

ECOLOGIC REHABILITATION OF MINING SITES IN THE SUCEAVA COUNTY

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Abstract. Pollution and the risk of human communities or natural ecosystems from the mining sites do not disappear at the same time with the cessation of exploitation and useful mineral substances preparation activities. The respective sites continue to remain sources of risk and pollution. Toleration of this risks has sometimes led to accidents or even catastrophes, not only from an ecological point of view, but also to a directly affectation of human communities. If it is easier for the present or future industrial activities to stipulate, from a legislative point of view, clear measures and responsibilities for terrain rehabilitation at the same time or at the end of the activities, for former polluted and degraded sites (the so-called “historical pollution”), difficulties in establishing some legislative measures are obvious. Even more obvious is the difficulty of necessary fund raising for financial aid for the ecological rehabilitation of the degraded sites. For elaborating an adequate politics in this domain it is necessary first of all to know the existence and importance of the problem that this sites constitute, and then, as a first step, to completely know them in a fully transparent environment. This knowledge must relay on listing and systematic research of potentially degraded sites by establishing priorities regarding rehabilitation necessities. Treating every site must be made by taking in consideration its impact on the environment, its risk level and its expected use.

Introduction

The pollution and risk for the community and for the natural ecosystems from the mining sites do not disappear once the activity of exploitation and preparation of the useful mineral substances have stopped. The respective sites continue to be sources of pollution and risk. Not taking in consideration these risks has led sometimes to some accidents or even catastrophes, either from an ecological point of view or having a direct impact on the human communities.

If in the case of the present or future industrial activities it is easier to stipulate, from the legal point of view, clear, concrete measures of responsibilities in order to remedy and to rearrange the field during as well as at the closure of the activity, in the case of the sites that have been polluted and degraded long before,

the so called “historical pollutions”, the difficulties in establishing some legal measures are obvious.

And more obvious yet is the difficulty of constituting the necessary funds for the financing of the ecological rehabilitation work of these old degraded sites.

In order to elaborate an adequate policy in this area it is first necessary to know the existence and the importance of the problem that these sites represent and the, as a first step, knowing these sites as good as possible and in a frame of full transparency. This knowledge must be based on an inventory and a systematic research of the potentially degraded sites with establishing some priorities regarding the remedy necessities. The treatment of each site must be done function of the impact that it has on the environment, of the risk degree and the desired use.

Closing down and rehabilitating represents the last phase in the life cycle of a mine and of the activities related to this one. After suspending the operations, the essential object of this phase of activity can be resumed as follows:

- Closure- abandoning the operational zones of the mine and of the afferent equipments, realization of insurance works;
- Closing down the activities post closure of evacuation and demolishing or elimination of the equipments, installations, buildings and any other structures and infrastructures that have been part of the general mineral complex;
- Rehabilitation- preparing a clean placement for establishing the conditions for the ulterior use according to an accepted plan, through the transfer of the placement to a new owner.

The problem categories that are taken into consideration at closure, closing down and in the management of a mine can be enumerated as follows:

- Waste management: all the undesirable materials (ex. Toxic subsoil, contaminated soil, technological waste, etc.) must be isolated, eliminated or treated in another way in order to obtain a stability on long term and in agreement with the national regulations applicable or with the specific limits imposed to the location in question.
- The stability of the location: the rehabilitated area must be stabilized, with no unbalance of the slopes (neither within the location nor in the adjacent areas), no perceivable tendency of tearing or sliding of the soil and no active incision of erosion (big ditches or withdrawals of the ends of the draining routes.)
- Water management: the quality and the integrity of the underground and surface water that could have been affected by the mining must be protected within the recovery activities and remade if necessary, in agreement with the approved plan of closure of the mine and with the regulations applicable at a national level.

- Visual resources and alternative uses of the location: as far as possible, the field that is submitted to rehabilitation will have approximate or compatible with the visual characteristics of the adjacent area, from the point of view of the location, size of the form, color and orientation of the main relief shapes. There where replanting is not possible or there are certain features, a certain localization or infrastructure that can support with beneficial effects new alternatives of occupation and use of the field, this thing must be approved within the Plan of closure of the mine and be presented in the Rehabilitation Plan of the environment.

