

problems appeared a long time ago, yet people just did not pay attention to it. Ecological problems are wide spread not only in Ukraine, there are found all over the world .We live in the region where mining is well-developed with two basic mining methods: surface mining and underground mining.

Kryvyi Rih is one of the largest metallurgical centres of Europe. The mining and metallurgical complexes operation produced 252 thousand tons of chemicals emitted into the air in 2016. The enterprises negatively affecting our environment include "Arcelor Mittal Kryvyi Rih", JSC "YuGOK", PJSC "SevGOK" and many others. Gas and dust emission into the air is an inevitable result of open-pit mining technologies. It negatively affects our health. Mining operations destruct hydro-geology of the ground.

The increased amounts of mine groundwater run-offs including many pollutants such as chlorite compounds, a sulphuric acid, solved salts of iron, manganese, copper, nickel, zinc, etc. contaminate the environment. Especially hazardous for people are heavy metals like cadmium, molybdenum, nickel, zinc, vanadium, mercury, selenium, arsenic, lead and others. Heavy metals are easily transported with water and are often concentrated in sediments. The waters accumulated in tailing ponds are continuously drained into underlying sedimentary rocks, causing flooding and salting of fertile soils. It deteriorates the quality of drinking water. The destructed soil structure makes the crops capacity worse in the areas with the developed mining industry. The next problem is estimation and utilization of industrial waste areas. We can decide this problem in the following way: either to leave rocks in exhausted areas or use them as construction materials.

The global ecological crisis is the most important task for people to solve today. We must take care of the environment for the sake of the next generations and ourselves.

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CONTROL OF THERMAL TREATMENT IN ROASTING IRON-ORE PELLETS CONSIDERING THEIR PHYSICAL AND CHEMICAL PROPERTIES

The actual problem of pelletizing plants at mining and concentrating complexes is improvement of pellets quality in roasting on a conveyor machine. The control of pellets thermal treatment requires considering equipment working modes, effects of loads and disturbances when parameters of the raw material and energy carrier are changed. At the same time, pellets thermal treatment is affected by the pellet layer blow-down rate, fuel consumption, the conveyor speed, physical and chemical properties of green pellets, etc.

Nowadays, scientific and practical studies are carried out to develop efficient techniques that will allow considering the above parameters of the technological process and performance of equipment for pellets production and roasting. Therefore, developing a multidimensional mathematical model for controlling the thermal treatment on a conveyor machine is a crucial scientific and practical task. The model will consider iron ore physical and chemical properties and provide a high-quality pellet roasting at maximum productivity and optimal energy consumption.

Analysis of the existing pelletizing methods and inspection of pelletizing plants have resulted in developing a pellet treatment control technique that enables management of granulometric composition, bulk mass, chemical composition and green pellet consumption and prompt compensation of their variations [1]. When roasting pellets in real-time mode, express analysis of pellet quality is done applying the atomic emission spectroscopy to determine the amount and proportion of Fe (iron), Ca (calcium), O (oxygen), Si (silicon), S (sulphur), C (carbon), H (hydrogen) and other microelements. Their amount control allows energy consumption decrease in pellets roasting. Simultaneous infrared thermography determines temperature and moisture of the pellet layer in each operational area of the ma-