



DEPARTMENT OF HEALTH  
*Republic of South Africa*

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## DEPARTMENT OF HEALTH

**Pathology Division  
Report:  
Demographic Data and  
Disease Rates for  
January – December  
2002**

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**NCOH Report 07/2003**

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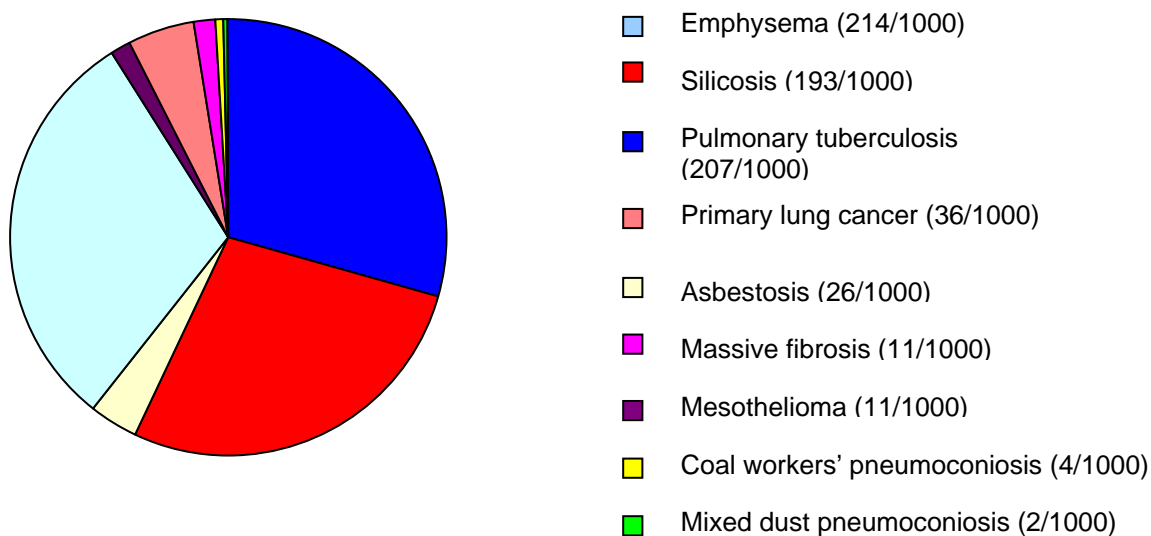
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## EXECUTIVE SUMMARY

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South African law requires the examination of the cardiorespiratory organs of deceased miners and ex-miners for compensation purposes, provided the next of kin agrees. These examinations are performed at the National Centre for Occupational Health (NCOH) and the findings are recorded on a computerized database (PATHAUT). This database is unique and provides an important resource for surveillance and research.

During 2002, 2 518 cases came to autopsy at the NCOH. Of these, 66.6% were black, 30.3% were white, 2.0% were coloured and 1.1% were submitted without information on ethnic group. No autopsies were received from Asians. Overall disease rates (per 1000 autopsies) for 2002 are shown in figure 1.



**FIG. 1**      **OVERALL DISEASE RATES FOR 2002**

## SECTION 1 – INTRODUCTION

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The Pathology Department of the National Centre for Occupational Health (NCOH) provides an autopsy service for miners and ex-miners to determine the presence of occupational lung disease. Under the Occupational Diseases in Mines and Works Act (ODMWA, 1973) it is obligatory for the last attending doctor to remove the cardiorespiratory organs and send them for examination, provided the next of kin agrees. A detailed report of each case is sent to the Medical Bureau for Occupational Diseases (MBOD). Cases certified as having a compensatable disease are then referred to the Compensation Commissioner's office, where payment of compensation is managed.

Since 1975 the pathological findings from autopsy examinations have been recorded on the PATHAUT database, a unique computerized source of information for research and surveillance. PATHAUT comprises data from autopsy summary sheets and clinical files (including occupational histories). The structure of this database was changed in 1995/1996 and new programs were written, upgrading and enhancing the existing database by improving the quality of the system and making better use of existing data (SIMRAC Project GEN509).

This is the sixth of the new format reports and describes autopsy cases examined during the year 2002.

Data from PATHAUT are exported into the Statistical Analysis System (SAS System) where programs have been written using Structured Query Language (SQL), permitting the user to analyze data related to any aspect of the PATHAUT database.

## SECTION 2 – DATA DESCRIPTION

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The number of autopsies performed since 1975 is presented in Table 2-1.

**TABLE 2-1 DISTRIBUTION OF AUTOPSIES BY YEAR AND ETHNIC GROUP  
(1975-2002)**

Year of autopsy	Black		White		Coloured		Indian		Unknown		Total N
	N	%	N	%	N	%	N	%	N	%	
1975	2 190	71	854	28	32	1					3 076
1976	2 335	68	1 072	31	27	1					3 434
1977	2 351	69	1 039	30	33	1					3 423
1978	2 245	67	1 090	32	32	1					3 367
1979	2 118	66	1 026	33	45	1					3 189
1980	2 338	64	1 274	35	46	1					3 658
1981	2 209	66	1 117	33	33	1					3 359
1982	2 312	63	1 302	36	44	1					3 658
1983	2 096	65	1 109	34	41	1					3 246
1984	1 966	64	1 098	36	28	1					3 092
1985	2 275	64	1 200	34	66	2					3 541
1986	2 456	68	1 125	31	45	1					3 626
1987	2 594	68	1 168	30	78	2					3 840
1988	2 518	67	1 165	31	77	2					3 760
1989	2 138	65	1 090	33	60	2					3 288
1990	2 172	64	1 155	34	51	2					3 378
1991	2 143	65	1 080	33	66	2					3 289
1992	2 144	66	1 049	32	70	2					3 263
1993	1 863	65	956	33	65	2					2 884
1994	1 737	61	1 021	36	94	3					2 852
1995	2 830	71	1 059	27	99	2					3 988
1996*	766	68	329	29	19	2			14	1.2	1 128
1997	2 223	69	897	28	70	2			18	0.6	3 208
1998	1 977	69	836	29	49	2	1		17	0.6	2 880
1999	1 656	65	832	33	29	1			12	0.5	2 529
2000	1 798	69	761	29	41	2			8	0.3	2 608
2001	1 690	67	813	32	13	1			13	0.5	2 529
2002	1 677	67	763	30	50	2			28	1.1	2 518
<b>Total</b>	<b>58 817</b>	<b>66</b>	<b>28 280</b>	<b>32</b>	<b>1403</b>	<b>2</b>	<b>1</b>		<b>110</b>	<b>0.1</b>	<b>88 611</b>

