

# FAST ATMOSPHERIC DIOXIN DETECTION

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## Introduction

LIFE DIOXDETECTOR is a project financed by LIFE program and its main objective is the application of a new analytical technique for the quantification of dioxin, tracking PCDDs/PCDFs concentrations in air, soil and biota (vegetal) at the surroundings of a MSW incinerator facility.

The first step that this study performs, to determine the areas of highest concentration of PCDDs/PCDFs around the incinerator, and so later in these areas perform sampling and analysis with the new technique of quantification of PCDDs/PCDFs, is the study of PCDDs/PCDFs through a dispersion model.

And the second step of this study is to describe the new technical of quantification of PCDDs/PCDFs and compare it with other techniques.

## Materials & Methods

The modeling of PCDDs/PCDFs was carried out with the following tools: ADMS and SURFER.

ADMS is a dispersion model Gaussian plume, used to model the impact of air quality industrial facilities.

SURFER is a program of surfaces which is used to represent the dispersion of pollutants on a map.

The new technology uses a low flow ionization chamber attached to a high resolution Differential Mobility Analyzer previous to the mass spectrometer. The mobility stage preselects the ions of interest in the sample reducing noise and so improving the overall detection efficiency.

## Main results

Analyzing the dispersion maps obtained, it is observed that in general, the direction of the plume dispersion is toward the predominant winds in the area (Southwest and Northeast).

Total levels of PCDDs/PCDFs commonly found in air samples range from  $< 2\text{pgm/m}^3$  to remote rural areas, 2-15  $\text{pg/m}^3$  in urban areas and 15-120  $\text{pg/m}^3$  for areas near major sources as it can be an incinerator <sup>(1,2)</sup>.

In this study, the dispersion maps show peak concentrations of the order of  $10^{-5}\text{pg/m}^3$ , well below the values considered for areas near an incinerator, as is the case.

The main advantage of the new technique is speed. A whole sweep of mobility may take less than a second, while characteristic times in Gas Chromatography columns are of some minutes. Detection limits for some substances using this technique can be lower than 0.1pg. This figure depends on the analyte, but no huge pre-concentration times are expected.

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## References:

1. Jones K.C., Bennett B.G. (1989); *Sci. Total Environ.* 78- 99
2. Rappe C., Kjeller L.O., Bruckman P., Hackhe K.H. (1988); *Chemosphere*, 17-3