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Prof.dr.sc. Rejhana Dervišević  
Glavni i odgovorni urednik

## *U susret jubilejima 2018. godine*

<i>60 godina</i>	<i>osnivanja Više tehničke škole rudarske struke</i>
<i>55 godina</i>	<i>izdavačke djelatnosti Fakulteta</i>
<i>45 godina</i>	<i>Geološkog odsjeka</i>
<i>20 godina</i>	<i>Građevinskog odsjeka</i>

Polovinom prošlog stoljeća, 1953. godine, donesena je Uredba kojom je odlučeno da se u Narodnoj Republici Bosni i Hercegovini otvori rudarski fakultet. Uredba nije precizirala lokaciju, a u opciji su bili gradovi Sarajevo i Tuzla. Angažovanjem Društva inženjera i tehničara Tuzlanskog basena i uticajnih javnih ličnosti, donešena je odluka da se fakultet otvori u Tuzli.

U Tuzli su već djelovale Srednja tehnička škola, Rudarska nadzornička škola (pri rudniku Kreka) i Industrijska škola, čime je generisana kadrovska baza za fakultet, uz evidentnu potrebu za daljim usavršavanjem zaposlenih u oblasti rudarstva, koje je u Bosni i Hercegovini uvijek predstavljalo značajnu privrednu granu.

Rudarski fakultet u Tuzli osnovan je na osnovu zakona Narodne skupštine BiH 1960. godine, kojim je Viša rudarska škola u Tuzli prerasla u Rudarski fakultet Univerziteta u Sarajevu. Viša tehnička škola rudarske struke u Tuzli je osnovana 1. februara 1958. godine. Viša tehnička škola je ubrzo preimenovana u Visoku tehničku školu za pogonske inženjere rudarske struke. Studenti Više tehničke škole rudarske struke su nastavili školovanje na novoosnovanom Fakultetu.



Svečano otvaranje Rudarskog fakulteta u Tuzli održano je u subotu 8.10.1960. godine, u zgradi izgrađenoj 1957.godine. Otvaranju su prisustvovali Hajro Kapetanović, ispred Izvršnog vijeća

BiH, prof.ing. Fazlija Alikadić, prorektor Univerziteta u Sarajevu, Milenko Savić, predsjednik Narodnog odbora Tuzlanskog sreza, ing. Branko Popović, dekan Tehnološkog fakulteta u Tuzli, ing. Branko Jakanović, redovni profesor Rudarskog fakulteta u Beogradu, članovi Komisije matičara, predstavnici rudnika, radnih kolektiva, studenti i drugi gosti.

Prof. Branko Jakanović, član Komisije matičara, u svečanom govoru, naveo je da ideja otvaranja Rudarskog fakulteta u Tuzli datira još iz 1921. godine, a da se ideja realizovala 1958. godine otvaranjem Visoke tehničke škole koja je prerasla u Fakultet. Rudarski fakultet u Tuzli je bio četvrti rudarski fakultet otvoren u nekadašnjoj FNRJ i SFRJ, a drugi fakultet, nakon Tehnološkog, otvoren u Tuzli.

Dr.sc Ivan Soklić, prvi nastavnik geologije na tek osnovanom Rudarskom fakultetu, zajedno sa ostalim geozozima – zaposlenicima Fakulteta, angažuje se na osnivanju Odsjeka za primijenjenu geologiju. Nakon četrnaest godina rada Rudarskog fakulteta, akademske 1973/74. godine utemeljen je Odsjek za primijenjenu geologiju, a Rudarski fakultet je prerastao u Rudarsko-geološki fakultet.

Rudarsko-geološki fakultet postaje član Univerziteta u Tuzli njegovim osnivanjem 1976. godine. Naredne godine Fakultet postaje jedan od tri OOUR-a Radne organizacije Rudarsko-geološki institut i fakultet, u sastavu složene organizacije udruženog rada Titovi rudnici uglja - Tuzla. Na Rudarsko-geološkom fakultetu realizovao se nastavno-naučni proces, a u Institutu za rudarska istraživanja nastavnici i saradnici su se, kroz zajedničke timove, bavili naučnoistraživačkim radom. Ovakav model nije dao očekivane rezultate, te se Rudarsko-geološki fakultet od januara 1990. godine konstituisao kao samostalna organizacija u sastavu Univerziteta u Tuzli.

Rudarsko-geološki fakultet je prolazio kroz različite razvojne faze, usmjeren na razvojne potrebe privrede. Akademske 1998/99. godine utemeljen je Građevinski odsjek, a Fakultet prerasta u Rudarsko-geološko-građevinski fakultet. Odsjek za bušotinsku eksploataciju mineralnih sirovina osnovan je akademske 2000/01. godine, a odsjek Sigurnosti i pomoći ak. 2004/05.godine, tako da se naučna i nastavna djelatnost Rudarsko-geološko-građevinskog fakulteta danas realizuje na pet studijskih odsjeka i 15 užih naučnih oblasti.

INSTITUT ZA RUDARSKA I HEMIJSKO-TEHNOLOŠKA ISTRAŽIVANJA  
TEHNOLOŠKI FAKULTET I RUDARSKI FAKULTET  
SARAJEVSKI UNIVERZITET

Institute of Mining and Chemical Researches  
Faculty of Technology and Faculty of Mining of  
The University of Sarajevo

Институт рударско-хемијско-технолошког истраживања  
Технолошки факултет и Рударски факултет  
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TUZLA

**ARHIV ZA TEHNOLOGIJU**  
(Technologica Acta)

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SARAJEVSKI UNIVERZITET

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Технолошки факултет и Рударски факултет  
Сарајевски универзитет

TUZLA

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I  
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SOUR - TITVOI RUDNICI UGLJA U TUZLI  
(UNIVERZITET U TUZLI)  
RADNA ORGANIZACIJA RUDARSKO-GEOLOŠKI INSTITUT I FAKULTET TUZLA  
ОУОУ Рударско-геолошки институт  
ОУОУ Рударско-геолошки факултет

Сарајевски универзитет  
Универзитет у Тuzли

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TUZLA

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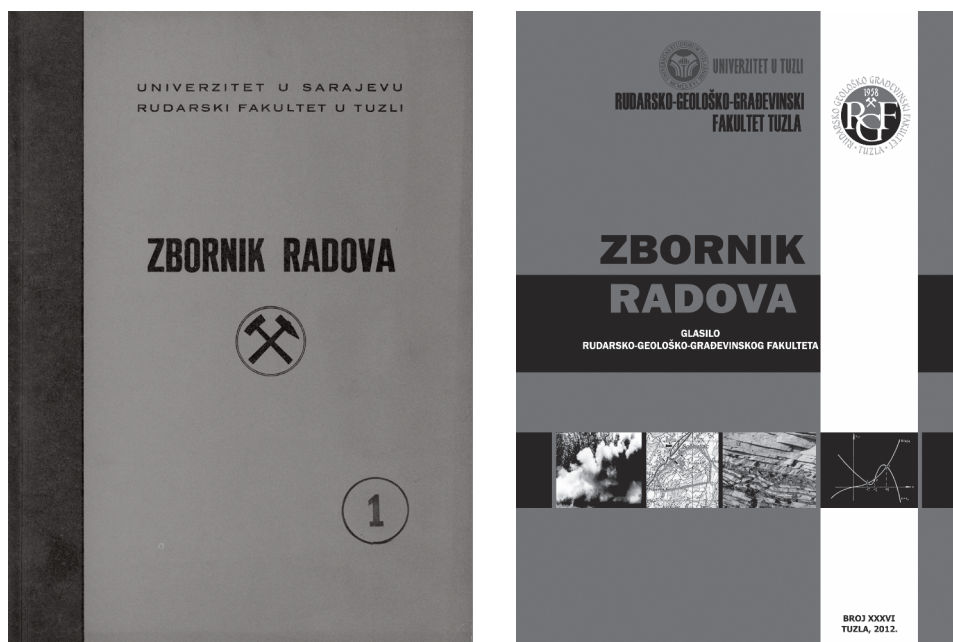
Izdavačka djelatnost Fakulteta započela je njegovim osnivanjem. Nakon nekoliko godina rada Tehnološkog i Rudarskog fakulteta i Instituta za rudarska i hemijsko-tehnološka istraživanja, ove institucije su postigle značajne rezultate i započele proces povezivanja privrede, nauke i visokog obrazovanja. Prvo izdanje je bio časopis pod nazivom "Arhiv za tehnologiju" (Technologica Acta) čiji prvi broj je štampan 1963. godine kao zajedničko izdanje Tehnološkog fakulteta i Rudarskog fakulteta Sarajevskog univerziteta, i Instituta za rudarska i hemijsko-tehnološka istraživanja

Tuzla. Pet godina kasnije, 1968. godine, časopis je štampan pod nazivom "Arhiv za rudarstvo i tehnologiju" (Technologica Acta). U 17. godini svog postojanja časopis mijenja naziv u "Arhiv za rudarstvo i geologiju" i postaje glasilo RO Rudarsko-geološkog instituta i fakulteta u Tuzli, tj. njenih osnovnih organizacija udruženog rada: Instituta za rudarska istraživanja, Rudarsko-geološkog fakulteta i Elektronske obrade podataka Tuzla, u okviru SOUR-a "Titovi rudnici uglja" u Tuzli.

Arhiv za rudarstvo i geologiju je naslijedio Arhiv za tehnologiju, odnosno Arhiv za rudarstvo i tehnologiju i, u kontinuitetu, najmanje jednom godišnje, izlazio je od 1979. do 1988. godine.

Od 1971. godine na Rudarskom fakultetu započinje izdavanje još jednog naučno-stručnog časopisa pod nazivom "Zbornik radova". Časopis je izlazio na godišnjoj osnovi, a zadnji broj (XXXVI) štampan je 2012. godine. Kroz sve te godine, od kojih mnoge nisu bile niti lake niti naklonjene izdavaštvu, Zbornik radova je zadržao svoj prepoznatljivi kvalitet.

