

## 付 属 資 料

1. 質問票・回答
2. RTB BOR の5 か年計画
3. 収集資料リスト

## 1. 質問票・回答

### 関連資料

#### 1. 1 質問票

#### Questionnaire related to the “Study for Promotion and Sustainable Development of the Mining Industry of the Republic of Serbia”

To carry on our meeting of the “Project Formulation Study” smoothly, would you please prepare the data and documents on the following items?

Note: The statistical data between 1980 to the 1990 are agreeable, two or three optional(representative) years data, which show the maximum and average figure among the decade. However the data for 1991 to 2003 are required for every year.

#### <Implemental Organization(s)>

1. The Ministry of the Energy and Mining (回答あり)
  - (1) The roll of the Ministry in the Government
  - (2) The organization chart of the Ministry. The manpower and the distributed duties of each sector.
  - (3) The organization chart of the Geology and Mining Sector. The manpower and the distributed duties of each sub-sector.
2. The Ministry for Protection of National Resources and Environment (回答あり)
  - (1) The roll of the Ministry in the Government
  - (2) The organization chart of the Ministry. The manpower and the distributed duties of each sector.
  - (3) The organization chart of the of the Sector related to mining. The manpower and the distributed duties of each sub-sector.
3. The Steering Committee (検討中)
  - (1) The details of seven Local Experts and eight Local Assistants for implementation (professional affiliation, title, specialty)

#### <Working Group>

1. The Ministry of International (回答あり)
  - (1) The roll of the Ministry in the Government
  - (2) The organization chart of the Ministry. The manpower and the distributed duties of each sector.
  - (3) The organization chart of the of the Sector related to mining. The manpower and the distributed duties of each sub-sector.

2. Working Group (検討中)

- (1) The functions
- (2) Details of the Group members (professional affiliation, title, specialty)

<Related laws> (現地にて聴取、一部書類による補足回答あり)

(1) The new Mining Law (which was found mention in "Investing in Mining Sector" April 24-25,2002 at Hyatt Regency Hotel, Belgrade By Mr. Vojislav Krstić) : The main points of revision of the Law NO.44/95 – 27. October 1995 on the items of previous JICA's questionnaire of "Part 1 Questionnaire for Arrangements in Mining in Serbia.

(2) The detail explanation of the 'needs to be amended to become a suitable law and regulation system' (that is found in reason for Project Request)

- (3) The Environmental Standards related to mining

<Potential of non-ferrous-metal mineral resources>

(1) The Methods for calculation and classification of Ore Reserve (Resource) Calculation in Serbia (回答あり、ただし、不十分)

- (2) The outline of the each developed deposit: (未回答)

–The type of the deposit and main minerals

–Ore reserves/resources in each category of classification, quantities of ore and metals, ore grade

–mineable reserves and ore grade

- (3) The outline of the each undeveloped deposit: (未回答)

–The type of the deposit and main minerals

–Ore reserves/resources in each category of classification, quantities of ore and metals, ore grade

(4) A geological map and a metallogenic map (with mines location) covered the whole of Serbia. (鉱床位置図について解答あり)

- (5) GIS (現地で聴取、視察。システム構成については未解答)

–Existing main equipment and materials (including software)

–Inputted data, and data necessary to be inputted in the future.

–Output opened to the public

- (6) The methods of mineral deposit evaluation in Serbia. (未回答)

- (7) Feasibility Study of major mining development projects (現地で聴取)

<Exploration Activities for non-ferrous –metal minerals>

- (1) Statistics

Exploration drilling length, cost amount ( Operator basis: (e.g.) Ministry of E&M,

domestic companies, foreign companies) 1980-2003 (データなし)

(2) Process/Procedures of application of PL, EL, ML, and the actual average duration from application to approval. (回答あり)

(3) Number of inquiries of mineral licenses from foreign investors in recent years, and the result (( e.g.)exhibited applications, pending, abandoned) (認可分について解答あり)

< Statistics of production and sales on non-ferrous metal >

(1) Production of crude ore, concentrate and metal. 1980-2003 (回答あり)

(2) Sales volume and value for Domestic and Export (country basis) of concentrate and metal, 1980-2003 (未回答)

(3) Import volume and value of concentrate and metal 1980-2003 (未回答)

< Activities of non-ferrous metal mines > (ほとんどデータなし)

(1) Statistic of mining that is published in Serbia, including data of number of mines, manpower, production, materials consumption and depreciation etc.

(2) Following information of each mine (including shutdown or abandoned mines)

- Mineable reserves and ore grade
- Type of deposit
- Mining method and mining capacity
- Mineral processing system and capacity
- Manpower ( mining, mineral processing, indirect)
- (with the shutdown/abandoned mine) The reason for shutdown/abandonment (e.g.: drain of ore reserves, damage of infrastructure, shrinkage of market, difficulty of materials availability due to foreign currency shortage)
- 。 The condition of mine activities in 2004: that is, the effect of metal price rising tendency.

< Today's conditions of infrastructure related to non-ferrous metal mining industry >

(未回答)

(1) The conditions of electric power supply and maintenance plan in mining areas.

(2) The conditions of water supply and maintenance plan in mining areas.

(3) The today's capacities of road, railway and port for material/product transportation related to mining activities including export/import, and maintenance plans.

<Environment>

- The situation of environmental pollution in each mining area, and Governmental activities for the pollution caused by mining. (現地にて聴取、一部現地調査)
- National environmental monitoring (Content, monitoring station results of the monitoring etc.) (現地にて聴取)
- Environmental criteria/standard, effluent standard, air standard, Future program/plan for drawing up standards/criteria (未回答)
- Environmental impact assessment (EIA)、Situation of its application to mining activities (現地にて聴取、また書類回答あり)

<Privatization>

- (1) The present situation of privatization in every industrial sector. (未回答)
- (2) The basic policy of Government for the privatization of mining sector. (現地にて聴取)

<Promotion of Foreign investment>

- (1) Details of Ministry of Energy and Mining toward the foreign governments and/or foreign investors to promote the mining investment. (現地にて聴取)
- (2) Today's situation of foreign investment to mining sector. Number of foreigner's interest in mining investment and the results. (探鉱のみ回答あり)

<Economical Index>

- (1) Statistics of DGP, DGP per capita, Percent in DGP of each industry including mining 1980-2003 (近年のデータのみ入手)
- (2) Document: Republic Statistical Office "Statistical yearbook of Serbia 2004" (現地にて入手)

<Others>

- (1) Program/plan of EU accession (未回答)
- (2) National development plan, Position of the mining industry in the National development plan (現地にて聴取)

<Information of a mine that is requested case study > (現地にて調査)

1. Geology
  - The outline of geology and deposit
  - Location map of deposit, pit, waste dump, etc.
2. Mineable reserves, ore grade, strip ration (open pit mine). Mineral potential.

