Proceedings
of the XVI Serbian Geological Congress

ОПТИМАЛНО ИСТРАЖИВАЊЕ И ОДРЖИВО КОРИШЋЕЊЕ ГЕОЛОШКИХ РЕСУРСА

OPTIMAL RESEARCH AND SUSTAINABLE USAGE OF THE GEOLOGICAL RESOURCES

Donji Milanovac, 22-25.05.2014.
XVI Конгрес геолога Србије: Зборник радова
(Национални конгрес с међународним учешћем)

XVI Serbian Geological Congress: Proceedings
(National Congress with International Participation)

Donji Milanovac, 22-25.05.2014.

За издавача / For the Publisher
Zoran Stevanović,
Председник Српског геолошког друштва / President of the Serbian Geological Society

Главни уредник / Editor-in-Chief
Vladica Cvetković

Уредни факултет / Editorial Board
Biljana Abolmasov, Katarina Bogićević, Meri Ganić, Rade Jelenković, Aleksandra Maran Stevanović, Vesna Matović, Vesna Ristić Vakanjac, Aleksandar Ristović, Ljupko Rundić

Техничка припрема / Technical Preparation
Veljko Marinović, Ognjen Jevtić, Milan Vukićević, Nemanja Krstekanić, Jelena Krstajić, Nikola Vojvodić, Bojan Kostić, Kristina Sarić

Издавач / Publisher
Српско геолошко друштво / Serbian Geological Society
Kamenička 6, P. Box 227, 11001 Belgrade, Serbia
http://www.sgd.rs; e-mail: office@sgd.rs
Тираж: 300 примерака / Circulation: 300 copies

Штампа / Printing
Šprint, Alekse Nenadovića 28, Beograd, Serbia


Напомена: Аутори су одговорни за садржај и квалитет својих саопштења
Note: The authors are responsible for the content and quality of their contributions
XVI КОНГРЕС ГЕОЛОГА СРБИЈЕ

Чланови одбора
XVI SERBIAN GEOLOGICAL CONGRES
Committee Members

Почасни одбор / Honorary Committee
Zoran Maksimović, Stevan Karamata, Vidojko Jović, Aleksandar Grubić, Jelena Obradović, Ivan Antonijević, Rajka Radojičić, Zora Sučić-Protić, Branislav Ćirić, Radule Popović, Jovanka Mitrović, Nadežda Krstić, Mihajlo Kalenić, Ivan Filipović

Почасни одбор (институције) / Representatives of the Institutions
Adam Dandić (Društvo geoloških inžinjera i tehničara Srbije), Ivan Obradović (Univerzitet u Beogradu – Rudarsko-geološki fakultet), Dragomir Rabrenović (Geološki zavod Srbije), Milutin Ignjatović (CIP, Beograd), Srdan Stefanović (NP Derdap), Vlastimir Trujić (Institut za rudarstvo i metalurgiju, Bor), Milan Dimkić (Institut za vodoprivredu Jaroslav Černi), Dragan Mitrović (Geološki zavod Republike Srpske), Vasiljevich Aleksey Alexandrovich (Gazprom Neft), Alexander Rodionov (NIS)

Организациони одбор / Organizing Committee
Zoran Stevanović (predsednik), Nenad Banjac (potpredsednik), Ljupko Rundić (potpredsednik), Tivadar Gaudenzi (tehnički sekretar), Boško Jevtović (tehnički sekretar), Milovan Rakjić (blagajnik), Petar Stejić, Nenad Grubin, Mile Bugarin, Dejan Koželj, Aleksandra Maran Stevanović, Vesna Lesić, Marija Kukavica

Научни одбор / Scientific Committee
Vladica Cvetković (predsednik), Milan Sudar, Dragan Milovanović, Radmila Pavlović, Vladan Radulović, Vesna Poharc-Logar, Aleksandar Đorđević, Rade Jelenković, Veselin Dragišić, Nebojša Vasić, Slobodan Knežević, Divna Jovanović, Dragutin Jevremović, Slobodan Vujasinović, Aleksandar Kostić, Spomenko Mihajlović, Ljiljana Karanović, Ivan Dulić, Dejan Prelević, Milenko Burazer

