

labor protection for gas contamination of the station premises with toxic gases.

2. On the basis of the presented scientific research works of the authors, work projects can be developed for the creation of pilot industrial models of accident-free gas cogeneration control stations at forges and mines.

References

1. Stasevich R.K., Litvinenko A.A., Jurchenko A.A. (2018). Information resource-saving technology of extraction, transportation and utilization gases of coal mine. *Development of scientific foundations of resource-saving technologies of mineral mining and processing: Multi-authored monograph*. - Sofia: Publishing House "St.IvanRilski", 151-170 pp.

2. Sofiyskiy K.K., Stasevich R.K., Vlasenko V.V., Agaev R.A., Dudlia E.E. (2018). Matematicheskoe obespechenie bezavariynoy raboty paroturbinnoy cogenratsii / World science. Warsaw: RS Global, №7(35), Vol. 5. 13-20 pp.

3. Sofiyskiy K.K., Stasevich R.K., Tyshchenko A.V. (2018). Ensuring safety and protection of resource-saving trigeneration of coal deposits gases of mine and metallurgical production. *Topical issues of resource-saving technologies in mineral mining and processing: Multi-authored monograph*. - Petroșani, Romania: UNIVERSITAS Publishing, 212-228 pp.

UDC 614.894.3:622.012

DOMNICHEV M.V., Candidate of Technical Sciences, Associate Professor, Kryvyi Rih National University. Ukraine.

NESTERENKO O.V. Candidate of Technical Sciences, Associate Professor, Kryvyi Rih National University. Ukraine.

BLIZNYUKOVA O.Yu. Candidate of Science in Engineering. Kryvyi Rih National University. Ukraine

USE OF NATURAL BISCHOFITE WATER SOLUTION FOR WARNING OF AIR DUSTING

Current technology of mineral deposits mining operations with the purpose of low-grade ore enriching is needed enormous areas in order to arrange special places for washery refuse storages (mine refuses). Today "wet milling" of washery refuse storages is the most popular in our region, we say about sludge ponds [1].

Dry areas are created at the mine refuses outlet zones after the process of pulp aggradation on the maps. If wind speed is more than 3,0 m/s mine refuses after wind erosion are fulfilled into dust emission sources. The most quantity of mine refuses according to the fraction consistence is belonged to the erodible dangerous dust emissions. About 90% of these emissions are air borne particles with diameter less than 50 mkm [2]. This is very important to take into account that mine refuses areas are situated not far from the residential communities, 1-5 km usually. Analysis of mine refuses dust emissions shows that in such zones these dust emissions have a negative influence to the environmental as well as to the health of people, especially children. In these ecological dangerous zones level of the diseases of the children respiratory system is higher in 1,3 times [3].

For the decision of problem of moisture loss from the upside ball, it was decided to use water solution of chlorides, namely chlorides of magnesium - natural bischofite solution ($MCl_2 \cdot 6H_2O$). This solution has got a 4th class of danger level. It does not burn. It has got nominal low corrosive ability. It is used in the interval from 55°C till - 35°C and this solution is produced in Ukraine.

Conducted laboratory and industrial researches are showed that after buttering of natural bischofite solution (NBS) to the wet upside area of the exist mine refuses storages, with the charges on the level 1,5-2,0 l/m² and concentration 100 % (density of the material not less then 1250 kg/m³), this surface is well fastened. Due to the high NBS hygroscopicity this surface is remained moisture during the long period (no less than 75 days) taking into account the hottest days. Moistening of surface allows decreasing of air dust emissions fundamentally.

When the weather is stable dry and hot we have some moisture decreasing at the mine refuses upside ball during the day (there is a salt membrane on the upside surface and this membrane keeps air dust emission because of daily temperature surges - became known as "dew effect", so the surface is moisten against). During this process air dust emissions are fundamentally decreased - Table 1.

