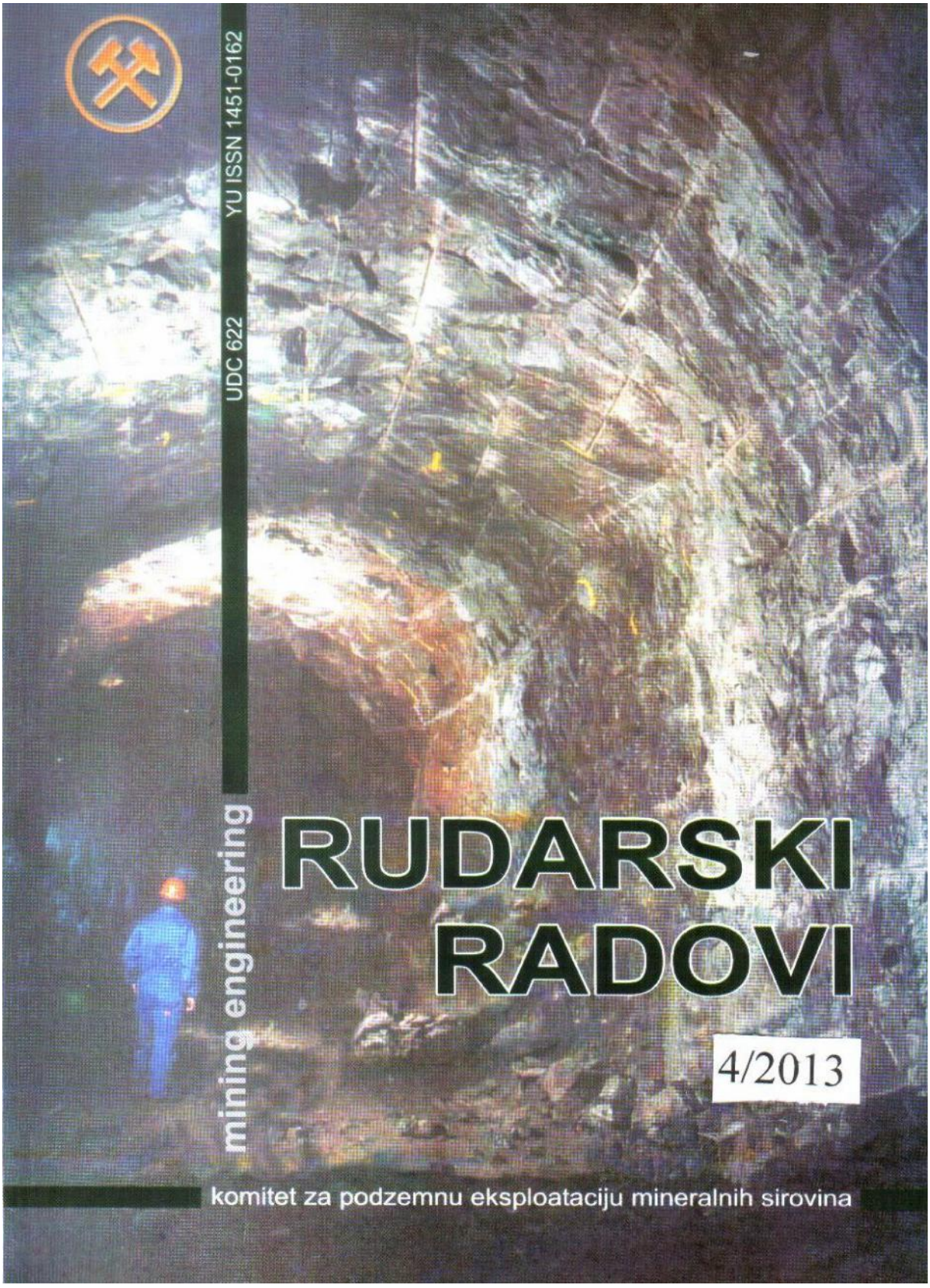
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CONTENS

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OUTLOOK OF UNDERGROUND COAL MINING IN SERBIAN ENERGY SECTOR

ABSTRACT

Real challenge for mining industry is possibility for production increase of solid fuels from own resources, for purpose of overcoming energy crisis which is present in the region. It is a known fact that largest energy sources in Serbia are solid fuels, while secure and safe energy source is the one produced from own energy resources.

Geological coal reserves in Serbia, which only can be mined by underground mining technology, are estimated at the amount of over 800,000,000t.

Key words: coal reserves, exploitation, mechanized mining, underground mine, coal.

INTRODUCTION

Real challenge for mining industry is possibility for production increase of solid fuels from own resources, for purpose of overcoming energy crisis which is present in the region. It is a known fact that largest energy sources in Serbia are solid fuels, while secure and safe energy source is the one produced from own energy resources.

Occasional worldwide energy crises are having significant impact on Serbia, due to lack of appropriate national energy strategy. Industrially developed countries, including countries with any form of energy potential, are performing exploration and balancing of these resources on regular basis, especially is the resources is non-renewable one such as fossil fuels.

Serbian economy did not have adequate approach to solving global energy crises, which caused long-term recessions in the developing countries. During first global energy crisis in 1965, at the moment when underground coal industry is reaching its maximum production of 3,850,000 t (1964), state is stope to care on developing energy sector. Direct result of this decision was drop of production by 60% until 1968. Achieved production in underground coal mines (existing 8 mines, without Aleksinac mines) in 1968 is given in table 1.

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Table 1: Achieved coal production in underground mines in 1968.

Mine	Achieved production (t)
VrškaČuka	52,400
Ibarskirudnici	191,400
Rembas	732,000
Bogovina	191,783
Soko	151,500
Jasenovac	23,000
Štavalj	42,300
Lubnica	177,000
Total	**1,562,583**

Source: *Archive of technical sector of JP PEU Resavica*

Transition to imported fuels (oil and gas) in next decade caused closure of production facilities and devastation of most of the underground coal mines. Underground mines which continued to operate, until today, were losing its developing component and contact to modern technologies in coal industry. Also, these mines were struggling to maintain regular operation, requiring state subsidies and decline of own standard, since overall coal production from underground mines, at the beginning of 21st century, dropped to 600,000 t per annum. Complexity of mining conditions, rules of open market and ever growing difficulties of achieving the profit induced very difficult situation for Serbian underground coal mining industry. Continuing operation of these mines is closely related to their readiness for implementation of new technologies in all phases of technological process of coal mining.

COAL RESERVES IN THE WORLD

World coal reserves are approximately one trillion tonnes. More precisely in 2010, reserves were 984.9 billion t, while coal consumption was 4.4 billion tonnes. In 2011 reserves were reduced to 860.3 billion tones and consumption increased to 7.05 billion tonnes (source: *International Energy Outlook, 2012).* Reserves and consumption of coal in year 2010 are shown on diagram on figure 1.

Figure 1: Reserves and consumption of coal, worldwide in 2010

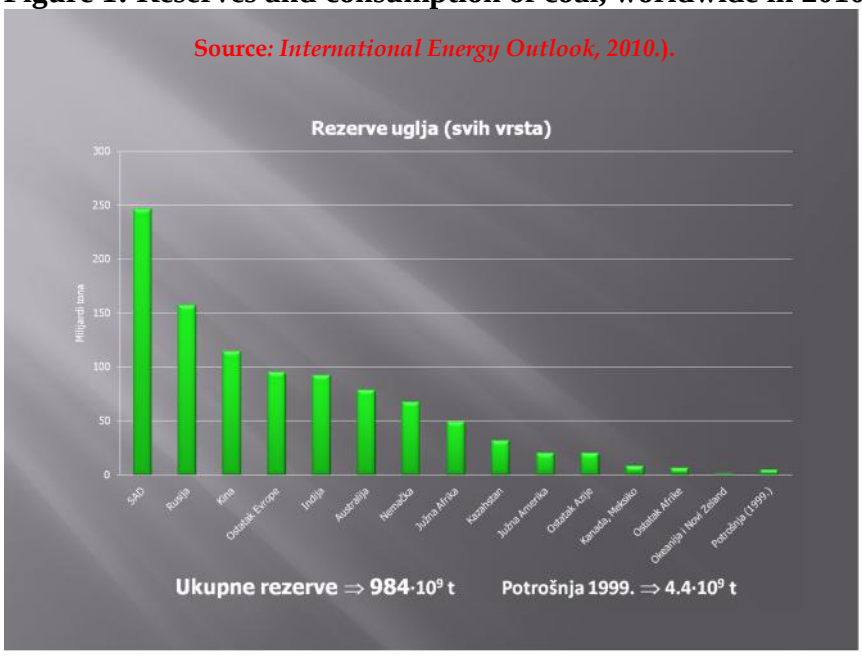
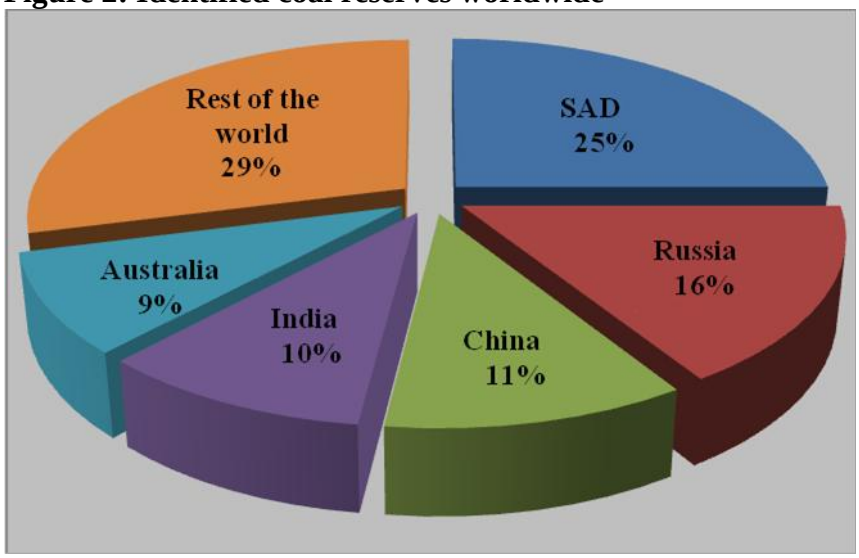


