

## QUARTZ OF THE LAKAVICA DEPOSIT

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### Abstract

*The paper presents the geological characteristics, occurrence mode and the mineralogical characteristics of the quartz of the Lakavica deposit.*

**Key words:** Quartz, opal, colour

### INTRODUCTION

The Lakavica deposit is situated 300 meters north of the village with the same name. In the east it borders the villages of Tarinci and Goracino that are 1 km far from the deposit. In the south is the village of Lakavica. The Dlaboka Reka is natural border in the north and north-west.

The deposit has good connections to the surrounding places partly because the Stip - Strumica road passes 300 meters from the mine. An advantage also is that the local Lakavica - Tanatarci road passes next to the deposit.

### GEOLOGY OF THE AREA

The deposit is located at the contact between the Vardar Zone in the west and the Serbo-Macedonia massif in the east. The area includes several kinds of rocks with extremely high SiO<sub>2</sub> content. [1],[2]. The most frequent are gneisses and granite. Andesites can also be found in the south parts of the Brest and Damjan area. (Fig. 1.).

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Sediments have been revealed in a large area. They are present as Pliocene gravels and sands, conglomerates, flysch, yellow sands, marles and small amounts of other sediments [3],[6].

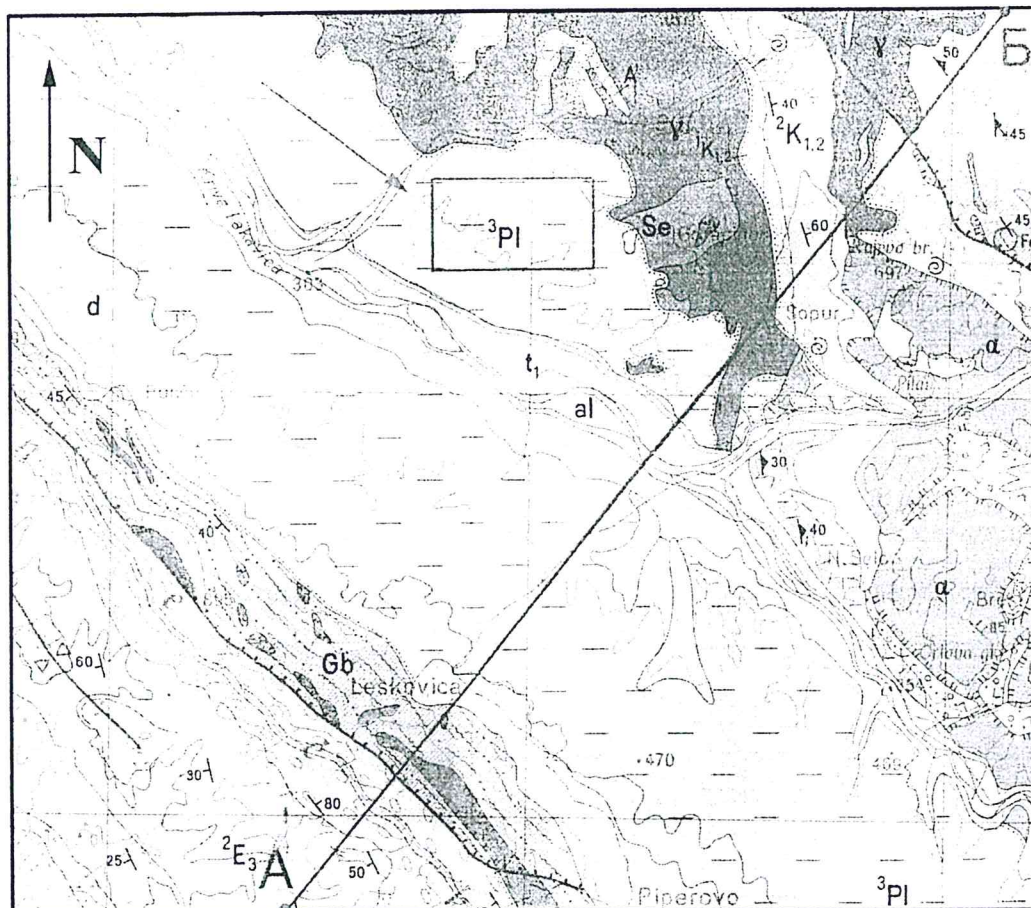


Figure 1. Geological map of the wider area P 1:100 000

The Pliocene sediments extend along the River Lakavica course being most frequent on the left side.

Cretaceous sediments have been found on the Sopur - Mocarnik strike overlying a granite base.