Студенти волонтери / Students Congress volunteers
Jelena Krstajić, Marina Prodanović, Veljko Marinović, Milan Vukićević, Ognjen Jevtić, Nemanja Krstekanić, Bojan Kostić, Marina Zečević
САДРЖАЈ / CONTENT

SKETCH OF THE DERDAP'S AREA GEOLOGY
Aleksandar Grujić ................................................................. 1

ONE GEOLOGY – GEOSCIENCE DATA AT THE TOUCH OF A BUTTON
Marko Komac, Francois Robida, Tim Duffy .................................................. 7

STANJE I POTENCIJALI MINERALNIH RESURSA ISTOČNE SRBIJE
STATUS AND POTENTIAL OF MINERAL RESOURCES OF EASTERN SERBIA
Rade Jelenković .................................................................................. 10

O KENOZOJSKOM MAGMATIZMU SRBIJE – REČIMA KOJE RAZUME SVAKI GEOLOG
ABOUT CENOZOIC MAGMATISM IN SERBIA – BY WORDS UNDERSTANDABLE TO EVERY GEOLOGIST
Vladica Cvetković ............................................................................. 29

СТРАТИГРАФИЈА, ПАЛЕОЕНТОЛОГИЈА И ТЕКТОНИКА
STRATIGRAPHY, PALAEOONTOLOGY AND TECTONICS
 ........................................................................................................... 41

RHODOPE EVOLUTION IN THE HEART OF BALKAN GEOLOGY
Ivan S. Zagonchev ............................................................................. 43

CIKLIČKA SEDIMENTACIJA NA RUBOVIMA MARINSKOG ŠELFA ZA VRIJEME SREDNJEG I GORNJEG PERMA U CENTRALNOM DIJELU VELEBITA (HRVATSKA)
CYCLIC SEDIMENTATION IN MARGINAL MARINE SHELF ENVIRONMENT
AT THE MIDDLE/UPPER PERMIAN BOUNDARY IN CENTRAL PART OF THE VELEBIT MT. (CROATIA)
Ana Simčišić, Jasenka Sremac .............................................................. 49

THE LAKE PANNON – SERBIAN SIDE OF THE STORY
Dejan Radivojević, Imre Magyar, Marten ter Borch, Ljupko Rundić .......................................... 54

STABLE ADRIA AND THE EXTERNAL DINARIDES: TECTONIC MODELS IN THE CONTEXT OF JURASSIC-CRETACEOUS PALEOMAGNETIC RESULTS
Emő Marton, Vlasta Cosović, Alan Moro .................................................. 61

АНЕЗИЈСКИ КАРБОНАТНИ ЦРМИЦЕ И ОКОЛИНЕ (У ЦРНОЈ ГОРІ)
ANISIAN CARBONATES OF CRNICA AND SURROUNDINGS (IN MONTENEGRO)
Danjan Ćadenović, Jelena Mišljen, Martin Đukić, Novo Rudulović ..................................... 63

MAJOR PHASES OF NEOGENE-QUATERNARY TECTONIC EVOLUTION OF THE SOUTH-EASTERN PART OF PANNONIAN BASIN
Ivan Dulčić, Snežana Marjanović, Vladislav Gajic, Goran Bogičević ................................. 72

СТРАТИГРАФСКИ МОДЕЛ КВАРТАРА ЗА РЕЧНЕ ПОЛУЦИКЛУЋЕ СЕДИМЕНТЕ НА ПРОСТРУНУ СРБИЈУ
STRATIGRAPHICAL MODEL OF QUATERNARY FOR FLUVIAL POLYCYCLIC SEDIMENTS IN THE TERRITORY OF SERBIA
Draženko Nemadić, Tivadar Gaudernyi ....................................................... 74

ПЛЕISTOCЕНЕ ПЛУВИЈАЛНЕ НАСЛАДИ ЕУРОПСКОГ СРЕМА И ДОЛІЦА ДУНАВА И МОРАВЕ
PLEISTOCENE FLUVIAL DEPOSITS FROM THE SOUTHEASTERN SREM AND THE VALLEYS OF THE DANUBE AND MORAVA
Draženko Nemadić, Katarina Bogičević .................................................... 78

