*, p. 1.

[33] ZAR, *Wetten*, 1896, No. 12, section (39) (m), 1897, No. 11, section (39) (m), No. 12, section (39) (m); Katz, *A Trade Union Aristocracy*, pp. 23, 140-142. Coloured persons were occasionally employed in these jobs on the small mines beyond the Reef, and in prospecting shafts. See *TCMAR*, 1896, p. 61. On the Witwatersrand itself banksmen and onsetters were almost exclusively white workmen. See Merriman Papers, correspondence, 1913 [sic], [1914], no. 274, "Notes on the Colour Bar Question and the Debate in the House of Assembly, May 12th, 1914".

[34] The colour bar was reintroduced in these jobs in the Transvaal Mining Regulations of 1903. See Katz, *A Trade Union Aristocracy*, pp. 140-141.

[35] This quotation is from Davies, *Capital, State and White Labour in South Africa 1900-1960*, p. 3, who uses it to attack the arguments of the so-called liberal school of historians.

[36] TG 2, 1908, pp. 443, 489, qq. 4 893, 5 420, evidence of T. Mathews and J. Coward. See also, ibid., pp. 522-523, qq. 6 139-6 141, evidence of E. Moore.

[37] Davies, *Capital, State and White Labour in South Africa 1900-1960*, pp. 3-4.

[38] *The Mining Industry*, 1897, p. 142, evidence of E. J. Way; TG 2, 1908, p. 162, qq. 1 434-1 437, evidence of E. J. Way.

[39] TG 2, 1908, p. 1 245, qq. 18 236-18 237, evidence of J. H. Johns.

[40] TG 2, 1908, pp. 528, 667, 728, qq. 6 263, 8 454, 11 084, evidence of E. Moore, S. Richards and C. Locke.

[41] TG 2, 1908, p. 823, q. 11 865, evidence of R. Raine.

[42] Katz, *A Trade Union Aristocracy*, pp. 56-57.

[43] TG 2, 1908, p. 669, qq. 8 507-8 512, evidence of S. Richards.

[44] TG 2, 1908, pp. 700, 728, 785, 924, 1 245, qq. 9 049, 11 084, 11 177, 13 659, 18 236, evidence of F. Crean, C. Locke, P. Harvey and J. H. Johns; *Final Report of the Mining Regulations Commission*, 1910, v. 2, pp. 153-155, evidence of J. Yates.

[45] TCMA, file W6(c), T. H. Leggett to Secretary of the TCM, 29 Aug. 1902.

[46] TCMA, file W6(c), confidential letters to the Secretary of the TCM from the following members of management: T. H. Leggett, 29 Aug. 1902; F. Hellmann, 29 Aug. 1902; R. M. Catlin, 5 Sept. 1902; T. J. Britten, 11 Sept. 1902; H. R. Skinner, 25 Sept. 1902; S. J. Jennings, 6 Oct. 1902; and G. A. Denny, 9 Oct. 1902.

[47] *Report of the Council of the Association of Mine Managers*, 1903, pp. 15-17.

[48] Denoon, "'Capitalist Influence' and the Transvaal Government during the Crown Colony Period, 1900-1906", pp. 304-305; Grey, p. 161; TG 2, 1908, p. 208, statement of J. B. Roberts.

[49] Richardson, *Chinese Mine Labour in the Transvaal*, pp. 18-23, analyses the complex issues involved in the decision to import the indentured Chinese labourers. Cf. Bozzoli, *The Political Nature of a Ruling Class*, pp. 92-93, who argues that the mining ideologists created a favourable climate for employing Chinese labour. Bozzoli is wrong. The Chamber of Mines, through its public relations arm, including the *Mining Journal*, organised the propaganda campaign.

[50] Unless otherwise noted, the following paragraph, is based on Katz, *A Trade Union Aristocracy*, pp. 17-20, 110-127.

[51] *South African News*, 11 July 1903, "Labour Notes"; *Star*, 1 April 1903, letter by W. Mather.

[52] Richardson, *Chinese Mine Labour in the Transvaal*, p. 180.

[53] Katz, *A Trade Union Aristocracy*, p. 132.

[54] CHA, WLF, P. Upton to Secretary, Maritzburg, 22 June 1906; BRA, HE, v. 34, S. Evans to R. Schumacher, 20 Nov. 1905, S. Evans to H. Eckstein and Company, 11 Dec. 1905.

[55] See below, chapter 12.

[56] Cf. Bozzoli, *The Political Nature of a Ruling Class*, p. 100, who incorrectly notes that, when management increased the number of machine drills from two to three under the miner's supervision, each drill was manned by fifteen to twenty Africans. A gang of this size operated the hand drills. Two Africans operated each machine drill under white supervision.

[57] See Richardson, *Chinese Mine Labour in the Transvaal*, pp. 182-185, for an analysis of these events.

[58] See, for instance, CHA, WLF, P. Upton to Secretary, Maritzburg, 22 June 1906; *South African Mines, Commerce and Industries*, 17 March 1906, pp. 3-4, "Leading Article", 13 Oct. 1906, pp. 107-108,

"Leading Article". See also TG 2, 1908, pp. 966, 1 041, q. 15 147, statement and evidence of J. B. Roberts and A. S. Edmunds; SC 9, 1913, p. 3, q. 28, evidence of H. R. Skinner.

[59] See, for instance, TCMA, file W6(c), T. H. Leggett to Secretary of the TCM, 29 Aug. 1902.

[60] TG 2, 1908, p. 1 041, q. 15 147, evidence of A. S. Edmunds. See also SC 9, 1913, p. 3, q. 28, evidence of H. R. Skinner.

[61] TG 2, 1908, p. 669, q. 8 512, evidence of S. Richards.

[62] SC 9, 1913, p. 200, q. 1 424, evidence of J. G. Lawn.

[63] Cf. Fraser and Jeeves, p. 217, who claim that the F. H. P. Creswell and his Labour Party colleagues opposed the importation of "tropical" Africans for "disingenuous" reasons and solely to promote their "White Labour Policy". This is not completely accurate. Organised labour did, indeed, have selfish considerations. But humanitarian motives were also enmeshed with its opposition to African indentured labour, particularly from non-British territories. In 1913 Creswell, for instance, was responsible for exposing the scandalous death rate, which the mineowners tried to conceal, in the WNLA compound. See *Union House of Assembly Debates*, F. H. P. Creswell, 14 May 1913, cols. 2417-2422. For an example of the sympathetic views of organised labour to African migrant workers, see TG 2, 1908, pp. 430, 460, qq. 4 600, 4 090, evidence of T. Mathews.

[64] TG 2, 1908, p. 1 483, q. 21 365, evidence of E. J. Moynihan.

[65] TG 2, 1908, pp. 402 ff., 705 ff., 1 426 ff, evidence of J. Ware, W. Andrews and E. J. Riley.

[66] Katz, *A Trade Union Aristocracy*, pp. 149-151.

[67] Katz, *A Trade Union Aristocracy*, pp. 152, 200-201, 224-227.

[68] Katz, *A Trade Union Aristocracy*, pp. 224-225.

[69] See, for instance, *Rand Daily Mail*, 15 Feb. 1911, "The Miners' Bill", 4 March 1912, "Rand Miners", 8 April 1912, "Phthisis Bill", 28 Aug. 1912, "Eight Hours Underground".

[70] Katz, *A Trade Union Aristocracy*, pp. 224-225.

[71] See, for instance, TG 2, 1908, pp. 389, 480-481, 698, qq. 3 958, 5 405-5 409, 8 982, evidence of T. Willis, J. Coward and F. Crean.

[72] See, for instance, TG 2, 1908, pp. 380, 387, 443, qq. 3 921, 3 926, 4 847-4 848, evidence of T. Willis and T. Mathews.

[73] TG 2, 1908, p. 1 172, qq. 17 468-17 472, evidence of K. Cahill.

[74] See, for instance, TG 2, 1908, pp. 372, 528-533 passim, qq. 3 089, 6 062-6 142 passim, evidence of T. Willis and E. Moore.

[75] See, for instance, TG 2 1908, pp. 372, 480, 511, 518-523 passim, qq. 3 800, 5 395-5 398, 5 995, 6 062-6 142 passim, evidence of T. Willis, J. Coward, J. H. Bridgman and E. Moore. Very few miners approved the principle of white assistants on the rock drills. But see, for instarce, TG 2, 1908, pp. 302, 311, 1 066, qq. 2 091-2 096, 3 069, 15 084-15 822, evidence of S. S. Crowle and F. Crean. Cf. Simons and Simons, p. 88, who incorrectly state that a majority of miners approved the principle.

[76] TG 2, 1908, pp. 337-354, 425-462, 465-478, 478-497, 497-511, 511, 532, 687-701, 1 158-1 162, 1 170-1 172, 1 213-1 218, evidence of C. C. Smith, T. Mathews, D. Hadenfeld, J. Coward, J. H. Bridgman, E. Moore, F. Crean, G. W. Sullivan, K. Cahill and A. E. Musson.

[77] TG 2, 1908, p. 505, q. 5 853, evidence of J. H. Bridgman.

[78] TG 2, 1908, p. 505, q. 5 854, evidence of J. H. Bridgman.

[79] *JCMMS*, Jan 1906, "Safety Measures in Mining", p. 227, discussant T. L. Carter; TG 2, 1908, pp. 227, 361, 381, qq. 2 196, 3 630, 3 968, evidence of J B. Roberts, R. B. Greer and T. Willis.

[80] *Cornubian*, 30 May 1907, "Coming in Droves"; *South African Mines, Commerce and Industries*, 16 March 1907, p. 28, "Leading Article"; *GMEAR...30 June 1909*, p. 58.

[81] ZAR, *Wetten*, 1896, No. 12, section (89), 1897, No. 11, section (89), 1898, No. 12, section (87) and "Definition of Terms"; *Transvaal Laws dealing with Mines, Works and Machinery and Machinery Regulations*, 1903, "Interpretation of Terms under these Regulations" section 92.

[82] *Mines and Works Regulations*, 1911, p. 3, "Interpretation of Terms", p. 38, section 99 (1)(a), (1)(b).

[83] TG 2, 1909, p. 157, q. 1 332, evidence of E. J. Way.

[84] TG 2, 1908, p. 148, q. 1 206, evidence of E. J. Way.

[85] Fraser and Jeeves, p. 368. have not included this position in their biographical note on Barry.

[86] Merriman Papers, correspondence, R. Barry to JXM, 17 May 1914.

[87] Katz, *A Trade Union Aristocracy*, p. 344, quoting from the Merriman Papers, correspondence, R. Barry to JXM, 5 July 1914. See also Merriman Papers, R. Barry to JXM, 2 Oct. 1913, and 10 Nov. 1913.

[88] Merriman Papers, correspondence, R. Barry to JXM, 11 Dec. 1913.

[89] Merriman Papers, correspondence, JXM to R. Barry, 9 Dec. 1911.

[90] See, for instance, Merriman Papers, correspondence, R. Barry to JXM, 17 April 1912.

[91] Merriman Papers, correspondence, R. Barry to JXM, 11 Dec. 1913.

[92] Merriman Papers, correspondence, R. Barry to JXM, 11 Dec. 1913.

[93] Merriman Papers, correspondence, R. Barry to JXM, 16 Feb. 1918.

[94] Merriman Papers, correspondence, R. Barry to JXM, 16 Feb. 1918.

[95] Samuel Evans did, indeed, show an active concern for the health of workers, particularly Africans. See Cartwright, *Doctors of the Mines*, p. 28. But it is wrong to attribute the same commitment to Lionel Phillips, as do Fraser and Jeeves, p. 218.

[96] See, for instance, Merriman Papers, correspondence, R. Barry to JXM, 11 Dec. 1913, 31 Jan. 1914.

[97] Merriman Papers, correspondence, R. Barry to JXM, 31 Jan. 1914, 21 May 1914.

[98] Merriman Papers, correspondence, R. Barry to JXM, 21 May 1914, 20 Nov. 1915.

[99] Merriman Papers, correspondence, R. Barry to JXM, 11 Dec. 1913.

[100] Merriman Papers, correspondence, R. Barry to JXM, 17 Nov. 1913.

[101] Merriman Papers, correspondence, R. Barry to JXM, 17 Nov. 1913.

[102] Merriman Papers, correspondence, R. Barry to JXM, 17 Nov. 1913, 31 Jan. 1914.

[103] Merriman Papers, correspondence, R. Barry

to JXM, 31 Jan. 1914.

[104] See, for instance, TG 2, 1908, p. 109, q. 780, evidence of L. J. Reyersbach; *Rand Daily Mail*, 23 Dec. 1913, "Sir Lionel's Logic"; and *Evening Chronicle*, 12 May 1914, "Therefore". See also Merriman Papers, correspondence, 1913 [sic], [1914], no. 274, "Notes on the Colour Bar Question and the Debate in the House of Assembly, May 12th, 1914".

[105] Merriman Papers, correspondence, R. Barry to JXM, 17 May 1914, 5 July 1914. See also ibid., W. Hosken to JXM, 8 May 1914.

[106] During World War 1 a large number of additional semi-skilled underground jobs, customarily performed by whites, were handed over to blacks. Therefore after the war, for this and other complicated economic reasons, the mineowners perceived a strong and urgent need to dispense with the colour bar. See Johnstone, pp. 105 ff.

[107] Merriman Papers, correspondence, R. Barry to JXM, 2 Oct. 1913, 10 Nov. 1913, 5 July 1914.

[108] SC 9, 1913, pp. 34-37, qq. 352-375 passim, evidence of H. R. Skinner.

[109] UG 19, 1912, p. 4; SC 9, 1913, pp. 36, 335, qq. 374, 2 290-2 292, evidence of H. R. Skinner and R. N. Kotze; *Rand Daily Mail*, 23 March 1911, "Company Meetings, 29 June 1912, "A. Goerz and Company".

[110] UG 40, 1917, pp. 16, 25, tables showing the number of white employees, from 1899 to 1916 and from 1907 to 1916. Cf. Richardson and Van-Helten, "Labour in the South African Gold Mining Industry, 1886-1914", p. 85. Thorpe, pp. 250-251, makes the same mistake. Thorpe's inaccuracy derives from comparing the ratios in the years 1901 to 1904 with those from 1905 to 1907. During the immediate post-war period there was a shortage of non-white labour. From 1905 to 1907, with the arrival of the Chinese labourers and the return of the Africans to the mines, the ratio of non-white to white labour was restored to its pre-war levels.

[111] Katz, *A Trade Union Aristocracy*, pp. 150-152.

[112] According to Doxey, p. 125, in 1921 the Federation of Trade Unions refused the Chamber's offer of a fixed ratio of whites to non-whites of 1:10,5. The unions demanded a white to non-white ratio of 1:3,5.

[113] Merriman Papers, correspondence, R. Barry to JXM, 31 Jan. 1914.

[114] Katz, *A Trade Union Aristocracy*, pp. 131-133.

[115] Underground firemen and engine drivers, responsible for ore cars, feared that a small group of experienced African, Indian and coloured workers would be permanently upgraded to skilled positions, but at unskilled wage rates, and would displace them. To obviate the "unfair competition" the engine drivers' union requested the certification of these operatives. See TG 2, 1908, pp. 1 474-1 477, evidence of T. Hannigan.

[116] *Rand Daily Mail*, 15 Feb. 1912, "Miners' Phthisis".

[117] *Lancet*, 2 Dec. 1911, p. 1 588, letter by Dr J. L. Aymard.

[118] Katz, *A Trade Union Aristocracy*, pp. 321-426 passim; *Worker*, 31 July "The Workers' Charter".

[119] PRO, CO, 551/42, despatches, Gladstone to Harcourt, 20 July 1913; Merriman Papers, correspondence, R. Solomon to JXM, 8 Aug. 1913.

[120] Union, *Statutes*, 1911, no. 9, section 9(1).

[121] Katz, *A Trade Union Aristocracy*, pp. 321-426 passim. See, in particular, ibid., pp. 331-335.

[122] Katz, *A Trade Union Aristocracy*, pp. 381-393.

[123] *Evening Chronicle*, 4 June 1913, "Notes".

CHAPTER 8

THE "PALMY" YEARS 1892-1899

> "The increased and rapidly expanding market presented for skilled labourers by the mining industry of these Fields, coupled with the high rates of pay, have attracted men from every country in the world, and means of communication being what they are, we are practically in competition with the labour markets of the world; drawing from all a certain number of men, allured hitherward by the higher wages offered."---George A. Denny, consulting engineer, 1902.[1]

> "We used to hear a good deal of the happy lot of the rock-drill contractor, of the high wages he earned for very little work. These high wages allured many into becoming rock-drill men. I, for one, thought there was a fortune in it, and learned how to run machines. All that I can say is that I devoutly hope an unkind Providence will never decree that I must make my living as a rock-drill runner. There are many more comfortable ways of getting through the world, and the high wages are small compensation if a man is finished up in seven years or so."---T. Lane Carter, mine manager, 1902.[2]

As the major plank in their recruitment campaign for skilled overseas mineworkers, the Randlords offered high wages. Indeed, from 1892 to 1914 the white mineworkers on the Witwatersrand on average earned higher money wages than their counterparts at

any other mining centre in the world. But the mineowners soon regretted their generous slogan of "a sovereign a day":[3] mineworkers, the state and the public viewed it as a commitment, and not as a form of advertisement, and regarded £1 per day, or £26 per month, as the standard minimum rate for skilled workmen.[4] From the mid-1890s the mineowners, intent on reducing working costs, privately confided their determination to lower the wages of white workmen.[5] But for reasons of expediency and propaganda, their individual public statements guaranteed their slogan.[6] In 1903, when it was rumoured that the mineowners intended importing indentured Chinese labourers, Sir George Farrar, Chairman of the East Rand Proprietary Mines and President of the Chamber, clearly showed the disingenuousness of the Randlords' rhetoric. In a speech designed to dispel the disquiet of the British Liberal Party and its labour supporters and to allay the fears of the Witwatersrand mineworkers, who were concerned that the Chinese would jeopardise their jobs, Farrar said:

> It is true that the wages of skilled men have been high, and to my opinion they will always remain high, because the skilled labour we require ranks with the best quality in the world.[7]

This chapter examines the wages of professional miners and compares them to those of skilled artisans. It shows that the miner, as opposed to the artisan, did not have the security of a fixed minimum wage. Instead, management's increasing tendency to

employ miners under the flat contract system obliged them to gamble for their livelihoods. By 1910 management had so thoroughly entrenched the contract system that most supervisors were compelled to exchange a secured day's pay for a contract, which provided them with no guaranteed income. As important, the contract system, which was one of management's measures to increase the productivity of miners, motivated miners to risk their health in the hope of earning higher than average wages and even average wages. As we will show later, the practices of miner contractors, which management encouraged, both created and exposed miners, especially rock drillers, to prolonged and excessive dust densities. The heightened dust levels under which most miner contractors worked caused them to be exceedingly vulnerable to accelerated silicosis.

The high cost of living on the Witwatersrand was an important reason that single males constituted an overwhelming proportion of the gold mines' white workforce. Management's housing policy, too, helped perpetuate the predominance of single males, a trend which was stronger amongst miners than amongst artisans.[8] The exploration of these issues is crucial to the study. Such analysis explains why during the early part of the 20th century Transvaal epidemiological data for silicosis seriously underestimated the gravity of the disease. In 1907 at least one-third of the Witwatersrand miners who had

been disabled by silicosis, did not die on the Reef.[9] Instead, after they had been severely incapacitated by the dust-induced disease, those migrant miners, who could afford to do so, returned to their overseas homes to die.

In focusing on the workmen's perception of Kruger's government as being benevolently disposed towards them, the chapter also demonstrates that during the 1890s most miners, as opposed to artisans, did not regard unionisation as being important. Despite the workmen's suspicions that the mineowners intended to reduce their wages, the miners believed they had less need for union welfare benefits and wage protection than did the artisans.

Finally, the chapter shows that during the era of the South African Republic most miners were apparently satisfied with most of their terms of employment on the Witwatersrand; their criticisms focused on relatively minor issues.[10] They did not fully appreciate their morbidity due to the appalling underground working conditions, which were worse on the Witwatersrand than at most other mining centres in the world. Nor did they realise that the excessive dust levels in the Reef mines made them more vulnerable to contracting silicosis, particularly accelerated silicosis, than elsewhere.[11]

On average miners on the Witwatersrand did, indeed, earn higher cash wages than miners anywhere

else in the world. But it is a myth that miners were, *on average*, the highest paid workmen on the gold fields.[12] Most skilled artisans earned £1 per day, or £26 per month.[13] But miners earned less. Management did not regard the skills of an average professional miner as being comparable to those of a skilled artisan. Instead, it viewed the skills of a miner as being equivalent to those of a skilled *labourer*.[14]

Throughout the *period from* 1892 to 1914 professional miners, as opposed to skilled artisans, did not on average earn £1 per day.[15] In both development and production the daily rates of hand-drill supervisors ranged from a minimum of 12s to a maximum of £1; and the average rate was 17s. per shift or £22 per month.[16] Miners therefore earned a semi-skilled wage, which was approximately two-thirds of the £1 skilled wage. Specialist pitmen, who were on the fringe of skilled work, earned 2s to 2s 6d more a shift. But their average wages were also less than £1 per day.[17] In contrast, initially management considered rock drillers as being skilled workmen and paid them £1 a day to run a single machine.[18]

The introduction of rock drill supervision raised the average earnings of miners, because supervisors of two machines received 25s per shift.[19] Even so, the average wage of miners, including those who worked under contract, continued to be less than £1 per day.[20] But the skilled wages of the rock drillers, particularly supervisors, and the boosted earnings of

a few miner-contractors, created the illusion that all the Witwatersrand miners earned skilled or higher-than-skilled wages.[21] In 1904 Wernher, Beit and Company sent a consulting mining engineer, E. Ross Browne, to the Witwatersrand to investigate the working costs of the company and to recommend measures for their reduction. After twenty months of research Browne concluded that the average wage of the miners was 10,86s per shift.[22]

After the Anglo-Boer War, the newly established Transvaal Miner's Association unsuccessfully tried, from 1902 to 1913, to negotiate a fixed minimum of £1 per day for miners who possessed a blasting certificate.[23] But it was only in the wake of the 1913 general strike and as a result of the Economic Commission's recommendations in 1914, that the industry in 1915 eventually agreed to guarantee a minimum wage to contract miners, most of whom were rock-drill supervisors.[24]

The industry was undoubtedly reluctant to take this step;[25] it bowed to pressure from the state and the Miners' Phthisis Prevention Committee which showed that miner-contractors, who had no guaranteed wage, were prone to break mining regulations - a practice, which many mine managers overlooked or actively encouraged.[26] Most miner-contractors were obliged to do so, as will be shown, in order to earn a bare minimum wage. But in "speeding up", miners under contract aggravated their risk of contracting

accelerated silicosis.[27] In agreeing to a minimum wage for miners under contract the mineowners clearly showed that they did not consider a miner's skills to be equivalent to those of a skilled artisan. They fixed the guaranteed minimum at 15s per day, so conceding the miners merely a nominal victory, as this was a wage that decidely did not exceed the market rate.[28]

During the 1890s the Witwatersrand miners did not seem to be perturbed by their lack of economic parity with the artisans. They were apparently content with the average rates and, if they wished to earn skilled wages, they became rock drillers. Also, they enjoyed a relative wage security: throughout the period 1892 to 1899 management, on the whole, informally observed the wide-ranging customary rates.[29] Although the mineowners privately complained about the high wages of miners - and of artisans - they made no united and concerted effort to reduce wages, as they had done in the case of black mineworkers. Before the Anglo-Boer War, therefore, the miners saw little need to organise and to press for a skilled daily minimum r .te.

White mineworkers on the Witwatersrand were, indeed, highly paid, particularly by European standards. The mineowners boasted that their wages for white mineworkers were approximately five times higher than those paid in the United Kingdom.[30] But they studiously avoided mentioning that employers at other newly established mining c .s in Australia and

the United States had similar high wage structures.[31] The Randlords' propaganda was successful. It gave the public the wrong impression that British and other overseas workmen on the Witwatersrand gold mines were overpaid. This was one of the reasons that the 1912 and 1914 Miners' Phthisis Acts awarded silicotic miners a mere £8 per month as compensation. The award was for one to two years, or for four years, depending on the miner's stage of disability.[32] Although the monthly award included a small but inadequate allowance for the high cost of living on the Witwatersrand, the Union members of parliament unjustly fixed it at a level equivalent to the average monthly wage of a miner in the United Kingdom.[33]

Employers at all overseas mining camps were obliged to offer wages which were higher than those paid in Britain and Europe. The prospect of high earnings was the major incentive for miners and artisans to uproot themselves from their homelands and to undergo the traumatic experience of emigrating. At far-flung mining camps most mineworkers, who were severed from their families, undoubtedly longed for home, as did John Cockerill who left Hastings for Johannesburg:

> I am a long way from you all, but home is home still. South Africa is so different from Old England. Here we have no bright green fields with pretty hedges and stately old trees. One misses the sight of the fine old homesteads and pretty country villages. Here the trees are waxy looking, houses new, people smart, everything go ahead sort of way. Africa is a place to get on in and to make money, but Old England for home.[34]

To a limited extent, therefore, the wages of emigrant workmen took such nostalgic sentiments into account. Workmen were not prepared to break off entirely all physical links with their mother country and kin; and their wages permitted them to return home for visits every few years.[35] The Randlords made themselves acquainted with all the inducements that prompted British and European mineworkers to emigrate. Also, they knew that they could fill the enormous number of jobs created by the size and expansion of the industry only by offering money wages which were more attractive than those that prevailed at other overseas mining centres.[36] Wittingly they decided to raise the workmen's wage rates to higher levels than those prevalent in Australia and the United States.

In America and Australia money wages varied enormously from one mining camp to another; wages depended on the remoteness of the camp, its degree of stability and future settlement prospects. It is, therefore, difficult to compare exactly the wages of mineworkers on these continents with those on the Witwatersrand.[37] In 1897 Hennen Jennings, consulting engineer for the largest mining group, the Corner House, could estimate the differences only in general terms:

> Some of the white labour [on the Witwatersrand] is the best that money can command, and is culled from all over the world. It is very highly paid when compared to labour in old-established countries where climatic and general conditions are favourable, but when compared to new fields,

to which men only go for high wages, it is not excessive.[38]

"First class" miners in the United States commanded equivalent wages to those paid on the Witwatersrand.[39] But the average miner on the Reef received approximately 30 per cent more than miners at new camps in remote parts of Australia and the United States, and 50 per cent more than miners in the settled communities of Victoria in Australia.[40] The mineowners stressed their own "altruism" in providing high wages.[41] But clearly market forces obliged them to do so: they were compelled to make the Witwatersrand competitive with other overseas mining camps. Also, even after the Witwatersrand had become a settled mining community, the high cost of living persisted, so that the mineowners found it necessary to continue paying high wages to overseas workmen, who up to 1914 far outnumbered South African white workmen.[42]

As at all the new overseas mining camps, initially single miners predominated on the Witwatersrand. A few migrant miners deliberately opted for a single roving life - a characteristic not exclusive to the Cornish.[43] Most miners, however, expressed a preference for marriage and a settled existen .[44] But until they were confident that new gold finds had continuity, so offering them prospects for future permanent settlement,[45] migrant bachelors were not prepared to commit themselves to marriage and married men could not ask their wives to join them on the Witwatersrand. After 1892 the Witwatersrand gold

deposits satisfied the criteria of continuity and permanence. But the high cost of living on the Reef, as opposed to the "vastly cheaper" costs in the western states of the USA and Australia,[46] debarred a settled community of married miners. High money wages did not compensate married men for the high cost of living. According to management, bachelors could "live well", but married men, who had their families with them, subsisted.[47] Consequently long after the gold mining industry had been firmly established, bachelors and single married miners continued to predominate on the Witwatersrand.

In 1897, 54 per cent of mineworkers were bachelors; and of the 46 per cent who were married only 12,9 per cent had their families with them in Johannesburg and its environs:[48] nearly half the workmen were married men but approximately two-thirds of them lived as grass-widowers. They were not able to enjoy the same living standards as bachelors. Like married men who had their families with them on the Witwatersrand, single married men had difficulty in making "both ends meet": they had to send home money to support their families.[49] In 1897 Percy FitzPatrick, a Corner House director, explained:

> According to one estimate I find that all details being given, the cost of living for a white married miner amounts to £18. 17s. 6d. per month. That makes no allowance for life insurance, education of children, smoking, drink, amusements, native servant, newspapers, books, or cost of coming to this country. That is for a man with a wife and two children coming from England. Food and clothing, you will see,

> come to nearly double, and house-rent to five times what they pay in Europe. In face of these conditions, most married men leave their wives and families in England and on the Continent: and, although they may appear to be saving money, this is not the case, as they have to continuously remit money to their wives. Another estimate brings out the cost to £20.[50]

Irrespective of whether they lived on their own or with their families, most mineworkers' highest item of costs was undoubtedly housing. In most mining centres in Australia and in the United States land, in close proximity to the mines, was plentiful and cheap: mineworkers could afford to own their homes, however modest, with relative ease.[51] But this was not so on the Witwatersrand. The Randlords had the property rights to all the proclaimed land in the vicinity of the mines: affordable land for mineworkers was inaccessible to the mines.[52] Also, in the settled mining communities of Europe, America and Australia rents were relatively low.[53] But this, too, was not the position on the Reef: house rentals were exorbitant and lodgings expensive in comparison. Mineworkers, and miners in particular, found the high cost of accommodation a major deterrent to permanent residence.

The mineowners went to great lengths to show that they actively took steps to help workmen combat the high cost of housing; and they widely advertised their provision, "since the inception of the industry", of "the necessary housing accommodation" on the mines for all workmen.[54] The claim was apparently true. On each property the industrialists built large dormitories

with sufficient rooms for the mine's white workforce. The dormitories were known as the "single quarters"; and two men, at a nominal cost of 5s or 10s each per month, shared a room.[55] But the rooms were suitable only for single males.

The mineowners also provided small houses for married workmen. Unlike the commodious and attractive houses at the living museum at Gold Reef City, Johannesburg, from 1892 to 1914 most of the mine cottages were tiny - they consisted of only two rooms - and were often "crude" structures.[56] But the low rents of approximately £3 10s per month offset their other major disadvantages. Even so, the industrialists refused to go to the expense of building enough houses to meet the demand.[57] For instance, the Crown Deep, a Corner House mine, which started producing in 1910, had thirty semi-detached cottages for its 634 workmen and six detatched cottages for its shift bosses.[58]

All married mineworkers were prejudiced by the limited number of mine cottages. But miners were at more of a disadvantage than artisans: "not one miner in a hundred" was given the opportunity of renting such a home.[59] The cottages were at a premium and mine managers let them to skilled mechanics in preference to miners. Even after the Corner House in 1903 adopted the policy of building additional houses for its married workmen, the company continued to follow its old practice of allowing only a handful of miners

to rent them.[60] Percy Cazalet, mine manager of the Nourse, elaborated in 1906:

> Owing to the relatively small number of cottages on the Mine, it is necessary to give practically all those available for workmen to these Artisans (Fitters, Carpenter, Smiths, Riggers, etc.) since they may be called out at any time during the night, or at weekends in case of accident, and it is important to have them available at short notice.[61]

To accommodate their families married miners were obliged to rent modest houses in Johannesburg or in the towns on the East and West Rand. As the towns were situated at some distance from the mines, the workmen had the inconvenience of commuting daily to their work. More important, the average rentals, which ranged from £6 to £10 per month, were exceedingly high: they comprised one-third to one-half of the married miner's monthly budget.[62] In contrast, the rents for similar dwellings in Britain were £10 to £15 per year and comprised one-sixth to one-tenth of the married miner's annual income.[63] Clearly a married miner was better off if he left his family behind in Britain and worked temporarily on the Reef as a grass-widower and as a migrant workman.