3. Organization chart of the mine.
4. Exploration: length of exploration drilling/tunnel 1980-2003
5. Operational statistics 1980-2003: Crude ore, ore grade, (underground mine) length of development, (open pit) waste volume, concentrate, grade of concentrate, recovery, grade of tailings; (if there is smelting/refining facility) volume of crude metal and refined metal
6. Sales statistics 1980-2003 : Sales volume (consumer basis
7. Mining operation
  - Cross section of mining pattern
  - Main mining equipment: numbers, accumulated working hours, availability, productivity ( e.g. t/operating hour)
  - Main unit consumption: explosives, consumables, fuels and lube, electricity etc
  - Problems in mining operation to hold at present
  - Feasibility Study of major mining development projects
  - Management of Waste rock, low grade ore
  - Waste water (e.g, acid drainage from open pits) management
8. Mineral processing operation
  - Location map of plant facilities and equipment
  - Flow chart
  - Material balance
  - Main processing equipment: numbers, accumulated working hours, availability, productivity ( e.g. t/operating hour)
  - Main unit consumption: reagents, consumables, electricity etc
  - Problems in mineral processing operation to hold at present
  - Waste water treatment system
  - Tailing management
  - Amount of tailings (Current generation (t/y) and historical deposited)
  - Grade and total amount of remained metals in the tailings
  - Tailing dam management (Location monitoring, embankment management etc.)
  - Secondary recovery of the metals from the tailings
  - Facility improvement plan
9. Environment
  - Measured data of water quality and dust
  - Existing monitoring facilities and chemical analysis equipment
  - Countermeasures against environmental pollution caused by mining activities

- Problems in operation to hold at present with the pollution
  - Environmental monitoring station inside BOR and/or its vicinity (Reconnaissance)
  - Capacity of the laboratory or institute in terms of mining and smelting (Number of staffs, organization equipment , research items and content etc.)
10. (if included in mining organization) Smelting/ Refining Facility
- Location of facilities and equipment
  - Process chart
  - Size and capacity of the facility
  - Problems in smelting/refining operation to hold at present
11. Statistics of manpower 1980-2003
- Staff and worker wise manpower of prospecting, mining, mineral processing, smelting/refining and indirect division
12. Terms of sales (ore, metal)
13. Transition of operating cost (expressed in index)

1. 2 質問票の回答

**REPUBLIC of SERBIA**

**Questionnaire for the “Study for Promotion and Sustainable Development  
Of the Mining Industry of the Republic of Serbia”**

Belgrade, January 2005.

Implemental Organizations

**The Ministry of Energy and Mining**

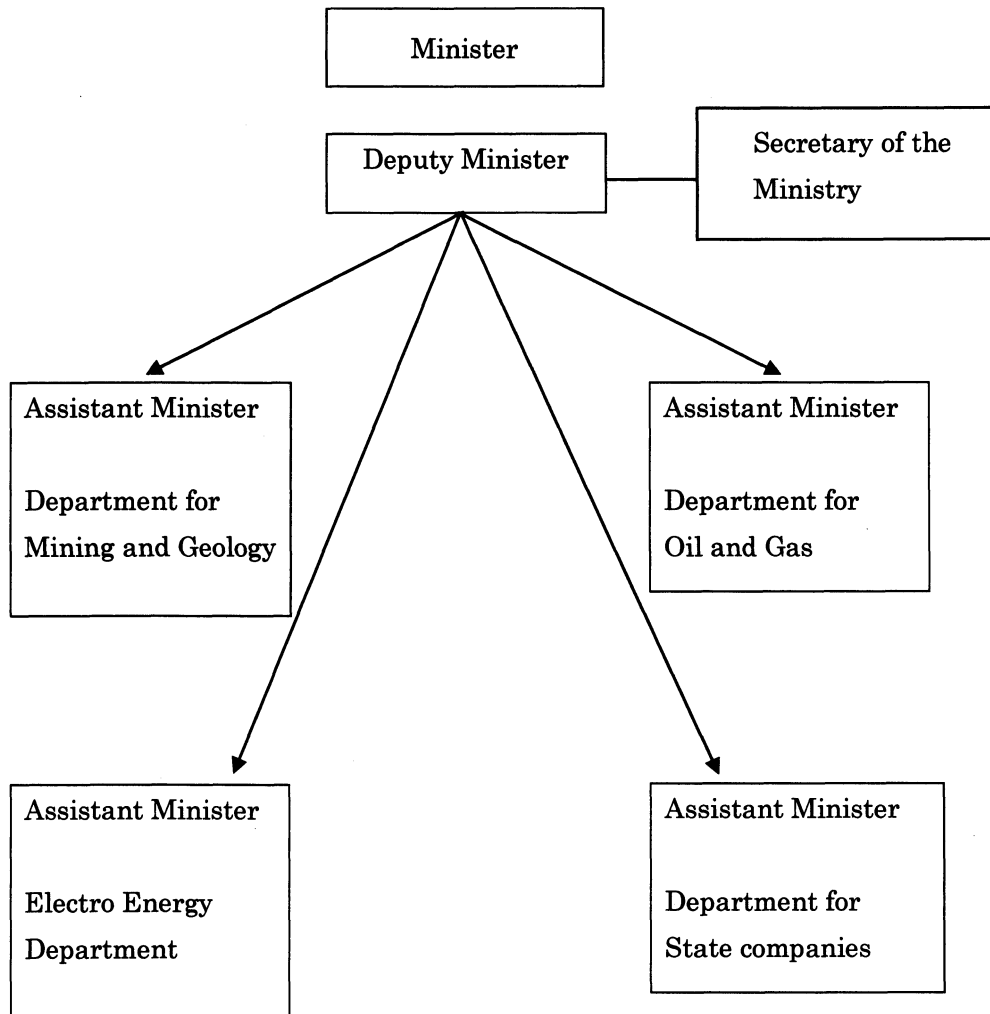
The role of the Ministry in the Government

The Ministry of Energy and Mining represents the state authority in following areas: mining, energy, the state energy balance and production in oil and gas industry .It is also responsible for detailed geological explorations, with exception of underground water, and for making annual and middle term programs of detailed geological exploration works. The Ministry of Energy and Mining has an obligation to take all necessary measures in order to provide conditions for operating the state owned companies. This Ministry has also supervising role over appliance of articles of various laws such as: Mining Law, Law for Geological explorations, Energy Law etc.



The organization chart of the Ministry

The basic organization scheme is as follows:



The total number of employers is around 80 in 4 departments.

Department for mining and geology

It is responsible for issuing permits for geological exploration and mining licenses for mining activities. This sector has a cadastre for all exploration and exploitation fields at

the whole territory of the Republic of Serbia. At the same time, one of the main duty of this department is to follow the basic production results of the state owned companies in mining area ( open-pit coal mines, which are part of Electric Power of Serbia, and RTB-Bor, the leading company of production copper.)

#### Electro Energy Department

It is responsible for making state energy balance (a part of electric power production) and it is in charge for all power plants (thermo and hydro-power plant) and transmitting network (power level lines) in the country. The basic duty of this sector is to take all necessary measures in order to obtain good conditions for production and development of the national Electric power company.

#### Department for Oil and Gas

This Department is in charge for another part of state energy balance( production of oil and gas which comes from domestic sources and import of these goods from foreign countries).This sector is responsible for national Oil and gas company ( NIS ) and oil refineries, which are part of NIS. Making and executing Government policy in this area(taxes, prices of oil products and business relationship with private sector) is the most important thing which this sector dealing with.

