

Monitoring of the cross border territories. Transboundary pollution

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**Seminar for bloggers and journalists
Kirkenes 11. November 2013**

Outline

- Mining activity and emissions
- Norwegian monitoring program; Svanvik, Karpdalen, Viksjøfjell, Karpbukt
- Some results from April 2011 – March 2012
- Air quality threshold values and guidelines
- Information
- Questions unanswered



Photo: Hildur Eikås,
Sør-Varanger library

Mining activity in the border areas

Kola MMC

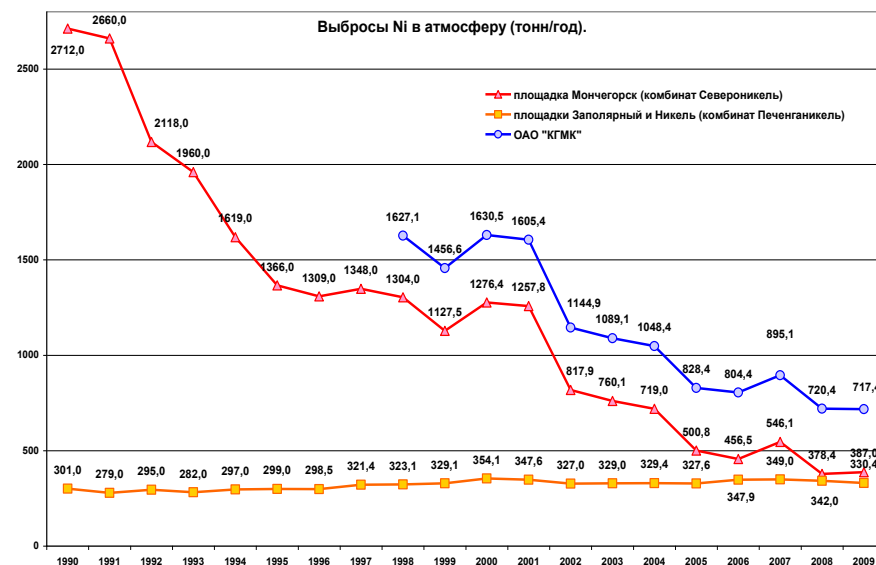
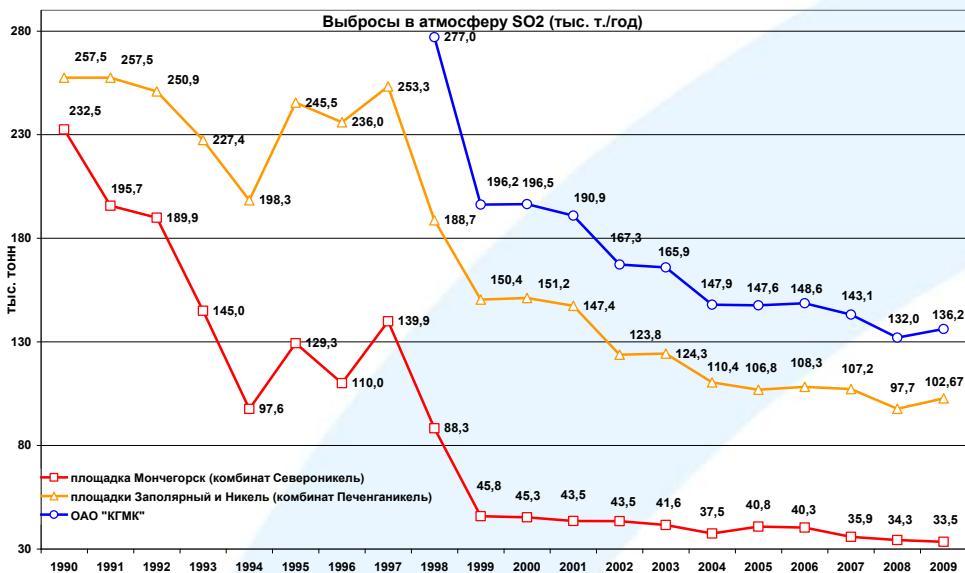
The key operating assets of Kola MMC



Kola MMC is the largest industrial producer in the Murmansk region and is fully integrated into the transport infrastructure of the North-Western Federal District.