### GEOLOGY OF THE DEPOSIT

The deposit is detritic consisting of Pliocene limnic sediments. It is composed mostly of gravel - sandy series being the ore mass for obtaining quartz boulders. The concentration of quartz boulders over the whole deposit is uniform. In the north, small interlayers of clayey - marly earth occur. Their thickness does not exceed 2 to 3 m in size.



In the higher benches in the northern section of the deposit interlayers of red clayey - humus overlying other sediments can also be seen. [4], [5].

The most common mineral in the deposit is quartz, in addition to opal feldspar, mica, zircon, hematite, rutile, gold, clay etc.

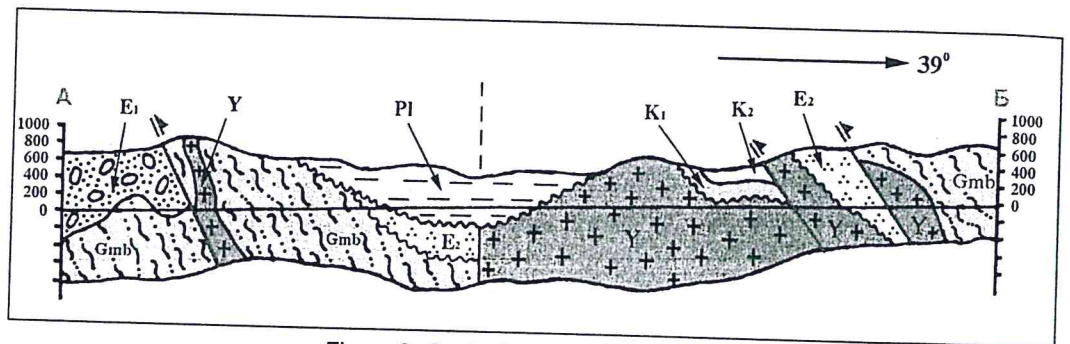
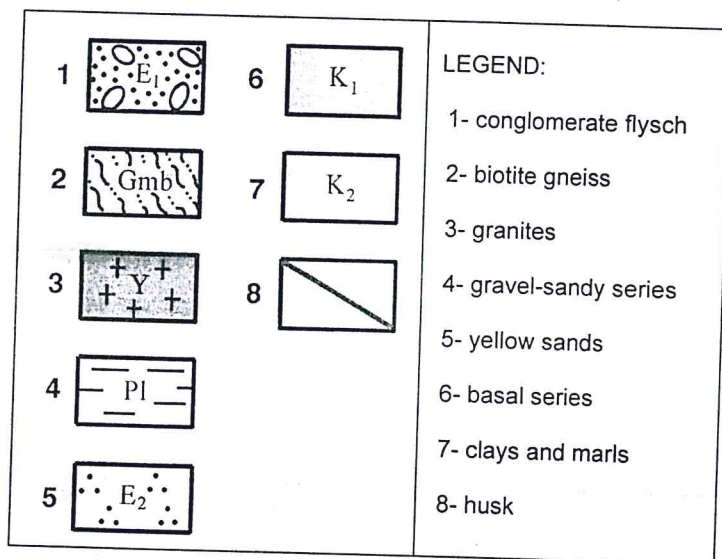


Figure 2. Geological cross section A - B



### MINERALOGICAL CHARACTERISTICS

The chemical composition of quartz is  $\text{SiO}_2$ . Luster is vitreous and greasy. It does not possess cleavage. Hardness is 7 and density 2.65. It is transparent to semi-transparent. It is colourless, yellowish or poorly greyish (figs. 3, 4, 5, 6), grey quartz being the most common (from 60% to 70%).

The amount of milky white quartz is about 10%, the red from 20% to 30% and the yellow from 3% to 5%.



Fine-grained well-developed quartz crystals have also been found in the cracks of some quartz boulders. The crystals is small amounting from 2 to 5 mm in size. In polished sections quartz is anisotropic single axis. It is colourless. It possesses low relief and interferes into first order grey colour. The chemical composition was determined with AEC - ICP.

Table 1. Chemical composition of quartz of Lakavica

SiO <sub>2</sub>	99.9 %	MnO	<0.001 %
Al <sub>2</sub> O <sub>3</sub>	0.026 %	CaO	0.006 %
P <sub>2</sub> O <sub>5</sub>	0.003 %	MgO	0.004 %
TiO <sub>2</sub>	0.004 %	NaO	0.007 %
FeO	0.029 %	H <sub>2</sub> O <sup>+</sup>	0.022 %

Gravimetric method was used to determine SiO<sub>2</sub>. For the determination of other oxides the AES - ICP methods was used. Besides quartz, well coloured opal can also be found in the deposit.