#### Department for State companies

This is quite new department and the main duty is to carry on the Government policy in state owned companies which are under reconstruction and are planned to be privatized. This department is in charge to take negotiations with the Unions in order to determine the future needs for job places and at the other hand to protect rights of workers who will lost their jobs.

#### **The organization chart of Department for Mining and Geology**

This Department consists of two sectors and they are: Team for Study and Analytic works and Mining and Geology Inspection .The head of the Department is Assistant Minister.

### Team for Study and Analytic works

This team is responsible for issuing the exploration and exploitation rights or licenses. At the same time this team is obliged to collect all reports of exploration activities which have been done. The employers in this team are temporary members of the State commission which is in charge for issuing the state statements of ore reserves. Making the concessions acts or changes of related laws and rules is also duty of the team. The state owned companies in mining area are under authority of the team which is responsible for solving the basic difficulties in production.

The total number of employers is 8 and the structure is:

- 4 mining engineers
- 2 geology engineers
- 1 lawyer
- 1 economist

### Mining and Geology Inspection

The role of the Inspection is to supervise exploration and mining activities throughout the country. The main duty of this sector is to get know whether or not the exploration and mining activities are in order. They are dealing with the articles of Mining Law, Law for Geological Exploration and various Regulation and Rules related to mining activity.

The total number of employers is 9 and the structure is:

- Head of the Inspection
- 6 mining engineers - inspectors
- 2 geology engineers - inspectors

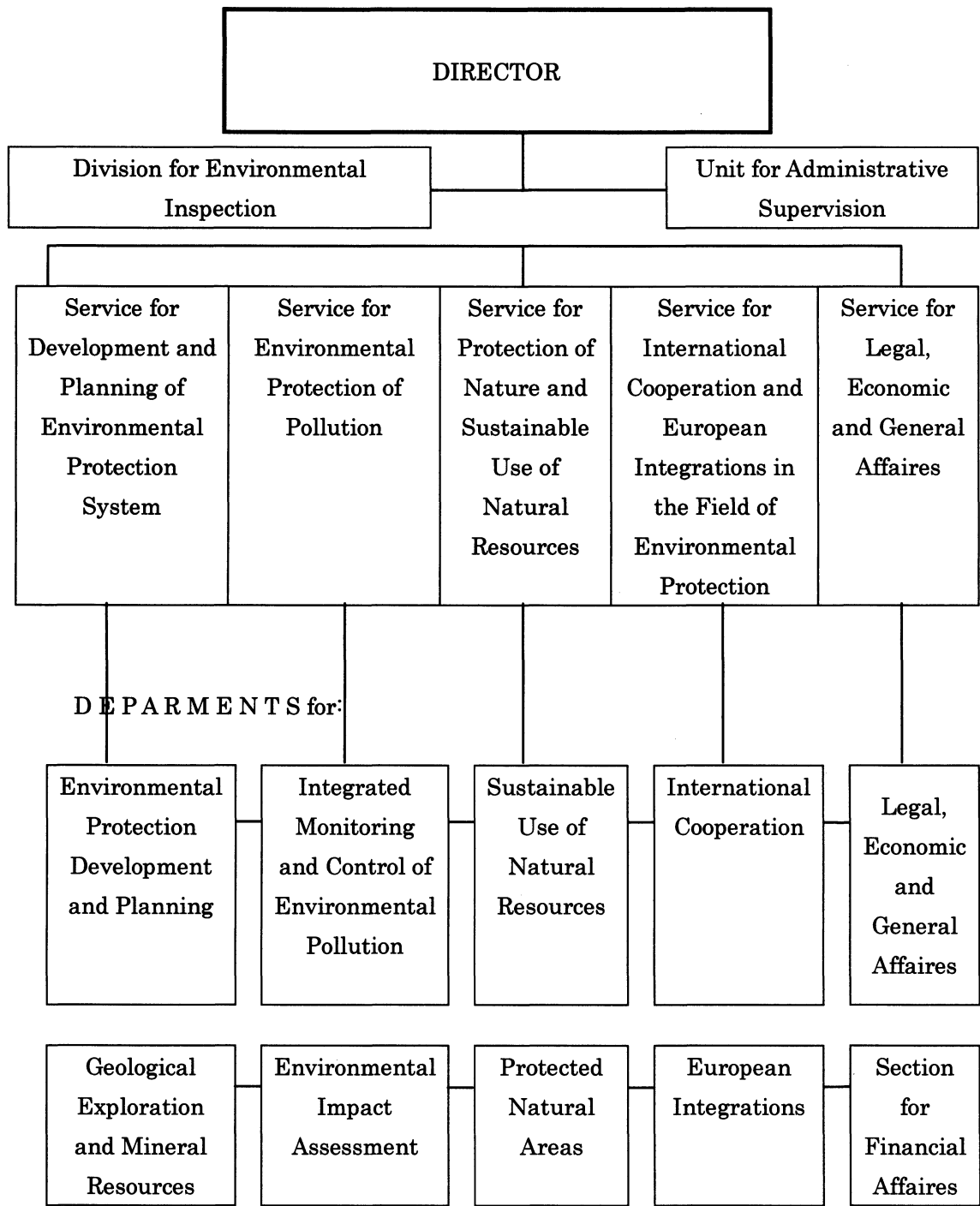
### **The Ministry of Science and Environment Protection**

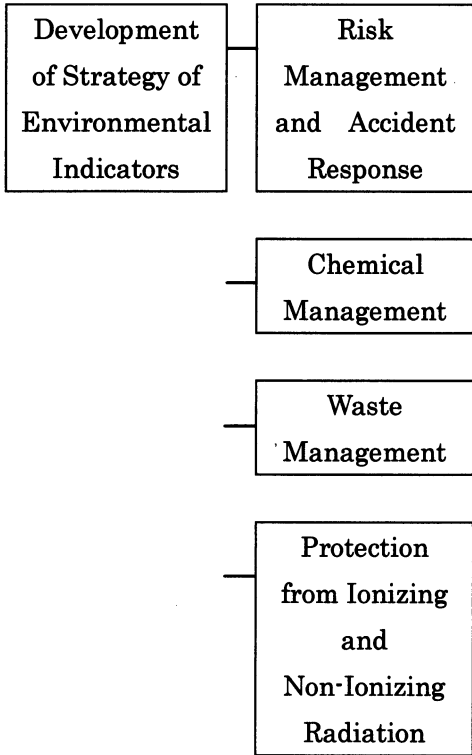
Questionnaire related to the Study for promotion and sustainable development of the mining industry of the Republic of Serbia

***The roll of the Ministry/Directorate in the Government and the organization chart of the Directorate***

. Directorate for Environmental Protection, as a governmental body within the Ministry of Science and Environmental Protection, performs jobs of state governance and experts jobs regarding: system of protection and sustainable use of natural resources (air, water, soil, mineral raw materials, forests, fishes, wild plants and animal species), producing strategic documents, plans and researchers programs within the area of sustainable use of natural resources and renewable energy resources; producing reserves balance of underground water, norms and standards for geological maps performances; producing programs for research work in the area of basic geological researches related to sustainable use of resources - underground water and detailed research work; procurement of material and other conditions needed for realization of that programs; system of protection and environmental improvement; basis of environmental protection; natural protection; protection of ozone layer; monitoring of climate changes; Tran boundary air and water pollution; establishing and implementing protection of natural wholes of great importance for the Republic of Serbia; establishing conditions for environment protection in urban planning and constructing; advance warning of accidents; activities of the national database and data on quality of water and air; protection from noise pollution and vibrations; protection from ionization and non-ionization radiation; production and commerce of poisons and other dangerous matters, except for drugs and precursors; chemicals management; waste management, except for radioactive waste; approval of exceeded circulation of waste and protected plant and animal species; establishing quality monitoring of all the members of the environment; the function of national communication centre of the system for sustainable use of natural resources and environment protection; establishing and development of information system for sustainable use of natural resources and environment; inspection supervision in the area of sustainable use of natural resources and environment, as well as other already mentioned areas; ecological inspection supervision at the border, as well as all other jobs regulated by law.