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## VAŽNOST POZNAVANJA MINIMALNE TEMPERATURE UPALE OBLAKA ZAPALJIVIH PRAŠINA KOD ODREĐIVANJA DGE PRAŠINE U HIBRIDNOJ SMJESI

Jelena Marković<sup>1</sup>, Mario Mačković<sup>2</sup>

### SAŽETAK

U mnogim granama industrije mogu se formirati smješe zapaljivog plina ili pare sa prašinom u zraku, kisiku ili nekom drugom plinu koje se označavaju kao hibridne smjese. U podzemnim rudnicima uglja hibridnu smjesu najčešće formiraju metan - ugljena prašina - zrak. Utjecaj metana na eksplozivne karakteristike ugljene prašine je dokazan ali nije u potpunosti istražen. Budući da se ispitivanja eksplozivnih karakteristika ugljene prašine u laboratorijskim uvjetima najčešće provode u sistemu ugljena prašina – zrak, za određivanje donje granice eksplozivnosti ugljene prašine u navedenoj hibridnoj smjesi, koristi se obrazac W.Bartknecht-a, u kojem od parametara egzistira i donja granica eksplozivnosti metana. U literaturi se uglavnom ne navodi podatak da se radi o vrijednosti donje granice eksplozivnosti metana pri minimalnoj temperaturi upale oblaka ugljene prašine i energiji pripale eksplozivne smjese ugljena prašina-zrak a ne kako se instiktivno misli na vrijednost DGE za sadržaj metana od 5% i referentnu temperaturu od 21°C, koja se najčešće koristi. Sukladno tome, pri minimalnoj temperaturi upale oblaka prašine mrkog uglja utvđenoj za bosanskohercegovačke ugljeve, koje se kreću od 415-550°C, smanjuje se DGE metana i do 40% u odnosu na vrijednost pri referentnoj temperaturi. Cilj ovog rada je da ukaže na važnost poznavanja minimalne temperature oblaka zapaljivih prašina kao neophodnog parametra za određivanje DGE prašina u hibridnoj smjesi kao i na moguće greške prilikom njenog određivanja, što bi u konačnici utjecalo i na ocjenu ugroženosti jamskih prostorija od eksplozije ugljene prašine.

**Ključne riječi:** hibridne smjese, ugljena prašina, metan, donja granica eksplozivnosti

Rad objavljen u: Bilten Agencije za prostore ugrožene eksplozivnom atmosferom 2014.

[http://www.ex-agencija.hr/wp-content/uploads/2015/02/ExBilten2014\\_v0.pdf](http://www.ex-agencija.hr/wp-content/uploads/2015/02/ExBilten2014_v0.pdf)

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## ERUPCIJA METANA NA ISTRAŽNOJ BUŠOTINI ZA VODU

Jelena Marković<sup>1</sup>, Snežana Mićević<sup>2</sup>

### SAŽETAK

Rad opisuje erupciju metana koja se dogodila januara 2008. godine na istražnoj bušotini za vodu u naselju Gornje Dubrave, a u neposrednoj blizini ležišta uglja PK "Dubrave". Budući da se pri izvođenju radova bušenja za potrebe vodosnabdjevanja ne vrši posebno istraživanje u pogledu prisutnosti ili potencijalnog izboja zapaljivih plinova, ovim radom se želi ukazati na potrebu istraživanja i procjenu mogućnosti nastanka erupcije plinova, te u skladu s tim definisanje zona opasnosti i preduzimanje preventivnih mjera, kako bi se zaštitili ljudski životi i spriječio nastanak velikih materijalnih šteta.

**Ključne riječi:** erupcija, metan, istražno bušenje, bunari

Rad objavljen u: Bilten Agencije za prostore ugrožene eksplozivnom atmosferom 2014.

[http://www.ex-agencija.hr/wp-content/uploads/2015/bilten2015/Ex-Bilten\\_63.pdf](http://www.ex-agencija.hr/wp-content/uploads/2015/bilten2015/Ex-Bilten_63.pdf)

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## IMPACTS OF SLAG AND ASH DEPOSITION ON SURROUNDING AGRICULTURAL SOIL

Jelena Marković<sup>1</sup>, Snežana Mičević<sup>2</sup>, Zvezdan Karadžin<sup>1</sup>

### ABSTRACT

Significant quantities of slag and ash are produced as side burning products in thermal power plants. It concerns a solid technological waste that requires proper disposal. The slag and ash produced by coal combustion contain various elements including heavy metals with toxic properties. Soil used for agricultural purposes in the vicinity of the deposition sites (for production of food for humans and animals) was examined for its fertility properties and content of heavy metals at a location closest to the deposition site, that is in the final phase of usage. Analyses of pH value analysis at representative samples show that acidic reaction of soil was detected. Content of phosphorous and nitrogen was within the permitted limits, whereas potassium level was below levels required for proper plant growth. Concentrations of majority of heavy metals were below limit values, while concentrations of chromium, nickel and zink were manyfold above the permitted limits.

**Key words:** slag and ash deposition sites, soil, fertility, heavy metals

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## TESTING OF DUST EXPLOSION CHARACTERISTICS OF BROWN COAL AT REDUCED OXYGEN CONTENT

Jelena Marković<sup>1</sup>, Rijad Šišić<sup>1</sup>, Safer Demirović<sup>2</sup>

### ABSTRACT

According to the test results of explosive characteristics, all types of coal dust from the mines in Bosnia and Herzegovina have been classified as dangerous explosive dust. This paper reviews the effect of oxygen volume content in air on the explosive characteristics of brown coal dust. Testing was performed in laboratory conditions by the method described in EN 14034-1. Special emphasis was paid to the efficiency of nitrogen and carbon dioxide, which were used for the reduction of oxygen content.

**Keywords:** brown coal, dust, explosive characteristics, limiting oxygen concentration (LOC), inertisation, N<sub>2</sub>, CO<sub>2</sub>

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[http://www.academia.edu/6586472/Journal\\_of\\_Society\\_for\\_development\\_in\\_new\\_net\\_environment\\_in\\_B\\_and\\_H](http://www.academia.edu/6586472/Journal_of_Society_for_development_in_new_net_environment_in_B_and_H)

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## FOLDING AND FAULTING OF THE LIMESTONE MASSIF TRIGGERED BY DEEP- SEATED CRUSTAL LINEAMENT (DUBOKI POTOK-BIJELA RIJEKA, BOSNIA AND HERZEGOVINA)

Rejhana Dervisevic,<sup>1</sup> Indira Sijercic<sup>1</sup>, Hamo Isakovic<sup>1</sup>

### ABSTRACT

Engineering geologic exploration of the limestone massif "Duboki Potok-Bijela rijeka" was performed continuously since 2002 to nowadays with the aim to determine the exploitation conditions in the quarry. These explorations include detailed recording of all types of discontinuity, statistical and kinematical analysis of a large number of data, as well as identification of their genesis related to regional tectonic structure of the area.

Dominant influence on the formation of structural-tectonic forms in limestone massif had movement along the deep seated fault Tinja-Moluhe located in the immediate vicinity. This limestone massif has an anticline form - its north limb is steeper and dips towards the fault Tinja-Moluhe. Detailed kinematical analysis was performed using the stereographic projection, based on slickenside lineation registered on the faults and bedding planes.

Obtained results show that the folding and faulting directions of the limestone massif have been triggered by horizontal movements as well as related tectonic blocks shifting along the deep-seated lineament/fault Tinja-Moluhe. Detailed analysis revealed a relationship between joint sets and the anticline north limb.

**Keywords:** engineering geology exploration, regional tectonic structure, fault, fold, joint set, stereographic projection

Rad objavljen u: International Multidisciplinary Scientific GeoConference: SGEM: Surveying Geology & mining Ecology Management; Sofia, 2013.

<https://search.proquest.com/openview/e5258f0c67deda61c9eef828587c311b/1?pq-origsite=gsc-holar&cbl=1536338>

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## INTEGRATED GEOLOGICAL EXPLORATION TO POWER GENERATION PLANT. CASE STUDY: KONGORA COAL DEPOSIT, TOMISLAVGRAD, BOSNIA AND HERZEGOVINA

Hamo Isakovic<sup>1</sup>, Rejhana Dervisevic<sup>1</sup>, Indira Sijercic<sup>1</sup>

### ABSTRACT

In the area of Neogene's basin Tomislavgrad, back in the 19th century, found were brown coal in the northern part, area of the village Eminovo selo and lignite in the area of Kongora village, in the southern part of the basin. Exploration in this area began after the Second World War, with a different scope and intensity. With a purpose to prove the quantity and quality of coal in Kongora, 49 new exploratory boreholes were drilled with a total length 6055 m, and over 1000 different coal analyses. This complex research of geological and tectonic relations, development of coal seams and deposit composition, hydro geological and engineering geological properties as well as extensive laboratory tests for coal quality determination have proven lignite quality and reserves.

This paper provides basic information of the coal reserve and the quality which indicates sufficient to supply coal as fuel for two 275 MW each fired power plant for more than 35 years. Kongora coal deposit represents only 4% of the total productive coal area which improve the reliability and security of the domestic power supply in Bosnia and Herzegovina.

**Keywords:** complex geological exploration, lignite deposit, quality and reserves

Rad objavljen u: International Multidisciplinary Scientific GeoConference: SGEM : Surveying Geology & mining Ecology Management; Sofia, 2013.

<https://search.proquest.com/openview/afee75f655344f7520c97f7de41a0705/1?pq-origsite=gsc-holar&cbl=1536338>

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## RAINFALL-TRIGGERED LANDSLIDES CASE STUDY: GRADACAC MUNICIPALITY, BOSNIA AND HERZEGOVINA

Sijercic Indira<sup>1</sup>, Dervisevic Rejhana<sup>1</sup>, Isakovic Hamo<sup>1</sup>, Salkic Zehra<sup>1</sup>

### ABSTRACT

Natural hazards, such as landslides and floods, caused by climate change have been recently more frequent in Bosnia and Herzegovina and the countries in the region. During the past two decades, at different time intervals, seasonal anomalies in temperatures and heavy rainfall have been recorded that go beyond the average (or long-term) value recorded in the past 120 years. In each subsequent period of increased rainfall the number of landslides increased as well, triggering the occurrence of new landslides and the reactivation of the old ones. Gradačac Municipality is a municipality in the north of Tuzla Canton (BiH) with a serious landslide hazard. Most urban and rural settlements in the municipality are situated on gentle to steep slopes susceptible to the occurrence of landslides. By 2014 over 400 landslides which accounted for more than 10% of the municipality territory were recorded in Gradačac Municipality, and in 2014 alone 368 landslides were registered that caused more severe economic losses to private and public property, psychological trauma in the population and the enormous damages that exceed the capabilities of the municipality and the wider community. In order to mitigate the landslide hazard in local communities, it is important to develop a strategy for planning and management both at local and national level, which requires significant financial resources.