In the Kola MMC, three mines extract disseminated sulfide ores containing nickel, copper and other useful components from the Zhdanovskoye, Zapolyarnoye, Kotselvaara and Semiletka deposits.

Emissions

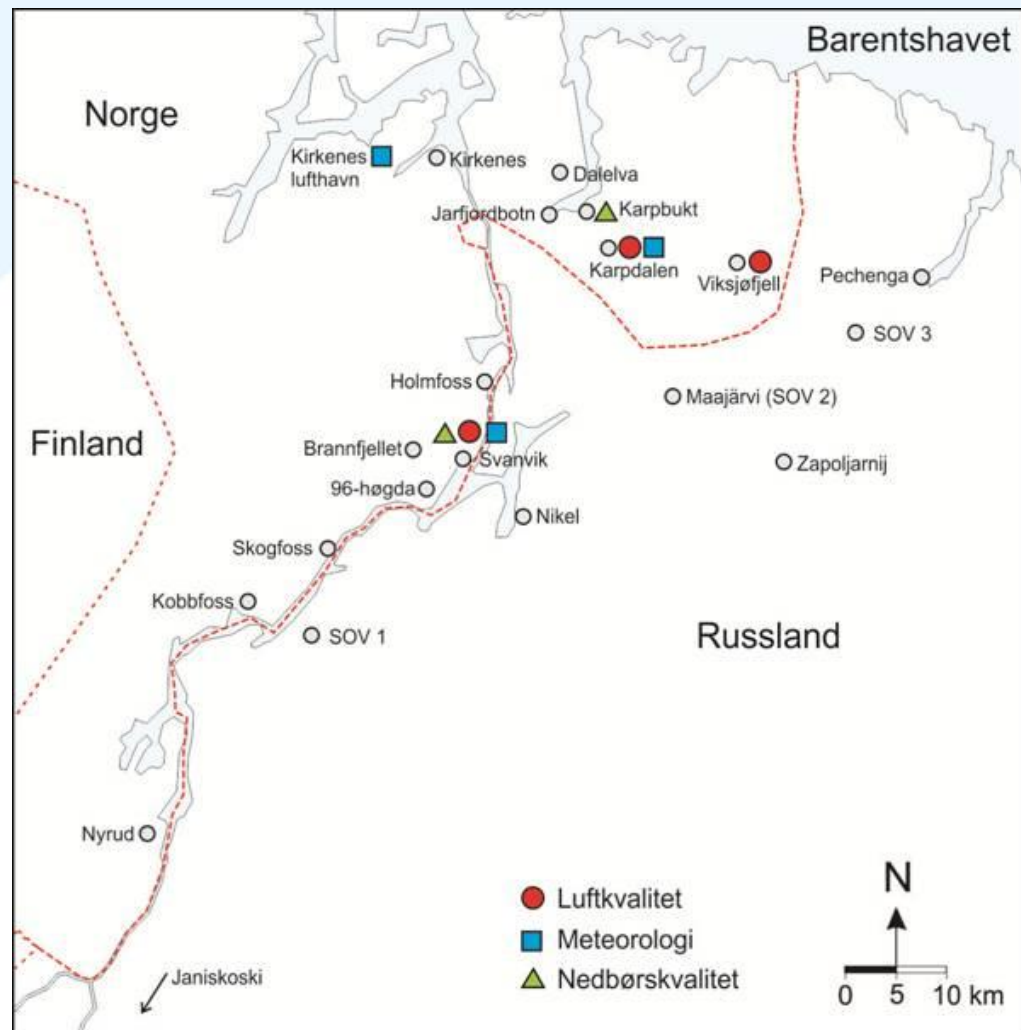


Numbers reported by Kola MMC,
provided by Bellona

Norwegian monitoring program



MILJØVERNDEPARTEMENTET





Svanvik (Сванвик)

- SO₂ monitor
- Heavy metals in air/particles
- Heavy metals in precipitation
- Meteorology
- Results on www.luftkvalitet.info
- In collaboration with Bioforsk Soil and Environment

