INTRODUCTION

The EMEP/MSC-E regional model of heavy metals airborne pollution (MSCE-HM) has been developed to meet the goals of Co-operative Programme for Monitoring and Evaluation of Long-Range Transmission of Air Pollutants in Europe (EMEP) to "… calculate transboundary fluxes, deposition and source attribution; analyse trends …" [*ECE/EB.AIR/73 "Strategy for EMEP 2000-2009"*]. The main objectives of the model application impose certain requirements to the model characteristics. First of all, the model should adequately describe intrinsic physical and chemical processes governing heavy metals behaviour in the atmosphere to assess the pollution levels with acceptable accuracy. On the other hand, the model should not be too unwieldy to be able to perform long-term calculations in operational regime. And, finally, it should be flexible enough to meet the modern requirements of the environmental community.

The MSCE-HM model has being consistently developed from the first Eulerian-type version [*Pekar*, 1996] improving both the model itself and input information (such as meteorological parameters). Along with this the model performance has being validated in a number of comparison campaigns with other chemical transport models [*Sofiev et al.*, 1996; *Gusev et al.*, 2000; *Ryaboshapko et al.*, 2005]. Besides, the model sensitivity and uncertainty have being analyzed [*Travnikov*, 2000].

The current Technical Report contains detailed description of the MSCE-HM model along with the model sensitivity analysis. *Chapter 1* contains description of the computation domain and the model formulation of physical and chemical processes such as the atmospheric transport, chemical transformations and removal. A particular attention is paid to formulation of dry deposition to handle the needs of the effect-based approach with the ecosystem-dependent pollution levels.

Chapter 2 is devoted to input information required for the model calculations. Meteorological parameters, emission data, land cover information as well as data on chemical reactants concentration in the atmosphere are considered.

Results of the sensitivity analysis are presented in *Chapter 3*. The most important input parameters affecting the model output results are defined and ranged. The model uncertainty due to inaccuracy of individual parameters is evaluated and the overall uncertainty is estimated.