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The Possibility of Increasing the Air Flow in the Stope S-144 "Trepca" Stanterg

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Abstract: The stope S-144 as a system of exploitation it is applied and is applying the method of exploitation with filling from bottom upwards where for access to the stope respectively in benches has applied so called classical method with vertical objects (passage for people). In bench 5 has been changed the working principle being applied the approach in the stope by ramp method where it is changed the principle of drilling and loading (application of high productivity machines – Boomer and diesel mechanic loaders Toro and Wagner). The above mentioned stope for now possesses these mining facilities: 1) horizontal adit that connects the ramp; 2) shaft for filling of mining area where at the same time it is like air shaft, and; 3) passages for people where the one of them has already been out of operation while the other one serves as the pit for ore haulage of this stope. The current state of the shaft (raise) ventilation for the moment is considered as a sensitive and has great curves during the working phase encountering in soft rocks (schist) thus it made impossible the opening of vertical shaft where we concluded that there do not appear the major resistance and loss of the amount of air.

***Keywords**: security crown, ore body, pillar, exploited*

Introduction

Regulation of mining areas through which the air enter in the mine in the period when the recording was made there was obtained these results as follows:

- Adit- "Tuneli i Parë" (610 m)
- New pit which draw polluted air
- Adit at level 760 m and
- The northern shaft-called servicing.

Ventilation shaft which under the influence of the fan, the air returned from the mine where the areas are connected with the mine at levels IV, VII, and X.

- Part of level I to level IV, ventilated with return air flow.
- Part of level IV to level VI, ventilated within take air flow.
- The levels between VI and VII, ventilated with return air flow.
- Part of the level IX to VIII, ventilated within take air flow.
- Part of the level XI to X, ventilated by lifting air flow.

Depending on the distribution of air in the mine, the levels with depressive points are: levels IV, VII and XI. Figure1. Figure 1 has been presented as the scheme of mine with transverse air movements across the horizons and depressive points

The current state of the ventilation of stopeS-144

Fresh air flows come from the main adit of the level IX to the point 1 as in Figure 2, and gave the following values:

Q1=185 m^3/min; V1=0.64 m/s; S1=2.20 x 2.20 m^2

These air flows significantly lost in a shaft of the point 2 of stopeS-134 from the same ore body and pass on level VIII. In point 2 we get the following values:

Q2= 44.30 m^3/min; V_2= 0.41 m/s; S_2=1.5 X 1.20 m^2

Now the air flow in the ventilation shaft as in point 3 gave the following results:

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Q_3= 136 m^3/min; V_3= 0.41 m/s; S_3=1,5 X 1.20 m^2

From here the air flows enter for the stope S-144.

Once we have measured the air flow in the level IX respectively at the level of adit which is connected with the ventilation shaft of the stope S-144, there were measured the air flow in the stope on the level of X. Point 4 as in figure 2 shows the measurements that we made in the ventilation shaft and gave the following values:

Q_4= 142 m^3/min; V_4= 1.98 m/s; S4=1.0 x 1.20 m^2

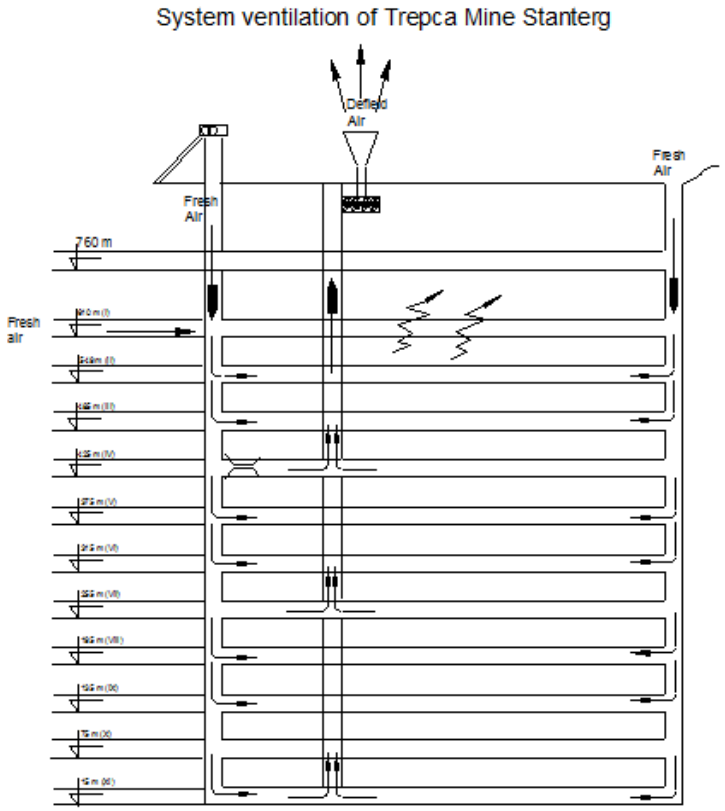

Figure1. Scheme in distribution air for Trepça Mine Stanterg

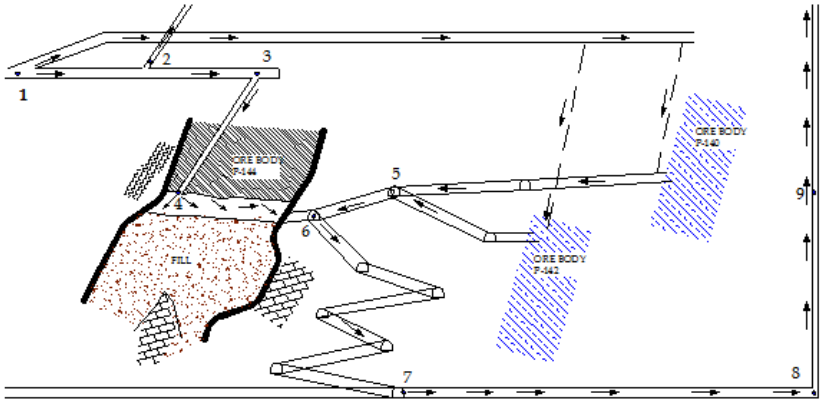

Figure2. Scheme in distribution air for ore body S-144, P-140 and S-142

It is characteristic that the air has changed the parameters of the amount to fair from the level IX and till the level X respectively in a shaft the ventilation amount Q_4 from that Q_3 and capture the value (Q_r = Q_4 - Q_3 = 142-136 = 6 m^3 / min) with what is determined as the relative error where such a mistake is allowed during the measurement or resistance measurements that can be caused by itself during the measurement so fair flows.

The possibility of increasing of air for stope S-144

Elimination of losses of air flow is made and because of that we have a loss and has decreased the amount of air in the stope and provided the known results by eliminating losses. Losses are eliminated with flexible hermetic barrier (airlock) of polyvinyl plastic material. We are presenting the results obtained and amount of air in the stope has the following values:

$$\mathbf{Q_{total}\text{-}144 = 190\ m^3 / min}$$

From this explication of works and measurements that were made it can be concluded that the ventilation is sufficient although prevails a great temperature sensitive and is determined not as a result of insufficient air flows but as a result of this that a stope possesses ore with emphasize content of pyrite that during the pyrite oxidation releases an temperature and increase the temperature of environment where they work. The purpose of the first part of the work is to provide ideas for intake of air flows, i.e. increasing the air velocity which would significantly reduce the temperature for at least 1º C and will increase the effectiveness of work in this stope.

Option 1 for new stope condition for S-144

Intake of the air respectively the increase of speed and amount of air to the stope can also be done by barrier in the main adit level where there are crucified as in Figure 3. In the main adit there are built barriers in level IX which connect airsoft stope S-140 and S-142 which would decrease the amount of air in the stope and will also increase the amount of air in the stope P-144. It must be measured the parameters of changes in both stopes if it is applicable the first option because it could have negative effects in the stopeS-140.

Option 2 for new condition for stopeS-144

Intake of the air respectively the increasing of speed of air with the help of barrier forming built at the intersection of the adit and the ramp in stopes S-140 and S-144 where thanks to the depressive adit point 7, 8 and depressive point of 8-9 - area it will be created artificial resistance of stope S-140 but now and the stope S-141 and at the same time would be increasing of the speed and amount of air in the S-144 (Figure 4). From Figure 4 and is presented on air movement across ramp. During the air speed measurements it is determined that air losses are larger.