**Keywords:** natural hazards, heavy rainfall, landslides, monitoring

Rad objavljen u: International Multidisciplinary Scientific GeoConference : SGEM: Surveying Geology & mining Ecology Management; Sofia, 2015.

<https://search.proquest.com/openview/e4acac066b94cb568f6380c19348bdb6/1?pq-origsite=gsc-holar&cbl=1536338>

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## GROUND SURFACE DEFORMATION OF THE URBAN AREA IN COMPLEX ENGINEERING-GEOLOGICAL CONDITIONS IN THE SINKING TOWN OF TUZLA (BOSNIA AND HERZEGOVINA)

Indira Sijerčić<sup>1</sup>, Rejhana Dervišević<sup>1</sup>, Ruža Čeliković<sup>1</sup>,  
Francesco Mancini<sup>2</sup>, Francesco Stecchi<sup>3</sup>

### ABSTRACT

Centuries-long exploitation of rock salt from Tuzla salt deposit has produced significant deformation of the ground surface and buildings in the town of Tuzla. The southern edge of the deposit dips beneath the northern part of the town. Although relatively small size, the deposit represents an extremely complex geological body

The slow, natural processes of dissolution of the deposit's eastern part were accelerated by industrial exploitation of saline water (brine) that lasted over 100 years. Exploitation of the western part of the deposit started much later in 1967, by classical dry underground mining.

Natural processes and applied exploitation works endangered part of the town above the deposit. Subsidence has reached its peak in 70-s of the last century, when the city lost huge number of its residential, commercial and cultural facilities. Although the salt exploitation ended (2004 and 2007) very complex processes of degradation of wider deposit environment and urban areas are still ongoing, with visible consequences on the ground surface.

Featured are the geodynamic phenomena and deformation caused by a complex structural-tectonic structure of the terrain. Analyzed were also geodetic monitoring data for the period 1956-2010 which present important information about the processes of ground surface movements.

Deformation on the ground surface is being developed under the influence of various factors. In the part of the town that was investigated and presented in this paper, the consequences of the salt deposit exploitation on the ground surface are predisposed by complex terrain structure.

**Keywords:** ground deformation, salt deposit, complex structural-tectonic conditions

Rad objavljen u: 11th International Multidisciplinary Scientific GeoConference SGEM2011.

<http://www.citeulike.org/group/18367/article/13486203>

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## KLASIFIKACIJA DISKONTINUITETA U KREČNJAČKOM MASIVU KAMENOLOMA "DUBOKI POTOK-BIJELA RIJEKA"

Indira Sijerčić<sup>1</sup>, Rejhana Dervišević<sup>1</sup>

### SAŽETAK

Inženjerska svojstva većine intaktnih stijena obično su zadovoljavajuća, dok u stijenskim masama ona više zavise od diskontinuiteta nego od fizičkih karakteristika intaktne stijene. Diskontinuiteti predstavljaju ravnine unutar stijenske mase preko kojih je stijenski materijal strukturno deformisan, oni imaju malu tenzionu čvrstoću ili je uopšte nemaju. Osnovni cilj sistematskih izučavanja predstavlja upoznavanje prostornog položaja, geometrijskih veza, kao i genetskih i simetroloških veza diskontinuiteta sa ostalim strukturnim elementima područja.

Sistematska izučavanja diskontinuiteta u krečnjačkom masivu "Duboki Potok-Bijela Rijeka" kod Srebrenika, vršena su na radnim etažama istoimenog kamenoloma, od 2002. godine do danas. Dobiveni rezultati istraživanja primijenjeni su na radne kosine kamenoloma radi identifikacije potencijalnih nestabilnosti kod izvođenja inženjerskih radova u stijenskim masama.

**Ključne riječi:** diskontinuiteti, Šmitovi dijagrami, stabilnost kosina

Rad objavljen u: Zbornik radova V savjetovanja geologa BiH sa međunarodnim učešćem (elektronska verzija), Pale, 2013.

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## INŽENJERSKO GEOFIZIČKO-SEIZMOLOŠKA ISTRAŽIVANJA NA LOKALITETU ZGONI U MOSTARU

Eldar Husejnagić<sup>1</sup>, Rejhana Dervišević<sup>1</sup>, Božo Padovan<sup>2</sup>, Nikica Vidović<sup>1</sup>

### SAŽETAK

U sklopu geotehničkih istražnih radova na lokaciji Zgoni u Mostaru izvedena su geofizička istraživanja sa ciljem određivanja fizičko-mehaničkih karakteristika plićeg podzemlja, te definisanja seizmičkog hazarda na istraživanoj lokaciji. Istraživanja su obuhvatila inženjerskogeofizička mjerenja u svrhu izrade detaljnog geotehničkog modela i kategoriziranja tla prema Eurokodu-8, prikupljanje makroseizmičkih podataka kao i analizu kataloga potresa, proračun parametara maksimalne vršne akceleracije i maksimalnog intenziteta, mjerenja mikrotremora na lokaciji i proračun HVSR spektara, te izradu sintetskog akcelerograma.

Inženjersko-geofizička istraživanja obuhvatila su primjenu metode seizmičke refrakcije P i S-talasa, višekanalne analize površinskih talasa, MASW-a, te geoelektrične tomografije. Cilj ovih istraživanja je bio da se dobije pouzdan geotehnički model, definisan brzinama P i S-talasa i vrijednostima električne otpornosti, a kojim će se odrediti dubina do osnovne stijene, brzine u slojevima iznad osnovne stijene, ustanoviti zone jače saturiranosti vodom, te pomoću prosječne brzine S-talasa u prvih trideset metara dubine, Vs-30, kategorizirati tlo prema Eurocode-8.

Inženjersko-seizmološkim istraživanjima određeni su parametri maksimalne akceleracije tla i intenziteta potresa na nivou osnovne stijene. Za proračun parametara maksimalnog intenziteta, maksimalne akceleracije i koeficijenta seizmičnosti primjenjena je deterministička metoda. Kako bi se pouzdanije procijenio uticaj lokalnog tla, izvedena su i mjerenja mikrosezmičkog nemira te je izrađen sintetski akcelerogram i spektar odziva tla.

**Ključne riječi:** seizmički rizik, inženjerska geofizika, mikrosezmički nemir

Rad objavljen u: Zbornik radova V savjetovanja geologa BiH sa međunarodnim učešćem (elektronska verzija), Pale, 2013.

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## FRESHWATER AND MARINE MIOCENE ON THE ČAKLOVIĆI CROSS SECTION IN TUZLA BASIN

Sejfidin Vrabac<sup>1</sup>, Izudin Đulović<sup>2</sup>, Elvir Babajić<sup>3</sup>,  
Samir Ustalić<sup>4</sup>, Adem Mujanović<sup>4</sup>, Miralem Kamerić<sup>4</sup>

### ABSTRACT

The Čaklovići geological cross-section is located in the Tuzla basin, about 7 km south-eastern from the Tuzla. The southern limb of Čaklovići anticline is made by sedimentary rocks. Based on paleontological research and principle of superposition, the sedimentary rocks of this area are divided on the Lower and the Middle Miocene. The Lower Miocene is dominantly composed by laminated and thinly stratified marlstones in which we can find layers of conglomerates and sandstones. Laminated marlstones contain pieces of mollusc shells. The basis of the Lower Miocene is made from tuff layer that is about 3 meters thick. These sediments were deposited in a coastal part of a freshwater lake. Total thickness of the Lower Miocene sediments is about 33 meters. The Middle Miocene is defined based on foraminifera, which belong to zones of the Lower Badenian. The older part of the Lower Badenian is represented by *Ammonia viennensis* and *Nonion commune* zone. This zone is exclusively represented by marlstones with massive structure. Layered marlstone is only found in one centimetric interval, in the upper part of this zone. Typical macrofossil associations for this part of the Lower Badenian are *Aporrhais* and *Tellina*. These molluscs in Tuzla basin are represented in immediate upper layer of rock salt deposits, in which we can find identical foraminifera zone. Massive marlstones of the older part of the Lower Badenian were deposited in infralittoral zone of the Central Paratethys, and their thickness is about 50 meters. The last part of researched Čaklovići cross-section is made by massive marlstones, sandstones and conglomerates. This sequence of geological cross-section is a part of the Lower Badenian, precisely it belongs to the zone *Globigerinoides trilobus* and *Orbulina suturalis*. Typical macrofossils of younger part of the Lower Badenian are *Vaginella* and *Corbula*. Sediments of this the Badenian section were deposited in circalittoral of the Central Paratethys. Their researched thickness is about 7 meters, and their total thickness is over 100 meters for sure. Based on previously researched cross-sections of the Lower Badenian in the Tuzla basin, it was concluded that same foraminifera zones are identical to nannoplankton zone NN5 (Martini, 1971). Čaklovići cross-section points out that in this part of the Tuzla basin, there were no salt formation deposits and in this part of the basin marine deposits are found unconformitally over freshwater lake sediments. These marine deposits are regularly representing immediate roof sediments of the salt formation. The studied cross-section is a exception in the Tuzla basin, and it's unique because of the fact that the margin between foraminifera zones is visible because of the erosion, hence it's available for different geological researches.

**Keywords:** freshwater Miocene, Lower Badenian, foraminifera, Tuzla basin, Central Paratethys

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<http://eprints.ugd.edu.mk/18285/1/01-Abstract.pdf>

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## MIDDLE MIOCENE CALCAREOUS NANNOPLANKTON FROM THE SOUTHERN PANNONIAN BASIN (BOSNIA AND HERZEGOVINA)

Stjepan Ćorić<sup>1</sup>, Đurđica Pezelj<sup>2</sup>, Oleg Mandić<sup>3</sup>, Sejfudin Vrabac<sup>4</sup>

### ABSTRACT

Paleoenvironmental analyses based on calcareous nannoplankton and foraminiferal distribution were carried out on samples from a locality at the village of Bogutovo near Ugljevik. During the middle Miocene, the region was positioned on the southern margin of the Pannonian Basin and the Central Paratethys Sea. The studied section is a sedimentary succession that is dominated by marine marls with a single limestone package near the middle. Samples from borehole UI568 were also studied. All assemblages are dominated by small reticulofenestrids, with lesser numbers of *Coccolithus pelagicus*, *Helicosphaera carteri*, *H.walbersdorfensis*, *Holodiscolithus macroporus*, *Reticulofenestra gelida*, *R.seudoumbilicus*, *Sphenolithus moriformis* and *Umbilicosphaera jafari*. *Braarudosphaera bigelowii*, *Calcidiscus leptoporus*, *Coronocyclus nitescens*, *Coronosphaera mediterranea*, *Cyclicargolithus floridanus*, *Geminilithella rotula*, *Pontosphaera multipora*, *Rhabdosphaera sicca* and *Syracosphaera pulchra* are rare but continuous in occurrence.

