5 CONCLUSIONS

Primary data from 28 (8 international and 20 national) regional geochemical mapping projects were collected and organised in a common database. These include practically all of the regional and global geochemical mapping projects carried out during the period of 1980-2005 in NW Russia, Finland, Sweden, Norway, Estonia, Latvia and Lithuania. Data from more than 58,000 samples of moss, the uppermost soil layer, organic and mineral soil horizons, the fine fraction of till, stream and lake water and stream sediment were collected and processed for the compilation of geochemical review maps.

Although the main part of the work was carried out in Russia, the active participation of geochemists and geologists from all seven countries made it possible to successfully carry out this huge exercise. Their suggestions and critical observations in the course of preparing the maps led to significant improvements in the final version of the Atlas.

The methodology in the compilation of the composite maps was based on joint international and national experience acquired over many years of geochemical investigation in Finland, Sweden, Norway, the Baltic countries and NW Russia. This ensured the reliable association of retrospective data and the possibility to use them in preparing composite review maps. In the future, this methodological approach could be widely applied in the regional and global geochemical mapping of territories with similar natural conditions.

The Geochemical Atlas of Northern Europe consists of:

- accessory maps, illustrating natural conditions and features of human activities in Northern Europe;
- a set of compiled basic geochemical maps, showing the spatial distribution of a wide range of elements and their associations in the sampled media;
- maps with different combinations of particular and integrated anomalous geochemical fields (AGFs) as interim cartographical data for the resulting prognostic geochemical map;
- an ecogeochemical map and a map of ore-related geochemical anomalies, representing the geochemical assessment of the environmental status and mineral potential of the region;
- catalogues of anthropogenic and ore-related anomalies with geochemical assessment of their environmental status and mineral potential in the area of participating countries.
- text with description of the methods used to compile the composite maps and explanation of the main results of their interpretation.

Land use and anthropogenic pollution have had a strong effect on the composition of moss, the organic soil horizon and partly on the uppermost soil layer. It is evident that the regional distribution of many metals and rare elements in moss and surface soil horizons is affected by a combination of natural (climate and geology) conditions and input related to human activities in urban and industrial centres. Element concentrations in surface waters are primarily controlled by regional landscape features such as the type of relief, the climate and vegetation zones, and the influence of marine aerosols. However, surface waters and stream sediments in urban and industrially active areas are also locally impacted by anthropogenic activities.

Estimation of the environmental status was performed with the aid of an agreed and unified Russian method, and the information gained will be useful for international and national policy decision making on various ecological problems.

The chemical compositions of the mineral horizons of soil, stream sediments and the fine fraction of till reflect mineralogical features of the bedrock geology and different types of ore mineralization. The spatial placement of the geochemical zones reflects the historical geological development of the Fennoscandian Shield. The composition of these zones and their metallogenic specialization are characterized by a clear spatial-temporal trend from the north-east to the south-west, connected with changes over time following the formation of the Precambrian Earth's crust, i.e. from the Late Archaean-Early Proterozoic period through the Meso Proterozoic period to the Late Proterozoic stage, and the further formation of setting folded belts and superposed zones of magmatic activity in the Palaeozoic.

The results presented on the map of ore-related geochemical anomalies revealed a wide range of mineral potential, including areas favourable for prospecting Ni-Cu (15 AGFs), MPG (5 AGFs), Au (26 AGFs), polymetallic Cu, Cu-Zn, Pb-Zn and Zn-Pb ores (13 AGFs), Mo (9 AGFs), U (6 AGFs), and U-V ores (1 AGF). New districts are recommended for exploration for diamonds (12 AGFs), Cr (4 AGFs), V (1 AGFs), rare metals and rare earth elements (3 AGFs), bauxites (2 AGFs), celestine (2 AGFs) and apatite ores (5 AGFs). These results are obviously valuable for the investment strategy in the development of mineral resources in the region, and in planning mineral exploration work for various types of mineral deposits.