

Safe Management of Mining Waste and Waste Facilities. A Coordination Action in the Programme of Scientific Support to Policies of European Union

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Abstract

The paper is part of the dissemination activities provided in the SAFEMANMIN coordination action of the European Commission devoted to support the Directive 2006/21/EC on the management of waste from the extractive industries. The structure and objectives of the project are presented together with the provisional results. The URL from where to download more detailed information on the project and presentations at the related workshop are given.

Key words: SAFEMANMIN, mining waste, management, Europe.

Introduction

SAFEMANMIN⁽¹⁾ (Safe Management of Mining Waste and Waste Facilities) is a Coordination Action financed by the European Commission under the Sixth Framework Programme⁽²⁾ (FP6).

The project aims at supporting the implementation of the Directive 2006/21/EC of the European Parliament and of the Council on the management of waste from the extractive industries⁽³⁾ which amends Directive 2004/35/EC⁽⁴⁾. The Directive was prepared following several major accidents with a serious impact on the environment, and it has the purpose of ensuring safer management of mining waste facilities and preventing such accidents occurring in the future.

The activities of the project are divided into four major work packages:

- Review of Methods for the Characterisation of Mining Waste
- Collect relevant information for the Risk Assessment of Mining Waste Facilities, including Old/Abandoned Mining Waste Facilities
- Review of Techniques for the Prevention and Abatement of Pollution Generated by Mining Wastes
- Development of a Decision Support Tool for Minimising the Impact of the Mining Industry on the Environment.

Two further work packages are included for management and dissemination activities.

The Consortium is co-ordinated by BIUTEK, an Environmental Consulting Company specialised in environmental analysis, risk assessment, abandoned sites remediation, wastes and water management. The Consortium includes 12 entities chosen from universities, research institutes, NGOs, private enterprises and implementing authorities from 9 European countries (table1).

Table 1 Organizations taking part in the project.

ORGANIZATIONS	COUNTRY
BIUTEK – Biotechnologie und Umwelttechnologie F&E GesmbH	Austria
University of Mining and Geology “Saint Ivan Rilski”	Bulgaria
Institute of Environmental Engineering, Polish Academy of Science	Poland
Environmental Protection Agency Maramures	Romania
University of Cagliari, Department of Earth Sciences	Italy
Research & Development National Institute for Metals and Radioactive Resources, INCDMRR	Romania
Asociación Para La Investigación Y Desarrollo Industrial De Los Recursos Naturales, AITEMIN	Spain
Aristotle University Thessaloniki	Greece
Geological Institute of the Bulgarian Academy	Bulgaria
Norwegian University of Science and Technology	Norway
University of Petrosani	Romania
INERTEK	France

Objectives of the project

The project will serve the general goals of environmental protection in Europe foreseen in the 6th Environmental Action Programme of the European Union⁽⁵⁾, such as the sustainable use of resources, pollution prevention and abatement, minimisation of waste production and the good management of waste, risk prevention and the environmentally safe operation of industrial installations.

As a co-ordination action, the project will have to review and summarise the existing information in the field of the mining industry, and to build on the results of previous projects that have been carried out in this area. It will also review the results of recent research and latest technologies that have been developed for the management of mining waste. Based on the findings in each work package, information shall be provided for a common approach that can be used all over Europe, and that can be adapted to each specific branch and situation. The project includes also training of the environmental authorities on the implementation of the Directive, and dissemination of knowledge to the relevant stakeholders.

A key role in the characterisation of waste is played by Work Package 1 (WP 1) that will provide the information for sampling (point, linear, panel and bulk samples) and for analysis of waste as far as the geo-technical (index testing, desiccation testing, permeability testing, strength testing, consolidation testing, settlement testing) and geo-chemical (chemical and mineralogical analysis, metal partitioning, acid base accounting, kinetic tests, presence of soluble salts and metal leaching tests) properties are concerned.

Another objective of SAFEMANMIN is related to risk assessment for the classification of mining waste facilities (WP 2). Article 9 of the Directive, in conjunction with Annex III, provides for a classification system of waste facilities that takes into account the likely effects that an accident involving the release of the waste stored in the facility may have. The project team will collect relevant information for the risk assessment of mining waste facilities, including old and abandoned sites, an issue that is creating a lot of problems at the moment, and to which in several countries no solutions have been found or agreed upon yet.

A further objective is to provide a review of the techniques for the prevention and abatement of pollution generated by mining waste, as well as of the research that has been carried out recently in this area (WP 3). The project team will perform studies and prepare reports on the following main topics:

- Review of the techniques used to minimise the amount of mining wastes;
- Review of the techniques used to prevent the generation of polluted mine drainage;
- Review of the techniques used to cleanup polluted mine drainage;
- Review of the techniques used to cleanup soils polluted as a result of mining activities;
- Review of the techniques used for storage of hazardous mining wastes;
- Review of the techniques for closures of mines and for remediation of post-mining areas;
- Review of the monitoring systems in connection with mining operations.

By achieving the above mentioned objectives SAFEMANMIN will then integrate the results into a Decision Support Tool (DST) that will be an instrument for finding the best solutions for managing mining waste (WP 4).

A central element of the Directive 2006/21/EC of the European Parliament and of the Council on the management of waste from the extractive industries is the obligation of the operators of mining waste facilities to prevent the occurrence of serious accidents and their possible negative effects for humans and environment. The results of the project (standard reviews decision support tool, etc.) will bring an important contribution to the fulfilment of these obligations. The operators will be offered the tools that are needed for the correct characterisation of waste and the identification of the possible (environmental) risks, so that they can take proper measures for the prevention or minimisation of negative effects and prepare appropriate waste management plans, which are also a central component of the Directive.