MIDDLE JURASSIC RADIOLARIANS FROM OPHOLITIC MİLANGE OF DINARIDE OPHOLITE ZONE
(DOZ) - AGE AND GEODYNAMIC SIGNIFICANCE (PAPRATNICA RIVER, NORTHERN BOSNIA AND HERZEGOVINA)
Branimir Segvić, Alan Vranjković, Đuje Kukoč, Vlatko Brčić, Špela Goričan, Elvir Babajić, Hazim Hrvatović, Ivan Dragičević, Majda Paden .......................................................... 82

СЕДИМЕНТОЛОГИЈА И БИОСТРАТИГРАФИЈА САНТОНСКО-КАМПАНИЈСКИХ КРЕЦЊАКА ОКОЛИНЕ БРЕЖЊА (ЦЕНТРАЛНИ ДЕО ВАРДАРСКЕ ЗОНЕ)
SEDIMENTOLOGY AND BIOSTRATIGRAPHY OF SANTONIAN-CAMPANIAN LIMESTONE FROM BREŽDE VICINITY (CENTRAL PART OF THE VARDAR ZONE)
Violeta Gajić, Miletina Dunčić, Vladislav Gajić, Nebojša Vasić ..................................................... 85
ANALIZA I OBRADA KAROTAIŽNIH MERENJA ZA POTREBE ZRADE SEIZMIČKE INVERZIJE I PROGNOZE PETROFIZIČKIH PARAMETARA NA OSNOVU 3D SEIZMIČKIH PODATAKA WELL LOG PROCESSING AND ANALYSIS FOR SEISMIC INVERSION AND PREDICTING OF PETROPHYSICAL PARAMETERS DISTRIBUTION
Stevan Doroslov, Aleksandar Zlatovic

STANDARDIZACIJA POCRAVA PRI RANJIVOSTI GRAWITMETRIČKIH ANOMALIJA U SRBIJI STANDARDIZATION IN REDUCTION FOR CALCULATION OF GRAVITY ANOMALIES IN SERBIA
Ivana Vasiljevic, Stevan Ignjatovic, Branislav Sretenovic, Oleg Oslilovic

GEOMAGNETSKI PRIJEDLO NA TACIKAMA DRUGOG RUDA REPUBLIKE SRBIJE GEOMAGNETIC SECOND ORDER SURVEYS AT SERBIA
D. Andricjic, D. Popkovic, M. Milojkovic

PRAČENJE PRIMENA GEOMAGNETSKOG POLJA, PARAMETARA ATMOSFERE I ZEMLJOTRESA U PROJEKUT P7 BLACKSEAHAZNET MONITORING OF EARTHQUAKES, GEOMAGNETIC FIELD AND ATMOSPHERE PARAMETER IN P7 BLACKSEAHAZNET PROJECT
Milena Cakac, Dragana Cht. Mavrak, Lazo Pekevski, Spomenko J. Mihajlovic

PRIMENA SEIZMIČKE INVERZIJE I MULTIATRIBUTIVNE ANALIZE PRI INTERPRETACIJ 3D SEIZMIČKIH PODATAKA KIKINDA 2013 THE APPLICATION OF SEISMIC INVERSION AND MULTIATTRIBUTE ANALYSIS FOR INTERPRETATION OF 3D SEISMIC DATA KIKINDA 2013
Janko Sovilj

ECONOMIC GEOLOGY AND RUDA LEZHIÇTAT ECONOMIC GEOLOGY AND ORE DEPOSIT

GEOLÓGICO E KARSTIC ASPECTS OF THE BODY DISCOVERY SOUTH OF BOR – TIMOK MAGMATIC COMPLEX
Miodrag Banjelic, Duncan Large

ODJELJIVO PLANIRANJE AGREGATA U JUGOISTOCNOJ EURIPONE – ZAŠTITO I KAKO SUSTAINABLE AGGREGATES PLANNING IN SOUTHEAST EUROPE – WHY AND HOW
Vladimir Simic, Dragana Zivotic, Nevena Andric, Zoran Miladinovic

GEOLOŠKE KARTE KAO PODLOGE ZA ODRŽIVO PLANIRANJE SNABDEVANJA AGREGATIMA (NA PRIMERU REPUBLIKE HRVATSKOJE) GEOLOGICAL MAPS AS BACKGROUND FOR SUSTAINABLE AGGREGATE SUPPLY PLANNING (EXAMPLE OF THE REPUBLIC OF CROATIA)
Vladimir Simic, Slobodan Miko, Boris Kruk, Zeljko Dedič, Dragana Životić, Nevena Andrić, Zoran Miladinović

