Air survey around MSW landfills in Wallonia: feedback of 8 years field measurements

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Extended abstract

For more than 8 years, an interdisciplinary air survey was achieved by ISSeP around 10 municipal solid waste (MSW) landfills in Wallonia (Belgium). Surveying campaigns include 4 axes of investigations: landfill gas (LFG) surface emissions detection, ambient air quality control, odours annoyance assessment and measurements on exhaust fumes from LFG valorisation units. Especially the first 3 domains closely interact.

Monitoring of landfill surface gas-emissions is performed by a simple low-cost method[1]. Portable FID measurements are taken on landfill surface along regular and dense grids. Krigging measured CH_4 concentrations furnish continuous maps which localize higher and lower emission zones, assuming that, at a medium observation scale, high fluxes zones create high methane concentrations in the upper part of landfill capping.

Air surveying campaigns on each landfill include ambient air quality measurement. During several weeks, 8 tracers parameters are analysed continuously by on site monitoring devices. They are placed near exploitation, downwind or in direction of the nearest neighbours. Measured values are compared to health threshold values. Local wind directions are simultaneously recorded in order to create “pollution roses”. These graphs show, for each sector of wind direction, the mean concentration of a tracer at the measured point when wind comes from the sector. This dual approach allows controlling that air quality remains safe for human health and checking if possible anomalies are produced by the landfill or not.

Evaluating the odour annoyance created by a wide, heterogeneous diffuse and multiple sources such as MSW landfills is a difficult challenge. Classical flux chamber method combined with dynamic olfactometry does not allow apprehending the unique perception of an observer created by a so complex odour emitter. An interesting alternative approach, developed by the Environmental Monitoring Research Group, University of Liège, was applied to the wallonian landfills[2]. Field observers first delineate the regions in which odour impact is experienced. Emission rates are then manipulated in a dispersion model until the predicted size of the impact zone matches the one observed in the field, taking into account of measured meteorological conditions. Such back-calculation assesses global odour emission rates.

In situ odour campaigns may guide the positioning of air monitoring devices. Inversely, analysing odorous compounds near a neighbour can corroborate its annoyance by analytical evidences. Knowing the intensity and localisation of LFG emissions often help to better understand LFG odour in the neighbourhood, and motivate the placement of H_2S sensor at right place, for example. Finally, by combining results from three fields of investigation, one can obtain a really efficient and complete environmental impact study of a landfill on its surrounding ambient air.

References

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