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METAMORPHISM OF Fe-Ni ORES FROM RŽANOVO — STUDENA VODA (YUGOSLAVIA) AND THE ZONE ALMOPIAS (GREECE)

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ABSTRACT

The work about the metamorphism of the Fe-Ni ores from Ržanovo — Studena Voda, deals with the problem of the degree of metamorphism, on the bases of the consolidatet mineral paragenesis in the Fe-Ni ores. There is consolidated a very low degree of metamorphism form the greenshist-pellyite facies til the begining of the facies of green shists.

On the basis of the minerological composition of the Fe-Ni ores from Ržanovo published by T. Ivanov, 1962 than by Grafenauer Stanko and Strmole Dragica (1966), as well as on the basis of the minerological composition established by Zoran Maksimović about the deposits Ržanovo and Studena Voda, as well as the data of the ore samples from Studena Voda analyzed in Canada in 1979, the following can be concluded: the oxide minerals such as hematite, specularite, maghemite, and magnetite are very obviously products of the diagenetic, epigenetic and the metamorphic processes which followed after the diagenesis of the sedimentary rocks.

The following silicate minerals have been established: — alkalic amphibole, (magnesioriebeckite), phlogopite, stilpnomelane, chlorite, tremolite and talc, which can be considered as metamorphic minerals except the talc or the talc-chlorite which can result in the diagnesis, and even in the hydrothermal way (talc in lodes). Most of the mentioned minerals resulted in dynamometamorphism in regional scope. These minerals associations correspond to some metamorphic rocks from facies of green schists which resulted under relatively high preassures and relatively low temperatures, perhaps during the young alpine orogenesis. Such assumption about the metamorphism of the Upper-cretace-

ous sediments was carried on already in Athens in 1977 in the discussion referring to the report of Eckard Walbbracher, where we have said: »In the south-eastern edged part of the Pelagonian massive (Yugoslavia) the Upper-cretaceous sediments are dynamometamorphised, perhaps in the tertiary« (page 290).

Some ore occurrences have been found south from Ržanovo — Studena Voda, in the vicinity of Voden (Edesa) in Greece. We have visited them in september 1981. These occurrences are in the ophiolitic zone south from Voden (Edesa) and are described by E. Mposkos (1980). This author, in the locality Vrita devides a zone with very low metamorphism (pumpellyite zone) with the following minerologic associations: pumpellyite-chlorite-quartz-albite and pumpellyite-actinolite-quartz-chlorite in metadiabasite, and magnetite-actionlite-chlorite-myllerite in the Fe-Ni laterite ores.

In the region of Flamuria — Platani Mesimeri (south-west from from Voden — Edesa) and Sfikia near the river Alikman (Bistrica) the author devides a zone vith low metamorphism in the facies of green shists. Therefore, a characteristic minerological association is the following: actinolite-chlorite-clinozoisite-epidote-albite-quartz in metadiabasite, and talc-actinolite-riebeckite-stilpnomelane in the laterite ores. Characteristic silicate metamorphic minerals in the laterite ores from Flamuria and Mesimeri are the talc, the stilpnomelane and the riebeckite. These minerals are the main neoconstituents formed under the influence of the young-alpine regional metamorphism.

After the visit of the Fe-Ni deposits, that is, occurrences south from Voden (Edesa) we have established a great similarity between the deposis of Fe-Ni ores from Ržanovo — Studena Voda and the occurrences in Mesimeri and Flamuria, but in the Greek occurrences there is no flogopite, established until now.

The following sulfide minerals are established in the Fe-Ni ores from Ržanovo: pyrite, bravoite, myllerite, nickelane, chalcopyrite, sphalerite etc. (T. Ivanov 1964, Grafenauer Stanko and Strmole Dragica 1966) There is not much said about the genesis of these sulfide minerals, unitl now, but it is the most obvious that the above mentioned sulfide minerals point out the local reductional conditions. There is a question, if some of them resulted on the hydrothermal way, because in their vicinity there are younger volcanic rocks from the Kožuf tertiary volcanism?

Presidemented sedimentary Fe-Ni, upper-cretaceous ores from Ržanovo — Studena Voda, as well as the mentioned ores in Greece, south from Voden, near Mesimery and Flamuria, after the sedimentation were defeated under long processes of diage-

nesis. After that, during the young alpine orogenesis (after the middle eocene) they were folded and deformated, and after that even cut off and overtrusted.

Because of the increasing of the preassures in the rocks during the folding and the overtrusting, there was a little increasing of the temperature. The temperature was not high (in the interval from 200 and 400° in particular parts) but under the influence of the high preassures, which could amount around several kilobars, and with the interpores solutions of »captured sea water« in the sedimentary rocks, the regional dynamo-metamorphism is performed also on the Fe-Ni ores up to the level of the facies of the green shists. As for the presence of the high preassures during the metamorphism of the mentioned Fe-Ni sediments, remarcable is the presence of the reibeckite, albite and stilpnomelane.

The origin of the alkalies, for the formation of the above mentioned minerals can be explained from the sea water in the pores of the sedimentary rocks, or from the surrounding sedimentary rocks. Although, in the metamorphised uppercretaceous sediments, the above mentioned mineral association such as quartz-albite-riebeckite, so as quartz-albite-stilpnomelan, can correspond to the facies of the dynamo-metamorphism, which have higher preassures.

At the end we can conclude that the upper-cretaceous, presedimented Fe-Ni ores in the region Ržanovo — Studena Voda, and in the region south from Voden (Edesa) Greece, are metamorphised in the region of the facies between prehnite-pumpellyite and the facie of the green shists. We want to point out that tere are still many unsolved questions. We hope that later detailed investigations will give answere to all questions, which are still unsolved in the metasedimentary ore deposits in the zone of the ophiolites, and cspecially about the metasedimentary Fe-Ni ores from Ržanovo and Studena Voda.

РЕЗИМЕ

МЕТАМОРФИЗАМ НА ЖЕЛЕЗНО-НИКЛОНОСНИ РУДИ ОД 'РЖАНОВО — СТУДЕНА ВОДА (ЈУГОСЛАВИЈА) И ЗОНАТА НА АЛМОПИАС — (ГРЦИЈА)

Ристо Стојанов
Блажо Боев

Трудот за метаморфизмот на Fe-Ni рудите од 'Ржаново — Студена Вода го дава степенот на метаморфизамот на овие руди, а врз основа на минералните парагенези содржани во нив. Се утврдува многу низок степен на метаморфизам во пренит-пумпелитската фација па сè до гриншист-фацијата на регионалниот метаморфизам.

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