



# Air pollution in the border area of Norway and Russia

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**The Norwegian Institute for Air Research (NILU) has been measuring air pollutants close to the border between Norway and Russia since 1974. In 1988 the Norwegian Pollution Control Authority (SFT) asked NILU to plan and carry out a comprehensive investigation of air quality, precipitation chemistry, and various environmental impacts. The study was started in October 1988. Data from 2003 show that the Norwegian national long term objective value for SO<sub>2</sub> was exceeded at the monitoring station in Svanvik in Norway.**

Since the beginning of the 1990's SO<sub>2</sub> concentrations in Svanvik and Maajavri have not changed significantly. In the Russian town of Nickel the concentration has increased, especially from 1995 to 1998, due to increased wind frequency from the smelter to the measuring station. SO<sub>2</sub> emissions from the nickel smelter in Nickel were at the lowest in 1994 and increased in 1995. Emission data after 1993 are scarce and must only be used with great care.

The EU air quality limit values for SO<sub>2</sub> (and other components) were implemented in Norway from 4. October 2002.

During the last 10 years (1993-2002) the 24 hour limit value for SO<sub>2</sub> (125 µg/m<sup>3</sup>, 3 allowed exceedances a year) have been exceeded 4 out of 10 years (last time in 2000) in Svanvik. The 1 hour limit value has not been exceeded since 1991. In 2002 the SO<sub>2</sub> 1 hour value was above 350 µg/m<sup>3</sup>

during 10 hours. The limit value is allowed to be exceeded 24 times during a year.

At the former Norwegian station Viksjøfjell and the Russian stations in Maajavri and Nickel exceedances of the EU limit values and the Norwegian National long term objective value are much more frequent and the concentrations are much higher than in Svanvik, especially at the Russian stations.

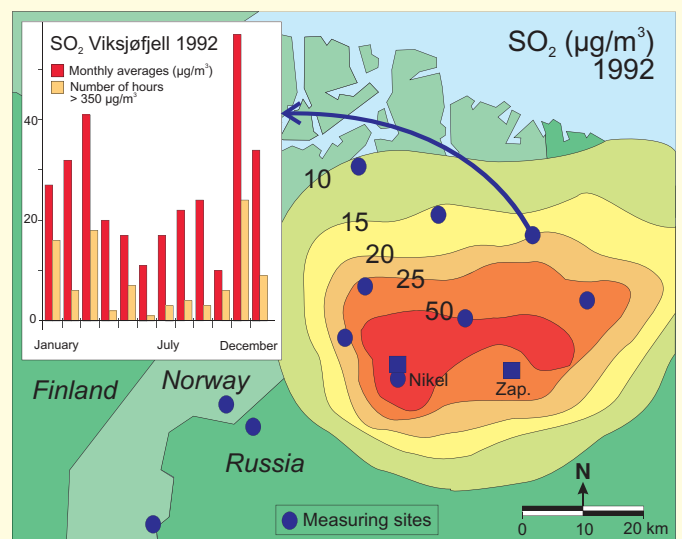
In conclusion very high SO<sub>2</sub> concentrations has been and are still being observed in the border areas of Norway and Russia. More than ten times international air quality guideline values, might oc-

cur during so-called air pollution episodes.

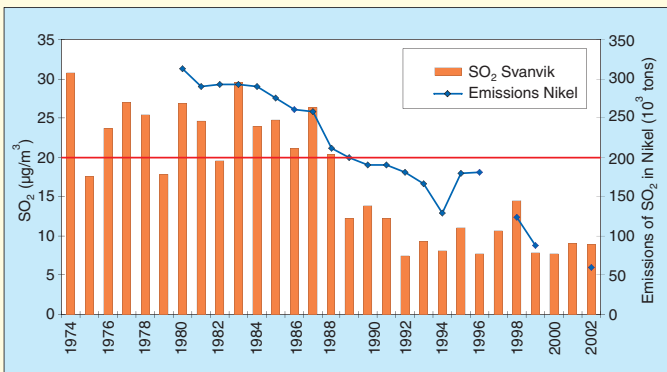
Also concentrations of Ni and Cu are about 10 to 20 times higher in the border areas of Norway and Russia than in Southern Norway, in the town of Nickel up to 60-150 times higher.

Sulphur deposition rates due to emissions from the Pechenganickel smelters are well correlated to vegetation injuries and exceedances of critical loads and critical levels for the area. Due to the sensitivity of some of the areas far north air pollutants have caused injuries that can only be repaired by a considerable reduction of the local emission sources.

About 100 000 tons of SO<sub>2</sub> was released annually from the Nickel smelter in 2000. More than 85 % of these emissions are assumed to be emitted from the 150 m tall stacks. However, the low level diffusive emissions around the buildings may cause more impacts to the closest areas, such as in the town of Nickel.



The annual average concentrations of SO<sub>2</sub> estimated from measurements and dispersion models indicated that the closest 20 to 50 km around the smelters were severely impacted by the emissions. Most of the forest and vegetation damages were observed in these areas. Exceedances of the hourly WHO limit values occurred between 2 and 22 hours each month, most frequently during the winter season at Viksjøfjell.



The reduction of "Pechenganickel" emissions has led to decreased atmospheric pollution in Svanvik since 1989. Also in the urban village of Nickel, close to the smelter, the occurrence of high SO<sub>2</sub> concentrations has been reduced during the latest years.