Karpdalen (Карпдален)

- SO₂ monitor
- Meteorology
- Heavy metals in air/particles
- Results on www.luftkvalitet.info
- In collaboration with Leif Vonka



Viksjøfjell (Викшёфьелл)

- SO₂ passive samplers (exposed 2 weeks)
- Average concentration ~ 30 µg/m³



View from Viksjøfjell southwards. One can see the flue gas from stack in Zapoljarnij. Photo: Christoffer Aalerud, County governor of Finnmark

Norwegian threshold values (air)

- SO₂ hourly mean: 350 µg/m³ (24 exceedances per year)
- SO₂ daily mean: 125 µg/m³ (3 exceedances per year)
- SO₂ seasonal mean winter / annual mean: 20 µg/m³
- Ni annual mean target value: 20 ng/m³

Важные ключевые показатели SO_2 из измерений 1 апреля 2011 г.-31 марта 2012г

Параметр	Сванвик	Карпдален
Наивысший 10-минутный показатель $\mu\text{г}/\text{м}^3$	1099	1732
Наивысший среднечасовой показатель $\mu\text{г}/\text{м}^3$	858	838
Количество среднечасовых показателей $>350 \mu\text{г}/\text{м}^3$ летом	6	3
Количество среднечасовых показателей $>350 \mu\text{г}/\text{м}^3$ зимой	4	3
Наивысший среднесуточный показатель летом $\mu\text{г}/\text{м}^3$	88	112
Наивысший среднесуточный показатель зимой $\mu\text{г}/\text{м}^3$	110	139
Количество среднесуточных показателей $> 125 \mu\text{г}/\text{м}^3$	0	3
Количество среднесуточных показателей $> 90 \mu\text{г}/\text{м}^3$	2	5
Средний показатель лета $\mu\text{г}/\text{м}^3$	7,2	12,0
Средний показатель зимы $\mu\text{г}/\text{м}^3$	6,1	18,3

Heavy metals

- Svanvik (Сванвик, air & prec.) & Karpdalen (Карпдален, air)
- Ni, As, Cu and Co trace metals from smelter activity
- Increased levels in precipitation from 2004

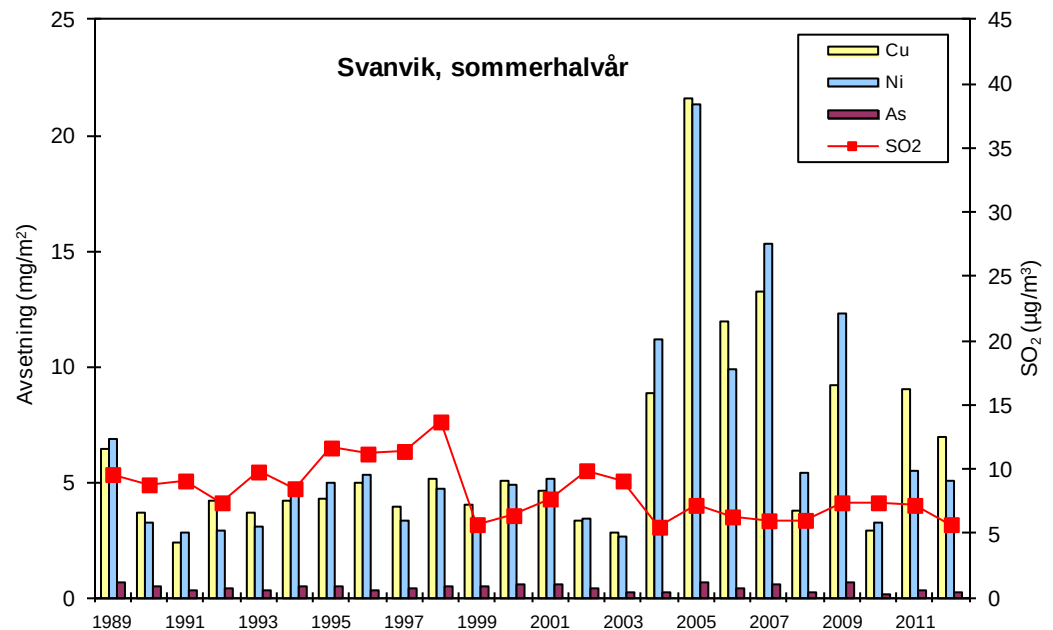
AIR:

Maximum Ni weekly values in air 2012/13:

Сванвик: 37 ng/m³

Карпдален: 60 ng/m³

Precipitation:



Deposition of heavy metals at Svanvik, summer season

Sources of information

www.luftkvalitet.info

www.kolgimet.ru

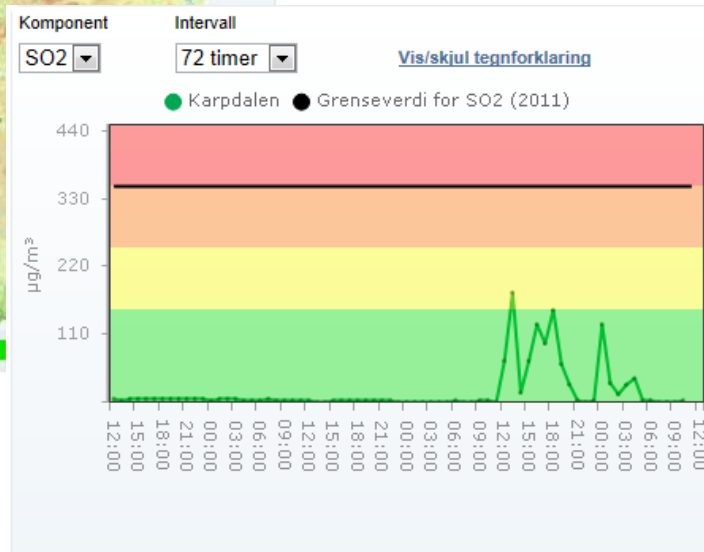
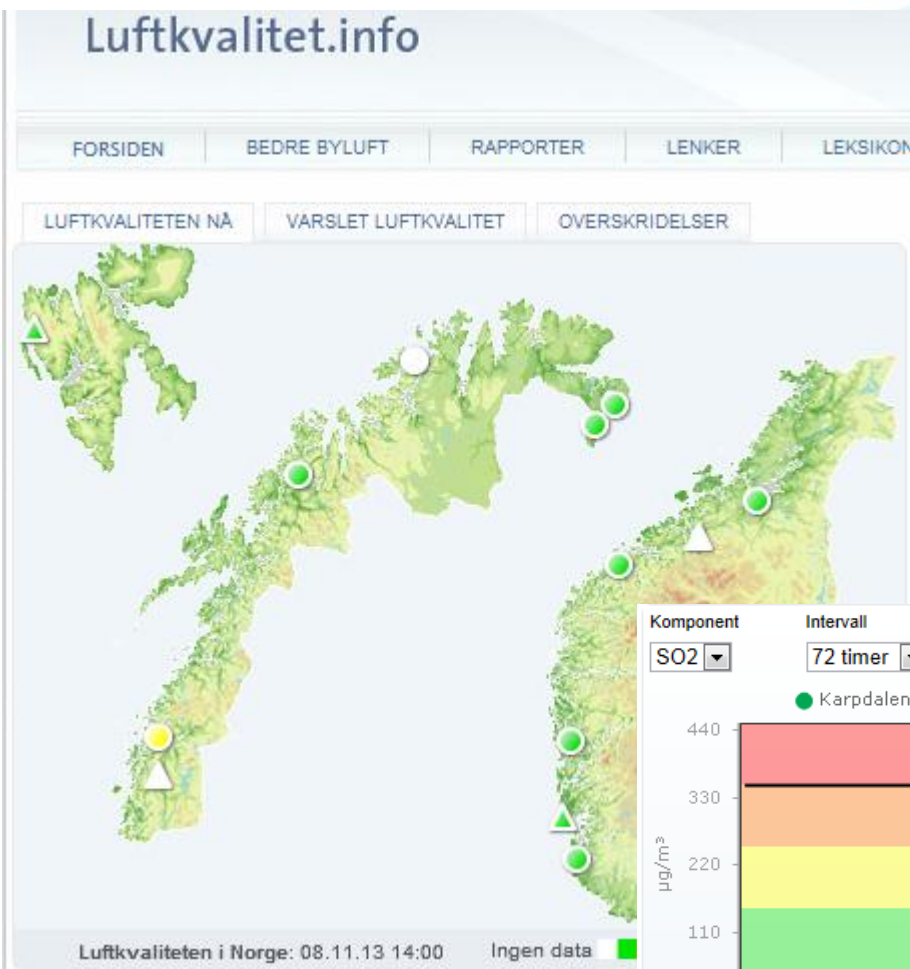
http://www.kolgimet.ru/index.php?option=com_content&view=article&id=54&Itemid=239