\* Data for only ± 6 months are available for this year

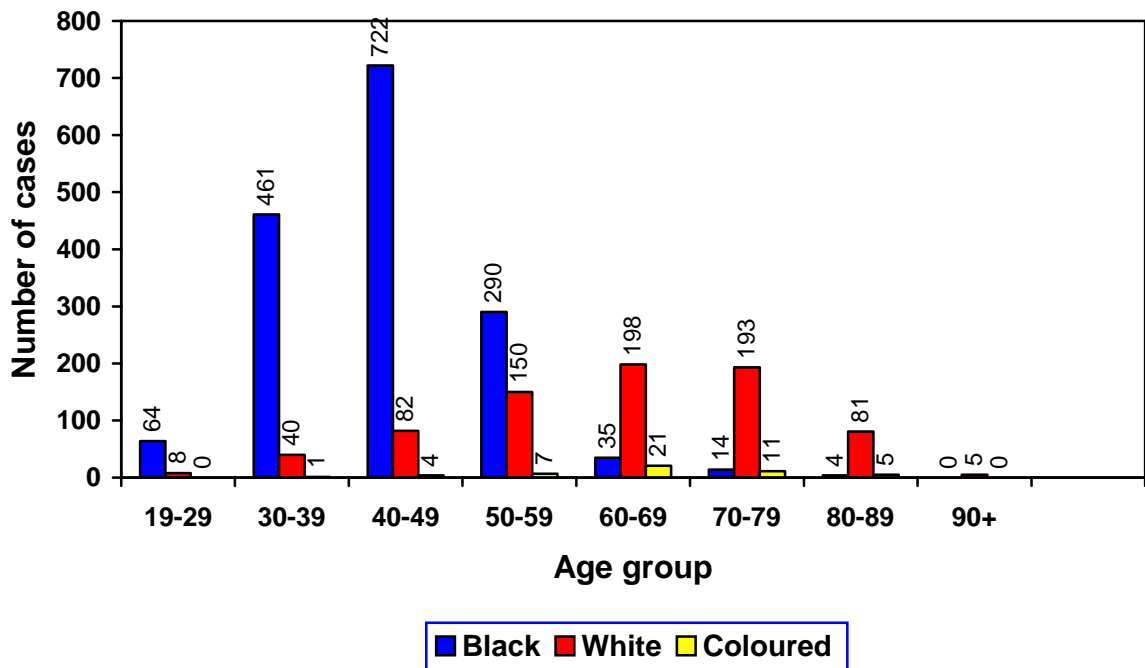
It is important to note that a referral bias exists, in that black men are infrequently autopsied after leaving employment in the mines, whereas the majority of whites come to autopsy after retirement.

The age distribution of autopsies for 2002 is shown in Table 2-2 and Fig 2-1. The mean age at autopsy for black miners has increased from 37.9 years in 1998 to 43.5 years in 2002. The age of white miners at autopsy has remained essentially unchanged.

**TABLE 2-2 NUMBERS AND PROPORTION OF AUTOPSIES BY AGE AND ETHNIC GROUP (2002)**

Age group (years)	Black		White		Coloured		Unknown		All races	
	N	%	N	%	N	%	N	%	N	%
19-29	64	3.8	8	1.1	0	0.0	0	0.0	72	2.9
30-39	461	27.5	40	5.2	1	2.0	0	0.0	502	20.0
40-49	722	43.1	82	10.8	4	8.0	0	0.0	808	32.1
50-59	290	17.3	150	19.7	7	14.0	0	0.0	447	17.8
60-69	35	2.1	198	26.0	21	42.0	0	0.0	254	10.1
70-79	14	0.8	193	25.3	11	22.0	0	0.0	218	8.7
80-89	4	0.2	81	10.6	5	10.0	0	0.0	90	3.6
90+	0	0.0	5	0.7	0	0.0	0	0.0	5	0.2
Unknown	87	5.2	6	0.8	1	2.0	28	100.0	122	4.9
<b>Total</b>	1 677		763		50		28		2 518	

**FIG 2-1 DISTRIBUTION OF AUTOPSIES BY AGE AND ETHNIC GROUP (2002)**



The pathologists at the NCOH perform two types of autopsy examinations. For men dying distant from Johannesburg, the cardiorespiratory organs are removed locally, preserved in formalin and sent to the NCOH. Full autopsies are undertaken on men who die close to Johannesburg.

Table 2-3 shows the distribution of autopsies by ethnic group for 2002. Autopsies of only cardio-respiratory organs comprised 94.4% of all examinations.

**TABLE 2-3 NUMBER AND PROPORTION OF AUTOPSIES BY TYPE AND ETHNIC GROUP (2002)**

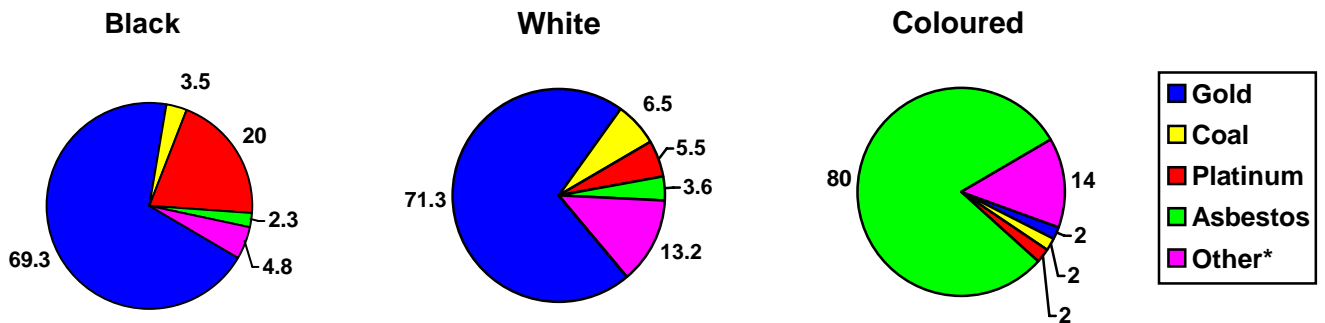
Autopsy type	Black		White		Coloured		Unknown		TOTAL	
	N	%	N	%	N	%	N	%	N	%
Cardiorespiratory organs only	1 675	99.9	624	81.8	49	98.0	28	100.0	2376	94.4
Full autopsy	2	0.1	139	18.2	1	2.0	0	0.0	142	5.6
<b>Total</b>	1 677		763		50		28		2 518	

Table 2-4 and Figure 2-4 show the distribution of autopsies by industry and ethnic group for 2002. The percentage of autopsies received from the gold mining industry has continued to decline from 75.8% in 1999, to 70.7% in 2000, to 68.0% in 2001, to 67.5% in 2002. The percentage of autopsies from platinum miners increased from 8.3% in 1999, to 14.3% in 2000, to 14.4% in 2001, to 15% in 2002. As in previous years, the majority of autopsies on coloured miners came from asbestos mines (80%).

