

# Modelling Odour Emissions from an Industrial Area in Northern Greece - Abstract

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## Summary

Olfaction is one of the basic human senses which enables the detection of odorous substances and triggers various subjective psychological and physical symptoms via the nervous system. At elevated concentrations, industrial odours emitted during production processes can be annoying for employees and nearby residents and they have been linked to several health effects, such as cough, nausea, headache, eyes' irritation, fatigue and sleep disorders, as well as a general feeling of discomfort and stress. Apart from the levels and duration of exposure, odours-related symptoms are determined by age, sex and various socioeconomic factors. As a result, the adverse outcomes can lead to decreased productivity, poor quality of life and devaluation of local properties. The present work is focused on the Phosphate Fertilizer Industry of Kavala in Northern Greece. Some of the most important air pollutants emitted during the process of fertilizers' production are NO<sub>2</sub>, SO<sub>2</sub>, HF and NH<sub>3</sub> which have pungent and irritating odour. This industry employs 120 workers, and it is located at a distance of 2.5 km west from the town of New Karvali and 5 km east from the city of Kavala, where 2.244 and 58.663 people live, respectively. The residents occasionally complain to local authorities about intense malodorous emissions. The objective of this study was to quantify these odour emissions. For this purpose, different scenarios corresponding to the prevailing winds over the area of interest and meteorological conditions which stand for the Pasquill-Gifford stability categories A-G were considered, using the Atmospheric Dispersion Modeling System (ADMS-5). The long-term output of odour (averaging time of 1 hour) as well the 98<sup>th</sup> percentile of concentrations was investigated. The results were compared to the annoyance levels proposed by the UK Environment Agency, as no statutory national standards exist. The maximum predicted 98<sup>th</sup> percentile of hourly average odour concentrations (0.7 ouE/m<sup>3</sup>) occurred under extremely stable conditions (Pasquill-Gifford category F) with south-easterly wind, while the maximum long term average concentrations (0.2 ouE/m<sup>3</sup>) occurred under slightly stable conditions (Pasquill-Gifford category E) with north-easterly winds. The odour concentration did not exceed the annoyance levels in any case, even at distances very close to the sources. These results highlight the importance of atmospheric stability in odour dispersion and can be used in odour impact assessment studies.

## Keywords

ADMS-5 dispersion model, odour emissions' modeling, air pollution

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