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ENHACING THE EFFECTIVENESS OF FIXING DUSTY SUFAES DUMPS

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This article contains information about the harmful effects of open dumps Lebedinsky mining and processing plant on the environment and the results of the study a new method of dust control Operation of the modern iron ore mining and processing enterprise raises difficult problem of removing and storing the tailings (tailings), as they constitute about 40-50% of the original ore

Lebedinsky mining (LGOK) – Russia's largest mining and enrichment of iron ore and producing high-quality iron ore for the steel industry Resource base of the plant are ferruginous quartzite deposit Lebedinsky Kursk magnetic anomaly, in which the processing by wet magnetic separation of magnetic concentrate and get tailing in the form of fine waste rock [1]

Operating experience shows that the "tailing" economy is one of the most complex and expensive technological areas and processing complex, from the success of which depends on the work of the whole plant Despite the fact that the tailings are placed in the gullies, ravines and other natural depressions, the cost of capital expenditures for their construction is constantly growing and increasing the amount of land allocated for disposal

Tailings of LGOK one of the largest in Russia Its land allocation of 1520 hectares, which exceeds the space allocated under the quarry – 1100 m, the volume of waste stored annually is 18 5 million m^3 The mam source of air pollution in the area of the tailings is open dusty surface During hot dry period, from surface dusting of objects by means of wind erosion shall be made a lot of man-made dust The average monthly wind speed in the tailings, depending on the season varies from 3,3 to 5,2 m/s average speed of 4 3 m/s

Dusting beaches begins at a wind speed 3 4 m/s with increasing wind speed up to 8 m/s deposition zone captures the entire beach and extends beyond the dike [3] An important feature of this problem is the need for environmentally safe secure dusty surfaces The preferred technology is the ease of implementation and cost-effectiveness [4]

Tailing wet magnetic separation LGOK as current production, and from the tailings close to weak ore quartzite and may be regarded as high metallic artificial sand The chemical composition is presented in Table 1

Conducting sieve analysis of the tailings (Table 2), we can conclude that a predominant fraction with a particle size of 0 1 mm and is 55% of the total mass

Table 1

The chemical composition of the waste of (LGOK)

Components	Fe main	Fe magn	FeO	S_1O_2	Al_2O_3	CaO	MgO	S	P	K_2O
Contents, %	10,30	1,28	6,58	69,35	2,13	2,93	4,95	0,204	0,163	0,54

Table 2

Fractional composition of the tailings

№ sieve	2,0	1 4	1 0	0 632	0 315	0 25	0 2	0,14	0 1	0,08	pallet
% fraction content	3, 544	0,2	0,454	0,466	0,17	0,074	20,146	8,15	55,142	8,694	2,172

Currently, the GOK used a physical method of dust control (irrigation water tailings beaches) This method is costly and ineffective in hot weather, which is observed in recent years The study aims to increase the efficiency of pinning dusty surfaces

To achieve this goal was selected chemical method of fixing solution, based on the waste production of citric acid, which consists of Ca $(OH)_2$ (28%), water (50%) and biomass (22%) Experiments were performed on a laboratory setup, shown in Fig 1