**TABLE 2-4 NUMBER AND PROPORTION OF AUTOPSIES BY INDUSTRY AND ETHNIC GROUP (2002)**

Industry	Black		White		Coloured		Unknown		TOTAL	
	N	%	N	%	N	%	N	%	N	%
Gold	1 157	69.0	541	70.9	1	2.0	1	0.0	1 700	67.5
Coal	59	3.5	49	6.4	1	2.0	0	0.0	109	4.3
Platinum	334	19.9	42	5.5	1	2.0	0	0.0	377	15.0
Asbestos	38	2.3	27	3.5	40	80.0	0	0.0	105	4.2
Diamond	19	1.1	10	1.3	0	0.0	0	0.0	29	1.2
Copper	8	0.5	11	1.4	4	8.0	0	0.0	23	0.9
Isacor	0	0.0	16	2.1	0	0.0	0	0.0	16	0.6
Other	19	1.1	31	4.1	0	0.0	0	0.0	50	2.0
Unknown	43	2.6	32	4.7	3	6.0	27	100.0	109	4.3
<b>Total</b>	1 677		763		50		28		2 518	

**FIG 2-4 DISTRIBUTION OF AUTOPSIES BY INDUSTRY AND ETHNIC GROUP (2001)**



\* Includes copper, diamond, quarry, silica (silicon smelters), manganese, tin, zinc, minerals, chrome and iron, as well as cases where information about type of mining is missing

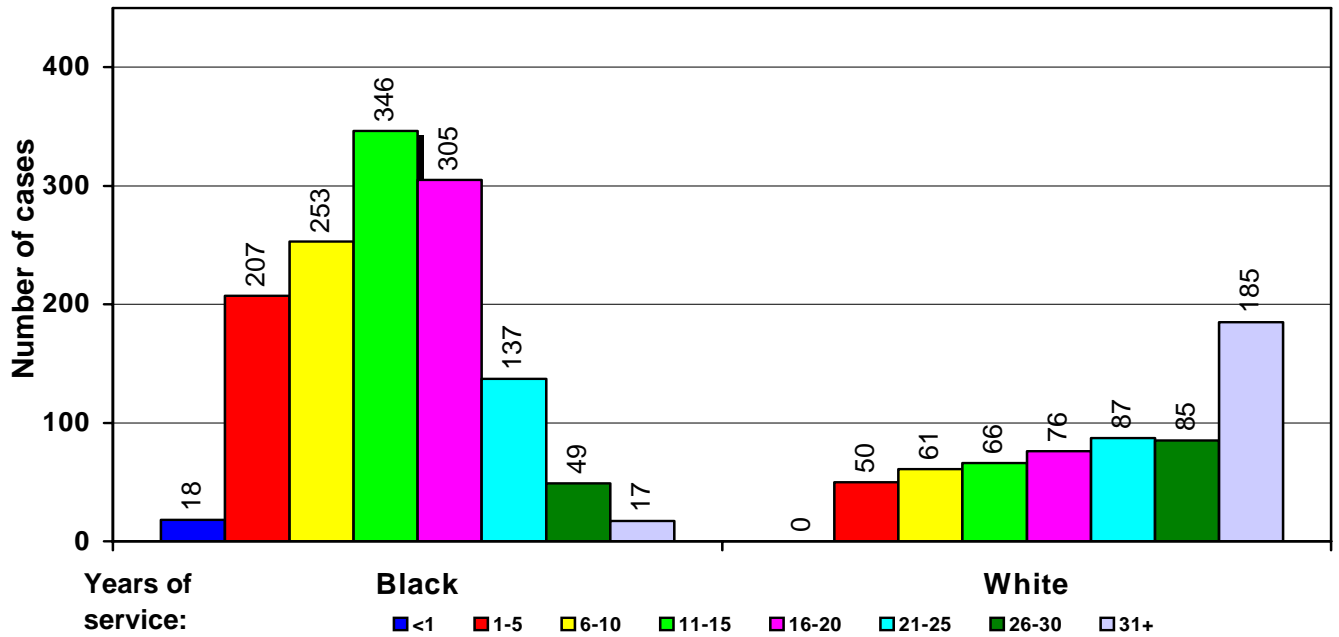
Detailed information about the years in mining service by ethnic group is given in Table 2-5. This is also presented in Fig 2-5. Cases were categorized according to the industry in which most years of service had occurred. It is important to note the large proportion of cases with missing information about the duration of service (21.6%). This proportion is similar to that found in 2001 (24.4%), 2000 (22.6%) and 1999 (22.7%) but considerably lower than the figure for 1998 (43%).

**TABLE 2-5 NUMBER AND PROPORTION OF AUTOPSIES BY YEARS OF SERVICE AND ETHNIC GROUP (2002)**

Years of service	Black		White		Coloured		Unknown		TOTAL	
	N	%	N	%	N	%	N	%	N	%
<1	18	1.1	0	0.0	0	0.0	0	0.0	18	0.7
1 - 5	207	12.3	50	6.6	9	18.0	0	0.0	266	10.6
6-10	253	15.1	61	8.0	9	18.0	0	0.0	323	12.8
11-15	346	20.6	66	8.7	7	14.0	0	0.0	419	16.6
16-20	305	18.2	76	10.0	2	4.0	0	0.0	383	15.2
21-25	137	8.2	87	11.4	1	2.0	0	0.0	225	8.9
26-30	49	2.9	85	11.1	2	4.0	0	0.0	136	5.4
31+	17	1.0	185	24.3	3	6.0	0	0.0	205	8.1
Unknown	345	20.6	153	20.1	17	34.0	28	100.0	543	21.6
<b>Total</b>	1 677		763		50		28		2 518	



**FIG 2-5 DISTRIBUTION OF AUTOPSIES BY YEARS OF SERVICE AND ETHNIC GROUP (2002)**



The mean duration of service and age by industry type and ethnic group for those cases for which information was available are shown in Table 2-6.

**TABLE 2-6: MEAN DURATION OF SERVICE AND MEAN AGE BY INDUSTRY AND ETHNIC GROUP (2002)**

Industry	Black					White				
	N	Age		Service		N	Age		Service	
		Mean	SD	Mean	SD		Mean	SD	Mean	SD
Gold	1082	42	8	12	8	539	64	14	21	13
Coal	59	44	7	15	10	49	61	15	17	16
Platinum	332	44	8	10	9	42	61	15	11	11
Asbestos	38	58	13	9	10	27	68	12	16	13
Diamond	18	47	15	14	10	10	51	19	13	12
Copper	8	51	12	13	11	11	54	13	9	9
Iscor	0	-	-	-	-	16	60	13	21	14
Other	18	50	12	11	11	31	61	13	17	16
Unknown	29	47	13	-	-	28	63	15	-	-
<b>Total</b>	<b>1584</b>					<b>753</b>				

