EXECUTIVE SUMMARY

Information on pollution levels regularly produced by EMEP can be extended by an assessment performed at a country-scale level. MSC-E and the Task Force on Measurements and Modelling (TFMM) of EMEP organized a number of country–specific case studies on heavy metal pollution assessment in several individual countries. Country-specific case studies assume the integrated analysis of factors affecting quality of the assessment including emissions, measurements, and modelling with fine spatial resolution in the selected countries as well as detailed joint analysis of pollution levels. The studies allow taking into account specific features of countries' orography, meteorological conditions, distribution of emission sources across a country and additional data from national monitoring programmes.

This report is focused on the results of a country-specific case study for the Netherlands. Concentration, deposition levels and transboundary fluxes were simulated with fine spatial resolution (5x5 km^2) for 2007. Results of this work were compared with information annually prepared by EMEP for the Netherlands. In particular, in addition to the annual EMEP data, the country is informed about pollution levels with fine spatial resolution, contribution of emission source categories to lead pollution, and transboundary transport between the provinces of the country.

The work was carried out in close cooperation with national experts from the Netherlands. The experts presented detailed national emission data with fine spatial resolution from emission source categories. In addition to the EMEP monitoring information the data from national monitoring programmes were involved in the study. Experts from MSC-E and the Netherlands jointly analyzed the obtained results.

Spatial distribution of lead levels over the Netherlands is not uniform. In the northern part of the country (provinces Groningen, Friesland, Drente, Flevoland, Overijssel) the range of air concentrations is 4-5 ng/m^3, and that of deposition - 1-2 kg/km^2/y. The highest air concentrations (more than 30 ng/m^3) and deposition (more than 4 kg/km^2/y) levels are noted for the province Noord-Holland. The levels obtained for 50-km resolution are generally similar to those for 5x5 km^2, but ranges between maximum and minimum values are smaller.

Contribution to total deposition of lead (48 tonnes) in the Netherlands in 2007 from national anthropogenic sources is 18%, from foreign anthropogenic sources – 27%, from secondary sources (wind re-suspension) – 52%, and from non-EMEP sources – 3%. When pollution levels are simulated with coarse (50x50 km^2) resolution, contributions of re-suspension (55%) and foreign sources (29%) to deposition in the Netherlands are similar to those modelled with fine resolution. However, the contribution of national sources is considerably lower (12%).

Contribution of foreign emission sources to deposition from the anthropogenic sources in the Netherlands ranges from 25% to 80% over the most part of the country. The highest contribution is noted for the Dutch-Belgian border, while the lowest – for the central part of the country (province Noord-Holland). The main foreign contributors to lead pollution in the Netherlands are emission sources of Belgium, Germany, the United Kingdom, and France. The main national contributor – sources of the Noord-Holland province.

From 5% to 12% of lead is deposited to a territory of a province where it is emitted, and from 4 to 19% - to the other provinces. The most of lead (72-90%) emitted in the Dutch provinces is transported through state borders to foreign countries. For the country as a whole 19% of

emitted lead is deposited to the country's territory. When modelling with 50x50 km resolution, this fraction is around 13%.

Contributions of emission source categories to deposition from national sources in the Netherlands were estimated. The main contribution (63%) to deposition in the country is caused by "*Iron and steel production*", followed by "*Transport (except aviation)*" (16%), "*Industrial processes*" (9%), "*Small combustion installations*" (6%) and "*Aviation*" (5%). The highest contribution of "*Iron and steel production*" is noted for the Noord-Holland province (91%), "*Transport (except aviation)*" – in Gelderland (28%), "*Industrial processes*" – in Limburg (34%), "*Small combustion installations*" – in Noord-Brabant and "*Aviation*" – in Groningen.

Refinement of spatial resolution leads to general reduction of discrepancies between modelled and measured pollution levels in the Netherlands. Besides, the correction of wind re-suspension parameterization favours further improvement of the modelled concentrations in air in the Netherlands. For the other parts of the EMEP region additional research is needed to achieve the improvements.

Detailed assessment of lead pollution levels in the Netherlands was possible due to availability of highly detailed and diverse national data on emissions and monitoring and due to close co-operation with national experts from this country. Similar work can be carried out for other countries interested in detailed national-scale information on heavy metal pollution.