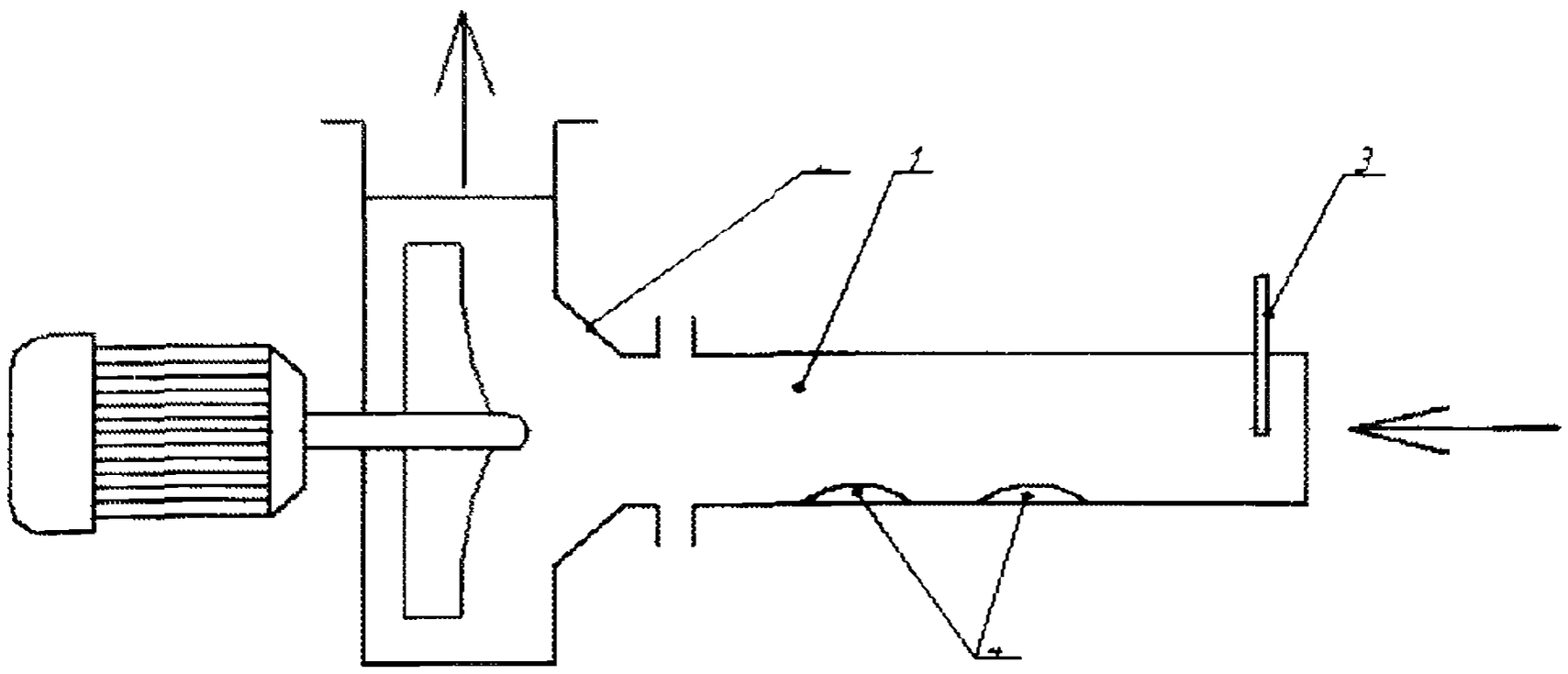

Fig 1 Laboratory setup

1 – Wind Tunnel, 2 – Fan, 3 – Valve, 4 samples

Samples of waste were placed in a wind tunnel 1, the simulated wind speed 6 m/s and flushed for 10 minutes In this case investigated dust entrainment when

moistened with water and developed a solution Coefficient dust entrainment determined by the formula $K_{pu} = \frac{m_0 - m}{m} 100\ \%$, where m_0 – the mass of the initial sample, g, m_1 – mass after the purge, the results are presented in Table 3

Table 3

Mean values of dust entrainment at different ways of dust suppression

№ п/п	Term of experiment	Coefficient of dust entrainment, %		
		Control	Physical method	Chemical method
1	In 2 days	14,71	0,14	0,100
2	After 2 weeks	14,58	11,30	0,004
3	After month	14,62	14,53	0,0035
4	After 2 months	14,63	14,60	0,0035

Analysis of experimental data showed that on the second day after treatment of the samples with water and the proposed composition, dust entrainment approximately the same and lower than the control sample of 100

After 2 weeks of sample treated with water, dried and dust entrainment rate increases compared with the second day after moistening to 80 times and is close to the original that requires re-irrigation With irrigation the proposed solution in two weeks, a decrease of the coefficient dust entrainment compared with the control sample and irrigation water to more than 4000 times due to formation of solid crust on the dusty surface

The coefficient is not changed in 2 months (which corresponds to the hot period) It should be noted that the proposed method of fastening the beaches surface dumps more effective than irrigation water

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