Air Quality Assessment of a Thermal Power Producing Area in Ghana: A Case Study of the Air Emissions of Takoradi Thermal Power Station and Its Effects on the People of Aboadze

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ABSTRACT

Air quality assessment was done in a thermal power producing area in Ghana called Aboadze from the period of October 2008 to March 2009. This coastal village of Aboadze is located 15km east of Takoradi, the capital town of the Western region of Ghana. This research determined the levels of the oxides of nitrogen (NO_x), sulphur dioxide (SO_2), particulate matter (PM_{10}) and noise in the ambient environment. The social and health impacts as a result of the presence and operations of the thermal plant in Aboadze were also investigated. A high volume air sampler was used to sample the ambient air particulates of size less than 10 microns (PM_{10}). The gravimetric method was used to determine the mass concentrations of PM_{10} in the Aboadze area and the results ranged from 16 to 111µg/m^3. The average PM_{10} levels were far below the EPA of Ghana standard of 70µg/m^3. A UV-Visible Spectrophotometer was used to determine the concentration of nitrate and sulphates ions in the PM_{10} air particulates which were 0.064 and 5.355 µg/m^3 respectively. The concentrations of Fe, Ca, Mg, Mn, Ni, Co, Cu, Zn, Cr, Pb and Cd were determined in the PM_{10} air particulates. High concentrations of Fe, Ca and Mg were observed with Pb and Cd having concentrations below the detection limit of the Atomic Absorption Spectrophotometer (AAS) analytic technique that was used. Results obtained from the enrichment factor analysis revealed the concentration of Ca, Mn and Fe in ambient air to be of natural (crustal) origin while Cu, Zn, Cr, Co and Ni had significant anthropogenic contributions to their natural concentrations. The Monitor Lab (ML) 9850 SO_2 analyzer and ML 9841 AS analyzers were used to measure the ambient concentrations of SO_2 and NO_x. The results obtained were lower than their respective regulatory standards. The average daytime noise levels recorded in the community exceeded the daytime noise standard of 55 dBA (EPA, Ghana) while the average night time noise levels were generally lower than the night time noise standard of 45dBA. Based on the low levels of parameters investigated and results from the 200 sets of questionnaires administered, the presence and operation of the TTPS has not negatively impacted on the lives of the people of Aboadze and as such the air quality of the area can be said to be good.

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