Safety In Mines Research Advisory Committee
Project Summary:

Project Title:	HEALTH 606 Silicosis prevalence and exposure response relationships in older black mineworkers on a South African goldmine (1 volume, 45 pages)

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Category:		**Applied Research**	

The study aimed to measure the prevalence of silicosis among older black goldminers on a South African goldmine and to investigate the exposure response relationship with silica dust exposure.

Methods In a cross-sectional study, 520 black goldminers over 38 years of age were interviewed and had chest radiographs taken. Silicosis was defined as International Labour Organisation (ILO) Classification profusion of 1/1 or greater. Cumulative exposure was calculated for each individual using TWA dust concentrations from two sources: personal sampling of a separate group of 112 workers and a database of routine surveillance measurements. Quartz fractions were measured by x-ray diffraction. The 85 different occupations in the sample studied were reduced to 24 occupational categories by grouping occupations with similar exposures in a job exposure matrix.

Results The mean length of service was 21.8 years (range: 6.3 – 34.5), the (mean) average intensity of dust exposure 0.37 mg/m^3 (range: 0 - 0.70) and of quartz exposure 0.053 mg/m^3 (range: 0 – 0.095).

Among the 520 miners examined, the prevalence of silicosis (reader 1) was 18.3 percent [95% confidence interval (CI) 15.0 – 21.9]. Significant trends were found between all of the exposure variables and the prevalence of silicosis, the strongest being for cumulative quartz exposure (odds ratio 3.2, 95% C.I 1.9 – 5.4) or each 1 mg-year/m^3 increment across a range from 1 to 3 mg-years/m^3. Weaker but significant trends were observed for average intensity of quartz and respirable dust. Only one case of silicosis was found in the group with 15 years or less of service.

Conclusions The results confirm an ongoing epidemic of silicosis in the South African mining industry, which is likely to worsen as contracts of service lengthen. An urgent need for improved dust control in the industry in indicated.

If the assumption of stability of average dust concentrations on this mine over the working life of this group of workers is correct, these workers developed silicosis while exposed to a quartz concentration below the recommended occupational exposure limit (OEL) of 0.1 mg/m^3.

This is in accord with a mounting body of evidence that an OEL of 0.1 mg/m^3 is not protective against silicosis and points to the need to reduce the South African OEL.