Table 1

Results of production researches of keeping of upside mine refuses storage areas affectivity of Private Joint-Stock Company «PivnMCC»

Temperature of air °C	Degree of air saturation, %	Wind speed, m/s	Moisture of mine refuses		Air pollution, mg/m ³	
			proc. NBS	final	proc. NBS	final
4,8	70	3,0-4,0	5,52	4,61	0,16	2,6
8	84	5,4-6,0	11,3	1,6	1,13	6,0
25	63	4,4-4,8	9,01	1,3	1	4,6
26	60	2,5-3,0	8,8	0,15	0,26	4,5

According to the researches, NBS, contrary to the other methods, can be used during the whole year. NBS use is not needed any special equipment, any prior operations. NBS is totally mechanized and can be used through different actual water distributing vehicles (water sprinkler tank, moisture monitor, etc). All these methods are increased flexibility of the use of the solution and are allowed easily to fasten the areas of different size and form.

But use of NBS with the concentration 100%, is not always economically appropriated. According to the results of the laboratory researches we approved that use of the solutions with low concentrations (60-80%) has made possible to save money for the fastening. We can reach efficiency of solution at the level during no less than 10 days. That is why we can decrease fastening expenses at the expenses of use of low concentration water solution in case of short term fastening of mine refuses storage areas (dam reconstruction, dredge piping laying).

This developed dust emission surfaces fastening technology of existing mine refuses storage areas passed industrial researches at such plants as PJSC “ArcelorMittal Kryvyi Rih” and PJSC “PivnMCC”. According to the results of these researches it was developed technology of industrial use of natural bischofite solution in local conditions. Also it was developed the most optimal schemes of solution application to the fastening surfaces.

Conclusions:

According to the survey results it is set that:

- Water natural bischofite solution is the optimal method of the dust surfaces fastening;

- A high NBS hygroscopicity allows to fasten the high humidity of the upside ball of the dust materials, decreasing dust emissions from the upside areas of the mine refuses storages;

- At optimal charges of NBS 1,5-2,0 kg/m² air dust emissions at outlet from the timbered area of mine refuses storages in 4,6-16 times less than at outlet from the ordnance datum taking into account the basic wind speeds;

- In order to block dust upsides during the short period we can use NBS with the concentration less than 100%.

References

1. **Beresnevich P.V.** Environment protection during mine refuses exploitation/ **P.V. Beresnevich, N.G. Kuzmenko, N.G. Nezhnesteva**. - M.: Nedgra, 1993. - 128 p.

2. **Mikhailov V.A.** Dust prevention on the ore careers/**P.V. Beresnevich, V.G. Borisov**. - M.: Nedra. - 1981, 262 p.

3. **Bondarchuk O.M.** Increasing of environmental security of the mining processing plants areas based on the decreasing of the slugging pits dust emissions: autoabstract. Ph.D. thesis in Engineering Science: spec. 21.06.01 «Environmental security»/ **O.M. Bondarchuk**. – Dnepropetrovsk, 2010. - 20 p.

4. **Ar'ye A.G.** Researches of liquid filtration process in a porous medium [Obzor] // M. VIEMS. 1982, 57 p.

SECTION "MINERAL PROCESSING"

UDC [658.78:622'17]:622.012

T.A. OLIINYK, Doctor of Sciences (Engineering), Professor, Kryvyi Rih National University, Ukraine

N.V. KUSHIRUK, PhD (Engineering), Associate Professor, Kryvyi Rih National University, Ukraine

I.M. MATSYUK, PhD (Engineering), Associate Professor, Dnipro University of Technology, Ukraine

SUBSTANTIATION OF EXPEDIENCY OF INVOLVING STOCKPILED WASTES INTO PRODUCTION AT CENTRAL ORE-DRESSING AND PROCESSING ENTERPRISE, PJSC

Economical use of physical resources is of significant importance for improving the efficiency of public production since the national economy demand for raw materials and supplies is increasing steadily, while their production is becoming more and more expensive.