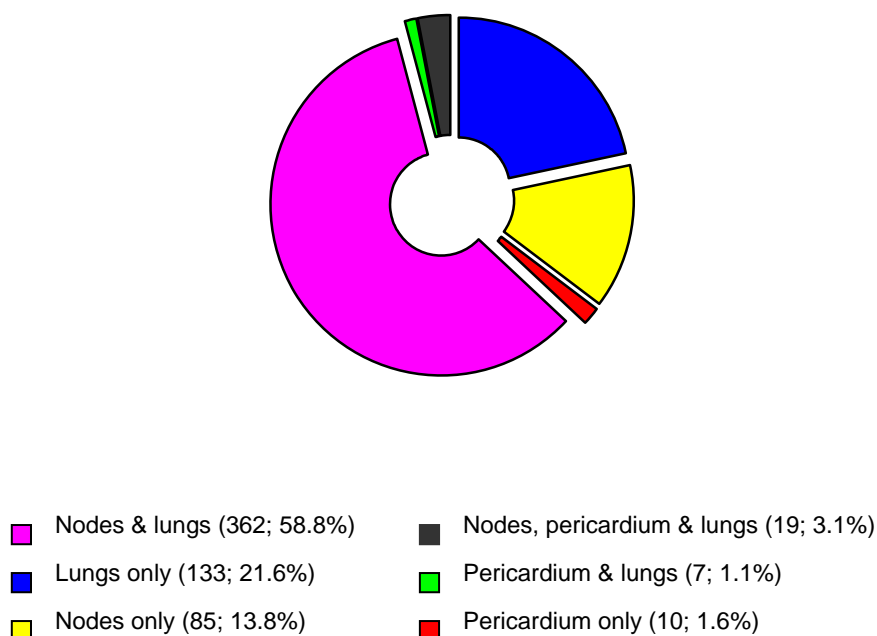
### SECTION 3 – ACTIVE TUBERCULOSIS

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The distribution of active tuberculosis (TB) by anatomical site is presented in Fig 3-1 (n=616). Active pulmonary TB was diagnosed in 20.7% (521) of all cases autopsied in 2002, in comparison with 19.2% (486) in 2001, and 16.4% (416) in 2000. 93.1% (485 cases) of men with PTB were black, 5% (26 cases) were white, 1% (5 cases) were coloured, and in 1% (5 cases) the ethnic group was unknown. 65.5% (341 cases) of all PTB cases came from the gold mines and 25% (130 cases) from platinum mines. Most (68%; 354 cases) of the PTB cases were in the age group 30-49 years.

The overall rate of PTB (206/1000) has increased from 192/1000 in 2001, 159/1000 in 2000 and 123/1000 in 1999. This is attributed to the increase in the PTB rate in black miners to 287/1000, from 267/1000 in 2001, 217/1000 in 2000, and 174/1000 in 1999. The rate of PTB increased particularly in black platinum miners from 179/1000 in 1999, to 251/1000 in 2000, to 345/1000 in 2001, to 383/1000 in 2002. Comparable rates for black gold miners were 171/1000 in 1999, 219/1000 in 2000, 251/1000 in 2001 and 274/1000 in 2002.

**Fig 3-1 Distribution of active TB by site (2002)**



The age distribution of cases with active PTB is shown in Table 3-1.

Rates in this and the following tables are expressed per 1000. In all tables, the denominators used are all autopsies in a specific industry and ethnic group. Consequently, where the denominators are small, the rates may not be reliable.

**TABLE 3-1 NUMBER OF CASES AND PREVALENCE OF ACTIVE PTB BY AGE AND ETHNIC GROUP (2002)**

Age group (years)	Black		White		Coloured		Unknown		Total	
	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate
20-29	23	359	0	-	0	-	0	-	23	319
30-39	142	308	2	50	1	1000	0	-	145	289
40-49	208	288	1	12	0	-	0	-	209	259
50-59	72	248	8	53	1	143	0	-	81	181
60-69	8	229	7	35	1	48	0	-	16	63
70-79	3	214	4	21	1	91	0	-	8	37
80-89	0	-	4	49	0	-	0	-	4	44
90+	0	-	0	-	0	-	0	-	0	-
Unknown	29	333	0	-	1	1000	5	179	35	287
<b>Total</b>	<b>485</b>	<b>289</b>	<b>26</b>	<b>34</b>	<b>5</b>	<b>100</b>	<b>5</b>	<b>179</b>	<b>521</b>	<b>207</b>

The distribution of active PTB cases by industry is shown in Table 3-2. 65.5% of active PTB cases came from the gold mining industry (67.8% of all autopsy cases came from that industry).

**TABLE 3-2 NUMBER OF CASES AND PREVALENCE OF ACTIVE PTB BY INDUSTRY AND ETHNIC GROUP (2002)**

Industry	Black		White		Coloured		Unknown		Total	
	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate
Gold	317	274	23	43	0	-	1	1000	341	201
Coal	12	203	0	-	0	-	0	-	12	110
Platinum	128	383	1	24	1	1000	0	-	130	34
Asbestos	8	211	0	-	2	50	0	-	10	95
Diamond	2	105	0	-	0	-	0	-	2	69
Copper	1	125	1	91	2	500	0	-	4	174
Iscor	0	-	0	-	0	-	0	-	0	-
Other	4	211	1	32	0	-	0	-	5	10
Unknown	10	233	0	-	0	-	4	148	14	128
<b>Total</b>	<b>482</b>	<b>287</b>	<b>26</b>	<b>34</b>	<b>5</b>	<b>100</b>	<b>5</b>	<b>179</b>	<b>518</b>	<b>206</b>

Table 3-3 shows the number of active PTB cases by years of service and ethnic group.

**TABLE 3-3 NUMBER OF CASES AND PREVALENCE OF ACTIVE PTB BY YEARS OF SERVICE AND ETHNIC GROUP (2002)**

Years of service	Black		White		Coloured		Unknown		Total	
	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate
<1	3	167	0	-	0	-	0	-	3	167
1 - 5	66	319	3	60	1	111	0	-	70	263
6-10	80	316	2	33	2	222	0	-	84	260
11-15	88	254	0	-	1	143	0	-	89	212
16-20	78	256	1	13	0	-	0	-	79	206
21-25	31	226	5	57	0	-	0	-	36	160
26-30	14	286	3	35	0	-	0	-	17	125
31+	4	235	10	54	0	-	0	-	14	68
Unknown	121	351	2	13	1	59	5	179	129	238
<b>Total</b>	<b>485</b>	<b>289</b>	<b>26</b>	<b>34</b>	<b>5</b>	<b>100</b>	<b>5</b>	<b>179</b>	<b>521</b>	<b>207</b>

## SECTION 4 – SILICOSIS

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Silicotic nodules were found in the lungs of 486 cases (19.3% of all autopsies); 88.1% of these cases came from the gold mining industry. Of all cases of silicosis, occasional silicotic nodules were found in 51.3%, a few in 20.6%, a moderate number in 24.4% of cases and a large number in 3.7%.

The age distribution of cases with silicosis (Table 4-1) differed between ethnic groups. No clear trend was evident for age and rates of silicosis in black miners. One explanation is that relatively few older black miners who have retired came to autopsy. There is, however, a trend in white miners.

**TABLE 4-1 NUMBER OF CASES AND PREVALENCE OF SILICOSIS BY AGE AND ETHNIC GROUP (2002)**

Age group (years)	Black		White		Coloured		Unknown		Total	
	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate
20-29	1	16	0	-	0	-	0	-	1	14
30-39	47	102	3	75	0	-	0	-	50	100
40-49	174	241	9	110	0	-	0	-	183	226
50-59	92	317	16	107	1	143	0	-	109	244
60-69	7	200	36	182	0	-	0	-	43	169
70-79	2	143	41	212	0	-	0	-	43	197
80-89	2	500	27	333	0	-	0	-	29	322
90+	0	-	2	400	0	-	0	-	2	400
Unknown	18	207	1	167	0	-	7	250	26	213
<b>Total</b>	<b>343</b>	<b>205</b>	<b>135</b>	<b>177</b>	<b>1</b>	<b>20</b>	<b>7</b>	<b>250</b>	<b>486</b>	<b>193</b>

The distribution of cases with silicosis by industry and ethnic group is presented in Table 4-2. As indicated previously, cases are categorized according to the industry in which the most years of service occurred. The rate in gold miners has increased from 164/1000 in 1999, to 191/1000 in 2000, to 228/1000 in 2001 and to 252/1000 in 2002. Cases from the platinum mining industry with silicosis might be explained by unstated previous service in gold mines.

