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Environmental Aspects and Reducing the Negative Impact of Waste From Potash Ore Mining

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Abstract: The article presents analyzes and methods for reducing the negative impact of waste from the extraction of potash ores from the Tyubegatan deposit. In addition, the article proposes a technological scheme for placing a salt dump and sludge storage facility on the site.

Keywords: Geodynamic active zones, waste rock, salt dump, sludge storage, abrasiveness, sylvinite, salt ions and cations, conveyor line, dump former; pump, brine pipeline, bulldozer.

At the Tyubegatan mining complex, a room-and-pillar mining system is used to extract potassium salts [1-21]. At the same time, the main environmentally significant sources are:

- Formation of gas-air mixtures during ventilation;
- Gas release in exhausted workings, including exhausted waste and substandard rocks;
- Formation of water effluents saturated with various salts;
- Geodynamic active zones in the area of the primary development site of the mine;
- Areas for preliminary preparation of the initial face ore;
- Storage facilities for bulk ore, waste rock dumps and tailings ponds for sylvinite processing waste;
- Underground and above-ground loading and unloading areas for initial and crushed ore;
- Mine dumps of rock and waste rock;
- Halite waste tailings;
- Conveyor and automobile transport of crushed sylvinite;
- Near-share area of exhaust mine air emission;
- Aggressiveness and abrasiveness of aerosol gas-air mixtures;
- Areas for averaging and temporary storage of crushed sylvinite;
- And others.

More than 700 thousand tons of sylvinite are extracted from the mine of the Tyubegatan mining complex and brought to the surface, which is transported by road to a distance of 50 km to the Dekhkanabad processing plant. From there, halite waste is returned after processing. Halite waste consists of up to 80-85% NaCl and other compounds. At the same time, more than 400 thousand tons of table salt are thrown into the dump. With the cost of 1 kg of table salt on average being 1000 sums, more than 400 billion sums or $50 million are wasted annually. Considering that the mine has been in existence for 8 years, the economic benefits from the loss of more than $400 million in table salt are buried in the dumps.

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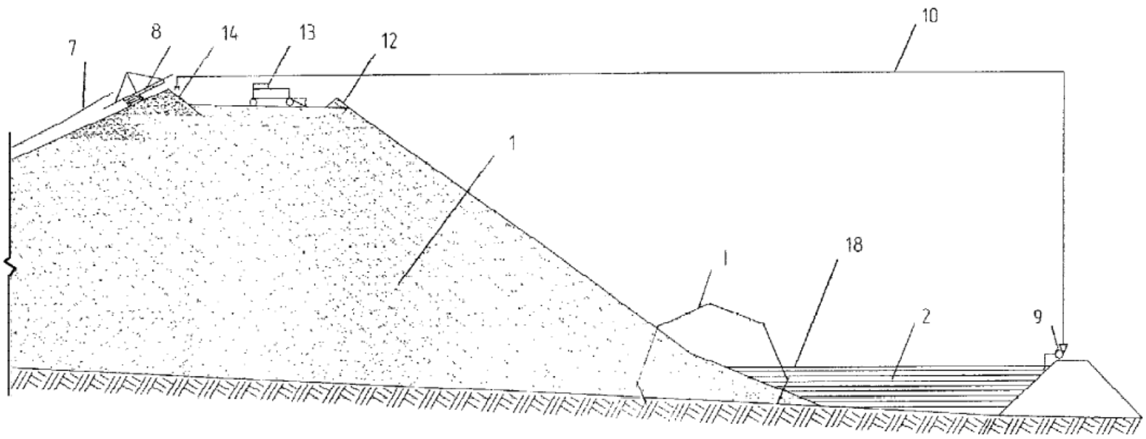
Currently, the processing plant, after commissioning the second stage, has a fertilizer production capacity of up to 400 thousand tons, naturally, the loss of economic benefits is estimated to be twice as large. Moreover, compensation payments for salt dumps for causing environmental damage to the environment will increase several times.

Since the mining and processing of potash ores is accompanied by the formation of a huge amount of salt waste, negative environmental consequences of production activities and negative impacts on the environment, leading to serious environmental consequences, cannot be ruled out. Environmental problems during the mining of potash ores and ways to reduce the negative impact of potassium ore waste on the environment are described in detail in works [9-15].

There is a known method for isolating salt dumps at potash mines [21], which involves gunning the surface of the dumps with a waterproofing material. 30-45 days after dumping the salt waste during the hot and dry period of the year, its surface is covered with clay-salt sludge 10-20 mm thick in the form of a suspension, which is fed into the receiving hopper of a pneumatic pump with a T:L ratio from 1:2 to 1:3 . Thus, the surface of the salt dump is sprayed with sludge.

There is also a known method for placing a salt dump and a sludge storage facility on the same site [21], which includes supplying salt waste, producing pulp from salt waste at the salt dump, forming a hydraulic alloy and filling the sludge storage facility with sludge (Fig. 1). In this case, in the area intended for the salt dump, when forming the salt dump, a forward slope is constructed with an angle of inclination less than the angle of repose of the salt waste in the brine. When the front slope reaches a height exceeding the height of brine seepage from the salt dump, the upper part of the salt dump slope is formed at the angle of natural repose of solid salt waste.



1 – salt dump; 2 – sludge storage; 7 – conveyor line; 8 – dumper; 9 – pump; 10 – brine pipeline; 12 – shaft; 13 – bulldozer; 14 – embankment from a previously reclaimed massif; 18 – maximum level of sludge storage

Fig. 1. Technological scheme for placing a salt dump and sludge storage facility on one site.

Thus, the analysis allows us to conclude that when mining potassium ores, it is necessary to carry out work in such a way that the new landscapes, salt dumps, tailings, etc. that are formed can be used in the future with maximum effect and low impact on the environment. One of the ways to solve the problem of reducing the negative impact on the environment of salt waste placed on the daytime surface is to increase the capacity and height of salt dumps without expanding the area of its base and the introduction of reclamation work with insulation of the surface of salt dumps. Until now, reclamation work on salt dumps on an industrial scale has not been carried out in the Republic of Uzbekistan.

At the Tyubegatan mining complex, a room-and-pillar mining system is used for the extraction of potassium salts. At the same time, the main environmentally significant sources are the formation of gas-air mixtures during the ventilation process, gas release in spent workings, including waste and substandard rocks, formation of water runoff saturated with various salts, geodynamic active zones in the area of the primary mining site, pre-treatment areas initial bottom-hole ore, warehousing and storage facilities for averaged ore, waste rock dumps and tailings dumps for sylvinite processing waste, underground and above-ground loading and unloading areas for raw and crushed ore, mine dumps and waste rock, halite waste tailings, conveyor and road transport of crushed sylvinite, near-share area of exhaust mine air release, aggressiveness and abrasiveness of aerosol gas-air mixtures, areas for averaging and temporary storage of crushed sylvinite, etc.

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