PROCEDURE FOR MARBLE CLASSIFICATION FROM BOREHOLES WITH PARTICULAR REFERENCES TO THE SIVEC MINE
Mice Trkaleski, Blazo Boev, Ilia Rigopoulos

QUALITATIVE-QUANTITATIVE CHARACTERISTICS OF THE MARBLES FROM TUMBA AREA (REPUBLIC OF MACEDONIA) AND OPPORTUNITIES FOR THEIR EXPLOITATION
Orce Spasovski, Daniel Spasovski

GENERALNI OSVRT NA MINERALNU EKONOMIJU U SAVREMENIM USLOVIMA ODRŽIVOG RAZVOJA GENERAL REVIEW OF MINERAL ECONOMY IN MODERN CONDITIONS OF SUSTAINABLE DEVELOPMENT
Radule Tološič

ZNAČAJ PRIMENE MODERNOG I EKKSASNOG MENADŽMENTA LJUDSKIH RESURSA U MINERALNOM SEKTORU THE IMPORTANCE OF MODERN AND EFFECTIVE HUMAN RESOURCE MANAGEMENT IN THE MINERAL SECTOR
Radule Tološič

QUALITATIVE-QUANTITATIVE FEATURES OF CLAY FROM THE SITE BAZERNIK (WESTERN MACEDONIA)
Orce Spasovski, Daniel Spasovski

CHARACTERIZATION OF THE ORIGIN OF THE MTE ANOMALIES IN THE "CAP DE GARDE", EDOUARD MASSIF, ANNABA (NE ALGERIA)
Soraya Hadj Zebni, Menana Darf, Saidane Djerbi
Кварци, песак и пешковита лава: леђишта бољшани као сировина за цементну индустрију
Quartz, sand and sandy clay from the Bojnian deposit as raw material for cement industry
Miroslava Maksimović, Milenko Jovanović, Sladan Krstić, Goran Pačković, Marijko Pavlović

Геохемијске карактеристике полиметалних депозита Казандол (Р. Македонија)
Geochemical characteristics of polymetallic deposit Kazandol (R. Macedonia)
Jordanka Nikolova, Orce Spasovski, Daniel Spasovski

Технологије највећег старог флутацијског јадовишта у Бору (Поле I и Поле 2)
Technogenic deposit in the area of the old flotation tailing dump in Bor (Field 1 and Field 2)
Miroslava Maksimović, Mile Bugarin, Vladan Marković, Zoran Stevanović

Дисперзне органске материје у заједници бора чесане 1/Србија
Dispersed organic matter in the Borska bore deposit (Serbia): source and depositional environment
Nenad Andreš, Dragana Životić, Vladimir Simić

3D модел савремених вулканских депозита Равна река, Блок IV
3D model of the deposit “Ravna Reka”- Block IV
Nikola Pašajić

Истраживање угаља у деспо-tovac басену
Exploration of coal in the Despotovac basin
Svetlana Simić

Подручје хомоља геолошко-економски центар камена (АГК и ТК) са аспекта перспективности, врсте, квалитета, кoličina i употребљивости
The homolje area, the geological and economic centre of stone, when referring to the budding species, their quality, quantity, as well as the usability of the decorative stone in Serbia
Cvetko Zivković

Геодукатија, заштита геонаслеђа и геоеколошт
Geoducation, Geodiversity and Geoscience

Геоциркулација у Србији: прошлост, садашњост, буђење
Geocirculation in Serbia: past, present, future
Aleksandra Marko Stevanović

Улога и значај геодукатије у савременом друштву
Role and importance of geoducation in the modern society
Ljupko M. Rundić, Marina M. Filipić

Методолошка основе за процену објеката геонаслеђа
Methodological guidelines for assessment of geodiversity sites
Aleksandra Marko Stevanović

„Јупознам земљу - зазвиру у микроскоп“ - промicanje геолошке и геолошке баштине
„Meet the Earth-Perk under the Microscope“ - promotion of geology and geodiversity protection
Lidija Galović, Marija Bojanić

Заштита и промовсчање геолошким објекати у урбаном окруженим
The protection and presentation of geological sites in the urban environment
Erna Sokovać, Milan Popović, Srećko Stefanović, Branka Lazović, Ljupko Rundić, Slobodan Knežević