Russian reports – Murmansk oblast authorities

NILU web

www.barentsobserver.com

www.luftkvalitet.info



Karpdalen

Stasjonen ligger i Karpdalen, øst for Kirkenes og nord for smelteverket i Nikel, Russland. Dette er en "gammel" stasjon som ble nedlagt i 1999 og gjenåpnet høsten 2008. SO2 og meteorologi måles. Om vinteren er dominerende vindretning fra sør og sør-sørvest. Da bringes utslippene fra Nikel nordover mot Karpdalen og Jarfjordfjellet.



Status: Stasjonen er i normal drift.
Eiet av: NILU (målinger på oppdrag fra KLIF)

Detaljer

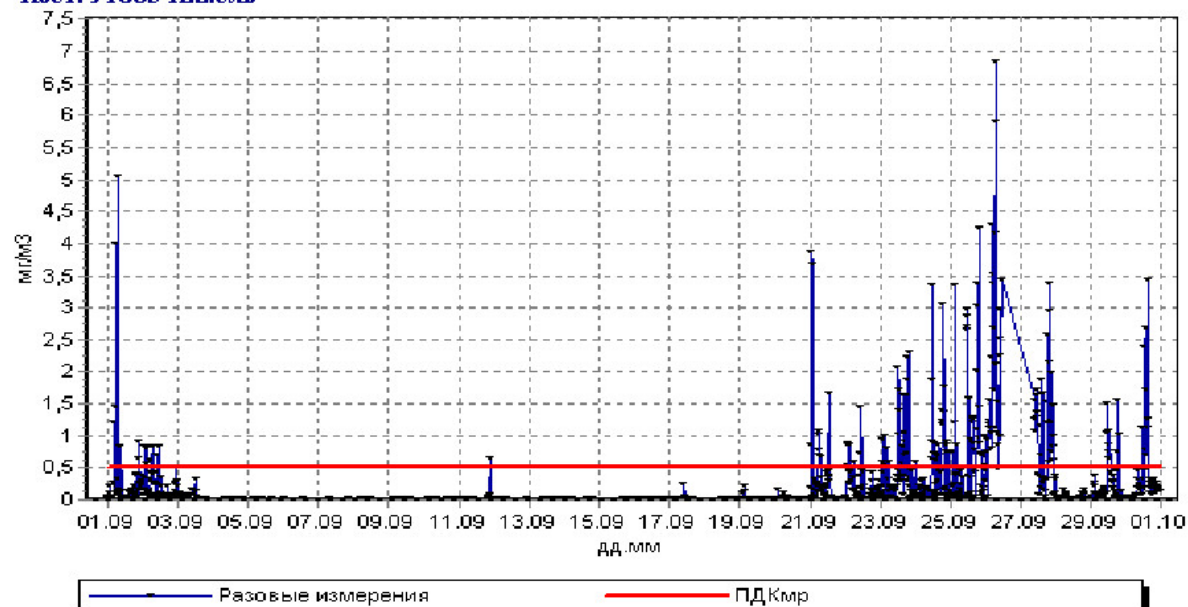
- ♦ [Se kart](#)
- ♦ [Se luftkvalitets index \(Tabell\)](#)
- ♦ [Se luftkvalitets data \(Tabell og graf\)](#)

07.11-09.11.2013 г. В г.г. Заполярном, Мончегорске, п. Никеле наблюдаются метеоусловия, способствующие накоплению загрязняющих веществ в приземном слое атмосферы. В связи с неблагоприятными для рассеивания примесей метеоусловиями предприятиям области переданы предупреждения о принятии решений о сокращении выбросов.