Above the nonmarine Oligocene sediments from the borehole are sediments that contain some unidentified nannoplankton taxa. Continuous occurrences of the calcareous nannoplankton zonal marker *Sphenolithus heteromorphus* and the absence of *Helicosphaera ampliapertura* in the middle and the upper part of the section allow placement in *Zone NN5*. The last occurrence of *S. Heteromorphus* indicates that the *Zone NN5/NN6* boundary can be placed in the top portion of the studied interval. Using the standard Central Paratethys ecozones for benthic foraminifera, the analyzed time interval includes two zones: the early Badenian (Moravian) upper Lagenidae Zone and the middle Badenian (Wielician) *Spirorutilus carinatus* Zone.

Rad objavljen u: Journal of Nannoplankton Research INA 15 abstracts / Bybell, L.M. (ur.). - Bohol, Philippines, 2015.

[http://webmail.untz.ba/service/home/~/?auth=co&loc=en\\_US&id=27538&part=4](http://webmail.untz.ba/service/home/~/?auth=co&loc=en_US&id=27538&part=4)

<http://bib.irb.hr/prikazi-rad?rad=767985>

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## DISKORDANCIJA IZMEĐU BADENA I SARMATA U PROFILU SPASINE KOD UGLJEVIKA

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### SAŽETAK

Profil Spasine nalazi se oko 1 km jugoistočno od Termoelektrane Ugljevik (sjeveroistočna Bosna i Hercegovina) na južnom obodu Panonskog bazena. Sedimenti ovog profila otkriveni su tokom eksploatacije uglja na površinskom kopu Bogutovo Selo. U gornjem badenu izdvojene su zona *Bolivina dilatata maxima* i zona *Ammonia viennensis*. Donji sarmat je predstavljen zonom *Anomalinoidea dividens* odnosno *Mohrensternia* slojevima. Ovo je prvi profil na području Ugljevika u kojem su definisane foraminiferske zone kao u Tuzlanskom bazenu, okolini Beograda, okolini Zagreba i Bečkom bazenu. Na osnovu krečnjačkog nanoplanktona određeno je da istraživani sedimenti pripadaju zoni NN6. Značajnu karakteristiku ovog profila predstavlja izrazita dominacija laminiranih laporaca. Profil Spasine je posebno specifičan jer je u njemu između gornjeg badena i donjeg sarmata konstatovana eroziona diskordancija koja je posljedica djelovanja moldavske orogenetske faze. Krajem badena ovdje je došlo do regresije Centralnog Paratetisa i erozije gornjebadenskih sedimenata. Ima još profila na prostoru sjeverne Bosne gdje je dokazan diskordantan odnos badena i sarmata, ali je ovo prvi put da je definisana diskordancija između mlađe zone gornjeg badena i najstarije zone donjeg sarmata. Pouzdan dokaz te diskordancije je neravna, erodovana površina gornjeg badena na kojoj se nalazi bazalni sloj sarmatskog pješčara koji sadrži proslojke i sočiva uglja. Debljina zone *Ammonia viennensis* je u profilu Spasine erozijom redukovana na oko 1 m. Gornjebadenski sedimenti profila Spasine karakterišu se čestim spikulama spongija, a slična pojava je zabilježena i u gornjebadenskim laminiranim laporcima Gornjeg Vrapča kod Zagreba. Poseban značaj profila Spasine je da su ovdje u gornjem badenu nađeni otisci listova *Daphnogene* (= *Cinnamomum*) i tuf, što predstavlja naučne novine za područje sjeverne Bosne i Hercegovine. Sedimenti profila Spasine taloženi su na južnom obodu Panonskog bazena u Centralnom Paratetisu. Na osnovu laminarne tekture, fragmenata ugljenificiranog bilja, proslojaka uglja, otisaka listova dikotiledona, čestih spikula spongija i plitkovodnih foraminifera (*Ammonia*, *Asterigerinata*, *Cibicides*, *Elphidium*) definisano je da su sedimenti gornjeg badena taloženi u priobalskom infralitoralno Centralnog Paratetisa. Na izrazito oplićavanje morske vode ukazuju proslojci kalkarenita koji sadrže maksimalan broj spikula silicijum spongija. Ostaci ehinida predstavljaju pouzdan podatak za zaključak da je salinitet morske vode tokom gornjeg badena bio normalan (30-40 ‰ - euhalina voda). Bazalni pješčar je taložen u litoralno, tokom transgresije Centralnog Paratetisa. Laminirani laporci i gline, kao i krečnjaci, taloženi su u priobalskom infralitoralno Centralnog Paratetisa. Salinitet morske vode je bio niži nego u badenu i odgovarao je nivou brahihaline vode (18-30 ‰). Na postepen pad saliniteta tokom sarmata ukazuju reliktno foraminifere iz gornjeg badena i spongije. U donjem dijelu stuba sarmata spikule spongija su prisutne, a u mlađim sedimentima (laminirane gline i krečnjaci) nema ostataka spongija.

**Ključne riječi:** gornji baden, diskordancija, donji sarmat, Ugljevik, sjeveroistočna Bosna i Hercegovina, Panonski bazen, Centralni Paratetis

Rad objavljen: I kongres geologa Bosne i Hercegovine 2015.

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## STRATIGRAPHY OF THE MIDDLE MIOCENE SALT DEPOSIT TETIMA NEAR TUZLA (THE CENTRAL PARATETHYS, NORTH BOSNIA)

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### ABSTRACT

During 2008. in the deposit of rock salt Tetima four exploratory boreholes: B-72, B-73, B-81 and B-91 have been done. Sediments of the roof of salt formations have been drilled without coring and salt formation has been drilled with coring. Micropalaeontology sediments samples were taken from the sieve and the core drilling at the distance of 1-5 m. The main goal of the micropaleontologic research was to make biostratigraphic analysis of the salt roof and an attempt to define a new stratigraphic levels. On the basis of foraminifera it was defined the lower Badenian, which is divided into two local foraminiferal zones. The older part of the lower Badenian is presented by *Ammonia viennensis* and *Nonion commune* and the younger part of the lower Badenian makes the zone of *Globigerinoides trilobus* and *Orbulina suturalis*. These zones correspond to Lagenid zone of the Vienna basin. Within these zones the two new bench mark stratigraphic levels have been separated. The first is the immediate roof of salt formation and has a thickness of about 3 m, and the second level is 60-70 m above the salt formation and has a thickness of about 10 m. The first mark stratigraphic level is characterized by an extremely rare, dominantly planktonic foraminifera and lack of zoning type of *Ammonia viennensis* (d'ORBIGNY). The Second mark stratigraphic level is indicated by the presence of species *Uvigerina macrocarinata* PAPP & TURNOVSKY which is in the Central Paratethys related exclusively to the lower Badenian. This species on Tetima is represented in the boundary sediments of isolated foraminiferal zones. In laminated and thinly stratified dolomicrite of immediate substratum of rock salt some very rare foraminifera predominantly planktonic forms *Globigerina praebulloides* BLOW and *Globigerina bulloides* d'ORBIGNY have been found. Discovery of foraminifera in salt formation has confirmed the hypothesis about lagoon genesis and lower Badenian age of rock salt in Tuzla basin. The immediate roof of salt formation is presented with massive marls thickness of 65-80 m. About 3 m above the salt formation species *Ammonia viennensis* (d'ORBIGNY) emerges with the species *Nonion commune* (d'ORBIGNY) which together have the highest frequency and abundance in massive marls.

It is interesting that shells of species *Ammonia viennensis* (d'ORBIGNY) are of orange colour and about three times larger than those in the upper Badenian. Above massive marls there are marls with interbeds of sandstones. These sediments with local foraminiferal zone *Globigerinoides trilobus* and *Orbulina suturalis* have a thickness of 220-242 m. Based on nannoplankton it was determined that the zone *Ammonia viennensis* and *Nonion commune* corresponds to zone NN5 (*Sphenolithus heteromorphus* zone by Martini, 1971), while zone *Globigerinoides trilobus* and *Orbulina suturalis* corresponds to upper part of zone NN5 and lower part of NN6 zone (*Discoaster exilis* zone by Martini, 1971).

The results of these studies will be applied for the next investigations of salt formation.

**Keywords:** Lower Badenian, foraminifera, nannoplankton, stratigraphy

Rad objavljen: Regional Committee on Mediterranean Neogene Stratigraphy 14<sup>th</sup> Congress, Neogene to Quaternary Evolution of Mediterranean, Paratethys and Black sea, Istanbul, 2013.

[https://www.researchgate.net/publication/313105649\\_Stratigraphy\\_of\\_the\\_middle\\_Miocene\\_salt\\_deposit\\_Tetima\\_near\\_Tuzla\\_The\\_Central\\_Paratethys\\_north\\_Bosnia](https://www.researchgate.net/publication/313105649_Stratigraphy_of_the_middle_Miocene_salt_deposit_Tetima_near_Tuzla_The_Central_Paratethys_north_Bosnia)

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## BIOSTRATIGRAFSKE ZONE DONJEG BADENA U PROFILU BUŠOTINE UI – 568/3 KOD UGLJEVIKA

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### SAŽETAK

Tokom 2012 god. u ležištu uglja Ugljevik-istok rađena je bušotina Ui-568/3. Njena konačna dubina je 161,5m. Iz jezgra bušotine uzeto je osam uzoraka za mikropaleontološka istraživanja foraminifera i krečnjačkog nanoplanktona. Prvih sedam uzoraka je iz intervala 7,0-18,8 m dok je osmi uzorak sa dubine 26,7 m. Na osnovu mikropaleontoloških analiza konstatovano je da klastični sedimenti u intervalu 7,0-18,8 m pripadaju donjem badenu, dok uzorak sa dubine 26,7 m pripada slatkovodnim ugljonosnim sedimentima gornjeg oligocena-donjeg miocena.