The organization chart of the Directorate for Environmental Protection within the Ministry of Science and Environment Protection





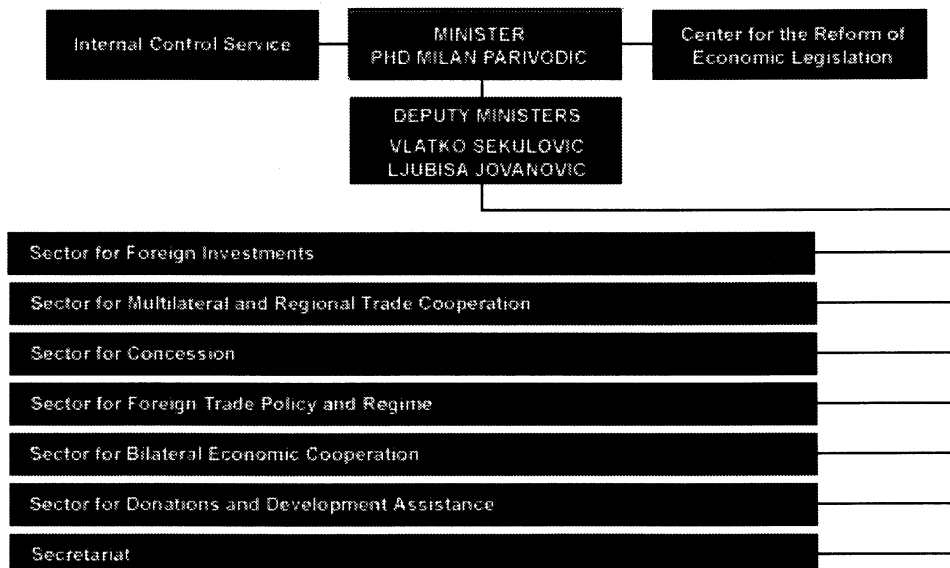
## MINISTRY OF INTERNATIONAL ECONOMIC RELATIONS

### (1) The roll of the Ministry of International Economic Relations (MIER)

The **Ministry of International Economic Relations** is in charge of public administration assignments relating to:

- promotion of international economic relations
- foreign investments
- coordination of the use of donations and other forms of foreign assistance
- coordination of Serbian economic entities operating abroad
- regional cooperation
- coordination and monitoring of cooperation between Serbian authorities and international organizations
- other assignments envisaged by the law

### Organization chart of MIER



**The Department of Foreign Investments** is in charge of activities relating to: promotion, proposing and implementation of economic policy measures to increase the level of foreign investments; preparation and coordination of activities relating to national FDI strategy; coordination of activities in the field of foreign investments; initiation, coordination, implementation and monitoring of measures supporting the elimination of administrative barriers to foreign investments; improvement of overall competitiveness of the economy and increased economic efficiency of investments; proposing and adoption of new regulations and amending of the existing ones, as well as monitoring of implementation of regulations governing the investment issues; cooperation with and

provision of support for foreign investors; identification, planning and proposing of investment projects, in cooperation with the relevant institutions; coordination and participation in international activities relating to foreign investments; coordination of activities and cooperation with other Ministries and government agencies the activities of which affect foreign investment; cooperation with relevant donor institutions (Organization for Economic Cooperation and Development /OECD/, Stability Pact for Southeast Europe /SP SEE/, USAID, European Agency for Reconstruction /EAR/, World Bank etc.), interested investor organizations and economic representatives of foreign countries; analytical and statistical monitoring of economic activities; production of investment activity reports; carrying out analyses to monitor the results of investment promotion programs; development of an IT system to link the Ministry with other government institutions in order to collect and exchange economic data within the framework of public administration bodies and organizations, as well as other activities required by the law.

Manpower: 5 civil servants.

Within the **Sector for Multilateral and Regional Trade Cooperation** activities related to the promotion and development of trade relations with World Trade Organization/WTO/, European Union /EU/, regional and sub regional organizations and initiatives, are conducted, and in particular: coordinating of preparation of multilateral trading agreements to be concluded and their execution; monitoring of conclusion and realization of trade agreements with EU; harmonization of trading regulations with WTO and EU standards; preparation of information for discussions between state and political representatives and representatives of the international organizations and initiatives;



monitoring and analysis of exchange of goods, industrial and technological cooperation and other forms of trade cooperation, as well as other activities laid down by the law.

**Manpower: 7 civil servants**

Within the **Sector for Concession**, operations related to analysis are performed as well as the proposal of measures for underpinning the concessional activities, follow up of administrative bodies and state organization operations are conducted and consultations regarding the procedure of availing of concessions; collection, analysis and publishing of data related to concessional activities, as well as the other operations laid down by the law.

**Manpower: 1 civil servant.**

Within the **Sector for Foreign Trade Policy and Regime** the following activities are conducted: system and development of foreign trade exchange; foreign trade instruments underpinning export of goods and services and instruments, by which the local market is protected from excessive, subvention import and damping price import; governance and monitoring of foreign trade exchange, goods turnover and services with abroad; concluding contracts on goods and services turnover with abroad; governing the role of goods arrangements and mechanisms for their implementation; conditions for implementation of specific operations regarding foreign trade turnover; entering into the registers maintained by the Ministry; research-analytical activities and preparation of informative material with proposals of measures by mentioned issues; realization of cooperation with enterprises and state administration bodies and organizations, as well as other activities laid down by the law.

Within the Sector for Foreign Trade Policy and Regime the following internal organization units are formed:

- Department for Foreign Trade System
- Department for Implementation of Safeguards and Realization of Inter-governmental Agreements
- Department for Special Forms of Foreign Trade Turnover
- Department for Long-term Forms of Economic Cooperation with Abroad
- Department for International and Local Foreign Trade Network

Manpower: 14 civil servants

Within the **Sector for Bilateral Economic Cooperation**, activities related to the promotion and development of bilateral economic relations are conducted, and in particular: proposal and implementation of strategy and policy related to bilateral economic relations; preparation for concluding, design of documentation for and execution of bilateral trade agreements and agreements on goods; preparation of information and platforms for bilateral negotiations with foreign state representatives; follow up and analysis of bilateral economic cooperation; proposal and execution of measures for promotion and underpinning of bilateral economic cooperation; proposal for establishing, harmonization and management of mixed boards for bilateral economic cooperation; coordination of state administration bodies and organizations regarding these activities, as well as the other activities laid down by the law.