**TABLE 4-2 NUMBER OF CASES AND PREVALENCE OF SILICOSIS BY INDUSTRY AND ETHNIC GROUP (2002)**

Industry	Black		White		Coloured		Unknown		Total	
	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate
Gold	308	266	119	220	0	-	1	1000	428	252
Platinum	15	45	5	119	0	-	0	-	20	53
Coal	2	34	2	41	0	-	0	-	4	37
Asbestos	8	211	1	37	0	-	0	-	9	86
Diamond	0	-	0	-	0	-	0	-	1	34
Copper	0	-	0	-	1	250	0	-	0	-
Iscor	0	-	0	-	0	-	0	-	0	-
Other	0	-	2	65	0	-	0	-	2	40
Unknown	6	140	5	139	0	-	6	222	17	156
<b>Total</b>	<b>339</b>	<b>202</b>	<b>134</b>	<b>176</b>	<b>1</b>	<b>20</b>	<b>7</b>	<b>250</b>	<b>481</b>	<b>191</b>

**TABLE 4-3 NUMBER OF SILICOTIC ISLETS IN THE LUNGS BY YEARS OF SERVICE AND ETHNIC GROUP (2002)**

Years of service	Black		White		Coloured		Unknown		Total	
	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate
<1	3	167	0	-	0	-	0	-	3	167
1 - 5	31	150	4	80	0	-	0	-	35	132
6-10	25	99	4	66	0	-	0	-	29	90
11-15	73	211	10	152	1	143	0	-	84	200
16-20	93	305	14	184	0	-	0	-	107	279
21-25	40	292	16	184	0	-	0	-	56	249
26-30	14	286	16	188	0	-	0	-	30	221
31+	3	176	48	259	0	-	0	-	51	249
Unknown	61	177	23	150	0	-	6	-	91	168
<b>Total</b>	<b>343</b>	<b>205</b>	<b>135</b>	<b>177</b>	<b>1</b>	<b>20</b>	<b>6</b>	<b>214</b>	<b>486</b>	<b>193</b>

## SECTION 5 – MASSIVE FIBROSIS, COALWORKER’S PNEUMOCONIOSIS, MIXED DUST FIBROSIS AND ASBESTOSIS

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### MASSIVE FIBROSIS

There were 27 (1.07%) cases of massive fibrosis (18 black, 9 white). Twenty-six were from the gold mining industry.

### COAL WORKERS’ PNEUMOCONIOSIS

There were 10 cases of coal workers’ pneumoconiosis; 6 were older than 40 years.

### MIXED DUST FIBROSIS

There were 5 (0.2%) cases of mixed dust fibrosis.

### ASBESTOSIS

There were 65 cases of asbestosis of which 53.8% (n=35) had slight, 44.6% (n=29) moderate and 1.5% (n=1) marked fibrosis.

The distribution of asbestosis by age and ethnic group is shown in Table 5-1. No cases were younger than 40 years.

**TABLE 5-1 NUMBER OF CASES AND PREVALENCE OF ASBESTOSIS BY AGE AND ETHNIC GROUP (2002)**

Age group (years)	Black		White		Coloured		Unknown		Total	
	N	Rate	N	Rate	N	Rate			N	Rate
40-49	10	14	0	-	0	-	0	-	10	12
50-59	7	24	1	7	1	143	0	-	9	20
60-69	7	200	5	25	8	381	0	-	20	79
70-79	5	357	5	26	6	545	0	-	16	73
80-89	2	500	3	37	0	-	0	-	5	56
90+	0	-	1	200	0	-	0	-	1	200
Unknown	0	-	0	-	1	1000	3	107	4	33
<b>Total</b>	<b>31</b>	<b>18</b>	<b>15</b>	<b>20</b>	<b>16</b>	<b>320</b>	<b>3</b>	<b>107</b>	<b>65</b>	<b>26</b>

## SECTION 6 – EMPHYSEMA

There were 538 cases of emphysema, the extent of which was mild in 74.0% (n=398), moderate in 24.0% (n=129) and marked in 2.0% (n=11). The distribution of emphysema by age and ethnic group is presented in Table 6-1.

**TABLE 6-1 NUMBER OF CASES AND PREVALENCE OF EMPHYSEMA BY AGE AND ETHNIC GROUP (2002)**

Age group (years)	Black		White		Coloured		Unknown		TOTAL	
	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate
30-39	26	56	3	75	0	-	0	-	29	58
40-49	88	122	11	134	0	-	0	-	99	123
50-59	70	241	51	340	4	571	0	-	125	280
60-69	12	343	88	444	12	571	0	-	112	441
70-79	3	214	96	497	7	636	0	-	106	486
80-89	3	750	41	506	2	400	0	-	46	511
90+	0	-	2	400	0	-	0	-	2	400
Unknown	7	80	1	167	1	1000	10	357	19	156
<b>Total</b>	<b>209</b>	<b>125</b>	<b>293</b>	<b>384</b>	<b>26</b>	<b>520</b>	<b>10</b>	<b>357</b>	<b>538</b>	<b>214</b>

The majority of black and white miners with emphysema 63% (n=337) were from the gold mining industry (Table 6-2).

**TABLE 6-2 NUMBER OF CASES AND PREVALENCE OF EMPHYSEMA BY INDUSTRY AND ETHNIC GROUP (2002)**

Industry	Black		White		Coloured		Unknown		TOTAL	
	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate
Gold	129	111	208	384	0	-	0	-	337	198
Platinum	36	108	19	452	0	-	0	-	55	146
Coal	18	305	14	286	0	-	0	-	32	294
Asbestos	14	368	10	370	20	500	0	-	44	419
Iscor	0	-	5	313	0	-	0	-	5	313
Copper	0	-	4	364	4	1000	0	-	8	348
Diamond	3	158	1	100	0	-	0	-	4	138
Other	4	211	13	419	0	-	0	-	17	340
Unknown	5	116	16	444	2	667	10	370	33	303
<b>Total</b>	<b>209</b>	<b>125</b>	<b>290</b>	<b>380</b>	<b>26</b>	<b>520</b>	<b>10</b>	<b>357</b>	<b>535</b>	<b>212</b>



**TABLE 6-3 NUMBER OF CASES AND PREVALENCE OF EMPHYSEMA BY YEARS OF SERVICE AND ETHNIC GROUP (2002)**

Years of service	Black		White		Coloured		Unknown		Total	
	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate
<1	3	167	0	-	0	-	0	-	3	167
1 - 5	16	77	12	240	4	444	0	-	32	120
6-10	16	63	20	328	2	222	0	-	38	118
11-15	33	95	13	197	5	714	0	-	51	122
16-20	61	200	29	382	1	500	0	-	91	238
21-25	28	204	37	425	1	1000	0	-	66	293
26-30	10	204	30	353	1	500	0	-	41	301
31+	7	412	84	454	0	-	0	-	91	444
Unknown	35	101	68	444	12	706	10	357	125	230
<b>Total</b>	209	179	293	384	26	520	10	357	538	214

## SECTION 7 – MESOTHELIOMA

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The number of cases of mesothelioma in 2002 (n=27) was similar to that in previous years (19 in 1998, 24 in 1999, 17 in 2000, 18 in 2001).