**Ključne riječi:** donji baden, foraminifere, krečnjački nanoplankton, Ugljevik

Rad objavljen u: Zbornik radova V savjetovanja geologa BiH sa međunarodnim učešćem (elektronska verzija), Pale, 2013.

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## DONJI EOCEN I MIOCEN U PODRUČJU DOKNJA KOD TUZLE

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### SAŽETAK

U području Doknja istraženi su izdanci sedimenata na jugozapadnom i sjeveroistočnom krilu Dokanjske sinklinale. Na osnovu foraminifera definisan je donji eocen, donji baden i sarmat. Donji eocen je određen na osnovu rukovodeće vrste *Nummulites robustus* SCHAUB. Donji baden je predstavljen sa dvije zone. Starija zona je *Ammonia viennensis* i *Nonion commune*, a mlađa *Globigerinoides trilobus* i *Orbulina suturalis*. Sarmat reprezentuje zona *Porosonion granosum*. Donji miocen i panon izdvojeni su na osnovu ostrakoda i superpozicije.

**Ključne riječi:** donji eocen, miocen, Dokanjska sinklinala

Rad objavljen u: Zbornik radova V savjetovanja geologa BiH sa međunarodnim učešćem (elektronska verzija), Pale, 2013.

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## NUMERICAL MODEL OF THREE DIMENSIONAL PANEL AB SKELETAL STRUCTURES ON EXPOSED TO THE EFFECTS OF UNDERGROUND EXPLOITATION

Zahid Bašić<sup>1</sup>, Nedim Suljić<sup>1</sup>

### ABSTRACT

For the numerical model of three-dimensional analysis of the budget has been selected skeletal structural system of reinforced concrete MB30, with two screens in one and three in the other direction, ground floors and two floors.

Calculation of the numerical model is made in programu ADINA-AUI 8.3.1. The purpose of this analysis, previously performed studies of existing dwellings in the village of Lake, located in a narrow field of exploitation zone Pit Omazići "RMU" Banovici. The results allow the distribution of the stress-strain state in certain stages of the simulated operation and also the emergence and development of coating the individual elements of soil and structural elements of the skeletal system of the building, as well as the occurrence of fracture damage in structural elements.

This work is processed and systematized termination or completion of the model, which arises due to the effects of loss of convergence, which leads to breakage in the structure or some elements of the soil.

**Keywords:** numerical model, three-dimensional analysis, constructive, underground mining

Rad objavljen u: Technics Tehnologies Education Management, 2011.

[https://www.researchgate.net/publication/296764865\\_Numerical\\_model\\_of\\_three\\_dimensional\\_panel\\_AB\\_skeletal\\_structures\\_on\\_exposed\\_to\\_the\\_effects\\_of\\_underground\\_exploitation](https://www.researchgate.net/publication/296764865_Numerical_model_of_three_dimensional_panel_AB_skeletal_structures_on_exposed_to_the_effects_of_underground_exploitation)

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## ANALYSIS AND COMPARISON OF ALTERNATIVES CITY CROSSROADS IN TUZLA

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### ABSTRACT

This work presents alternative solutions city road at the junction of the main road M4 and transversal T8 in Tuzla.

Option 1, is defined by the planned reconstruction of the main road M4 at this stage, given that it is located in a horizontal curve. The reconstruction of the main road M4 predicted upgrade two traffic lanes and correction elements horizontal geometry and the vertical alignment over a length of 800 m. Transversal to T8 with bright height of 4.50 m passing beneath the reconstructed highway M4, respectively, the main road to crossing the overpass over the mentioned intersection. Connection leveled roads would be enabled by building two ramps one ascending-descending, and one upward.

Option 2, is defined on the same concept as the variant 1, but without further intervention on the highway M4 except for corrections relating to the provision of the necessary clear height between grade separated junctions. Also, the connection T8 and M4 is achieved by building two ramps one downward and one upward and over the reconstructed two-way road on the north side.

Option 3, is defined as a two-lane roundabout with a single-lane entryway /outputs width of 4.5 meters on the main road M4, and two-lane entryway /outputs width of 5.4 meters with the retention of the central islands of the transversal T8 because in this way does not compromise comfort cross section transferzale. The horizontal geometry is designed to meet the mobility of the relevant vehicle. Round about is down south along the direction transversal T8 to obtain adequate space, as well as to avoid problems with fitting in the current situation, ie. so as not to jeopardize the residential buildings on the north side.

The paper presents elements of the plan and profile elements by variants as well as construction costs including the cost of expropriation.

**Keywords:** highway, transversal, cross roads, flyover, roundabout

Rad objavljen u: Zbornik radova 5. međunarodne konferencije savremenih dostignuća u građevinarstvu 2017, Subotica, Srbija

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# GEOFIZIČKO-SEIZMIČKA ISTRAŽIVANJA U SVRHU DEFINISANJA SEIZMIČKOG HAZARDA NA LOKALITETU STAMBENO-POSLOVNOG OBJEKTA ZGONI U MOSTARU

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## SAŽETAK

U sklopu geotehničkih istražnih radova na lokaciji Zgoni u Mostaru izvedena su geofizičko-seizmička istraživanja sa ciljem određivanja fizičko-mehaničkih karakteristika plićeg podzemlja te definisanja seizmičkog hazarda na istraživanoj lokaciji.

Primjena kombiniranih geoloških, inženjerskogeoloških i geofizičkih metoda imaju posebno mjesto u inženjerskogeološkim istraživanjima svojstava terena u zoni slijeganja tla i sekundarnih geohazarda uzrokovanih promjenom površine terena. Kombinirana istraživanja dati će jasne fizičke parametre i potencijalna rješenja koja bi se mogla direktno povezati sa inženjerskogeološkim, geotehničkim i hidrogeološkim svojstvima terena.

Istraživanja su obuhvatila geofizičko-seizmička mjerenja u svrhu izrade detaljnog geotehničkog modela i kategoriziranja tla prema Eurokodu-8, prikupljanje makroseizmičkih podataka i analizu kataloga potresa, proračun parametara maksimalne vršne akceleracije i maksimalnog intenziteta, mjerenja mikrotremora na lokaciji i proračun HVSR spektara te izradu sintetskog akcelerograma.

Geofizičko-seizmička istraživanja obuhvatila su primjenu metode seizmičke refrakcije P i S-talasa, višekanalne analize površinskih talasa, MASW-a te geoelektrične tomografije. Cilj ovih istraživanja je bio da se dobije pouzdan geotehnički model, definisan brzinama P i S-talasa i vrijednostima električne otpornosti, a kojim će se odrediti dubina do osnovne stijene, brzine u slojevima iznad osnovne stijene, da se identifikuju zone jače saturiranosti vodom te pomoću prosječne brzine S-talasa u prvih trideset metara dubine, Vs-30, kategorizira tlo prema Eurocode-8.

Geofizičko-seizmološkim istraživanjima određeni su parametri maksimalne akceleracije tla i intenziteta potresa na nivou osnovne stijene. Za proračun parametara maksimalnog intenziteta, maksimalne akceleracije i koeficijenta seizmičnosti primjenjena je deterministička metoda. Kako bi se pouzdanije procijenio utjecaj lokalnog tla, izvedena su i mjerenja mikro-seizmičkog nemira te je izrađen sintetski akcelerogram i spektar odziva tla.

**Ključne riječi:** seizmički rizik, inženjerska geofizika, mikro-seizmički nemir

Rad objavljen u: Zbornik radova četvrtog međunarodnog naučno-stručnog savetovanja "Zemljotresno inženjerstvo i inženjerska seizmologija", Borsko jezero, Srbija, 2014.

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## CLIMATE CHANGE IMPACTS ON THE ACCUMULATION LAKE MODRAC

Nedim Suljić<sup>1</sup>

### ABSTRACT

The catchment area network of the accumulation lake Modrac is made up of three larger streams: Spreča River, Oskova River and Turija River. In the design and construction of the dam and the accumulation of Lake Modrac, it was planned that it serves as a multi-use water management system. The accumulation and Modrac Lake dam is used for the following purposes:

- to ensure continuous and safe water supply of industrial capacity of Tuzla basin,
- to alleviate high water waves and prevent flooding of large areas of agricultural land, especial downstream from the Modrac dam,
- supply the population of Tuzla and Lukavac by drinking water,
- production of electricity.

Climate change is having a major impact on the amount of water in the accumulation as well as the appearance of large water waves. One of the key elements for monitoring climate changes is temperature changes. Even slight changes in temperature affect the distribution of precipitation throughout the year, and the amount of precipitation.

This study provides information on the movement of temperature changes in the Lake Modrac accumulation for the period from 1980. It also analyzes the layout and the amount of precipitation in the observed catchment area for the past 30 years.

**Keywords:** climate changes, temperature, precipitation, Lake Modrac accumulation, water waves

Rad objavljen u: Proceedings 17th International Research/Expert Conference "Trends in the Development of Machinery and Associated Technology". Istanbul, Turkey, 2013.

<http://www.tmt.unze.ba/proceedings.php>

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# APPLICATION OF REINFORCED CONCRETE RETAINING WALLS FOR THE REHABILITATION OF LANDSLIDES ON ROADS

Nedim Suljić<sup>1</sup>

## ABSTRACT

In this study we will analyze the use of reinforced concrete retaining walls in the case of the remediation of landslide "Potoci" on a local road in Srebrenik, in the northeastern part of Bosnia and Herzegovina. This landslide occurred on the part of the road toward the Old Town of Srebrenik and due to landsliding the road was damaged over a distance of about 60 m. Deformation of the landslide is reflected in depressions, folds and fissures on the hillside terrain and two damaged facilities, one residential building and one outbuilding (garage with storage). At this location, the drainage of rainwater is completely uncontrolled, and pours from the asphalt road down the hillside terrain. The catchment area of this site covers a considerable area. During major and long-lasting precipitation most of the water flows down the slope below the road, and part infiltrates into the soil through cracks, which has led to the emergence of the landslide, and slope and road instability. In addition, unplanned construction of residential buildings resulted in an overloading of the slopes and is an additional factor that affects the occurrence of landslides. Based on the general properties determined for the landslides and the causes and mechanisms of initiation of earth masses from an engineering-geological point of view, permanent remedial measures are proposed. These permanent measures include the application of appropriate support structures and technically suitable drainage of rainwater (surface) and underground water.

