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PROTECTIVE CHANNELS TO PREVENT A POTENTIAL ROCKFALL DURING BLASTING

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Abstract

Drilling and blasting at the Open Pit North Mining District takes place in the complex geological and urban environment conditions. The proximity of the city requires the performance of mining works with application the numerous and strict protection measures against the negative impact of mining. This paper presents a protection measure against the possible movement of loose pieces of rock that may occur as a result of blasting by creating the protective channels.

Keywords: *Open pit North Mining District, rockfall during blasting, special protection measures, protective channels*

1. INTRODUCTION

Exploitation of waste and ore in this open pit is carried out using a discontinuous technology. The technological stages of exploitation at the Open Pit North Mining District are: drilling, blasting, excavation-loading, transport, dewatering, auxiliary works, and crushing.

Drilling and blasting must be carefully planned, designed and optimized so that the effects of blasting are as good as possible from the aspect of granulation and economic profitability. In addition to the positive effects, it is necessary to reduce the negative effects that can occur during blasting, such as the flying of rock material, earthquakes, rockfalls, and emission of harmful gases. The technology and parameters of drilling and blasting are aligned with the project documentation and previous experiences at the site in question, which gave the good results in terms of granulation, safety, and achieving the minimal costs in the exploitation phase.

In the previous period, as a part of precautionary measures and preparatory works, in order to ensure the safety of population and buildings of the city of Majdanpek, the company Zijin Copper constructed two protective channels on the slope of the Starica mountain. They represent a buffer zone whose function is to cushion the eventual rockfall, i.e. the movement of separated material that may occur during blasting. Rockfall events represent a serious hazard for people, structures, and infrastructures. The

phenomenon can occur in several environments, natural and artificial [1]. The appearance of these protective channels is given in Figure 1.

Figure 1. *Orthophoto shot of the protective channels at the foot of the Starica mountain (shot from a drone) and a picture of the channel from the field*

2. CREATION OF THE TWO NEW PROTECTIVE CHANNELS

In addition to the already existing protective channels, the two additional protective channels were designed in the eastern part in order to fully protect the city of Majdanpek from possible rockfalls. Figures 2 and 3 show the position of the two created protective channels and the new additional two protective channels in the eastern part, while Figure 4 shows the appearance of across-section of the safety cut.

Table 1 shows the length of a channel and scope of work on their construction. The construction of these channels is provided by the equipment that is already used in the operation of exploitation system at the Open Pit North Mining District

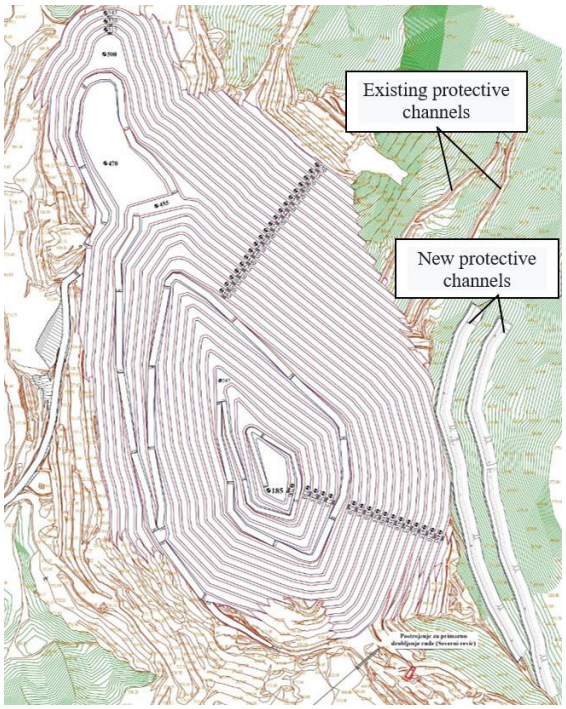

Figure 2. *View of the protective channels - existing and new protective channels*

Figure 3. *Position of the new channals in relation to the city of Majdanpek*

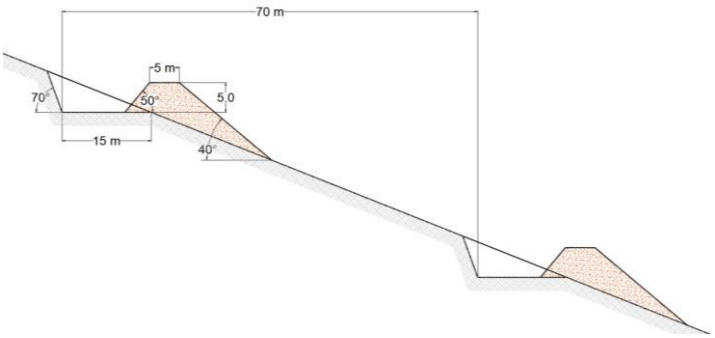

Figure 4. *Cross-section of the safety cut*

Table 1. *Total lengths of the two protection channels and volume of incision*

Length of the I channel (m)	862
Length of the II channel (m)	918
Total length of both channels (m)	1780
Total volume of the cut (m^3)	93000

3. CONCLUSION

The negative effects of drilling and blasting on the environment can be significantly reduced applying the appropriate measures, and the processes that occur during blasting can be controlled and thereby prevent the incident situations. This is especially important when works are carried out near urban areas or important infrastructure facilities. By creation the protective channels, it is possible to completely control and prevent damage to nearby buildings from the eventual occurrence of the movement of loose pieces of rock, which occurs as a result of mining operations. By creation the protective channels, the company Zijin Copper shows responsible and professional behavior when performing mining works while respecting the strictest safety measures with application the modern and verified methods of drilling and blasting.

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