

Directional Dust Deposition Measurements: The Influence of Seasonal Changes and the Meteorological Conditions Influencing in Witbank Area and Carletonville Area

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Abstract : Coal mining in Mpumalanga Province is known of contributing to the atmospheric pollution from various activities. Gold mining in North-West Province is known of also contributing to the atmospheric pollution especially with the production of radon gas. In this research directional dust deposition gauge was used to measure source of direction and meteorological data was used to determine the wind rose blowing and the influence of the seasonal changes. Fourteen months of dust collection was undertaken in Witbank Area and Carletonville Area. The results shows that the sources of direction for Ericson Dam its East in February 2010 and Tip Area shows that the source of direction its West in October 2010. In the East direction there were mining operations, power stations which contributed to the East to be the sources of direction. In the West direction there were smelters, power stations and agricultural activities which contributed for the source of direction to be the West direction for Driefontein Mine: East Recreational Village Club. The East of Leslie Williams hospital is the source of direction which also indicated that there dust generating activities such as mining operation, agricultural activities. The meteorological results for Emalahleni Area in summer and winter the wind rose blow with wind speed of 5-10 ms⁻¹ from the East sector. Annual average for the wind rose blow its East South eastern sector with 20 ms⁻¹ and day time the wind rose from northwestern sector with excess of 20 ms⁻¹. The night time wind direction East-eastern direction with a maximum wind speed of 20 ms⁻¹. The meteorological results for Driefontein Mine show that North-western sector and north-eastern sector wind rose is blowing with 5-10 ms⁻¹ win speed. Day time wind blows from the West sector and night time wind blows from the north sector. In summer the wind blows North-east sector with 5-10 ms⁻¹ and winter wind blows from North-west and it's also predominant. In spring wind blows from north-east. The conclusion is that not only mining operation where the directional dust deposit gauge were installed contributed to the source of direction also the power stations, smelters, and other activities nearby the mining operation contributed. The recommendations are the dust suppressant for unpaved roads should be used on a regular basis and there should be monitoring of the weather conditions (the wind speed and direction prior to blasting to ensure minimal emissions).

Keywords : directional dust deposition gauge, BS part 5 1747 dust deposit gauge, wind rose, wind blowing

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