Manpower: 7 civil servants

Within the Ministerial **Secretariat** the following activities are conducted: organization, integration and coordination of the sector operations; public relations and information; drafting and proposition of Rules of Procedure laying down issues of organization and work related to the ministries; preparation of decisions on individual rights of employees within the Ministry and other normative-legal affairs in the jurisdiction of the Ministry; performing of statistical-registry related activities, IT activities, administrative-technical and other operational activities for the needs of Ministry; preparation and processing of requests for the provision of financial resources for ministerial operations and special purpose resources; maintaining the employment register; acquisition of equipment, professional literature and office supplies, as well as the other activities of common interest for the Ministry.

Manpower: 13 civil servants

### **(3) The organization chart of the Sector for Donations and Development Assistance**

Within the **Sector for Donations and Development Assistance**, the following activities are conducted: coordination between authorities and state administration organizations in order to establish sectoral and inter-sectoral strategies, priority needs and selection of adequate projects and programs to be financed with donations and development assistance, including assets from international reconstruction funds,

development and stabilization, cohesion and structural funds, funds for regional, international and cross-border cooperation and other bilateral and multilateral sources of earmarked assets; providing information to donors on priority projects and programs; cooperation with donors regarding harmonization of donors' priorities with the priorities of Republic of Serbia, preparation of donors strategies, planning and realization of programs and projects financed with donations and development assistance; monitoring of project and program implementation through reports made by beneficiaries using donations and development assistance and donors; data collecting, analytical data processing and preparation of reports on donations and development assistance, as well as other activities laid down by the law.

Manpower: 7 civil servants.

### **The New Mining Law Activities**

#### Introduction

After democratic changes in Serbia the whole stuffs of ministries and Government agencies have been changed and new members started to think about needs they have. It was decided to give a high priority to revision of the Mining Law and various kind of regulation rules related to mining and geological activities. The reason for that decision was outdated regulation system incapable to response to requirements of the modern industry.

The team, made for revision of the current Mining Law , have started in 2002. but after a while some members were changed. In spite of that the first version was finished in 2003.and the first round of accordance and collecting thoughts from other ministries and institution , was over at the end of the year. Last year was finished the second version, with some improvements, and finally that documents is ready to be reviewed in national Parliament.

#### Explanation of reasons for revision Mining Law

As it is mentioned above, it has been noticed that Mining Law is not capable any more to response well to the requirements which come from mining industry and that some topics must be changed. First of all some articles are defined on different way in order to make faster decision procedure and at the same time the better protection of investors

rights. It is done to encourage foreign and domestic investments in mining, furthermore for the first time will be possible to get concession rights for exploration and mining.

The second

main thing is, according to the new Mining Law , an Agency for Mining and Found for development of mining and geological activities will be established. These organizations will be state and under authority of Ministry of Energy and Mining but independent in their works. Their role will be technical suport to the Ministry.

One of the new thing which new Mining Law provides are licenses and there will be two type of them:

1. license for performing mining works
2. license for imaging and reviewing mining projects

The Ministry of Energy and Mining expects that changes will put in order current situation and give an answer who has and who has not right to operate in mining.

Another important topic is the royalty matter. The new Mining Law proposes smaller rate of royalty and different way of dividing founds: 50 % goes to state budget and another 50 % goes to local community budget. The basic idea is to make greater interest in local community and to avoid some difficulties.

There is a big interest either in mining companies and society for new Mining Law and Ministry of Energy and Mining hopes that it will be a great step toward the open market and that it will contribute to our industry in general.

## **The Methods for calculation and classification of Ore Reserves**

At the early phases of prospecting-exploration process, at the stage of prospecting and previous exploration, the calculation of solidly minerals reserves has limited character and serves only to give us basic information.

The decidedly calculation of ore reserves is done after finishing the stage of detailed exploration works of mineral site and it is shown in the final Project Report of Ore Reserves, as the individual topic. The Project Report of Ore Reserves has textual part ( 7 different topics, including the evaluation of mineral deposit ),graphic documentation (geological maps and geological and calculation cross-section and other facts which are relevant for the better view of the mineral deposit geology etc.) as well as other documents ( the reports of various kind of analysis etc.).The Project Report of Ore Reserves must be reviewed and confirmed by State Commission (open-public discussion) and it consists of geology and mining engineers. After that procedure, a statement of Ore Reserves for mineral deposit is issued and it has facts about the quality of mineral, the quantity and classes of reserves, for what purpose can be useful and the total ore reserves (categories A, B and C<sub>1</sub>) are given with the specific date.

The most important parameters in process of calculations are: the surface of ore body, the average thickness of ore body, the average specific consistency of ore, the average contents of useful component in ore and the humidity ( if it is more than 30% in mineral deposit).

The surface of ore body, on the plan and on the cross-section is contouring (the border between the ore and tailings is drawn) on the base of exploration works. Measuring of the surface is done in many different ways such as: by plan meter, by measuring the surface of geometric figures, using computer technology etc.

Defining the thickness of ore body in process of exploration is done directly (base on exploration works) or on indirect way.

Defining the specific consistency of minerals is done by measuring mass of the test jack piece in dry condition and it's cubage without pores.

Defining the average contents of useful component in mineral is done by methods of average arithmetic and average pondered value.

Defining the humidity of minerals is taken into account (only in case if the humidity in deposit is more than 30%) and a correction coefficient for humidity is used in procedure of calculation. This correction coefficient is calculated from relation between masses of test jack piece before and after drying process is finished.

### **The Methods for calculation of Ore Reserves**

The calculation of reserves in contoured parts of mineral deposit or in whole contoured deposit is done by different analytic and graphical methods. The contours of deposit ( the border between ore and tailings), inside and outside ones, are drawn based on interpolation and extrapolation, those are approximate and the grade of regularity depends of how many exploration works were, geological nature of deposit and variation