Diagram (figure 2) shows location of known reserves in five countries: USA 25%, Russia 16%, China 11%, India 10% and Australia 9%. Although data on world's reserves can be considered as accurate, it can be concluded that at the moment these reserves can supply energy market for a long term, or approximately for 122 years, at the current rate of production and reserves,

Figure 2: Identified coal reserves worldwide



Source: *International Energy Outlook, 2012*

Some two thirds of overall coal production worldwide is produced in underground coal mines, while the rest is produced in the open cast mines. For example, surface mining generates approximately 80% of production in Australia, and about 67% in the United States, while some 80% of coal production in China is from underground coal mines. Coal

production in Serbia from underground mines contributes to overall production by 1.6%. Production in 2011 in countries which are largest coal producers are given in table 2.

Table 2: Larges coal producers in the World in 2011

Country	Production (Mt)
PR China	3,471
USA	1,004
India	585
Australia	414
Russia	334
South Africa	253
Germany	189
Poland	139

Source: *International Energy Outlook, 2012*

EUROPEAN UNION FACING CLOSURE UNPROFITABLE COAL MINES

Spain and Romania are EU countries which are suffering by decision made by European Commission to close coal mines generating losses. These mines must be closed until 2018, and since then member countries must gradually reduce subsidies to coal industry, and finally subsidies must be completely cancelled. European Commission initially proposed mine closure until 2014, but decision was postponed upon demands of Germany and Spain. These countries wanted "socially responsible" process and additional manoeuvring room for social mitigation of mine closure. However, member states are provided with extended period to mitigate social unrest, since closure of unprofitable mines will cause significant losses of jobs. Coal industry in EU directly or indirectly employs over 100,000 workers. According to the data provided by the Unions, crisis and reduced subsidies threats between 25,000 and 30,000 workers in Spain alone.

Ministers of the industry in EU countries decided on December 2010 that coal industry can receive state subsidies, under certain conditions, until 2018. According to this decision, member countries will reduce state subsidies, in order to facilitate closure of unprofitable mines until December 2018. Some state help will be allowed until 2027, but only for "special" costs, which are not related to production, but only to social programs and rehabilitation of mining regions.

In Spain, country which must reduce Budget deficit, Government decided to reduce subsidies to mining companies by 63%, i.e. from 301 million Euros in 2011 to 111 million Euros in 2012.

Romania accepted the plan, approved by European Union and International Monetary Fund, for closure of three mines until 2018, while four mines will continue to operate. Portion of the miners will be retired, while some will be repositioned in other mines or receive stimulation for re-education. For example, Petrili mine, in foothill of Carpathian Mountains will be closed in 2015, after 153 years of operation. In 1988 this mine employed some 4000 workers, and now there is only 688 remaining, while town faces unemployment and poverty.

COAL CONSUMPTION IN THE WORLD

Forecast of International Energy Agency, from December 2011, estimated that coal consumption in the World would be in significant increase until 2016, by 18%, due to developing economies and increased energy consumption in China and India. However, energy consumption will not be increasing in member countries of OECD, mainly in Europe and USA.

Coal consumption in 28 member countries of EU significantly decreased in past 20 years (1990-2010), as reported by Eurostat. Anyway, coal imports into EU continue, mainly from Russia and Colombia, meeting domestic demand. Although coal production was fastest growing source of primary energy between 2000 and 2010 (5.5% annually), its distribution was unbalanced. Growth was largest in Asia, China in particular, while consumption in the region and OECD countries was lower.
Economic development in China and India in next five years will be respectable. Coal is most important source of energy in both countries, meaning that economic development and energy consumption are directly related.

Therefore, global demand for coal will probably be increasing at high rate in upcoming years. China announced plans for increased consumption of natural gas, nuclear energy and renewable energy in next five-year plan, but this is not including reduced coal production, but significant increase of coal production in immediate future.

STATUS OF UNDERGROUND COAL PRODUCTION IN SERBIA

Status of underground coal mines in Serbia, operating by Public Company for Underground Coal Exploitation (JPPEU) is not satisfactory for following reasons:

- Coal production is reduced to about 600,000 tpa from 11 mines and one open cast mine at Ibaski Coal Mines;
- There is no production machines in JPPEU mines for a long time (roadheader, continuous miner or longwall);
- There is no classic investment at the moment in JPPEU mines (Soko mine stopped activities on opening of East Field, while RavnaReka deposit in REMBAS mine does not have significant reserves);
- Geological exploration are in complete standstill for numerous years;
- Increase of production in immediate future is not realistic;
- There is no development strategy of JPPEU.

Positive elements are:

- Secured gross salaries for employees of JPPEU in upcoming year;
- Large interest of workers for employment in coal production;
- Increased interest of students at universities for mining;
- Largest mines in JPPEU introduced systems for automated monitoring of safety and operational parameters.

Overall structure of primary energy consumption in Serbia in 2008 shows contribution of coal by 53%, oil by 27%, natural gas by 13%, while other primary sources, including bio fuels

and renewable sources, contributes by 7%. It can be seen that coal is most important source of primary energy.

More than 72% of complete coal reserves in Serbia (18.4 billion tonnes) are in Kosovo-Metohija basin, while 15% is in Kolubara basin. Kostolac basin has 10% of reserves and remaining 3% are in other deposit throughout Serbia.

PROGRAMMES FOR MODERNIZATION AND REVITALIZATION OF EXISTING CAPACITIES FOR COAL PRODUCTION

Programmes and projects for modernization and revitalization of existing capacities for coal production in JPPEU mines, as well as programmes for geological exploration were not executed. Only exemption is Basic programme of Strategy, related to JPPEU: "Introduction of new technology for excavation for JPPEU and closure of non-perspective mine of JPPEU".

Effect of this programme was to supply 1.5 million tonnes of quality coal per year, to the market up to year 2015. This programme foresees investments of 65 million Euros in underground mines of Public Company.

Present condition indicates that this investment will not be realized, meaning that planned production will not be achieved.

What needs to be done in order to elevate condition of underground coal mining in Serbia?

Requirements for increased coal production and application of modern mechanization on one hand, and exploration of coal reserves and its quality on the other hand, for realistic assessment of JPPEU mines capabilities as well as capabilities of new deposits, are including following activities:

- Execution of geological explorations for purpose of reserves balancing;
- Development of suitable geological documentation;
- Execution of additional geo-physical testing, related to determination of seismic and tectonic conditions;
- Development of Feasibility Studies for justification of remaining reserves in coal mines of JPPEU and new deposits;
- Execution of technological and semi-industrial tests for excavation, processing and utilization of coal;
- Development of Environmental Impact Assessment Studies of coal mining and utilization in most favourable circumstances.

COAL DEPOSITS IN SERBIA WITH POTENTIAL FOR UNDERGROUND COAL MINING

Active and non-active coal deposits in Serbia with potential and which can be mined by technologies of underground mining are:

- Sjenica-Štavalj coal basin;
- Sokobanja coal basin;

- Despotovac coal basin;
- Western Morava coal basin;
- Remaining reserves in Ćirikovac deposit;
- Coal deposit Melnica;
- Coal deposit Poljana.

National structure of energy sources should be considered during economic assessment of coal mines and deposits. In case of Serbia, and for coal reserves, overall balanced reserves of coal are distributed to hard coal with 1%, brown coal with 17% and lignite with 82%. Lignite has no significant importance in World economy, while in Serbia this type of coal has major importance. Contribution of JPPEU to national coal production is 1.6% regarding tonnage and 3.2% regarding energy content.

COAL RESERVES WITH POTENTIAL AND FUTURE FOR UNDERGROUND COAL MINING IN SERBIA

Sjenica-Štavalj basin

Reserves of coal in Sjenica-Štavalj basin, on 31st December 2010, are given in table 3.

