CROSS-SECTIONAL SILICA EXPOSURE MEASUREMENTS AT TWO ZAMBIAN COPPER MINES OF NKANA AND MUFULIRA

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Abstract: Silicosis is a major lung disease of continuing worldwide importance whose cumulative estimates exceed a million cases in developing countries. In Zambia, levels of crystalline silica exposure hazard and silicosis morbidity have been poorly studied since large-scale Zambian copper mining started in the early 1930s. This paper reports on cross-sectional dust exposure assessment that is part of an on-going epidemiological study at four of the country's largest copper mines. The overall aim of the epidemiological study is to ascertain the risk of nonmalignant respiratory diseases among miners. The specific objective of dust measurements at Nkana and Mufulira Mines was to characterize current total respirable dust and crystalline silica (i.e., quartz) exposure at the copper mines of Mopani Copper Mines plc (MCM). The 200 samples collected (100 per mine) were sent to a certified analytical laboratory in the USA (Bureau Veritas) where NIOSH Methods 0500 and 7500 (NMAM 4th Edition) were used for gravimetric analysis of total respirable dust and for quartz content determination in bulk or respirable dust, respectively. Measured quartz content of respirable dust correlated with bulk dust results and showed that 19% and 51% of Nkana and Mufulira Mine samples, respectively, were above the Occupational Safety and Health Administration permissible exposure limit. Weak dust monitoring regulations may result in many miners being exposed to high dust levels. It is recommended that Zambian mining houses and the government establish crystalline silica analysis laboratory capacity and adopt a mass concentration occupational exposure limit for more protective dust monitoring.

Keywords: Crystalline silica, silicosis, exposure, respirable dust, monitoring, mining.

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