Opal amounts from 1% to 3%. It occurs as kidney-like or irregular shapes. It is yellow, reddish, yellow-green, Fig. 7 and Fig. 8. The most common is reddish and yellow opal can seldom be found. The grain size of the yellow opal is from 3 to 5 cm. The red and yellow-green opal are larger in size. Hardness is 5.5 to 6.5. Density is from 2.0 to 2.2 depending on the water content and admixtures. In polished sections it is colourless and transparent. It possesses negative relief. Index of refraction is 1.446 to 1.459.

These rare opal samples can be used as semi-precious stone.

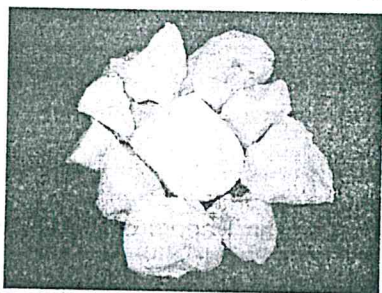


Figure 3. Milky white quartz



Figure 4. Grey quartz

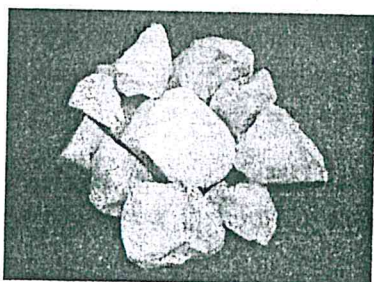


Figure 5. Yellow quartz

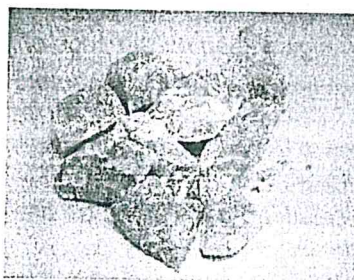


Figure 6. Red quartz



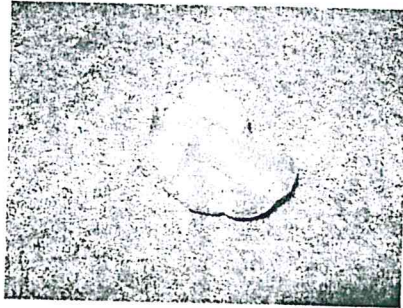


Figure 7. Yellowish opal of Lakavica (5x3cm)

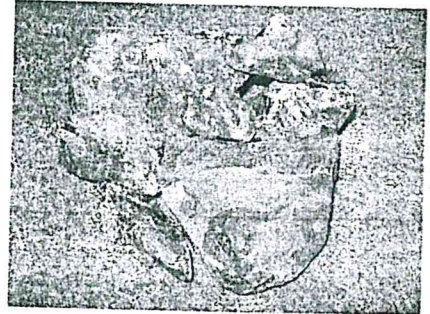


Figure 8. Reddish opal of Lakavica (20x30cm)

### CONCLUSION

Quartz in the Lakavica deposit occurs as irregularly distributed boulders of various sizes. They occur as lenses that occasionally grade to layers. Quality is fairly uniform. The average  $\text{SiO}_2$  content amounts to 99,00 - 99,80 %. Quartz pieces of over 30 mm in size and  $\text{SiO}_2$  content of minimum 99 % are of commercial value.

In addition to quartz, opal can also have commercial value although amounting only 1 to 5 % of the total mass. Owing to the beautiful colours and shine it can also be used as precious stone.

According to available knowledge on the Lakavica deposit and the wider vicinity, it can be inferred that the area is interesting representing good potential of quartz as raw material. Quartz of the Lakavica deposit can be used as ceramics, crystal, glass, sand paper, metal containers, cleaning powder, and ferro silicon industry.

### References

- 1) Ivanov T., (1966), *Report on the geological mapping of the Damjan ore region, Izvestaj za geoloskoto kartirawe na rudniot reon Damjan* Papers of the Geological Instsitude, Skopje.
- 2) Izmailov N., (1960), *Major Features of the Tectonics of Macedonia*, Papers of the Geological Instsitude, No7, Skopje.
- 3) Karajanovik M., Temkova V., Strackov M., (1973), *Explanation of the Basic Geological Map for the page of Stip*, 1:100 000.
- 4) Prendjov K., (1976), *Elaborate on the geological characteristics of the occurrence and calculations on the ore reserves of high quality quartz in the Lakavica deposit*, Papers for the Opalit production plant.
- 5) Serafimovski T., Aleksandrov M., Boev B., Bojagiev P., (1990), *Report on the calculations carried out on the geological reserves of quartz in part of the Lakavica deposit*.
- 6) Hristov S., Karajanovik M., Strackov M., (1973), *Explanation of the Basic Geological Map for the page of Kavadarci*, 1:100 000.