Table 3: Coal reserves in Sjenica-Štavalj basin

Exploitation field/block	Reserves (t)				
	A	**B**	**C_1**	**A+B+C_1**	**C_2**
Central field	1,188,753	14,463,297	107,926	15,759,976	–
East field	–	10,120,520	17,602,570	27,723,090	–
Stup field	1,477,710	566,800	–	2,044,510	–
West field	–	85,398,550	63,409,600	148,808,150	–
Northern block	–	44,148,650	11,180,230	55,328,880	–
Middle and Southern block	–	41,249,900	52,229,370	93,479,270	–
South field	–	–	–	–	50,000,000
Total	2,666,463	195,947,717	144,529,696	343,143,876	50,000,000
Total (A+B+C_1) + C_2	**733,621,289**				

Source: *Technical documentation of Štavalj mine*

Sokobanja coal basin

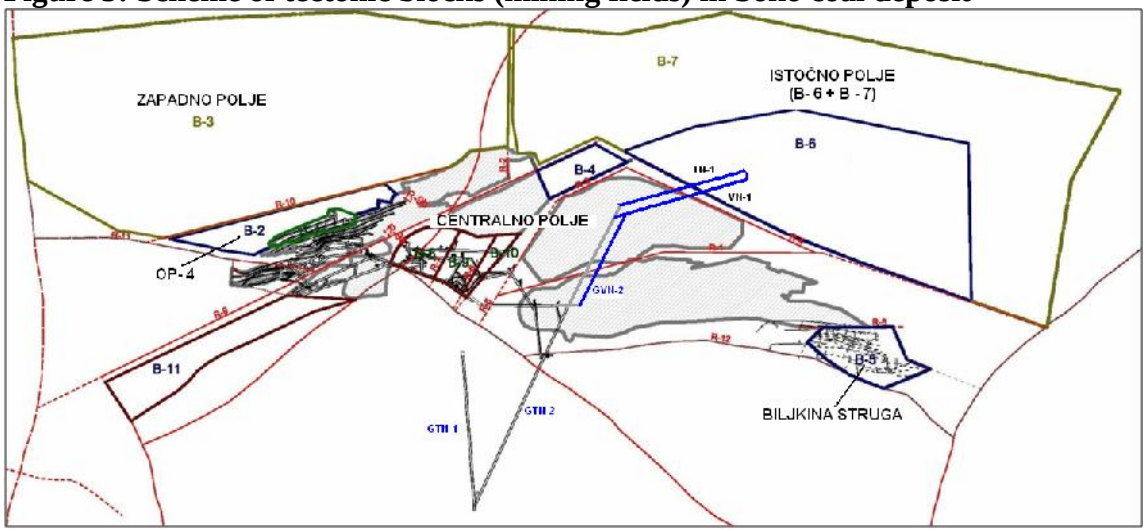
Reserves of coal in Sokobanja coal basin are given in table 4. Figure 3 represents tectonic blocks (mining fields) in Soko coal deposit.

Table 4: Coal reserves in Sokobanja coal basin

Block	Mining field	Balanced reserves (t)	Losses by geometry (%)	Losses by mining method (%)			Minable reserves (t)
				R&P	LW	Surface	
B-1	OP-4	363,179	5	30			241,514
B-2	OP-4	1,630,138	5	30			1,084,042
B-3	West field	21,392,586	5		15		17,274,513
B-4	OP-2	607,780	5	30			404,174
B-5	Biljkina struga	703,318,	5			10	601,337
B-6	East field	11,752,735	5		15		9,490,334
B-7	East field	17,728,500	5		15		14,315,764
Totral		54,178,236					43,411,678

Source: *Technical documentation of Soko mine*

Figure 3: Scheme of tectonic blocks (mining fields) in Soko coal deposit



Source: *Technical documentation of Soko mine*

Despotovac coal basin

Reserves of coal in Despotovac coal basin are given in table 5.

Table 5: Coal reserves in Despotovac coal basin

	Geological coal reserves (t)				**Total (t)**
	A	**B**	**C_1**	**A+B+C_1**	
Balanced	–	22,402,000	5,455,000	27,857,000	27,857,000
Non-balanced	–	430,000	–	430,000	430,000
Total	**–**	**22,832,000**	**5,455,000**	**28,287,000**	**28,287,000**

Source: *Technical documentation of Rembas mine*

Western Morava coal basin

Existing level of exploration of Western Morava coal basin, which is insufficient, indicates coal reserves provided in table 6.

Table 6: Coal reserves in Western Morava coal basin

	Geological coal reserves (t)			
	A	**B**	**C_1**	**A+B+C_1**
Balanced	10,111,992	47,560,803	10,574,126	68,246,921
Non-balanced	720,473	5,550,100	–	6,270,573
Total	**10,832,465**	**53,110,903**	**10,574,126**	**74,517,494**

Source: *" Coal", dr Predrag Nikolić, Belgrade, 1980*

Remaining reserves in Ćirikovac deposit

Reserves of lignite in Ćirikovac deposit, on 31st December 2001, are given in table 7.

Table 7: Remaining lignite reserves in Ćirikovac deposit

Category	**Explored coal reserves (t)**		**Geological coal reserves (t)**
	Balanced	**Non-balanced**	
A	–	–	–
B	85,461,000	44.319.000	129.780.000
C_1	33,537,000	42.710.000	76.247.000
A+B+C_1	**118,998,000**	**87.029.000**	**206.027.000**
C_2	Potencionaly		823.000.000
Total	**1,029,027,000**		

Source: *Faculty of Mining and Geology, Belgrade*

Melnica coal deposit

Coal reserves in Melnica deposit are explored at area of around 4 km^2. Confirmed reserves, according to Elaborate on categorization on 30th June 1984 which is accepted by the State Committee by decision SRS br. 310-83/89-02/1 on 19th October 1985, are given in table 8.

Table 8: Coal reserves in Melnica deposit

	Geological coal reserves(t)			
	A	**B**	**C_1**	**A+B+C_1**
Total	**–**	**21,021,761**	**8,899,908**	**29,921,669**

Source: *Geological Institute of Serbia*

Poljana coal deposit

Poljana coal deposit comprises of two coal seams, where upper seam is divided into two additional sub-seams. Thickness of coal varies (thickness larger than 7 m was not detected). Also, no complex tectonic disturbances were detected in the deposit. Coal seam dips at angle of 8 degrees. Lower calorific value of coal is 10,250 kJ. Reserves are given in table 9.

Table 9: **Coal reserves in Poljana deposit**

	Geological coal reserves (t)			
	A	**B**	**C_1**	**A+B+C_1**
Balanced	–	48,467,000	10,528,000	58,995,000
Non-balanced	–	2,018,000	1,166,000	3,184,000
Total	**–**	**50,485,000**	**11,694,000**	**62,179,000**

CONCLUSION

Whether any of these programmes will be executed depends on decision of the State, since any power facility is in fact national project. At the same time, it should be remembered that JPPEU is a part of energy sector of Republic of Serbia.

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Dejan Ćirić, graduate engineer of mining*, Branislav Stakić*, Savo Perendić*

USAGE OF ANTHRACITE IN DRINKING AND WASTEWATER PURIFICATION

ABSTRACTION

Anthracite is as good as absorption means, and it is widely used for purification of drinking water and wastewater.

Key words: anthracite, waters, ecology.

INTRODUCTION

AM “Vrška Čuka” Avramica located in the Eastern part of Serbia, around 10 km SE from the city of Zajecar. Mine is producing high-quality anthracite coal. Coal have black – grey colour, metallic-glass shine and depending on its metamorphosis can appear as a graphite. It is brittle and easy to break, rarely save a whole piece. Scratch mark is black. Fracture is irregular and with sharp edges. It occurs in two macroscopically different types of coal, such as amorphous carbon and crystalline carbon. These physical properties of anthracite are suitable for the purification of water.

USE OF ANTHRACITE IN PURIFICATION OF DRINKING WATER

Elemental analysis by Institute of General and Physical Chemistry anthracite showed good coal quality with more than 80% C and less than 1% S. These features indicate that anthracite has a good filtration and sorption characteristics, qualifying it for purification and filtration of drinking water.

Based on these research results have shown that the anthracite very good for purifying drinking water. Anthracite from mine "VrškaCuka” with an ash content below 6% and a grain size of 0.6 mm to 5.00 mm was used in further studies.

An anthracite samples were sent to the Institute for Public Health “Dr. Milan Jovanović – Batut” - Center for Toxicological diagnostic, Belgrade to investigate its applicability for purification drinking water. Results of analysis are written down in a Report No. 6283/ per u.896 from 14.05.2002.

The study included the determination of the characteristics of the coal (volatility and metal content), the discharge of substances soluble in water (to simulate conditions superiors in the planned use of anthracite: coal ratio, the water and the contact time), changing the characteristics of the water after contact with anthracite and dynamic migration of total organic matter (TOC), PAHs (polyaromatic hydrocarbons), and benzo (a) pyrene content after 24, 48 and 72 hours of contact. Based on the results of these studies it was concluded that the extraction of organic and inorganic substances distilled and deionized water from anthracite equal and very small. After contact of water (distilled and deionized) to the anthracite has not been any significant migration of the tested compounds videlicet, all the parameters are within the expected values Regulation on the hygiene of drinking water (Official Gazette no. 42/98).

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The extraction of polyaromatichydrocarbons, and benzo (a) pyrene is negligible, and below the detection limit

Further down the report states:” due to results of the performed analysis it can be concluded that anthracite prepared as in samples should not pose any threat to consumers.Given that according to studies and under conditions simulating real applications, there are no changes in a drinking water, which could jeopardisehealth of consumers”.

For the purpose of purification of drinking water Anthracite is incorporated into fewwater systemsex. Makis - Belgrade, plumbing Lazarevac and Negotin as well as pilot plant in Elemir near Zrenjanin.

PROCESSING MARKET AND THE NEED FOR ANTHRACITE

Due analysis of the surveys, we can conclude that more than 50% of the water in the technological line do not have represented filtration on a two-layer filters. Mostly represented filtration in sand filters. Only 10% of respondents confirmed that they have completed or in the near future can complete necessary documentation needed for a water treatment technologies. These water supply systems have expressed the interest of anthracite as filtering material. interested systems are Belgrade water supply (Makis II, reconstruction of existing facilities), Leskovac (Barije) and Arandjelovac. Estimated anounts are around 600 m^3 of product.

Further analysis are showing much higher potential due to physical - chemical and bacteriological - biological quality of drinking water. It can be concluded that the needs for a product are much higher..

Republika Srpska has expressed its needs for Banja Luka’s water supply system. Amounts are around 400 qubic meters related to the reconstruction of existing and extention of piping systems.