**TABLE 7-1 NUMBER AND PROPORTION OF MESOTHELIOMA CASES BY AGE AND ETHNIC GROUP (2002)**

Age group (years)	Black		White		Coloured		TOTAL	
	N	%	N	%	N	%	N	%
40-49	5	50.0	0	0.0	0	0.0	5	18.5
50-59	5	50.0	3	25.0	2	40.0	10	37.0
60-69	0	0.0	5	41.7	2	40.0	7	25.9
70-79	0	0.0	3	25.0	1	20.0	4	14.8
80-89	0	0.0	1	8.3	0	0.0	1	3.7
<b>Total</b>	10		12		5		27	

The distribution of mesothelioma by industry and ethnic group is presented in Table 7-2. The highest proportion of mesothelioma cases was found in asbestos miners (51.9%).

**TABLE 7-2 NUMBER AND PROPORTION OF MESOTHELIOMA CASES BY INDUSTRY AND ETHNIC GROUP (2002)**

Industry	Black		White		Coloured		TOTAL	
	N	%	N	%	N	%	N	%
Asbestos	4	40.0	5	41.7	5	100.0	14	51.9
Coal	1	10.0	2	16.7	0	0.0	3	11.1
Copper	1	10.0	0	0.0	0	0.0	1	3.7
Diamond	1	10.0	0	0.0	0	0.0	1	3.7
Gold	0	0.0	1	8.3	0	0.0	1	3.7
Other	1	10.0	1	8.3	0	0.0	2	7.4
Unknown	2	20.0	3	25.0	0	0.0	5	18.5
<b>Total</b>	10		12		5		27	

\*2 February 2006. In an earlier print run of this report, the total number of mesothelioma cases was given as 25. Changes have been made to the text and tables.

## SECTION 8 – PRIMARY LUNG CANCER

Ninety one cases of primary lung cancer were found at autopsy, 22% of which were in black, 70.3% in white, and 5.5% in coloured miners. Most of the cases were of the large cell type (37.4%; n=34), followed by squamous cell type (26.4%; n=24), lung adenocarcinoma (16.5%; n=15) and small cell type (18.7%; n=17). One case of bronchoalveolar carcinoma was seen.

The distribution of primary lung cancer by age and ethnic group is presented in Table 8-1.

**TABLE 8-1 NUMBER OF CASES AND PREVALENCE OF PRIMARY LUNG CANCER BY AGE AND ETHNIC GROUP (2002)**

Age group (years)	Black		White		Coloured		TOTAL*	
	N	Rate	N	Rate	N	Rate	N	Rate
20-29	0	-	1	125	0	-	1	14
40-49	8	11	5	61	0	-	13	16
50-59	5	17	8	53	1	143	14	31
60-69	2	57	20	101	2	95	24	94
70-79	2	143	22	114	1	91	25	115
80-89	0	-	8	99	1	200	9	100
Unknown	3	34	0	0	0	-	4	33
<b>Total</b>	<b>20</b>	<b>12</b>	<b>64</b>	<b>84</b>	<b>5</b>	<b>100</b>	<b>90</b>	<b>36</b>

\* In one case both age and race were unknown.

The distribution of primary lung cancer by industry and ethnic group is presented in Table 8-2. For white miners, the majority of cases came from the gold mining industry.

**TABLE 8-2 NUMBER OF CASES AND PREVALENCE OF PRIMARY LUNG CANCER BY INDUSTRY AND ETHNIC GROUP (2002)**

Industry	Black		White		Coloured		TOTAL*	
	N	Rate	N	Rate	N	Rate	N	Rate
Gold	10	9	44	81	0	-	54	32
Coal	1	17	4	82	1	1000	6	55
Asbestos	4	105	2	74	3	75	9	86
Platinum	5	15	4	95	0	-	9	24
Diamond	0	-	1	100	0	-	1	34
Iscor	0	-	2	125	0	-	2	125
Other	0	-	4	129	0	-	4	80
Unknown	0	-	3	83	1	333	5	46
<b>Total</b>	<b>20</b>	<b>12</b>	<b>64</b>	<b>84</b>	<b>5</b>	<b>100</b>	<b>90</b>	<b>36</b>

\* In one case both race and industry were unknown

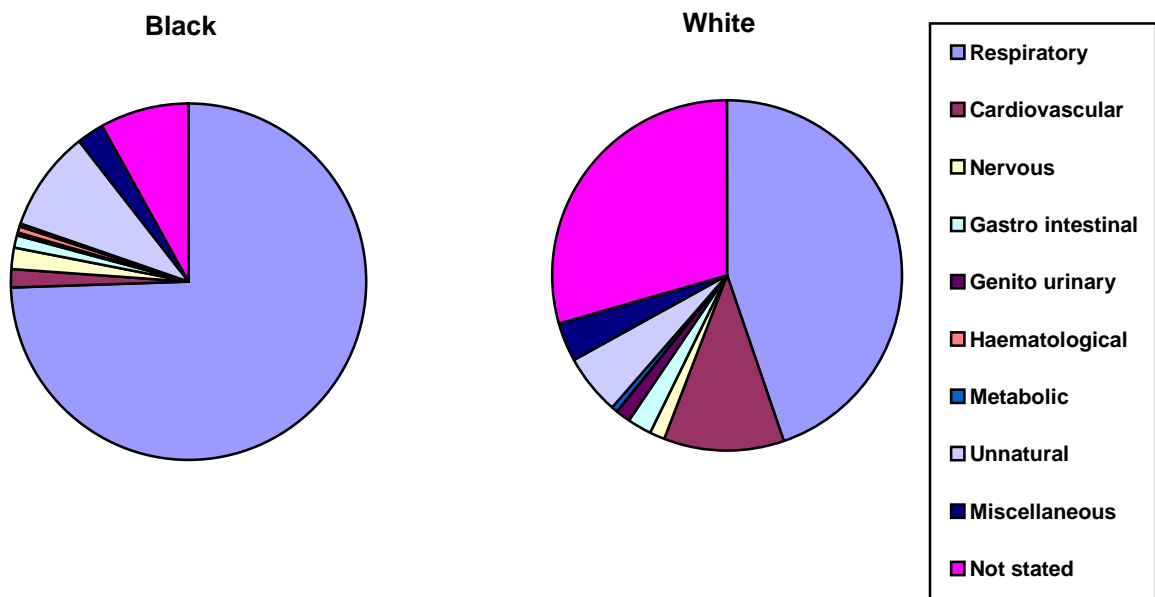
## SECTION 9 – CLINICAL CAUSES OF DEATH

Table 9-1 and Figure 9-1 show the clinical cause of death that accompanied the cardiorespiratory organs, by ethnic group. Diseases of the respiratory system were the most frequent (64.5%) overall. The rate in black miners increased from 50.9% in 1998, to 57.6% in 1999, to 64.5% in 2000, to 69.9% in 2001, to 74.4% in 2002. Black miners had the highest proportion of unnatural causes of death (9.4%). There has been a steady decline in the proportion of unnatural deaths in black miners (19.2% in 1998, 16.8% in 1999, 13.3% in 2000 and 11.2% in 2001). In 15.5% of cases the cause of death was not stated.