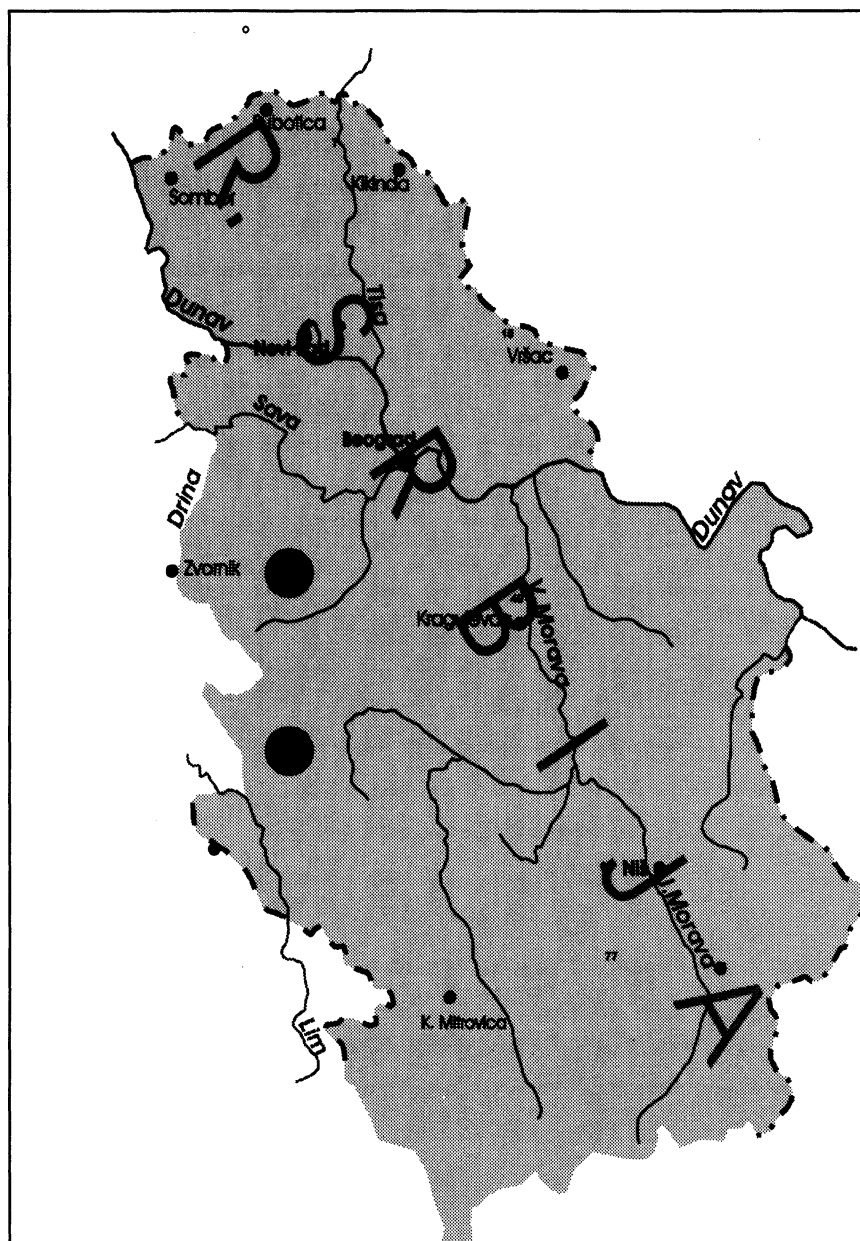
and that' why mistakes are very often. So, the appliance of some complex mathematic calculations is absurdness. Ours standpoint is that the calculation of reserves is much more geological than mathematic problem and only simple mathematic methods are used.

In geological literature there is description for more than 20 methods of calculation ore reserves of solidly minerals and the following are more known: the average arithmetic method, geology blocks method, exploitation blocks method, profiles methods- which the most popular in our country ( the parallel and non parallel vertical or horizontal profiles),triangles method, polygons method, contouring method and statistics method. All these methods are specific and depending of that fact, applying under determined conditions.

The calculation of ore reserves is never done by only one method, but with the combination of two ore more methods. Usually, two methods are operated, one as the basic method of calculation of ore reserves and the other method which serves as a control method, to be sure that basic method did not make any big mistake.

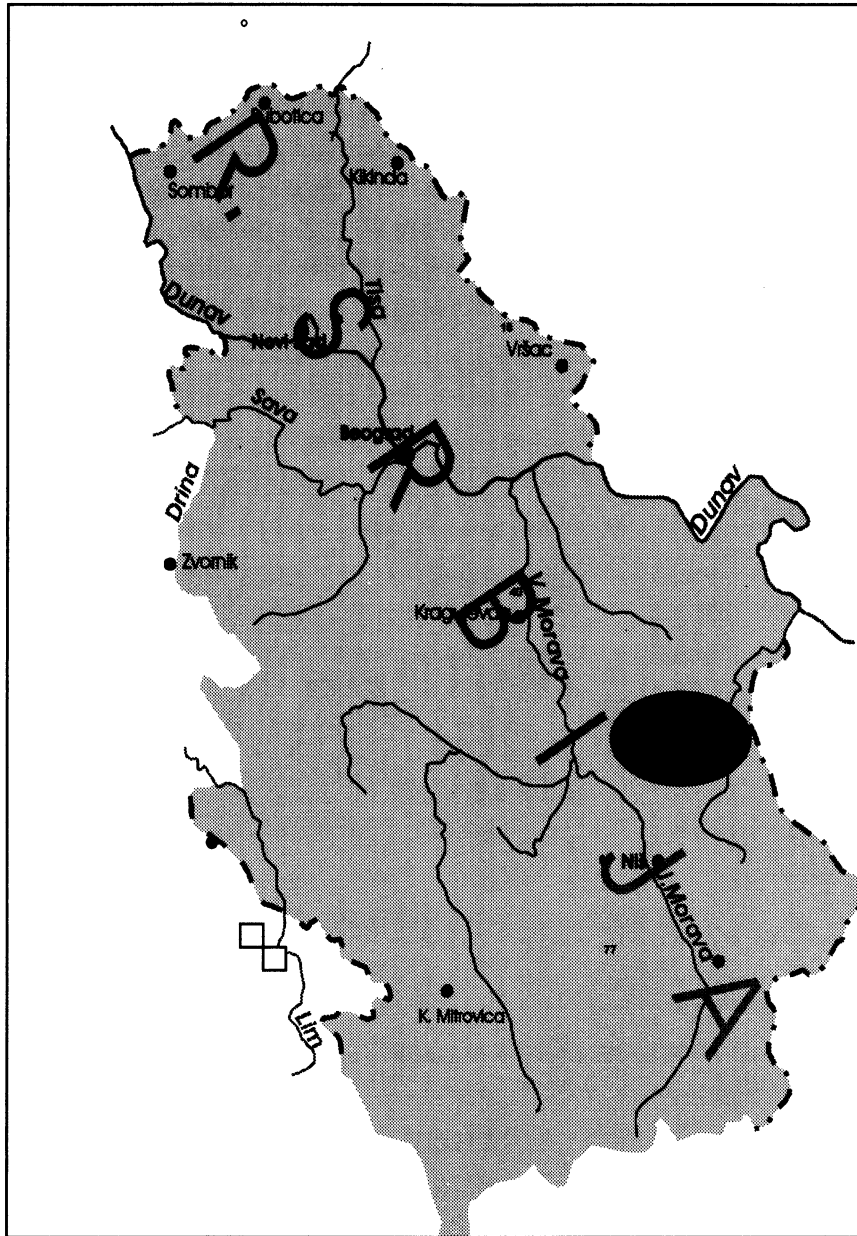
In Serbia exists the " Rule for classification and categorization reserves of solidly minerals and taking evidence" from 1979, which strictly determine, based on belongings to specific group of deposits and on consistency of exploration works, where to one mineral deposit should be and what is the allowed grade of mistake of calculation reserves.

After finishing the calculation of reserves ( as a part of Project Report of Ore Reserves) the mineral deposit evaluation is done ( technical- economic evaluation ) based on the analyze mining and market factors.



### Aluminium occurrences in Serbia.

● Area Zlatibor and around Valjevo town.



**Major  
copper  
deposit  
And  
Occurrence  
in  
Serbia.**

● (Bor-Majdanpek)Ist . Serbia, Volcano-intrusive andesit complex

□ Occurrence copper in west Serbia.