For bachelors and single married miners rent was also usually the highest item of costs. Despite the availability of low-cost housing on the mines, few miners, for good reason, took advantage of the mineowners' offer, except when absolutely necessary. There are "a lot more rooms than are occupied", said an Australian miner, Samuel Crowle;[64] and a

contemporary miner's description of the single quarters explains the reason for Crowle's contention:

> My heart sank at the first sight of the building I was to occupy. Needless to say it was built of wood and iron, and had a dirty and shoddy appearance, sadly wanting in a coat of paint. It was like a big oblong box, about eighty yards long, divided in two down the middle, and each division was partitioned off into twenty rooms. A small verandah ran along each front, supported by wooden posts which were connected by a hand rail four feet from the ground. The whole building had been dumped upon the bare red earth without a single tree or shrub to give any idea of privacy. There was nothing to hide the hideous nakedness of that box-like building! Along the hand-rail a few cotton shirts were hung out to dry, and at the far end, close to a standpipe, a miner was washing himself in a bucket of water. I walked along this depressing row of rooms to find the one that had been allotted to me, which, I was told, it would be necessary to share with someone else. It was a small, badly-ventilated room, and in it there were two beds covered with grimy blankets. In one corner an empty whisky-case, standing on end, supported a jug and basin; a few dirty clothes hung on nails driven into the walls, and a few more were scattered on the floor.[65]

Such tiny "wretched" rooms[66]- they did not have stoves and any equipment for heating[67] - provided the miners with little comfort after their arduous day or night shifts.[68] Also, miners detested the single quarters because of their lack of hygiene: the rooms were infested with insects and vermin;[69] and they had no ventilation.[70] Consequently the workmen intuitively and correctly believed that the single quarters were as deadly a source of lung infection, notably tuberculosis, as were the underground workings.[71]

For nearly twenty years the state and the medical profession neglected the dormitories. In 1902 Horace Weldon, the Government Mining Engineer, stated that their insanitary features aggravated lung diseases in miners. But the Department of Mines waited until 1910 before officially investigating the conditions.[72] In 1910 the Mining Regulation Commission's adverse disclosures on the prevalence of tuberculosis amongst black and white mineworkers and its recommendations for improving the single quarters prompted the Mines Department's eventual response.[73] For miners, already stricken with silicosis, the "complication" of tuberculosis was invariably fatal. Astounded by the deplorable findings of its own departmental investigation, mining inspectors severely censured the workmen's single quarters:

> Now what occurs on every mine is ... men in varying stages of this highly contagious disease [tuberculosis] are accommodated in the same room with healthy young men. What is the inevitable result! The pthisical [sic] man by his habit of spitting about the floor conveys his disease to his fellow room mate. The latter continues to work underground. The disease rapidly develops under underground conditions and he goes to join the great majority. This state of affairs savours more of the ignorance of the middle ages than of the scientific enlightenment of the 20th. Century. What would the great medical authorities of the world say to a state of affairs which permits a man in the last stages of tuberculosis to be confined in a stuffy room with another man hitherto immune from the disease?[74]

In 1910 the Department of Mines, under the energetic leadership of Robert Nelson Kotze, who was

appointed Government Mining Engineer in January 1908, took medical advice and enacted regulations to remedy the situation.[75] To date mine doctors had been conspicuously silent on the subject of the single quarters. According to officials of the Mines Department, the mine doctors were as indifferent to the white workmen's housing on the mines as they were to the compound conditions of the blacks.[76] When the Department of Mines confronted mine doctors with the evidence of their neglect, the medical profession could no longer shirk public discussion of the workmen's poor-quality housing:[77] they were obliged to place medical priorities above their own interests and their allegiance to the industry.[78]

In December 1911 new mining regulations laid down stringent conditions for the building of single quarters, which included a ban on back-to-back rooms.[79] Also, the laws allowed the mineowners two years to effect modifications to existing buildings. Workmen were satisfied with the new single quarters,[80] which consisted of four-room blocks with bathrooms and heating facilities.[81] But they continued to avoid the existing ones.[82] Apart from providing the new requirement of through-ventilation,[83] most of the mineowners refused to spend any more money on the old buildings: in many respects they continued to be deficient in "public health and comfort".[84]

The miners also disliked the mineowners' policy of housing their own workmen, because, like the

compounds in which African mineworkers were accommodated, management used its housing as a form of social control.[85] The workmen alleged that if a miner had any dispute or political disagreement with management, the mine manager exercised his right to give the miner twenty-four hours' notice: he dismissed the miner from his job and evicted him from the property. Although summary eviction was contrary to common law, workmen could not legally contest it: management refused to hire white mineworkers, unless they first signed a written contract agreeing to the notice provision.[86] Apart from the poor quality accommodation, the unreasonable notice provision was an important reason for miners shunning the subsidised housing.[87]

According to a miner, Eldwin Moore, the "only reason" that workmen lived in the single quarters was

> because some of these mines are far away from any town, where they could get a room. Where the men can get rooms in a town they never think of living on the mine.[88]

The rooms in the towns, to which Moore referred, were those in private boarding houses. The accommodation, including board, cost workmen on average £5 to £8 per month.[89] These were also the costs for board and lodging on the "mine" boarding houses, which some of the mineowners built on their own properties.[90] Clearly, even for bachelors and single married miners, board and lodging was a major item of cost.

Most bachelors and grass-widowers, therefore, did not seriously contemplate settling on the Witwatersrand. Also contrary to the mineowners' disingenuous assertion, the unsettled political conditions in the South African Republic during the 1890s minimally influenced their decision not to settle permanently.[91] Rather, white mineworkers chose to be migrants because of the high cost of living and "rents". This was the unanimous response of single married workmen on thirty-one mines to an open-ended survey conducted by the Association of Mine Managers in 1901.[92]

Nor did the material position of mineworkers alter significantly from 1902 to 1907, during the British administration of the Transvaal,[93] and after Union until World War 1.[94] At a dinner given by the Cornish Association of the Transvaal in 1907 the High Commissioner, Lord Selborne, himself a Cornishman, chided the miners for leaving their "wives and children at home". Even so, he also candidly acknowledged that married miners, who had their families living with them on the Witwatersrand, endured economic hardships; and these remarks were repeated in a Cornish newspaper:

> The cost of living in South Africa, more especially on the Rand, is very much higher than in this country, so much higher that it is infinitely cheaper to keep open a "grass widower's" home in the Transvaal and another for wife and children in Cornwall, than it would be to provide one for all the family in South Africa. That this economic difficulty is a serious one, and does and

> will tend to make South Africa "a land of grass-widowers", so far as Britishers are concerned, are facts that admit of no doubt.[95]

In many ways, as we note again, the migrancy of the overseas white mineworkers was markedly similar to that of African mineworkers. Also, when white miners contracted fatal silicosis most of their graves, like those of African mineworkers, were not on the Witwatersrand: white miners' graveyards were in the "Kraals of the North" at "home" in Britain.[96]

Single miners on the Witwatersrand, whether bachelors or grass-widowers, were clearly economically better off than married men who had their families with them. This was not so in Australia and in North America. Despite their lower cash earnings, the real wages of American and Australian married miners enabled them to live together with their families at slightly higher than subsistence.[97] An improved material lifestyle - it was a temporary possiblity only for bachelors - was not, therefore, one of the Witwatersrand's attraction for mineworkers. Instead, high cash wages gave single migrant males an important option: if they lived frugally, it was possible for them to make small savings, so enabling them to live in relative comfort with their families at home or abroad afterwards.[98] In 1907 Samuel Crowle, an Australian miner, illustrated their use of the option:

> I know that several Australians came here [to the Rand] and brought their families and found they could not keep them here, so they sent them on to the old country, intending to make a few pounds and then get them to come back, joining them at Cape Town on the way to Australia.[99]

For the single miner, more so than for the single artisan, the accumulation of capital seemed a realistic aspiration. Unlike the artisans who worked solely on day's pay, by 1907 most miners, excluding specialist pitmen, worked under contract. Although contract work was undoubtedly a gamble, the earnings of consistently successful miner-contractors averaged £40 per month with one rock drill and £60 with two.[100] Such high earnings, which permitted relatively large savings, were the lot of only a fortunate few. But the success of the minority became the yardstick against which all miner-contractors measured their prospects.

Initially the miners' participation in contracts was voluntary. But, as contracts became increasingly popular, management gradually tended to make them compulsory. By 1906 most mine managers allowed only a few miners to work on day's pay;[101] management considered the contractor to be the "miner proper".[102] By initially submitting to the temptation of contract work, in the long term miners on the Witwatersrand traded the security of a fixed income for the illusion of inordinately high earnings, which must be seen against the yardstick of those earned by the successful few. Of equal importance, the contract system obliged, miners to "speed up", so aggravating their risk of contracting accelerated silicosis.

Between 1892 and 1894 the Randlords found that their "mining costs were going up".[103] Despite rapid

development and increased production, the pace of production did not match the demands of the mills and the ambitions of the industrialists. The mineowners attributed its deficient speed to the low productivity, or "inefficiency", of the miners, particularly the supervisors, who worked on day's pay. The mineowners contended that the miners were taking advantage of them by deliberately restricting their efforts and so curtailing output.[104] Partisans of the industrialists also blamed the miners for the industry's inadequate production, as an editorial in a prominent South African mining journal indicated in 1895:

> With the present preference of managers for day work the best results are not obtained from the men under them; the remuneration is not made to depend upon the efforts of the labourer [the miner], and the inevitable result has followed in his deterioration. And so it must continue so long as his wages remain constant and fixed, and he is able to live without manual labour, or without exercising his mental faculties. Equally whether he works or shifts the work on to the ignorant men under him, he is paid, and in no way is the wage received a measure of the exertion put forward to obtain it. The general truth holds good on the Rand as elsewhere, that if men are not compelled to work by the pressure of necessity, nothing will be done, and consequently the present system of day work in a mine for white men with natives under their control is radically defective, for it is impossible to exercise effective supervision or prevent the delegation of duties to the boys.[105]

At the beginning of 1894 management began the practice of offering miners either bonuses or contracts as incentives to increase their productivity.[106] Miners preferred a bonus to a

contract:[107] irrespective of their output, the bonus system guaranteed them a day's pay at the average informal rates. Even so, contracts were also popular. Between 1894 and 1899 the number of voluntary miner-contractors, particularly rock drillers, rose from approximately 28 per cent to approximately 55 per cent.[108]

The mineowners soon calculated that bonuses were less economical than contracts. They began gradually to discontinue them, and by 1897 they paid them only to shaft sinkers.[109] After the Anglo-Boer War contracts for rock drillers - and also for hand-drill supervisors - became virtually compulsory: in 1907 few miners worked on day's pay;[110] and in 1913 Robert Shanks, the Inspector of White Labour, claimed that "all" miners were "working on piece-work".[111]

Like contracts, bonuses encouraged miners to "speed up". Management noted with pride that: "Rates of monthly sinking have been achieved on the Rand which have no parallel in any mining country."[112] It correctly attributed the records to the handsome bonuses paid to shaft-sinking teams.[113] For instance, in 1897 twelve miners responsible for sinking the Catlin Shaft on the Simmer and Jack received, for March, a bonus of £483; and the average wage was £66. The miners, however, did not share the bonus equally: its distribution was weighted according to each miner's degree of skill. Consequently the man in "charge of the bottom" received more than £100. This

was not an extraordinary case: in other record months expert shaft sinkers earned as much as £150.[114] The wages of specialist shaftmen were, however, exceptional. As has been noted, the wages of development and production contractors, who performed consistently well, ranged from £40 to £60 per month.[115]

Under the contract system the mine manager gave the miner a one-month verbal contract in which the manager stipulated the price per fathom or per foot. At the end of the month both parties negotiated the contract's renewal; but at any stage either party could terminate the contract with twenty-four hours' notice. During the 1890s contract prices varied from mine to mine; generally rock-drill operators received higher prices than hand-drill supervisors.[116] During this period, too, contract rates were good on the whole. From 1896 to 1899 on the Edendale, for instance, the prices for stope contractors ranged from 52s 6d per fathom to 65s.[117] On the Crown Reef the prices were higher: both hand and machine stope-contractors received 80s per square fathom.[118]

Although most miners preferred a contract to a day's pay,[119] the contract was undoubtedly a risky proposition. Unlike the bonus system, which gave the miner the security of his day's pay, the flat contracts, which operated on the Witwatersrand, guaranteed the contractor "nothing".[120] Management provided the contractor with all his equipment and

labour, but charged him for many of the items: the Africans' wages, the sharpening of drills, the explosives, the lights and the machine lubricants. Hand and rock drills were free of charge, as were their maintenance and running costs.[121] The contractor's nett monthly earnings, therefore, equalled the price of his total fathomage less his debit for company charges. Often a contractor earned less than on day's pay; sometimes he was even in debt to the company.[122]

Ostensibly a contract gave a hard-working miner the opportunity to earn more than he did on day's pay. But, in practice, the contract was more often than not a gamble for the miner. The miner was not allowed to negotiate the price of his contract: management fixed it unilaterally and invariably only verbally.[123] A "fair" price was one in which the mine manager assessed the degree of mining difficulty. As most prices were fixed according to so-called average conditions, a financially rewarding contract often depended on the miner's good luck in finding an easy "pitch".[124] Also, many of the contractor's facilities were not under his direct control. He had no choice in the selection of his African complement and chance determined its general level of experience.[125] Likewise, the procedures for the supply, running and maintenance of his equipment were tied to the personality and administrative competence of the mine manager.[126] Although the contract system may have

provided the early-day miners with "scope for individual enterprise", as mining-house enthusiasts contend,[127] most of the odds were stacked against the miner-contractor.

As important, the contract system, which motivated miners to increase their productivity, also encouraged them to adopt mining practices which were detrimental to both their health and safety. In fact, the successful outcome of a contract frequently hinged on the miner's use of dangerous methods, which we will discuss in detail later.[128] Initially both miners and management were heedless of the increased health risks inherent in such practices. Even so, it must be stressed that by "speeding up" the miners both created more dust and for longer continuous periods they laid themselves open to exposure to the deadly dust particles. The contract system therefore undoubtedly helped promote conditions which facilitated the occurrence in miners of accelerated silicosis.

The miners' acceptance of contract work helped to widen the rift between themselves and the artisans.[129] The craftsmen on the Witwatersrand criticised the miners for being

> the worst organised body...other trades fight for - if they do not always obtain - a standard day's pay and maximum hours. The miner wants a big cheque and DAMN THE CONSEQUENCES.[130]

Indeed, the craft unions, which world-wide rejected piece work, correctly regarded the miners' contracts

as a variant of piece payment.

Artisans rejected piecework for a number of reasons. First, like the flat contract system, piece payments did not guarantee workmen a minimum wage. Instead, their wages corresponded with the completed piece jobs. Young and hard-working individuals could often earn more on piecework than on day's pay. But older persons, who had physical difficulty in sustaining the required pace, earned less than on day's pay: often they were forced out of work. Also, "sweating", "speeding up" and overwork usually resulted. Significantly, too, once management of an enterprise had succeeded in entrenching piece payments, it invariably lowered the original piece prices so instituting all-round wage reductions.[131]

Contracts for miners were not unique to the Witwatersrand: world-wide they were popular with miners.[132] But in Australia, for instance, contractors generally had more security than contractors on the Witwatersrand: miners in Australia were allowed to negotiate the price of their contracts; the contracts were for long periods - often a year - so giving miner-contractors a fair opportunity at least to break even;[133] and, as the contracts were in writing, they constituted a legal and binding agreement.[134] Even so, miners on the Witwatersrand initially trusted management. They ignored the artisans' warnings concerning the adverse long-term implications of piece payments.

Before the Anglo-Boer War the miners' faith in the contract system appeared to be warranted: management did not - or could not - abuse the contracts; and the early-day miners, unlike their post-war successors, had few complaints about the implementation of contracts. Thomas Matthews, organising secretary of the Transvaal Miners' Association, confirmed such sentiments in evidence to the Mining Industry Commission of 1907:

> In the days before the war, if we ever wished to have a stope re-measured we had no opposition from the government, because we only had to go and see Dr. Krause [the Transvaal Senior Prosecutor], and the agencies then at work would be favourable to us, and the manager would not go out of his way to damn and snub us, as they did after the war.[135]

In their eagerness to promote rapid production and development, during the 1890s most mine managers generally honoured their undertakings to the contractors in order to retain their good workmen.[136] But after the Anglo-Boer War miners alleged that many mine managers were unfair to them. For instance, in negotiating the renewal of monthly contracts many mine managers conceded that they cut the prices if miners had been, in their view, too successful, a practice which mining-house supporters endorsed.[137] Such managerial actions confirmed the warnings of the artisans that miners, through their acceptance of piecework, would ultimately suffer the consequences of all-round wage reductions. Also, the contract system stifled the miners' freedom to bargain for standard

wages and conditions of work. As we have noted, the Transvaal Miners' Association, as opposed to many of the craft unions, was unable to establish a minimum wage for miners.

During the 1890s the mineowners made little effort to limit the earnings of contractors. With pride they published figures to show records in shaft-sinking speeds, the hundreds of miles driven underground and the thousands of tons of ore hoisted.[138] Through such achievements they justified the high money wages of miners to the shareholders and to the public. In evidence to the Industrial Commission of 1897, the American civil engineer of Consolidated Goldfields, W. S. Hall, argued persuasively in favour of incentive payments for miners:

> And now we have seen that the bonus system [contracts and bonuses] operates greatly to the share-holders' benefit, what are the objections [then] to it? That it enables common miners to make very much higher wages than miners usually do or should; and that it has [enabled] and may again enable a common miner to draw from a company as much money in a month as high-grade professional men can earn in like time. This is alleged to be extravagant waste of company money. In the face of the facts and deductions which have been shown to you, this ground of objection is untenable.
>
> The primary conclusion from the facts must be that the company saves money, and the shareholders make money under the operation of the bonus system.[139]

Hall further submitted that the miner-contractors had special attributes; he praised their "industry, extra intelligence or special skill".[140] After 1905,

once the industry had regained its pre-war impetus, the rhetoric of the mineowners changed significantly. In a determined drive to reduce their working costs, the mineowners publicly denounced the self-same miners, namely those who had up to now escaped death from silicosis, as inefficient and unworthy of high wages. The Randlords' propaganda was successful. The public agreed with the mineowners - and so, too, have a number of subsequent historians.[141]

The "sudden concern" in 1905 of the *South African Mines, Commerce and Industries*, with "efficiency" puzzles Belinda Bozzoli.[142] There is, however, a logical reason for the journal's switch in rhetoric, or "ideology". The arrival of the indentured Chinese and the simultaneous return to the mines of African workers in large numbers,[143] provided the mineowners in 1905, for the first time since 1899, with a full complement of "cheap", "unskilled" non-white labour.[144] The time was, therefore, propitious for the mineowners to reduce working costs: they wanted both to reduce miners' wages and to introduce measures which compelled miners to increase their productivity.[145] As we shall see later, at the beginning of 1906 the reduction of miners' wages was not a feasible proposition, because of the prospect of elections for Transvaal responsible government: the mineowners did not want to alienate potential electoral support for their parliamentary representatives, many of whom were members of the

Progressive Party.[146] Therefore in 1906 they concentrated their efforts on increasing the productivity of miners.

Also, in April 1906 Ross E. Browne, the consulting mining engineer, whom Wernher, Beit and Company had sent to Johannesburg to investigate methods for reducing the working costs of the mines, submitted his report to the Corner House directors.[147] Although they were not, as yet, ready to release it "for public discussion",[148] Browne had concluded that the productivity of miners was not commensurate with their "high" wages.[149] The journalists, or the "organic intellectuals", as Bozzoli terms them, were, therefore, clearly not an "ideological vanguard" for the mineowners.[150] Nor were they, as Bozzoli contends, "far ahead of the thinking of the owners of the industry".[151] Instead, the mineowners, as their private correspondence shows, had decided to "increase the efficiency" of miners a few months before the journal, in March 1906, started to publicise their intention.[152] Clearly the function of the journal, as one of the cogs in the Chamber's public relations machine, was to rationalise the mineowners' intention, so making it acceptable to the public.

In 1912 representatives of the Transvaal Miners' Association claimed to the Select Committee on Miners' Phthisis that the average earnings of miners as reported in the "blue books", as they called the Annual Reports of the Mines Department, were

incorrect. The unionists argued that miners did not on average earn £27 10s per month, as the official figure indicated.[153] The official figure of 21s per shift was approximately 2s higher than miners' average earnings in 1899 and those in 1905, which Browne had calculated.[154] Although most of the Select Committee dismissed the miners' contention, the miners were, in fact, correct. The Mines Department was not at fault because it based its calculations on returns provided by the mining houses. But the industrialists' figures were misleading: the figures submitted for wages paid did not take into account the debit balances of miner-contractors and in this way inflated the average earnings of miners.[155] As the earlier, more accurate figures indicated, miners' average wages in 1912 were probably still less than £1 per day.

In 1913, in preparing evidence for the Economic Commission, the Chamber of Mines was obliged, for the first time, to draw up a statement which identified the individual earnings of all miner-contractors in the industry. The balance sheets provided by the companies were for only one month, April 1913: they, therefore, indicated only the short-term earnings of contractors.[156] The mineowners' propaganda had always led the public to believe that skilled contractors on average earned wages of £60 to £80 per month,[157] which were double and even treble the average earnings of other mineworkers. But the Chamber's research committee discovered that the generalisation applied

to only 7 per cent of contractors.[158] The committee also found that 17 per cent of contractors earned less than 15s. per day.[159] At first the Chamber of Mines refused to "face the position": the mineowners contemplated "taking away the numbers they first thought of and trying to shape the facts to suit their desires". But later, as a member of the committee, Richard Barry, confided to his uncle, John X. Merriman, they accepted the consequences of disclosure.[160]

The statistics compiled by the research committee of the Chamber of Mines confirmed the contention of the Transvaal Miners' Association that the contract system, as management implemented it on the Witwatersrand, was inequitable. In vain, from its inception until 1913, the union had tried to convince members of numerous enquiries and commissions that many experienced and proficient miners could not earn a living wage under the mineowners' type of contract.[161] Indebtedness, as they tried to show, was not confined solely to the poorly-trained and "scratch" local miners,[162] or to the "incompetent" overseas miners.[163] The Chamber's 1913 figures for the wages of contractors are probably equivalent to those earned by contractors during the 1890s:[164] management raised its contract prices after the Anglo-Boer War but reduced them to approximate pre-war levels after the miners' unsuccessful strike in 1907.[165]

Both before and after the Anglo-Boer War approximately 26 per cent of contractors appear to have prospered: their wages ranged from 40s to "60s and over" per shift.[166] But excellent financial rewards were not the lot of contractors in general.[167] Twenty-four per cent of contractors earned less than £1 per day: of these 11 per cent earned "nil"[168] - they were in debt to their companies. The remaining 50 per cent earned contract payments which were on average equivalent to day's pay;[169] one-third of the contracts were worth 5s to 10s more than on day's pay; and another third were worth 5s less.

Most miners derived minimal additional financial recompense from their contracts, as Thomas Leggett, consulting engineer of S. Neumann and Company, confirmed in 1897 in evidence to the Industrial Commission: "Contract work does not greatly exceed that average pay, in my experience."[170] Also, the flat contract system put additional emotional and physical pressures on miners who under normal circumstances had a difficult and dangerous job. During their working time, on which the success or failure of their contracts hinged, miners had to contend with the industry's general low level of underground time-management: inefficient repair services delayed them, as did haphazard methods for providing drills and sharpening them.[171] Contractors were, therefore, daily obliged to work additional hours over and above their ten-hour shift;[172] many contractors also worked

on Sundays, which was illegal.[173] As impartial contemporaries observed, contractors had to work under "unusually hard and exacting" conditions.[174]

We must here repeat an equally important feature of the contract system. Apart from the inequities of the flat contract system as management practised it on the Witwatersrand, most miners had no option but to risk their health and safety in order to earn a livelihood. In the poorly ventilated gold mines, as we shall later show,[175] the dust concentrations, which resulted from "speeding up", remained abnormally high and caused miners to be exceedingly vulnerable to accelerated silicosis.

Irregular and unsteady wages caused miners to feel insecure. Many were restless and often changed their jobs:[176] some miners moved several times a month in search of a financially rewarding contract.[177] If they could not meet a contract's capricious standard of productivity, they would give or receive twenty-four hours' notice and move on from "mine to mine".[178] The impermanence of contractors' jobs and, therefore, their place of residence was another important reason that overseas miners were reluctant to settle permanently in the Transvaal. In this respect the Witwatersrand differed from Ballarat and Bendigo in Australia, for instance, where conditions were far more stable both above and below ground.[179]

From 1897 to 1912 the number of settled married workmen on the Witwatersrand gold mines rose from 12,9 per cent to 42,32 per cent.[180] But during the period the percentage increase of permanent overseas married miners was minimal: most of the increase was taken up by artisans and South African born miners.[181] Also, there is little, if any, evidence to support the argument of some historians that the increase in South African born miners was the result of a deliberate policy by management to "displace" overseas miners with Afrikaners:[182] in 1912 the demand for skilled overseas miners, particularly from Britain, Australia and America, was still especially strong.[183]

By 1912 the numbers of overseas miners had fallen dramatically. After the unsuccessful 1907 miners' strike a number of professional miners decided to go home or to work elsewhere.[184] Also, only a handful of emigrant miners were now attracted to the Witwatersrand: the danger of accelerated silicosis was a major deterrent.[185] By 1912 the single most important reason for the marked reduction in the number of overseas miners was the mortality from silicosis. As we shall show later,[186] by 1912 most pioneer and immediate post-war rock drillers had died of accelerated silicosis, as had general miners who had started work on the Witwatersrand during the 1890s or shortly after 1901. Also, many migrant miners, who had been severely disabled by the disease, had returned to their countries of birth to await death at

home.[187]

During the period 1904 to 1912 the vacancies caused by the death and disablement of huge numbers of overseas professional miners created an ever growing market for local miners.[188] The training programmes designed by management and the government to create an elite core of Afrikaner miners to break the "virtual monopoly" of the overseas miners failed miserably.[189] Therefore it was not that the mineowners used the Afrikaner miners, who were poorly trained, to " isplace" the professional overseas miners. Rather, market forces obliged the industrialists to employ low-calibre local miners as substitutes for the dead and dying.

Most members of the public did not understand the vagaries of the contract system. The advertisements of the mineowners, the press and exaggerated rumours fanned the news of the "sensational" wages earned by the isolated few miners. These sources persuaded the public - and unbriefed overseas miners[190] - that most miners earned inflated wages.[191] Well-informed public figures, including John X. Merriman, a leading politician and Prime Minister of the Cape Colony from 1908 until Union, also entertained the misconception that miners, particularly contractors, earned "handsome cheques" which far exceeded £1 per day.[192]

In 1899, when the Anglo-Boer War started, a few contractors - bachelors - undoubtedly took home to the

North of England four-year savings ranging from £700 to £900. But Sir Thomas Oliver, the industrial health specialist at Newcastle-upon-Tyne, who published the figures, incorrectly reported them as being the average savings of rock drillers:[193] only a handful of contractors earned inordinately high wages. Indeed, most miners considered annual savings of £100 as exceptional and a "fortune".[194] Most contractors, who were not in the top 7 per cent of wage-earners, but who were consistently successful, were able to save, on average, approximately £40 per annum.[195]

The size of many miners' savings was inconsequential. In 1899, when pioneer miners, who had operated rock drills for five to seven years on the Witwatersrand, returned home to avoid involvement in the Anglo-Boer War, few could use their hard-earned capital.[196] Within a brief time of their home-coming, like their compatriots who remained in South Africa, most of the forerunners on machine drills died. In most cases the primary cause of death was accelerated silicosis;[197] "speeding up" under the contract system undoubtedly hastened their premature deaths.[198]

By "speeding up" contractors both created high dust concentrations and exposed themselves to excessive dust levels for longer than average hours. But they did so in complete ignorance of the increased dangers:[199] during the 1890s few, if any, miners were aware of or understood the implications of accelerated silicosis. They did not regard dust excesses as being

more dangerous than normal dust levels: they took dust for granted as an inherent mining danger. Similarly, the overseas miners overlooked the lack of underground sanitation on the Witwatersrand.[200] Poor hygienic conditions merely reinforced their negative perceptions of the workplace: they were unsavoury mining features to which the miners were inured.[201] Nor did the miners regard their high wages and contract prices as a form of risk pay to compensate them financially for their dangerous calling. Instead, like the mineowners, they viewed the prevalent rates of pay as a business proposition: under exceedingly unhealthy conditions miner-contractors worked harder to earn more money.

Apart from gold mining, there were few industries on the Witwatersrand: most were small service industries to the mines.[202] The influence of the gold mining industry was therefore overwhelming. As the largest employer of workmen, the gold mines set the pattern for the wage and service conditions of most other workmen on the Witwatersrand:[203] changes in the employment conditions of artisans on the mines directly affected those of craftsmen who worked in other industries.

This phenomenon helps explain the popularity of craft unions on the Witwatersrand. By cutting across workplace confines each craft union, like a brotherhood, drew together specialist workmen in a specific trade. As most of their fellow-workers

accepted prescribed union wages and service conditions, craft unionists could move with a certain security from one enterprise to another.[204] Also, in the absence of state welfare during the 19th century the craft unions operated as benefit societies. Relatively high subscriptions ensured for their members financial aid for illness, unemployment, litigation and other contingencies. Although workmen often stigmatised the craft unions as "sick and burial societies", the financial security which they provided appealed to the conservative artisans, particularly to married men who lived with their families on the Witwatersrand.[205]

Workmen believed that Kruger's partiality to them was sufficiently strong to deter the mineowners from reducing their wages and from altering their service conditions detrimentally. Even so, from the beginning of the industrialisation of the mines skilled artisans established craft unions in Johannesburg and its environs. A few of the unions - the engine drivers and firemen, the operative masons and the printers - were autonomous. But most craft unions, including the Amalgamated Society of Engineers, the Boilermakers' Society, the Iron Moulders' Society and the Amalgamated Society of Carpenters and Joiners, were branches of world-wide organisations, which had their headquarters in Britain.[206] From 1892 onwards the number of sectional organisations increased steadily; by 1897 there were unions and protection societies

related to virtually every trade in Johannesburg.[207]

Although large in number, the craft unions were small and weak.[208] For instance, in 1903 the Johannesburg branch of the powerful international Amalgamated Society of Engineers attracted less than one-fifth of the mineworkers eligible for membership.[209] As wages were relatively good, most bachelors and single married men perceived little need for unionisation. When the "state of trade was bad", the migrants did not endure hardship for long: they returned home or went to other British overseas possessions.[210] Also, the refusal of most Transvaal craft unions to admit formally trained, skilled African, Indian and coloured artisans further weakened them: industrialists, particularly under recession, employed non-unionised, non-white craftsmen at lower wages than whites.[211]

In contrast, industrial unions, which catered for all workers in a single enterprise irrespective of their skills, were unpopular on the Witwatersrand. Most artisans, who perceived themselves as being superior to semi-skilled and unskilled workmen, refused to join the general unions.[212] In this respect artisans on the Witwatersrand were not unique. Their class-based attitude, which radical workmen called "snobocracy",[213] was similar to, and derived from, their British and European counterparts.[214] Another reason for the unpopularity of industrial unions was their inability to provide welfare benefits: nominal

membership fees could not support them financially.[215] The weakness of the general unions also stemmed from their all-white policy: they refused to organise most of their potential supporters - the semi-skilled and unskilled African, Indian and coloured workers.[216]

Miners, who lacked a formal apprenticeship and definite skills, were ineligible for membership of the craft unions; and throughout the 1890s the miners were virtually unorganised. From 1892 to 1897 short-lived industrial unions catered sporadically for miners. The first general union, the Labour Union, existed from 1892 to 1895. The second general union, the Rand Mineworkers' Union, was founded in May 1897 in response to management's attempts on the Randfontein mines of J. B. Robinson to reduce the wages of its mineworkers.[217] Although the membership soon reached approximately 800 to 900, the union stopped functioning by the end of 1897.[218]

The inability of class-conscious workmen to organise the miners did not perturb the rank and file. Even the economic slump in the mining industry, which began at the beginning of 1897 and had partly eased by the end of 1898, affected the miners minimally.[219] Professional miners were always in short supply and, when certain mines were obliged temporarily to stop working, the miners had little difficulty in finding alternative employment.[220] In fact, under recession the underground work complements of working mines increased: between January 1897 and

September 1899 the number of white underground workers rose from 2 168 to 4 359.[221]

During the same period the position was different for artisans. The closing of some of the mines seriously affected them, as did the bankruptcy and rationalisation policies of many small businesses.[222] Although the number of surfacemen on the working mines also increased during the depression,[223] the extra jobs for craftsmen did not meet the demand; artisans undoubtedly endured hardships.[224] But unionised artisans, who had lost their jobs, were able to survive the depression through the sustenance of their organisations' benefits. In contrast, the miners, who had different interests from those of the artisans, saw no need for out-of-work benefits.

