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ENPRODUS

DEVELOPMENT OF AN OPERATIONAL PLAN FOR ENVIRONMENTAL PROTECTION FROM DUSTS IN RUSSIA AND OTHER NIS

Instrument: **Specific Support Actions (SSA)**

Thematic Priority: **Specific Measures in Support of International Cooperation (INCO) – Russia and other NIS**

Second Year Periodic Activity Report

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Project coordinator name: **PANIAS Dimitrios**
Project coordinator organisation name: **National Technical University of Athens - NTUA**

Revision: **[draft]**

List of participants:

1. National Technical University of Athens (Greece)

2. Rheinisch-Westfaelische Technische Hochschule Aachen (Germany)

3. The Ukrainian Research and Development Institute of Industrial and Sanitary Purification of gases (Ukraine)

4. Moscow State Institute of Steel and Alloys – Technological university (Russian Federation)

5. The K.I. Satpaev Kazakh National Technical University (Kazakhstan)

Coordinator name: **PANIAS Dimitrios**
Coordinator Organisation name: **National Technical University of Athens**
Coordinator e-mail: **panias@metal.ntua.gr**
Coordinator fax: **+30-210-7722168**

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Publishable executive summary

Summary of the project

Russia and other NIS possess considerable natural mineral resources of ferrous and non-ferrous metals, which are used for the production of steel, ferroalloys, aluminium, nickel, base and precious metals. Metallurgical industry, a highly developed industrial branch in Russia and other NIS, applies currently outdated process technologies for the extraction of metals causing severe environmental contamination problems in the area, which are enlarged as little or none attention is paid to the minimization and/or treatment of the produced wastes.

The emission of the industrial dusts originated from the metallurgical activities is included among the most important environmental problems in this geographical area. Dusts are formed due to the extraction of thin fractions of the processed raw material and the evaporation and sublimation of some metals and metal compounds. The lack of adequate technologies for the treatment and recycling of the metallurgical dusts has resulted in several environmental problems in Russia and other NIS and has caused a significant materials and energy consumption during the production processes. A considerable amount of the generated metallurgical dusts is land-filled, contributing significantly to the environmental problems at the places of their dumping as well as to places far away from the dumps since the fine dust particles are carried out by winds. Due to their extremely small size, the dust particles are entering the lungs of humans through respiration, resulting in severe health problems, even death. On the other hand, the metal oxides (e.g. NiO, FeO, Fe_2O_3, SiO_2, CaO, MgO, Al_2O_3 and MgO) that are contained in the metallurgical dusts could be leached by the rain, resulting in the contamination of soil and water resources. Therefore, the introduction of a dusts minimization and treatment policy could contribute to a cleaner environment in Russia and other NIS.

ENPRODUS project addresses the environmental pollution problems arising from the generated metallurgical dusts in Ukraine, Russia and Kazakhstan, focusing at the development of an Operational Plan, which will include proposals for feasible technological improvements in the metallurgical production processes and viable technologies for the management of the generated industrial dusts, ensuring the protection of the regional ecosystem.

In order to achieve this objective, the project deals with (i) the collection and management of information regarding the environmental contamination from the metallurgical dusts generation in the involved countries and the risks associated with it, (ii) the identification of Best Available Techniques that have to be adopted by the regional metallurgical industries for the management of the industrial dusts aiming at the prevention, minimization and remediation of the environmental contamination and thus, safeguarding the ecosystem of the affected areas and (iii) the dissemination of the gained knowledge and the promotion of the project results.

1. Project Objectives

ENPRODUS Project addresses the environmental pollution problems that are related to the emission of metallurgical dusts in Russia, Ukraine and Kazakhstan. Actually, ENPRODUS aims at the development of an Operational Plan, which will include proposals of feasible preventive and remedial technologies that are already installed and run in other European or non-European countries facing same or similar environmental problems. The term “feasible” implies technologies that are economic in installation and operation and at the same time give high yields of pollution prevention or remediation. Moreover, ENPRODUS aims at determining research priorities with high innovation potential, taking into consideration the needs of the local industry and community, disseminating existing and new knowledge so as the scientific communities of Russia and other NIS to be familiarized with the respective technologies and assisting the scientific community and the national authorities of the involved countries towards economic growth through sustainable development and management of natural resources.

The strategic objective of this project is the reinforcement of environmental protection, one of the three distinct pillars on which sustainable development for both, developed and developing countries, is based. It is hoped that this will be one of the first steps towards sustainable development of mining and metallurgical industry in Russia and other NIS, setting the base for social cohesion, political stability, economic growth, peace and prosperity in the area.