Mine of copper Majdanpek

Production		1993	1994	1995	1996	1997	1998	1999	2000	2001
Ore(10 <sup>3</sup> )		8.016	6.182	7.178	6.534	6.764	6.761	4.299	2.241	544
Cu	%	0.352	0.43	0.40	0.34	0.38	0.37	0.35	0.24	0.26
Cu	t	28.215	26.583	28.523	22.296	25.944	25.059	15.057	5.474	1.422
Au	g/t	0.271	0.235							
Ag	g/t	1.531	1.200							
Au	kg	2172	1452							
Ag	kg	12.271	7.418							
Total balances reserve: 456.000.000t.										

Mine of copper Bor. (Bor+Veliki Krivelj)

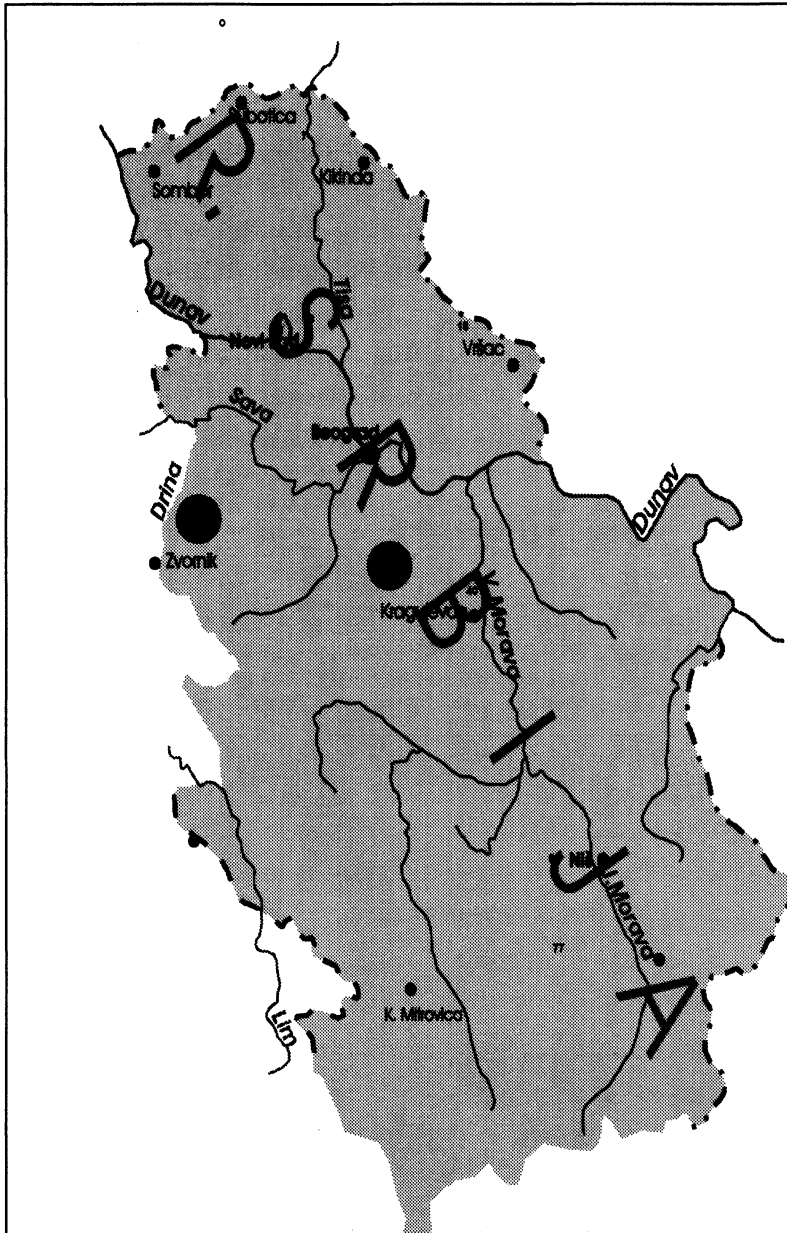
Production		1993	1994	1995	1996	1997	1998	1999	2000	2001
Ore(10 <sup>3</sup> )		9.678	11.669	12.884	13.435	13.743	13.177	10.903	10.147	6.575
Cu	%	0.41	0.50	0.46	0.44	1.44	0.45	0.43	0.36	0.35
Cu	t	39.552	58.563	59.116	59.382	60.732	58.890	47.217	36.394	22.911
Au	g/t	0.138	0.181							
Ag	g/t	0.987	1.276							
Au	kg	1333.6	2112.9							
Ag	kg	9556.4	14886							
Total balances reserve: 230.000.000t.										

Total mineral copper-(Bor+Majdanpek)

Production		1993	1994	1995	1996	1997	1998	1999	2000	2001
Ore(10 <sup>3</sup> )		17694	17851	20062	19988	20507	19939	15727	12896	7119
Cu	%	0.383	0.477	0.437	0.41	0.42	0.42	0.39	0.32	0.34
Cu	t	67.767	85.146	87.613	81.913	86.676	83.949	62.265	41.869	24.333
Au	g/t	0.198	0.199	0.200	0.176	-	-	-	-	-
Ag	g/t	1.233	1.249	1.268	1.662	-	-	-	-	-
Au	kg	3505.8	3.564.8	4024.1	3525.6	-	-	-	-	-
Ag	kg	21.828	22.305	25.440	33.220	-	-	-	-	-