But most mineworkers, irrespective of their individual group needs and their degree of job security, viewed the mineowners with a deep-rooted suspicion and even antagonism.[225] Some workmen, under recession from 1897 to 1898, as they did during the depression which followed soon after the end of the Anglo-Boer War, alleged that the Randlords had deliberately engineered the economic slump in a devious attempt to lower working costs by reducing mineworkers' wages.[226] Although the allegation was probably far-fetched, one of the mineworkers' assumptions was, indeed, correct: the mineowners wanted to reduce their wages.[227] The mineworkers believed that Kruger's benevolence to them had

prevented the Randlords from reducing their wages. This belief was incorrect. Rather, during the late 1890s it was the mineowners' desire for the franchise that was the deterrent.

The mineowners asserted to Kruger and the British government that there was unanimous Uitlander support for the franchise. This was clearly untrue, as Diana Cammack has shown.[228] In particular, many workmen opposed the franchise: they feared that it would give the capitalists excessive political and economic leverage at their expense, as had occurred at Kimberley and at other major industrial centres in the world.[229] Most of the mining houses refrained from industrial actions which would openly antagonise the workmen. They did not wish to cause a worker-employer confrontation which would destroy the facade of Uitlander unity, which the Reform movement had assiduously cultivated.[230]

Although the wage costs of the Randlords were similar to those of employers at European and other overseas mining centres,[231] wage reductions for white mineworkers, particularly miners, was undoubtedly an item of high priority on the Randlords' hidden agenda.[232] In private correspondence Percy FitzPatrick, a director of the Corner House, agreed with one of his senior London directors, Julius Wernher that: "We don't get a fair day's work...unless we also reduce labour costs."[233]

The mineowners concealed their intentions. They connived to present for public consumption a spurious concern for the welfare of their workmen. In 1897 FitzPatrick, in private correspondence with Wernher, gloated over the duplicity of the largest group, the Corner House,[234] which by 1912 controlled more than 60 per cent of the mines:[235]

> Now, as to White Labour. This was the most difficult thing to handle in evidence [to the Mining Industry Commission]. In my opinion, the *wages* can be reduced but it should not be the subject of public discussion or of concerted action. It can be done quietly. I therefore got away from it as soon as possible and treated it rather from the point of view of the married man with family here. Few things would be more disastrous to us or more acceptable to the Government, than a split between the white labourers and employers at the present juncture.[236]

In the same letter of 1 May 1897, but in an addition penned two days later, FitzPatrick fulminated against J. B. Robinson for breaking the mineowners' informal agreement to refrain from industrial actions which would precipitate open workmen's hostility.[237] As FitzPatrick explained to Wernher, over the weekend Robinson had without warning or negotiation reduced the wages of artisans and miners and extended their hours, so causing a strike on his Randfontein properties:

> You will see by the papers that J. B. R. has been trying a high-handed reduction of white wages. It is curious to think that, while I was writing on the subject, on the previous page, the Randfontein scene was being enacted. Surely Robinson is a madman or he would not do such a thing now, of all times, and he would not call in the mounted police, you would think, if he had a grain of sense

left. One cannot tell where such a man may lead us.[238]

The Randfontein strikers were successful: management reinstated their previous hours and wages.[239] Although the mining houses made no concerted efforts to change the service and wage conditions of mineworkers up to the outbreak of the Anglo-Boer War, the mineworkers remained hostile towards their employers.[240] The mineowners' attempts to placate them did not allay their suspicions that the mineowners would ultimately unite to reduce working costs at the expense of white mineworkers, particularly miners. Instead, the miners believed correctly that the candid editorials of mining journals were the public expression of the mineowners' private views. For instance, in 1897 the *South African Mining Journal* reminded the mineworkers that "they were overpaid in comparison with the rate of wage earned by white labour on other goldfields";[241] and in 1889 the *Mining World* ominously threatened: "White wages must come down."[242]

Mineworkers remembered the actions of the Robinson group in 1897. Subsequently piecemeal attempts by individual mine managers to implement wage reductions also constituted warnings. Such actions occurred on a number of mines, including the Crown Deep, the New Primrose and the Robinson Deep in August and September 1897 and in August 1899. Although in all cases successful strikes restored the *status quo*,[243] the actions of management on these occasions reinforced the workmen's hostility towards the

Randlords. Clearly during the 1890s employers' wage and service changes were the sole reasons for worker resistance. Miners were not aggrieved by their unhealthy working conditions and accepted them with a sense of fatalism.

The strikes thwarted management's intentions. The mineworkers' successful resistance to changes strengthened the Randlords' opposition to organised labour. Having committed themselves to mining low grade ore during the 1890s,[244] the mineowners in 1904 undoubtedly employed indentured Chinese in preference to unskilled white labourers because it was cheaper for them to do so.[245] Even so, the contractual conditions of the Chinese labourers were attractive to the mineowners;[246] unlike freely employed white labourers, the Chinese labourers' contracts debarred them from legally organising and striking for higher pay.[247]

The Randlords' desire for compliant labour explains why, both before and after the Anglo-Boer War, they also secretly imported small bands of miners under contract, particularly from southern Europe.[248] Such "underhand" actions by management aroused the anger of the freely-recruited overseas miners:[249] they objected to contract workers who had no freedom to bargain and who were often, but now always, employed at lower than customary skilled wages.[250] Indeed, one of the reasons that inspired mineworkers in 1892 to found the Labour Union was the rumour of the

mineowners' intention to import two thousand semi-contract workers.[251]

In contrast, workmen admired Kruger and his government because the volksraad had enacted "democratic laws".[252] Legislation, which benefited workmen, included the secret ballot, stringent measures for the inspection of boilers to prevent accidents and the withdrawal of the unpopular Gold Thefts Bill. In 1899, shortly before the outbreak of the Anglo-Boer War, in response to a workmen's petition, the volksraad published a draft law for an eight hours' day. Simultaneously it also seriously considered introducing an employers' liability law.[253]

Despite their suspicions of the mineowners, the mineworkers did not apparently resent Kruger's dispensations to the Chamber. Although Kruger had initially harboured "hostile feelings" towards the industry,[254] he was later far more cordially disposed towards it. Indeed, workmen seemed respect Kruger's impartiality in "meting out even-handed justice to all parties alike".[255] In April 1895 an article in the *Mining Journal* affirmed workmen' assumptions of Kruger's conciliation to the mineowners. In stressing the "cordial understanding between Pretoria and Johannesburg" the article detailed Kruger's substantial concessions to the mineowners during 1894:

> Thus the amendments to the gold laws, asked for by the Chamber, have been to a great extent adopted by the Volksraad, and it

> seems probable that the codification of the law will be undertaken this year.[256] The mining regulations, too, are being amended so as to work more satisfactorily. The laws respecting patents, gold thefts, and the burning question of Sunday work, which latter threatened at one time to assume very serious dimensions, have all been satisfactorily amended in accordance with the representations of the Chamber.[257]

Most members of the volksraad obviously valued the gold mining industry; initially the industry had rescued the republic from bankruptcy and it had later brought prosperity to the Transvaal. In fact, the industry's contributions to government revenue increased from £188 000 between 1883 and 1890 to £4 266 000 between 1895 and 1897.[258] Nor did the volksraad, as its mining-house critics contended, view the industry as a "milch cow, from which the last possible drop has to be squeezed".[259] Rather, as current research shows, the Republican government tried in many ways to nurture the industry from its infancy: the industry's growth was closely linked to state protection, particularly in the area of black labour recruitment and control.[260]

Clearly both the state and the gold mining industry were dependent on one another. In December 1895 the Jameson Raid undoubtedly fortified Kruger's suspicions of the mineowners. In spite of this he did not subsequently refuse to co-operate with them. Current research suggests that an important reason that Kruger alienated the Randlords was his poor administration of laws, which he had enacted in response to the Chamber's requests. These laws were vital to the profitable mining of low grade ore.[261]

But the mineowners' economic difficulties in fulfilling their commitment to shareholders to mine low grade ore at a profit were of no concern to the workmen: they interpreted their employers' apparently hostile actions towards them as an inevitable symptom of the class struggle. In holding aloof from the franchise demands of the mineowners, most miners therefore tacitly supported Kruger's government. In 1899 they still agreed with the Painters' Union representative who had, in 1894, concluded a public address with the following statement:

> The working men have obtained as much from the Government in twelve months, as they would have got in England in twelve years.[262]

When war broke out in October 1899, not surprisingly most miners refused to join the British army;[263] many returned home;[264] and some retreated to the South African coastal towns, where they waited impatiently for the war to end.[265] Although the Tories accused the miners, particularly Cornishmen, of "cowardice",[266] and "want of grit and patriotism",[267] the miners were not perturbed: they were loyal to their Queen and country, but not to the Tory government, which they believed had been duped into "a capitalist war for sinister purposes".[268]

After the Anglo-Boer War most workmen contrasted the new, but adverse, conditions in the Transvaal with the "palmy years" during Kruger's republic.[269] They were palmy years - but for artisans not for miners.

By 1907 only a handful of pre-war rock drillers were still alive to reminisce - and they did not survive for much longer.[270] Between 1900 and 1912 most rock drillers died "like flies" from accelerated silicosis:[271] excessive dust concentrations in the underground workings of the Witwatersrand gold mines was the primary cause of their unduly premature mortality.

Notes

[1] Denny, p. 147.

[2] *JCMMS*, 1902-1903, "Miner's [sic] Phthisis: Some Notes and Suggestions", pp. 245-246, discussant T. L. Carter.

[3] Worsfold, p. 278.

[4] PRO, CO, 291/42, despatches, G. G. Robinson to Mr Lambert, 11 Sept 1902, telegram, 291/90, parliament, 8 March 1905.

[5] See, for instance, Duminy and Guest, pp. 100, 105, J. P. FitzPatrick to J. Wernher, 1 May 1897, 8 May 1897.

[6] PRO, CO, 291/42, despatches, G. G. Robinson to Mr Lambert, 11 Sept 1902, telegram, 291/90, parliament, 8 March 1905; Worsfold, p. 278.

[7] CHA, WLF, "The Labour Question", enclosure, 31 March 1903.

[8] Merriman Papers, correspondence, R. Barry to JXM, 22 Sept. 1913.

[9] *Final Report of the Mining Regulations Commission*, 1910, v. 1, p. 47, v. 2, p. 234, evidence of Dr. L. G. Irvine.

[10] *The Mining Industry*, 1897, pp. 299-309 passim, evidence of A. B. Fyffe. Cf. Bozzoli, *The Political Nature of a Ruling Class*, p. 80, who overstates white workmen's dissatisfaction with their terms of employment before the Anglo-Boer War.

[11] J. Pratt Johnson, p. 332. Cf. Thorpe, p. 268, who incorrectly states that the incidence of silicosis was higher on the Australian mines than on those of the Witwatersrand.

[12] See, for instance, the historian, Lang, p. 224. See also *Union House of Assembly Debates*, W. H. Andrews, 21 Feb. 1912, col. 247. In his speech Andrews attempted to correct the contemporary misconception about the high average wages of miners.

[13] Calculations based on *Rapport van den Staats-Mijningengenieur*, 1896, 1897, 1898, statement 7. See also *ASEMJ*, 1906-1910 passim, "Minimum Rate of District per Day", listed in each monthly journal.

[14] *South African Mines, Commerce and Industries*, 16 March 1907, p. 28, "The Reduction of Working Costs". See also TCMA, file W6(c), T. H. Leggett to Secretary of the TCM, 29 Aug. 1902, G. A. Denny to Secretary of the TCM, 9 Oct. 1902; and Fraser and Jeeves, pp. 190-191, L. Phillips to F. Eckstein, 13 April 1908.

[15] In addition to the sources on which the calculations, which follow, are based, see also Merriman Papers, correspondence, R. Barry to JXM, 17 Nov. 1913; and SC 10, 1912, pp. 1-2, qq. 3-4, evidence of W. Morgan, A. R. Moon and M. Trewick.

[16] Calculations based on the following: *Report of the Council of the Association of Mine Managers*, 1902, pp. 4-7; TCMA, file W6(c), S. Jennings to Secretary of the TCM, 6 Oct. 1902; *Rapport van den Staats-Mijningengenieur*, 1896, 1897, 1898, statement 7; *The Mining Industry*, 1897, pp. 174, 201, evidence of R. Barrow and S. Jennings; *JCMMS*, Oct. 1908, "Reminiscences of the Early Rand", p. 123, discussant J. S. Curtis; *Report of the Council of the Association of Mine Managers*, 1902, pp. 4-7; *GMEAR...30 June 1903*, Table 8; PRO, CO, 291/117, despatches, Selborne to Elgin, 24 June 1907, enclosure no. 5; and TG 2, 1908, p. 833, q. 12 907, evidence of R. Raine.

[17] *The Mining Industry*, 1897, p. 201, evidence of H. Jennings; *Report of the Council of the Association of Mine Managers*, 1902, pp. 4-7; PRO, CO, despatches, 291/117, Selborne to Elgin, 24 June 1907, enclosure no. 5; *GMEAR...30 June 1903*, Table 8.

[18] *Report of the Council of the Association of Mine Managers*, 1902, pp. 4-7; TCMA, file W6(c), F. H. P. Creswell to Secretary of the TCM, [Sept.] 1902; TG 2, 1908, pp. 157, 436, qq. 1 349-1 350, 4 718, evidence of E. J. Way and T. Mathews.

[19] *Report of the Council of the Association of Mine Managers*, 1902, pp. 4-7; TCMA, file W6(c), F. H. P. Creswell to Secretary of the TCM, [Sept.] 1902; TG 2, 1908, pp. 157, 436, qq. 1 349-1 350, 4 718, evidence of E. J. Way and T. Mathews.

[20] *The Mining Industry*, 1897, pp. 46, 300, evidence of S. J. Jennings and A. B. Fyffe.

[21] Worsfold, p. 278; *Cornubian*, 16 Oct. 1901, "Cornishmen and the Rand"; PRO, CO, 291/90, parliament, 8 March 1905.

[22] Browne, pp. 289, 330.

[23] PRO, CO, 291/112, individuals, T. Wood to Elgin, 12 March 1906; TG 2, 1908, pp. 371-372, 387, statements of T. Willis and T. Mathews.

[24] Merriman Papers, correspondence, R. Barry to JXM, 20 Nov. 1915.

[25] Merriman Papers, correspondence, R. Barry to JXM, 17 April 1912, 17 Nov. 1913, 20 Nov. 1913, 21 Nov. 1915, 16 Feb. 1918.

[26] UG 40, 1913, pp. 113, 148; *Rand Daily Mail*, 2 April 1912, "Phthisis Commission Report"; Merriman Papers, correspondence, R. Barry to JXM, 11 Dec. 1913.

[27] Merriman Papers, correspondence, R. Barry to JXM, 17 April 1912, 17 Nov. 1913, 20 Nov. 1913, 21 Nov. 1915, 16 Feb. 1918.

[28] Merriman Papers, correspondence, R. Barry to JXM, 20 Nov. 1915; TCMA, file M23, circular letters, 59/15, 14/16, 23 Dec. 1915, 2 March 1916.

[29] Duminy and Guest, pp. 100, 105, J. P. FitzPatrick to J. Wernher, 1 May 1897, 8 May 1897.

[30] *The Mining Industry*, 1897, p. 218, evidence of H. Jennings.

[31] *The Mining Industry*, 1897, p. 218, evidence of H. Jennings. See also *Cornubian*, 18 Oct. 1901, "West Africa".

[32] Union *Statutes*, 1912, no. 19, section 21(1)(a),(b), 1914, no. 29, section 2, A(1)(a),(b)

[33] See, for instance, SC 10, 1912, pp. 20-21, qq. 130-134, evidence of W. Morgan, A. R. Moon and M. Trewick, and questions of J. X. Merriman.

[34] John Cockerill Letters, John Cockerill to Annie [his sister], 22 March 1902.

[35] *The Mining Industry*, 1897, pp. 251, 300, evidence of T. H. Leggett and A. B. Fyffe; Michell, p. 201; TG 2, 1908, p. 516, q. 6 034, evidence of E. Moore.

[36] Duminy and Guest, p. 105, J. P. FitzPatrick to J. Wernher, 8 May 1897.

[37] TCMA, file W6(c), G. A. Denny to Secretary of the TCM, 9 Oct. 1902.

[38] *The Mining Industry*, 1897, p. 218, evidence of H. Jennings. See also *Cornubian*, 18 Oct. 1901, "West Africa".

[39] *The Mining Industry*, 1897, p. 149, evidence of L. I. Seymour.

[40] TCMA, file W6(c), R. M. Catlin to Secretary of the TCM, 5 Sept. 1902, S. J. Jennings to Secretary of the TCM, 6 Oct. 1902.

[41] Denny, p. 146.

[42] See, for instance, BRA, HE, v. 134, S. Evans to R. Schumacher, 20 Nov. 1905; SC 4, 1914, p. 162,

q. 985, evidence of S. Evans; and UG 12, 1914, p. 33, par. 46.

[43] Calculations based on *Report of the Council of the Association of Mine Managers*, 1903, Appendix 4. Cf. Burke, "Disease, Labour Migration and Technological Change: The Case of the Cornish Miners", p. 79, who suggests that the single roving miner was a "particularly Cornish phenomenon".

[44] See, for instance, TCMA, file W6(c), F. Yeatman to Secretary of the TCM, 24 Sept. 1902, Annexure 2.

[45] SC 9, 1913, pp. 399-400, qq. 2 877-2 880, evidence of R. Shanks.

[46] TCMA, file W6(c), F. Hellmann to Secretary of the TCM, 29 Aug. 1902. See also TG 2, 1908, p. 341, q. 3 318, evidence of C. C. Smith; and Browne, pp. 332-333.

[47] *The Mining Industry*, 1897, p. 41, evidence of S. J. Jennings.

[48] UG 51, 1913, p. 12. See also *Report of the Council of the Association of Mine Managers*, 23 Feb. 1903, Appendix 4. Cf. Richardson and Van-Helten, "Labour in the South African Gold Mining Industry, 1886-1914", p. 87, whose ambiguous statistics are misleading.

[49] *The Mining Industry*, 1897, p. 41, evidence of S. J. Jennings.

[50] *The Mining Industry*, 1897, p. 47, evidence of J. P. FitzPatrick.

[51] TG 2, 1908, pp. 318, 326, 329, 341, 447, 462, 690, 785, qq. 326, 329, 3 001, 3 113, 3 176, 3 319, 4 907, 5 118, 8 837-8 843, 11 190-11 198, evidence of S. S. Crowle, C. C. Smith, T. Mathews, F. Crean and C. Lock.

[52] See, for instance, TG 2, 1908, pp. 319, 407, 785, qq. 3 011, 4 409, 11 190-11 198, evidence of S. S. Crowle, T. Mathews and C. Lock.

[53] TG 2, 1908, p. 462, q. 5 118, evidence of T. Mathews; Worsfold, p. 279.

[54] Cd. 1895, 1904, p. 204, A. Lawley to Lord Lyttelton, 18 Dec. 1903. See also Phillips, p. 251.

[55] *The Mining Industry*, 1897, pp. 299, 304, evidence of A. B. Fyffe; TG 2, 1908, pp. 110, 199, qq. 795, 1 967, evidence of L. J. Reyersbach and G. E. Webber.

[56] Cope, p. 36.

[57] CHA, WLF, L. Phillips to Selborne, 24 Jan.

1906, L. P. Cazalet to L. Phillips, 27 Oct. 1906; TG 2, 1908, pp. 110, 199, qq. 795, 1 967, evidence of L. J. Reyersbach and G. E. Webber.

[58] Letter Book of City Deep Limited, 1910-1911, J. Whitford to Secretary, Rand Mines, 12 Nov. 1910, J. Whitford to Chairman and Directors of City Deep Limited, 8 Feb. 1911. The married quarters, including staff houses, cost the company £28 383 10s.

[59] TG 2, 1908, p. 519, q. 6 048, evidence of E. Moore. See also ibid., p. 318, q. 3 003, evidence of S. S. Crowle.

[60] CHA, WLF, L. P. Cazalet to L. Phillips, 27 Oct. 1906, Schedule 4.

[61] CHA, WLF, L. P. Cazalet to L. Phillips, 27 Oct. 1906.

[62] Burt, pp. 42-43; Worsfold, pp. 278-280; TG 2, 1908, pp. 316, 341, 519, qq. 2 980, 3 318, 6 048, evidence of S. S. Crowle, C. C. Smith and E. Moore.

[63] Worsfold, p. 279.

[64] TG 2, 1908, p. 318, q. 3 004, evidence of S. S. Crowle.

[65] Anon., "The Gloom of the Mines", pp. 267-268. See also TG 2, 1908, p. 966, q. 14 300, evidence of J. B. Roberts.

[66] *Rand Daily Mail*, 16 July 1912, "Mr. Malan and the Miners"; TG 2, 1908, p. 519, q. 6 152, evidence of E. Moore.

[67] *Report of the Miners' Phthisis Commission, 1902-1903*, p. xix, par. 69.

[68] TG 2, 1908, p. 966, q. 14 300, evidence of J. B. Roberts.

[69] CAD, MNW, file MM, 1106/10, Assistant Secretary of Mines to Deputy Inspector of Mines, Krugersdorp, [April] 1910; TG 2, 1908, p. 318, q. 3 004, evidence of S. S. Crowle.

[70] *Final Report of the Mining Regulations Commission*, 1910, v. 1, pp. 64-65. Cf. Grey, p. 260, who endorses the advantage to miners of the single quarters.

[71] Centurion, article 1.

[72] *GMEAR...30 June 1902*, p. 9.

[73] *Final Report of the Mining Regulations Commission*, 1910, v. 1, pp. 44-46, 64-65.

[74] CAD, MNW, file MM 1106/10, Assistant Secretary of Mines to Deputy Inspector of Mines,

Krugersdorp, [April] 1910.

[75] TG 2, 1909, p. 41.

[76] CAD, MNW, file MM 1106/10, R. N. Kotze to Secretary of Mines, 30 April 1910 and enclosed undated memorandum.

[77] *SAMR*, 13 Jan 1912, p. 13, "Demonstration of Cases at General Meeting of Transvaal Medical Society"; Porter, pp. 6-12. See also BRA, HE, v. 258, file 154, "Report of Sub-Committee on Health Conditions on Mines", recorded date 15 Nov. 1910.

[78] CAD, MNW, file MM 1106/10, R. N. Kotze to Secretary of Mines, 30 April 1910 and enclosed undated memorandum.

[79] UG 40, 1913, p. 9.

[80] SC 10, 1915, p. 217, q. 1 482, evidence of J. F. Brown.

[81] Letter Book of City Deep Limited, 1910-1911, J. Whitford to Chairman and Directors of City Deep Limited, 8 Feb. 1911. See also *East Rand Express*, 11 Nov. 1911, "Brakpan Mines, Ltd.".

[82] SC 10, 1915, p. 217, q. 1 482, evidence of J. F. Brown.

[83] UG 40, 1913, p. 9.

[84] CAD MNW, file MM 1106/10, Assistant Secretary of Mines to Deputy Inspector of Mines, Krugersdorp, [April] 1910. See also UG 49, 1912, p. viii; and *Rand Daily Mail*, 16 July 1912, " Mr. Malan and the Miners". Cf. Grey, p. 124, who assumes that after 1911 the mineowners, as a matter of course, upgraded the single quarters.

[85] See, for instance, TG 2, 1908, p. 523, q. 6 152, evidence of E. Moore. Bozzoli, *The Political Nature of a Ruling Class*, pp. 79-80, also notes this. But Bozzoli refers to mine boarding houses rather than to mineworkers' cottages and the single quarters.

[86] TG 2, 1908, pp. 158, 318, 447, 519, qq. 1 348, 3 002, 4 906, 6 048-6 155, evidence of E. J. Way, S. S. Crowle, T. Mathews and E. Moore. See also Merriman Papers, correspondence, F. D. P. Chaplin to JXM, 28 Aug. 1913.

[87] *The Mining Industry*, 1897, p. 309, evidence of A. B. Fyffe; TG 2, 1908, pp. 158, 318, 447, 519, qq. 1 348, 3 002, 4 906, 6 048-6 155, evidence of E. J. Way, S. S. Crowle, T. Mathews and E. Moore.

[88] TG 2, 1908, p. 523, q. 6 152, evidence of E. Moore.

[89] *The Mining Industry*, 1897, p. 15, evidence of G. Albu; TG 2, 1908, pp. 316, 519, 1 117, qq. 2 977-2 980, 6 048, 16 641, evidence of S. S. Crowle, E. Moore and J. Buys.

[90] Merriman Papers, correspondence, R. Barry to JXM, 17 April 1912; Letter Book of City Deep Limited, 1910-1911, J. Whitford t Chairman and Directors of City Deep Limited, 8 Feb. 1911.

[91] Calculations based on *Report of the Council of the Association of Mine Managers*, 1903, Appendix 4.

[92] Calculations based on *Report of the Council of the Association of Mine Managers*, 1903, Appendix 4. Other reasons given by respondents were "educational disabilities" (81 per cent), "high cost of travelling (10 per cent), "uncertainty of employment" (6 per cent) and "tendency to rove" (3 per cent).

[93] Browne, pp. 332-333; BRA, HE, v. 134, S. Evans to R. Schumacher, 20 Nov. 1905; Houghton and Dagut, v. 2, p. 85, 3.46, quoting J. Balfour Browne.

[94] *Rand Daily Mail*, 16 Aug. 1910, editorial; *East Rand Express*, 18 March 1911, "Trades Union Dinner"; *JCMMS*, April 1912, "Accidents in Transvaal Mines", p. 410, discussant J. M. Phillips; *Rand Daily Mail*, 16 July 1912, "Mr. Malan and the Miners"; Merriman Papers, correspondence, R. Barry to JXM, 17 Nov. 1913; SC 9, 1913, pp. 399-400, qq. 2 877-2 880, evidence of R. Shanks.

[95] *West Briton*, 6 June 1907, "Cornishmen in South Africa".

[96] *South African Mines, Commerce and Industries*, 2 May 1904, p. 226, "Miners' Phthisis".

[97] *The Mining Industry*, 1897, p. 243, evidence of T. H. Leggett; *Cornubian*, 30 May 1907, "Coming in Droves"; TG 2, 1908, pp. 316-329 passim, qq. 2 973-3 179 passim, evidence of S. S. Crowle.

[98] *JCMMS*, Oct 1906, "Safety Measures in Mining", p. 112, discussant M. H. Coombe; *Rand Daily Mail*, 6 Aug. 1910, editorial. See also *The Mining Industry*, 1897, p. 61, evidence of E. J. Way; and Hannan, *Letters of a South African Miner, 1898-1904*, p. 8, Joseph Tucker to Joseph [his son], 20 Dec. 1902.

[99] TG 2, 1908, p. 329, q. 3 178, evidence of S. S. Crowle.

[100] *The Mining Industry*, 1897, p. 15, evidence of G. Albu; TG 2, 1908, pp. 339-340, 389, qq. 4 116, statement and evidence of C. C. Smith and T. Mathews.

[101] TCMA, file W6(c), T. H. Leggett to Secretary of the TCM, 29 Aug. 1902, S. J. Jennings to Secretary of the TCM, 6 Oct. 1902. See also BRA, HE, v. 134, S. Evans to R. Schumacher, 20 Nov. 1905; TG 2, 1908,

p. 695, qq. 8 974-8 975, evidence of F. Crean; and SC 9, 1913, p. 400, q. 2 878, evidence of R. Shanks.

[102] Merriman Papers, correspondence, F. D. P. Chaplin to JXM, 28 Aug. 1913.

[103] *South African Mining Journal*, 4 May 1895, p. 647, "Leading Article".

[104] Duminy and Guest, p. 105, J. P. FitzPatrick to J. Wernher, 8 May 1897. See also TG 2, 1908, p. 158, q. 1 356, evidence of E. J. Way.

[105] *South African Mining Journal*, 4 May 1895, pp. 647-648, "Leading Article".

[106] TG 2, 1908, p. 192, q. 1 855, evidence of G. E. Webber.

[107] Truscott, p. 291.

[108] Calculations based on: *TCMAR*, 1894, 1895, 1896, 1897, 1898, pp. 247, 180, 272, 406b, 407, "Labour Returns"; TG 2, 1908, pp. 42-43, evidence of H. Weldon; and TCMA, file W6(c), F. H. P. Creswell to Secretary of the TCM, [Sept.] 1902.

[109] Truscott, pp. 191-193, 291-293; Denny, pp. 24-27; *The Mining Industry*, 1897, pp. 91-95, 119, 219, evidence of R. M. Catlin, C. S. Goldmann and S. J. Jennings.

[110] TG 2, 1908, p. 168-169, qq. 1 546-1 547, evidence of E. J. Way.

[111] SC 9, 1913, p. 400, q. 2 875, evidence of R. Shanks. According to the 1913 Economic Commission, practically all development and more than half of production was done by miners under contract. See UG 12, 1914, p. 54, Table XX.

[112] Denny, p. 24.

[113] *The Mining Industry*, 1897, pp. 91-94, evidence of R. M. Catlin. See also Denny, p. 25.

[114] *The Mining Industry*, 1897, pp. 91-94, evidence of R. M. Catlin.

[115] *The Mining Industry*, 1897, p. 15, evidence of G. Albu; TG 2, 1908, pp. 223, 339-340, 389, qq. 2 141, 4 116, evidence of J. B. Roberts, statement of C. C. Smith and evidence of T. Mathews.

[116] Truscott, pp. 192-193, 360-363; *South African Mining Journal*, 4 May 1895, p. 648, "Leading Article"; TG 2, 1908, pp. 223, 321, 352, 689, 787, qq. 2 139, 3 058-3 059, 8 029, 11 241-11 249, evidence of J. B. Roberts, S. S. Crowle, C. C. Smith and F. Crean.

[117] TG 2, 1908, p. 223, q. 2 140, evidence of

J. B. Roberts.

[118] Truscott, pp. 359-360.

[119] See, for instance, TG 2, 1908, p. 321, qq. 3 057-3 059, evidence of S. S. Crowle.

[120] SC 10, 1915, p. 295, q. 1 823, evidence of L. R. Kelley. See also ibid., pp. 59, 235, qq. 529, 1 607, evidence of M. Fergusson and of J. F. Brown and J. Thompson.

[121] Truscott, pp. 291-292, 361-362.

[122] See, for instance, PRO, CO, 291/112, individuals, J. G. Wood to Elgin, 12 March 1906; TG 2, 1908, pp. 162, 690-691, 783, 832, qq. 1 429-1 434, 8 851-8 854, 11 132, 12 049, evidence of E. J. Way, F. Crean, C. Lock and R. Raine; Letter Book of City Deep Limited, 1910-1911, J. Whitford to Messrs Adam and Alexander, 23 Dec. 1910; and Merriman Papers, correspondence, R. Barry to JXM, 17 Nov. 1913, 11 Dec. 1913.

[123] See, for instance, TG 2, 1908, pp. 529, 695, qq. 6 274-6 277, 8 947-8 948, evidence of E. Moore and F. Crean.

[124] See, for instance, TG 2, 1908, pp. 321, 783, qq. 3 059, 11 130-11 133, evidence of S. S. Crowle and C. Lock.

