THE ARCTIC COUNCIL'S ARCTIC CONTAMINANTS ACTION PROGRAM (ACAP): PROJECT FOR REDUCTION /ELIMINATION OF EMISSIONS OF DIOXINS AND FURANS IN THE RUSSIAN FEDERATION WITH FOCUS ON THE ARCTIC AND NORTHERN REGIONS IMPACTING THE ARCTIC

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Abstract

The presence of dioxins and furans in the Arctic region as reported by AMAP and others has attracted much attention by the high levels found in certain biota. There is however only limited information on sources for this contamination and how the contaminants reach the Arctic regions. Persistent organic compounds such as dioxins can be transported over long distances via air and water. The relative importance of possible local sources of dioxins currently found in the Arctic is not known but it can not be excluded that local sources could contribute substantially in certain areas. A number of Russian sites have been classified as "hotspots" in inventories performed by NEFCO and others[1]. Similar to the situation in many countries, detailed information on emissions from Russian industries and other sources is often lacking, incomplete, or not easily accessible.

Release of polychlorinated dibenzo-*p*-dioxins and dibenzofurans (PCDD/F) are regulated under the UN-ECE Convention on Long Range Transport of Atmospheric Pollutants (CLRTAP) and the Stockholm Convention on POPs. Both Conventions require parties to report on and to take measures against their national releases of PCDD/F. Russia signed the Stockholm Convention in 2002 but has not yet ratified it.

One of the intentions behind this ACAP project is to form a better basis in order to facilitate Russia's ratification of these conventions as one important measure to protect the arctic from further contamination with dioxins and other POPs.

Introduction

This project is performed under the Arctic Council, through its "Arctic Contaminants Action Program", ACAP. [2,3] The Arctic Council is an intergovernmental forum for cooperation, coordination and interaction between Arctic states, indigenous communities and industrial facilities.

The ACAP was set up to address the sources identified by AMAP's monitoring and assessment work. It involves several priority projects to reduce pollution in the Arctic, including projects on cleaner production and control of releases of PCBs, obsolete pesticides and dioxins, all of which are priority pollutants under the Stockholm Convention on Persistent Organic Pollutants (POPs).

The dioxin project was launched in 2002 and has an international steering group consisting of donor countries (Sweden, USA and Norway) and Russian experts including representatives from Russian ministries and agencies. The Centre for International Projects, CIP (attached to the Ministry of Natural Resources) has a coordinating role for Russian activities. There are three Federal level authorities from the Russian Federation involved: the Ministry of Industry and Energy, the Ministry of Health and the Federal Environmental, Industrial and Nuclear Supervision Service (Rostechnadzor). In addition also the Research Engineering Centre "Syntez", Cleaner Production and Sustainable Development Centre in cooperation with TEKNA (the Norwegian Society of Chartered Technical and Scientific Professionals), Russian Research Centre of Emergencies of the Ministry of Social Development of the Russian Federation and the U.S. Environmental Protection Agency are partners in the project.

The overall objectives of this ACAP-project are to achieve substantial reductions in the formation and emission of dioxins and furans in the Arctic and in areas affecting the Arctic, and to support Russian authorities and enterprises to reduce and eliminate the emission of dioxins and furans from other parts of Russia to the Arctic. Another important objective of this project is to facilitate the development of dioxin and furan inventories in

Russia and to gain new information on sources of dioxins and furans and the magnitude of their releases. In addition, recommendations on adequate measures and techniques (based on BAT and BEP) for reduction/elimination of dioxins/furans emissions will be identified. These activities will hopefully facilitate the implementation of the UN ECE LRTAP POPs Protocol and the Stockholm Convention on POPs in the Russian Federation.

The project objectives are:

I. To compile existing information on PCDD/F releases from earlier activities e.g., UNEP's activities with Russian Federation and the Russian-US inventory project, relevant information from government, industry, scientific literature, and other ongoing or completed international projects.
II. To identify and quantify sources of PCDD/F in Russia and establish a national PCDD/F source inventory.
III. Based on (II), close knowledge gaps with respect to (a) newly discovered sources in Russia (b) differences between Russian emissions factors and internationally-accepted emission factors or other relevant information and/or (c) sources that will be found to dominate the inventory.
IV. Based on results from (II) prioritise sources of PCDD/F for release reduction/source elimination measures (including identification of BAT and BEP).
V. Implement a release reduction/source elimination initiative with the largest impact on the Arctic.
VI. The project will facilitate implementation of the UN ECE LRTAP POPs Protocol and the Stockholm Convention on POPs in the Russian Federation.

Project description

The dioxins/furans project consists of three phases, whereof the first was completed in August 2005. The Report of Phase 1 is titled, "Assessment of some major sources of dioxins/furans in Arkhangelsk and Murmansk Regions and Republic of Komi". [4] Phase two is currently ongoing and its final report will be delivered in October, 2007. The third phase, based on the recommendations given in the phase two report, is planned to start in late 2007.