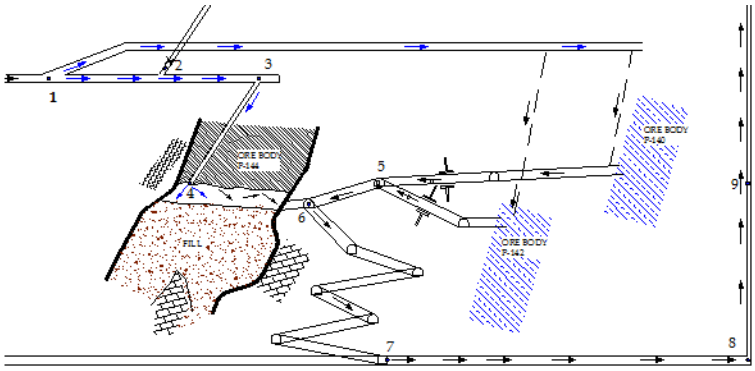

Figure4. Increasing of the quantity air with the help of the dikes in ramp P-140 and P-142

The description options and parameteres of ventilation

Choosing the optimal options is very complicated and the three solutions can be applied and as technical accepted solution but all three have their own characteristics that will be discussed all of them one by one and later one of them will be applied as possible optimal. The first option can be considered as quite successful and applicable and therefore later will be present the reason of application of this option.

The second option is considered and may have the technical and practical solutions but the way of barrier formation in the level there at the level where the works place is not considered as successful because of the movement of machines and there are frequent cases of damages during work. As base and successful option is determined the second option because of many factors.

• Because that the regulation of air flows do impromptu for as long as we need and always by controlling the amount of air changes and speed.
• The adjustment is made by barriers not interfering with anyone during the construction of the barrier for this reason that in this level (lev. IX), the works are considered as finished.
• If during the time needed to intake air flows in the stope S-140 air can be adjusted more easily because the barriers are considered as very flexible and worked with rubber bands (Figure 5), thus more easily intake the air in this stope as well as the amount of air is currently present. Formation of barriers of air flows that we have shown in Figure 4, and observation of the parameters changed in the stope S-144 after being set barriers as in Figure 5.

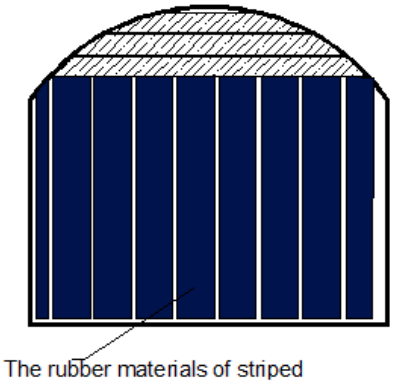

Figure5. The ramp with rubber materials of striped

These barricades are the prepared by of rubber strips where access of vehicle sand miners is not difficult, while the air resistance it is great. The amount of air that has intake to the stope is measured and knowing that in paragraph 1 as in figure 2 where the measurements were made, it resulted with the same outcome as in point 4, and from the measurements are obtained values after are formed partial barriers:

$$Q_1 = 246{,}84\ m^3/min\ ;\ V_1 = 0{,}85\ m/s \quad ;\ S_1 = 2{,}20\ X\ 2{,}20\ m^2$$

And the same values are obtained from the air that is intake in the ventilation shaft /raise/ and already approximately should give us values and there are the follow in results:

$$Q_4 = 248{,}40\ m^3/min;\ V_4 = 3{,}45\ m/s;\ S_4 = 1{,}0\ X\ 1{,}20\ m^2$$

From this there are obtained and other results of the losses of the amount of air in the stope S-140 but by experience and practice we are dealing with a stope of great area where the machines working in do not cause air pollution, but also it is worth to note that the content of ore does not pose any ignition of the pyrite ore as that of S-144 then we have to do with second bench of stope where do not have ore heap as in other works in stopes with second bench thanks to the successful work that made the drilling machine (Boomer) with high productivity and knowing that we are not dealing with ore heap. The aim of this as we have mentioned above is to increase the speed of the air flow in order to reduce the temperature of the air and there is achieved significantly that it gave good results and improved microclimate conditions of air.

Conclusion

From the joint work which has been done the aim was to make a measurements and determination of parameters of ventilation in the stope S-144 in the level -X- of the Trepca" mine in Stantërg. During the work of the paper is determined that parameters such as the amount of air in the stopes crosses with that of normal, but by analysing other microclimatic and temperature conditions slightly more is noticed the registration of relative humidity taking into account crash ore with high content of pyrite with what it is knowing very well that the moisture content and the ore heap can come to the ignition of the pyrite ore where the temperature increases significantly. Mining works are necessary in order to

work daily shifts, this may be noted that the good base ventilation may result in this stope a relaxation and good conditioning by significantly reduce or at least to 1º C temperature at the forefront working and avoiding the occurrence of the pyrite ore ignition. Results of works are shown satisfactory and as very successful, but considering it that always be taken under the control the stope S-140 or in those cases when it is necessary for any interval of time the greater amount of air in S-140 than air flows are adjusted very quickly thanks to worked flexible barriers.

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