

ASSESSMENT OF ENVIRONMENTAL COMFORT INDICATORS OF UNDERGROUND GRAPHITE MINE AT BOGALA, SRI LANKA

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Ventilation is a basic need for all underground mining operations as fresh, cool air is required to remove stale, contaminated air and to control the heat flux flowing from the exposed rock and high humidity levels in a dynamic system posing a psychological and physiological threat to the mines. Inadequate ventilation often is the cause of lower efficiency of the miner leading to low levels of efficiency and decreased productivity and increased accident rates. This study focuses on the evaluation of environmental comfort indicators in Bogala, medium-depth underground graphite mine located in Aruggammana, Sri Lanka. A detailed analysis of environmental determinants, namely, the dry-bulb temperature, humidity, mean radiant temperature and air velocity leading to environmental comfort was carried out after conducting a detailed ventilation survey, taking measurements of, the dry bulb temperatures, wet bulb temperatures, Dry Kata and Wet Kata thermometer values, air velocities and barometric pressures at strategic points, namely, shaft stations, hoist rooms and stopes covering the entire mine.

Air cooling power was calculated using the standard relationships for heat convection, radiation and evaporation. Analysis of results reveal that all stopes were above the accepted limit of standard wet bulb temperature. Therefore, periods of continuous work in stopes should not be 8-hours at wet bulb temperature in excess of acceptable limit 28°C₃.

According to the calculated effective temperatures, effective temperatures at shaft landings, mine hoist chamber were suitable for a 8-hour work shift. The period of continuous work in stopes should not be 8-hours at effective temperature in excess of acceptable limit 28°C₃. Work at Stope No. 12 -2 should be continued with auxiliary ventilation. According to the calculated Wet Kata cooling power, at some locations, miners were under conditions below par.

Detailed analysis comfort indices and the cooling power enabled identification of weak areas spelling out methods and techniques to improve the present environmental comfort conditions by installing auxiliary fans in stopes where necessary which will enhance the immediate mine environment contributing to health and safety.

Keywords: *auxiliary fan, heat indices, mine environmental, mine ventilation*

