

The contribution of winter sanding to PM₁₀ concentrations at traffic stations in the Czech Republic in 2011

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Air pollution caused by PM₁₀ remains one of the main problems of air quality assurance in the Czech Republic. The exceedance of the daily limit value for PM₁₀ in 2011 at least in one locality was recorded in all zones and agglomerations. Of the total number of 157 localities in which PM₁₀ measurements were carried out in 2011, 89 localities reported exceedances of 24-hour PM₁₀ limit value.

The concentrations of PM₁₀ show a clear course with the highest concentrations in the cold months of the year. Higher concentrations of PM₁₀ in the ambient air during the cold part of the year may be influenced both by higher emissions of particles from seasonal sources (e.g. the share of local heating as concerns PM₁₀ emissions is more than 30 %), and by deteriorated dispersion conditions. The maximum concentrations in February and November correspond with bad dispersion conditions in these months (Matoušková and Ostanická eds., 2012).

According to EC (2011), higher concentrations of during the cold part of the year may be also influenced by the re-suspension of particulates following winter sanding or salting of roads. This guidance recommends methods for the determination of the contributions of these processes to the ambient concentrations of PM. Member States may designate zones or agglomerations within which limit values for PM₁₀ are exceeded in ambient air due to the re-suspension of particulates following winter-sanding (EC, 2008). The proposed method (based on results from Northern Europe) assumes the contribution from winter sanding to be 50 % of the coarse fraction (PM₁₀-PM_{2.5}) for each exceedance day with an identified impact from winter sanding. This contribution can be subtracted from the observed PM₁₀ concentration if the following criteria apply (EC, 2008): there was road sand or the remains of it actually on the road or adjacent footpaths; PM_{2.5} measurements at the same site at which the PM₁₀ exceedance has been observed if it is possible; the road surface was dry; the PM_{2.5}/PM₁₀ ratio is equal or less than 0.5. This criterion selects days with high local contributions of coarse particles and excludes high contributions from long-range transport.

On the assumption that these conditions were met, the analysis for five traffic stations in the Czech Republic has been possible to carry out. The averages of PM_{2.5}/PM₁₀ ratio at these five sites are higher than 0.5. They range from 0.52 to 0.84. Furthermore, lower ratio approaching the value 0.5 occurs mostly from April to September. Further, we take into the account the period January-March and November-December according to

Austrian study (EC, 2011) for the subtraction of the contribution of winter sanding to PM₁₀ concentrations. Consequently, it was possible to identify only a few days, where both the conditions of the PM_{2.5}/PM₁₀ ratio less than 0.5 and the concentrations of PM₁₀ higher than daily limit value (50 µg.m⁻³) were met (Table 1).

Table 1. The contribution of winter sanding to PM₁₀ concentrations at five traffic sites in the Czech Republic

Monitoring site	Days > 50 µg.m ⁻³	Days with the ratio < 0,5 and PM ₁₀ > 50 µg.m ⁻³	Days > 50 µg.m ⁻³ after reduction
Brno-Svatoplukova	85	1	85
Brno-Zvonařka	59	0	59
Hradec Králové	49	0	49
Prague 9-Vysočany	46	14	36
Beroun	53	21	40

Based on these results, the contribution of winter sanding to PM₁₀ concentrations in the Czech Republic is neglected. The achievement of maximal 35 exceedances of the daily limit value has not been met at sites suitable for this analysis. Our results are consistent with the conclusion that more sophisticated methods might be needed in Central European countries for attributing an exceedance to winter sanding (EC, 2011).

EC (2008) *Directive 2008/50/EC of the European Parliament and the Council relating to Air Quality and Clean Air for Europe*

EC (2011) *Working paper establishing guidelines for determination of contributions from the resuspension of particulates following winter sanding or salting of roads under the Directive 2008/50/EC on ambient air quality and cleaner air for Europe*

Ostanická, J., Matoušková, L. eds. (2012) *Znečištění ovzduší na území České republiky v roce 2011 (Air Pollution in the Czech Republic in 2011)*, Czech Hydrometeorological Institute