[125] See, for instance, *JCMMS*, February, April 1908, "The Incidence of Methods of Payment on the Efficiency of Miners", pp. 27, 299-300, discussants R. N. Kotze and W. Taylor; TG 2, 1908, p. 783, q. 11 130, evidence of C. Lock.

[126] See, for instance, *JSAIE*, 1 June 1907, "Working Costs of the Mines of the Witwatersrand", p. 352, discussant J. P. Ward; TG 2, 1908, p. 1 002, q. 14 797, evidence of G. H. Somers; and *JCMMS*, April 1908, "The Incidence of Methods of Payment on the Efficiency of Miners", pp. 299-300, discussant W. Taylor.

[127] See, for instance, Taylor, p. 217.

[128] See below, chapters 9 and 12.

[129] Katz, *A Trade Union Aristocracy*, pp. 48, 252-253.

[130] CHA, Phillips Diary, v. 1, extract quoted from the *Worker*, 19 Nov. 1910. I used the same quotation in Katz, *A Trade Union Aristocracy*, pp. 252-253.

[131] Clegg et al, pp. 343-344; Phelps Brown, pp. 92-98.

[132] Doxey, p. 24. Doxey, however, incorrectly

states that contractors received both day's pay plus a contract on "flat" rate.

[133] TG 2, 1908, p. 352, q. 3 500, evidence of C. C. Smith.

[134] See, for instance, TG 2, 1908, pp. 311, 316, 338, qq. 2 905, 2 972, evidence of S. S. Crowle and statement of C. C. Smith.

[135] TG 2, 1908, pp. 447-448, q. 4 915, evidence of T. Mathews.

[136] TCMA, file W6(c), F. Hellmann to Secretary of the TCM, 29 Aug. 1902, H. R. Skinner to Secretary of the TCM, 25 Sept. 1902.

[137] TG 2, 1908, pp. 436, 521, 823, qq. 4 718, 6 111, 11 849, evidence of T. Mathews, E. Moore and R. Raine; Austin, p. 141; *South African Mines, Commerce and Industries*, 17 March 1906, p. 4, 13 Oct. 1906, p. 107, "Leading Articles".

[138] *The Mining Industry*, 1897, pp. 91-95, 119, evidence of R. M. Catlin and C. S. Goldmann; Denny, pp. 24-27.

[139] *The Mining Industry*, 1897, pp. 426-427, evidence of W. S. Hall.

[140] *The Mining Industry*, 1897, p. 427, evidence of W. S. Hall.

[141] Lang, pp. 184-185; Grey, p. 263.

[142] Bozzoli, *The Political Nature of a Ruling Class*, p. 98.

[143] Denoon, "The Transvaal Labour Crisis, 1901-6", p. 491; Jeeves, *Migrant Labour in South Africa's Mining Economy*, p. 57; PRO, CO, 879, 89/801, "Chinese Labour in the Transvaal. The Question of its Continuance", memorandum, 18 Dec. 1905. See also TG 2, 1908, p. 208, statement of J. B. Roberts.

[144] PRO, CO, 879, 89/801, "Chinese Labour in the Transvaal. The Question of its Continuance", memorandum, 18 Dec. 1905.

[145] CHA, WLF, L. Phillips to Selborne, 19 Jan. 1906.

[146] See below, chapter 12.

[147] BRA, HE, v. 145, F. Eckstein to L. Phillips, 20 april 1906.

[148] Fraser and Jeeves, p. 164, L. Phillips to Messrs Wernher, Beit and Company, 18 June 1906.

[149] Browne, pp. 330-331.

150 Bozzoli, *The Political Nature of a Ruling Class*, pp. 1-12 passim, 96.

151 Bozzoli, *The Political Nature of a Ruling Class*, p. 98.

152 See, for instance, BRA, HE, v. 134, S. Evans to R. Schumacher, 20 Nov. 1905, S. Evans to H. Eckstein and Company, 11 Dec. 1905; CHA, WLF, L. Phillips to Selborne, 18 Jan. 1906. See also *South African Mines, Commerce and Industries*, 10 March 1906, pp. 1 209-1 210, 17 March 1906, pp. 3-4, 14 April 1906, p. 97, "Leading Articles".

153 SC 10, 1912, pp. 24-25, qq. 159-172, evidence of W. Morgan, A. R. Moon and M. Trewick.

154 TCMA, file W6(c), S. J. Jennings to Secretary of the TCM, 6 Oct. 1902; Browne, p. 330.

155 Letter Book of City Deep Limited, 1910-1911, E. G. Hilner, acting manager, to Consulting Engineer, City Deep Ltd, 5 June 1911.

156 UG 12, 1914, p. 56.

157 CHA, WLF, L. Phillips to Selborne, 18 Jan. 1906; SC 9, 1913, p. 29, q. 302, evidence of H. R. Skinner.

158 Calculations based on UG 12, 1914, p. 56, par. 106, Table XXI.

159 Merriman Papers, correspondence, R. Barry to JXM, 11 Dec. 1913.

160 Merriman Papers, correspondence, R. Barry to JXM, 11 Dec. 1913.

161 See, for instance, TG 2, 1908, pp. 316, 690-691, 783, qq. 6 034-6 041, 8 851-8 854, 11 132, evidence of E. Moore, F. Crean and C. Lock; SC 10, 1912, pp. 24-25, qq. 159-172, evidence of W. Morgan, A. R. Moon and M. Trewick. See also PRO, CO, 291/112, individuals, J. C. Wood to Elgin, 12 March 1906.

162 *JCHMS*, Aug. 1906, Oct. 1906, "Safety Measures in Mining", pp. 39, 111-112, discussants J. M. Johnston and C. B. Saner, April 1912, "Accidents in Transvaal Mines", p. 409, discussant J. M. Phillips.

163 BRA, HE, v. 133, S. Evans to J. Wernher, 12 June 1905, v. 134, S. Evans to R. Schumacher, 20 Nov. 1905, S. Evans to H. Eckstein and Company, 11 Dec. 1905; CHA, WLF, L. Phillips to Selborne, 18 Jan. 1906.

164 Unless otherwise noted, the following calculations are based on UG 12, 1914, p. 56, Table XXI.

165 TCMA, file W6(c), S. J. Jennings to Secretary of the TCM, 6 Oct. 1902; TG 2, 1908,

pp. 432-433, 912, qq. 4 636-4645 passim, 13 457, evidence of T. Mathews and H. F. Petersen; TG 2, 1909, p. 49; *Rand Daily Mail*, 17 Dec. 1910, editorial; *Mining Journal*, 12 March 1910, "Transvaal Mines".

166 TG 2, 1908, pp. 339-340, 389, 483, qq. 4 116, 5 426, statement of C. C. Smith and evidence of J. Coward and T. Mathews.

167 *JCHMS*, 1902-1903, "Miner's [sic] Phthisis: Some Notes and Suggestions", pp. 245-246, discussant T. L. Carter.

168 Merriman Papers, correspondence, R. Barry to JXM, 17 Nov. 1913.

169 *Union House of Assembly Debates*, W. H. Andrews, 21 Feb. 1912, col. 547.

170 *The Mining Industry*, 1897, p. 251. See also Letter Book of City Deep Limited, 1910-1911, J. Whitford to Chairman and Directors of City Deep Limited, 8 Feb. 1911.

171 See, for instance, Browne, p. 334; *JSAIE*, 1 June 1907, "Working Costs of the Mines of the Witwatersrand", p. 352, discussant J. P. Ward; TG 2, 1908, p. 1 002, q. 14 797, evidence of G. H. Somers; and *JCHMS*, April 1908, "The Incidence of Methods of Payment on the Efficie. y of Miners", pp. 299-300, discussant W. Taylor.

172 After the enactment, in 1911, of the eight-hour day (or forty-eight hour week) for underground workers, many contractors found it even more difficult to fulfil their contracts. Union *Statutes*, 1911, no. 12; Merriman Papers, correspondence, R. Barry to JXM, 17 Nov. 1913, 11 Dec. 1913; *Union House of Assembly Debates*, W. H. Andrews, 3 June 1913, col. 3034.

173 Merriman Papers, correspondence, R. Barry to JXM, 17 Nov. 1913, 11 Dec. 1913.

174 Oliver, "An Address on Rand Miners' Phthisis...", p. 920.

175 See below, chapter 9.

176 TCMA, file W6(c), T. H. Leggett to Secretary of the TCM, 29 Aug. 1902; CHA, WLF, Selborne to L. Phillips, 13 Jan. 1906.

177 UG 12, 1914, p. 56, par. 106; SC 9, 1913, p. 399, qq. 2 871 ff., evidence of R. Shanks.

178 CHA, WLF, Selborne to L. Phillips, 13 Jan. 1904; *The Mining Industry*, 1897, pp. 301, 302, evidence of A. B. Fyffe.

179 *Rand Daily Mail*, 6 Aug. 1910, editorial.

[180] UG 51, 1913, p. 12, table showing "White Employees on Witwatersrand Gold Mines".

[181] UG 19, 1912, p. 13, par. 25; SC 9, 1913, pp. 399-400, qq. 2 877-2 880, evidence of R. Shanks.

[182] Richardson and Van-Helten, "Labour in the South African Gold Mining Industry, 1886-1914", p. 87; Bozzoli, *The Political Nature of a Ruling Class*, p. 89.

[183] TG 2, 1908, p. 1 238, q. 18 089-18 090, evidence of J. H. Johns; *JCMMS*, April 1912, "Accidents in Transvaal Mines", p. 410, discussant J. M. Phillips; SC 9, 1913, pp. 320-321, q. 2 168, evidence of R. N. Kotze; UG 40, 1912, pp. 112-113.

[184] See below, chapter 12.

[185] See below, chapter 12.

[186] See below, chapter 12.

[187] See, for instance, Cd. 7476, 1914, p. 139.

[188] Katz, *A Trade Union Aristocracy*, p. 379, n. 233.

[189] CHA, WLF, S. Evans to Wernher, Beit and Company, 1 April 1903, P. Cazalet to L. Phillips, 27 Oct. 1906; Fraser and Jeeves, pp. 163-164, 189-191, L. Phillips to Messers Wernher Beit and Company, 18 June 1906, L. Phillips to F. Eckstein, 13 April 1908; TCMA, file A1(c), Secretary of the TCM to J. N. de Jongh, 12 June 1908; SC 4, 1914, p. 275, q. 1 537, evidence of W. Wybergh; CAD, MNW, file MM 3233/1912, memorandum, "The Wolhuter School of Mines", 31 Aug. 1912.

[190] *The Mining Industry*, 1897, p. 309, evidence of A. B. Fyffe.

[191] *Cornishman*, 5 June 1902, "Mining Notes"; *Rand Daily Mail*, 17 Dec. 1910, editorial, 31 May 1911, "Miners' Phthisis"; *Evening Chronicle*, 5 May 1913, "Mining Disabilities".

[192] *Rand Daily Mail*, 17 Dec. 1910, editorial.

[193] Oliver, "An Address on Rand Miners' Phthisis...", p. 920.

[194] *Evening Chronicle*, 4 Aug. 1913, "In Other Days"; TCMA, file W6(c), S. J. Jennings to Secretary of the TCM, 6 Oct. 1902.

[195] TCMA, file W6(c), S. J. Jennings to Secretary of the TCM, 6 Oct. 1902.

[196] Oliver, "An Address on Rand Miners' Phthisis...", p. 920.

[197] See below, chapter 10.

[198] *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 140, evidence of Dr L. G. Irvine; Oliver, *Diseases of Occupation*, pp. 284-285.

[199] *Mining Journal*, 3 Nov. 1901, p. 1 408, letter by N. Trestrail; BRA, HE, v. 258, file 154M, F. Oats to C. E. Rube, enclosure, Dr F. Hiehens [sic] [Hichens] and Dr A. E. Pennewan [sic] [Permewan] to F. Oats, 21 July 1902; *Report of the Miners' Phthisis Commission, 1902-1903*, p. 26, q. 173, evidence of Dr W. G. Rogers; *Transvaal Leader*, 28 Aug. 1909, "Capital and Labour"; *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 140, evidence of Dr L. G. Irvine.

[200] See below chapter 9.

[201] See, for instance, TG 2, 1908, p. 515, q. 6 018, evidence of E. Moore.

[202] Doxey, p. 68; van der Horst, p. 253.

[203] Merriman papers, correspondence, S. Evans to JXM, 7 Aug. 1913; Doxey, p. 24.

[204] *ASEMJ*, Feb. 1912, pp. 7-8, letter by F. Nichol.

[205] *ASEMJ*, May 1906, p. 6.

[206] Katz, *A Trade Union Aristocracy*, pp. 20-24, 249.

[207] Ticktin, p. 81, quoting the *Transvaal Critic*, 26 Feb. 1897.

[208] *SATJ*, June 1902, p. 9.

[209] *AEJ*, Sept. 1903, p. 33, report of T. J. Kneebone.

[210] See, for instance, PRO, CO, despatches, 291/119, Selborne to Elgin, 27 Aug. 1907, telegram A, Deputy Governor of the Transvaal to Elgin, 9 Sept. 1907, telegram; *East Rand Express*, 27 Dec. 1913, "The Old and the New Year".

[211] Katz, *A Trade Union Aristocracy*, pp. 25-26, 229-241.

[212] Cf. Bozzoli, *The Political Nature of a Ruling Class*, p. 79, who incorrectly states that during the 1890s craft unionism was under "siege" from radicals.

[213] *Voice of Labour*, 18 Nov. 1910, "Industrial Notes", 16 Dec. 1910, "Industrial Notes".

[214] Pelling, pp. 102-106 passim.

[215] Katz, *A Trade Union Aristocracy*, pp. 302, 309.

[216] Katz, *A Trade Union Aristocracy*, pp. 25-26, 229-241.

[217] Grobler, pp. 9-10.

[218] For details of the general mineworkers' unions, see Ticktin, pp. 79-81; Grobler, pp. 2-10 passim; and Rose, pp. 27, 29, 32.

[219] Cammack, *Class, Politics and War: A Socio-Economic Study of the Uitlanders of the Witwatersrand, 1897-1902*, pp. 37-89 passim, details the effects of the depression on the white working class. She fails, however, to note that the depression had minimal impact on the miners.

[220] *The Mining Industry*, 1897, p. 42, evidence of E. J. Way.

[221] TG 2, 1908, p. 43, Annexure 11, Table A, evidence of H. Weldon.

[222] Cammack, *Class, Politics and War: A Socio-Economic Study of the Uitlanders of the Witwatersrand, 1887-1902*, pp. 38, 43, 45.

[223] TG 2, 1908, p. 43, Annexure 11, Table A, evidence of H. Weldon.

[224] Cammack, *Class, Politics and War: A Socio-Economic Study of the Uitlanders of the Witwatersrand, 1887-1902*, pp. 38, 43, 45.

[225] Cf. Thorpe, p. 256, who overestimates the "relative solidarity between employer and employee" during the 1890s.

[226] Cammack, *Class, Politics and War: A Socio-Economic Study of the Uitlanders of the Witwatersrand, 1887-1902*, p. 48; *AEJ*, Nov. 1903, pp. 23-24, report of T. J. Kneebone.

[227] Duminy and Guest, pp. 100, 105, J. P. FitzPatrick to C. Wernher, 1 May 1897, 8 May 1897.

[228] Cammack, "An Illusion of Unity: Uitlander Politics before the Anglo-Boer War", pp. 3-8 passim.

[229] Ticktin, pp. 100-102. See also Cammack, "An Illusion of Unity: Uitlander Politics before the Anglo-Boer War", p. 4.

[230] Cammack, "An Illusion of Unity: Uitlander Politics before the Anglo-Boer War", pp. 3-8 passim.

[231] *The Mining Industry*, 1897, pp. 37, 47, evidence of G. Albu and J. P. FitzPatrick.

[232] Duminy and Guest, p. 105, J. P. FitzPatrick

to J. Wernher, 8 May 1897.

[233] Duminy and Guest, p. 105, J. P. FitzPatrick to J. Wernher, 8 May 1897.

[234] *South African Mining Journal*, 8 May 1897, p. 661, "Leading Article".

[235] Merriman Papers, correspondence, F. D. P. Chaplin to JXM, 22 Aug. 1913.

[236] Duminy and Guest, p. 100, J. P. FitzPatrick to J. Wernher, 1 May 1897.

[237] The Robinson and Goerz-Albu groups had seceded from the Chamber shortly after the Jameson Raid; in 1896 they founded a rival organisation, The Association of Mines of the South African Republic. But the two employer organisations maintained close links with one another: collaborative activities included mutual support for the franchise. After their constitutional complaints had been rectified, in December 1897 the dissident mineowners liquidated the short-lived Association and rejoined the Chamber. See Grey, pp. 53-54. Curiously, Lang, who recently wrote the centenary history of the Chamber, does not mention the episode.

[238] Duminy and Guest, p. 100, J. P. FitzPatrick to J. Wernher, 1 May 1897.

[239] For details of the strike, see Grobler, pp. 9-10; Cammack, *Class, Politics And War: A Socio-Economic Study of the Uitlanders of the Witwatersrand 1887-1902*, p. 47; Katz, *A Trade Union Aristocracy*, p. 30; Star, 5 May 1897, "The Randfontein Strike"; and *South African Mining Journal*, 8 May 1897, p. 661, "Leading Article".

[240] Ticktin, p. 111.

[241] *South African Mining Journal*, 8 May 1897, p. 661, "Leading Article".

[242] *Mining World*, quoted in Cope, p. 50.

[243] For details of the strikes see Cammack, *Class, Politics and War: A Socio-Economic Study of The Uitlanders of the Witwatersrand, 1887-1902*, pp. 49-50; Ticktin, p. 95; TG 2, 1908, p. 497, q. 5 709, evidence of J. H. Bridgman.

[244] Jeeves, *Migrant Labour in South Africa's Mining Economy*, p. 9.

[245] Richardson, *Chinese Mine Labour in the Transvaal*, pp. 18-31 passim, explores the economic complexities of Chinese labour. See also TCMA, file W6(c), F. Hellmann to Secretary of the TCM, 29 Aug. 1902, R. M. Catlin to Secretary of the TCM, 5 Sept. 1902. Cf. Thorpe, pp. 65-67, 148, who states that the mineowners' preference for Chinese labour over

unskilled white labour was for political reasons rather than economic ones. In reaching this finding Thorpe, pp. 65-67, misinterprets the evidence of the mine manager, Robert Raine. Also, she has not consulted the report of the impartial consulting mining engineer, Ross E. Browne who confirmed the views of the Corner House directors that both the full and the partial substitution of African and Chinese mineworkers by unskilled whites would considerably increase the industry's working costs. See Browne, p. 297. See also, and in particular, *JSAIE*, Jan. 1909, "Working Costs of Mines of the Rand", pp. 131-132, reply to discussion.

[246] TCMA, *file W6(c)*, F. Hellmann to Secretary of the TCM, 29 Aug. 1902, R. M. Catlin to Secretary of the TCM, 5 Sept. 1902. See also Katz, *A Trade Union Aristocracy*, pp. 118-121.

[247] Richardson, *Chinese Mine Labour in the Transvaal*, p. 31.

[248] Duminy and Guest, p. 105, J. P. FitzPatrick to J. Wernher, 8 May 1897; PRO, CO. 291/42, despatches, Milner to Chamberlain, 29 Sept. 1902, telegram no. 2; Katz, *A Trade Union Aristocracy*, pp. 66-68; CHA, WLF, memorandum to R. Madew, 30 Jan. 1913.

[249] TCMA, file W6(c), F. H. P. Creswell to Secretary of the TCM, [Sept.] 1902.

[250] TCMA, file W6(c), F. H. P. Creswell to Secretary of the TCM, [Sept.] 1902; Katz, *A Trade Union Aristocracy*, pp. 68-69.

[251] Ticktin, p. 83.

[252] PRO, CO, 291/36, individuals, Southport and District Independent Labour Party to Chamberlain, 21 July 1902.

[253] PRO, CO, 291/53, individuals, E. P. Rathbone to Chamberlain, 3 March 1902.

[254] *Mining Journal*, 13 April 1895, p. 428, "A Year's Work in the Transvaal".

[255] *Star*, 18 Dec. 1893, "The Labour Union".

[256] According to Grey, p. 53, the gold law was ultimately moulded to the wishes of the Chamber.

[257] *Mining Journal*, 13 April 1895, p. 428, "A Year's Work in the Transvaal".

[258] Gallagher and Robinson, p. 211, n.

[259] Mining Journal, 13 April 1895, p. 428, "A Year's Work in the Transvaal".

[260] Harries, "Kinship, ideology and the nature of pre-colonial labour migration", p. 31; Jeeves,

"The Administration and Control of Migratory Labour on the South African Gold Mines: Capitalism and the State in the Era of Kruger and Milner", pp. 1, 8; Levy, p. 38. See also *Report of the Council of the Association of Mine Managers*, 1895, p. 5.

261 Jeeves, "The Administration and Control of Migratory Labour on the South African Gold Mines; Capitalism and the State in the Era of Kruger and Milner", p. 9. Also, Kruger could not fulfil all the mineowners' other cost-related demands, as Marks and Trapido, p. 67, note. It is beyond the scope of this study to examine the continuing debate concerning the causes of the Anglo-Boer War.

262 *Standard & Diggers' News*, 12 May 1894, "Kruger and the Working Man". Ticktin, p. 107, also cites this speech. See also Cammack, "An Illusion of Unity: Uitlander Politics before the Anglo-Boer War", p. 5, who quotes the following exerpt from an artisan's speech reported in the *Star*, 8 Aug. 1898: "There is no Government on the face of the earth more ready to give working men their due than the Transvaal Government."

263 *Cornubian*, 16 Oct. 1901, "Cornishmen and the Rand", 21 Aug. 1902, "Redruth Urban District Council", 20 March 1903, "To the Members of the Redruth Rural District Council"; BRA, HE, v. 258, file 154M, R. G. Nesbitt to F. Oats, 15 July 1902, F. Hiehens [sic] [Hichens] and A. E. Pennewan [sic] [Permewan] to F. Oats, 21 July 1902 and C. S. Jago to F. Oats, 22 July 1902; *JCMMS*, Aug. 1906, "Safety Measures in Mining", p. 43, discussant H. M. Coombe; Ticktin, pp. 101-102; TG 2, 1908, p. 1 225, q. 17 872, evidence of J. H. Johns. See also *TCMAR*, 1900-1901, p. 63; Grey, p. 14; and Ticktin, pp. 103-105, for details of the few active pro-Boer supporters. Ticktin, pp. 103-104, lists a number of prominent members of organised labour who enlisted: they were all artisans.

264 *Cornubian*, 7 Sept. 1899, "Notes and Comments"; *Newcastle Daily Chronicle*, 30 Oct. 1902, "Rock Drills and Miners' Phthisis"; *JCMMS*, Aug. 1906, "Safety Measures in Mining", p. 43, discussant H. M. Coombe; Taylor, p. 221; TG 2, 1908, p. 446, q. 4 900, evidence of T. Mathews.

265 *GMEAR*, 30 June 1902, p. 8; *Mining Journal*, 5 July 1902, p. 935, "Consumption among Miners on the Rand"; Oliver, "Gold Miners' Phthisis and some of the Dangers to Health incidental to Gold Mining in the Transvaal", p. 1 678. *Cornubian*, 18 Sept. 1902, letter by F. J. Tiddy. For a description of the exodus of 90 000 Witwatersrand dweller , see *Standard & Diggers' News*, 14 Oct. 1899, "The Departure".

266 *Cornubian*, 16 Oct. 1901, "Cornishmen and the Rand".

267 CHA, WLF, Selborne to L. Phillips, 13 Jan. 1906.

[268] *Cornubian*, 7 Sept. 1899, "Notes and Comments". See also *SATJ*, Nov. 1900, p. 10, editorial.

[269] Centurion, articles 1 and 2. See also *Evening Chronicle*, 4 Aug. 1913, "In Other Days", letter by A. R. McNally; MacDonald, pp. 106-107, 115; *South African News*, 3 March 1904, "Labour Notes"; Burt, p. 107; *AEJ*, Jan. 1905, p. 16, May 1905, p. 18, report of T. J. Kneebone; *SATJ*, Dec. 1904, p. 6, March 1905, p. 10.

[270] Three prominent pre-war miners survived a little longer than most of their compatriots, because before 1907 they gave up mining to work as full time paid officials of the Transvaal Miners' Association. Thomas Willis died in 1911, James Coward in 1913 and Thomas Mathews in 1915. See *Rand Daily Mail*, 1 May 1911, "Miners' Phthisis"; *East Rand Express*, 3 May 1913, "Germiston's Loss"; and *SATJ*, April 1915, p. 15.

[271] *Cornubian*, 10 July 1913, "The Rand Strike".

CHAPTER 9

THE DUSTY YEARS 1892-1910

> "The angel of death is present in every drive, stope, shaft, winze, raise and cross-cut of our mines. We can almost hear the rustle of his wings; he does not flap them; but, quietly, persistently, hourly, daily, there he is, watching in silence his victims, who inch by inch are preparing themselves for his scythe."---Anonymous miner, 1913.[1]

> "If hon. members would imagine a railway tunnel stretching from here to Bulawayo and back, 10 ft. high and 10 ft. wide, that tunnel would roughly represent the excavations which human hands had made on the Rand."---Lionel Phillips, Director of The Central Mining & Investment Corporation, Ltd, 1911.[2]

The late 1890s were years of self-congratulation for the mineowners. They were proud of their technical achievements as Hennen Jennings, consulting engineer for H. Eckstein and Company, told the Industrial Commission of 1897:

> Now, in 1897, the class of machinery of these fields can be considered the most perfect of any gold fields in the world; the various processes dealing with the extraction of gold are rapidly approaching practical perfection, and our working costs have been decreased until we can scarcely reduce them further without the Government's help...[3]

Likewise, the Randlords were smug about the ventilation of the mines. Under the rubric of sanitation, or hygiene, the purpose of ventilation was to supply fresh wholesome air. In this respect the mines did, indeed, have two major natural endowments. First, they were relatively cool and therefore conducive to maximum worker productivity, as Ross E. Browne, the overseas consulting mining engineer, confirmed in 1905:

> There is nothing in the natural conditions to prevent the white man from working as energetically as he does elsewhere. The mines are well ventilated and unusually comfortable.[4]

Second, they were virtually free of natural poisonous gases: unlike coal seams, or fissures in the gold mines of Australia, the Witwatersrand pyritic rock did not give off inflammable and noxious gases.[5] Consequently the Witwatersrand mines were markedly free of "big disasters" such as those which occurred in collieries:[6] in coal mines methane fires or the exposure of workers to carbon monoxide often caused multiple deaths. On the Reef the coincidence of relatively cool mine air and the absence of natural gases prompted the mineowners' complacency: they considered the ventilation of the Witwatersrand mines to be so "favourable" as to warrant scant attention.[7]

Basing their assessments on the attributes of the pyritic rock and on cursory mine inspections, the general consensus of mining engineers was that ventilation "is undoubtedly good, as ventilation in

mines goes".[8] Also, like Stafford Ransome, a British mining engineer, whom *The Engineer*, a London journal, commissioned in 1902 to investigate the Witwatersrand mines, management on the Reef agreed that the compressed air exhausted by the rock drills improved the flow of air: "Ventilation is easily obtainable by ordinary compressed air methods and is as a general rule satisfactory."[9] But T. Lane Carter, the manager of the French Rand, was one of the few members of management who had misgivings about such glib generalisations. In 1903 he stated: "We have congratulated ourselves too much upon the comparative safety of the miners in this country [with respect to ventilation]."[10]

Most miners, on the basis of their daily underground experience, disagreed with the majority view of management. In February 1903 George Blight, an executive member of the newly founded Transvaal Miners' Association,[11] told the Weldon Commission on "miners' phthisis" that the ventilation and the sanitation were "bad". He elaborated: "Well we must be pretty healthy or we would all have been dead long ago."[12] Blight, a miner of twenty-two years' experience, was well qualified to make the judgement: before coming to the Witwatersrand in the early 1890s, as a youth he had been a miner in Cornwall and had then gone to the north of England to mine iron ore and coal.[13] Blight's pessimism concerning the unhealthiness of the Witwatersrand mines was

realistic. In 1912, when he returned to Britain in the company of six members of his union who, like him, had received compensation for second-stage silicosis, the Miners' Phthisis Board estimated his life expectancy as being one and a half years.[14]

The comments of Thomas Mathews, one of the organisers of the Transvaal Miners' Association, were even more cynical than those of Blight. In 1907, when J. S. Fisher, the Johannesburg Inspector of Mines and a member of the enquiry into Mining by Single Outlet, asked him what ventilation standards his organisation requested, Mathews replied:

> We might call for what we please, but it is largely a case of what the Lord sends, and we must accept it without demur. I believe, in theory, we ought to have it, but whether we have it or not lies with those who emoloy us: we cannot demand it.[15]

Mathews, as we have noted,[16] was an "exceptionally well informed" man.[17] From 1892 to 1894, when Speaker of the House of Representatives in Montana, he was Commissioner for Mines and Mining.[18] On returning from America to Cornwall, Mathews trained at the Camborne School of Mines and thereafter came to the Witwatersrand in 1897.[19] He, too, died of silicosis - in April 1915.[20] As organising secretary of the Transvaal Miners' Association from 1908 to 1915,[21] his paid post, which removed him from exposure to mine dust, undoubtedly gave him a temporary reprieve; he survived death from silicosis for a few years longer than most of his contemporaries.

From the start of systematic mining on the Witwatersrand in 1892 the republican Department of Mines introduced provisions for ventilation. E. P. Rathbone, a mining engineer and the only "Englishman" in the employ of the Mines Department, as an inspector of mines helped the department in 1892 draft its first ventilation measures, which were designed to "prevent accidents".[22] The republican provisions were based on the regulations of the "old countries" and, like those of the British hard rock mines, they followed the ventilation measures enacted for fiery mines.[23]

The first measure stipulated that it was necessary for each *mine* to have two shafts, one for the entry of air and the other for its exit. Both shafts, as we have earlier seen,[24] did not necessarily have to be part of the same mine.[25] Although each mine required two outlets, one shaft was allowed to be connected to the shaft of another mine situated on a contiguous property.

The second measure, its precedent being that of the coal mines in Westphalia,[26] established the volume of prescribed air: two cubic metres of air (or seventy cubic feet) per minute per person was the minimum requirement. The provision did not define the quality of the air: it was indefinitely termed "fresh air". Further, "where necessary" the employers were obliged to erect suitable partitions, called brattices, to split the current of air. The brattices created streams of air, which were "conducted to and along"

all working places to cleanse them of the blasting fumes, smoke and gases. Also, before beginning his shift the miner was required to inspect the workplace to ensure that it had a supply of fresh air and was free of gases; and management had the same obligations, when it reopened disused workings. For breach of regulation the penalty was two months imprisonment or the option of a fine: the fines ranged from £25 to £50.[27]

With the advice of two former British mining inspectors, A. R. Sawyer and E. Williams, in 1895 the State Mining Engineer drafted new provisions for ventilation.[28] Besides retaining the three 1892 ventilation provisions, the mining law of 1896 incorporated two additional measures; and the laws of 1897 and 1898 re-enacted them.[29] The first new measure stated that every mine had to be supplied with a continuous flow of fresh air to prevent the air from stagnating.[30] The second established that brattices be installed, be maintained in good working order and be self-closing.[31] The installation and maintenance of brattices were time-consuming exercises on the Witwatersrand mines. The reason was that frequent blasting disturbed or destroyed the partitions - the wooden doors, the canvas-cloth curtains and the clay-pipe barriers - so preventing them from splitting the air currents for both general and local, or sectional, ventilation.[32]

In the opinion of a modern-day ventilation mining engineer, M. J. Martinson, the republican ventilation requirements were "eminently reasonable".[33] But management regarded them as being too strict: in memorials to the volksraad in 1892 and 1896 the Chamber lodged its objections. It stated that the ventilation articles, which derived from European coal mines, were "inapplicable" to conditions on the Witwatersrand and were "totally unsuited to metalliferous mines".[34] The Chamber's reason for dissent was not based on precedent: the republican ventilation principles were identical to those which governed European and overseas metal mines.[35] Instead of the specified volume of air and detailed requirements for its splitting, the mineowners wanted a loose and vague substitute, namely that "all reasonable care should be taken to ventilate the mines".[36]

The republican Mines Department prosecuted mine managers for "minute infringements" of the mining laws, including the maintenance of boilers.[37] Therefore management believed that the Mines Department would strictly enforce the ostensibly stringent ventilation measures. But the mine managers' fears were groundless: both before and after 1896 the department neither observed nor enforced the regulations.[38] Indeed, throughout the 1890s the Department of Mines never tested the quantity or flow of air in the mines.[39] Nor did the department build a

laboratory for the systematic testing of quantitative analyses.[40] Although its professional staff apparently had the technical expertise for supervising ventilation,[41] the Mines Department was narrowly concerned with the prevention of mechanical accidents, the incidence of which was higher on the Witwatersrand than on the metalliferous mines in the United Kingdom.[42] Despite the proliferation of gases, particularly nitrous fumes, which mining methods released, deaths from gassing were "rare".[43] The republican Department of Mines, unlike similar state authorities in many other countries, did not, therefore, regard the observance of the ventilation regulations as a priority.[44]

In providing ventilation in its narrow sense 19th century mining engineers aimed to supply underground workings with fresh air and to remove vitiated air, in the process of which noxious and inflammable gases would be diluted.[45] To achieve the objectives 19th and early 20th century mining engineers all over the world subscribed to the principles of natural ventilation. Both coal and hard rock mines, which ranged in vertical depth from approximately 200 to 4 000 feet, used natural ventilation.