Rad objavljen u:

[https://link.springer.com/chapter/10.1007/978-3-319-05050-8\\_111](https://link.springer.com/chapter/10.1007/978-3-319-05050-8_111)

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## HIDRAULIČKO MODELIRANJE KARAKTERISTIKA VODOTOKA RIJEKE SPREČE I PRIOBALNOG PROSTORA NA DIONICI NIZVODNO OD UŠĆA JALE DO ENTITETSKE GRANICE ZA POPLAVNI VAL KOJI SE DOGODIO U MAJU 2014. GODINE

Nedim Suljić<sup>1</sup>, Omer Kovčić<sup>2</sup>, Mahir Žigić<sup>2</sup>

### SAŽETAK

Ovim radom prikazat će se analiza poplavnog područja nastalog u maju 2014. godine, odnosno izvršit će se hidrauličko modeliranje propagacije poplavnog vala rijeke Spreče od ušća Jale do entitetske granice (kod Doboja). Uski proticajni profili rijeke Spreče i njenih pritoka i mostovi nedovoljne propusne moći nisu u mogućnosti propustiti odgovarajuće velike vode bez izlivanja iz korita.

Proticajna količina koje će služiti za hidrauličko modeliranje usvojit će se kao suma maksimalnih proticaja rijeke Jale i obrađenog poplavnog vala na profilu brane Modrac koji su nastali za vrijeme majskih poplava u 2014. godini. Rezultati proračuna dati će tačniju lokaciju poplavnih linija, pa i druge važne informacije, kao kao i raspodjelu dubine vode u poplavljenom području.

Rezultati hidrauličkog modeliranja omogućavaju sagledavanje opasnosti od poplava u postupcima planiranja, ocjenjivanje pozitivnih efekata protiv poplavnih mjera, a i analizu opterećenosti objekata (i stabilnosti) u poplavnim područjima.

Treba istaći da dobiveni rezultati imaju važnu ulogu kod prostornog planiranja kako lokalne zajednice tako i regije kroz koju protiče vodotok – rijeka Spreča.

**Ključne riječi:** hidrauličko modeliranje, rijeka Spreča, poplavni val, digitalni model terena, HEC-GeoRAS, rizik od poplava

Rad objavljen u: Akademija nauka i umjetnosti Bosne i Hercegovine, Odjeljenje matematskih i prirodnih nauka, 2015.

[http://www.anubih.ba/images/publikacije/posebna\\_izdanja/PRIMAT/25\\_osebna\\_izdanja\\_CLXI\\_25/Poplave%202015-03.pdf](http://www.anubih.ba/images/publikacije/posebna_izdanja/PRIMAT/25_osebna_izdanja_CLXI_25/Poplave%202015-03.pdf)

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<sup>2</sup> JP za vodoprivrednu djelatnost "Spreča", d. d. Tuzla

## UZROCI, ŠTETE I POSLJEDICE POPLAVA NA PODRUČJU TUZLE

Nedim Suljić<sup>1</sup>, Nedreta Kikanović<sup>2</sup>, Mirela Uljić<sup>3</sup>

### SAŽETAK

Područje Tuzle je često ugroženo plavljenju gradskih i prigradskih površina terena. Nakon obilnih padavina koje direktno uzrokuju pojavu plavljenja terena, na površinama gdje postoje neregulirani manji vodotoci, pojavljuju se i brojna klizišta. Osnovni uzrok pojave plavljenja u gradskom području Tuzle je nepostojanje oborinske kanalizacije na padinskim dijelovima, što izaziva plavljenje nizinskih gradskih površina. Poseban problem čine poplave u prigradskim i ruralnim naseljima sa velikom vjerovatnoćom pojave. Rad analizira uzroke i štete od poplava na području Tuzle od 2001. do 2014. godine, sa procjenom vrijednosti ukupnih nastalih šteta.

**Ključne riječi:** poplava, uzroci, posljedice, štete, mjere zaštite.

Rad objavljen u:

Akademija nauka i umjetnosti Bosne i Hercegovine, Odjeljenje matematskih i prirodnih nauka, 2015.

[http://www.anubih.ba/images/publikacije/posebna\\_izdanja/PRIMAT/25\\_osebna\\_izdanja\\_CLXI\\_25/Poplave%202015-12.pdf](http://www.anubih.ba/images/publikacije/posebna_izdanja/PRIMAT/25_osebna_izdanja_CLXI_25/Poplave%202015-12.pdf)

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## THE PROBLEM OF SILT DEPOSIT IN HYDRO ACCUMULATION MODRAC

Nedim Suljić<sup>1</sup>, Neđo Đurić<sup>2</sup>

### ABSTRACT

The dam and hydro accumulation Modrac are located in the northeastern part of Bosnia and Herzegovina. Construction of the dam was completed in 1965, and that year the accumulation was filled. Hydro accumulation consists of three rivers Spreča, Oskova and Turija. In recent years, the useful capacity of hydro accumulation was significantly reduced compared to the originally projected state. The main cause of reduction in the useful capacity is increasing quantities of the silt, mainly coal dust from the coalmine Banovići. Today, hydro accumulation lake is mainly used for water supply of Tuzla power plant and the supply of drinking water the towns of Tuzla and Lukavac.

**Keywords:** dam, hydro accumulation, silt, water capacity

Rad objavljen u:

International Journal of Engineering and Management Research, 2015.

[http://www.ijemr.net/DOC/TheProblemOfSiltDepositInHydroAccumulationModrac\(331-335\).pdf](http://www.ijemr.net/DOC/TheProblemOfSiltDepositInHydroAccumulationModrac(331-335).pdf)

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## THE ANALYSIS OF WATER RELEASE FROM THE HYDRO ACCUMULATION LAKE MODRAC WITH SPILLWAY CURVE AND VOLUME CURVES

Nedim Suljić<sup>1</sup>, Dino Hodžić<sup>1</sup>

### ABSTRACT

Dam Modrac is multiple arched reinforced concrete buttress dam, with nine buttresses and ten arches, which by its technical characteristics and volume of the accumulation is considered as one of the high dams. Crown level of spillway is 200.00 m a.s.l. Crest length is 205.00 m, while the maximum height is 27.50 m. To control the water level in the reservoir, under normal hydrological conditions, there are four basic discharges with maximum capacity around  $Q = 77 \text{ m}^3/\text{s}$  for the projected state. The paper gives an analytical expression of the spillway curve and analytical expressions of amounts of water discharge separately for each bottom outlet, which are obtained by conducted measurements. Special significance of this paper gives volume curves for hydro accumulation Lake Modrac for projected state and the period of use of the system.

**Keywords:** hydro accumulation, dam, bottom outlet, spillway curve, volume curve

Rad objavljen u: Archives for Technical Sciences, Bijeljina, 2016

<http://doisrpska.nub.rs/index.php/arhivzatehnickenaue/article/viewFile/2418/2326>

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## SILTATION OF MODRAC HYDROACCUMULATION FROM ASPECT OF USABLE VOLUME

Nedim Suljić<sup>1</sup>, Jasmin Hrnjadović<sup>1</sup>

### ABSTRACT

Modrac hydroaccumulation is the largest and most important multi-purpose water resource for water supply to large industrial capacities of importance for Bosnia and Herzegovina, but also for public water supply of Tuzla and Lukavac. Since the water quality of the hydroaccumulation is threatened by the waste water of a large number of different pollutants in the basin area of 1.189 km<sup>2</sup>, and that the useful volume of hydroaccumulation is limited, then during the time it comes to the filling of the hydroaccumulation dominated by coal dust from coal mines in the basin reservoirs. It must be ensured that good quality water is supplied to consumers, especially households and industries, while ensuring hydrobiological minimum dilution of waste water discharged into the river Spreča downstream from dam and reservoir Lukavac.

**Keywords:** hydroaccumulation, dam, sediment, useful volume

Rad objavljen u: Archives for Technical Sciences, Bijeljina, 2016.

[http://www.arhivzatehnickenauke.com/files/arhiv15/4\\_Suljic\\_Nedim\\_Siltation\\_of\\_Modrac.pdf](http://www.arhivzatehnickenauke.com/files/arhiv15/4_Suljic_Nedim_Siltation_of_Modrac.pdf)

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# THE IMPORTANCE OF AIR TEMPERATURE AND FLUCTUATIONS IN WATER LEVEL OF THE HYDRO ACCUMULATION LAKE MODRAC ON THE CONCRETE DAM COUNTERFORT DISPLACEMENT

Nedim Suljić<sup>1</sup>

## ABSTRACT

This study analyzes the counterfort displacement of the concrete multi-arch dam on the hydro accumulation Lake Modrac near Tuzla, in northeast Bosnia and Herzegovina, due to changes in air temperature and water level fluctuations. Measurements and analyzes were performed in the period from 2010 to 2013. On the basis of measurements we came to a conclusion that it is necessary to implement recovery measures of the concrete counterfort multi-arch gravity dam in order to disable the appearance of large cracks in the dam body. Such damage and deformation could lead to eventual catastrophic consequences of encountering flood of 1000 annual return period.

**Keywords:** air temperature, water level, hydro accumulation, concrete dam, counterforts displacement

Rad objavljen u: International Journal of Mechanical Engineering and Automation, USA, 2015.

<http://www.ethanpublishing.com/uploadfile/2015/0127/20150127035739348.pdf>

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## OPTIMIZATION OF HIGH PREASURE PIPELINE IN THE PRESSURE PIPE OF WATER SUPPLY

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### ABSTRACT

The water supply system is a set of facilities related to a functional unit with the primary aim of ensuring sufficient quantities of quality water by the most economical way. Design and implementation of such systems requires extensive previous research and analysis aimed at finding the optimal solution of water supply system.

This paper presents an analysis of the pressure pipeline of the water supply system in which discussed several alternatives with different input parameters. It is shown the influence of the position and the number of tanks in the system on the basic parameters such as a pressure in the pipeline, power of pump units and so on. It's analyzed the impact of changes in diameter of the pipe to the hydraulic parameters, and also to the initial and operating costs of the system. The main aim of the complete analysis is to establish a uniform depending of the analyzed elements in the system and finding the optimal parameters and their relationship that provide the most appropriate solution from the technical and economic aspects.

