Economic Evaluation and Perspectives of the Magnesite Mine in the Deposit “Dubovc”

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Abstract: In The magnesite deposit “Dubovc” is located in the area of the village with the same name, about 10 km, in Southwest of Vushtrri in the north slopes of Çiçavice mountain.

The deposit has been explored in the great mass with a relatively dense network of underground mining operations and drilling so today we can say that the exploration level of deposits is satisfactory. The deposit is represented by two great magnesite veins laying in the North west and South southeast direction, and according to the data of exploration operations it lays in the NE direction, except in the deeper parts dictated of surrounding rocks the vein will entirely change the angle and direction of dipping.

The done studies in the period from the mining interruption until now has denied the opinion of some previous researchers of this deposit, that calculate only for main veins of the deposit “Dubovc”, the deposit contains 1.5-2 million tons of reserves. The general final calculated reserves for all deposit “Dubovc” are 964 949 tons, from which the North part 409 898 ton, and South part 555 051 ton magnesite. Also two extensions in dipping of main magnesite strings that are about 55 000 tons, have been added to this quantity of reserves.

The comparison of percentage of some determinate categories of mineral reserves in the deposit “Dubovc”, leads to conclusion for a satisfactory level of the exploration of deposit and that it is a base for opening of mining operations of deposit.

Since still we don’t have any active mine for exploitation of magnesite in the Republic of Kosovo, the fastest exploitation of this resource type is benefit for investors, residents, Municipality of Vushtrri and further.

Key words: deposit, magnesite, Dubovc, reserves, explorations

1. Introduction

Territorial area of Kosovo contains considerable natural resources and the deposits of useful minerals whether metal or non-metal ones are important in the national economy [5].

Documented research potentials exist for lignite, lead, zinc, silver, chrome, magnesite and construction minerals (such as hard rock, sand, gravel, clay). According to explorations, many geological premises are met for precious metals (gold, platinum) which are distinguished through rivers and associated metals in other ores (chromite and base metals) [1, 4].

Two mines in magnesite operation: “Goleshi” and “Drenica” (Dubovci) have been present between the two World Wars in Kosovo 4.

The first interests for magnesite deposit “Dubovc” started in 1929, whilst exploitation operations have been carried out during the 30s’, a furnace is set in 1930 to gain caustic magnesite. Activity in this deposit was interrupted when World War II started, then it restarted in 1953. In this year it was set the town, three caustic furnaces, but due to non-standardized production, so bringing the raw material out of qualitative conditions, production was interrupted

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occasionally until it was finally suspended in 1956. The revision operations in the North and South sectors of deposit were undertaken in 1958, along mapping, sampling, a gallery was opened in the new horizon 565m below the levels of mining existing operations that currently it is deepest in the deposit, but immediately after finishing the operation of opening, it was abandoned after it was flooded with water. The operations were intensified in the years 1963-1965 in the Southern sector by performing exploration works through drilling, to verify the presence of magnesite below the level of horizon 560m. Explorations that were carried out during 1975 and 1976 and the years 1978/1979 give the detail development of the works carried out in the respective years. The operations that were carried out during 1975/1976 did not give the expected results since they didn’t verify the magnesite vein to the direction of depth below the horizon level 565m. Later, the authors of the explorations carried out exploration works for the same purpose in the years 1978/1979, mainly drilling in Northern and Southern sectors of the deposit, in order to increase the reserves below the horizon 565m, which they were mostly worth of re-categorization of the ore reserves at the highest levels of mining operations than the perspective of magnesite deposit “Dubovc” in terms of depth [2, 3, 6].

The general final calculated reserves for all deposit “Dubovc” are 964 949 tons, from which the North part 409 898 ton, and South part 555 051 ton magnesite. Also two extensions in dipping of main magnesite strings that are about 55 000 tons, have been added to this quantity of reserves. The possibility of exploiting these magnesites and some important data of the past geological explorations and the state of mine today will be the subject of study in this paper.

2. Materials and Methods

Initially we went to the field, it was analysed geographic and traffic position, all so far surface and underground operations have been identified, the outcrops of magnesite veins in the surface have been identified etc.

The analysis is mainly done for all geological explorations carried out in the past (1929-1979) which have occurred in different periods with occasional interruptions. A primary importance during studying and analysing the literature for this deposit has been paid to the quality of magnesite which has been disputed in the past. However in this regard it is not underestimated information about the flow of streams, ground water levels, of the Brusniku stream and torrents created in the surface of the deposit or around it, which affect food and groundwater levels [2, 3].

Hydrogeological observations are simple tasks in geological practice during explorations of a deposit, especially for discharges, debit and measuring the level of groundwater for different seasons of the year and for the entire territory of performing various works, drilling, underground operations or simple observations of water resources in or around its deposit. We think that exploitation methods that are used today for underground mines are very practical and Brusniku stream will not present a problem for example putting this stream in wide profile pipes or wall the riverbed which it will also bring a very positive environmental effects as well for the inhabitants in surrounding [2, 3].