In the case of natural ventilation a mine needed to have two shafts or outlets. Access to a second shaft was also a vital safety requirement. In the event of an accident, which might cause a shaft to be inoperative or inaccessible, miners required another

shaft for a safety exit.[46] Consequently the republican Mines Department strictly enforced the two-shaft (or two-outlet) provision.[47] For instance, in 1902 fifty-three of the fifty-four producing mines on the Witwatersrand had two outlets. The one exception was only temporary: the mine was in the process of effecting a connection with the shaft on the adjacent property.[48] The second outlet was also necessary for the supply of ventilation by natural means: single-shaft coal mines in Europe required expensive mechanical ventilators.[49]

The theory of natural ventilation is apparently simple. But it operates on complex aerodynamic principles which relate to temperature and pressure. Temperature affects ventilation in the following way. In mines air currents are induced by differences in the temperature in the mine compared to that at the surface. Cooler and therefore denser air on the surface is drawn downwards and displaces the warmer and lighter air in the mine. Consequently one shaft serves as a downcast column for the air and the other as an upcast one. In brief, the cold dense fresh air from the surface flows into the mine through the downcast shaft; it sweeps through the warm atmosphere of the mine, which has gained additional heat from the strata; and the cold current pushes up the hot and polluted light air by way of the upcast shaft. Pressure also influences the movement of air. The gravimetric analysis is that the increase in the

pressure of the cold dense column of air is greater than the hot light column, so creating a pressure differential between the two shafts.[50]

From a climatic standpoint natural ventilation in Europe, Australia and America worked relatively efficiently. Unless the mine was very shallow, even in summer the contrast between the cooler surface temperature and the warmer atmosphere in the mine was great enough to create air currents.[51] But this was not so on the Reef. We have earlier seen that the low thermal gradient of the Witwatersrand mines was an advantageous feature; it kept the temperature of the mines relatively cool at depth.[52] But the small increase in the temperature of the rocks at depth was not conducive to promoting efficient natural ventilation.[53] Also, except in the early mornings and the late afternoons of mid-summer and mid-winter, the temperature differences between the surface and underground were insufficient to create strong downward and upward draughts of air.[54] In 1912 Hugh Frederick Marriott, the London-based consulting engineer of the Corner House, who had been resident in the Transvaal from the 1890s to 1906, illustrated this phenomenon in his evidence to the British Royal Commission on Metalliferous Mines and Quarries:

> Twice in the year there is the maximum ventilation down those mines: in the extreme of summer and the extreme of winter when the contrasts between the surface temperatures and the underground temperatures are greatest. Twice in the year, in the spring and autumn, the period comes round when the temperature is about the same as the earth

temperature and the ventilation goes down to its minimum.[55]

The minimum, indicated by Marriott, was a mere twenty-five cubic feet per minute per person.[56] Indeed, for the greater part of the year the air flow was so small that it could not cause the flame of a candle to flicker. This was so in both the outcrop and the deep level mines and applied even to the open workings, including the stopes, as opposed to the blind ends.[57]

World-wide, mining engineers recognised the "unreliability" and "precariousness" of natural ventilation.[58] Generally it operated more efficiently in coal mines than in hard rock mines. In coal mines the current had to circulate through only one working place - at the seam. But in metalliferous mines the draughts of air had to be directed through, to the lowest passage, where the "foul" air tended to settle, as well as through numerous higher horizontal drives, through the vertical and inclined winzes and cross-cuts and through all the stopes on each level.[59] Yet even in coal mines management often built furnaces, despite their dangers, at the bottom of the upcast shaft, or installed mechanical fans there. Such resorts warmed the sullied upcast air, made it lighter and decreased its density, so ensuring that the heavier fresh air from the downcast shaft would replace it and push it upward and out of the mine.[60]

Because it was so cheap and relatively effective, owners of metal mines world-wide generally relied on

natural ventilation. Even so, most of them also recognised that ventilation, created by the laws of thermodynamics, was efficient only if they directed and systematised the natural currents of air:[61] such techniques required only a "small outlay" of capital.[62] Mining officials in Europe, America and Australia understood, as did the Transvaal Mining Regulations Commission of 1907, that:

> Only a fraction of the proper effect of the existing current will be obtained, if the air is not artificially directed and suitably distributed between the working places.[63]

Many overseas mining employers ensured that brattices were erected for splitting the air currents. Also, they authorised that disused stopes and other abandoned workings be filled to prevent air circulating in caverns where it was not needed, so ensuring a maximum flow of air in workings which were in current use.[64] The skilful direction of air enabled the draughts to gather up the pollution for eventual delivery to the surface.[65] With only a "comparatively insignificant" capital outlay, the owners of overseas mines provided beneficial ventilation, which relied almost solely on natural means.[66] As early as the 1860s, for instance, Cornish mining proprietors often fined contractors and tributers for neglecting to clear away mounds of rock in the levels because the obstructions inhibited the air flow.[67]

But the cost benefits of improved worker efficiency, which effective ventilation promoted,[68]

eluded the Randlords who, ignoring the advice of their technical advisers,[69] made "very little attempt to direct the air currents underground".[70] Except for occasionally pouring a "little water" down the ventilation compartment of the downcast shaft to facilitate the entry of heavy cool air,[71] management did virtually nothing to ensure that the air was conducted to the stopes and the development tunnels.[72] So great were their companies' pressures on them to produce at a profit, that many mine managers did not permit the time or expense to implement simple expedients to facilitate natural ventilation. They neglected to make provision for the installation and maintenance of brattices; and failed to ensure that the disused workings were filled or blocked off.

In the absence of measures to assist natural ventilation, even when the weather was optimum and the temperature was cooler on the surface than in the mine, the air simply went down the one shaft and up the other.[73] Worse still, on days when there was no contrast between surface and underground temperatures, the downcast shaft would simultaneously be turned into the upcast shaft;[74] the downcast shaft would distribute polluted air and not fresh air to workers at the higher levels of production.[75] Also, by permitting the installation of hot pipes in the downcast shafts and by authorising the building of furnaces for drill sharpening at the bottom of them, management was often responsible for obstructing

natural ventilation.[76]

Except for the "three winter months", from May to July, in all the production sites of the mines the current of air was "woefully small, and much less per man than is given in other countries".[77] While the air current was good in some places, in other parts of the mine the volume fell to as little as, or less than, ten cubic feet per minute per person: there was "practically no ventilation".[78]

Such poor air circulation applied equally to both outcrop and to deep level mines. In fact, contrary to the claims of several historians and contemporary spokesmen for the Chamber of Mines,[79] Dr James Moir, the chemist to the Department of Mines, observed in 1907 that both the general and sectional ventilation of most of the outcrop mines were worse than those of the first and second row deeps.[80] Over and above the possession of two shafts, most outcrop mines had numerous additional outlets which distorted the process of natural ventilation. Instead of the numerous openings providing a high volume of fresh air in the mines, they created eddies which diverted the main currents, so causing fresh air to escape and allowing polluted air to pervade the workings.[81]

Except for shaft sinking, there was no supply of fresh air for miners in development. Apart from the exhaust air of the machine drills, rock drillers had no ventilation whatsoever during development in the

blind ends, or "dead-ends" - at the faces of the drives, raises, winzes and cross-cuts.[82] This was not a problem unique to the Witwatersrand; management elsewhere had difficulty distributing air to blind ends and expected developers to supplement local ventilation with exhaust air from the machines.[83] Even so, overseas employers apparently made some effort to provide local ventilation, however small the current.

For two other reasons the drives of hard rock mines in other mining centres were better ventilated than those on the Witwatersrand. First, the development drives in overseas mines were far shorter in distance than those on the Reef, where their distances ranged from 1 000 to 1 700 feet.[84] Consequently overseas developers made connections with the second shaft rapidly. Second, the vertical winzes, which supplied supplementary ventilation to the drives, made connections with the drives at far shorter intervals at other mining centres than those on the Witwatersrand: the drives in overseas mines derived supplementary winze air far more rapidly than the drives on the Rand.[85]

Apart from its far larger complement of underground workers,[86] in physical size a "small mine" on the Witwatersrand was "enormous" in comparison to a "big" metalliferous mine in the United Kingdom.[87] This phenomenon was reflected, for instance in the length of drives. By drilling on average eighty to ninety feet per month rock drillers, who exerted themselves

under contract, could effect the connection between the drive and the second shaft, so introducing ventilation into the drive, within just under or just over a year.[88] By comparison, the far shorter drives in Cornish tin mines could be completed in two months. Therefore, in effecting connections between the horizonal drives and the shafts and between the vertical winzes and the drives, developers on the Reef were solely reliant on the exhaust air from the machines for periods which were approximately six times longer than their counterparts in Cornwall.[89]

Likewise, rock drillers excavating cross-cuts, which were horizontal drives or headings running through the country rock at right-angles to the reef, had a similar problem.[90] We have earlier seen that an important advantage of the gold-bearing series on the Witwatersrand was the relative infrequency of dykes and faults.[91] If it had been disrupted by a fault or dyke, management could with relative ease relocate the reef by authorising the drilling of cross-cuts.[92] Even so, the drilling of a cross-cut often took a long time as well. For instance, in completing the 2 000-foot cross-cut on the Simmer and Jack the miners were deprived of fresh air for an inordinately long time: the developers took over two years to complete their task.[93]

In 1907 representatives of the Transvaal Miners' Association stated in evidence to the Mining Regulations Commission that the ventilation on the

Rand mines was the "worst in the whole world".[94] They correctly believed that the "mines had no ventilation at all, except in a happy-go-lucky fashion".[95] In concentrating on "speeding up" the Randlords neglected to make basic inexpensive adaptations to natural ventilation. They argued that the natural coolness of the Witwatersrand mines was a sufficient health safeguard.[96]

Although the total volume of air may have given each underground worker on average 70 cubic feet of air per minute, the air was undoubtedly unevenly distributed. Also, in many places the air was often unwholesome.[97] Indeed, Arthur Sawyer the former British mining inspector, who had in 1895 helped the republican government to frame the ventilation measures, contended that management on the Witwatersrand neglected to attend to both general and sectional ventilation. In evidence to the Weldon Commission in 1902, Sawyer stated that the gold mines "cannot be said to be ventilated in the spirit" of the state regulations.[98]

We shall now investigate the quality of the air. During the 19th century and the early decades of the 20th century, ventilation went "hand in hand with sanitation".[99] Our analysis begins, therefore, with an exploration of the hygienic conditions in the underground workings. Such analysis will help us to assess the quality of the air supply and to determine the degree to which underground sanitation and hygiene

were responsible for polluting the air with infectious germs.

As the government of Kruger did not appoint a public officer of health to exercise medical supervision of the mines,[100] the sanitary arrangements were left entirely to management, which did nothing about them. There was no "privy accommodation" on any of the outcrop mines:[101] management expected the miners to leave their work and climb out of the mine to relieve themselves in the latrines on the surface.[102] Few miners, particularly those under contract, had the time to do so. It was their practice - and Africans followed suit - to relieve themselves in the more accessible disused workings and in the ore-boxes.[103]

The lack of latrine facilities in the deep level mines created equally appalling insanitary conditions: they were "as disgusting, as they were disgraceful and dangerous".[104] In 1902 Dr Charles Porter, the Medical Officer of Health for Johannesburg, who was responsible for twenty-two mines in his municipal area, said that only two of them had, "underground at all",[105] any form of latrine arrangements - presumably the bucket system.[106] Such pollution caused mineworkers to be specially liable to bacterial infection, as the Weldon Commission affirmed:

> While the main workings are usually kept in good condition, the worked out or unused portions of mines are often permitted to get into a very foul state. We are concerned to find that the excreta of the underground

> workers is in certain mines systematically permitted to be mixed with the ore raised from the mine. This practice is most insanitary. It is obvious that if human excavations are allowed to mingle with the water circulating through the mine (and this water is pumped to the surface and used on the sorting floors, mills, and other workings, and is constantly brought in contact with the employees), this pollution cannot but give rise to specific illnesses, and also tends to lower vitality and render individuals more prone to develop disease.[107]

After legislation in 1903 obliged the industry to introduce underground latrines,[108] hygienic conditions improved.[109] Even so, the privies were invariably located at considerable distances from the working faces.[110] Consequently both black and white mineworkers often soiled the disused workings and "dark corners", as they had done during the 1890s.[111]

In the main workings the mixture of excreta and rock or excreta and water caused enteric fever, dysentry and other bacterial diseases.[112] As important, the excrement had the potential for spreading tuberculous infection. As late as 1915 a parliamentary select committee on "miners' phthisis" reported:

> The medical evidence before the Committee has shown that tuberculosis is prevalent amongst the underground workers, both white and coloured; that the underground workings are widely contaminated by *dejecta* containing *tubercle bacilli*, and that healthy subjects and especially silicosis subjects, are liable to become infected, the latter with particularly dangerous results.[113]

Undoubtedly the provision of underground sanitation was a long-overdue and necessary hygienic measure. But management and health officers were

disappointed by the Africans' lack of compliance, or "carelessness",[114] in using the separate facilities provided for them.[115] Mining officials resorted to blaming the miners for not teaching their "semi-civilised" subordinates the most elementary hygienic principles", namely those of "mine sanitation".[116]

It was apparent to many health officers that the mineowners were observing only the letter and not the "spirit" of the new 1903 sanitation regulations, particularly with regard to the Africans' amenities:[117] the Africans' privies were unhygienic and they were inferior to those provided for white mineworkers.[118] As the latrines were seldom equipped with screens, Africans had no privacy.[119] More important, the privies were poorly maintained, cleaned and disinfected.[120] In evidence to the Mining Industry Commission of 1907, Thomas Willis, President of the Transvaal Miners' Association, illustrated his request for improved ventilation by referring to the Africans' latrines:

> Would you call it good sanitation if you went down a mine after breakfast in the morning, and nad to go past one of those huts they put up for the Kaffirs to go to, where there is a fearful stench, and you have to take that stench in with you?...I call it bad sanitation. Why not drive a cross-cut or go to some dead end and have these things properly fixed up with a sanitary pail?[121]

Apart from their "stink...which runs right through the mines",[122] the privies of the black mineworkers were a

source of infectious bacteria, particularly the tubercle bacillus, which was spread by many Africans who had tuberculosis of the alimentary canal.[123]

Clearly the state of the privies caused black mineworkers to dislike them: Africans had to be "policed" to use their facilities.[124] Contemporary mine managers, officials and health officers claimed that Africans did not use the privies because of their "bad", "filthy" habits and "ignorance".[125] But an important reason that the Africans avoided using the latrines was their offensiveness. Management often failed to ensure that the excrement was covered with earth or sawdust and that the open buckets were disinfected.[126] Despite the general unhygienic features of the underground sanitation, particularly those relating to African mineworkers, it was not until 1918 that detailed legislation accorded mine sanitation the "seriousness which the circumstances warrant".[127]

Faecal contamination of the underground workings also caused mineworkers to be vulnerable to contracting ankylostomiasis - miners' anaemia.[128] The half-inch nematoid worm, which causes ankylostomiasis, also known as hookworm disease, lives in wet or muddy environments under temperatures exceeding seventy degrees Fahrenheit and needs the human intestine to deposit its eggs which are then passed outside. By means of their hook-like mouths and conical teeth the larvae, deposited in the stools, penetrate the skin of

man through his hair follicles - the worms can also be ingested - so causing pustular eruptions, which the Cornish miners called "bunches".[129] Passing into the blood stream, the parasites reach the alimentary canal causing severe indigestion, the swelling of limbs, palpitations, shortness of breath and anaemia; the disease may be chronic for several years or fatal within a few months. Ankylostomiasis is related to unhygienic habits and is preventable, as an article in the *British Medical Journal* indicated in 1903:

> The presence of one infected workman, if he be careless in the disposal of his faeces in the mine, is sufficient to contaminate all the men who are working therein. By means of personal cleanliness on the part of the miners and the fulfilment of hygienic requirements in the mines by the proprietors, ankylostomiasis can be completely got rid of.[130]

Starting in 1896, by 1902 ankylostomiasis reached epidemic proportions in several Cornish mines, particularly the Dolcoath Mine.[131] The prevalence of the disease prompted the British Home Office to appoint a commission, under Dr John Scott Haldane, to investigate its occurrence and to recommend measures for its elimination.[132] The relationship of this commission to ankylostomiasis is one reason for its importance. The second is the extension, in 1902, of the commission's terms of reference; its scope was broadened to include an enquiry into the incidence and prevalence of silicosis in Cornwall. For the first time since the appointment of the Kinnaird Commission in 1864, the state briefed health officers to

investigate silicosis in British mines.[133] The British Home Office instituted the enquiry in response to the high mortality from silicosis, during the period 1900 to 1902, amongst Cornish miners, particularly amongst returned miners who had worked on the Witwatersrand before the outbreak of the Anglo-Boer War in 18 [134]

The Witwatersrand mines were generally free of the hookworm's ova.[135] This was despite the poor hygienic state of the underground workings. The ova could not survive the acidity of the underground water which, like the salt water of the Levant Mine in Cornwall,[136] the workings of which were beneath the sea, acted as a form of disinfectant.[137] For this reason the Witwatersrand mineowners and the health officers were complacent about the underground sanitation,[138] and failed to alert white and black mineworkers to the dangers of ankylostomiasis.[139] The disease often erupted, both before and after the Anglo-Boer War, in the underground mines of Kimberley and in the collieries of Natal.[140]

Despite the "immunity" which the acid waters of the Witwatersrand mines provided against the "dreadful scourge of ankylostomiasis",[141] a major outbreak of the disease occurred on one of the deep level mines in 1906. Officials refused to reveal the mine's identity.[142] This outbreak showed that the underground sanitation was extremely poor and that the ventilation to cool the mine was markedly inadequate.[143] Management took immediate remedial precautions, but

also ensured that the "official enquiry" was "hushed up".[144]

The mineowners and their public relations arm, the Chamber of Mines, entirely concealed the occurrence of ankylostomiasis on the Witwatersrand mines. But the epidemic of the disease amongst both black and white mineworkers on the one mine in 1906 was by no means an isolated incident:[145] the medical literature on the period shows that doctors often detected cases of the disease, some of which were fatal.[146] Through good fortune and chance, rather than through assertive health intervention, ankylostomiasis was a relatively minor disease on the Witwatersrand gold mines. Even so, its existence on the Reef was evidence of the marked underground pollution which promoted bacterial spread, particularly tuberculosis.

Another source of bacterial infection was the underground water. The mineowners refused to have water service pipes installed which would provide fresh water for their underground work complements;[147] the major sources of water were the sumps and the tanks. As these containers were filled with water from the drains, it was polluted.[148] Management's practice of locating the latrine drains in close proximity to the general drains intensified the contamination.[149] The "stinking holes", which provided water containing "urine" and "droppings", were a bacterial risk for thousands of mineworkers,[150] particularly for Africans who "freely" drank the

underground water.[151] As contemporary medical opinion confirmed, tuberculous infection caused mineworkers, already stricken with chronic silicosis, to develop progressive massive fibrosis.[152]

As we saw earlier, one of the important advantages of the Witwatersrand mines was the minimal presence of underground springs: the need for underground pumping was minimal.[153] But the absence of springs caused the dust released in mining operations to be exceedingly dry, so intensifying the risk to miners of contracting silicosis on the Reef.[154] Also, management's failure to provide fresh underground water was a major obstacle in the combat of silicosis. When management introduced wet preventive methods to allay the dust, miners, as we shall see, were for many years obliged to use the contaminated water.

With the help of the former British mining inspectors, A. Sawyer and E. Williams, mentioned earlier, the republican Mines Department, following hygienic precedents in Britain and "other countries",[155] enacted regulations, in the mining laws of 1896, 1897 and 1898, for the building of change houses on the surface of the mines. Each change house had to be a room proportionate in size to the number of underground workmen and one in which they could change and dry their clothing.[156] Unlike those in Britain, European countries and Australia, the republican regulations did not detail the construction

requirements for change houses and the necessary amenities.[157] But the intention of the republican government - and that of the British administration later - was that the Witwatersrand change houses should comply with the overseas practices, which Sebastian Valentyn van Niekerk, the Medical Inspector of Mines, defined in 1914:

> Change houses are buildings [close to the mine shaft] fitted with steam-pipes, hot water basins, and showers and lockers. In these houses the miners change their ordinary wearing apparel for the clothing they wear underground, changing back again before they leave the mine at the conclusion of their day's work. The working clothes hanging in the lockers overnight are dried by the steam-pipes and are thus ready to wear next day.[158]

There was no penalty for the infringement of the republican change house regulation and mining inspectors did not enforce it. Consequently "many mines" did not provide any form of change house.[159] On a handful of mines management went to "considerable expense"[160] - "several thousand pounds[161] - to build "efficient" change houses.[162] But, as with the provision of underground latrines, most mines complied with the letter and not the "spirit" of the law. Indeed, the condition of most change houses was a "scandal".[163] Many were built of tin and were located at a considerable distance from the shaft head; after miners had emerged from the heated atmosphere of the mine, they were exposed to intense cold until they reached the change house. Also, the change houses were dirty, unheated and poorly lit and lacked

essential equipment, including baths, hot water, adequate lockers and hanging facilities.[164]

In the absence of change houses miners could not avoid the risk of chills. They contracted colds on returning from the mines to their living quarters and through wearing damp and sodden work clothing, which they could not dry in their rooms.[165] Chills set up irritations in the lungs, so "laying miners open to infection by tubercle bacilli".[166] Chills also caused miners to be vulnerable to contracting pneumonia.[167] Pneumonia aggravated chronic silicosis and was especially damaging and dangerous in miners who had progressive massive fibrosis, particularly when the condition was "complicated" by tuberculosis.[168] Also, their wet, unclean and "perhaps faecally contaminated working clothes", which often stank of nitrous fumes, polluted their living quarters.[169] In their own right, as we have seen, the single quarters on the mines were a major source of bacterial infection, particularly tuberculosis.

The Weldon Commission affirmed the hygienic principle of change houses on mines: it recommended that the industry build, within reasonable distance of the shafts, heated change houses;[170] and the suggestion was incorporated in the mining regulations of 1903.[171] As the new measure was identical to the provision in the republican mining laws,[172] it was similarly flawed being vague and lacking detailed instructions.

A few mining directors provided "efficient" and "excellent" change houses.[173] But for reasons of cost, most mineowners, as they had done in the past, virtually ignored the regulation until 1910: some mineowners merely provided a room as a change house without equipping it with heating apparatus and other facilities.[174] During the entire period from 1892 until World War 1, the Robinson mining house neglected the hygiene of its miners and failed to construct adequate change houses, which were a relatively minor precaution against silicosis.[175] Indeed, the Robinson group showed a complete disregard for the health care of both its white and black workforces.[176]

After 1906 the vigilance of the Transvaal Miners' Association and the pressure which its organisers exerted on mining inspectors to coerce management to comply with the change house regulations, had beneficial results: by 1910 most mines had "satisfactory" change houses.[177] But as late as 1912 the "accommodation" of the change houses on "some mines" was still "hardly sufficient";[178] the "sheds" on the Robinson group's mines persisted.[179] One of the grievances of the miners' strike committee in 1913 was that the Witwatersrand change houses were generally markedly inferior to those at Kimberley.[180]

Although health officers blamed the miners for not using the change houses,[181] most miners recognised their benefit:[182] they avoided the change houses only when they were deficient. Except when the Department

of Mines coerced the mineowners to comply with this minor medical precaution against silicosis, they were clearly reluctant, if not sluggish, about doing so. As we shall see later, the Randlords were even more indifferent to implementing efficiently major precautions against silicosis: both dry and wet methods for dust prevention involved greater outlays of capital than the provision of change houses.

The Weldon Commission recommended that the industry build change houses for Africans as well as for white mineworkers.[183] But under Crown Colony government the Transvaal Mines Department, like its republican predecessor, did not view change houses as being necessary for black mineworkers: it did not prescribe the provision of African change house in the mining regulations of 1903. A few mining directors voluntarily provided change houses for Africans. But the practice was exceptional.[184] For several reasons management did not regard change houses as being essential for African underground mineworkers. First, management did not consider the black mineworkers as being prone to silicosis. It followed the medical view which held that: "So-called *miners' phthisis* is sometimes seen amongst the natives, in boys who have been engaged in underground work over considerable periods."[185] Also, although a committee of mine doctors in 1903 recommended that the industry construct simple warmed change houses for Africans at the headgears,[186] most mine managers did not believe

that Africans needed them.[187] Management argued that the Africans' work clothing was not a source of tuberculous or other bacterial infection in the compounds.[188] Africans "went to work with just their nakedness covered",[189] that is they wore only a loin-cloth for underground work.[190]

Finally, because of the Africans' preference for wearing scanty clothing underground, management also asserted that, if it provided change houses, Africans would refuse to use them. The premise for this contention was the Africans' avoidance of the change houses on the few mines, including the Witwatersrand Deep, where the mineowners had provided them.[191] But a mine inspector, J. E. Vaughan, disagreed with this rationale of the Association of Mine Managers. In advocating their necessity for reasons of health, Vaughan added:

> Judging by the way one sees mine natives washing in pools on the veld after coming up from below ground, they would make use of the washing accommodation and comforts provided in a change house.[192]

Like the "indifferent" miners, whom management accused of neglecting their facilities,[193] most black mineworkers, too, did not use the few available change houses because of their spartan and distasteful conditions.

When the Coloured Labourers' Health Regulations of 1906 stipulated that change houses be built for Africans, not surprisingly the Chamber of Mines

opposed the provision on the ground of expense.[194] Instead, with the support of the mine doctors, the Chamber agreed in 1907 to build shelters, or waiting-rooms, which would be warmed during winter, at those shafts situated at some distance from the compounds.[195] The intention of the shelters was to reduce the Africans' risk of "exposure to wet and bleak weather". Such exposure aggravated the danger of Africans "contracting acute respiratory disease" - pneumonia - which was the major cause of their mortality.[196] Even so, the watered-down substitution of shelters for change houses, enacted in the mining regulations of 1911,[197] was a dead letter;[198] many mining directors took advantage of the clause by which they could apply to inspectors for exemption from building them.[199]

From 1911 the Department of Mines, with the agreement of the mining houses, enforced the regulation solely in the case of "tropical natives", namely those Africans who came from areas north of Latitude 22° South.[200] The reason for the industry's compliance regarding tropical Africans was the excessive mortality amongst them from pneumonia. In May 1911 the annual death rate from all causes amongst the Nyasa Africans and those from Zambesia, Quillimane and Tete was 121,4 and 122,4 per 1 000.[201] In contrast, the mortality amongst Mozambican Africans, who came from the east coast south of Latitude 22° South was considerably lower: from December 1910 to

May 1911 their death rate ranged from 27,5 to 37,4 per 1 000. By comparison, the annual mortality figures for black mineworkers born in South Africa who came from the Transvaal and from Zululand combined with Natal were 19,8 and 10,4 per 1 000.[202] Pneumonia was the single largest contributor to the mortality. In 1913 its toll of the total mortality was 55,28 per cent amongst tropical Africans and 40,25 per cent amongst Africans who came from areas south of Latitude 22° South.[203]

The high mortality amongst tropical Africans appalled Henry Burton, the Union Minister of Native Affairs: privately in 1911 and publicly in 1912, he warned the mineowners that, if the death rate was "not reduced", he would prohibit African recruitment in the areas north of Latitude 22° South.[204] Although their death rate persisted "tragically" in 1912,[205] Burton did not carry out his "promise" to the public to stop their recruitment.[206] But in June 1913 his successor, Jacobus Wilhelmus Sauer, halted tropical recruiting with immediate effect.[207] Sauer was obliged to do so. In response to questions asked in parliament by F. H. P. Creswell, the parliamentary leader of the South African Labour Party, in May 1913 Sauer disclosed the "shocking" death rate of the tropical Africans in the WNLA compound.[208]

Since August 1907 a regulation had obliged the mineowners to detain underground black mineworkers, recruited in tropical Africa, at the WNLA compound for

a month so that before their distribution to the mines the Africans could be "acclimatised" and receive medical and dietary supervision.[209] To a shocked Union parliament Sauer revealed that in March and April 1913 the mortality of tropical Africans in the WNLA compound had been 229,7 and 214,6 per 1 000.[210] Sauer's replies to Creswell's questions further showed that since 1910 the industry had provided the Native Affairs Department with only the figures for "tropical" deaths on the mines. By excluding the deaths in the WNLA compound from its 1910, 1911 and 1912 returns, the industry had substantially reduced the average annual mortality figures for both tropical and all other Africans. The industry's "falsification" of the mortality figures intensified public outrage;[211] the public agreed with J. X. Merriman, the former Prime Minister of the Cape Colony, that the "state of affairs" was "nothing short of murder".[212]

Many reasons account for the high prevalence and mortality from pneumonia amongst African mineworkers.[213] The workers came from areas of mild climatic conditions, where they led a type of community life in which close contact was limited to the family. When they went to work on the Witwatersrand mines, the mineowners transported them to living conditions which were both insanitary and overcrowded. This set the stage for the spread of infectious disease. Also, working conditions were physically harsh with exposure to extremes of

temperature and humidity. Such circumstances rendered this "immature" immunological community susceptible to invasion by bacteria and viruses. Not surprisingly, the prevalence and death rate from lung diseases, particularly from pneumonia, were high. Africans, especially those from the tropics, had minimal resistance to this bacterial disease, which spread rapidly to produce epidemics of pneumonia.[214]

Had change houses been built, the temperature adaptation of the tropical Africans might have been improved. But exposure to fluctuating temperature and humidity changes was only one factor in the cause of pneumonia epidemics. Any significant improvement in the incidence of and mortality from pneumonia required radical changes in both social and medical services for African mineworkers. The industry, as it later discovered, could not separate medical prevention and therapy of the disease from social prevention and therapy;[215] it needed to improve each of these broad areas simultaneously by conferring on the mine doctors both the authority and the funds to institute medical health care in the wide sense of the term.[216]

In fact, the industry's implementation of medical health care in the successful combat of pneumonia took several decades and involved huge capital expenditure.[217] In 1934 the South African government, under pressure from the mining directors, allowed the industry to recruit a limited number of tropical Africans on an "experimental basis", prescribing

strict conditions concerning their engagement.[218] As the experiment proved a success, after 1937 the state permitted the industry to resume large-scale tropical recruiting.[219]

As with pneumonia, the industry's piecemeal application of preventive measures to silicosis retarded significantly any reduction in the incidence of the disease. The mineowners - and the state - needed to apply medical and hygienic precautions simultaneously with dust precaution measures. The eventual construction of change houses, an important hygienic provision, helped to lessen the miners' vulnerability to chills and pneumonia, which their dust-laden lungs aggravated. Also, the building of change houses obviated the necessity for miners to take to their living quarters dirty clothes contaminated with germs and poisonous fumes, so aggravating their vulnerability to lung disease. The Weldon Commission viewed the institution of change houses as being a necessary medical precaution against silicosis. But the provision of change houses was a general public health precaution and a relatively minor measure in the combat of this occupational disease.