Summarasing above stated, estimated amounts of the product are around 1,000 qubic meters. If we include sanitary control Regulations amounts are significantly higher.

THE COST OF PRODUCTION

ROM costper tone is95 EUR processing , separation and washing are adding additional 35 EUR per metric tone totaling in 130 EUR per tone. Additional costs costs for thermical treatment are40 EUR plus wrapping and packaging 20 EUR per tonne, transportation and handling is 10 EUR per tone of product. According to stated finalized product can be estimated at level of 240 EUR per metric tone of anthracite

Survey shows that retail price of world famous manufacturers are somewhere between 750 EUR per Mt (China) to 950 EUR per Mt(England without VAT) respectively.Recommended price for our product can be between those values.it should be emphasized that our product have better performance than world manufacturers in the range of 10% regarding sorption analysis.

USE OF ANTRHRACITE AS FILTRATING – SORPTION AGENT IN PURIFICATION OF WASTEWATER CONTAINING OIL AND CRUDE OIL

The Power plant Industry of Serbia, as a biggest problem emphasizes oily wastewaters. None of the existing power plant don't have implemented a system for purifying oily wastewater, regardless of the type of liquid fuel used. The evacuation of the water, from object to object, performed, depending on the place of origin in the rain sewage, landfill coal, recipient, tracked station, the return chilled water, city sewer, etc. Unsolved problem at the start of thermal power plant and insufficient maintenance during the operation is leading to the fact that the amount of this water are increased on daily basis., regardless of the content of oils and fats in them. Attempts to introduce, or build, adequate facilities for water treatment have not been satisfactory. And those thermal power plants that possess required the projects hence they are not implemented due to various reasons such as lack of space, bulking, lack of funds etc. Some thermal power plants permission is conditioned with a construction of purification facilities.

It is the fact that inside JP PEU is existing mine Vrska Cuka with a production of anthracite as a hight quality coal. Worldwide usage of anthracite in water purification is one of the reasons why beneficiation of ROM product is considered. Obtained results are in the range of world famous manufacturers. During the research, it is noticed that product is showing some sorption characteristics. Those finding led to idea that product itself or with some additives can be used in treatment of oil polluted wastewaters generated in Thermal Power Plants.

The fact that anthracite itself is efficient removal of trace organic substances from water, drive to a preliminary reserch of the possibility to use anthracite in removing the oily fragments from wastewater. During those analysis it was found that anthracite can be efficient agent in sorption. This is where idea came from.

Based on the results estimated costs for a wastewater treatments can be found in table below:

Table 1: Price of filtration / sorption mass:

Activated carbon	150	din/ kg	150.000	di n/t
Zeolite 13x	250	din/ kg	250.000	di n/t
Anthracite	15	din/ kg	15.000	di n/t

It is a fact that the sorption capacity of activated coal is around 4 times higher than the sorption capacity of anthracite, and a cost comparison of those sorbents is putting anthracite as favorable product. Price of activated coal is also at least 10 times higher than the price of anthracite This can say that at the same cost anthracite can be purify 2.5 times more wastewater.

Assumption is that wastewater contain oil in a concentration of 5mg per liter and it need to purified until concentration of oil is 1mg per liter. According to calculations, we can assume that for 1 qubic meter of water we will need 0.5 kilogram of anthracite. That results in a cost of sorption agent as 7.5 RSD per cubic meter of oily water. I we consider that after

purification we can use anthracite as a fuel in Power Plant that also decrease cost and remove waste disposal.

Implementation of chemical treatment of oily wastewaters can extend anthracite sorption life up to ten times.

Based on surveys in the Institute, ROM anthracite can be used as oily wastewater purifying agent. It decreases cost significantly due to avoiding classification and any further treatment.

At the end of the assessment of the effectiveness was made of selected filtration / the sorption agents, and has been shown to be very suitable anthracite, not just as efficiently and as cost-effective for filtration / sorption agent.

Mine already produced anthracite for filtration of wastewaters and delivered thermal power plant with a pilot facility. Purifying facilities are already built is Heating Plant Zrenjanin and Power Plant Drmno. Results from purifying facilities have shown that the oil contain is decreased below 0.2 ppm. Results from both plants are the same as per results given by laboratory.

Technical Faculty in Bor done research and series of laboratory testing in treatment of oily wastewaters from RTB "Bor" using the fine class of anthracite coal produced “VrškaČuka” mine. For this puroposefine anthracite class (FK) size is used. Classification is as follows:

(-1+0)mm with an ash content of 38.17% and
raw coal (RC) size class (-10+0)mm ash content of 39.52%.

Experimental results are shown in Table 2 .

Table 2: Absorption capacityregardingthe initial concentration of oil in wastewater.

Initial concentration of oil in waste water Co (mg/l)	Apsorption capacity Q (mg oil/g coal)
135	0,42
104	0,31
120	0,36

The results of analysis of concentration of oil in purified water, and the degree of absorption depending on the range and quality of the test class fine anthracite coal are given in Table 3.

Table 3: Concentration of oil in the purified wastewater and the degree of absorption depending on the quality class of the fine coal.

Sample class coal	Mass of solid (g)	Concentration of oil in purified water C (mg/l)	Degree of absortion A(%)
FK	22,25	40	79,37
RU	22,15	37	72,59

Research of absorption under dynamic conditions showed that fine class raw coal and anthracite from RA, Vrška Čuka, Avramica can successfully be used for the treatment of oily wastewaters produced by RTB "Bor".

The treated water contains oir and grease in concentrations within the permitted limits, according to the Regulation .After treatment waste waters are safe to be drained in sewer system From aspect of economy it is important to say that used class of is not adequately valorized by mine and it usage in purification can contribute to better mine performance.

Technical Faculty in Bor also performed research about absorption of metal ions by fine anthracite fractions. Research shown promising results for anthracite fines from Anthracite Mine “Vrska Cuka”. According to research fines can be used for removal of metals from various efuenats to prevent pollution of natural watersheds. Crucial for this research is availability of fines and its very low cost.

CONCLUSION

Mine anthracite, Vrška Čuka, is one of the eight anthracite mines in the world that has a very good quality of coal. It is used as a raw material and technology: for purification of drinking water and wastewater to produce carbon cathodes, silicon carbide, graphite, etc. after processing of coal low quality cola is used as fuel in smelters, brick factories, power stations etc.

Anthracite mine “Vrska Cuka” produces high quality coal. Mine operates underground using room and pillars mining method. Ash content of ROM coal is in the range from 30 to 35 %Processing facility includes wet coal separation plant with gravitation and flotation line. Processing the ROM coal separation plant can decrease the ash content to ranges between 2% and 6% respectively. This is high quality concentrate which is base for filtration materials used in purification of drinking water, wastewaters and industrial wastewaters.

Separation plant is processing the coal ash content up to 6%. This coal is used to produce anthracite for drinking water purification. It is necessary to build a facility with a set of sieves, mill and dryer to improve classification of ROM coal. Total investment is around 100,000 Eur with a capacity of 2.5 tone per hour.

Construction of a plant for the production of anthracite mine gets a new technological product that is used for purification of drinking water, oily and wastewater. Byproducts are to be used as energy sources in cement plans, Power stations, Smelters and Brickyards. Construction is about to increase utilization of ROM coal to number which excesses 95% of all production

ROM coal price is 9384 din per tone. Utilisation and implementation as explained above is multiplying the price of the product./ Investment in preparation plant is the only possibility with no further increase in costs. The cost of ROM coal production is the same. For the increased production investment need to be increased for exploration and development cost. It should be noted that the operation of the plant for the production of anthracite will engage the existing workforce (i.e. will employ workers who are already working in the mines or separation). All this will allow increasing economy of the mines.

As stated above, the vital interest is construction of plants for the production of anthracite, which will be produced technological raw material. This product has a very important place in the market, and our country is importing it. Investment and further construction of the mine plant will produce sufficient quantities for domestic needs. With this production and processing of coal, mine will achieve profitable results, which will favorably affect the area where it is found,videlicet on the border with Bulgaria in underdeveloped areas.

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DIMENSIONING OF SYSTEMS FOR THE DELIVERY OF PRODUCTION MATERIALS IN CONDITIONS OF THE COAL MINE "LJEŠLJANI"

ABSTRACT

When it comes to the implementation of planned tasks how in the process of investment construction the same and in realization of the physical volume of production, very important is timely delivery of production materials and basic equipment which is provided for the exploitation process of the mine. Very often, there is a need for transport of very bulky and heavy goods whose transport is complex, and that's why investors place special tasks in the design phase of the system for the delivery in the mine.

In this paper, dimensioned are the basic parameters for the delivery of production materials and equipment for new mine Lješljani, for which is currently doing the basic technical documentation.

Key words: delivery of production materials, pit lift, drive station, towing rope

INTRODUCTION

In mines with underground exploitation, with increasing of depth at which the exploitation work performed, increases the problem of transport - delivery of production materials and equipment (1), (3), (4). Particular problems occur due to reduced cross section - profile of mine underground rooms, small bend radius, poor geomechanical characteristics of rocks through which rooms are made, sized cargo (5). Very often, there is a need that the system for delivery of production materials and equipment is projected so that throughout same mining room performs equipment delivery and transport systems for digs – ores (1), (5), (6).

For delivery of production materials and equipment in underground mines, today are mainly in the application hanging monorail ropeways and hanging monorail railways. It is important to mention that aforementioned systems in underground mining are also successfully used for driving workers to the worksite (2). This paper defines the basic parameters of the hanging monorail ropeway system for new coal mine "Lješljani" and which can be used in the equipment selection of this mine.