**Keywords:** pressure pipeline, pressure, pump station, water, water supply, reservoir

Rad objavljen u: Archives for Technical Sciences, Bijeljina, 2017.

<http://doisrpska.nub.rs/index.php/arhivzatehnickenuke/article/viewFile/3779/3604>

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## CHROMIUM AND NICKEL IN SOIL IN THE WIDER MAGLAJ AREA – CONCENTRATION AND GENESIS

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Ustalić Samir<sup>1</sup>, Akmadžić Husnija<sup>1</sup>

### ABSTRACT

Research on potentially toxic elements chromium and nickel and laboratory testing of their concentrations was carried out in the wider area of Maglaj, with the aim to detect and determine their quantities, which gave basis for discussion about origins of these pollutants in soil. Field and laboratory observations included 45 soil samples, taken by the network, which is dictated by geomorphological conditions. The most frequently sampled type of soil are fluvisol and humofluvisol. Concentration of chromium (Cr) and nickel (Ni) are obtained by the most sophisticated laboratory method (ICP-MS), with a highly sensitive detection threshold (0.1 to 10,000 ppm).

Evaluation of test results showed that concentrations of Cr (max. 954 ppm, min 154 ppm, average 457.5 ppm) and Ni (max 504.5 ppm, min 103.5 ppm; average 275.57 ppm) are significantly increased compared to the concentrations prescribed in the Regulations on determination of allowed amounts of harmful and hazardous substances in soil (Cr max = 100 ppm and Ni max = 50 ppm). Considering geological settings of surrounding area (the dominant presence of igneous ultramafic and mafic rocks) it can be concluded that high concentrations of Cr and Ni have geogenic origins, what is mean that they originate from source rocks from which they are separated through the long-term decomposition and disintegration processes.

**Keywords:** potentially toxic elements, Cr and Ni, soil, Maglaj, concentration, genesis, geogenic origin

Rad objavljen u: Arhiv za tehničke nauke (Archives for Technical Sciences) 2017.

[http://www.arhivzatehnickenuke.com/files/arhiv17/02\\_Babajic\\_E\\_Cr\\_i\\_Ni.pdf](http://www.arhivzatehnickenuke.com/files/arhiv17/02_Babajic_E_Cr_i_Ni.pdf)

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## LEAD (PB) CONCENTRATIONS IN SOIL OF TUZLA'S URBAN AREA

Stjepić Srkalović Željka<sup>1</sup>, Srkalović Dado<sup>2</sup>, Babajić Elvir<sup>2</sup>, Gutić Senad<sup>1</sup>, Babajić Alisa<sup>2</sup>

### ABSTRACT

The paper presents the results of the geochemical-pedological researches based on the lead concentrations in soil of the Tuzla's urban area. The main goal of the research was to determine to what extent, the urban area of Tuzla was contaminated by lead and to determine the pollutant origin. The 129 soil samples were collected in situ on the of area about 100 km<sup>2</sup>. The testing of the lead concentration in soil samples was performed by mass spectrometry (ICP-MS) with detection range of 0.02 to 10.000 ppm. The exceeding of the maximum permissible concentrations of lead (as defined by the „Pravilnik o utvrđivanju dozvoljenih količina štetnih i opasnih tvari u zemljištu i metode njihovog ispitivanja“), was recorded in eight soil samples (samples 108, 170, 171, 182, 187, 189, 195 and 244), 6.20% of the total analyzed. The exceeded lead concentrations range from 114.0 - 190.82 ppm and the average value is 146.72 ppm. The concentration of lead in the soil, which is within the limits of the doses, ranges from 14.14 to 60.74 ppm, and the mean value is 33.68 ppm. Locations of elevated lead concentrations are closely related to the main road, resulting that the contamination is the result of the anthropogenic activities.

**Keywords:** lead (Pb), soil, concentration, Tuzla, contamination

Rad objavljen u: Arhiv za tehničke nauke (Archives for Technical Sciences) 2017.

[http://www.arhivzatehnickenuke.com/files/arhiv17/04\\_Stjepic\\_Srkalovic\\_Pb%20\\_Tuzla.pdf](http://www.arhivzatehnickenuke.com/files/arhiv17/04_Stjepic_Srkalovic_Pb%20_Tuzla.pdf)

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## PETROGRAPHIC CHARACTERISTICS OD MAFIC EXTRUSIVE ROCKS ALONG THE SOUTHWESTERN PART OF MAJEVICA

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### ABSTRACT

Total number of nineteen mafic extrusive rock samples is subjected to the detailed optical examination. Based on definition of mineral composition, structure, texture, type and intensity of alteration processes, and taking into consideration the recent classification schemes, different lithotypes are defined. The most frequent are spilites distinguished by classical "spilite" mineralogy (albite), and very often with "quench" texture and amygdaloidal structure. Diabases consist of primary plagioclase and clinopyroxene which are often decomposed and disintegrated. Diabase rocks are mostly characterised with ophitic texture and massive structure. Coarse grained varieties are characterized as dolerites, the rocks in which intensity of alteration process is significantly lower than in previous lithotypes. Varieties with frequent occurrences of amphibole got adjective amphibolic. The most common and the most intense alteration processes are albitization and chloritization. Alteration processes of lower intensity are actinolitization, pumpellytization, zeolitization, carbonation-calcitization, limonitization, kaolinitization and silicification. Depending on alteration degree a certain lithotypes are named with prefix meta (metadiabases and metadolerites).

**Keywords:** optical examinations, spilites, diabases, dolerites, alterations, Majevica Mountain

Rad objavljen u: Arhiv za tehničke nauke (Archives for Technical Sciences) 2017.

[http://www.arhivzatehnickenuke.com/files/arhiv16/1\\_Babajicc\\_et\\_al\\_compressed.pdf](http://www.arhivzatehnickenuke.com/files/arhiv16/1_Babajicc_et_al_compressed.pdf)

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## QUALITATIVE CHARACTERISTICS OF BAUXITE "OŠTRELJ" NEAR BOSANSKA KRUPA

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### ABSTRACT

Qualitative characteristics of bauxite deposit "Oštrelj" are defined through extensive laboratory testing of chemical and mineralogical-petrographic composition, and geomechanical characteristics. Chemical composition has shown that it is a relative poor bauxite with low Al/Si module (2,28). Low values of Al/Si module are result of lower Al<sub>2</sub>O<sub>3</sub> concentration (48 %), and higher SiO<sub>2</sub> concentration (21 %), what these bauxites define as high silicic or »acidic«. Identified are increased concentrations of larger number of analyzed trace elements (B, Co, Cr, Li, Mn, Ni, Sn, V, Zn) comparing to the medium content in the Earth's crust. Mineralogical composition, structure and texture are uniform.

Hosts of Al mineralization are bemitite and diaspor (to a lesser extent) as crypto-crystalline phases of rock matrix. Lower Cretaceous age (K<sub>1</sub>) of roof layers over bauxite deposit is paleontologically documented, while in the bauxite any fossils are not registered. Values of geomechanical parameters of layers under and over bauxite is uniform. In bauxite value of compressive strength is increased, which is equivalent to chemical and mineralogical composition, and structural and textural characteristics of tested bauxite samples.

**Keywords:** chemical composition, mineralogical-petrographic composition, geomechanical parameters, bauxites, Oštrelj

Rad objavljen u: Arhiv za tehničke nauke (Archives for Technical Sciences) 2017.

[http://www.arhivzatehnickenauke.com/files/arhiv10/Qualitative\\_charakteristics.pdf](http://www.arhivzatehnickenauke.com/files/arhiv10/Qualitative_charakteristics.pdf)

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# NEW RECORD OF MIDDLE JURASSIC RADIOLARIANS AND EVIDENCE OF NEOTETHYAN DYNAMICS DOCUMENTED IN A MÉLANGE FROM THE CENTRAL DINARIDIC OPHIOLITE BELT (CDOB, NE BOSNIA AND HERZEGOVINA)

Branimir Šegvić<sup>1</sup>, Duje Kukoč<sup>2</sup>, Ivan Dragičević<sup>3</sup>, Alan Vranjković<sup>3</sup>, Vlatko Brčić<sup>4</sup>, Špela Goričan<sup>2</sup>, Elvir Babajić<sup>5</sup>, Hazim Hrvatović<sup>6</sup>

## ABSTRACT

Within the ophiolitic mélange of the Central Dinaridic Ophiolitic Belt (CDOB) that stretches throughout the Balkans region in SE Europe, a latest Bajocian-early Bathonian radiolarian assemblage was obtained from chert-rich shaly to silty matrix. The sampling locality in northern Bosnia and Herzegovina is characterized by a highly-diversified ophiolitic suite, consisting of basic and ultrabasic rocks of different geotectonic provenances. This makes the radiolarian dating a convenient complementary tool for studying the geodynamic history of CDOB within a broader regional context. The host sediments and the nature of their associated crystalline rocks suggest that radiolarian deposition occurred relatively close to the Adria shelf margins, predating or being contemporaneous to the rapid transitions in the Dinaridic Neotethys geotectonic setting, changing from active ridge magmatism to an intraoceanic subduction environment and island-arc volcanism. The minimum age of ophiolite mélange formation is defined by the mineral equilibration ages in metamorphic sole ( $161 \pm 4$  Ma), with the obduction tectonics that must have lasted at least until the Oxfordian time (i.e. termination of MOR activity in the Dinarides). This age correlates well with the ages of sediments reported elsewhere in the mélange of the Dinaride-Hellenide orogenic system.

**Keywords:** Jurassic radiolarians, ophiolitic mélange, Dinarides, CDOB, Neotethyan dynamics. Bosnia and Herzegovina.

Rad objavljen u: [https://www.researchgate.net/publication/263483296\\_New\\_record\\_of\\_Middle\\_Jurassic\\_radiolarians\\_and\\_evidence\\_of\\_Neotethyan\\_dynamics\\_documented\\_in\\_a\\_melange\\_from\\_the\\_Central\\_Dinaridic\\_Ophiolite\\_Belt\\_CDOB\\_NE\\_Bosnia\\_and\\_Herzegovina](https://www.researchgate.net/publication/263483296_New_record_of_Middle_Jurassic_radiolarians_and_evidence_of_Neotethyan_dynamics_documented_in_a_melange_from_the_Central_Dinaridic_Ophiolite_Belt_CDOB_NE_Bosnia_and_Herzegovina) [accessed Nov 14 2017].