We have established that the Witwatersrand mines were relatively free of natural gases. Yet miners complained constantly that the presence underground of noxious fumes and gases lowered their vitality and made them vulnerable to silicosis.[220] Therefore we

must examine the reasons for the existence of poisonous gases and the level of their concentration. In analysing the vitiation of air by gases during the 1890s and in the immediate period after the Anglo-Boer War, we rely on two main sources: first, the personal experiences of miners; and second, the tests, from 1904 to 1907, of the chemist to the Mines Department, Dr James Moir. Management improved the natural ventilation on a few mines during the period 1903 to 1904.[221] Even so, Moir supported the miners' view that the "conditions of mining here are more adverse to ventilation than at home".[222]

In evidence to the Weldon Commission, three chemists presented their analyses of air samples taken by officials from the Transvaal Mines Department.[223] The conditions which they tested in 1902 were a fair reflection of those which prevailed during the 1890s.[224] But the Haldane Commission rejected the chemists' findings "for their serious errors": the carbon dioxide levels were so high that "work could not possibly be carried on in such an atmosphere".[225] Later Haldane learned that the air samples, but not their analyses, were "unscientific". In a letter to the *London Mining Journal* of October 1905 Haldane apologised publicly to the Transvaal chemists for casting doubts on their professional competence.[226] Having received the apology, the *amende honorable*, Moir conceded that the air results were inaccurate.[227] Nevertheless he went to great lengths to prove to

Haldane that the deleterious gas pollution, which he had discovered in the controversial analytic examinations of 1902, was a reality.[228]

After up-to-date equipment, ordered from Britain, had arrived in the Transvaal by 1904,[229] through exhaustive air tests, Moir proved that the vitiation of the air on the Witwatersrand mines was infinitely worse than the air pollution in Cornish and Australian mines. In 1906, in a paper addressed to the Chemical, Metallurgical and Mining Society of South Africa, he indicted "ten of the principal mines of these fields" for their "scandalous unhealthiness".[230] Most mine managers rejected Moir's findings; they argued that his samples were "based on second-hand information" and consequently his results were "half truths" lacking "conclusive proof".[231] Despite concerted managerial opposition, Moir remained resolute. Showing integrity and independence he presented the same findings to the Mining Regulations Commission of 1907.[232]

According to the Haldane Commission, which took a firm and critical stand in its report on "miners' phthisis" in Cornwall, the small flow of air in the directed ventilation currents, together with supplementary exhaust air from the machines, provided an adequate volume of air for Cornish developers in the blind ends. The commissioners also found that the air, which was exhausted into the atmosphere after performing work on the machines, was fresh and cool

and promoted the miners' health, vitality and efficiency: the commissioners considered the exhaust air to be "superior" to "an equivalent volume of ordinary mine air".[233]

The circumstances were markedly different on the Witwatersrand, particularly during the 1890s. As we have seen, there was no directed ventilation whatsoever to the blind development ends: miners relied for ventilation solely on the exhaust air of the machines.[234] Under optimum conditions the miner and his African helpers might receive the required volume of air, namely seventy cubic feet per minute per person, but only when they were in the immediate vicinity of the rock drill: the exhaust air had no effect on the "stagnant" atmosphere of the "dead-end" 100 feet behind the machine.[235]

The beginning of each shift was an unpleasant experience for the developer as the thick atmosphere, polluted by gases and fumes, "exhausted" him until the machine started working:[236] it often took a "considerable time" to clear the working place and to rig the rock drill.[237] When doing other jobs the developer was obliged to keep the machine running. But if it broke down, or if the compressor was stopped for maintenance or repairs, in the absence of exhaust air the developer and his assistants were overcome with headaches or dizziness.[238] Clearly management on the Witwatersrand regarded the secondary function of the machines, the supplementary supply of air, to be

as important as their primary function, namely that of drilling holes. Unlike mining centres elsewhere, on the Reef exhaust air from the machines was the sole and not a supplementary source of ventilation for developers.

Although the volume of exhaust air complied with regulation, unlike machine air in other mining centres, including Cornwall and Western Australia,[239] its quality on the Witwatersrand was invariably so poor as to be "extremely dangerous to health";[240] the compressor "usually" produced "tainted" air.[241] This was because management failed to take "precautions that pure air should be supplied to the drills".[242] Mine managers often located the compressors in dirty engine rooms or workshops, so providing the compressors with a contaminated intake of air.[243]

More important, to lubricate the cylinders of the compressor engine the mineowners used cheap oil with a low flash point.[244] Superior, but expensive oil, gives off vapours at only exceedingly high temperatures. But the heat and pressure in the cylinders caused the cheap oil with a low flash point, when it got hot, to release sulphur and carbon compounds, particularly carbon dioxide, so reducing the air's oxygen content.[245] Instead of improving local ventilation, the exhaust air from the drills forced into the blind ends the noxious products of combustion. In 1902, according to the Government Mining Engineer: "It became impossible for the miner to work his drill in a

confined place owing to the suffocating gas emitted."[246]

The Weldon Commission recommended that the industry should avoid the use of low flash point oils in the compressor engines.[247] But the Transvaal government did not enact a measure forbidding the use of cheap lubricants: the "scare" created by the revelations of the Weldon Commission caused many mineowners voluntarily to improve the quality of the oils.[248] Miners continued to complain vociferously that the exhaust air was "suffocating";[249] and in 1907 Thomas Mathews publicly alleged that the oil was "the cheapest and rankest in the world".[250]

In 1907 Moir advised the Mining Regulations Commission to disregard the complaints of miners concerning the contamination of exhaust air. He agreed that the compressed air smelled "offensive", but argued that it was not generally unhealthy.[251] Even so, by recommending the enactment of a regulation forbidding the use of low flash point oils, Moir implicitly affirmed the legitimacy of the miners' grievance: some mineowners were still using low flash point oil.[252] The commission agreed with Moir that local ventilation was deficient. But it also concluded that, unlike the earlier years, compressed air was no longer generally "deleterious". Despite the miners' complaints of its "staleness", the commissioners found compressed air to be an important and healthy source of ventilation in blind ends.[253]

Further, the commission rejected Moir's plea for the installation of mechanical ventilators in the blind ends.[254] Mine managers had earlier argued in opposition to Moir that such a resort, which would be of benefit to only five workers at a time, was "absurd"; it was not cost effective.[255] By ignoring Moir's recommendation the commission, like the mining house directors, displayed both a lack of economic foresight and a disregard for the health of developers. Blind ends, which had the poorest air supply and the greatest concentration of air pollution in the mines, also possessed the highest levels of fine and lethal dust. As we shall see later, blind ends were the most dangerous source of accelerated silicosis.

In 1906 H. F. Marriott, the consulting mining engineer for the Corner House, in a report on the "Ventilation of Rand Mines", advised that for the financial reason of "*labour efficiency underground*" artificial ventilators were necessary.[256] But the Corner House, as it had done with a similar report presented in 1899, shelved his proposals because they "would have meant an increase in working costs".[257] In 1925 Marriott publicly declared that, if the Corner House had implemented the recommendations of the 1899 and 1906 reports, "miners' phthisis would never have become the scourge it did, and shareholders would have benefited by millions of pounds". Marriott added:

> Action still tarried, and some time elapsed before even such a simple experiment as

> installing a fan was made...But it was too late. The mischief had been wrought. The seeds of phthisis had been sown, broadcast and had germinated, cutting off thousands of men in their prime and burdening the mining industry with compensation awards for millions of pounds. Instead of the small outlay originally suggested, which had been begrudged, money had to be poured out to make the mines workable at all, for they had become so bad that no one could work in them for long without succumbing to the fell disease.[258]

It took many years before the state and the mining houses took significant steps to improve ventilation, particularly local ventilation. Therefore until the late 1920s miners had no option but to continue breathing compressed air in the blind ends.[259] More important, the attitude of the state and the mining houses towards improved ventilation is indicative of their piecemeal approach towards eliminating silicosis. As the report of the Mining Regulations Commission indicated, the main reason for such procrastination was the high cost to the industry of important improvements in ventilation.[260]

We have earlier seen that nitrous fumes are not a direct cause of silicosis. Even so, the gas can injure the defense mechanisms of the respiratory system, so rendering the lungs vulnerable to dust damage.[261] Consequently we must now explore the source and concentration level of nitrous fumes on the Witwatersrand mines.

In laboratory experiments dynamite, or other nitroglycerine explosives, yield virtually no traces of carbon monoxide and nitrous fumes. But under practical conditions, "even when shots are fired

perfectly satisfactorily", such explosives, including gelignite and the more powerful gelatine, release small amounts of the gases.[262] The Haldane Commission found that the small quantities of carbon monoxide, nitrous fumes, carbon dioxide and smoke, which blasting released, caused "no appreciable harm" to the Cornish miners.[263]

But blasting conditions on the Witwatersrand were markedly different from those in Cornwall. As Moir illustrated, the Reef gold mines used far greater quantities of explosives than any other mining centre in the world:

> As regards the quantity of explosives used, one can only describe it as enormous. Cases are known in which well over 1,400 lbs. are exploded daily by a single mine. (Dolcoath [in Cornwall] in 1903 used 125 lbs. per day). As regards the average consumption the Chief Inspector of Explosives' reports show that the present annual consumption of explosives on the Witwatersrand is about 24,000,000 lbs., which divided over 80 mines and 310 working days, works out at 960 lbs. daily in each mine. It may be said that the Rand mines are much larger than those in other countries, and therefore use more explosives, but I find the amount of explosives used per ton blasted is also much higher than in any other country. The number of tons blasted on the Witwatersrand is about 19,000,000 per annum, hence explosives per ton blasted=1.26 lbs. (in Dolcoath, for comparison, the figure is 0.36 lbs.. per ton).
>
> The quantity appears to be about 1.0 lbs. in stoping and 2.5 lbs. per ton for development.[264]

Also, on the Witwatersrand two factors, which were absent from other mining centres, intensified the air vitiation from blasting: first, the enormous

number of "miss-fires" , or incomplete detonation of the fuses during blasting; and second, the accelerated scale of development and production which required intensive blasting.

Incomplete detonations, or "miss-fires" as the miners called them, caused the dynamite to burn - it did not explode - so releasing into the atmosphere considerable quantities of carbon monoxide, carbon dioxide and nitrous fumes.[265] Management invariably blamed the miners for "miss-fires", accusing them of carelessness and incompetence when they tamped the fuses.[266] There were undoubted instances of worker negligence. But the main reason for the frequency of "miss-fires" was the poor quality of the detonators, fuses and explosives that the mineowners used during the 1890s. Like their preference for cheaper but inferior compressor oil, before the Anglo-Boer War most mineowners used the same criteria for buying sub-standard blasting equipment.[267]

One of the Weldon Commission's recommendations was that management should import and buy only the "best quality of dry fuses and detonators" to prevent "miss-fires".[268] Although this was only a subsidiary recommendation, in 1904 the vigilant Colonial Office secretariate prompted Alfred Lyttelton, the Colonial Secretary, to enquire whether the Transvaal government had taken steps to ensure the precaution.[269] Self-interest and the need for "economy", rather than an equal regard for the health of their underground

workforces, prompted the mining houses to commit themselves to the recommended measure. Although occasional "miss-fires" continued to occur,[270] in 1907 neither Moir nor the miners had serious complaints about the quality of the industry's explosives, fuses and detonators.[271]

All the same, both Moir and the Transvaal Miners' Association criticised the industry for its poor provision of ventilation: the air currents were too small to dilute the gases released in blasting. The air in every part of the mine was filled with a "mass" of smoke and nitrous fumes which,[272] according to George Sullivan, a British miner with world-wide experience of hard rock mining, never subsided:

> There is a stink here - there is the fumes from the blasting, and bad fumes which lay around the mine longer in this country than in any other country I have ever seen in my life. In other places you can blast at any time and all the smoke gets out of the mine, but here it does not. It hangs around like the smoke in the stope and you can smell it for days afterwards.[273]

The air vitiation from blasting even pervaded the waiting stations located at intervals alongside the downcast shaft. Waiting stations were enlarged chambers which were cut out of the rock at the intersection of the shaft and the levels and served as landing places for the cages.[274] At the end of their shift mineworkers, with their hands covering their faces for protection, stood at the waiting stations amongst the fumes and smoke for fifteen minutes to an hour, while the winding engine drivers hoisted the ore

to the surface.[275] Clearly the demands of the mills had priority over the health needs and comfort of the mineworkers.

Such "vile" pollution caused miners acute discomfort: they endured "fearful headaches and dizziness" and depleted "vitality".[276] Also, the pollution resulted in miners being "gassed", as James Coward, one of the organisers of the Transvaal Miners' Association, illustrated in 1907:

> If you don't blast in a winze for a week you can go down there. In some winzes you blast there and you cannot get down there for two or three days...I have had a lot of experience of gassy winzes, and I am sorry to say I have been knocked out a few times with them.[277]

Of equal importance, the nitrous fumes depressed the defense mechanisms of the miners' respiratory systems, so causing them to be vulnerable to silicosis and other respiratory diseases, including tuberculosis, pneumonia, emphysema and bronchitis.

Apart from the virtual absence of air flow, another reason for the vitiation of the air by explosives was the intensity on the Witwatersrand of development and production. On the tin mines of Cornwall, where development was "not usually carried out under great pressure", the miners "as a rule...allowed considerable time to elapse before returning [to the development faces] after blasting";[278] they gave the fumes in the blind ends sufficient time to clear. But on the Witwatersrand,

because of both the contract system and the compulsion by management on developers to finish the fixed daily drilling task, the Rand gold miners neglected the precaution.[279] Developers on the Witwatersrand blasted at least twice a shift: promiscuous, or in-shift, blasting was the rule. Moreover, the industry's demand for efficient miner performance was so intense that, if the holes did not "break" with the first explosion, the developer would immediately return to the face, in the thick of the smoke and the fumes, to retamp them.[280]

The two-shift system on the Witwatersrand compounded the vitiation of the mines by nitrous fumes. Two ten-hour shifts was the rule on most of the mines: the day shift was from 7 a.m. to 5 p.m; and the night shift lasted from 7 p.m. to 5 a.m.[281] Between each shift, therefore, there was only a two-hour interval for the smoke and fumes, caused by blasting in production, to subside. Most other metalliferous mines also worked a double shift. But, as the scale of production in an average mine elsewhere - in Britain, Australia and America - was much lower than that of the average Witwatersrand mine,[282] there was relatively less blasting. Consequently the fumes on such mines could dissipate more rapidly than on the Reef mines. The "speeding up" of development and production, as Moir confirmed, caused the release of nitrous fumes on every Rand mine to be "*quite ten times as great as an English mine* of

similar size".[283]

In the general atmosphere of the Witwatersrand mines dust, like poisonous gases, was not naturally present in appreciable quantities. But it was released in many mining operations.[284] As we have seen, the concentration of nitrous fumes generated in blasting in an average Witwatersrand mine was ten times heavier than in an average British hard rock mine. Likewise, the quantity of dust similarly created in a Witwatersrand mine must also have been markedly greater than in a typical British metalliferous mine, or one overseas. In fact, dust levels in the Witwatersrand mines were at least ten times higher than those in the Cornish mines. In 1902, for instance, gravimetric analyses of dust samples prepared for the Weldon Commission showed an average of 307 milligrams of dust per cubic metre of air at the face of the drive.[285] In 1910 the Transvaal Department of Mines conducted a dust survey in which it weighed nine samples: the measurements ranged from 61 to 530 milligrams per cubic metre of air and averaged 170 milligrams.[286]

The results of the dust tests made in 1902 and 1910 cannot be directly compared with one another as neither test provides details for the sampling methods nor for the selection of the sampling sites.[287] Likewise, because the methods and procedures for taking dust samples on the Witwatersrand differed from those taken in Cornish mines in 1904,[288] we cannot use

the Transvaal and British tests to judge the regional differences in the dust levels. All the same, the results of the dust tests on the Witwatersrand are valuable. Although few in number, the tests confirm subjective reports of dust conditions.[289]

We quoted earlier an extract from a book in which the author, Lewis Mariano Nesbitt, the mining engineer who had been trained at the Camborne School of Mines, described the "nightmare" conditions of the dust in the Witwatersrand gold mines during the period 1912 to 1914.[290] His graphic but general illustration now needs detailed investigation. We shall first examine the quantitative and qualitative differences between dust generated by rock drills and hand drills and then explore the dust levels in each of the development and production processes. The analysis relies on two kinds of sources: first, the findings of various commissions on silicosis during the period 1902 to 1912, particularly the Union of South Africa's Medical Commission, which investigated "miners' phthisis" and tuberculosis; and second, the subjective experiences of mining personnel, including health officers, state officials, mine managers and miners.

In the absence of any dust precaution measures during the 1890s, the process of rock drilling produced greater quantities of dust, with far more fine particles, than the process of hand drilling.[291] Rock drills, as mentioned earlier, were originally designed to be used with water in order to prevent the

machines from becoming over-heated.[292] During the latter part of the 19th century British and European mining engineers were well aware that the use of machine drills with water protected the health of the drillers: during the 1870s and the 1890s the safeguard proved effective when rock drillers excavated the St Gotthard and the Simplon tunnels through the Alps between Italy and Switzerland.[293]

But water did not generally accompany the use of machine drills in mining. World-wide both management and the miners abandoned the use of hoses attached to cisterns or pipes: the provision of water meant additional expense for management and the use of water slowed down the miner's daily progress.[294]

Miners on the Witwatersrand did, indeed, use water, but only for sludging. In both hand and rock drilling miners poured a little water into the hole to facilitate the progress of the drills. But they did so only after they had "collared", or started, the hole. "Collaring" caused large quantities of dust, chips and minute fragments to "fly off in all directions"; the starting of the hole was, therefore, the most dangerous part of the drilling operation.[295] In 1904 two British investigators, W. P. D. Macqueen and R. A. Thomas, who tested dust levels in Cornish mines, found that machine drill collaring produced four milligrams per litre of air.[296] In 1906 Macqueen, who had become a mine manager on the Rand, in condemning "the primitive method" of throwing water

into the hole with a condensed milk can, described the practice on the Witwatersrand:

> The usual method of using the can is to wait until the hole will "carry water", that is, when it has reached a depth of about 3 in., and then to commence throwing water, by which time a large quantity of dust has escaped in the air.[297]

Sludging undoubtedly decreased the amount of airborne dust. But miners could use water in this way only when drilling holes, either by hand or machine, in a downward direction: miners called such holes "downers"; and when they excavated the ore, the miners termed the method "underhand" stoping.[298] When miners drilled holes in a horizontal or an upward direction, they called them back holes, or "uppers":[299] in production they named the method "overhand" stoping.[300] Throughout the boring of "uppers" the holes were drilled dry; and the dust, estimated at fourteen milligrams per cubic foot per machine, remained in suspension, so causing the miners to inhale it.[301] Also, the dust from "uppers" often physically enveloped the workers in "thick volumes".[302]

The drilling process, whether by hand or by machine, released variable quantities of dust depending on the direction of the holes. But, if the direction of the hole was identical, for two reasons rock drilled holes released more dust and a greater quantity of tiny particles than did hand drilled holes. There were two reasons for this. First,

machine drilled holes were larger in diameter and longer in distance than hand drilled holes; and second, they required greater quantities of explosives and stronger varieties. Consequently the charges of rock drilled holes generated more dust of a finer quality than did the charges of hand drilled holes.[303] This phenomenon was self-evident, as an article in the *South African Mines, Commerce and Industries* indicated:

> Machine work always causes from 10 per. cent. to 20 per. cent. more "fines" than hand work. This being the case...how much more dust is machine work, with its attendant heavy charges of explosives, responsible for, than hand work with its light charges and much less ground broken in an equal area.[304]

In absolute terms there were more rock drills in use on the Witwatersrand than in Cornwall or elsewhere: in 1904 there were 320 rock drillers in Cornwall compared to 2 092 on the Witwatersrand.[305] In relative terms, too, the same contrast held good. In Cornwall machine drills were used mainly in development; as the Haldane Commission indicated, proprietors of tin mines rarely deployed rock drills in production.[306] It is likely that in 1904 - and during the 1890s - each of the fifty-eight Witwatersrand producing mines used on average one-tenth of the total number of machines in use in Cornwall;[307] in 1906 an average Reef mine had "over seventy machines regularly at work".[308] A large deep level mine had even more. For instance, when the City Deep, a second-row deep level mine, began producing in

1910, it deployed sixty-four rock drills in stoping and forty-three in development. Although it had a hand drill complement of 2 000 "hammer boys", 75 per cent of its production was done by machines.[309] Through the use of machine drills alone each Witwatersrand mine produced a minimum of ten times more dust than a hard rock mine of equivalent size elsewhere.

In the virtual absence of underground springs the dryness of the Witwatersrand rock intensified the dust levels; in metalliferous mines in other parts of the globe the presence of underground water damped the rock, so serving as a natural dust preventive.[310] More important, it was the conditions under which the miners operated the machines that made them more vulnerable to accelerated silicosis than rock drill operators elsewhere.

In addition to running the machines, in other mining centres rock drill operators were obliged to perform a variety of tasks.[311] Such tasks relieved them, even temporarily, from the constant exposure to the fine dust released in drilling. But specialisation was so strongly entrenched on the Witwatersrand that Transvaal rock drillers attended to work solely associated with the rock drills.[312]

Apart from prolonged periods of rock drill work and uninterrupted daily exposure to the machine dust, the conditions under which the Witwatersrand rock

drillers operated the machines intensified their exposure to excessive dust levels. Most of the factors, including the "much greater output" and the pressures of production and development,[313] which promoted the appalling pollution of the air, were also responsible for vitiating the air with dust. In particular, the absence of air currents caused the dust to be localised in the vicinity of the machines: it remained suspended in the air and accumulated on the floors and the walls of the rock driller's working pla .

By 1900 the high incidence and prevalence of silicosis amongst Transvaal rock drillers alerted machine drillers in mines all over the world to the dangers inherent in their work. For instance, during the first decade of the 20th century the Colorado miners called the machines "widow-makers";[314] and rock drill operators on the Witwatersrand termed their form of silicosis, namely accelerated silicosis, "machine fever".[315] All the same, after 1902 most rock drillers in Australia and America expected a working life of "fifteen to sixteen" years,[316] and not approximately seven years, as did rock drillers on the Reef.[317] After the Anglo-Boer War the Witwatersrand rock drillers believed that the conditions under which they carried out their task were "far more" detrimental to health in the Transvaal than in Cornish mines".[318] Haldane confirmed their opinion and Irvine and Macaulay agreed with him that all rock drillers on the

Witwatersrand were at risk of contracting accelerated silicosis.[319]

On the Witwatersrand the combination of "speeding up' with especially poor ventilation produced excessive dust levels in every part of the mine. Consequently the development of chronic silicosis in general miners, as opposed to the accelerated silicosis of rock drillers, was also far more rapidly progressive on the Witwatersrand than in metal mines elsewhere.[320] The manifestation of the disease in either its accelerated or slow-developing form depended on the level of dust released in each job. We begin our examination of the degree of risk attached to each avenue of mining work by analysing development tasks.

Except for shaft sinking, miners performing development tasks were at greater risk of contracting silicosis than miners doing production jobs. Although the Rand established world records in shaft sinking speeds,[321] for a number of reasons dust levels in this branch of mining were not unduly high: instead of dying from accelerated silicosis, shaft sinkers tended to contract a slower developing silicosis, which manifested itself when they were relatively older than other developers.[322]

Even so, the contention of shaft sinkers that their occupation generated a great deal of dust was valid.[32. Shifts were shorter than the customary

ten-hour shift and after blasting there were only ten-minute intervals between them: there were usually three consecutive eight-hour shifts per day.[324] There was little or no time for the dust to subside after blasting; and when shafts were machine drilled, most of the shaftmen were in close proximity to fine dust.

On the whole, however, shaft sinking was not a major dusty occupation. Most shafts were sunk by hand and not by machine drills;[325] there was a relatively large circulation of air in the shafts; and as all the holes were in a downward direction, they took water after "collaring, irrespective of whether they were drilled by machine or by hand.[326] More important, the wetted timber of the shafts helped allay the dust;[327] even during the 1890s shaft sinking was termed "wet work".[328]

In contrast to shaft sinking, driving, winzing and "raising" were highly dangerous dust producing occupations. Except for a few tunnels in the oxidised zone where miners used hand drills, invariably developers used machine drills.[329] All the development tunnels were in long blind ends. As we have seen, on the Witwatersrand the drives ran in a horizontal direction for distances ranging from 1 000 to 1 700 feet;[330] and the vertical tunnels, the winzes or "raises", which connected the upper and lower drives, were 100 to 500 feet in vertical depth.[331] In such confined areas, where virtually the only air circulation came from the exhaust air of the machines,

dust levels were inordinately high.

In sinking winzes miners used water for sludging, because all the holes were "downers". But thr- -quarters of the holes in the faces of drives were "uppers": only three of the thirteen odd holes were wet holes.[332] Worse than the drives, which an inspector of mines, C. J. N. Jourdan, in 1912 compared to "death chambers", were the "raises".[333] In drilling "raises" all six or seven of the holes were "uppers";[334] and as a drill-supplier, Reuben Greer, explained: "The enormous thick dust comes down on the man, and he is perfectly covered with it."

Blasting released even greater quantities of fine dust than did the drilling.[335] The average amount of gelatine used at each blast was about fifty pounds; and each blast dislodged approximately twelve to sixteen tons of rock, "much of it in a fine state of division".[336] Each blast produced so much dust that "one could not see a candle".[337]

The exposure of developers to dust was intensified by their practice of blasting promiscuously. In preparing a drive for blasting, the miners first drilled three of four holes to enclose a pyramid-like portion in the centre of the face, which they called the "cut". The remaining ten or eleven holes, which surrounded the "cut", were termed the "round". The "cut" and the "round" were then blasted separately. The reason that the "cut" was first

blasted was to provide a hollow for the blast of the "round", so reducing the explosive force which the charge would otherwise have required. But instead of waiting for the dust, fumes and smoke to subside after they had blasted the "cut", as was the custom in Cornwall,[338] the developers on the Witwatersrand would return almost immediately to the face to blast the "round".[339] The identical methods of drilling and blasting applied in winzing and "raising", except that the faces of these tunnels had slightly fewer holes.[340]

The contract system, "which placed a premium on breaking ground at any price",[341] tempted the miners to practise in-shift blasting:[342] they gained extra time to drill more feet during the same shift, a dangerous practice which management both encouraged and applauded.[343] Spokesmen for the industry were proud of "its excellent record for rapidity and cheapness of development" during the 1890s:[344] in 1896 developers drove 541 152 feet in levels and "raised" or winzed 57 935 feet in vertical tunnels.[345]

Of course Africans employed as helpers or machine operators under supervision faced the same dangers as miners in the blind ends. Also, Africans employed to tram and shovel the broken rock under the supervision of uncertificated gangers in the development tunnels both generated dust and were exposed to dust.[346] The dust released in the different mining procedures intermingled, so increasing the total dust density,

which was further intensified by the residue from the previous shift. The visible consequence of dust exposure was more noticeable with African mineworkers than with whites, as Sir Thomas Oliver illustrated:

> So great is the dust in the mines, that, as regards the kaffirs, their upper lip and parts immediate adjacent to the nostrils often appear greyish-white, as if powdered. This rime-like appearance stands out in contrast with their dark skin.[347]

In the absence of any ventilation the only time that the development ends were not enveloped in thick clouds of dust was on a Monday morning.[348] As the republican government did not permit work on Sundays except for essential reduction work,[349] the dust and fumes had twenty-four hours to subside - from 5 a.m. on Sunday to 5 a.m. on Monday. The description of development tunnels as being "death traps" was, indeed, apt,[350] as Dr Norman Fern showed in 1904:

> Unless one has actually witnessed a rock-drill in operation, especially when "raising", when it is frequently difficult to distinguish a man's form six feet off, and in "starting" holes in "driving" it must be hard to realise the condition of the atmosphere where the rock drillers and his assistants breathe, the only wonder is that they live as long as they do. The exhaust air from the drill causes in addition currents of air which to a large extent keep the dust in motion and prevent it from settling down.[351]

In production tasks miners were also prone to contracting silicosis. Although most of the stopes were better ventilated than the development places, rock drill stopers were almost as susceptible to contracting accelerated silicosis as developers.[352]

Because narrow reefs predominated on the Rand,[353] a large proportion of the stopes were "box-holes", or back stopes.[354] This meant that many of the holes drilled in the face were "uppers", or dry holes: "underhand" stoping was the method used.[355] Also, unlike hand drilled stopes where the lashers, or shovellers, cleared the stopes before the "hammer boys" began drilling, in machine drilled stopes the "continual" lashing of dust from "behind" enveloped the rock drillers.[356] As in development, the lashers and trammers, when shifting the broken rock, released and were then exposed to huge quantities of dust.[357] Finally, rock drill stoping was more dangerous than hand stoping because contractors resorted to promiscuous blasting; the fine powdered dust remained in suspension in the stopes and did not settle.[358]

We have established that in both development and production the most dangerous job was rock drilling; and the second important dust releasing occupation was rock removal: the dust from "lashing" was so intensive, that the miner standing at the bottom of the stope often could not see "the boys, the candles or anything else for the dust".[359] In 1912 health officers asserted that hand drilling had third priority in raising dust levels. Even so, the danger of this task must not be under-estimated. In 1907 Thomas Mathews told the Mining Regulations Commission that he knew of only two pioneer hand drillers who were still alive: all the others had succumbed to

silicosis.[360]

Specialist pitmen, who constituted approximately 10 per cent of miners,[361] also generated dust and were exposed to it. Timbermen raised "large quantities" of dust when cutting "hitches" in the rock for the props,[362] as did pipe fitters when digging holes for the swing pipes. Similarly, plate layers were responsible for the formation of dust when they dug up loose "stuff".[363] In 1912 the Medical Commission rated the order of risk for timbermen as being fourth and for plate layers and pipe fitters as being fifth. Although the tasks of these miners were less dangerous than those of drilling and ore removal, they rendered the specialist pitmen vulnerable to contracting and dying from chronic silicosis over a period which ranged from fifteen to thirty years. This is well illustrated by the case, already mentioned, of Solomon Johannes Pienaar, who was elected in 1915 as the Labour Party's Provincial Councillor for Denver. After twenty-seven years as a specialist pitman Pienaar, the plate-layer from Uitenhage, died from silicosis in 1919 at the age of forty-six.[364]

All miners, irrespective of the amount of dust which they raised in the course of their own work, were exposed to additional residual dust. The release of dust, particularly from rock drills, was not localised: any dust thrown into suspension "was carried through all the workings in a mine".[365] Underground artisans and officials, including shift

bosses, mine captains, underground managers and general managers, were, therefore, also at risk from silicosis. Ironically, Horace Weldon, who chaired the commission appointed by Milner to investigate silicosis on the Witwatersrand in 1902, died from the disease himself in 1910.[366] Before his appointment in 1901 as Government Mining Engineer, he had been a mine manager. After the resignation in 1903 of the Commissioner of Mines, Wilfred Wybergh, Weldon was appointed to the post in an acting capacity until Robert Nelson Kotze superseded him in 1908. Although his duties underground were therefore of "a most formal nature", Weldon, "a magnificent specimen of physical manhood", was "destroyed by the fatal deposit" at the age of forty-three.[367]

During the 1890s Johannesburg was a popular attraction for travellers from all over the world.[368] One of their lasting impressions of the Witwatersrand, a feature which pioneers confirmed, was its dustiness. Invariably they recalled the dust in a manner similar to Sam Kemp, an American tourist:

> Johannesburg was never intended to compete with the Garden of Eden. Situated on the dividing-line between the high veld and low veld, it was barren, treeless, desolate. For six months of the year the wind blew constantly, day and night. Such a wind! Dry, penetrating, it grated nerves and rasped tempers which were uneasy at best. Great yellow clouds of dust inflamed the eyes, caked the face, tasted grittily in every bite of food.[369]

One of the highlights of a visit to Johannesburg was a trip down a mine, particularly the Simmer and

Jack after it had started producing.[370] But from 1896 to 1907 not a single visitor commented on the dust underground. On conducted tours visitors obviously inspected "certain parts" of the mine, where even mine managers "thought there was no dust": on reaching the surface the visitors, unlike mine managers, did not expectorate to find out "how mistaken" they were.[371] Also, like the members of the Mining Industry Commission of 1907, the tourists saw "no clouds of dust" nor "boys come out as if from a flour mill":[372] they apparently did not go down to the stopes, where they would have inhaled the foul air and the dust, as the miners did.[373]

Thomas Mathews reminded the members of the Mining Industry Commission that when the British Colonial Secretary, Joseph Chamberlain, had visited a selected mine in 1903, he had pronounced it "beautiful", whereupon spokesmen for the industry had informed him that "it was like this all along the Rand".[374] In posing the question as to whether Chamberlain had "gone down underground at the expiration of blasting", Mathews himself supplied the caustic answer: "No fear, he went down on Monday morning when everything was clean and beautiful."[375]

Notes

[1] *Rand Daily Mail*, 7 May 1913, "Miners' Phthisis".