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TECHNICAL REQUIREMENTS OF THE SYSTEM

Using the regulations, the following conditions must be satisfied:

1. Carrier (rail) from strengthened "I" profile including and all connecting equipment (both between all carriers and between arches of roof support elements), must satisfy the requirement to achieve a triple safety in relation to the highest static drive load, i.e. (net weight of towing train + hanged burden);
2. All coupling elements including and coupling elements of towing train (the distance levers) must be eightfold security having in mind that the highest traction force is caused by highest hanged burden);
3. Leading rollers and roller carriers rope "roller sides", must be in curves (horizontal and vertical) that strengthened that the resultant force of towing rope can be taken with triple safety (1), (2);
4. The driving machine must be affixed in that way to the foundation that his connection can submit a triple static safety in relation to the nominal tractive effort of the driving machine.

THE PRINCIPLE OF OPERATION OF HANGING ROPEWAY

The principal of operation of monorail hanging cableway is based on circular motion of a single endless towing rope, which pulls suspended load on the wagon on the hanged strengthened "I" profile (rail) on room ceiling or the ceiling part of the support (4).

Infinite straining rope is coiled in tri lines through the pulley which guides the rope, over the driving drum with three semicircular, the circumferential grooves for the rope) allows, over tensile devices and feedback stations, to provide circular motion without slipping.

Speed of movement of hanged burden on the ropeway in both directions is 2 m/sec.

Facility of hanging monorail ropeway has two safety brake mechanism: break mechanism on driving machine – maneuver safety break which mainly serves like maneuver break – both for stopping the machine and as break for static safety (against self-movement of the ropeway towing train).

Profile and material quality of carrier – rails and span between portative wagons is determined by maximum allowed load which will be hanged – transported.

For guidance of steel rope tensile side and steel rope feedback side serve roller carriers (roller sides) which are placed at a distance of 15 – 25 m (on the flat sections), and depending on the shapes and layout section where the same rope is placed, that destination can be and shorter, as on all segments of horizontal curves (in each segment of the curve L=0,5 m and $\alpha=7,5^0$).

DESCRIPTION OF TRANSPORT

Planned route in addition to the maximum rise of 18^0 during exploitation works will have total yaw angle of 450^0.

Length of the route will maximum be 2150,5 m which represents and the active length of driving material by ropeway with top rail.

Along the transport route of monorail hanging ropeway there are and are envisaged the loading – unloading places which can be:

a) **Permanent** – one is in the immediate vicinity of ropeway driving station and the other is in the immediate vicinity of feedback station. This is the main solution and same places can be different placed.

On those places, there must be appropriate signage, lighting, alarm systems, appropriate warning signs, instructions. Such places must be clean and large with neatly arranged material and other stuff.

b) **Temporary** – loading-unloading places which can be temporary organized on any part of the ropeway transport path. Such places are so determined that on this places can be provided complete safety of people and equipment as on permanent loading-unloading places.

A cross section of room through which is moving and where is placed top rail for ropeway with infinite rope and the position of the ropeway is given in the figure 1.

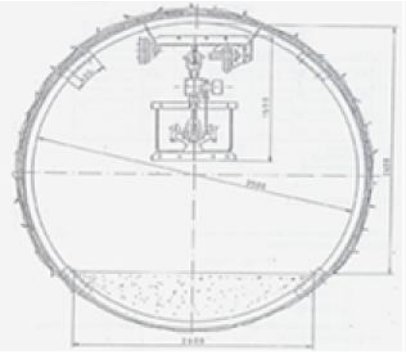

Figure 1. Cross section of room with ropeway elements

CALCULATION OF THE BASIC PARAMETERS OF THE DELIVERY SYSTEM

Basic data for the calculation

Table 1.

Length of the route	L_{uk} = 2150,5 m
Driving route length	L_v = 2140,5 m
The largest angle of inclination of the room on the route	α_{mah}=18° (GVN-1)
Max speed	v_{mah} = 1,3 m/s
Deceleration (acceleration) of drives	a = 0,2 m/s
Weight of the rope	g = 0,87 N/m
The coefficient of friction between the rope and the drum	μ = 0,25
Comprehensive angle on the drum	$\varphi = 540^o$
The horizontal radius of curvature	R = 4,0 m

we will consider two typical cases that occur:

a) Transport of singular burden;

b) Transport of various cargos.

Determining the weight of the towing train

How the towing train configuration is quite different both while transporting bulk materials and while transporting singular burden, and by that and his weight,

Transport of singular burden

The towing train is composed from the following elements of the singular weight, if the transport of bulk material is performed:

Table 2.

The carrying wagon	4	680 daN
The rope carrier	1	580 daN
Spacing bars	5	70 daN
Brake wagon	2	400 daN
Chain hoist 30 kN	2	80daN
Chain hoist 15 kN	2	60 daN
Utensil – container	2	280 daN
Total		2160 daN =21,60kN

For calculating will be adopted the value of the weight of towing train when is transporting singular burden, because the weight of bulk cargo is always less then weight of singular burden and for us, that is the worst case which is shall prevail for carrying out appropriate calculations (1), (2).

Determination of payload

Maximum hanged burden that can be driven – transported is (data that is foreseen to be transported on the basis of experience):

Q_t = 50 kN (30 kN)

The calculation will be performed for the case of singular burden where weight of towing train is 2160 daN.

Determination of the overall tractive force $G_s + Q_t$ (2)

$$G_s + Q_t = \frac{F_v \times \eta}{\sin\cdot\cdot + \mu \times \cos\cdot\cdot}$$

Where are:

F_v maximum tractive force, 4500 daN;

η level of utilization of route and is determined by the diagram and is in directly function of route deviation angle which, in this case is 340^0 and from the diagram, same is 0,56 (for calculation, we take less favorable variant of route deviation angle;

φ angle of the maximum rise on the observed route $\varphi = 18^0$;

μ coefficient of friction (driving resistance) $\mu = 0{,}03$.

By substituting the values in the above form, we get:

$$G_s + Q_t = \frac{45 \times 0{,}56}{\sin 18^o + 0{,}03 \times \cos 18^o}$$

$$G_s + Q_t = \frac{25{,}62}{0{,}309 + 0{,}03 \times 0{,}951}$$

$$G_s + Q_t = 96{,}32\ kN$$

After calculation is showed that the total weight Gs + Q_t is significantly higher than the actual towing weight G + Q_R, so we have that:

G + QR = 71,60 KN Gs < + Qs = 96,32 KN

Determination of engine power of driving machine

This is determined from the following form (1), (2):

$$N = \frac{F \times \nu}{\eta \times 102}\ kW$$

Where are:
F provided for maximum traction force of driving machine;
υ the driving speed;
η level of utilization.

By substituting the values, we get that:

$$N = \frac{4.500 \times 1{,}3}{0{,}75 \times 102} = 72{,}588 kW$$

We adopt the electric motor, power 75 kW.

CHECKING CALCULATED AND ADOPTED PARAMETERS

Checking the power for burden towing

$$F_v = \frac{(G + Q_r) \times \rho \times \sin^{\cdot\cdot}}{1000}, kN$$

Where are:
G + Q_R maximum burden with the weight of towing train 71,60 kN;
φ angle of the maximum rise φ = 18^0.

By substituting the values, we get that:
$F_v = 16{,}7\ kN$

Checking force for overcoming friction resistance

Determination of force for overcoming friction resistance we perform by form:

$$F_t = \frac{(G + Q_r) \times \mu \times \cos^{\cdot\cdot} \times \rho}{1000}, kN$$

Where is:
μ driving resistance 300 N/t
By substituting the values, we get that:

$F_t = 2{,}047\ kN$

Checking the total tractive force

Determination of the total tractive force we perform by form (1):

$$F_{vu} = \frac{F_v + F_t}{\eta}$$

Where is:

η level of utilization of the route that for the route deviation angle of 380^0 is 0,5.

By substituting the corresponding values we get that:

F_{vu} = 37,494 kN

as compared to the available tractive effort of driving machine of 45 kN satisfies.

F_{vu} = 37,494 kN < F_v = 45 kN

Checking the required power of the electromotor

$$N = \frac{F_{vu} \times v}{\eta}, kW$$

N = 64,899 kW

The available electromotor of 75kW power hereby adopts.

DETERMINATION OF PRETIGHTEN FORCE OF THE ROPE

Basic data given by the manufacturer of equipment essential for the calculation are given in Table 3:

Table 3.

pincer angle	β_1	540^o
coefficient of friction in the groove of driving machine	$e^{\mu\beta}$-1	6,25
coefficient of rope sliding by driving machine	λ	1,3
tractive force	F	45 kN
coefficient of friction	μ	0,21

Pretighten force of the rope, we calculate by form:

$$S_v = \frac{F \times \lambda}{e^{\mu\beta} \cdot 1}$$

By substituting the values, we get:

$$S_v = \frac{45 \times 1,3}{6,25} = 9,36 \text{ kN}$$

This pretighten force is achieved by a tensioning device which will be placed in front of the driving station and will perform straining only of towing sides of towing rope.

THE CALCULATION AND SELECTION OF STEEL ROPE

Basic data which are essential for calculating about the choice of the rope are given in Table 4.

Table 4.

safety factor	$\nu = 6$
maximum load	$G + Q_R = 7160$ daN
Maximum rise	$\varphi = 13^o$

Rope towing force we determine by form (1):

$S_B = \nu \times \sin \varphi \times (G + Q_R)$, kN

By substituting the values, we get:

$S_B = 6 \times \sin 18^O \times (50 + 21,60)$
$S_B = 6 \times 0,309 \times (50 + 21,60)$
$S_B = 132.7464$ kN

Based on the above calculation we carry out the selection of the rope:

Table 5.