Потенцијално токсици метали унутао Затон-булба карав систем (Међеници платау, Романија)
Potentially toxic metals within the Zaton-bulba karst system (Međenti Plateau, Romania)
Cristian-Mihai Munteanu, Andrei Giurginea, Marius Vlaicu

Потенцијално токсици микроелементи у стабици оглјивог србије
Potentially toxic trace elements in Serbian brown coals
Dragana Životić, Vladimir Simić, Ivan Getkete

Геохемијске својства плодне и геолошке дуста око Бор Општ Пит и Стаб Орбите (Србија)
Geochemical properties of soil and attic dust around the Bėr Opšt Pit and Cu smelter (Serbia)
Robert Sajić, Trajce Stafilov, Suzana Mrkić

Основне вредности подручја Ђердап лагоне, потенцијалне геопарке
Main values of the Đerdap area, potential geopark
Dragana Ohrenov, Srdjan Beli, Ivana Mojić, Maša Milević
QUALITATIVE-QUANTITATIVE CHARACTERISTICS OF THE MARBLES FROM TUMBA AREA (MK) AND OPPORTUNITIES FOR THEIR EXPLOITATION

Orce Spasovski and Daniel Spasovski
University “Goce Delcev”, FNTS, Insitute of Geology, Stip, R.Macedonia,
E- majl: orce.spasovski@ugd.edu.mk

Key words: architectural-building stone, dolomitic marble, exploitation, ore reserves, rock quality, structure.

Abstract: The use of marbles as a building - architectural stone for their aesthetic - technical characteristics has a long tradition in Macedonia from ancient times until today. Dolomitic white marbles are most prevalent in studied area and clearly different from the gray-white and gray dolomitic marbles. The samples were determined as a fine-grained dolomitic marble, which mineralogically and chemically are quite pure. According petrological, mineralogical and microscopic tests and chemical analysis of these dolomitic marbles, can find wide application in construction and in civil engineering, the concrete mixtures, and other hydrotechnical works. It can also be used as architectural stone allows removal of larger blocks. Based on calculations performed on mining stocks can be concluded that the investigated area is promising in terms of exploitation of white dolomitic marble. The fact that within the field are calculated geological ore reserves more than of 50 milions m³ is a sufficient indicator of perspective in this area.

INTRODUCTION

The Tumba area is situated near the village bearing the same name some 20 km from Prilep. The site is situated 0,5 km south of the village in the marble series which is part of the Pelagon metamorphic complex.

The use of marbles as construction-architectural stone has had a long tradition, from early times to the present day, owing to its aesthetic and technical characteristics.

The white marbles are also used in the making of art statues, colonnades, caryatids etc. This is can be seen in many Roman archaeological sites such as Stobi, Heraclea and others.

The search for white marbles in a number of sites were the subject matter of investigations. The best known in the country are those of Sivec, Bela Pola, Pletvar, Kitka and others. The highest interest has been in the white marble in the Pletvar –Sivec - Bela Pola zone. Besides its whiteness, the marble has been in use for such a long time due to the fine-grained structure, which helped sculptors make their master pieces.

In Macedonia marble has been used as building material continuously, but with variable intensity.

The first large undertakings and organized economic interest in excavation and processing started after 1956.

The greater use of marbles called for intense geological investigations, starting with opening new quarries and construction of new facilities for processing. Thus, in 1956 production of marble blocks amounted to 8.000m³ and processing of 6.000m³ slabs. In 1983 new mines emerged whose block output reached 22.000m³ along with new facilities in Prilep, Gostivar, Cer and Kumanovo were built. The entire annual nominal capacity of slab processing amounted to 500.000 m².

However, this trend of increase was folloed by a period of stagnation in 1990 and in 1997 production reduced to 10 to 12.000m³ of blocks and processing of 80.000m² slabs annually.
the same time the period was also characterized by the establishing small processing plants almost in every towns. Products were used mostly in erecting monuments.

The first investigations in the Belovodica marble started during the 1930s. Later (Maric, 1940) carried out mineralogical-petrographic examinations on the rocks in the vicinity of Prilep with special emphasis on the marbles around Prilep and Pletvar. The compiling of the basic geological map of SFRY the authors of the page for Prilep the scale 1:100 000 (Rakicevic, Stojanov and Arsovski, 1965a, 1965b) in the explanation gave a detailed description of the lithological composition of the rocks near Prilep. In their description on the rock composition they included an account of the dolomite marbles from the vicinity of Belovodica.