Thereby, the main objectives of the ENPRODUS Project are:

1. The creation of an inventory, including detailed information on the environmental contamination related to metallurgical dusts generation in the target countries (Ukraine, Russia and Kazakhstan) and a risk assessment study for the dusts’ impacts on the regional ecosystem and the human’s health.
2. The comparison of the production technologies currently used in the regional metallurgical industries of concerns and the technologies used for the management of the generated industrial dusts with the Best Available Technologies used in the relevant fields. This comparison will result in the designation of a frame for potential and feasible technological improvements in the target countries facing the environmental problems related to the metallurgical dusts generation.
3. The development of an Operational Plan aiming at (i) proposing appropriate and viable technologies for the confrontation of the environmental problems related to the metallurgical dusts generation in Russia and other NIS, (ii) composing a framework for the development of new and innovative technologies related to the environmental management of the metallurgical dusts and (iii) enabling the European Commission to define its future RTD strategic objectives and policies in the field of metallurgical activities in this geographic area.
4. The dissemination of existing and gained knowledge and the exchange of valuable experience on subjects related to management technologies for the metallurgical dusts.

2. Contractors involved

The following contractors are involved in ENPRODUS Project:

1. National Technical University of Athens (Greece)
2. Rheinisch-Westfaelische Technische Hochschule Aachen (Germany)
3. The Ukrainian Research and Development Institute of Industrial and Sanitary Purification of Gases (Ukraine)
4. Moscow State Institute of Steel and Alloys - Technological University (Russia)
5. The K.I. Satpaev Kazakh National Technical University (Kazakhstan)

3. Coordinator contact details

Coordinator name: **Dr. Panias Dimitrios**

Coordinator Organization name: **National Technical University of Athens, Greece**

Coordinator e-mail: **panias@metal.ntua.gr**

Coordinator telephone number: **+30-210-7722276**

Coordinator fax number: **+30-210-7722168**

4. Work performed and results achieved

A summary of the work performed during the two year of the Project,as well as of the results achieved, is given in the following paragraphs on a Workpackage basis.

WP 1: Data Collection and Environmental Problem Assessment

WP1 focused at defining the size and extent of the environmental pollution problems caused from the metallurgical dusts generation in the target countries, as well as at assessing the risk posed by the generated dusts with regards to the potential and actual impairements for the main natural receprors and affected media.

Partners from the target countries, namely URDIISPG, MISA-TU and KazNTU collected all the available information concerning the dusts generated in selected metallurgical plants, which represented the main metallurgical activities in each target country. Collected information included location of the industrial plants, production capacity, flow diagram of the production processes, dusts generation sources, quantity, chemical composition and particles size of the generated dusts and dusts management technologies currently used. Moreover, they performed a qualitative Risk Assessment study on the impacts of the disposed and released metallurgical dusts on human's health and the environment.

*The results of WP1 are included in **Deliverable D1** "Invertory including detailed information on the environmental contamination related with the metallurgical dusts generation in Russia and other NIS involved in the project and Risk Assessment Analysis" that comprises a useful tool for understanding the environmental contamination problems related to the generation of dusts in the metallurgical industry.*

WP 2: Technology Assessment

WP2 aimed at determining the reasons that cause environmental pollution problems, regarding the metallurgical dusts generation, as well as at defining potential and feasible technological improvements that have to be adopted by the metallurgical industry in the target countries , in order to prevent and/or remediate the environmental contamination related to the dusts generation.

Based on the data collected in WP1, the European Partners NTUA and RWTH-Aachen compaired the production technologies and the dust abatement / management technologies currently used in the target countries with the Best Available Technologies considered in the relevant fields.

*The results of WP2 are included in **Deliverable D2** "Designation of a frame for potential and feasible technological improvements in Ukraine, Russia and Kazakhstan in order to face the environmental problems related to the metallurgical dusts generation".*

WP 3: Operational plan Development

WP3 aimed at developing an Operational Plan that should (i) propose appropriate and viable technologies for the confrontation of the environmental pollution caused by the generation of metallurgical dusts in the target countries; (ii) compose a framework for the development of new and innovative technologies for the management (abatement, recycling, re-use and disposal) of the metallurgical dusts and (iii) enforce the European Commission to better define its future RTD strategic objectives and policies in the field of metallurgical activities in the geographic area of Russia and other NIS.

The results derived from WP1 and WP2 were evaluated and a frame for potential improvements in the metallurgical sectors studied in the project was defined. NTUA, in collaboration with all the other Partners of the project, has developed an Operational Plan (OP) containing proposals for the reduction of dust emissions and the prevention / elimination of the created environmental pollution. The developed OP proposes also guidelines for the future strategy and policy of the European Commission on Research and Technological Development in the field of metallurgy in Russia and other NIS.

*The result of WP3 are included in **Deliverable D3** "Operational Plan focusing at the prevention of the regional ecosystem contamination from the generated metallurgical dusts in Russia and the other NIS involved in the project" that is expected to be a "guide" for the metallurgical industrial sector in Russia and other NIS to effectively face the new era and establish a stable framework for sustainable development.*

Work Package 4: Dissemination of Knowledge

WP4 focused at disseminating the gained and existing knowledge and exchanging valuable experience on subjects related to the management of the metallurgical dusts.