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## PROBLEMS OF HERMETICALITY OF WELLS FOR LEACHING IN "TETIMA" MASSIF AND REPAIRING CONSTRUCTION IN CASE OF UNHERMETICAL COLUMN PIPES 9 5/8"

Šabović Almir<sup>1</sup>, Nuhanović Sanel<sup>2</sup>, Hodžić Adnan<sup>2</sup>, Nalić Adnan<sup>1</sup>

### ABSTRACT

As it is known, the extraction of rock salt from deposit "Tetima", Majevisa, performed is by controlled leaching in the underground chambers positioned diply in the salt deposit. The connection between the underground chamber, that represents the basic production unit in the primary salt production and technological installations on the surface, is through a deep wellbore, which is an integral part of the leaching system.

**Keywords:** hermeticality of wells, construction of wells, procedures of repairing, "Tetima" massif

Rad objavljen u: Archives for Technical Sciences, Bijeljina, 2014.

<http://doisrpska.nub.rs/index.php/arhivzatehnickenuke/article/viewFile/1299/1206>

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## PORE PRESSURE AND FRACTURING PRESSURE INFLUENCE AT BOREHOLES CONSTRUCTION ON THE ROCK SALT DEPOSIT "TETIMA" TUZLA

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### ABSTRACT

In the rock salt deposit "Tetima" by analysis of situation and pore (layers) pressures and fracturing pressures development it has been proved that the values of pore and fracturing pressures are quite low (in the part of deposit which is currently exploited) and on the border of use salt water such as fluid for canal rinse in some drilling intervals. That especially relates to the "weak" breccia layer, stationed just above rock salt series, which is rated as most likely zone of drilling fluid loss and hermeticity loss of all constructed boreholes in that part of deposit. Calculated values of pore pressures, fracturing pressures and their gradients indicate on need for correction of existing boreholes construction on the rock salt deposit "Tetima". Analysis results of six constructed boreholes are presented in this paper, by analytical and graphical method.

**Keywords:** borehole, construction, pore pressure, fracturing pressure

Rad objavljen u: Archives for Technical Sciences, Bijeljina, 2015.

<http://doisrpska.nub.rs/index.php/arhivzatehnickenuke/article/view/1900>

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## NOVA METODA IZLUŽIVANJA NA LEŽIŠTU KAMENE SOLI "TETIMA" KOD TUZLE

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### SAŽETAK

U projektnoj dokumentaciji eksploatacije ležišta kamene soli Tetima razrađene su dvije metode eksploatacije: metoda bočnog izluživanja sa bliskim stopama cijevi kao osnovna metoda koja se i primjenjuje na svim do sad izbušenim bušotinama, i metoda stropnog izluživanja sa cementiranom zaštitnom kolonom, kao alternativna metoda, koja će se primjenjivati u takvim dijelovima ležišta gdje ima prednost nad metodom bliskih stopa cijevi.

Ocjena i odluka - primjeni metode stropnog izluživanja sa cementiranom zaštitnom kolonom donosit će se nakon konstatovanja navedenih parametara u izbušenoj bušotini. Ova metoda se do sada nije primjenjivala.

Cilj ovog rada je da se kroz tehno-ekonomsku analizu do sada primjenjivane metode pokuša iznaći optimum za nastavak eksploatacije na već postojećim bušotinama.

Analiza je rađena na primjeru bušotina B-67, a obradila je regularnost komora, "bježanje" stropa i bilansiranje izolanta, a sve u korelaciji sa geološkim prilikama. U Institutu OBRGSCHEM. "CHEMKOP", u Krakovu (Poljska), urađena je kompjuterska simulacija tehnologije bočno-stropnog izluživanja sa dvije pokretne kolone korištenjem programa 'WinUbroNet' za bušotinu B-67 u dvije varijante: sa djelimičnom izolacijom stropa i bez izolacije stropa.

**Ključne riječi:** kontrolisano izluživanje, metoda eksploatacije, bilansiranje izolanta, kompjuterska simulacija

Rad objavljen u: Rudarski radovi, Komitet za podzemnu eksploataciju mineralnih sirovina, Bor, Srbija, 2014.

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<sup>3</sup> Rudarski fakultet Prijedor, Univerzitet Banja Luka

## DEFORMACIJE I PROPUSNOST CEMENTNOG KAMENA RAZLIČITOG SASTAVA U MEKIM DO SREDNJE TVRDIM FORMACIJAMA

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### SAŽETAK

Hemijsko skupljanje cementa ili hemijska kontrakcija cementa je osnovni mehanizam tokom hidratacije portland cementa. Zapremina hidrirajućih komponenti, kao što su voda i čestice cementa, veća je od zapremine proizvoda hidratacije. Ova kontrakcija zapremine se odnosi na unutrašnje ili hemijsko skupljanje cementa.

Ukupno hemijsko skupljanje može biti mjereno stavljanjem cementnog rastvora u rezervoar potopljen u vodu. Količina absorbovane vode tokom hidratacije cementa odgovara ukupnom hemijskom skupljanju. Ovakvi eksperimenti često vode ka pogrešnoj procjeni ukupnog hemijskog skupljanja, zbog stalnog smanjenja propusnosti cementnog kamena tokom hidratacije, koja sprečava potpuni prolaz vode stvaranjem mreže hidrata. Ukupno hemijsko skupljanje se procjenjuje na približno 6,25 ml/100 g cementa, pretpostavljajući 100 %-tnu hidrataciju. Dodatkom aditiva za širenje u cementnu mješavinu, propusnost cementnog kamena je smanjena.

**Ključne riječi:** cementna smjesa, hidratacija, aditivi, mehaničke karakteristike

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## DETERMINATION MECHANICAL PROPERTIES OF CEMENT STONE FOR PERMANENT TIGHTNESS CEMENTED ANNULUS

Bošković Zvonimir<sup>1</sup>, Čebašek Vladimir<sup>2</sup>, Nuhanović Sanel<sup>3</sup>, Crnogorac Jovana<sup>1</sup>

### ABSTRACT

Different types of additives for cement stone expansion for several years. Some additives are based on calcium sulfate, sodium sulfate, calcium sulfate hemihydrates, or the creation of ettringite. These expanding cements exhibit more than ten times greater than the spread of them have Portland cement slurry with the addition of salt. Known are also expanding cements containing calcium or magnesium oxide. The expansion of the cement in connection with the mineralogical and chemical changes that result from hydration and crystallization factors. Size expansion depends on the concentration of additives to the expansion, the particles of cement, of cement slurry design and their implementation of drilling conditions (pressure, temperature), and the types of rocks in which the hardened.

**Keywords:** cement stone, additives, expanding cements, mechanical properties, elastic properties

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## THE VULNERABILITY DETERMINATION OF GROUNDWATER BODIES IN SOUTHEASTERN BOSNIA ACCORDING TO DRASTIC, GLA AND EPIK METHODS

Srkalović Dado<sup>1</sup>, Stjepić Srkalović Željka<sup>2</sup>

### ABSTRACT

The vulnerability results of groundwaterbodies of southeastern Bosnia are shown in this paper. On the examined area 27 groundwater bodies were extracted, where 12 groundwaterbodies are in rocks with intergranular porosity and 15 groundwaterbodies are in rocks with karst-fissure porosity. All of the groundwater bodies were analysed through DRASTIC, GLA, PI and EPIK vulnerability determination methods, where the gained results are presented tabular. Depending on the porosity type, the vulnerability determination methods were used. So for intergranular groundwaterbodies the best results were gained by DRASTIC and GLA methods, while for the karst-fissure groundwater bodies the best results were gained by the EPIK method, which is the implementation of PI method.

**Keywords:** groundwater bodies, southeastern Bosnia, drastic, gla, epik, vulnerability

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[http://webmail.untz.ba/service/home/~/?auth=co&loc=en\\_US&id=27581&part=3](http://webmail.untz.ba/service/home/~/?auth=co&loc=en_US&id=27581&part=3)

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## THE TERRAIN CHARACTERISTICS OF RAILWAY ALONG THE ENTITY BORDER OF FEDERATION BIH - MAGLAJ, SECTION KM 103+500 – MAGLAJ

Đurić Neđo<sup>1</sup>, Babajić Alisa<sup>2</sup>, Đurić Dijana<sup>3</sup>, Srkalović Dado<sup>2</sup>, Perišić Milan<sup>4</sup>

### ABSTRACT

The railway Samac - Sarajevo was built in the fifties of the twentieth century, as a significant part of the railway that connects the central part of the former Yugoslavia with the Sava River. Later, in the seventies another track of Doboj and Zenica was built what was the most important by that time. In general the railway is situated on the corridor V, which links the Adriatic Sea via Sarajevo and Budapest. Over time, the tracks are worn, damaged and speed has been reduced to about 40 km/hour.

As part of the revitalization of the railway network in the former Yugoslavia, the reconstruction of the Samac - Adriatic Sea began, which is divided by sections. One of these sections is the section km 103 + 500 - Maglaj, a more demanding one compared to previous section from Samac to the now named section. The point is that the terrain along the route of the railway needs to be viewed from the aspect of geological features, then the characteristics of the embankment so the geotechnical conditions for the revitalization of the railway line for speeds of 120 km/hour can be provided.

Conducted field investigations along the route of the railway, as well as laboratory tests on samples provided enough data in the corridor route, while the wider area could not be perceived because of the mine field. However, the previous studies for the purposes of the General Geological Map, scale 1: 100 000, and field observations along the route line gave a satisfactory level of data for assessment of geological and engineering geological characteristics of the terrain.

**Keywords:** railway route, terrain characteristics, sediments, embankment, slo

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<http://doisrpska.nub.rs/index.php/arhivzatehnickenuke/article/viewFile/2416/2324>

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## THE ORIGIN OF MAGNESIUM IN THE GROUNDWATERS OF NORTHEASTERN BOSNIA

Dado Srkalović<sup>1</sup>

### ABSTRACT

The paper is based on 237 chemical analysis of groundwater, where the determination of magnesium origin in groundwaters of northeastern Bosnia were performed. The determination of magnesium origin in groundwaters were carried through on the basis of Mandel & Shiftan classification. Based on the results a distribution map of Mg<sup>2+</sup> ions in groundwaters in northeastern Bosnia were drafted.

**Keywords:** magnesium, chemical analysis, determination, map, northeastern Bosnia

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