In the same period, during compiling the basic geological map of SFRY, the authors of the page for Vitoliste, the scale 1:100 000 (Dumurzanov, Hristov, 1976) in the explanation gave an account on the lithological composition. The study included the dolomite marbles of the extension Tumba, Belovodica, Veprcani and Dunje (Dzolev, 2007). The same authors indicate that the marbles were an important raw material for obtaining marble blocks. They described them as white, massive with sugary white appearance and that blocks could be extracted for future processing.

Since 1970 to the present time, special detailed investigations were carried out for the calculation of ore reserves in Sivec for the writing of the main project for marble excavation from the deposit.


Latest data regarding the geological composition, petrographic - mineralogical and physical - mechanical characteristics of the marbles in close proximity to Tumba can be found in the documentation of the Dumigal Marble Company. Namely, the company has the concession for marble excavation close to the area under investigation and has started an open Tumba marble quarry which is in opescalen.

GEOLOGICAL CHARACTERISTICS

The Tumba marbles are part of the marble mass in the south part of the Pelagon. The mass is located in the marginal part of the Pelagonian metamorphic complex in the west and the Vardar zone in the east. It is a fairly narrow zone with two marble types: calcite in the eastern marginal part with the Vardar zone and dolomite in the western in immediate contact with the gneiss series of the Pelagonian metamorphic complex. The basic structural characteristics of the metamorphic phase in the Pelagon are the result of syngenetic processes of high regional metamorphism and folding with plastic flow mechanism with contemporaneous intrusion of granodiorites of the first phase when large fold structures were formed. It is worth mentioning that an important role played the second granitoid phase which manifested as major magmatic activity whose products, in addition to the metasomatic changes and homogenization of the metamorphic rocks, in some parts of the Pelagon caused refolding and developed new large foldings when distruction of earlier fold structures took place.

The whole Tumba site is situated in the eastern wing of the larger Dren anticline shape which is adome like elongated structure of N - S strike. The composition of the Dren anticline consists of
the rocks of both mixed and marble series. Of importance for the marble mass in Tumba is that, in its lower part, homogenization, whitening and dolomitization of marbles took place. These processes are related to the granitoid rock intrusion into the Dren anticline. Namely, the lower portions of the marble mass are made up of white sugary to flousery massive dolomite marbles in which, only locally, traces of foliation and micro folding and a small occurrence of calcite veins can be seen. Going far from the contact with the Dren anticline to the east, dolomite marbles grade into banded and further on into schistose calcite-dolomite marbles.

For the structural composition of the marble mass an important role played the rupture tectonics which are present as faults, fault and fissure zones. Of course, some of the structures are older, but the main rupture tectonics is of later age and related to the processes of formation of the neotectonic graben in the Pelagonian valley in the Pliocene as well as the processes of younger foldings and faults during the Alpine orogeny.

The marbles of the locality Tumba, which were subject of the research from the south-western side, are limited with series of dolomitic marbles which belong to the surface dig ‘Tumba’, a property of Pavlidis, in the south direction this marble mass continues to Mariovo, from east is limited with series of calcite marbles, while in the northern part this terrain is covered with deluvium made of dolomitic sand, pieces of marbles and clay material (Spasovski, 2011).

The Tumba area with the geological mapping three types of marbles were isolated: stratified to massive dolomitic marbles, tectonized dolomitic marbles and stratified dolomitic marbles (fig 1). Massive dolomitic marbles are characterized with white colour with occasionally present gray shade. These are massive and solid rocks where no cracks can be spotted and are characterized with absolutely weakly expressed stringed texture.

Tectonic dolomitic marbles meet as a small zone that moves from north-west and south-east and the same add to the massive dolomitic marbles.

As for the mineral content and the colour, among the stratified dolomitic marbles and the tectonic dolomitic marbles, there is no difference at all. These marbles are cracked on the surface and some decimeters’ cracks can be noticed in east-west direction and also northwest-southeast and normal cracks in these directions with falling angles from 50-90°.