ИЗМЕРЕНИЯ за период с 2013-09-01 по 2013-09-30

Наименование параметра: Серый диоксид

Пост: 91085 Никель



NILU web

<http://www.nilu.no/Nyhetsarkiv/tabid/74/language/nb-NO/NewsId/587/Kilder-til-luftforurensning-i-Murmansk-fylke-i-Russland.aspx>



News Archive

22/08/2013 | Atmosphere and climate, Air Quality, Environment, society and health, Industrial pollution, Environmental monitoring, Polar regions, News Norwegian, News English

Sources of Air Pollution in Murmansk County, Russia

According to recent media reports (*example*) Norway is a major source of pollution within the Murmansk county in N-W Russia. It is claimed that 45% of the total pollution in the area is originating from abroad, with Norway as an important contributor. NILU – Norwegian Institute for Air Research has worked extensively in this area, and has critical scientific objections to this assertion. NILU's work shows that it is actually sulfur dioxide (SO_2) and heavy metals that are causing pollution in the border area, not nitrogen dioxide (NO_x).



NILU's work in the border area

NILU has been monitoring the air quality in the area around the Norwegian-Russian border since 1974, which has been funded by the Norwegian authorities (Ministry of the Environment and Norwegian Environment Agency). As per today there are Norwegian monitoring stations at Svanvik and in Karpdalen, measuring SO_2 and heavy metals as well as meteorological data. NILU has also experienced successful cooperation with HydroMet, a governmental body in Murmansk which is the Russian counterpart to NILU.

NILU's measurements in the border area show excessive levels of SO_2 and heavy metals. Air quality in Karpdalen is exceeding Norwegian threshold values due to pollution from Nikel and Zapoljarnij (Berglen et al, 2012).

In order to assess air quality and sources of air pollution, long time measurements are crucial since it is not possible to draw any conclusions from single measurements carried out within a short period. Systematic and long term monitoring of SO_2 and heavy metals carried out by Norwegian and Russian research institutes show that the problem of air pollution in the border area is mainly caused by the production of nickel on the Russian side of the border.

Incorrect statements

The assertions that pollution from Norway is causing up to 20-30% of the threshold levels in the Murmansk county surprisingly do not even indicate for what components or specific threshold levels this applies to. Therefore, this can not be interpreted as a correct description of the situation.

Previously scientists from the research institute SRI Atmosfera in St Petersburg have carried out studies demonstrating that the dispersion of air pollution from Russia to Norway is marginal. In this context it should be mentioned that SRI Atmosfera is using a model that is made for calculating long range transport of air pollutants (EMEP-model in 50 km x 50 km resolution). NILU has shown that this model is meanwhile not suited to study emissions and dispersion from point sources such as the Nikel smelter that is situated only 7 km away from the Norwegian border. The model is too coarse and therefore it does not correctly display the actual pollution problem within the border area, which is caused by the emissions of SO_2 and heavy metals from smelter activity in Nikel and Zapoljarnij. In order to calculate dispersion from point sources it is required to use a model with a much finer grid resolution (e.g. 1 km x 1 km).

The ongoing transport of air pollutants crossing the border in both directions is well documented. Russian scientists have highlighted earlier that transport of nitrogen oxide (NO_x) is larger from Norway to Russia than the other way. However, these trans-boundary nitrogen and nitrogen deposition do not represent an environmental problem in Murmansk area. The deposition of these compounds with Norwegian origin makes only a fraction of the overall deposition, and the deposition of nitrogen is far below the critical load (EMEP-report 1/2013, and NILU OR 41/2012). The argument that NO_x is causing an environmental problems in the Murmansk area is based upon a selective use of data, and cannot be substantiated from a scientific point of view.

