ENVIRONMENTAL POLLUTION DUE TO MINING CONCERNING THE FORMER GRAVEL PITS FROM ALEȘD-RICIU VALLEY REGION

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Abstract

The environment represents the physical and biological system where the man and other bodies live, a complex group which includes the totality of the natural factors and those created by man by means of human activities. The interference between these factors and their continuous influence upon the environment led to the creation of a stable balance, an ecological balance of the terrestrial ecosystems. The ecological balance represents the relatively stable report, created along the time between different groups of plants, animals, micro-organisms, etc. as well as their interactions on the environmental systems where they live. This balance is continuously evolving, often the determinant having negative influences, cause a negative evolution. The soil is permanently interdependent of the physical-geographical factors. By its position, the soil is a component of the terrestrial eco-system, a product of the interaction between the biotic and abiotic environment, representing a specific concentration area of the living bodies, at the interference between the atmosphere and lithosphere. Both the demographical increase and the continuous growth of the mineral substances per inhabitant automatically led to the continuous growth of the mineral substance consumption.

Key words: ecological balance, eco-system, mining, mining industry, pollution

INTRODUCTION

The landscape has a certain structure, which resulted from some long evolving processes, being thus framed by certain precise limits determined by a certain variability of the environmental factors, which oscillate between certain values, so that certain imbalances do not occur which could disrupt the stability of the ecosystems.

Among all industrial activities which truly have an impact on the natural landscape, the gravel pits take the first position, irrespective which is the purpose of their activity (mining of building materials, coal, iron or non-iron ores). It often happens that the deposits destined for exploration to be found at depths varying from several metres up to tens of metres. Consequently, in order to get to these deposits, it is necessary to perform the scraping of the layers above. Their exploration implies the displacement of some enormous mining volumes, many times performing diggings up to depths of hundreds of metres, but also to significant deposits of mine

tailings. All these operations lead to significant changes of the natural aspect of the region where the excavation is performed.

Fig. 1. Abandoned gravel pit in Alesd area

Fig. 1 shows an image (example) of an abandoned gravel pit near the town of Alesd, Bihor county, included in the „Recovery plan of the environment in the Alesd- Riciu Valley 5 perimeter" drafted by SC IPROMIN SA Bucharest.

RESULTS AND DISCUSSION

Pollution of the pedospheric environment

It is considered that the most important forms of soil degradation are the mining works, which aim to obtain ferrous, non-ferrous metals, fuels, building materials, etc. from deposits, but also their use. The mining activity is differentiated according to three types, namely: soil degradation by digging activities, soil degradation by covering with landfill sites, tailings, settling ponds, deposits of tailings from flotation, deposits of wastes etc, respectively the soil pollution with wastes and inorganic residues such as: minerals, inorganic materials, salts, acids, even heavy industrial metals.

The most serious effect of the mining consists of the removal from the economic circuit of some large land areas and the reduction of the

production capacity of some adjacent lands by disturbing the hydrological system. In the area with low-depth mining, the lands are degraded both by the fact they are occupied by the constructions necessary to mining and due to the subsistence processes and to disruption of the aerohydrical regime of the soil.

All these forms of pollution prevent the normal development of the agricultural activities on the lands nearby the mining objectives. Many of these forms of pollution led to the long-term soil degradation, without these surfaces being officially affected by the mining.

In the mining process, the environmental factor called "soil" disappeared even if the arable horizon was selectively exploited in order to be used to cover in order to reduce the improvement period. The materials deposited in the waste dumps are very heterogeneous from the physical and chemical point of view, they have no biological activity and they are very different from the mineralogical point of view (sands, gravel, clays, marls), a fact that makes the fertility potential to be low.

Pollution of the aquatic environment

As regards the water pollution as part of the daily mining, even if the operations for exploration cease, the pollution of waters still remain active, because after performing the explorations, there remain deposits of wastes rich in sulphides, which by oxidation continue to generate acidic waters, rich in metallic ions.

During the mining and the technological processes of upgrading the ores, cases of accidental pollutions often take place. The main reasons of these undesired phenomena are the failures of the transport pipelines of the slurry, which are subject to corrosion and abrasion, failures of the water disposal systems from the settling ponds, failures of the dams of the ponds.