1. Situation of the mining in the county of Suceava in the context of the mining situation in Romania

In the *Strategy of the mining industry for the period of time 2004-2010* at the chapter of policies, instruments and necessary resources of the strategy of the mining sector are presented the measures that must be taken as far as regards the policy regarding the reconstruction and security of the environment for viable mining objectives and of the mining objectives that are closed and are being transformed to become ecological as follows:

At the level of 2007, in Romania there 458 mining objectives that have a Government Statement of definitive closure of activity, in activity being another 12 economic agents with a mining profile (exploitation- preparation useful mining substances.)

The county of Suceava has an old tradition in mining. The main deposits and useful mineral substances accumulations exploited in the county are: copper deposits, manganese deposits, baritine, uranium ore, rock salt, natural gas, useful rocks for the constructions (andesite, limestone), sand and gravel, mineral waters.

Presently there are in the county 69 mining perimeters with closed ore exploitation (there have not been included the useful rock exploitations, mineral aggregates, mineral waters or natural gas) and only one preparation installation in functioning- the recrystallization of the salt from Partestii de Jos.

2. Ecologic rehabilitation of some mining sites in the County of Suceava

♦ there are in the county of Suceava 19 mining perimeters with **works of ecologic rehabilitation to which the final reception has been made**. From these, compared to the works that were foreseen in the technical projects for making them ecological for which environment agreements were issued, at four of these there has only been made the closure of the underground works and we mention here the special case of the Calimani Mining Exploitation.

The sulphur ores in the mountains of Calimani are situated from an administrative point of view on the territory of the commune of Saru Dornei in the

south-western side of the county of Suceava, at the border with the counties of Harghita, Mures and Bistrita Nasaud. The M.E. Calimani constituted out of two mining perimeters: the Pietricelu perimeter and the Negoitul Romanesc perimeter.



Until 1997, despite all the efforts made in the field of the technological research there have not been solutions that would assure the valorisation of the resource in acceptable conditions under an economic aspect of view, so that it has been decided to close the exploitation activity and the activity of preparation of the sulphur on the Calimani platform.

Thus, the mining perimeter Calimani that lies on a surface of 492.88 ha; about 66 ha are occupied by the carrier, 100 ha by the sterile waste dumps, 10 ha by the sterile decantation pond, 30 ha by the industrial platform, continues to be the central area of the Calimani Mountains. The closure in 2003 of the mining underground works (by wasting them, the concrete embankment construction at the entrances of the galleries and putting pipes for evacuating the mine water and the gases emanated in the underground), these mining works representing only 5% of the mining activity in the area has reduced in an insignificant manner the negative impact on the environment.

The main aspects that are observed within the ecologic rehabilitation of the area where the **sulphur preparation activity** has been deployed besides the closing downs of the installations that must be made under a close surveillance because they can still contain material that is submitted to floating, reactive, etc. are those related to the arrangement of the mining and the sterile deposits of the factory, of arrangement and ecological of the trace of the pipe of factory sterile, arrangements for the evacuation of the polluted waters and the manner of monitoring the post closure period of these.

- *Arrangements for the evacuation of the polluted waters*

- Works for making ecologic the Dumitreleu pond

● An important aspect is that of arranging and ecological making the trace of the sterile pipe

◆ the works of closing down- closing-ecological rehabilitation that have covered mining perimeters in their whole, they have been made in 1999-2001 (14 mining perimeters in 2004-2005) (5 mining perimeters.)

The projects for closing down and for making these mines ecological have foreseen the execution of the following works:

1. The works of closing down of the mining works of connection with the surface
2. Works for demolishing of some constructions from the industrial area and the evacuation of the resulted material
3. Stabilization works- sterile. Waste dumps.

A special case is represented by the mining perimeter Mestecanis, com. Iacobeni.

The project of closing down and making ecologic the Mestecanis mine, perimeter in which there have been made works of copper ores exploitation, has included:

- Works for closing down of the mining works of connection with the surface that have meant the waste in two coast galleries and the closure with the concrete embankment of the mouths of the galleries;
- Ensuring works of the stability of the two waste dumps of sterile by executing the following works: supports walls from gabions filled with raw rocks;
- Ditch for collecting the waters at the basis of the waste dump no 6 and planting spruce fir seedling and making coast fences.