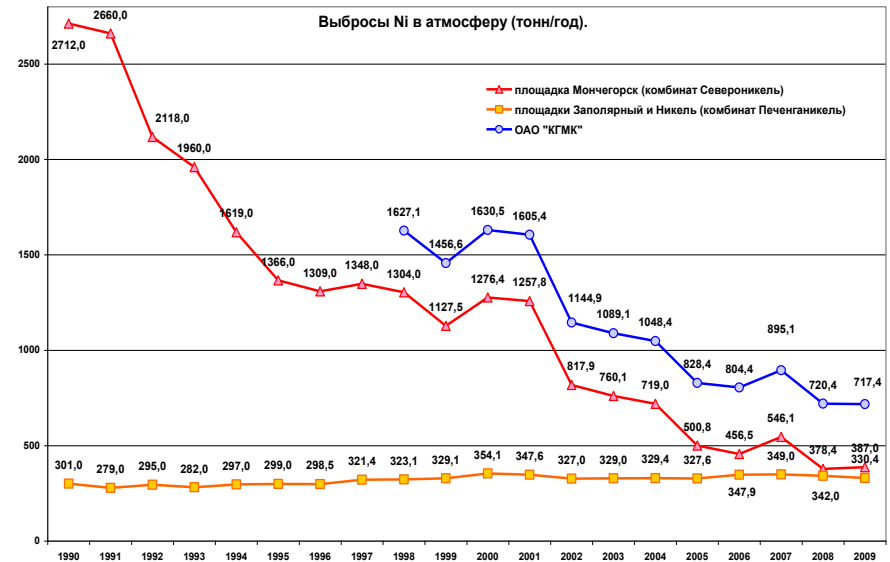
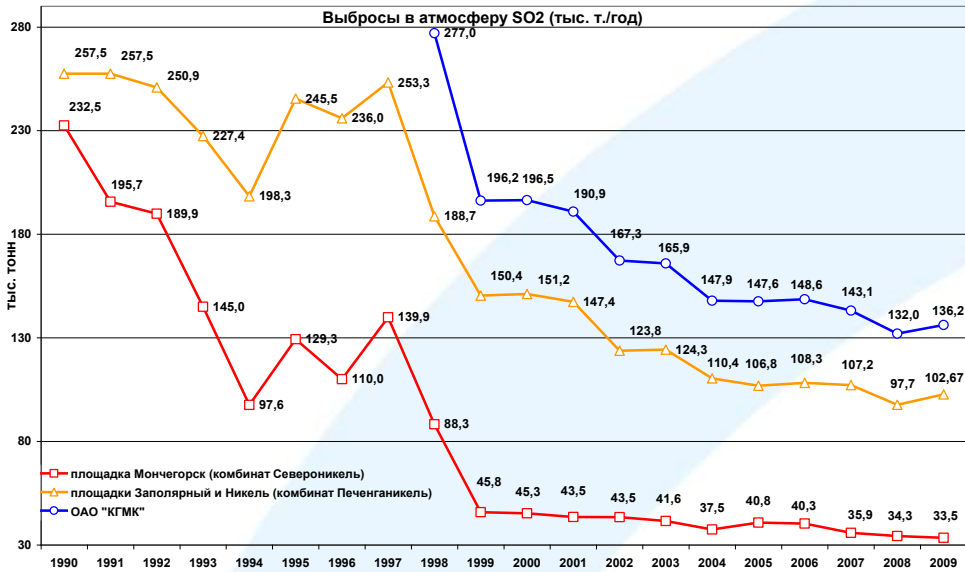
Claims that 45 % of the overall pollution in the Murmansk region originates from abroad (Poland, Finland, Germany and Norway) are cannot be substantiated, and it is only nitrogen that can even be considered as an imported pollution to the region.

Conclusions

Poor air quality in Murmansk county is primarily caused by local emissions from industry, mining, heating and transport. Plants in Nikel and Zapoljarnij are primarily causing environmental problems due to emissions of SO_2 and heavy metals, not nitrogen dioxides. This has been documented by research carried out by NILU and colleagues at HydroMet at Murmansk who have the official responsibility for this specific monitoring in Russia. In addition, HydroMet is cooperating closely with the county administration in Murmansk.