Quality of magnesite is described in detail in the exploration carried out in the past. Sampling with grooves used is in compliance with the methods and manner of sampling of magnesite mineralization. Grooves interrupt the whole thick of all magnesite veins. Initially, selective sampling with grooves only in those parts of thickness where magnesite with the best quality is determined macroscopically is carried out in the operations done during 1953 in the framework of qualitative evaluation. Sampling with grooves is practiced as well in the following years such as in the operations to open a mine in 1956, also during the years 1958-1959 and 1965 and to the operations carried out during 1976 to 1979 [4, 6].
Table 1 gives the average value of the length of sampling with grooves, and the average of the length of selective sampling in groove.

The mine has an extension detached from one side with the other side and therefore it is presented as two wings one as the Northern part and one as Southern part.

3. Results Calculation of Reserves and Economic Evaluation of Deposit

It means from transverse profiles that we have a reserve quantity of 325000 m³ as exploitable reserves see Fig. 2 — last transverse profile withdrawn from the longitudinal profile. This profile as in Fig. 2 is the last one drawn in the Southern part of the Northern part of the extension of the deposit Dubovc mine. From surface level to the level of 580 m this would best be seen from the exploitation system table where the

<table>
<thead>
<tr>
<th>Horizon</th>
<th>The number of samples taken</th>
<th>Length of sampling in grooves</th>
<th>Average content</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>MgO SiO₂ CaO</td>
</tr>
<tr>
<td>I</td>
<td>2</td>
<td>1.15</td>
<td>44.56 0.94 1.21</td>
</tr>
<tr>
<td>II</td>
<td>18</td>
<td>1.11</td>
<td>44.74 3.35 0.48</td>
</tr>
<tr>
<td>III</td>
<td>12</td>
<td>1.15</td>
<td>45.60 1.14 0.74</td>
</tr>
<tr>
<td>IV</td>
<td>12</td>
<td>0.92</td>
<td>45.71 1.35 0.56</td>
</tr>
<tr>
<td>Average</td>
<td>content</td>
<td></td>
<td>45.40 1.69 0.74</td>
</tr>
</tbody>
</table>

overall reserves of exploited mass are calculated from the surrounding rocks of the mine.

4. Results — Report on Exploited Reserves

Project: Magnesite mine Dubovc Northern Part
Situation
Longitudinal profile of the magnesite mine Dubovc
Transverse profiles of the magnesite mine Dubovc
Start Station: 0+000.000
Completion of Station: 0+435.646
From Fig. 3 as below there are designed elements of mine’s bench with dislevel scale of h = 15 m and an dipping angle of benches of a = 70° and final angle of the mine of g = 54° with a final square of bench of b = 4 m and benches of the mine have shown good stability.
Table 2  Exploitable reserves of magnesite deposit Dubovc Northern part.

<table>
<thead>
<tr>
<th>Stations</th>
<th>Mining</th>
<th>Mining m³</th>
<th>Volume (m³)</th>
<th>Filling (m³)</th>
<th>Volume Filling (m³)</th>
<th>Filling Total</th>
<th>Cumulative Volume mining (m³)</th>
<th>Cumulative volume filling (m³)</th>
<th>Cumulative neto (m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0+000.000</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>0+435.646</td>
<td>0.00</td>
<td>17535.28</td>
<td>17535.28</td>
<td>0.00</td>
<td>56.19</td>
<td>353294.74</td>
<td>353294.74</td>
<td>10531.15</td>
<td>342763.59</td>
</tr>
</tbody>
</table>

This table has not station elements from 0+000.000 to 0+435.646 but due to the large volume of the table it is not presented a complete table but only two above stations.

by referring to other similar deposits when we are dealing with such rocks. The following Fig. 3 will present how the mine’s benches will develop.

The mine has shown a good stability of the designed building and it has a view of how it will look after the exploitation system. For details how mine will look after exploitation is presented in Photo 1.

We conclude that the overall exploited quantity of this mine for exploitation of magnesite until the quota 580 m is extracted by Auto Cad Civil 3D and it has a small quantity of 2916395.22 m³ see Fig. 4 which presents exploitable reserves of the entire total exploited mass of mine.

Southern deposit as a mine with exploitation prospective in the near future and it is presented as an area of interest to the future investor.

From this we conclude a calculation of the value and quantity of mining as in Table 3.

Table 3 will present more clearly how much we have reserves of sterile mass, how much we have reserves of mineralizing mass such as magnesite in mine Dubovc Northern part.

From Table 3, we have a reserve quantity of 325,000 m³ exploitable reserves of magnesite and a quantity of 2590000 m³ sterile reserves which this mass is commercial in the construction market and it is used for the needs of infrastructure construction.

The relation of the mass of removing sterile mass for the benefit of 1 m³ magnesite is in relation as follows. 7.9 m³ of sterile mass shall be removed from surrounding rocks to extract 1 m³ magnesite. The cost to extract 1 m³ exploited mass with surface system is calculated about 7.5 €/m³ then it results that a total of approximately 60 €/1 m³ shall be removed for 1m³ magnesite mineral.

Based on all the above, we believe that the value of this deposit with significant quantity of magnesite, i.e., magnesite concentrate will be increased despite the unsatisfactory quality of magnesite deposit Dubovc with the use of modern exploitation methods, cleaning and concentration.

5. Conclusion

The mine is located in Northern part of the deposit of

![Photo 1  The scheme of a mine at the end of the exploited career.](Image 58x184 to 288x306)

![Fig. 4  Presentation of the reserves calculation of complete exploited mass with surrounding rocks and magnesite.](Image 59x339 to 286x429)
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References