A specific website (www.labmet.ntua.gr/prewarc/index.htm), promoting the objectives and the results of the project, was initially set up as to (i) raise awareness in the local communities and decision-makers for the environmental contamination related to the generation of metallurgical dusts and (ii) raise the interest of the metallurgical industries in Russia and other NIS countries for the Best Available Techniques.

Moreover, two Workshops, each one in Ukraine and Kazakhstan, were implemented in order to disseminate the project results, spread the existing and gained knowledge and familiarise the local industries, authorities, stakeholders, researchers and scientific stuff with the BAT for the prevention / elimination and management of dusts generated in metals production industry.

The first Workshop entitled "Major environmental problems and measures for reduction of industrial dust emissions at metallurgical enterprises" took place in Zaporozhie, Ukraine, on May 13, 2008. The second Workshop with the title "Environmental protection from industrial dusts" was performed in Almaty, Kazakhstan on 28/08/2008. Representatives from national and local authorities, academic institutions and metallurgical industries facing the waste management problems related to dust generation in metallurgical activities have taken part in these Workshops. In both Workshops, the Operational Plan developed in the project was presented and discussed with the participants.

The results of WP4 are included in the final version of the project website.

Work Package 5: Project Management

NTUA, as the Project Coordinator, performed the management of the Project during the two years, as it is described in Workpackage 5 of Annex I – "*Description of Work*" of the Contract. In particular, NTUA coordinated all the Project activities in a timely and effective way, prepared and submitted in the E. C. all the technical reports and financial statements, organized and chaired the Project's progress meetings and arranged the Consortium communication with the EC responsible Officer.

During the Project, the coordination of the Project, as well as the cooperation between all Partners, was excellent and no problems of any kind concerning the management of the Consortium were encountered. The implementation of the different activities was under an up-to-day communication

between the involved Partners and certain local meetings necessary for the performance of the work took place between Partners.

The successful management of the Project resulted in a productive and efficient work concerning the implementation of the Project's activities. Under the directions of Prof. D. Panias, the Project Coordinator and the Workpackages leaders, all the Partners conducted excellent work contributing possibly to the Project's progress.

5. Plan for using and disseminating the knowledge

A specific website (www.labmet.ntua.gr/prewarc/index.htm) installed onto the web server at NTUA was initially set up as to raise awareness in the local communities and decision-makers of the environmental contamination related to the generation of metallurgical dusts. The website was also expected to raise the interest of the metallurgical industries in Russia and other NIS countries for the Best Available Techniques proposed by the European Commission in the field of metals production and especially of management of the generated dusts. During the two years of the project, the website was continuously updated providing useful information on the implementation of the project and promoting the results. Through this website, the Consortium promoted the performance of the Workshops in Ukraine and Kazakhstan. The final version of this Website will keep running for a long time, after the end of the project.

The Workshops of the project, each one performed in Ukraine and Kazakhstan, were organised in order to disseminate the project results, spread the existing and gained knowledge and familiarise the local industries, authorities, stakeholders, researchers and scientific stuff with the BAT for the prevention / elimination and management of dusts generated in metals production industry. Except for the ENPRODUS website, useful contacts established during the project with all interested parties in the target countries (stakeholders, Ministries of Environment, metallurgical industries, scientists, researchers, institutes and universities) have been used for the promotion of the two Workshops.

The first Workshop entitled "Major environmental problems and measures for reduction of industrial dust emissions at metallurgical enterprises" and took place in Zaporozhie, Ukraine, on May 13, 2008. The second Workshop with the title "Environmental protection from industrial dusts" was performed in Almaty, Kazakhstan on 28/08/2008. Representatives from national and local authorities, academic institutions and metallurgical industries facing the waste management problems related to dust generation in metallurgical activities have taken part in these Workshops. The Program, the performed presentations and the list of participants of both Workshops can be found in the project website.

More than 30 participants in each Workshop had the opportunity to find out more about the environmental problems related to metallurgical dust emissions in Russia and other NIS and be familiarized with the European Union experience and practices in solving similar problems. In these Workshops, an overview of ENPRODUS project, data of the selected metallurgical plants and detailed description of the work performed in each country on the basis of the project were presented. Moreover, the results of assessment of the production and dust management technologies currently applied in the sector of metal production in the target countries and their comparison with Best Available Technologies were presented. Especially in these Workshops, the Consortium of the project presented a draft of the developed Operational Plan developed in the framework of the project in order to be discussed and commented by the participants, particularly the representative of metallurgical industries. In this way, the final Operational Plan is believed to be feasible and viable for the target countries and suits the specific conditions characterize their metallurgical industry. Finally, the Partners of ENPRODUS, as well as other participants for Universities and

Research Centers had the opportunity to present results of their research on the management of metallurgical dusts, while the representatives from the metallurgical industries studied in the project presented shortly the status of their plants concerning environmental issues and exchange with the Consortium their experience on relevant aspects. Their suggestions and comments made during the round-table discussion that followed presentations in each Workshop were vital for the development of the final version of the Operational Plan.