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Study of Polychlorinated Dibenzo-P-Dioxins and Dibenzofurans Dispersion in the Environment of a Municipal Solid Waste Incinerator

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Abstract : The general aim of this paper identifies the areas of highest concentration of polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/Fs) around the incinerator through the use of dispersion models. Atmospheric dispersion models are useful tools for estimating and prevent the impact of emissions from a particular source in air quality. These models allow considering different factors that influence in air pollution: source characteristics, the topography of the receiving environment and weather conditions to predict the pollutants concentration. The PCDD/Fs, after its emission into the atmosphere, are deposited on water or land, near or far from emission source depending on the size of the associated particles and climatology. In this way, they are transferred and mobilized through environmental compartments. The modelling of PCDD/Fs was carried out with following tools: Atmospheric Dispersion Model Software (ADMS) and Surfer. ADMS is a dispersion model Gaussian plume, used to model the impact of air quality industrial facilities. And Surfer is a program of surfaces which is used to represent the dispersion of pollutants on a map. For the modelling of emissions, ADMS software requires the following input parameters: characterization of emission sources (source type, height, diameter, the temperature of the release, flow rate, etc.) meteorological and topographical data (coordinate system), mainly. The study area was set at 5 Km around the incinerator and the first population center nearest to focus PCDD/Fs emission is about 2.5 Km, approximately. Data were collected during one year (2013) both PCDD/Fs emissions of the incinerator as meteorology in the study area. The study has been carried out during period's average that legislation establishes, that is to say, the output parameters are taking into account the current legislation. Once all data required by software ADMS, described previously, are entered, and in order to make the representation of the spatial distribution of PCDD/Fs concentration and the areas affecting them, the modelling was proceeded. In general, the dispersion plume is in the direction of the predominant winds (Southwest and Northeast). Total levels of PCDD/Fs usually found in air samples, are from <2 pg/m3 for remote rural areas, from 2-15 pg/m3 in urban areas and from 15-200 pg/m3 for areas near to important sources, as can be an incinerator. The results of dispersion maps show that maximum concentrations are the order of 10-8 ng/m3, well below the values considered for areas close to an incinerator, as in this case.

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