Nominal diameter	20 mm
Construction	6 (19 x 1,2) + V.J.
Type and direction of extending	Criss-cross right
Type of the core	Fibrillar
Surface condition of the wire	Naked
Nominal tensile strength of wire	1.970 N / mm^2
Calculated breaking force	254 kN
Measured aggregate breaking force	/
Specific mass	1,2777 kg/m

CALCULATION OF FOUNDATION OF THE DRIVING MACHINE

The driving machine is attached with ten fundamental screws distributed in two rows (distributed on the concrete foundation, the concrete brand is MB 25).

The appearance of the foundation, the position of the driving drum and the layout of the basic screws is shown in Figure 2.

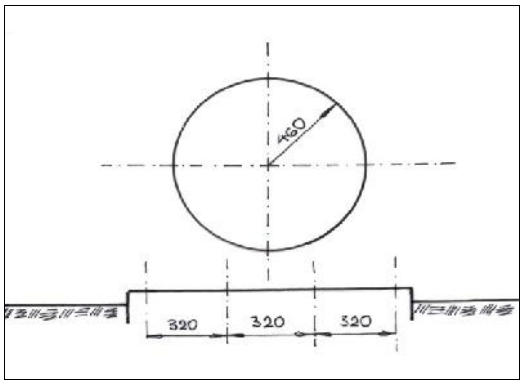

Figure 2. The foundation of the driving machine

Location, layout and action of force on the driving drum, i.e. on foundation of the driving machine is given in Figure 3.

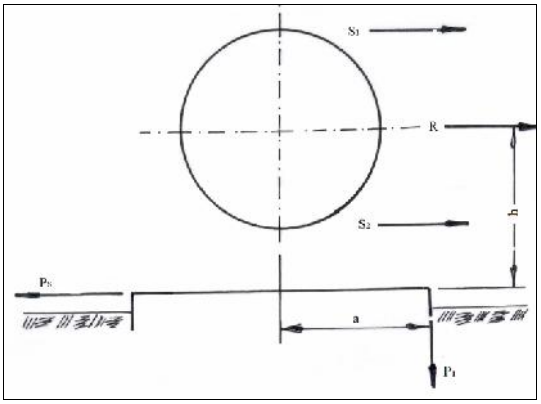

Figure 3. Action of force on foundation of the driving machine

Basic data for the calculation are:

Table 6.

presek jezgra zavrtnja M 20	Sj = 2,25 cm^2
ukupni broj zavrtnjeva M 24	n = 8
vučna sila	F = 45 kN
Sila predzatezanja užeta	S_v = 9,36 kN
A	560 mm
H	460 mm

From the Figure 3 can be seen that the force P acts through the spoke sized “a” which presents the distance from the middle of the driving drum (pedestal) till its end.

Force P_s is reduced to a distance "h".
Force S_1, we get from the sum of traction force and pretighten force of the rope.

$S1 = F + Sv = 45 + 9.36 = 54.36$ kN

S_2 is equal to the pretighten force of the rope:
$S_2 = S_v = 9{,}36$ kN

We get the resultant force as the sum of forces S_1 and S_2, so we have that:

$R = S1 + S2 = 54.36 + 9.36 = 63.62$ kN

CHEKING STRAINING INTO A STRENGHTENED PROFILE "I" 140 E RAIL CARRIER

During the work of the ropeway, on carriers may appear two cases of load:

a) when the axial spacing L_1 between carrier wagon of a portable device is $L_1 < L$ (where is L – the length of a rail carrier);
b) when the axial spacing is $L_1 > L$.

On the basis of these conditions shall be validated straining and safety of the rail carrier for both cases.
Basic data of the rail carrier "I" 140 E are:

Table 7.

resistant momentum	$Wx = 149\ cm^3$
length of the girder	L = 3000 mm
Material of the girder	St = 52-3

Determination of attacking force

For the determination of the attacking force the maximum value of cargo is determined, so the following elements are figuring:

Table 8.

Wagon carrier	4.000 N
Maximum cargo	50.000 N
TOTAL	54.000 N = 5.400 daN

This force is distributed on two carrier wagons, so the attacking force per one wagon is:

$$P = \frac{P_{max}}{2} = \frac{54.000}{2} = 27.000\ N$$

In the course of the calculation the most unfavorable case is taken and that is when the singular burden of maximum weight is hanged.

a) $L < L_1$

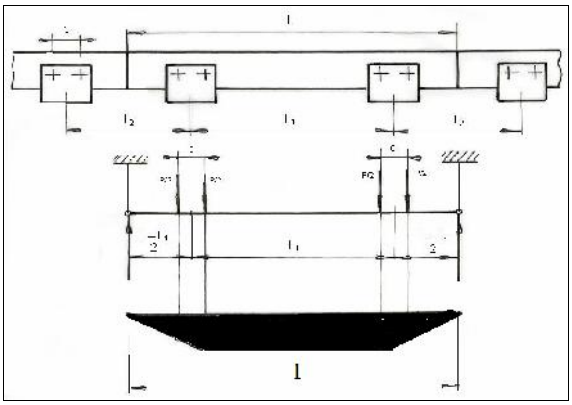

Figure 4. Scheme for the calculation of the bending moment of carrier rail in the case of distributed load at two points on the rail

The relevant data for this check-out are obtained from the Figure 4:

L = 3000 mm;
L_1 = 1850 mm;
L_2 = 1850 mm;
c = 250 mm.

Maximum moment for the most unfavorable case, we get by form (1):

$$M_{max} = P \times \frac{l \times l_1}{2} \qquad \text{N cm}$$

By substituting the values, we get that:

$$M_{max} = 27.000 \times \frac{300 - 185}{2} = 1552.500 \ , \text{N cm}$$

And a tension of bending, we get by form (1):

$$\sigma = \frac{M_{max}}{W_x} = \frac{1552.500}{149} = 10419,5 \qquad \text{N / cm}^2$$

Where is: W_x = 146 cm^3 – resistant moment per X axis

And level of safety, we get from relationship:

$$\nu = \frac{\sigma_f}{\sigma} = \frac{52000}{10419,5} = 4,99 \geq 3, \text{which satisfies the standards.}$$

b) $L_1 > L$

The relevant data for this check-out are obtained from the Figure 5:

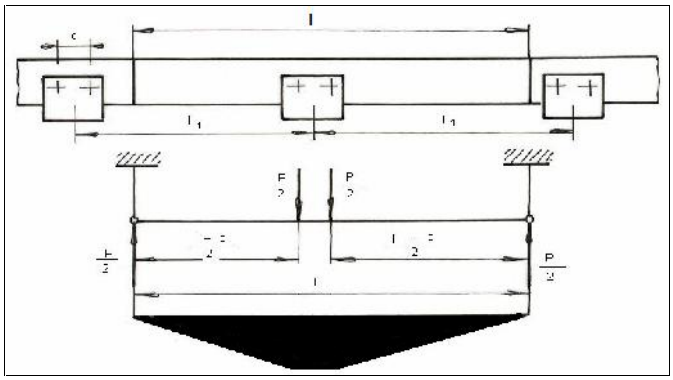

Figure 5. Scheme for the calculation of bending moment of carrier rail for the most unfavorable case

L = 3000 mm;
L_1 = 3400 mm;
L_1 = 3400 mm;
c = 250 mm.

Maximum moment for the most unfavorable case, we get by form (1):

$$M_{max} = P \times \frac{l \times c}{4} = 27.000 \times \frac{300 - 25}{2} = 2.541.500\,Ncm$$

And a tension of bending, we get by form:

$$\sigma = \frac{M_{max}}{W_x} = \frac{2.547.500}{149} = 16.875,10$$

And level of safety, we get from relationship:

$$\nu = \frac{\sigma_f}{\sigma} = \frac{52000}{16875,10} = 3,18 \geq 3, \text{ which satisfies the standards.}$$

CONCLUSION

For functional and timely supply of mines with production materials and equipment, and for solution of transport of workers, in many mines in the world successfully is applying systems of pit ropeway or railway.

Especially in the mines with underground exploitation where transport of dig out – ore is performed by belt conveyors, this question becomes more important. Precisely because of these factors, for a given system design for each mine, it is necessary to overview the needs for the amount of production materials and equipment, maximum number of workers that would be transported by pit ropeway, in order to be projected on the time required profiles of mining premises.

In this paper was performed a calculation of basic parameters for pit ropeway which would meet the needs for uninterrupted supply of production materials and other equipment in mine "Lješljani", which is in the phase of designing for commencement execution of works.

Basic parameters included for dimensioning of the system are:

- maximum load Q_t = 50 kN;
- route length L = 2150,5 m;
- the greatest angle of inclination of premise on the route $\alpha = 18^0$;
- maximum allowed driving speed V_{max} = 1,3 m / s.

Taking into account given input parameters for dimensioning system of production material and equipment delivery (monorail hanging ropeway) through calculating, following core values are obtained:

- required maximum traction force of the driving machine, F = 45 kN;
- available electromotor of strength N = 75 kW is adopted;
- nominal diameter of the rope d = 20 mm;
- strengthened rail carrier profile "I" 140 E.

Based on these parameters, it is possible to make a selection of necessary equipment for mine "Lješljani" which is in the phase of projecting for the commencement of execution of works.

