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MONITORING OF POLLUTANT CONCENTRATIONS IN AN UNDERGROUND URANIUM MINING PROJECT USING AERMOD

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ABSTRACT

The uranium mine at Tummalapalle is one among very few mines in India that supplies fuel to nuclear power plants. Investigations made by Atomic Minerals Directorate of Exploration and Research (AMD), India established the existence of abundant low grade uranium ore in Tummalapalle area of Kadapa district, AP, India and stressed it as feasible source for commercial extraction. As the extraction process involves dispersion of particulate matter into the atmosphere, it is essential to make an assessment of pollutant dispersion during mining which involves extracting larger quantities. To this end an air quality assessment was undertaken to evaluate the concentrations of PM 10, Uranium, Sox, NOx in and around Tummalapalle mine with the help of High volume air samplers for a period of 2011 January to 2011 December. AERMOD View-Air dispersion model (modified Gaussian plume dispersion package) was used to mathematically predict the air quality. The obtained concentrations and dispersions from AERMOD VIEW and MATLAB were compared with the monitored values at different locations and observed a quite agreement among three. Small deviations are noticed and these may be because of inbuilt confines of the models and uncertainties in the source emission characteristics. A detailed overview of basic mathematics behind atmospheric dispersion modeling software suggests AERMOD is the best modeling tool for the medium range atmospheric modeling where as MATLAB could only perform well for the short range modeling.

KEYWORDS: Air Pollution, Modified Gaussian Model, Mathematical Equations, Dispersion Model, AERMOD, MATLAB and CPCB