Layered dolomitic marbles lay directly through tectonic dolomitic marbles with clearly defined stratified (picture 6). The rock mass is in direction of spread north northwest-south southeast and with a fall toward east-northeast under the angle from 30-45°. Mineral and these dolomites are identical as well as the stratified dolomitic marbles. They are characterized with white colour and saccharine appearance. Presence of calcite can be found in them, present as a type of very thin stripes. This type of rocks is mostly present in the middle parts of the research space.

With a geological mapping special attention is dedicated to the series of white dolomitic marbles which lay concordantly on mixed series in a wider space. These rocks are characterized with white colour and saccharine appearance, massive, stratified to layered-schistose.

These dolomitic marbles have white colour, but there are also some rare samples with light gray colour. The structure is finer grained, but solid, massive and compact texture with weakly distinguished oriented-striped texture.

In microscope homeoblastic-granoblastic structure is noticed, but massive and weakly distinguished oriented-striped texture.
MINERALOGICAL – PETROGRAPHIC AND CHEMICAL EXAMINATIONS

Representative samples of marbles from the Belovodica locality are selected for the mineral-petrographic research as well as for the chemical analyses.

A complete trituration, grinding, pulverization and automatic shortening is performed on the selected samples by receiving the samples for analysis and a duplicate of the sample weighing 50 grams.

The method of chemical analyses the standard Atomic emission spectrometry with inductively engaged plasma (AES-ICP) which provides high accuracy for the majority of the chemical elements but only the elements that are of high importance for the chemical characteristics of the marbles are defined.

The purpose of the chemical examination is to determine the chemical content of the present rocks in the researched area with a special attention to the white dolomite marbles.

From the performed mineralogical-petrological examinations, the microscopic analyses as well as the chemical analyses of the samples in the area around Prilep it can be stated that:

The samples are determined to be finely grained dolomite marble with are very clear in both mineralogical and chemical content. The presence of MgO is over 19.52% only in the sample marked T-6 MgO is present with 17.89% (Table 1).

These dolomite marbles have white colour and the samples with light grey colour are very rare. The structure is finely grained but with solid, massive and compact texture with weakly distinguished oriented-striped texture. A homeoblastic-granoblastic structure is visible with microscope with massive and very weakly distinguished oriented texture (Spasovski, 2012).
From a mineralogical aspect these are carbon rocks made of mostly dolomite. The calcite is not very present – that is sample T-6. The dolomite crystals are mostly present in irregular to hypidiomorphic form and are slightly extended in a direction to orientation of the rock. The extension of the crystals is more strongly pointed in sample T-2 (light grey dolomite marble). The average granulation of the dolomite crystals is from 45-65 microns seen in all samples. Microcavities are noticed at the sample marked T-33 but are very rare, while microcavities are also visible at sample T-24.

Table 1. Chemical analysis of the marble the Tumba area

<table>
<thead>
<tr>
<th>Components (%)</th>
<th>SiO₂</th>
<th>Al₂O₃</th>
<th>Fe₂O₃</th>
<th>CaO</th>
<th>MgO</th>
<th>Loss of ignition</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-2</td>
<td>0,80</td>
<td>0,40</td>
<td>0,10</td>
<td>31,13</td>
<td>20,34</td>
<td>46,67</td>
<td>99,44</td>
</tr>
<tr>
<td>T-6</td>
<td>0,70</td>
<td>0,36</td>
<td>0,05</td>
<td>33,96</td>
<td>17,89</td>
<td>46,65</td>
<td>99,61</td>
</tr>
<tr>
<td>T-24</td>
<td>0,06</td>
<td>0,22</td>
<td>0,07</td>
<td>31,18</td>
<td>20,74</td>
<td>47,05</td>
<td>99,86</td>
</tr>
<tr>
<td>T-33</td>
<td>1,20</td>
<td>0,38</td>
<td>0,05</td>
<td>30,08</td>
<td>20,80</td>
<td>46,62</td>
<td>99,13</td>
</tr>
<tr>
<td>T-39</td>
<td>0,80</td>
<td>0,35</td>
<td>0,05</td>
<td>32,83</td>
<td>19,52</td>
<td>45,65</td>
<td>99,20</td>
</tr>
</tbody>
</table>

According to the petrological, mineralogical-microscopic examinations and chemical analyses of these dolomite marbles they can be widely used in the civil engineering mostly in low-building, concrete mixes, hydrotechnical works, etc. It can be also used as an architectonic stone while allowing macrotextonics to be able to excavate larger blocks.

