

**REPORTED DUST CONCENTRATIONS IN UNDERGROUND GOLD MINES
OVER THE YEARS 1999 TO 2002**

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ABSTRACT

Dust has been recognized as the most serious occupational health hazard across the South African Mining Industry. During 1998 more than 5600 mineworkers were certified with silicosis, a silica related lung disease. The objective of this research project is to describe the trend in respirable dust concentrations in four underground gold mines for the period 1999 to 2002.

The mines under discussion are situated in the Klerksdorp area and they were selected because they are a typical representation of deep underground gold mines. Typical gold mines use the same method of ventilation distribution and have similar dust sources e.g. breaking, transporting and tipping of rock. They are all situated in the same geographical area and all make use of conventional mining methods. A total of 4645 previously collected personal respirable dust samples were analysed for this research report making use of a central laboratory situated in the Klerksdorp area. The respirable dust samples were collected by the Occupational Hygienists appointed on the mines for control purposes over the years 1999 to 2002.

The arithmetic mean respirable dust concentrations for the four mines in discussion was $0,39\text{mg}/\text{m}^3$ in 1999, $0,33\text{mg}/\text{m}^3$ in 2000, $0,30\text{mg}/\text{m}^3$ in 2001 and $0,31\text{mg}/\text{m}^3$ in 2002 against the mine's internal target of $0,4\text{mg}/\text{m}^3$.

The report shows a statistically significant downward trend in the proportion of measurements below $0,4\text{mg}/\text{m}^3$ for mines 1, 2 and 3. The percentage of respirable

dust samples above the internal target of $0,4\text{mg}/\text{m}^3$ was 6,78% in 1999, 6,15% in 2000, 4,71% in 2001 and 4,38% in 2002.

Although there is a general downwards trend in the percentage of samples above the target, there is an increase in the number of samples above the target. In 1999, 202 samples were above, 310 in 2000, 402 in 2001 and 361 in 2002.

The key limitation to the project is the integrity of the data. The major limitations identified include non compliance with the sampling strategy. There is no guarantee that the instrumentations were worn on the body for the whole shift or whether any tampering of the gravimetric pumps took place. The sampling strategy measures all occupations, but all occupations do not receive the same type and amount of exposure, making it impossible to allocate exposure to a certain workplace. Samples could get affected during storage and transport.

The most recent audits on the mine's central laboratory show 100% compliance with the required standards. The mines under study are well in line with the DME requirements on the guidelines for a measurement strategy of airborne pollutants. The gravimetric sampling strategy includes the scheduling of samples managed by the electronic database system.

Although the report indicates that the results are pointing in the right direction, the integrity of the data should be tested continuously. Supervision of the pump wearers is of great concern and training of these wearers is essential for explaining the purpose of the personal monitoring strategy.

There is a scarcity of published information on respirable dust concentrations in underground gold mines and further research is required.