The mine water that is come from the gallery 2, having a powerful acid character (pH= 2,5-3) is passed by a purifying station, their debit being of approx 3l/s.

The ecologic rehabilitation works have been made in more steps: 2000-2001, 2004-2005.

Given the malfunctions that have appeared on the length of the exploitation of the station, supplementary works have been necessary for the increase of their efficiency, not being able to stay within the legal parameters for suspensions and the sulphate content. Also, a problem that has not been solved is that of the great quantity of slam resulted from filtration, slam that has a high Fe content.

◆ In the other 60 perimeters identified in the county of Suceava with environment notice for closing down the activity and for which there have not been started works of ecological rehabilitation, a special case is represented by the placements where there are the active factors of mechanic-chemical preparation of the useful mineral substances.

The decantation ponds in the mining industry constitute major factors of pollution of the environment. Through its size, the deposited waste quantity, the content of polluted substances, the effect on the environment and the population in the case of the production of some accidents or damage, the decantation ponds represent a major risk factor of risk, reason for which a special attention must be given in the phase of construction- operation that is more in the phase of closure and post closure.

In the county of Suceava there have been functioning:

- *The preparation factory of the manganese salts*, com. Iacobeni, that has been served by the decantation pond of sterile of the plant Valea hajului;
- *The preparation factory of the copper and baritina ores Tarnita*, commune Osdtra, served by the decantation ponds Ostra, A,B,C, Poarta Veche, Tarnicioara si Valea Strajii;
- *The preparation factory of the copper ores Fundu Moldovei*, comuna Fundu Moldovei, served by the decantation ponds Dealu Negru sand Paraul cailor;
- *The preparation pond of the technical sulphate Calimani*, comuna Saru Dornei and
- *The preparation factory – re crystallisation of the salt Partestii de Jos*, commune Partestii de Jos, which has been used as slam waste dump situated on the right side of the Solonet. This waste dump has been transferred in 2000, in a program of closure of some mining horizons, in underground, for the wasting of the desert underground. In present the slam is deposited only in the underground.

After the ponds have entered in conservation, the effect of the pollution can last decades in function of the mineral composition of the deposited sterile, the nature of the reactive used for the preparation, the dynamics of the precipitations, of the surface, phreatic and depth waters.

Conclusions

In all the placements where the exploitation and the preparation of some mineral resources are made, there are also environment issues, respectively the degradation of the natural fields, the pollution of water and air, problems that do not disappear but, in many cases are accentuated, once with the closure of the activity. The degradation and the pollution of the mining sites can come from other activities that are connected to mining: from transportations, mechanic workshops, as well as through organic waste resulted from social groups of from the annex households.

The pollution and the risk for the natural eco systems and for the human communities do not disappear but continue after the closure of the mining activities. The respective sites continue to remain sources of pollution and risk.

If we analyze the situation of the mining perimeters with closed activity in the county of Suceava, reported to the stage of the rehabilitation works realized or projected, we find out the following:

- It was not taken in consideration, when financing the works of the finished ecological rehabilitation, of the necessity of some prioritization of the objectives function of the negative impact that they have on the environment; thus, there have been made works in isolated perimeters, with galleries generally dry and sterile waste dumps where the natural grass already grew- important amounts of money being allocated for planting other species which, at 5 years after the termination of the works, were barren (ex. The mining perimeters Delnita where the coast fences made during the exploitation out of birch tree and willow tree has made twigs and the spruce fir planted during the ecologic program have gone dry.)
- For none of the mining perimeters that have been made ecological up to the present, there has not been made a monitoring of the environment factors during the execution of the ecological rehabilitation works and a post closure monitoring plan has not been made of financed. With the closure project of the mining perimeter Calimai- Pietricelu- Negoiu Romanesc, a monitoring program for the soil quality and water in this area has been made, during the execution of the ecologic rehabilitation works and the technical projects for the closure of the mining works authorized after 2004 have established the monitoring of the post ecological making of the sites. We have in view the implementation of some monitoring plans for all the mining perimeters that have already been made ecologic.

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