The particles have another impact on the water. The rainwater which flows on the wastes carries along a significant quantity of sediments which may flow into brooks and rivers. The level of suspended solids in the watercourses is considered as damaging for the aquatic animals. A vegetation layer which could cover the tailing could significantly reduce the quantity of sediment from the rainwater, which flows on the wastes or to entirely eliminate it.

Another source of water pollution in the extractive industry resides in the contamination of the rain waters and of the brooks due to the deposits of fuels, lubricants, detergents, resulted from the fixed and mobile equipments. This does not represent a major danger, but with a better developed control, a proper drainage and with a possible isolation around them, this issue may be solved.

Air pollution

By air pollution, we refer to the existence in the air of some foreign substances of the normal air composition which depending on the concentration and/or the action time causes disorders of the man's health, creates discomfort for the population of a specific territory (for instance, the place where activities are carried out for mining purposes), affects the flora and fauna or alerts the man's living environment.

By mining, it is spread in the air a huge amount of solid particles of different sizes. This spread of particles in the air represents an important element of its contamination. From a chemical point of view, there were detected various minerals in dusts, such as: quarts, calcite, feldspar, gips, anhydrite, asbestos. The asbestos, in low concentrations than the others, cause pulmonary diseases with slow but irreversible evolutions; it is a hydrated magnesium silicate and it mainly derives from the car brake linings.

According to their sizes, the dust particles are classified as follows: dust with large-diameter particles ($\Phi > 10^{-7}$ m), sedimentable and non-sedimentable, aerosol dust with colloidal-size dust ($\Phi < 10^{-7}$ m).

The sedimentable particles are spread up to 3 km, depositing on the soil close to the emission sources. The time to deposit on the soil of the sedimentable dusts depends on the rainfall intensity, on the intensity of the electrostatic phenomena contributing thus to their agglomeration. The particles with a size lower than 10^{-6} m are very important from the weather perspective, as they represent condensation cores of the water vapours.

The particles with $\Phi < 10^{-7}$ m remain suspended in air and influence the intensity of the artificial sun and indirectly the temperature from the troposphere. Because of the small sizes of the particles and therefore of their large specific surfaces, they have specific characteristics: adsorption, aggregation, electric recharge, radiation absorption. They may deposit on the leaves of the plants, sometimes with a phytotoxic action, manifested by reducing the photosynthesis process.

Another significant source of contamination of the free air consists of the transport means used during the technological process of the mining.

Irrespective of the type of the engine, the cars pollute the air with: CO, NO_x, unburnt hydrocarbons (HC), SO_2, aldehydes, lead, asbestos, CO_2, soot etc. The positive-ignition engine, petrol-based, discharges around 350 g toxic compounds per litre of consumed fuel, while the ignition engine, diesel based, Diesel engine, is not superior from the pollution point of view.

CONCLUSIONS

Among all industrial activities which truly have a certain impact on the natural landscape, the gravel pits are the first ones, irrespective of the purpose of their activity (extraction of the building materials, coal, iron or non-iron ores).

The most serious effect of the mining consists of the removal from the economic circuit of some large land areas and the reduction of the production capacity of some adjacent lands by disturbing the hydrological system. In the area with low-depth mining, the land are degraded both by the fact they are occupied by the constructions necessary to mining and due to the subsistence processes and to the disruption of the aerohydrical regime of the soil.

As regards the water pollution as part of the daily mining, even if the operations for exploration cease, the pollution of waters still remain active, because after performing the explorations, there remain deposits of wastes rich in sulphides, which by oxidation continue to generate acidic waters, rich in metallic ions. The particles have another impact on the water. The rainwater which flows on the wastes carries along a significant quantity of sediments which may flow into brooks and rivers. The level of suspended solids in the watercourses is considered as damaging for the aquatic animals.

By mining, it is spread in the air a huge amount of solid particles of different sizes. This spread of particles in the air represents an important element of its contamination. The particles with $\Phi < 10^{-7}$ m remain suspended in air and influence the intensity of the artificial sun and indirectly the temperature from the troposphere. Because of the small sizes of the particles and therefore of their large specific surfaces, they have specific characteristics: adsorption, aggregation, electric recharge, radiation absorption. They may deposit on the leaves of the plants, sometimes with a phytotoxic action, manifested by reducing the photosynthesis process.

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