**TABLE 9-1 CAUSES OF DEATH BY ETHNIC GROUP (2002)**

System	Black		White		Coloured		Unknown		TOTAL	
	N	%	N	%	N	%	N	%	N	%
Respiratory	1248	74.4	342	44.8	33	66.0	1	3.6	1624	64.5
Cardiovascular	28	1.7	83	10.9	3	6.0	0	0.0	114	4.5
Nervous	34	2.0	12	1.6	3	6.0	0	0.0	49	1.9
Gastro intestinal	18	1.1	16	2.1	2	4.0	0	0.0	36	1.4
Genito urinary	7	0.4	11	1.4	0	0.0	0	0.0	18	0.7
Haematological	8	0.5	1	0.1	0	0.0	0	0.0	9	0.4
Metabolic	0	0.0	3	0.4	0	0.0	0	0.0	3	0.1
Unnatural	158	9.4	42	5.5	2	4.0	0	0.0	202	8.0
Miscellaneous	40	2.4	28	3.7	3	6.0	0	0.0	71	2.8
Not stated	135	8.1	225	29.5	4	8.0	27	96.4	391	15.5
<b>Total</b>	<b>1677</b>		<b>763</b>		<b>50</b>		<b>28</b>		<b>2518</b>	

**FIG 9-1 CAUSE OF DEATH AS GIVEN BY THE CLINICIANS WHO SUBMIT THE ORGANS TO THE NCOH (2002)**



**APPENDIX: DISTRIBUTION OF AUTOPSIES ACCORDING TO THE LAST MINE  
WHERE THE DECEASED WORKED**

MINETYPE	LAST MINE WORKED AT	BLACK	WHITE	COL- OURED	UN- KNOWN	TOTAL
<b>Asbestos</b>	African Chrysolite asbestos	0	2	0		2
	Asbestos Mine	2	4	2		8
	Blackrich Asbestos	0	0	1		1
	Bretby Asb	0	0	1		1
	Cape Blue	1	3	0		4
	Danielskuil Asbestos mine	1	0	0		1
	Elandsfontein Asbestos mine	0	0	1		1
	Everite	0	1	0		1
	Gefco	24	5	3		32
	Kliphuis	0	0	3		3
	Koegas	1	4	25		30
	Penge Asbestos	2	2	0		4
	Pomfret Asbestos Mine	0	1	0		1
	Rocla Asb Pipe Indus	0	1	0		1
	Stofbakkies	0	0	1		1
	Voorspoed Asbestos Mine	1	0	0		1
	Wandrag Asbestos Mine	3	0	0		3
<b>Total from asbestos mines</b>		<b>35</b>	<b>23</b>	<b>37</b>		<b>95</b>
<b>Chrome</b>	Eastern Chrome	1	0	0		1
	Marble Lime Chrome	0	1	0		1
	Mooinooi	0	1	0		1
	Dilokong	1	0	0		1
	Winterveld	0	1	0		1
<b>Total from chrome mines</b>		<b>2</b>	<b>3</b>	<b>0</b>		<b>5</b>
<b>Coal</b>	Arnot Colliery	6	0	0		6
	Bank Colliery	3	3	0		6
	Amcoal Colliery	0	2	0		2
	Atcom Opencast Coal Mine	0	1	0		1
	Cornelia Colliery	0	1	0		1
	Bosjesspruit Colliery	1	0	0		1
	Brandspruit Colliery	1	0	0		1
	Coalbrook Colliery	0	1	0		1
	Delmas Colliery	1	3	0		4
	Durban Navigation	0	3	1		4
	Douglas Colliery	0	2	0		2
	Ermelo Coal	0	1	0		1
	Duiker Colliery	0	1	0		1
	Durnacol Mine	0	1	0		1
	Forzando Colliery	1	0	0		1
	Goedehoop Colliery	4	1	0		5
	Greenside Colliery	5	2	0		7
	Hlobane Colliery	0	1	0		1
	Kleinkopje Colliery	4	0	0		4
	Koornfontein Coal	0	1	0		1
	Kriel Colliery	6	1	0		7
	Landau Colliery	0	1	0		1
	Leeufontein Colliery	0	1	0		1
	Matla Coal	5	4	0		9
	New Vaal Colliery	0	1	0		1
	North Feld Colliery	1	0	0		1
	Nyati Coal mine	0	1	0		1
	Navigation Coll	0	1	0		1

MINETYPE	LAST MINE WORKED AT	BLACK	WHITE	COL- OURED	UN- KNOWN	TOTAL
<b>Coal</b>	Rietspruit Colliery	0	2	0		2
<b>(continued)</b>	Roofontein	0	2	0		2
	SA Coal Estates	1	2	0		3
	Sasol Coal Mine	8	1	0		9
	Savemore Colliery	1	0	0		1
	Secunda Colliery	1	2	0		3
	Slater Coal Mine	0	1	0		1
	Springfield Colliery	0	3	0		3
	Spitzkop	0	1	0		1
	Syferfontein Coal	1	0	0		1
	Tavistok Colliery	1	0	0		1
	Twistdraai	2	0	0		2
	Usutu Colliery	0	1	0		1
	Van Dyk's Drift	1	1	0		2
	Vryheid Coronation	0	2	0		2
	Welgedacht	0	2	0		2
	Witbank Collieries	1	1	0		2
	Witcons Colliery	3	0	0		3
<b>Total from coal mines</b>		<b>58</b>	<b>55</b>	<b>1</b>		<b>114</b>
<b>Copper</b>	Copper Mine	1	0	0		1
	Messina Copper	1	0	0		1
	O`Kiep Copper	0	1	4		5
	Phalaborwa	3	3	0		6
	Prieska	1	1	1		3
	Tsumeb Copper Mine	0	2	0		2
<b>Total from copper mines</b>		<b>6</b>	<b>7</b>	<b>5</b>		<b>18</b>
<b>Diamond</b>	Bellsbank Diamond	3	1	0		4
	De Beers Consolidated	4	4	0		8
	Diamond Mine	0	1	0		1
	Finch Diamond Mine	1	0	0		1
	Loxton Exploration	8	1	0		9
	Premier Diamond	6	4	0		10
	Unknown	0	1	0		1
<b>Total from diamond mines</b>		<b>22</b>	<b>12</b>	<b>0</b>		<b>34</b>
<b>Gold</b>	Afrikaner GM	0	1	0	0	1
	Anglo Health Service	0	1	0	0	1
	Anglo Power GM	0	1	0	0	1
	Bambanani GM	16	0	0	0	16
	Barberton GM	0	2	0	0	2
	Bayer GM	3	0	0	0	3
	Beatrix Gold	52	9	0	0	61
	Bernetco GM	0	1	0	0	1
	Blyvoorquizicht	0	11	0	0	11
	Bracken Mines	0	3	0	0	3
	Brakpan GM	1	3	0	0	4
	Buffelsfontein Gold	23	23	0	1	47
	City Deep	0	3	0	0	3
	Consolidated Main Reef	0	1	0	0	1
	Consolidated Mod	0	1	0	0	1
	Consolidated Mur	0	1	0	0	1
	Crown Mines	0	1	0	0	1
	Daggasfontein	0	2	0	0	2
	Deelkraal	2	7	0	0	9
	Doornfontein	0	13	0	0	13
	Durban Roodepoort Deep	0	11	0	0	11
	East Driefontein	60	17	1	0	78