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THE ROLE OF CORPORATIONS IN THEIR NEW ENTITY

ABSTRACT

The paper focuses on the new role of corporations in their corporate social performance and corporate financial performance. Stakeholder theory is pointed out as an instrument in providing a basis for exploring a relationship between the corporate social responsible activities and their corporate performance parameters like profitability, revenue, return of investments and so on. Case studies illustrate the positive relationship between the wealth – generating ability of corporations and their social responsible strategies and activities. Good practices in Bulgarian mining sector with positive impact on sustainable business and social development are mentioned to encourage socially responsible companies identify the interests, concerns and objectives of various stakeholders. The main assumption that a corporation that takes into account the needs of all its stakeholders will also be successful in traditional performance criteria is willingly accepted.

Key words: corporation; corporate social responsibility; financial interest and performance; stakeholders; mining industry

"Business corporations are created and survive only as a special privilege of the state" (Dahl, 1973). This statement is rejected by the same author by asking "Why should citizens, through their government, grant special rights, powers, privileges and protections to any company except on the understanding that its activities are to fulfill their purposes? And the rational answer is; corporations exist because we allow them to do so."

In fact, discussions on the role of corporations in their new entity tend to defend two assumptions: the corporation is guided by self-interest or the corporation operates on a socially responsible basis. These two assumptions seem to be problematic for society. The idea that the corporation is solely guided by narrow economic self-interest brings to reinforcing structures that will lead to this outcome. Moreover, this assumption leads to the conclusion that corporations will not usually take the socially responsible actions unless they obtain the necessary profitability. This view proves many GEOs, governments officials, academics, NGOs and etc. opinions that: Corporate social responsibility (CSR) is good for business." This point of view is widely spread in theory and practice concerning corporate targets and strategies. Various publications try to answer the main issue – how to find the balance between the socially responsible practices and initiatives and company interests and profits.

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One of the shortcomings of the "profitability obsession" is that in this case the government should regulate business to produce socially beneficial outcomes. This is difficult to achieve as laws are usually created after the fact and cannot anticipate in advance social unjusties. It is also naïve to assume that corporation's laws are made without the active participation and impact of industry. We cannot ignore political lobbying as a corporate strategy in the years and nowadays.

The second assumption that a corporation can operate on the basis of social responsibility brings the risk that managers can operate with impunity and without accountability. In a relaxed legal environment, competitive pressures and market demand and supply are the only drivers of corporate behavior which could bring to negative social outcomes.

Discussions between social and corporate interests tend to confuse social responsibilities of modern corporations. Curious was the case with Ford Motor Company (Henry. Ford, 1919) which was taken to court by its shareholders as a result of implementing one of Fords social engineering plans with the idea of helping the employers build up their lives and homes. The court disagreed and stated that "A business organization is organized and carried on primarily for the profit of the stockholders. Directors cannot shape and conduct the benefit of shareholders for the primary purpose of benefiting others." (Regan, 1998).

Nowadays, ruling of this type would have brought to a real public scandal as that court decision claimed social responsibility approach illegal.

However, this very delicate issue is on its way to be solved emphasizing that directors do not have a duty to the shareholders but instead have a duty to the corporation. This allows company directors to consider public interests.

The philosophy developed from the 1950s onwards was an attempt to cultivate the social, economic and ecological element in corporations, the last three being the pillars of sustainable development. In the 1980s the focus of CSR turned from CSR obligation ("doing good to be good") to CSR strategy ("doing good to do well"). The main arguments against CSR were its inability to stand against the profit corporations motive and the danger of using company economic resources for social targets. These contradictions were overcome by the new CSR approach by linking corporate strategies with social goals.

The theoretical and practical features of modern CSR prove that for companies it has become increasingly difficult to treat economic and social development objectives completely separate. The practices of philanthropy, sponsorships, donations or social contribution are often used to complement the CSR activities inside the company. These activities are united by the United Nations Global Compact under the term "social investment". Social investment includes various forms-from traditional philanthropy to more integrated corporate strategies. The philanthropic activities are extremely wide concerning grants, donations and all kinds of charities for those who need them.

CSR activities and practices are no longer a novelty in market economy. Companies behaving in a socially responsible manner are actually socially responsible. Recent studies offer more and more companies to adopt CSR approaches to help efficiency and stimulate innovations.[1]

In this case innovation finds a new identification of more efficient methods of doing business or new kinds of product or services that may not have appears if there were no CSR initiatives.

On November 11, 2009 Bulgaria accepted a "Strategy for Corporate Social Responsibility 2009-2013" encouraging CSR practices in companies. "Global Compact Network Bulgaria" (GCNB) Association was established to build on previous achievements and develop a business national structure supporting the Millennium Development Goals of shared universal values and principles to improve the quality of peoples life.

Most of the GCNB members operate in the mining sector that initiate public important practices with positive effect on sustainable business and social development (Asarel-Medet JSC., Chelopech Mining JSC., Elatsite-Med JSC., Mini Maritza-Iztok JSC., Kaolin JSC., Holcim Bulgaria, Overgas Inc., others).

Mining industry has made historically bad impacts on nature operating in areas without social legitimacy, causing major devastation and leaving when the area has been exhausted of all economically valuable resources.[2] In their efforts to encourage socially responsible companies identify the interests, concerns and objectives of various stakeholders (including national, regional government, local authorities, indigenous people, local communities, employees and competitors) and address their often changing needs. Moreover, the strategic approach to CSR has turned into a support to company targets.

The business priority to CSR, such as:

1.Environmental protection;

2. Human resources development;

3. Occupational safety and health;

4. Support for the municipality and region development ;

5.Dialogue with the stakeholders

Help companies in reaching their market objectives and identification by developing new programs for long-term social engagements, expert assistance, technological corporation, service access etc.

The effect of these CSR policies is rather complex – their contributions can be estimated in the strategic framework of positive social, economical and ecological changes. Positive effect on business activity alongside with the cause success-this is the challenge for the socially responsible corporation.

A number of case studies among clients point out that a cause considering marketing is highly estimated by them and such companies are supported by corporate citizenship.

An analysis of a case study among 25 000 participants from 23 countries gives a picture of public opinion on the following issues:

1. 90% of the participants want the companies to focus on anything else but profit
2. 60% declare that company social responsibility build up the image of the company
3. 40% mention that they react negatively to the lack of corporate social responsibility
4. 17% point out that they avoid buying products from socially irresponsible companies.

A recent survey of CSR initiatives of mining companies reveals a tendency to focusing on community initiatives in economic, social and environmental terms. Social responsibility has turned into a cause they pursue- providing funds for urban planning and infrastructure, improving living conditions and supporting culture and education initiatives in the regions. Improving administration capacity and developing local communities gives additional opportunities for local development and sustainable business.

Social issues differ for different corporations and industries and change over time. Product safety, environmental conservation, community development, employee diversity and occupational health and safety are examples of social issues that have received varying degrees of attention over the years.

The common opinion is that a business cannot be expected to address the entire scale of issues facing society but needs to identify the specific areas in which its different responsibilities have an impact. There is no universal agreement on what social issues need to be addressed by business. Aside from philanthropic activities many large corporations

develop social initiatives on the basis of “enlightened self-interest” having in mind the theories of CSR. [3]

While the CSR initiatives are targeted to communities, employees and customers, they are also related to the company business. Some initiatives, such as corporate social marketing, are designed to give specific financial benefits to the company. As Kotler F., and N. Lee [4] mention: “The beauty of the corporate social marketing is that the social good does not come at the expense of company objectives or vice versa. Rather, it does the greatest good it can possibly do for the cause while doing the most for the company”.

A corporation has to decide how it will address the issues of CSR. As Carrol [3] points out, his model of corporate social performance does not prescribe how far a company should go to address social issues but by positioning ethical and discretionary obligations into a “rational economic and legal framework” it allows managers to develop planning and solving tools.

Over the last 75 years various theories of the company have been proposed that have sought to explain how objectives, expectations and choices influenced decisions – making processes in a company. Stakeholder theory is instrumental in that it provides a basis for exploring a relationship between the corporate CSR activities and other corporate performance parameters like profitability, revenue, return of investments and so on. There is an assumption that a corporation that takes into account the needs of all its stakeholders will also be successful in traditional performance criteria. It has been proved by 127 empirical studies conducted during 1972-2002 that between corporate social performance and corporate financial performance there is a positive relationship. However, some recent reviews show serious shortcoming concerning sampling and measurement issue, lack of explanatory theory linking CSR with financial performance.

But still there is no serious proof that CSR can harm the wealth – generating ability of the corporations and a negative relationship between them. This fact confirms the new role of corporations in their CSR strategy and activities-a role, combining both corporate social performance and corporate financial performance.

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LEGISLATION FOR THE RE-CULTIVATION OF LAND DAMAGED BY UNDERGROUND COAL MINING

ABSTRACT

This paper presents the problems of recultivation of land damaged by the works of underground coal mining inside mines of PLC UCM - Resavica.

A special segment of this paper is the shew of legislation that treats the area of land re-cultivation in the complex system of environmental protection.

Key words: coal, re-cultivation, underground coal mining (exploitation)

INTRODUCTION

In carrying out mining operations, rather surface or underground coal mining, large and small areas of land are destroyed. Experience shows that land degradation is significantly higher in open cast mining systems where the content area degrades not only in the contours of the mine but also in the surrounding area and changes are also edit in the natural course of events and conditions. In underground mining are present appearance of the takeover of land by objects and landfill and deformation of the ground surface above mine space.

Landfill of tailings in underground coal mining are areas used to dispose tailings generated in the pits works of construction of underground facilities and tailings facilities in the preparation and processing of coal.

