Combined Influence of Stack Height and Exit Velocity on Dispersion of Pollutants Caused by Helwan Cement Factory (Study using AERMOD Model)

Abstract

The cement industry plays a very important role in the growth of the national economy and the social development of any country. Therefore, severe restrictions and controls must be placed on cement industry to assess the environmental impacts of such projects not only before implementation but also during and after the operation of these projects. This research is about to introduce and build model using AERMOD model that can be used in environmental impact assessment of cement factories considering the effect of the stack height and exit gas velocity with one, two and three stacks, on the dispersion and the concentration of air emissions at receptor locations. The air dispersion model is used to predict the dispersion of particulate matter (PM10) and sulphur dioxide (SO2) emissions released from cement plant stack. Finally, the model showed that the stack heights and exit velocity are controlling factors in pollutant dispersion, where the relation between the stack height and the exit velocity against the maximum pollutant concentrations is inversely proportional. Moreover, this model was applied to a current cement plant located 30 Km south of Cairo. The emission concentrations from cement plant (8lines) were found to be less than the limits of Egyptian and International Environmental Laws. However, the emission concentrations from the cement plant when operated with full capacity (10lines) were found to violate the limits.
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References

- Egyptian Meteorological Authority.
- Egyptian Environmental Affairs Agency.

Index Terms

Computer Science  Artificial Intelligence

Keywords

Air dispersion models  Exit velocity  Stack height  Air pollution