Norwegian and Russian research institutes have been collaborating for many years in order to monitor the environmental status of the border area. Norway and Russia have monitoring programs on both sides of the border that are built upon well validated measurement methods, in which meetings regarding these results are

Questions unanswered: emissions



Diffusive emissions: Smelter and city of Nikel 19. June 2008



Hourly mean concentrations in Nikel (NILU instrument):
1470 $\mu\text{g}/\text{m}^3$ (13h-14h) and 1527 $\mu\text{g}/\text{m}^3$ (14h-15h).

Extra in case of any questions



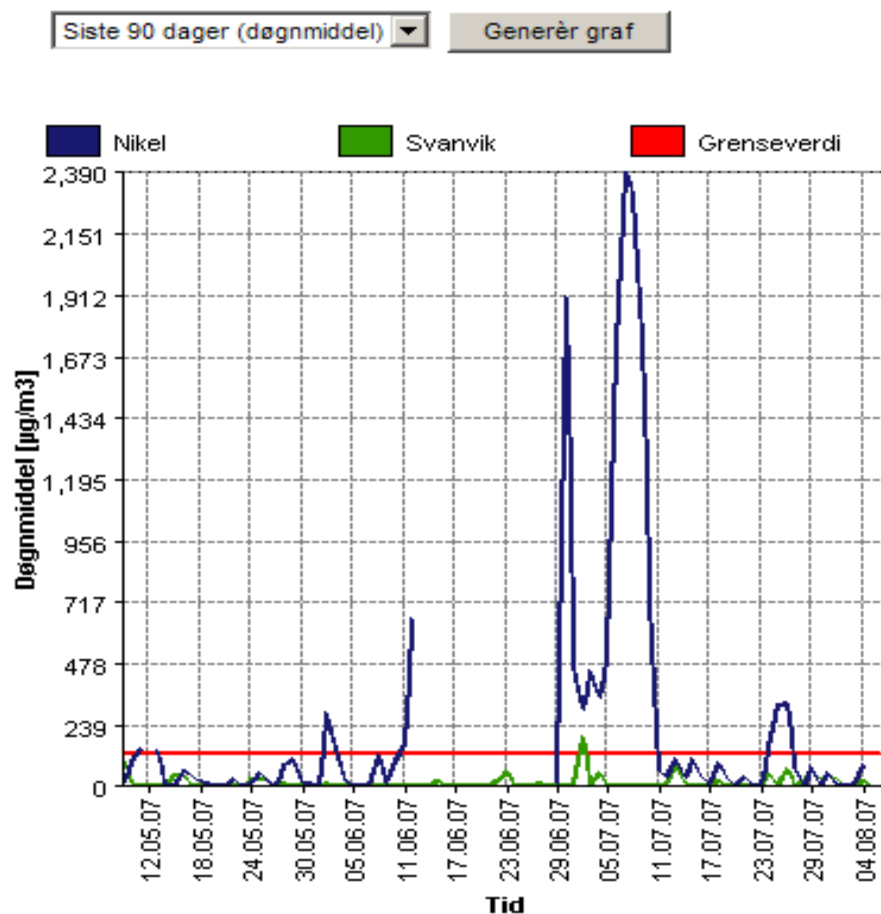
Smelter in Nikel and emissions seen from Brannfjellet, Pasvik valley 23. July 2007 (after the summer episode).

Summer episode 2007



Døgnmiddel for SO₂ siste 90 dager i µg/m³

[Om forurensningsnivåer](#)
[Om grenseverdier](#)



Model development

NILU and University of Oslo are working on development of WRF-Chem atmospheric-chemistry model to investigate dispersion and deposition from Nikel and Zapoljarnij

http://folk.uio.no/torefl/WRF-Chem/Domene3_SO2-SO4_delay10.gif

http://folk.uio.no/torefl/WRF-Chem/Domene2_SO2-SO4_delay10.gif

http://folk.uio.no/torefl/WRF-Chem/Domene1_SO2-SO4_delay10.gif