The authorities responsible for the implementation of the directive and the environmental agencies will have at their disposal an instrument that will support the prediction and prevention of polluted drainage and the classification of waste facilities into A and B categories, according to Article 9 and Annex III. The DST will allow the decision makers to take the necessary measures for the prevention

and minimisation of the risks associated with the waste facilities (operating as well as old and abandoned). The setting up of monitoring programmes, the responsibilities of the environmental authorities as permitting and inspection bodies for the construction and operation of waste management facilities, closure and after-closure procedures, prevention of pollution of water and soil and particularly the inspections of the competent authorities will also be significantly supported by the reviews and instruments that will be developed by the project.

The consultants and stakeholders will also receive great benefits for their work, in the planning and construction of waste facilities, or for closure and remediation works.

As a whole, the project intends to contribute to the achievement of the general objectives of the 6th Environmental Action Plan of the European Union, among which we would like to mention:

- the prevention and minimisation of waste generation;
- the prevention and minimisation of the risk related to industrial installations;
- the improvement of the quality of the environment;
- promotion of extraction and processing techniques to encourage eco-efficiency and the sustainable use of raw-materials and natural resources;

Provisonal results

The work carried out in the Work package 1 (Review of Methods for the Characterisation of Mining Waste) had the purpose of collecting information about the methods that are practically used on a national/local level for the characterisation of mining waste, and about the research that is being done in this area. In this respect, the project aims at giving a view about the extent to which the European, international and national standards and methods for the characterisation of mining waste are known and practically applied in the European Countries involved in the project.

A questionnaire on standards and methods applied for the characterisation of mining waste was submitted to National Standards Institutes, Environmental Agencies, Research institutes and Universities for mining industry, Centres of excellence in mining and mineral research, Mining companies, Consultants and laboratories in order to assess the state of the art in this field.

Results of WP1⁽¹⁾ show that there are big differences among the way the issues are dealt with within the different European Countries. While countries like Austria and Germany seem to have already gone a long way towards the implementation of the Directive, a lot of efforts will be required in the New Member States.

In most of the countries included in the project, mining activities have declined dramatically during the last years, and most of the mines are now closed so that the most critical environmental issues are caused by old and abandoned mining sites. The main problems concerning abandoned mine areas are:

- mechanical instability of waste heaps;
- dust pollution and erosion;
- acid drainage, followed by contamination of soil and water;
- self ignition of coal waste heaps (in Poland).

As a general remark we observe that the wastes from the extractive industries are not being systematically tested and there is no specific methodology for their characterisation. The methods in use are European and international standards for waste, soil, construction or raw materials, but also local standards in some cases. These methods have not particularly been developed for mining wastes and might be inappropriate in some cases; additional tests are required for wastes with a high polluting potential.

It should be also mentioned that some of the standards reported to be in use have been withdrawn, while for some of them more recent versions are available. European standards are used if available, and if not local, international, American or British standards, according to the particularities of the waste and the available equipment. Descriptions of standards and methods employed for the characterisation of mine wastes in each European country involved in the project are given. In Bulgaria and Romania a lot of experience in the characterisation of mining wastes has been acquired and some special standards for rational analysis have been developed that to our knowledge have no equivalent in international standards, and might be helpful for the characterisation of mining wastes.

In general we note that the most serious problems connected with mining activity in the European States are abandoned mines which are not actually subject to the Directive, so it will be up to the Member States to find ways of solving them.

Activities in progress and dissemination of results

The documents expected at the end of WP2 (Collection of relevant information for the Risk Assessment of Mining Waste Facilities, including Old/Abandoned Mining Waste Facilities) and WP3 (Review of Techniques for the Prevention and Abatement of Pollution Generated by Mining Wastes) are under approval by the EU Commission.

The work concerning WP2 has been carried on according a structure divided in three parts: (I) European Countries policies about Risk Assessment of mining waste facilities, (II) Risks Assessment Methodologies for mining waste facilities applied in Europe, (III) Main aspects to be considered in Risk Assessment of mining waste facilities. Case studies will highlight the results.

The work concerning WP3 takes into consideration the various technologies applied in EU for the prevention and abatement of pollution generated by mining waste with special attention to specific case studies in Bulgaria and Romania.

In the development of the project the generation of acid mine drainage has been identified as one of the main problems related to mining waste so that a workshop on Generation, Prevention and Treatment of Acid Mine Drainage and Old and Abandoned Mining Waste Sites – Environmental Risks and Remediation Techniques” was held in January 2008 in Vienna. The workshop was attended by approximately 70 people, including the researchers involved in the project, some invited speakers and representatives of research institutions, environmental agencies and mining companies. All the presentations given can be downloaded from the project homepage⁽⁶⁾.

References

- ⁽¹⁾ <http://www.safemanmin.eu/>
- ⁽²⁾ http://ec.europa.eu/research/fp6/index_en.cfm
- ⁽³⁾ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:102:0015:01:EN:HTML>
- ⁽⁴⁾ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32004L0035:EN:HTML>
- ⁽⁵⁾ <http://ec.europa.eu/environment/newprg/index.htm>
- ⁽⁶⁾ <http://www.safemanmin.eu/Workshop.html>