Tailings material in its properties is biologically sterile, and by moving and mixing the layers of the overburden layer is obtained by a heterogeneous composition and is usually called techno-genic land (deposol, rekultisol, flotisol). To give this land economic and biotic potential, it must be re-cultivated.

By excavation of a part of the deposit of mineral raw materials, in the affected underground massif is formed (uncovered) space which causes a certain settling and stratification of the rock mass, is also expressed in multi lying rock layers and "definitely" over the excavated area of the central zone in the reservoir.

Basic forms of disturbance undercuts rock layers with excavated underground works include the resulting cracks and crevices in the rock massif deposits. In addition, cracks are smaller, and crevices are greater degree of disturbance of rock strata. In situations where the appearance of cracks and fissures created such a disruption of the rock layers to lose Self-load time, then there is a complete violation of undermine rock layers. Practically distortions of undermine rock layers reach the surface and manifest themselves on the ground undermine terrain, vertical and horizontal scrolling. Through vertical displacement are formed so-called recess of undermine field, and on the ground there is a change in the slope and curvature of field.

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The immediate consequence of horizontal ground movements are cracks and crevices, and the appearance of wrinkles on the ground. Horizontal deformation of the soil and ground movements are a consequence of stretching or compressing massive rock deposits, and it has a special significance in terms of distortion of individual objects on the surface and by this indicator, determine the appropriate category of protection of surface facilities.

As the joint effects of vertical and horizontal displacements, on undermined ground there are landslides, which, like the corresponding distortion field can occur outside the direct influence of underground excavation works on the surface of the field.

Restoration of this field deformation is usually carried out by works of technical re-cultivation.

RE-CULTIVATION OF DAMAGED LAND

The term damaged land means those areas that are affected, directly or indirectly, by particular activity, in this case the underground mining of coal, which are changing the basic properties of such land. In addition to this, commonly used term is and devastated areas, which means the lifeless surface after use, without the layer of fertile soil suitable for further processing (use).

Each tailing material is biologically sterile, and by moving and mixing of this overburden the surface soil becomes usually very heterogeneous composition. When this happens, a number of problems occur: deterioration of drainage by increasing its transcendence, lack of nutrients, weak fauna activities, compacting and depending on it destruction of soil structure. Damaged land is coming to a new purpose by the works of technical and biological re-cultivation, where land re-cultivation is a collection of works for rehabilitation (reconstruction) productivity and economic value of the damaged area, as well as to improve the conditions of the surrounding environment.

Technical re-cultivation precedes biological re-cultivation and includes the preparation of the land surface for its later dedicated commercial use, restoration of fertile topsoil, surface leveling and removal of harmful substances.

Biological re-cultivation of land includes measures of soil fertility after technical reclamation. It implements a set of agro-technical and fitomeliorativ measures aimed at restoring the flora and fauna. Biological re-cultivation is essentially an upgrade in terms of training land for crop production.

In the company PLC UCM coal mining by underground mining is carried out in eight mines with eleven mining pits, while surface mining is performed in one locality (PK "Progorelica" - Ibar Mines coal) with a relatively small surface mine mountain character. In all mines are present appearance of land damage done by mining operations and tailings, and that is why is required taking measures of technical and biological re-cultivation, which was ordered by approved work studies of exploitation on the environment and by decision of the competent line ministry for environmental protection.

LEGISLATION RELATED TO LAND RE-CULTIVATION

Policy of the state and of the local authorities toward protection of the land from pollution and damage, as well as mandatory undertaking re-cultivation works, is regulated by a number of legal and bylaw acts, which everyone from his point of view, regulates this problem.

In the mining sector, the basic law is Law of mining and geological investigations which orders that mining companies which acquired exploitation rights are required, during and after the operation, to bring land for a particular purpose, or to perform tasks re-cultivation of land, according to project re-cultivation. How mining operations are caused by the existence of a

developed and approved investment and technical and project documentation and with this documentation is determined and the extent of re-cultivation and remediation work. Approval for the required documentation provides relevant Ministry of Mines and supervision of the implementation of measures is prescribed by the authority of the Republic mining and geological inspection.

Set of statutory of environmental includes protection of land, both from physical degradation and from pollution and harmful substances. This lists only the current basic legal acts, namely:

- ✓ The Law on Environmental Protection;
- ✓ The Law on Agricultural Land;
- ✓ Water Act;
- ✓ Forests Act;
- ✓ The Law on the Management of Waste;
- ✓ The Law of assessment of influence on Environmental;
- ✓ The Law of strategic assessment of influence on Environmental;
- ✓ The Law on integrated prevention and control of Environmental Pollution.

In modern terms, the Law of the environment as a separate branch of law is defined as a set of legal norms regulating and directing man's impact on his natural environment in order to protect the environment and maintain ecological balance.

The general legal framework for environmental protection in Serbia is established by the Law on Environmental Protection, the first is specifying the object of the law, basic concepts, system protection, protection of subjects and the basic principles underlying the system of environmental protection. Legal and physical entities are obliged, in performing their activities, to provide: rational use of natural resources; accounting of environmental costs within the investment and production costs, implementation of regulations, and taking measures to protect the environment in accordance with the law.

Legal or physical entities that use the natural resources or the goods, shall, during the construction and performance of activities, as well as its termination, plan and implement measures to prevent environmental degradation. Who degrade the environment, shall perform re-cultivation or otherwise rehabilitate degraded environment. Minister for the Environment shall prescribe the methodology for determining priorities for the rehabilitation of the environment.

Strategic assessment of the impact on the environment is regulated by the Law of strategic assessment of influence on Environmental, which terms, conditions and procedures for assessing the effects of certain plans and programs on the environment (strategic assessment) to ensure the protection of the environment and promoting sustainable development by integrating basic principles of environmental in the process of preparation and adoption of plans and programs.

Strategic assessment is carried out for plans, programs and principles in the field of spatial and urban planning or land use, agriculture, forestry, fishery, energy, industry, transport, waste management, water management, telecommunications, tourism, conservation of natural habitats of flora and fauna, which establishes a framework for the approval of future development projects of certain regulations governing the assessment of environmental impacts.

In addition to the strategic assessment of the environmental impact, there is assessment of environmental impacts. It is also regulated by special Law (The Law of assessment of influence on Environmental).

Assessing the impact of the project on the environment shall be for projects that are being implemented in the area, including changes in technology, reconstruction, capacity expansion

or termination of which may lead to significant pollution of the environment or pose a risk to human health. This estimate includes projects in the fields of industry, mining, energy, transport, tourism, agriculture, forestry, water and utilities, as well as all the projects that are planned in a protected natural area.

Assessing the impact of the project on the environment is an integral part of the documents without which you cannot access the performance of the project, and is based on a study of the assessment of environmental impacts, whose scope and content are determined by special regulations issued pursuant to the aforementioned law.

Consent to this study is given by a competent organ of the Ministry of Environment under the prescribed procedure, which is implemented through more phases.

Law on Integrated Prevention and Environmental Pollution Control regulates the conditions and procedures for issuing integrated permits for facilities and activities that may have adverse effects on human health, the environment or property, the types of activities and facilities, supervision and other issues of importance to the prevention and control of Environmental Pollution. The procedure for issuing integrated permits shall be through more phases in accordance with applicable regulations, and the ministry responsible for environmental affairs shall issue an appropriate license.

Protection of agricultural land is regulated by the Law on agricultural land and this law itself regulates: planning, protection, development and use of agricultural land, monitoring the implementation of this law and other issues relevant to the protection, development and use of agricultural land as a resource of general interest.

The law, among other things, stipulates that agricultural land can be used for non-agricultural purposes, as in the case of extraction of minerals, or the work of the tailings, fly ash, slag and other hazardous and noxious substances at a certain time by the previously obtained consent of the ministry responsible for agriculture. One of the conditions for the conversion of agricultural land is re-cultivation project, which contains in particular:

- ✓ general characteristics of the area for exploitation of mineral resources (climate, the soil, hydrographic) and condition of agricultural production;
- ✓ documentation of the owners, as same as of the users of agricultural land;
- ✓ design solution of technical re-cultivation (removal procedure, preserving and restoring topsoil, technical landscaping, hydro-technical works that established the original water regime in the soil, etc.);
- ✓ design solution of biological re-cultivation (land preparation for agricultural production, the use of agricultural land, procedure and deadline of dangerous substances in the reclaimed land);
- ✓ deadlines for the presentation of certain phases of re-cultivation;
- ✓ measurement and calculation of works;
- ✓ graphical and numerical contributions.

Re-cultivation project is prepared by a legal company or a company that has the authority of the ministry responsible for agriculture.

Also, a special law (Law on Water, Forests Act) provides that the protection of the land must be done, as same as water and forests protection inside the mining area if mining activities affect the water regime and perform re-appropriation of forest land. It is inevitable that the performance of underground mining works and related activities affect the water regime, how by lowering of groundwater levels, the same as water use and by engaging into the waterways of mine and industrial water. In addition, forest land is almost invariably present on the surface within the mining fields, so it comes under attack of forest Law and under attack of demands that he prescribes.

CONCLUSION

From the above, it is evident that the legislation field of land re-cultivation damaged by underground mining is widely covered and that it is under charge of several ministries and their relevant authorities. In practice, this creates a large number of problems, particularly in the process of drafting and approving of technical documentation because it requires more time and higher costs, and it would be appropriate that the whole area of re-cultivation get under the Law of mining and geological research. This would avoid unnecessary paperwork and would not affect the quality of technical solutions and their implementation.