PHYSICAL - MECHANIC EXAMINATIONS
At the department of geotechnical engineering at the Faculty of Civil engineering certain examinations for the strength of monolith parts of white dolomite marble from the locality Tumba – Prilep were made.
A great number of samples to test the pressure strength, strength on one point, volume weight and the absorption of the dampness, as basic classification parameters.
The results from the examination of the point load are presented in encl. 1. According to the examinations the value of the physical - mechanical characteristics is in the following frame:
• Average value Js(50)=2,72 to 3,63 dependent on the testing
• The volume weight is in a diapason of =27,87-28,24 kN/m³
• Absorption of dump is in the frame of U=0,15-0,16 %
• The strength of the pressure is sp=134-171,1 MPa, but in separate number of samples there are also values of sp=65,2-65,5 MPa.
In accordance with the performed examinations it can be stated that the dolomite marble has favorable characteristics to be used as an architectonic-building stone (Spasovski, 2012).
The present lower values point that the surface areas have weaker parties which should be taken into consideration in the process of exploitation.
It should be also noted that the samples are taken from the surface of the field and usually the more authoritative results are from the deeper zones, where the results are got through research drilling, testing and examination.

THE MINING RESERVES
Based on the performed evaluations of the mining reserves it can be noted that the research space is promising in a perspective of exploitation of white dolomite marbles. The very fact that within field I were estimated 9,586,976 m$^3$ geological mining reserves from category B and 16,826,333 m$^3$ from C$_1$ category and geological mining reserves in the field II 8,688,725 m$^3$ from category B and 21,346,275 m$^3$ from C$_1$ category or a total of B+C$_1$ 56,448,309 (m$^3$) is a real indicator for the possibilities of the researched area. In this opportunity it is necessary to note that the performed evaluations of the geological mining reserves are made without deep research drilling which is necessary for separating reserves from category A and of course confirming the reserves from B and C$_1$ and also the possibilities of the researched space.

CONCLUSION
Based on the presented detail and geological research on the concessive area in the location Tumba, the following conclusions can be made:
With the geological mapping three types of marbles are selected: stratified to massive dolomite marbles, tectonized dolomite marbles and stratified dolomite marbles. The separated rocks represent dolomite marbles characterized with white color and saccharine, sugar like appearance, massive, stratified to bedded - sheet like With the geological research the massiveness and compactness of the marbles was completely defined. According to the color, on the geological map mostly predominate the dolomite marbles with clearly apparent white color and dolomite marbles with grayish-white color. Dolomite marbles with white color are mostly found in the research space and can clearly be differentiated from the grayish-white and grey dolomite marbles. From a mineral point, the carbon rocks are mostly dolomite. The samples are determined as finer grained dolomite marble, which are very clear in their mineral and chemical content. The presence of MgO is over 19,52%, only in the sample marked T-6. MgO is present with 17,89%
According to the petrologic, mineral – microscopic testing these dolomite marbles can be widely applied in the civil engineering, mostly in low-construction, for concrete mixtures, hydro-technical works, etc. They can also be used as an architectonic stone provided the micro-tectonics allows larger blocks to be detached. In the researched field, three promising parts are selected that will be the research subject in the second phase i.e. a research drilling is planned in the selected parts. These promising parts will be presented afterwards with the supplement on topography base where the designed research drills will be presented.
In accordance with the completed research, the dolomite marble is evaluated with favorable characteristics for its use as architectonic-building stone. Notable lower values point out that areas even have weaker components, which needs to be taken into account before eventual exploitation. It is noted that the samples are taken from the surface of the field, even though the more trustworthy results are usually from deeper zones normally that data is received with research drilling, sampling and examination. The research space has a good perspective merely for exploitation of white dolomite marbles.

REFERENCES
Rakicevic, T., Stojanov, R., Arsovski, M.,(1965a): Explanation for the page Prilep, BGM SFRY 1 : 100 000, Geological Institute, Skopje. pp. 67
Rakicevic, T., Stojanov, R., Arsovski, M., (1965b): Explanation for the page Vitoliste, BGM SFRY 1 : 100 000, Geological Institute, Skopje. Pp. 65