MINETYPE	LAST MINE WORKED AT	BLACK	WHITE	COL- OURED	UN- KNOWN	TOTAL
<b>Gold</b>	East Geduld	0	2	0	0	2
<b>(continued)</b>	East Rand Prop	2	22	0	0	24
	Elandsrand	2	8	0	0	10
	Ellaton GM	0	1	0	0	1
	Evander GM	34	2	0	0	36
	Fairview Mine	0	1	0	0	1
	Freddies Gold	28	5	0	0	33
	Free State Geduld	2	13	0	0	15
	Free State Saaiplaas	2	5	0	0	7
	Glenhavy GM	0	1	0	0	1
	Goldfields	2	4	0	0	6
	Groenwater Asb	0	1	0	0	1
	Grootvlei Prop	1	6	0	0	7
	Harmony	153	15	0	0	168
	Hartebeesfontein	74	18	0	0	92
	J.I.C. Gold Mine	10	2	0	0	12
	Joel	12	0	0	0	12
	Kinross	8	5	0	0	13
	Kloof	60	23	0	0	83
	Kopanang GM	0	1	0	0	1
	Kuikenspoort GM	0	0	2	0	2
	Leeudoorn	12	3	0	0	15
	Leslie	0	2	0	0	2
	Libanon	11	14	0	0	25
	Marievale	0	6	0	0	6
	Masimong Gold Mine	14	1	0	0	15
	Merriespruit GM	1	1	0	0	2
	Motjabeng GM	9	0	0	0	9
	Naledi GM	1	0	0	0	1
	Oryx	27	0	0	0	27
	Placer Dome GM	27	0	0	0	27
	President Brand	0	9	0	0	9
	President Steyn	37	11	0	0	48
	Primrose GM	0	1	0	0	1
	Rand Leases	0	3	0	0	3
	Rand Mines	0	1	0	0	1
	Rand Refinery	0	1	0	0	1
	Randfontein	5	21	0	0	26
	S A Land	0	2	0	0	2
	Saaiplaas GM	0	2	0	0	2
	Sallies	0	2	0	0	2
	Savuka GM	0	1	0	0	1
	Springs GM	0	1	0	0	1
	St Helena	38	6	0	0	44
	State GM	1	0	0	0	1
	Stillfontein	0	11	0	0	11
	Target Gold Mine	1	1	0	0	2
	Tshepone GM	8	0	0	0	8
	Ubuntu Small Scale GM	5	0	0	0	5
	Unisel GM	0	1	0	0	1
	Vaal Reefs	223	45	0	0	268
	Ventersport	0	8	0	0	8
	Village Main Reef	0	1	0	0	1
	Virginia GM	0	3	0	0	3
	Vlakfontein	0	3	0	0	3
	Vogelstruisbult	0	2	0	0	2

MINETYPE	LAST MINE WORKED AT	BLACK	WHITE	COL- OURED	UN- KNOWN	TOTAL
<b>Gold</b>	Waterpan GM	0	2	0	0	2
<b>(continued)</b>	Welkom GM	2	2	0	0	4
	West Driefontein	42	21	0	0	63
	West Rand Consolidation	0	7	0	0	7
	West Witwatersrand	0	1	0	0	1
	Western Areas	12	19	0	0	31
	Western Deep Levels	50	29	0	0	79
	Western Holdings	11	13	0	0	24
	Western Keef GM	0	1	0	0	1
	Winkelhaak	2	3	0	0	5
	Wit Nigel GM	0	3	0	0	3
	Zandpan GM	0	1	0	0	1
<b>Total from gold mines</b>		<b>1 086</b>	<b>512</b>	<b>3</b>	<b>1</b>	<b>1 602</b>
<b>Platinum</b>	Amadelbult Platinum (Rustenburg)	5	1	0		6
	Atok Platinum	9	0	0		9
	Bafokeng	1	0	0		1
	Eastern Platinum	1	0	0		1
	Impala Platinum	123	20	0		143
	Karee Platinum	0	1	0		1
	Lebowa Platinum	2	2	0		4
	Madikwa Platinum	0	1	0		1
	Messina Platinum	0	2	0		2
	Northam Platinum	9	0	0		9
	R.U.C Platinum	1	0	0		1
	Rustenburg Platinum	191	27	1		219
	Swartklip Platinum	1	2	0		3
	Western Platinum	2	4	0		6
	Zondereinde Platinum	15	1	0		16
<b>Total from platinum mines</b>		<b>360</b>	<b>61</b>	<b>1</b>		<b>422</b>
<b>Cementation</b>	Cementation	0	7	0		7
<b>Iron</b>	Boshhoek Iron Mine	0	1	0		1
<b>Fluorspar</b>	Vergenoeg Mine	0	1	0		1
	Maandaghoek Iron	3	1	0		4
	Sishen Iron Mine	1	0	0		1
	Thabazimbi Iron Mine	0	1	0		1
<b>Iron &amp; Manganese</b>	Associated Manganese	1		0		1
<b>Minerals</b>	African Rainbow Minerals	40	3	0		43
<b>Manganese</b>	Hotazel	1	0	0		1
	Manganese mine	1	0	0		1
	National Manganese	1	0	0		1
	S A Manganese	2	0	0		2
<b>Phosphate</b>	Foskor Beperk	1	0	0		1
<b>Quarries</b>	Hippo Quarries	0	2	0		2
	Quarries Mines	0	1	0		1
<b>Silica</b>	Silicon Smelters	3	0	0		3
<b>Sinkers</b>	Shaft Sinkers	0	1	0		1
<b>Steel</b>	Highveld Steel and Vanadium	3	3	0		6
<b>Steel &amp; Iron</b>	Isacor	0	27	0		27
<b>Tin</b>	Rooiberg Mineral Division	0	1	0		1
<b>Vanadium</b>	Rhovan Vanadium	1	0	0		1
<b>Zinc</b>	Maranda Mine	1	0	0		1
	Zinc Corporation	0	1	0		1
<b>Non Miner</b>	Industry	5	2	0		7
	Non Miner	1	3	0		4



<b>MINETYPE</b>	<b>LAST MINE WORKED AT</b>	<b>BLACK</b>	<b>WHITE</b>	<b>COL- OURED</b>	<b>UN- KNOWN</b>	<b>TOTAL</b>
<b>Unknown</b>	Unknown	41	35	3	27	106
	Lime Acres	1	0	0	0	1
	Concor Plant Min	1	0	0	0	1
<b>TOTAL</b>		<b>1677</b>	<b>763</b>	<b>50</b>	<b>28</b>	<b>2 518</b>