For practical reasons the project has initially focussed on the Arkhangelsk and Murmansk Oblasts and the Komi Republic in Phase 1.

In the first phase, UNEP Chemicals' Standardized Toolkit for Identification and Quantification of Dioxin and Furan Releases was translated into Russian, a dioxins/furans Fact Sheet was produced and data collected. [5] A hands-on workshop for Russian scientists on sampling and analysis of flue gases was arranged in Stockholm in 2003. In Russia, emission inventories were carried out based on UNEP Toolkit estimations at the 61 sites investigated (21 in Arkhangelsk, 19 in Komi and 21 in Murmansk) but also on 11 chemical analyses of flue-gas samples at 4 sites. Based on this dioxin emission inventory a priority list of sources was produced to be used in phase 2. As to the selection of sources, the inventory focused on important sources, with respect to their magnitude, but also sources that are most representative for other processes present in the area or elsewhere.

Estimated assessment of environmental emissions of dioxins and furans from the major sources of Archangelsk and Murmansk Oblasts and Republic of Komi was also made in the first phase. Source-specific emission estimates were produced on the basis of quantity of output or consumable crude materials and so-called emission factors of dioxins/furans per unit of this output or crude materials. Amongst the largest sources of dioxin and furans in the region were the Murmansk Municipal Solid Waste (MSW) Incineration Plant, the Kotlas Pulp & Paper Plant in Arkhangelsk Region and the Vorkutinskiy cement plant in the Komi Republic. All activities within phase I were finalised in December 2004, and a full printed report in English was issued in August 2005.[4]

The second phase of the project is a feasibility study of programs of measures at the different facilities.
The selected facilities from phase I for further work were:

- Kotlas Pulp & Paper facility, Koryazhma (Arkhangelsk Oblast)
- Vorkutinskiy cement plant (Komi Republic)
- Syktyvkar Timber Mill (Komi Republic) (Cleaner Production program only)

Recent information from Vorkutinskiy cement plant states that no waste material is or has been used in this process. The formation of dioxins is therefore likely to be low. Due to the large emissions of particles the facility is still included.

Phase two contains the following tasks:
Task 1: *Determination and assessment of various factors impacting the formation of dioxins/furans.*

Task 2: *In-depth study of dioxin emissions through implementation of analytical measurements of concentration of dioxins in gas, liquid and solid wastes at selected sites before implementation.*

Task 3*: Selection of the most efficient technological solutions and development of recommendations of measures.*

Task 4: *Implementation of training programmes by Cleaner Production and Sustainable Development Centre followed by selection of the most economically and environmentally efficient projects.*

Task 5: *Assessment of dioxin emissions through implementation of analytical measurements after implementation of measures, preparation of the final report, including emissions reductions and project proposals for phase III.*

A Cleaner Production training programme has been performed at Kotlas Pulp & Paper. It resulted in almost twenty different proposals for improvements, and 6 were relevant for reductions of dioxin formation and emission. Potentially a few more CP-programmes will be launched. In the end a goal is to promote enhanced operation performance and technical up-grading of the equipment and processes at the selected enterprises.

In January 2007 it was decided to add the Murmansk Incineration Plant (for incineration of Municipal Solid Waste, MSW) to the plan. In the first step, a general pre-feasibility study of the technical and institutional prerequisites for financial support will be performed.

The emissions from different processes at the same enterprise will be determined. The final phase II report will give specific recommendations on how technical processes can be improved and also matters concerning information, education and organisation at individual enterprises could be improved in order to decrease the release of environmental pollutants such as POPs. The second phase is still ongoing.

The third phase is based on proposals from phase II. The site-specific recommendations for reductions, and the technological and economic assessment in support of the recommendations will be formulated as project proposals for the selected sites and serve as a basis for phase III.
The objective for phase III is implementation of demonstration projects commensurate with financing that is provided. Funding of environmental investment projects aiming at reduction/elimination of dioxins/furans emissions at individual enterprises will be discussed with NEFCO (Nordic Environment Finance Corporation) and other national and international financial institutions.

Discussion
The awareness of environmental and health problems caused by dioxins and furans is growing in Russia. During the project, the need for national analytical capacity has become obvious. During the last decade, the national analytical capacity has increased considerably. Russian scientists have performed all sampling and analysis within this project. As for most international laboratories, there is also in Russia a need for further improvements and intercalibrations. Therefore, one objective of this project is to further support the establishment of analytical tools and build qualified teams of specialists to investigate PCDD/F issues nationally. The use of scientifically established methods is therefore of great importance to enable comparisons and analogies to situations elsewhere that have been investigated in more detail.

The project has also shown the importance of an early involvement of both central and local authorities, enterprise representatives as well as other local stakeholders.

To be able to make environmentally sound proposals on measures based on BAT and BEP for further reduction of the formation and emission of PCDD/F, it will be important to base these proposals on an in-depth knowledge of the local conditions as well as the application of well-proven sampling and analytical methods.

References

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