[2] *Union House of Assembly Debates*, L. Phillips, 9 Feb. 1911, col. 1095.

[3] *The Mining Industry*, 1897, p. 209, evidence of H. Jennings.

[4] Browne, p. 331.

[5] *JCMMS*, Sept. 1903, "Miner's [sic] Phthisis: Some Notes and Suggestions", p. 233, discussant A. Heymann; *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 32, evidence of T. Mathews and M. Trewick; Praagh, p. 526.

[6] *JCMMS*, Feb. 1903, "Miner's [sic] Phthisis: Some Notes and Suggestions", p. 245, discussant T. L. Carter.

[7] *The Mining Industry*, 1897, p. 418, evidence of W. Hall; Denny, pp. 67-70; *South African Mines, Commerce and Industries*, 2 Sept. 1905, pp. 595-596, "Mine Ventilation".

[8] *South African Mines, Commerce and Industries*, 25 Aug. 1906, p. 519, "Mine Ventilation on the Rand".

[9] Ransome, p. 281. See also Hatch and Chalmers, p. 285; Truscott, pp. 387-388.

[10] *JCMMS*, Feb. 1903, "Miner's [sic] Phthisis: Some Notes and Suggestions", p. 245, discussant T. L. Carter. See also *South African Mines, Commerce and Industries*, 2 Sept. 1905, pp. 595-596, "Mine Ventilation".

[11] TAD, MM, 1395/06, 22 May 1906, "Deputation from the Transvaal Miners' Association".

[12] *Report of the Miners' Phthisis Commission, 1902-1903*, p. 109, q. 907, evidence of G. Blight.

[13] *Report of the Miners' Phthisis Co. ission, 1902-1903*, p. 109, q. 907, evidence of G. Blight.

[14] *Rand Daily Mail*, 5. Nov. 1912, "Miners Claimed by Phthisis"; UG 13, 1913, p. 9.

[15] *Report of a Commission...Mining by Single Outlet*, 1907, p. 5, q. 663, evidence of M. J. H.

Francke.

[16] See above, chapter 1.

[17] Mann, p. 197.

[18] TG 2, 1908, p. 386, statement of T. Mathews.

[19] Walker and Weinbren, p. 293; TG 2, 1908, p. 386, statement of T. Mathews.

[20] *SATJ*, April 1915, p. 15. See also Gitsham and Trembath, pp. 66, 160.

[21] *Rand Daily Mail*, 31 Dec. 1920, "Mine Workers' Union".

[22] PRO, CO, 291/53, individuals, E. P. Rathbone to Chamberlain, 3 March 1902.

[23] *TCMAR*, 1892, p. 69; *Report of the Miners' Phthisis Commission, 1902-1903*, p. 90, statement of A. R. Sawyer.

[24] See above, chapter 4.

[25] ZAR, *Wetten*, 1893, no. 3, section (35).

[26] *Report of a Commission...Mining by Single Outlet*, 1907, p. 7, q. 60, evidence of M. J. H. Francke.

[27] ZAR, *Wetten*, 1893, no. 3, sections (45), (46), (132), (133).

[28] *Report of the Council of the Association of Mine Managers*, 1896, p. 8; *Report of the Miners' Phthisis Commission, 1902-1903*, pp. 87-88, statement of A. R. Sawyer.

[29] ZAR, *Wetten*, 1896, no. 12, sections (42), (53) (54), (55), (56), 1897, no. 11, sections (42), (53) (54), (55), (56), 1898, no. 12, sections (41), (52) (53), (54), (55).

[30] ZAR, *Wetten*, 1896, no. 12, section (53).

[31] ZAR, *Wetten*, 1896, no. 12, section (55).

[32] *JCMMS*, Dec. 1903, "The Ventilation of Deep Levels", p. 240, discussant T. L. Carter.

[33] Martinson, p. 12.

[34] *TCMAR*, 1892, p. 69, 1896, p. 62.

[35] Thomas Johnson, p. 49; *JCMMS*, Feb. 1906, pp. 256-258, "Necessity for Attention to Ventilation and Sanitation of Mines", June 1907, p. 231, "Ventilation at Bendigo"; Cd. 7476, 1914, p. 123.

[36] *TCMAR*, 1896, p. 62.

[37] *Report of the Council of the Association of Mine Managers*, 1895, p. 2. See also Martinson, p. 13.

[38] *Report of the Miners' Phthisis Commission, 1902-1903*, pp. xiv-xv, par. 40; Martinson, p. 9.

[39] *Report of the Miners' Phthisis Commission, 1902-1903*, pp. xiv-xv, par. 40; Martinson, p. 9.

[40] *Report of the Miners' Phthisis Commission, 1902-1903*, pp. xiv-xv, par. 40.

[41] Grey, p. 39; Martinson, p. 10.

[42] PRO, CO, 291/53, individuals, E. P. Rathbone to Chamberlain, 3 March 1902.

[43] Macaulay and Irvine, pp. 292-293.

[44] *South African Mines, Commerce and Industries*, 2 Sept. 1905, pp. 595-596, "Mine Ventilation".

[45] *JCMMS*, Feb. 1906, p. 256, "Mining". See also F. T. Williams, p. 66.

[46] Pollack, pp. 9-10.

[47] Hatch and Chalmers, pp. 113-114; Truscott, pp. 152, 387-391. Cf. Thorpe, p. 253, who incorrectly states that the poor ventilation resulted from most mines having only one shaft.

[48] *Report of the Miners' Phthisis Commission, 1902-1903*, p. xiii, par. 35.

[49] *Report of a Commission...Mining by Single Outlet*, 1907, p. 6, q. 30, evidence of M. J. H. Francke.

[50] Thomas Johnson, p. 48; Cd. 2091, 1904, p. 9; *BMJ*, 23 July 1904, p. 217, "The Health of Cornish Miners".

[51] Cd. 2091, 1904, p. 9.

[52] See above, chapter 4.

[53] *GMEAR...June 1902*, p. 9; *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 95, evidence of Dr J. Moir.

[54] Cd. 7478, 1914, pp. 155, 162, qq. 23 978, 24 155, evidence of H. F. Marriott. See also Thomas Johnson, p. 48.

[55] Cd. 7478, 1914, p. 155, q. 23 978, evidence of H. F. Marriott.

[56] *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 88, evidence of Dr J.

Moir. See also ibid., p. 237, evidence of Dr L. G. Irvine. Irvine stated that the air volume was twenty cubic feet per man per minute.

[57] TG 3, 1910, p. 58.

[58] Thomas Johnson, p. 38; *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 89, evidence of Dr J. Moir.

[59] Cd. 7478, 1914, pp. 155-156, qq. 23 978-23 999, evidence of H. F. Marriott.

[60] Thomas Johnson, pp. 48-49.

[61] *Final Report of the Mining Regulations Commission*, 1910, v. 2, pp. 36, 89, evidence of T. Mathews and M. Trewick and of Dr J. Moir.

[62] *Report of the Miners' Phthisis Commission, 1902-1903*, p. 88, statement of A. R. Sawyer.

[63] *Transvaal Leader*, 24 Aug. 1910, "Mining Regulations".

[64] Thomas Johnson, pp. 50-51; Cd. 2091, 1904, p. 30; Cd. 7476, 1914, p. 130; TG 2, 1908, pp. 426, 665, 688, 1 160, qq. 4 530, 17 269, 8 811, 8 425, evidence of T. Mathews, G. W. Sullivan, F. Crean and S. Richards.

[65] Van Niekerk, p. 16.

[66] *Report of the Miners' Phthisis Commission, 1902-1903*, p. 88, statement of A. R. Sawyer.

[67] Jenkin, p. 207.

[68] Cd. 7478, 1914, p. 155, q. 23 978, evidence of H. F. Marriott; Marriott, pp. 58-65 passim.

[69] Marriott, pp. 58-65 passim.

[70] Truscott, p. 387; *GMEAR...June 1902*, p. 9.

[71] Truscott, p. 387; *South African Mines, Commerce and Industries*, 9 April 1904, p. 97, "Mine Ventilation".

[72] Truscott, p. 388.

[73] *Report of the Miners' Phthisis Commission, 1902-1903*, p. 132, q. 1 308, evidence of E. P. Rathbone.

[74] *South African Mines, Commerce and Industries*, 9 April 1904, p. 97, "Mine Ventilation"; *Final Report of the Mining Regulations Commission*, 1910, v. 2, pp. 37, 89, evidence of T. Mathews and M. Trewick and of Dr J. Moir.

[75] *Report of the Miners' Phthisis Commission,*

1902–1903, p. 119, evidence of J. M. Hodge.

[76] *Final Report of the Mining Regulations Commission*, 1910, v. 2, pp. 89, 95, evidence of Dr J. Moir.

[77] *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 89, evidence of Dr J. Moir.

[78] *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 96, evidence of Dr J. Moir.

[79] Irvine et al, p. 10; Grey, pp. 109–110; *Report of the Miners' Phthisis Commission, 1902–1903*, p. 132, evidence of E. P. Rathbone; *South African Mines, Commerce and Industries*, 19 Aug. 1905, p. 542, "Ventilation of Rand Mines".

[80] *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 89, evidence of Dr J. Moir.

[81] *Report of the Miners' Phthisis Commission, 1902–1903*, pp. 88–90, 119, statement of A. R. Sawyer and evidence of J. M. Hodge.

[82] Van Niekerk, p. 8; *Report of the Miners' Phthisis Commission, 1902–1903*, p. 88, statement of A. R. Sawyer.

[83] Cd. 2091, 1904, p. 9.

[84] Hatch and Chalmers, pp. 115–117. See also Truscott, p. 152; and UG 19, 1912, p. 3.

[85] TG 2, 1908, p. 331, qq. 3 213–3 215, evidence of S. S. Crowle.

[86] Moir, p. 14, and p. 14, n.

[87] Cd. 7478, 1914, p. 202, qq. 25 046–25 050, evidence of G. G. Hewitt.

[88] Hatch and Chalmers, p. 126.

[89] TG 2, 1908, p. 331, qq. 3 206–3 215, evidence of S. S. Crowle.

[90] Hatch and Chalmers, p. 113.

[91] See above, chapter 4.

[92] Truscott, pp. 294–296.

[93] TG 2, 1908, p. 1 473, q. 21 203, evidence of R. G. Fricker.

[94] *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 33, evidence of T. Mathews and M. Trewick.

[95] *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 35, evidence of T. Mathews and M. Trewick.

[96] *South African Mines, Commerce and Industries*, 19 Aug. 1905, p. 542, "Ventilation of Rand Mines".

[97] Thomas Johnson, p. 45.

[98] *Report of the Miners' Phthisis Commission, 1902-1903*, p. 88, statement of A. R. Sawyer.

[99] Anderson, p. 38.

[100] *GMEAR...30 June 1902*, p. 7.

[101] *Report of the Miners' Phthisis Commission, 1902-1903*, p. 85, q. 589, evidence of W. Moses.

[102] *Report of the Miners' Phthisis Commission, 1902-1903*, p. xix, par. 58.

[103] *Report of the Miners' Phthisis Commission, 1902-1903*, p. 82, q. 538, evidence of W. Moses.

[104] Praagh, p. 526.

[105] *Report of the Miners' Phthisis Commission, 1902-1903*, p. 83, statement of Dr C. Porter during the evidence of W. Moses.

[106] *Report of the Miners' Phthisis Commission, 1902-1903*, pp. xvii, 85, par. 57, q. 589, evidence of W. Moses.

[107] *Report of the Miners' Phthisis Commission, 1902-1903*, p. xviii, par. 56.

[108] *Mines, Works and Machinery and Machinery Regulations*, 1903, section 14, (1), (2), (3), (4).

[109] Cd. 1895, 1904, p. 192, A. Lawley to A. Lyttelton, 18 Dec. 1903; Praagh, p. 526; *South African Mines, Commerce and Industries*, 16 March 1907, pp. 30-32, "An Authoritative Review of the Mining Industry".

[110] *JCMMS*, Oct. 1906, "Safety Measures in Mining", p. 112, discussant C. B. Saner.

[111] PRO, CO, 291/57, despatches, Milner to Chamberlain, 23 May 1903, undated enclosure no. 2, "Memorandum by the District Medical Officer for Health", Dr C. L. Sansom; *Final Report of the Mining Regulations Commission*, 1910, v. 1, p. 88.

[112] PRO, CO, 291/57, despatches, Milner to Chamberlain, 23 May 1903, undated enclosure no. 2, "Memorandum by the District Medical Officer for Health", Dr C. L. Sansom.

[113] SC 10, 1915, p. xxx, par. 50.

[114] Cd. 1895, 1904, p. 192, A. Lawley to A. Lyttelton, 18 Dec. 1903.

[115] PRO, CO, 291/57, despatches, Milner to Chamberlain, 23 May 1903, undated enclosure no. 2, "Memorandum by the District Medical Officer for Health", Dr C. L. Sansom; *JCMMS*, Oct. 1906, "Safety Measures in Mining", p. 112, discussant C. B. Saner; Macaulay and Irvine p. 300.

[116] *JCMMS*, Oct. 1906, "Safety Measures in Mining", p. 112, discussant C. B. Saner; Macaulay and Irvine p. 300; Sellars, p. 14.

[117] *JCMMS*, Oct. 1906, "Safety Measures in Mining", p. 12, discussant C. B. Saner; van Niekerk, pp. 151-155.

[118] *Final Report of the Mining Regulations Commission*, 1910, v. 1, p. 88.

[119] *Final Report of the Mining Regulations Commission*, 1910, v. 1, p. 88.

[120] *Final Report of the Mining Regulations Commission*, 1910, v. 1, pp. 88-89; van Niekerk, pp. 151-155; Sellars, p. 13.

[121] TG 2, 1908, p. 376, qq. 3 869-3 870, evidence of T. Willis.

[122] TG 2, 1908, p. 515, q. 6 017, evidence of E. Moore.

[123] Sellars, p. 11; van Niekerk, pp. 151-155 passim; TG 2, 1908, p. 515, q. 6 017, evidence of E. Moore.

[124] Cd. 1895, 1904, p. 192, A. Lawley to A. Lyttelton, 18 Dec. 1903.

[125] Payne et al, p. 11; PRO, CO, 291/57, despatches, Milner to Chamberlain, 23 May 1903, undated enclosure no. 2, "Memorandum by the District Medical Officer for Health", Dr C. L. Sansom; *Final Report of the Mining Regulations Commission*, 1910, v. 1, p. 89.

[126] Sellars, p. 13.

[127] TCMA, file CV(1a), "Statement", by Dr A. D. Pringle, Medical Superintendent of Springkell, 16 Nov. 1920; Sellars, p. 13; Macaulay and Irvine, pp. 303-304.

[128] Unless otherwise noted, the description of ankylostomiasis is based on the following: Turner, "Anchylostomiasis in South Africa", pp. 34-39 passim; *Final Report of the Mining Regulations Commission*, 1910, v. 1, pp. 50-51; Cd. 7476, 1914, pp. 128-130.

[129] *Cornubian*, 23 Jan. 1903, "Sickness in Dolcoath".

[130] *BMJ*, 28 May 1904, p. 1 272, "Miners' Anaemia and Ankylostomiasis".

[131] *Cornubian*, 28 Dec. 1902, "Dolcoath Miners' Anaemia".

[132] Cd. 7476, 1914, p. 130; *Cornubian*, 23 Jan. 1903, "Sickness in Dolcoath"; *BMJ*, 12 March 1904, p. 611, "Notes on Books".

[133] Cd. 2091, 1904; Cd. 7476, 1914, p. 138.

[134] *Cornubian*, 20 March 1903, report of Dr A. E. Permewan, to the members of the Redruth District Council. See also *Cornubian*, 21 Oct. 1902, "Redruth Urban District Council".

[135] *Final Report of the Mining Regulations Commission*, 1910, v. 1, p. 52; van Niekerk, p. 50.

[136] Cd. 7476, 1914, p. 130.

[137] *Final Report of the Mining Regulations Commission*, 1910, v. 1, p. 52; van Niekerk, p. 50.

[138] Cd. 2104, 1904, pp. 91, 95, Appendix A, no. 11, sub-enclosure 3, "Public Health Department Report", 16 May 1904.

[139] *TMJ*, May 1906, pp. 309-310, "Danger!".

[140] TAD, SNA, v. 22, file 656/1902, Dr G. Turner, [senior], to G. Lagden, 18 March 1902; Turner, "Anchylostomiasis in South Africa", p. 228; Cd. 2104, 1904, Appendix A, no. 11, sub-enclosure 3, "Public Health Department Report", 16 May 1904; Nicol, pp. 228-238; Elliott, pp. 110-111.

[141] Van Niekerk, p. 50.

[142] *Transvaal Leader*, 17 Aug. 1910, editorial; Cd. 7478, 1914, p. 151, q. 24 023, evidence of H. F. Marriott.

[143] Macaulay and Irvine, p. 303; *TMJ*, May 1906, pp. 309-310, "Danger!"; *Final Report of the Mining Regulations Commission*, 1910, v. 1, p. 52.

[144] Cd. 7478, 1914, p. 151, q. 24 023, evidence of H. F. Marriott; *TMJ*, May 1906, pp. 309-310, "Danger!".

[145] Cf. Burke, "Disease, Labour Migration and Technological Change: The Case of the Cornish Miners", p. 85. Burke incorrectly states that ankylostomiasis was completely absent from the Witwatersrand mines.

[146] Macaulay and Irvine, p. 303; *TMJ*, May 1906,

pp. 309-310, "Danger!"; *TMJ*, April 1906, p. 287, "Notes from the Pathological Laboratory, Johannesburg Hospital"; Posnett, pp. 718-719.

147 Macaulay and Irvine, pp. 303-304; TG 2, 1908, pp. 428, 689, qq. 4 354, 8 831, evidence of T. Mathews and F. Crean.

148 TG 2, 1908, pp. 428, 431, qq. 4 354, 4 612, evidence of T. Mathews; *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 18, evidence of T. Mathews and M. Trewick.

149 Sellars, p. 13.

150 *Report of the Miners' Phthisis Commission, 1902-1903*, p. xxi, par. 69; TG 2, 1908, pp. 428, 431, qq. 4 354, 4 612, evidence of T. Mathews; *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 18, evidence of T. Mathews and M. Trewick.

151 *Final Report of the Mining Regulations Commission*, 1910, v. 1, p. 88.

152 Macaulay and Irvine, p. 60.

153 Truscott, pp. 271, 275. See above, chapter 4.

154 Cd. 7476, 1914, p. 130; *Mining Journal*, 19 July 1902, p. 996, letter by J. H. Rickard.

155 *Report of the Miners' Phthisis Commission, 1902-1903*, p. xix, par. 62; Cd. 7476, 1914, p. 12.

156 ZAR, *Wetten*, 1896, no. 12, section (149), 1897, no. 11, section (149), 1898, no. 12, section (149).

157 *South African Mines, Commerce and Industries*, 28 April 1906, letter by E. P. Rathbone; Macaulay and Irvine, p. 300.

158 Van Niekerk, p. 7. See also *GMEAR...30 June 1902*, p. 10; *South African Mines, Commerce and Industries*, 28 April 1906, letter by E. P. Rathbone; Macaulay and Irvine, p. 300; *Report of the Miners' Phthisis Commission, 1902-1903*, p. xix, par. 62; *Star*, 12 Oct. 1902, "Miners' Phthisis".

159 *Report of the Miners' Phthisis Commission, 1902-1903*, p. xix, pars. 59, 61; Macaulay and Irvine, p. 300.

160 Burt, p. 59.

161 Van Niekerk, p. 248.

162 *Report of the Miners' Phthisis Commission, 1902-1903*, p. xix, pars. 59, 62.

163 *JCMMS*, May 1906, "Safety Measures in

Mining", p. 338, discussant Dr J. C. McNeillie.

[164] TAD, MM, 1395/06, "Deputation from Transvaal Miners' Association", 22 May 1906.

[165] Macaulay and Irvine, p. 300. See also *Star*, 12 Oct. 1902, "Miners' Phthisis; and *Report of the Miners' Phthisis Commission, 1902-1903*, p. xxi, par. 70.

[166] *Report of the Miners' Phthisis Commission, 1902-1903*, p. xxi, par. 70; *JCMMS*, May 1906, "Safety Measures in Mining", p. 338, discussant Dr J. C. McNeillie.

[167] *GMEAR...30 June 1902*, p. 2.

[168] Macaulay and Irvine, pp. 331-333.

[169] Macaulay and Irvine, p. 300; *Report of the Miners' Phthisis Commission, 1902-1903*, pp. 109-110, qq. 903, 922, evidence of G. Blight; Cd. 1895, 1904, p. 204, A. Lawley to A. Lyttelton, 18 Dec. 1903.

[170] *Report of the Miners' Phthisis Commission, 1902-1903*, p. xxi, par. 71.

[171] Grey, p. 303, does not note that the 1903 regulation, which provided for change houses, was merely a re-enactment of the republican provision.

[172] *Mines, Works and Machinery and Machinery Regulations*, 1903, section 117.

[173] *Report of the Miners' Phthisis Commission, 1902-1903*, p. xix, pars. 59, 62; TG 3, 1910, p. 40; *East Rand Express*, 12 Aug. 1911, "Brakpan Mines Ltd."

[174] TAD, MM, 1395/06, "Deputation from Transvaal Miners' Association", 22 May 1906; BRA, HE, v. 244, file 107H, H. W. Smythe to Secretary of the TCM, 1 June 1906; Macaulay and Irvine, p. 300; *South African Mines, Commerce and Industries*, 7 April 1906, "Leading Article".

[175] *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 31, evidence of T. Mathews and M. Trewick.

[176] Jeeves, *Migrant Labour in South Africa's Mining Economy*, pp. 51-52, notes the Robinson group's lack of compliance with the regulations regarding the Africans' compounds.

[177] BRA, HE, v. 256, file 240V, C. E. Webber to L. J. Reyersbach, 2 July 1906; *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 31, evidence of T. Mathews and M. Trewick.

[178] UG 40, 1913, p. 148.

[179] *Final Report of the Mining Regulations*

Commission, 1910, v. 2, p. 31, evidence of T. Mathews and M. Trewick.

[180] Van Niekerk, p. 248.

[181] See, for instance, *Transvaal Leader*, 11 Aug. 1910, "Politics and Phthisis; and TG 3, 1910, p. 40.

[182] TG 3, 1910, p. 40; UG 40, 1913, p. 148.

[183] *Report of the Miners' Phthisis Commission, 1902-1903*, p. xxi, par. 71.

[184] *Final Report of the Mining Regulations Commission*, 1910, v. 1, p. 70; Irvine and Macaulay, p. 365.

[185] *Report to the Commissioner for Native Affairs on the Mortality amongst Natives on the Mines of the Witwatersrand*, 1903, p. 8.

[186] *Report to the Commissioner for Native Affairs on the Mortality amongst Natives on the Mines of the Witwatersrand*, 1903, p. 8.

[187] Council minutes of the AMM, 4 June 1906.

[188] Irvine and Macaulay, p. 365; *Final Report of the Mining Regulations Commission*, 1910, v. 2, pp. 222, 256, evidence of J. H. Johns (on behalf of the Chamber of Mines) and Dr L. G. Irvine.

[189] *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 31, evidence of T. Mathews and M. Trewick.

[190] *Final Report of the Mining Regulations Commission*, 1910, v. 1, p. 70.

[191] *Final Report of the Mining Regulations Commission*, 1910, v. 2, evidence of J. H. Johns (on behalf of the Chamber of Mines); Council minutes of the AMM, 4 June 1906.

[192] TG 3, 1910, p. 66.

[193] *Transvaal Leader*, 11 Aug. 1910, "Politics and Phthisis; TG 3, 1910, p. 40.

[194] *Transvaal Government Gazette*, no. 369, section (8), 18 June 1906; *TCMAR*, 1907, p. 85.

[195] *TCMAR*, 1907, pp. 17, 85. See also BRA, ME, v. 258, file 154M, no. 18, memorandum, "Mining Regulations Commission", signed by Dr L. G. Irvine, 1910.

[196] *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 256, evidence of Dr L. G. Irvine.

[197] *Mines and Works Regulations*, 1911, section

143 (2).

[198] UG 37, 1914, pp. 9, 28, pars. 53-60, 200-202.

[199] Native Grievances Inquiry, transcript, 2 Feb 1914, p. 24, evidence of S. A. M. Pritchard.

[200] BRA, HE, v. 155, L. Phillips to F. Eckstein, 25 July 1910; UG 40, 1913, p. 130; van Niekerk, pp. 57, 250; *East Rand Express*, 12 Aug. 1911, "Brakpan Mines Ltd.".

[201] *Union House of Assembly Debates*, J. X. Merriman, 8 Feb. 1911, col. 1048; *Rand Daily Mail*, 14 July 1911, "Mine Natives and Disease". See also BRA, HE, v. 155, L. Phillips to J. Wernher, 1 March 1911.

[202] *Rand Daily Mail*, 14 July 1911, "Mine Natives and Disease".

[203] Calculations based on the following: Merriman Papers, correspondence, 1913, no. 47, Secretary of the Department of Native Affairs to JXM, 30 April 1913, enclosed table showing territorial analysis of mortality amongst African mineworkers.

[204] Council minutes of the AMM, 21 July 1911; *Union House of Assembly Debates*, H. Burton, 15 May 1912, cols. 2703-2704.

[205] *Evening Chronicle*, 2 April 1913, "Native Affairs".

[206] *Union House of Assembly Debates*, F. H. P. Creswell, 14 May 1913, cols. 2417-2418.

[207] *Union House of Assembly Debates*, J. W. Sauer, 9 June 1913, cols. 3265-3266.

[208] *Union House of Assembly Debates*, J. W. Sauer, 8 May 1913, cols. 2330-2331, H. Mentz, 13 May 1913, col. 2372, F. H. P. Creswell, 14 May 1913, col. 2418.

[209] PRO, CO, 291/129, despatches, Methuen to Elgin, 26 Oct. 1908; TAD, SNA, v. 480, Secretary of the WNLA to Secretary of the Government Native Labour Bureau, 9 Aug. 1910, Assistant Director of the Government Native Labour Bureau to the Acting Secretary for Native Affairs, 27 Sept. 1910; Irvine and Macaulay, p. 262. See also *Union House of Assembly Debates*, F. D. P. Chaplin, 13 May 1913, col. 2383; and *SAMR*, 24 May 1913, "Medical Matters in Parliament".

[210] *Union House of Assembly Debates*, J. W. Sauer, 8 May 1913, cols. 2330-2331.

[211] *Reynolds Newspaper*, 8 Aug. 1913, "City of Dreadful Death".

[212] *Union House of Assembly Debates*, John X. Merriman, 16 June 1913, col. 3541.

[213] It is beyond the scope of this study to investigate in depth the causes of pneumonia. The history of pneumonia on the Witwatersrand gold mines is an important but neglected area of study which warrants investigation.

[214] Malan, pp. 12-16, 105-110.

[215] Malan, pp. 12-16, 105-110.

[216] Cartwright, *Doctors of the Mines*, pp. 36-80 passim, focuses narrowly on the provision of health services. Malan, pp. 12-16, briefly indicates medical care in its wide sense. See also Lang, pp. 237-238; and Cartwright, *Golden Age*, pp. 174-176.

[217] See, for instance, Wilson, *Labour in the South African Gold Mines 1911-1969*, pp. 68-69.

[218] Letcher, p. 419. See also Wilson, *Labour in the South African Gold Mines 1911-19*. pp. 68-69.

[219] Wilson, *Labour in the South African Gold Mines 1911-1969*, pp. 68-69.

[220] TAD, MM, 1395/06, 22 May 1906, "Deputation from Transvaal Miners' Association"; TG 2, 1908, p. 360, qq. 3 606-3 607, evidence of R. B. Greer.

[221] Moir, p. 14.

[222] *JCHMS*, Dec. 1905, "The Vitiation of the Air in Transvaal Mines", p. 192, reply to discussion; *Final Report of the Mining Regulations Commission*, 1910, v. 2, pp. 32-38 passim, evidence of T. Mathews and M. Trewick; TG 2, 1908, p. 1 160, qq. 17 268-17 269, evidence of A. W. Sullivan.

[223] *Report of the Miners' Phthisis Commission, 1902-1903*, p. xxii, par. 74 and Appendix D.

[224] Martinson, p. 13.

[225] Cd. 2091, 1904, pp. 24-25.

[226] *Mining Journal*, 28 Oct. 1905, p. 470, "Mining".

[227] *JCHMS*, Dec. 1905, "The Vitiation of the Air in Transvaal Mines", p. 191, reply to discussion.

[228] Moir, pp. 11-17 passim.

[229] PRO, CO, 291/70, despatches, Milner to Lyttelton, 18 April 1904.

[230] *JCHMS*, Dec. 1904, "Witwatersrand Mine Air: Recent Investigations", pp. 176-177, discussant D. W. Bradford.

231 *JCMMS*, Dec. 1906, "Witwatersrand Mine Air: Recent Investigations", pp. 175-181 passim, discussion. See also *JCMMS*, Dec. 1905, "The Vitiation of the Air in Transvaal Mines", p. 191, reply to discussion.

232 *Final Report of the Mining Regulations Commission*, 1910, v. 2, pp. 88-104 passim, evidence of Dr J. Moir.

233 Cd. 2091, 1904, pp. 11-12.

234 *Report of the Miners' Phthisis Commission, 1902-1903*, p. xiv, par. 37; *South African Mines, Commerce and Industries*, 2 Sept 1905, pp. 595-596, "Mine Ventilation"; UG 19, 1912, p. 3.

235 *Report of the Miners' Phthisis Commission, 1902-1903*, p. xiv, par. 37; *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 33, evidence of T. Mathews and M. Trewick.

236 *Report of the Miners' Phthisis Commission, 1902-1903*, p. 109, qq. 915-920, evidence of G. Blight.

237 TG 2, 1908, pp. 493, 688, qq. 5 632, 8 812, evidence of J. Coward and F. Crean; *Report of the Miners' Phthisis Commission, 1902-1903*, p. 109, qq. 915-920, evidence of G. Blight.

238 *Report of the Miners' Phthisis Commission, 1902-1903*, p. 109, qq. 915-920, evidence of G. Blight; *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 36, evidence of T. Mathews and M. Trewick.

239 *JCMMS*, Feb. 1906, p. 256, "Mining".

240 *Report of the Miners' Phthisis Commission, 1902-1903*, p. xiv, par. 39.

