

Assessment of Air Pollutant Dispersion and Soil Contamination: The Critical Role of MATLAB Modeling in Evaluating Emissions from the Covanta Municipal Solid Waste Incineration Facility

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Abstract : The environmental impact of emissions from the Covanta Waste-to-Energy facility in Burnaby, BC, was comprehensively evaluated, focusing on the dispersion of air pollutants and the subsequent assessment of heavy metal contamination in surrounding soils. A Gaussian Plume Model, implemented in MATLAB, was utilized to simulate the dispersion of key pollutants to understand their atmospheric behaviour and potential deposition patterns. The MATLAB code developed for this study enhanced the accuracy of pollutant concentration predictions and provided capabilities for visualizing pollutant dispersion in 3D plots. Furthermore, the code could predict the maximum concentration of pollutants at ground level, eliminating the need to use the Ranchoux model for predictions. Complementing the modelling approach, empirical soil sampling and analysis were conducted to evaluate heavy metal concentrations in the vicinity of the facility. This integrated methodology underscored the importance of computational modelling in air pollution assessment and highlighted the necessity of soil analysis to obtain a holistic understanding of environmental impacts. The findings emphasized the effectiveness of current emissions controls while advocating for ongoing monitoring to safeguard public health and environmental integrity.

Keywords : air emissions, Gaussian Plume Model, MATLAB, soil contamination, air pollution monitoring, waste-to-energy, pollutant dispersion visualization, heavy metal analysis, environmental impact assessment, emission control effectiveness

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