Safety In Mines Research Advisory Committee
Project Summary : SIM 030806

Project Title:	Respiratory disease in the South African platinum mining industry (1volume, 46 pages)

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Summary

This investigation was launched because little information has been collated and published about lung health in platinum miners. The aim of the study was to document in one place the existing knowledge about factors affecting the risk for occupational lung disease (OLD) among platinum group metal (PGM) miners, supplemented by a cross-sectional study of the burden of OLD among current PGM miners in South Africa. We did this by firstly reviewing the literature about the geology of the areas where platinum is mined as well as the occupational hygiene exposure limits for the substances found in the rock formations, with relevance to occupational lung disease. Our emphasis has been on silicon (as crystalline silica), radon and asbestos, although almost nothing has been written about these elements with regard to lung disease in platinum miners, especially the last two. We also examined occupational hygiene reports from platinum mines for evidence about exposure to air-borne pollutants. Next we investigated information about compensation paid for occupational lung disease in platinum miners using official sources of information, the PATHAUT autopsy data base and a sample of autopsies from one large mine. Lastly, we carried out a cross-sectional study of 969 miners seen for routine occupational health surveillance at a large platinum mine.

We found that although the platinum is being mined in igneous rock and igneous rock may contain variable quantities of crystalline silica, there was little or no generalisable information available about the silica content of the rock as opposed to the platinum bearing seam. We were unable to find any analyses of asbestos or radon radiation measurements for the mines but were told that a "radon survey" was conducted several years ago and had found no cause for concern.

Although we had reservations about the methods used (as *per* government guidelines) to measure the air-borne pollutants, even with re-calculation these were very low indeed. There were, however, three exceptions. Firstly, it appears that crystalline silica is not being measured routinely when the dust levels are considered too low to make its analysis worthwhile. Secondly, oil mist exposure limits are being exceeded from time to time. Thirdly particles not otherwise

The autopsy sample revealed very high prevalence of old TB among deceased platinum miners (43/131), as well as a smaller number of cases (4/131) with silicotic changes. The TB appeared not to be related to previous gold mining history, and 3 of the 4 (and perhaps the fourth as well) of the silicotic cases had previous gold mining exposure. We had reservations about the completeness of the work histories submitted with the autopsy requests. There were also 2/131 cases of lung cancer, one associated with asbestos, and neither of these miners had a record supplied indicating work outside the platinum mines.

The cross-sectional study revealed 3 cases of silicosis (out of 969), all three occurring in ex gold-miners. There were 15/969 miners on TB treatment, with no statistically significant association with previous gold mining detected. This equates to a likely incidence rate of over 2 000 per 100 000 person-years. The prevalence of COPD as based on GOLD scores was extremely low: so much so that we consider the results implausible.

We have made a number of recommendations:

- A survey to document the silica and asbestos composition in dust and rock samples.
- Dust specimens to be analysed for α-quartz and the level stated whenever possible.
- DME guidelines to be made clearer re: the time adjustment for estimating TWAs.
- Strengthening of the systems for documenting work histories for current miners as well as for deceased miners whose organs are submitted for autopsy.
- Improvements to the integration, responsiveness and accessibility of the compensation database.