241 *South African Mines, Commerce and Industries*, 2 Sept. 1905, pp. 595-596, "Mine Ventilation".

242 *GMEAR...30 June 1902*, p. 9.

243 PRO, CO, 291/96, despatches, Selborne to Lyttelton, 5 Feb. 1906; TAD, MM, 1395/06, 22 May 1906, "Deputation from Transvaal Miners' Association".

244 *GMEAR...30 June 1902*, p. 9; *Report of the Miners' Phthisis Commission, 1902-1903*, p. xiv, par. 57.

245 Moir, p. 12.

246 *GMEAR...30 June 1902*, p. 9.

247 *Report of the Miners' Phthisis Commission,*

1902-1903, p. xxi, par. 71.

248 *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 93, evidence of Dr J. Moir.

249 TAD, MM, 1395/06, 22 May 1906, "Deputation from Transvaal Miners' Association"; TG 2, 1908, pp. 325, 362-363, 426, 695, qq. 3 113-3 114, 3 657-3 661, 4 530, 8 956, evidence of S. S. Crowle, R. B. Greer, T. Mathews and F. Crean.

250 *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 33, evidence of T. Mathews and M. Trewick.

251 *Final Report of the Mining Regulations Commission*, 1910, v. 2, pp. 93-94, evidence of Dr J. Moir.

252 *Final Report of the Mining Regulations Commission*, 1910, v. 2, pp. 96-97, evidence of Dr J. Moir.

253 *Final Report of the Mining Regulations Commission*, 1910, v. 1, pp. 78, 111-112.

254 *Final Report of the Mining Regulations Commission*, 1910, v. 1, p. 98, Appendix A.

255 *JCHMS*, Dec. 1906, "Witwatersrand Mine Air: Recent Investigations", p. 176, discussant D. W. Bradford.

256 Marriott, pp. 62-65. See also BRA, HE, v. 286, file 250V, no. 32, "Memorandum on Ventilation of Mines", v. 162, R. Schumacher to H. F. Marriott, 29 Nov. 1907.

257 Marriott, p. 62.

258 Marriott, p. 65.

259 *The Prevention of Silicosis on the Mines of the Witwatersrand*, 1937, p. 147.

260 *Final Report of the Mining Regulations Commission*, 1910, v. 1, Part III, particularly p. 109.

261 International Labour Organisation, ed., *Encyclopaedia of International Health and Safety*, v. 1, p. 946; Green, pp. 698-699, 702; Shapiro, pp. 315-316. See above, chapter 3.

262 Moir, p. 15. See also F. T. Williams, p. 65.

263 Cd. 2091, 1904, p. 11.

264 *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 89, evidence of Dr J.

Moir. See also TG 2, 1908, p. 517, q. 6 049, evidence of E. Moore.

265 *Report of the Miners' Phthisis Commission, 1902-1903*, pp. xvi-xvii, pars. 45-56.

266 See, for instance, BRA, HE, v. 134, S. Evans to H. Eckstein and Company, 11 Dec. 1905.

267 *Report of the Miners' Phthisis Commission, 1902-1903*, pp. 30-31, statement of W. Cullen; TAD, GOV, Lyttelton to Milner, 13 May 1904.

268 *Report of the Miners' Phthisis Commission, 1902-1903*, p. xviii, pars. 54, 55.

269 PRO, CO, despatches, Milner to Lyttelton, 18 April 1904, minute signed by W. H. Just, 9 May 1904, Lyttelton to Milner, 13 May 1904.

270 *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 98, evidence of Dr J. Moir.

271 *Final Report of the Mining Regulations Commission*, 1910, v. 2, pp. 3-41 passim, 98, Appendix 2, evidence of T. Mathews and M. Trewick and of Dr J. Moir.

272 *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 35, evidence of T. Mathews and M. Trewick.

273 TG 2, 1908, p. 1 160, q. 17 269, evidence of G. W. Sullivan.

274 Truscott, p. 197.

275 *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 35, evidence of T. Mathews and M. Trewick; UG 40, 1913, p. 113.

276 *Report of the Miners' Phthisis Commission, 1902-1903*, p. 110, qq. 915-920, evidence of G. Blight; *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 32, evidence of T. Mathews and M. Trewick; UG 40, 1913, p. 113.

277 TG 2, 1908, p. 496, q. 5 689, evidence of J. Coward.

278 Cd. 2091, 1904, p. 25.

279 SC 10, 1912, p. 23, qq. 154-155, evidence of W. Morgan, A. R. Moon and M. Trewick; *Mining Journal*, 19 July 1902, p. 996, letter by J. H. Rickard; *Cornubian*, 14 May 1904, "The Miners' Scourge"; *JCMMS*, April 1903, "Miner's [sic] Phthisis: Some Notes and Suggestions", p. 247, discussant T. L. Carter.

280 TG 2, 1908, p. 455, q. 5 012, evidence of

T. Mathews.

281 PRO, CO, 291/499, despatches, Milner to Chamberlain, 10 July 1903, enclosure.

282 Cd. 7476, 1914, p. 130; SC 9, 1914, p. 282, q. 1 903, evidence of J. G. Lawn.

283 *Final Report of the Mining Regulations Commission.* 1910, v. 2, p. 89, evidence of Dr J. Moir.

284 Cd. 7476, 1914, p. 149.

285 *Report of the Miners' Phthisis Commission, 1902-1903*, Appendix D.

286 Van Niekerk, p. 236.

287 Martinson, p. 13.

288 Cd. 7476, 1914, pp. 148-149.

289 Martinson, p. 13. See also Irvine et al, p. 8.

290 Nesbitt, pp. 31-32. See above, chapter 5.

291 *Report of the Miners' Phthisis Commission, 1902-1903*, pp. xi-xii, pars. 19-27; Cd. 2091, 1904, pp. 12-13; Cd. 7476, 1914, p. 149; *JCMMS*, Feb. 1906, p. 258, "Mining".

292 Cd. 2091, 1904, p. 26; *Mining Journal*, 3 Nov. 1901, p. 1 486, letter by N. Trestrail.

293 Rosen, p. 421; *The Times*, 13 Oct. 1902, letter by F. Fox.

294 Cd. 2091, 1904, p. 26; *Mining Journal*, 3 Nov. 1901, p. 1 486, letter by N. Trestrail; *Star*, 3 Dec. 1902, letter by "A. P."; *JCMMS*, Feb. 1906, pp. 258-260, "Mining".

295 SC 10, 1915, p. 54, q. 316, evidence of M. Fergusson. See also Irvine and Macaulay, p. 297; and *JCMMS*, Sept. 1906, "Safety Measures in Mining", p. 82, discussant W. P. O. Macqueen.

296 Irvine and Macaulay, p. 297. See also Cd. 7476, 1914, p. 148, where the date of the dust tests in Cornish mines is incorrectly given as 1901 instead of 1904.

297 *JCMMS*, Sept. 1906, "Safety Measures in Mining", p. 82, discussant W. P. O. Macqueen.

298 Cd. 2091, 1904, p. 12.

299 Van Niekerk, p. 235; *GMEAR...30 June 1902*, p. 8.

[300] *Report of the Miners' Phthisis Commission, 1902-1903*, p. 8, statement of Dr F. Napier; Cd. 2091, 1904, p. 12.

[301] Cd. 2091, 1904, p. 12.

[302] TG 2, 1908, p. 357, q. 3 560, evidence of R. B. Greer.

[303] For details see: TG 2, 1908, p. 992, qq. 6 884-6 886, evidence of R. N. Kotze; and UG 19, 1912, p. 4, par. 4.

[304] *South African Mines, Commerce and Industries*, 25 Aug. 1906, p. 519, "Mine Ventilation on the Rand".

[305] Cd. 2091, 1904, p. 17; TG 2, 1908, p. 259, Exhibit No. 11, evidence of S. J. Jennings.

[306] Cd. 2091, 1904, pp. 11-13.

[307] Calculations based on: *TCMAR*, 1909, p. 376, table showing "Rock Drills at Work"; TG 2, 1908, p. 259, Exhibit No. 11, evidence of S. J. Jennings; and *GMEAR...30 June 1904*, Table 1A.

[308] *South African Mines, Commerce and Industries*, 25 Aug. 1906, p. 519, "Mine Ventilation on the Rand".

[309] Letter Book of City Deep Limited, 1910-1911, J. Whitford to A. M. Robeson, 21 Nov. 1910.

[310] Cd. 7476, 1914, p. 130; *Mining Journal*, 19 July 1902, p. 996, letter by J. H. Rickard.

[311] TG 2, 1908, p. 316, q. 2 971, evidence of S. S. Crowle.

[312] Dr L. G. Irvine and Dr D. Macaulay stated that: "Rock drill miners do not form an absolutely closed class. See *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 241, evidence of Dr L. G. Irvine. But their assumption was probably correct in the case of only a few miners: rock drilling on the Witwatersrand was a more closed branch of mine work than in other mining centres.

[313] Cd. 7476, 1914, p. 130; *Mining Journal*, 19 July 1902, p. 996, letter by J. H. Rickard.

[314] I thank Helen Rankin, curator of the Cripple Creek District Museum, for the information.

[315] Sellars, p. 3.

[316] TG 2, 1908, p. 515, q. 6 028, evidence of E. Moore. See also ibid., pp. 324, 338, 341, 347, 690, qq. 3 097-3 098, 3 319, 3 422-3 424, 8 845, evidence of S. S. Crowle, statement and evidence of C. C. Smith and evidence of F. Crean; and *BMJ*, 28 Sept.

1907, p. 839, "Miners' Phthisis at Bendigo".

317 TG 2, 1908, p. 341, q. 3 319, evidence of C. C. Smith; Fern. p. 874; Macaulay and Irvine, p. 299.

318 Cd. 2091, 1904, p. 18.

319 *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 240, evidence of Dr L. G. Irvine.

320 UG 19, 1912, p. 16, par. 35.

321 Truscott, p. 162; Hatch and Chalmers, pp. 125-126.

322 *Report of the Miners' Phthisis Commission, 1902-1903*, p. 27, q. 179, evidence of Dr W. D. Frazer; Oliver, "Gold Miners' Phthisis and some of the Dangers to Health incidental to Gold Mining in the Transvaal", p. 1 678.

323 *Report of the Miners' Phthisis Commission, 1902-1903*, p. 28, qq. 193-194, evidence of Dr W. D. Frazer.

324 For details on shaft sinking, see Truscott, pp. 156-165 passim; and Hatch and Chalmers, pp. 119-126 passim.

325 Hatch and Chalmers, p. 126; Truscott, pp. 156-165 passim.

326 TG 2, 1908, p. 1 173, statement of H. W. Pridgeon.

327 Truscott, p. 162; TG 2, 1908, p. 1 173, statement of H. W. Pridgeon.

328 Oliver, "Gold Miners' Phthisis and some of the Dangers to Health incidental to Gold Mining in the Transvaal", p. 1 678. See also *Report of the Miners' Phthisis Commission, 1902-1903*, p. 27, q. 194, evidence of Dr W. D. Frazer.

329 Truscott, p. 288; Hatch and Chalmers, pp. 121-122.

330 Hatch and Chalmers, pp. 115-117. See also Truscott, p. 152; and UG 19, 1912, p. 3, par. 4.

331 UG 19, 1912, p. 3, par. 4.

332 Fern, p. 874.

333 *JSAIE*, Jan. 1912, "The Prevention of Dust in Development Drives of Mines during Drilling Operations", p. 139, discussant K. Austin.

334 Fern, p. 874.

335 Van Niekerk, p. 243

336 UG 19, 1912, pp. 3-4, par. 4.

337 *Cornubian*, 14 May 1904, "The Miners' Scourge".

338 Cd. 2091, 1904, p. 25; C.. 7476, 1914, p. 130.

339 UG 19, 1912, pp. 3-4, par. 4; Watkins-Pitchford, "The Industrial Diseases of South Africa", p. 40.

340 Pern, p. 874.

341 SC 10, 1915, p. 9, q. 59, evidence of H. W. Smythe.

342 *JCHMS*, March 1903, "Miner's [sic] Phthisis: Some Notes and Suggestions", p. 247, discussant T. L. Carter.

343 *JCHMS*, March 1903, "Miner's [sic] Phthisis: Some Notes and Suggestions", p. 247, discussant T. L. Carter; TAD, MM, 1395/06, 22 May 1906, "Deputation from Transvaal Miners' Association".

344 *JCHMS*, March 1903, "Miner's [sic] Phthisis: Some Notes and Suggestions", p. 247, discussant T. L. Carter.

345 *Rapport van den Staatsmijningenieur*, 1896, p. 5.

346 UG 19, 1912, pp. 4, 18, pars. 4, 42.

347 Oliver, *Diseases of Occupation*, pp. 294-295.

348 TG 2, 1908, p. 436, q. 4 707, evidence of T. Mathews.

349 *Report of the Council of the Association of Mine Managers*, 1897, p. 8; Ticktin, p. 108; *Mining Journal*, 26 Aug. 1893, p. 943, "Gold Fields of the British Empire".

350 *JCHMS*, Sept. 1906, "Safety Measures in Mining", p. 79, discussant J. Yates.

351 Pern, p. 874.

352 UG 19, 1912, p. 18, par. 43.

353 PRO, CO, 291/97, despatches, Selborne to Elgin, 9 April 1906, enclosure no. 2, "memorandum".

354 SC 10, 1914, p. xviii, par. 10.

355 *Report of the Miners' Phthisis Commission, 1902-1903*, p. 8, statement of Dr F. Napier.

[356] TG 2, 1908, p. 439, qq. 4 774–4 776, evidence of T. Mathews.

[357] UG 19, 1912, pp. 4, 18, pars. 4, 42.

[358] *JCMMS*, April 1903, "Miner's [sic] Phthisis: Some Notes and Suggestions", p. 246, discussant T. L. Carter.

[359] *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 17, evidence of T. Mathews and M. Trewick. See also TG 2, 1908, p. 437, q. 4 734, evidence of T. Mathews.

[360] *Final Report of the Mining Regulations Commission*, 1910, v. 2, p. 12, evidence of T. Mathews and M. Trewick.

[361] TCMA, file A1(b), consulting engineer of the Johannesburg Consolidated Investment Company to Secretary of the TCM, 4 Sept. 1907. See above, chapter 6.

[362] Sellars, pp. 14, 19. See also UG 19, 1912, p. 5, par. 6.

[363] Sellars, p. 19.

[364] *Worker*, 12 March 1914, "Pienaar for Denver"; *Labour World*, 6 Sept. 1919. I thank David Ticktin for the clipping from the *Labour World*, which he obtained through access to the private papers of James Trembath.

[365] UG 19, 1912, p. 4, par. 5.

[366] CAD, MNW, file MM 33/51, Dr J. L. Aymard to Methuen, 23 Nov. 1910.

[367] *Rand Daily Mail*, 2 April 1912, letter by "X.Y.Z.". For biographical details on Weldon, see PRO, CO, 291/39, despatches, Chamberlain to Milner, 21 June 1902, enclosure, 291/84, despatches, Selborne to Lyttelton, telegram, 19 Aug. 1905, 291/97, despatches, Selborne to Elgin, telegram, 31 March 1906, 291/84, despatches, Selborne to Crewe, 1 June 1908.

[368] I found Bettine Gail Fairburn's annotated bibliography, listed in the bibliography of this study, most useful.

[369] Kemp, p. 20. See also Du-Val, p. 24; Hallé, p. 209; Marina King, pp. 195–196; McCarthy, p. 374; Praagh, p. 248; Ronan, p. 158; and Southey, pp. 89, 94.

[370] See, for instance, Sir Samuel Benfield Steele, p. 29; a Viator, p. 1.

[371] *JCMMS*, April 1903, "Miner's [sic] Phthisis: Some Notes and Suggestions", p. 246, discussant T. L.

Carter.

372 TG 2, 1908, p. 374, q. 3 847, evidence of T. Willis.

373 TG 2, 1908, p. 436, q. 4 709, evidence of T. Mathews.

374 TG 2, 1908, p. 436, q. 4 710, evidence of T. Mathews.

375 TG 2, 1908, p. 436, q. 4 709, evidence of T. Mathews.

CHAPTER 10

THE AWAKENING YEARS 1900-1902

> "Gold miners' phthisis, therefore, kills men when they are still comparatively young, usually before they reach the age of 40 years."---Sir Thomas Oliver, Newcastle-upon-Tyne, June 1902.[1]

> "I would therefore ask my professional brethren in Great Britain if they are consulted by miners to warn them against South Africa and to strongly advise them that the miner to stand any chance here, must have perfect health, for not to have this any who come to work on the mines come to certain death."---Dr Thomas Marshall, Cape Town, July 1902.[2]

In November 1902 the Governor of the Transvaal and the High Commissioner of South Africa, now raised to the peerage as Viscount Milner, appointed the Weldon Commission to investigate the mortality from silicosis amongst miners on the Witwatersrand.[3] In reviewing the events which prompted the establishment of the enquiry, contemporary health officers and present-day historians credit Milner with vigour and concern in tackling the problem.[4] Indeed, the praise they give Milner is reflected in the name given to the enquiry: it is invariably known as the Milner

Commission.[5] The commendation in 1914 of the Medical Inspector of Mines, Sebastian Valentyn van Niekerk, is typical:

> After the great Anglo-Boer War...excessive death rates in the Gold Mines, especially from respiratory diseases, caused great uneasiness amongst mine-workers, mine-owners, and the public generally, which, in 1902, led to the appointment by Lord Milner (then Governor of the Transvaal) of a Commission "to enquire into the extent which the disease prevailed, to ascertain its causes, and to make recommendations as to preventive and curative measures".[6]

Like van Niekerk's review, most historical accounts give the wrong impression that both the problem and its solution were local in origin and that Milner acted "immediately".[7]

The contemporary official Transvaal documents, which detailed the circumstances under which the Weldon Commission was appointed, are lost. In 1912 F. S. Malan, the Union Minister of Mines, sent a telegram to Pretoria asking his department to send him all documents relating to silicosis.[8] Malan needed epidemiological and demographic data to answer the questions tabled in parliament by the Labour Party MP, Walter Madeley.[9] Neither the Department of Mines nor the Department of Interior could "trace any papers on this subject" for the period 1903 to 1909.[10] At the same time, when the Government Mining Engineer, Robert Nelson Kotze, asked the Assistant Secretary of Mines to return all papers regarding the appointment of the Weldon Commission, Kotze received the following

memorandum:

> It is regretted that no papers dealing with the appointment of this commission can be traced in my books, either ordinary or confidential.[11]

Despite the loss of these important official documents, other scattered and fragmentary sources provide sufficient evidence to piece together the circumstances which led to the appointment of the Weldon Commission: contemporary health officers regarded it as a "landmark" in the history of silicosis in South Africa.[12] Our investigation includes events both in Great Britain and the Transvaal. We begin our exploration of the evidence by examining the circumstances in the Transvaal shortly after the British forces had captured Johannesburg in May 1900.[13]

Milner hoped that the British capture of Johannesburg would bring the Anglo-Boer War to a speedy close. But the resort of the Boers to guerrilla warfare prolonged the struggle and delayed the reopening of the mines.[14] While the war was in progress, in 1900 Lord Kitchener, who had been appointed commander-in-chief of the British forces, allowed the mineowners to establish the Mines Guard to protect the mines. The Mine Guard consisted of approximately 1 500 men, most of whom had been former skilled mineworkers.[15] When war erupted, these mineworkers had not returned to Britain or Europe. Also, they had refused to join the Colonial Corps, or the irregular troops. Instead, they had retreated to

the South African coastal towns, where they waited impatiently for the war to end.[16] After the Mine Guard had been disbanded in November 1901, many of its members comprised the vanguard of skilled miners for the newly reopened mines.[17]

Also, from May 1901 onwards miners, who had returned to Britain just before and during the hostilities, began to stream back to South Africa.[18] Few Transvaal miners who had gone home to Cornwall were able to find employment on the tin mines; the industry was "dull, stale and unprofitable".[19] Most Cornish migrants were therefore destitute and keen to return to the Witwatersrand.[20] The mineowners were equally eager for all the British miners to come back to the gold mines. Once the military authorities authorised the resumption of production, the mineowners needed their skilled work complement. Kitchener issued a proclamation which required all persons wishing to proceed to the Transvaal to possess an authorised permit. But most miners had difficulty in obtaining permits: British applications had to be lodged in London; mineworkers had to furnish evidence that they had secured employment; and they had to have £100 or proof of self-sufficiency until they could start work.[21]

Within the constraints of the permit system, William Sproston Caine, the "radical" Liberal MP for the Camborne constituency in Cornwall, successfully negotiated on behalf of miners an agreement with the

Chamber of Mines: on receiving written applications the London office of the Chamber testified that applicants had secured jobs. This procedure obviated the financial strictures of the permit system, so facilitating the British miners' return to South Africa.[22] Even so, despite their compliance with the permit measures, many British miners on reaching Cape Town were detained there under martial law and were refused permission to proceed to Johannesburg.[23] Although the Boers had left the mines virtually intact,[24] during 1901 and 1902 the reopening of the mines was slow and gradual. Consequently miners were not allowed to return to the Witwatersrand until those mines where they had secured employment had begun to resume crushing.[25]

Although Milner was formally sworn into office as Governor of the Transvaal in June 1902, he took up permanent residence in Johannesburg much earlier - in March 1901.[26] He was obliged to attend to many complicated issues. But he also devoted much attention to the gold mining industry. As the restoration and renewed prosperity of the industry were crucial to Milner's financial plans for the reconstruction of the Transvaal, he ensured that he had a sound knowledge of all aspects of the industry.[27]

In organising the health services for the Transvaal, Milner made provision for the mines. He did not appoint a specific health officer for them,[28]

but Charles Lane Sansom, one of the four district medical health officers in the Transvaal, as Medical Officer of Health for the Witwatersrand, was entrusted with the health care of mineworkers, particularly of Africans.[29] Sansom was the official medical adviser to the Department of Mines.[30] As Milner thought such an important post warranted priority, he went to great lengths to secure Sansom, then resident in Southampton, for the position.[31] The early reports of George Turner, the Medical Officer Health for the Transvaal,[32] and of Sansom concerning the mortality and disease amongst African mineworkers prompted state intervention.[33] Both Sir Godfrey Lagden, the Commissioner for Native Affairs, and Milner took immediate steps to improve the health conditions of black mineworkers.

In May 1901, amidst great celebration, three mines, each with fifty stamps, resumed milling.[34] But after May progress was slow. By July seven mines were in full production and in December fifteen crushing mines represented only one-quarter of the mines which had been producing in the first half of 1899.[35] In January 1902, when peace was in sight, Kitchener believed the situation on the Witwatersrand was sufficiently secure to warrant the resumption of intensive production. He therefore allowed the mines to resume crushing at the rate of 100 stamps per week.[36] In 1902 the supply of skilled white mineworkers was more than sufficient to meet the

demand. But it was not until 1905 that the industry returned to its pre-war production levels.[37] The main reason for the industry's sluggishness in regaining its pre-war momentum was the shortage of African labour: by 27 September 1902, sixteen months after the mines had first started crushing, there were only 42 218 black mineworkers as compared to 97 800 in June 1899.[38]

Most mining engineers acknowledged confidentially that the revised schedule of wages, devised and implemented, as we have seen,[39] by the Mine Managers' Association in October 1900, was the main reason that the Africans withheld their labour from the gold mines.[40] The reduction of black mineworkers' wages had been ill-conceived, as Thomas Leggett, the American consulting engineer for the S. Neumann group, bluntly advised the Chamber in August 1902:

> If the native laborer on the mines is indifferent to the amount of money he earns, he is the only wage earner that I have come in contact with of whom this can be said.[41]

In 1903 the Chamber restored the wage schedule to its pre-war levels. Even so, from 1901 to 1903 for a number of reasons, including reduced wages, the Africans' confidence in the mines was shaken.[42] From 1903, although they began gradually to return to the gold fields in increasing numbers, it was only in 1905 that the size of the African workforce reach its pre-war level.[43] By this time the Chamber had organised in 1904 the importation of indentured

Chinese labourers.

Starting in the winter of 1901 and continuing until the end of 1903, the "abnormally high" mortality,[44] principally from "sickness", amongst African mineworkers, intensified the black labour shortage. During the period November 1902 to April 1903 diseases were responsible for 94,5 per cent of the total number of deaths.[45] As neither the state nor the industry had kept any records of the African death rate for the pre-war or the interim-war periods, mortality figures were available only from 1902.[46] Also, as Milner had only in January 1903 instructed the mines and the Native Affairs Department to document figures for "sickness" amongst African mineworkers,[47] no statistics for diseases were available before 1903.

In February 1903 Lagden convened a conference consisting of representatives from the Chamber and "certain" mine doctors, which resolved to appoint a committee of mine doctors to investigate the mortality and to make recommendations to reduce it.[48] The committee of mine doctors submitted its report in June 1903.[49] Although the Chamber formally adopted most of the report's recommendations in September,[50] too little time had elapsed by December for the health improvements to have had any significant results. Therefore the mine doctors' calculations for the death rate in 1903, a period during which epidemics of pneumonia occurred, probably reflected accurately the

death rates for 1894, 1896, 1898 and 1901, when similar epidemics had occurrws.[51]

In the first half of 1903 the death rate for African mineworkers was 62 per thousand; and during the second half of 1903 it rose to 80 per thousand. The average annual death rate for 1903 was therefore 71 per thousand.[52] Respiratory diseases accounted for 58 per cent of the total death rate. Pneumonia at 52 per cent was the most deadly of this group of lung diseases; and next in importance was pulmonary tuberculosis, at approximately 5 per cent.[53] During the next few years the industry succeeded in reducing the total death rate from disease to approximately 45 per thousand per annum. Although they would have preferred a mortality rate of 40 per thousand per annum, the mine doctors and Milner considered the reduced mortality figures to be acceptable. They conceded that the African death rate compared "unfavourably" to that of "European countries". Even so, they rationalised that Africans in "their own kraals and villages" had a mortality rate from "sickness" which was exceedingly higher than that of "Europeans".[54]

The Colonial Office accepted these reasons:[55] during the first half of 1904 and in successive years, the reduced death rate, exclusive of accidents, of approximately 45 per thousand per annum was taken as evidence of the industry's improvement in the health care of African mineworkers.[56] H. Lambert, a member of

the Colonial Office, noted the improvement in 1908:

> If the native death rate is to be compared with that of this country [Britain] it is of course simply appalling - as the rate is that of males in the prime of life, it is three times the English rate. But the true standard of comparison is that of the native in his kraal...it is certainly known that the kraal death rate judged from standards must be very high...
>
> What we can point to [in the House of Commons] is that although the figure of native mortality is still very high, it is enormously lower than it was - the Crown Colony administration introduced a great number of reforms and the mortality was halved...[57]

Towards the end of 1903 the gold mining industry did, indeed, improve its health care for African mineworkers.[58] Even so, the new standards of health care were still poor relative to those recommended in 1914 by the visiting American consultant, Surgeon-General W. C. Gorgas.[59] Several years earlier, the implementation of Gorgas's health measures, which focused on environmental improvements, had dramatically reduced the death rate from disease amongst the labourers on the Isthmus of Panama.[60]

During the immediate post-war period both the short supply of African mineworkers and the high mortality amongst them were major concerns for Milner. The mineowners were less concerned than Milner about the mortality. Lionel Phillips declared that the African labour shortage "was the only gigantic problem for solution".[61] Milner agreed with Phillips. Even so, Milner was keenly aware that the high death rate would intensify the censure of the influential opponents of

the mineowners both within and outside the House of Commons.[62] For Milner the high death rate in its own right was a source of anxiety. Also, Milner understood from the numerous warnings of Alfred Lyttelton, who succeeded Chamberlain as Colonial Secretary, that unless the British government had proof of an acceptable death rate, the Home Office would refuse to sanction the importation of indentured Chinese labourers.[63] Agreeing with Lyttelton, Milner confided: "The high rate of mortality in [the] mines is the weakest point in our armour."[64]

In brief, during the reconstruction period the shortage of African labour was the dominant issue as far as the gold mining industry was concerned: it overshadowed all other problems. This shortage had another result. On the advice of F. H. P. Creswell, the mine manager of the Village Main Reef,[65] towards the end of 1902 the mineowners resorted to the temporary expedient of employing white workers in unskilled mining jobs.[66]

The disbanding of the irregular troops had resulted in a large number of white males being without jobs.[67] Many wanted to stay in the Transvaal but there was a shortage of employment. Also, many indigent Afrikaners, who had been forced off the land and whose distress had been intensified by the Anglo-Boer War, swelled the ranks of the unemployed on the Witwatersrand.[68] In 1902 indigent Afrikaners and ex-irregulars comprised the unskilled white labour

force used in the white labour experiments on the mines.[69]

When miners returned to the Witwatersrand at the beginning of 1901, their initial enthusiasm soon dissipated. There were two reasons for this. First, they perceived the new government under Milner as being far less sympathetic to their needs than the government of Kruger had been. Second, they were dismayed to discover that during the war many of their former compatriots had died from silicosis at a youthful age.[70]

Within a short time of their arrival in the Transvaal, most miners, who in 1899 had "not any complaints to make against the Boers",[71] were convinced that the new British regime was one in which the Randlords dominated Milner: "the mineowners", they stated, "have come into prominence, and have exerted an undue predominance, in the affairs of South Africa since the war."[72] The controversy, initiated by contemporaries, concerning the relationship between Milner and the mineowners, is still endlessly debated.[73] Some historians argue that Milner was the "tool" of the capitalist Randlords. Others contend that the Governor of the Transvaal manipulated the mineowners for his own political ends.[74]

Alan Jeeves plausibly argues that a form of collaboratic developed between the state and the industry which was too variable and complex to be

defined simply as domination by the one party over the other: both parties were to variable degrees and at different times dependent on one another.[75] For instance, Milner needed the revenue from the industry for his political plans, which included the reconstruction of the Transvaal and the creation of a predominantly English-speaking colony.[76] Reciprocally, Milner aided the Randlords by negotiating the *Modus Vivendi* in 1901 with Portugal; the treaty gave the mineowners, through its recruiting organisation the WNLA, established in 1900, favourable terms for recruiting black mineworkers in the Portuguese territories of southern Africa.[77] Also, through a more efficient state administration than that of Kruger, Milner purposefully helped the mineowners to exert firmer and more elaborate controls over their black workforce.[78]

Even if we accept the explanation that Milner and the Randlords were mutually dependent on one other, during the reconstruction period and until responsible government in 1907 was conferred on the Transvaal, it is clear that the Randlords enjoyed a far more direct and indirect political influence than they had exercised under the republican government. Their direct political influence is clearly manifest: during the period 1902 to 1907, for instance, three leading politicians, namely Sir Percy FitzPatrick, Drummond Chaplin and Sir George Farrar, were presidents of the Chamber.[79] Less obvious was the industry's indirect

influence in government. As Jeeves has shown, many officials at all levels in the hierarchy of the Department of Native Affairs had been employed by the industry before the Anglo-Boer War.[80]

Milner tried to avoid making appointments which would closely identify the state with the gold mining industry: he did not wish to antagonise further the anti-mining house lobby in the House of Commons, personified by the politician-cum-journalist, A. B. Markham.[81] But, as in the case of the Department of Native Affairs, Milner appointed many former employees of the industry to both lesser and more important positions in the Department of Mines. Besides promoting mine managers, including William Moses and U. P. Swinburne, to mine inspectors,[82] Milner conferred the dual key positions of Government Mining Engineer and Chief Inspector of Mines on Horace Weldon, a former mine manager.[83] As we have seen, after Wilfred Wybergh had in 1903 resigned as Commissioner of Mines, Weldon until 1908 occupied the position in an acting capacity while simultaneously retaining the post of Government Mining Engineer.[84]

Because of their former links with the mining houses, most of the officials in the Department of Mines had a strong affinity to management. In their dealings with the Transvaal Miners' Association, for instance, they were undoubtedly more sympathetic to management than to the workers. When officials of the trade union lodged complaints and produced evidence of