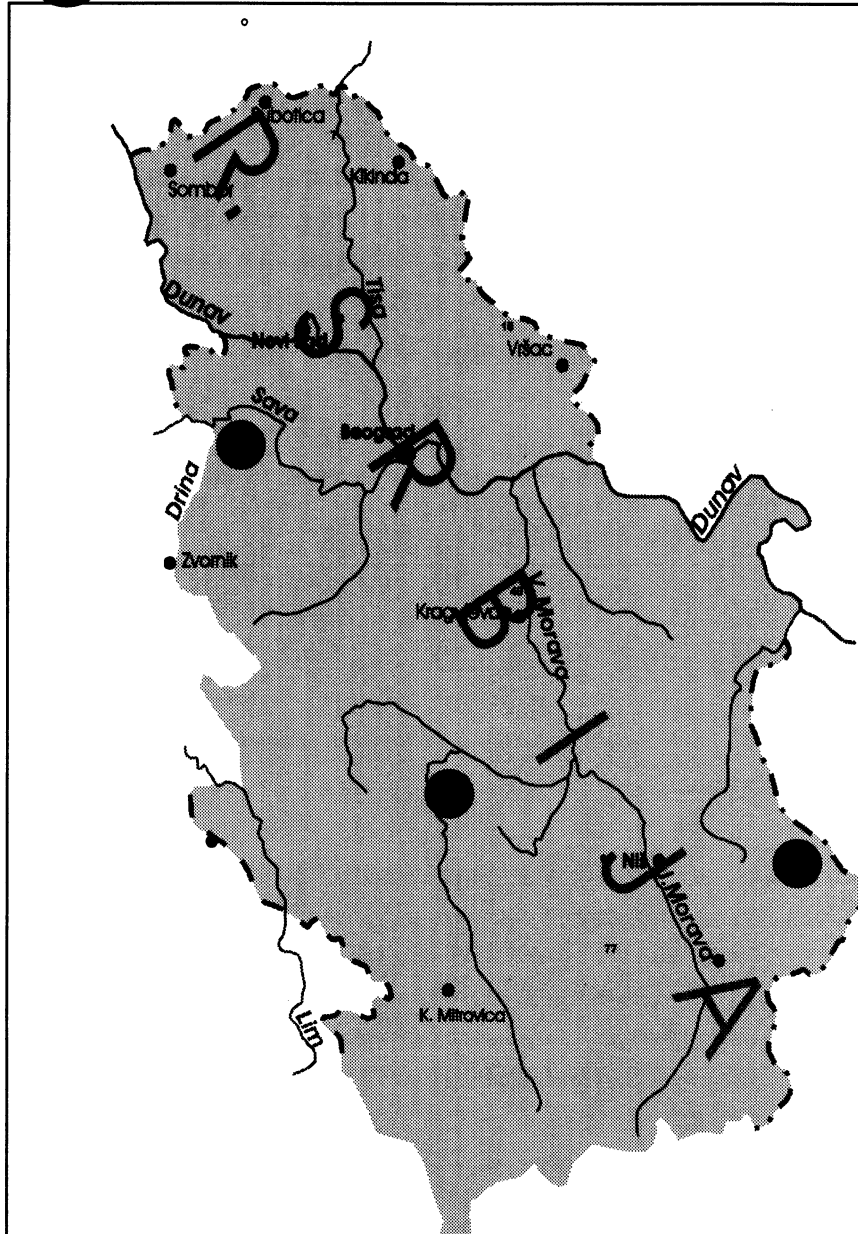
# Tin occurrences in Serbia.

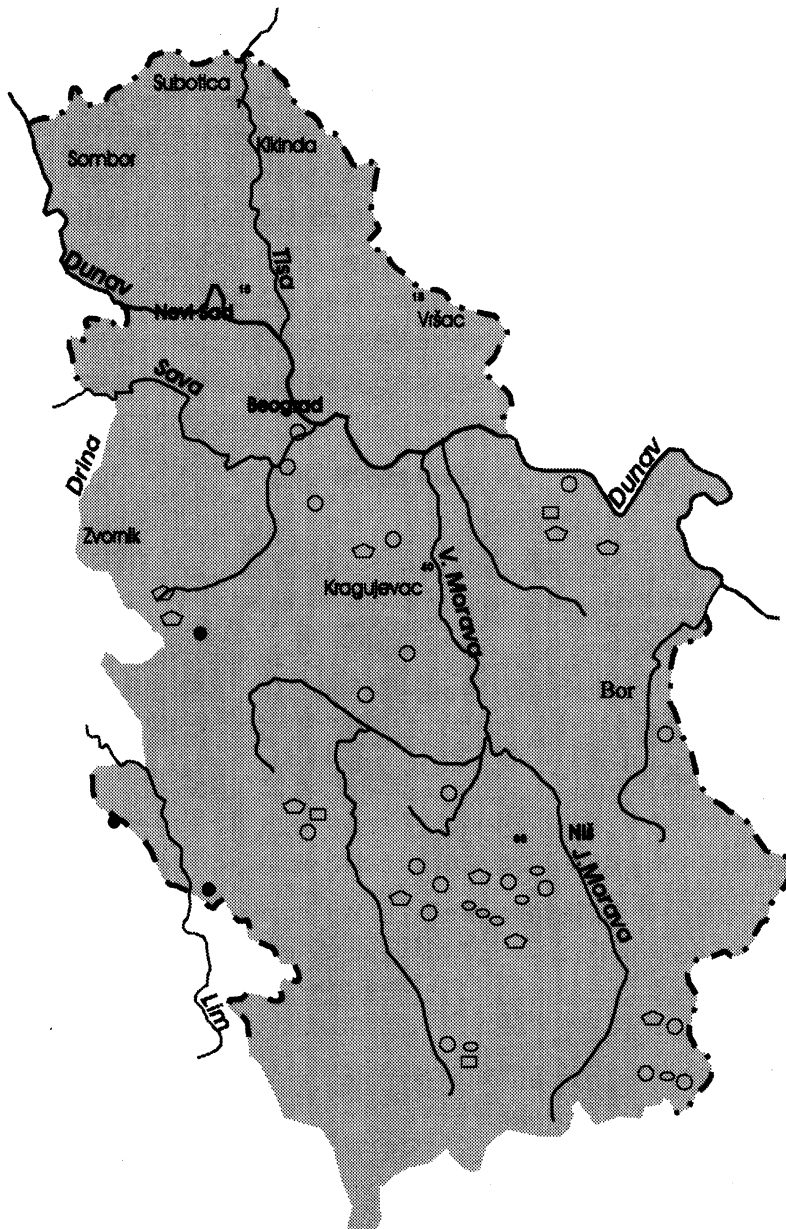
● Area Cer and Bukulja.



# Molybdenum occurrences in Serbia.

● Area Mackatica, Boranja and Kopaonik





Major  
Pb and  
Zn  
deposi  
ts and  
occurr  
ences  
in  
Serbia.

Five  
active  
mines in  
the  
centre of  
Serbia:  
(Rudnik,  
Lece, Grot  
Suva ruda)

Veliki Majdan

Not certainly date for Kosovo and Metohija. That location are :  
(Stari Trg, Kišnica, Ajvalija, Badovac and Leposavic.)

Regions area activities mining and flotation Pb and Zn.-  
project capacity

<i>Region</i>	<i>Mining</i>		<i>flotation</i>		<i>Note</i>
	<i>(10<sup>3</sup>t/g)</i>	<i>%</i>	<i>(10<sup>3</sup>t/g)</i>	<i>%</i>	
<i>Center of Serbia</i>	<i>860</i>	<i>29</i>	<i>940</i>	<i>28</i>	<i>Amount 5 minings.</i>
<i>Kosovo I Metohija</i>	<i>2.200</i>	<i>71</i>	<i>2.450</i>	<i>72</i>	<i>Amount 9 minings.</i>
<i>Amount</i>	<i>3.060</i>		<i>3.390</i>		

Production in Mine «Rudnik»

Production		1993	1994	1995	1996	1997	1998	1999	2000	2001
Ore(10 <sup>3</sup> )t		29	-	105	20	207	211	173	192	195
Pb	%	2.04	-	2.15	1.93	1.8	1.61	1.58	1.48	1.46
Zn	%	2.54	-	1.99	1.72	1.73	1.6	1.66	1.59	1.63
Ag	g/t	53	-	50	60	70	61.77	60.7	62.9	80.3
Cu	%	0.21	-	0.18	0.28	0.34	0.31	0.30	0.25	0.34

Production in Mine «Blagodot» at Vranje

Production		1993	1994	1995	1996	1997	1998	1999	2000	2001
Ore(10 <sup>3</sup> )t		65	79	29	72	82	62	54	38	91
Pb	%	3.8	2.9	2.3	2.35	2.1	2.13	2.91	2.88	2.83
Zn	%	2.4	1.67	1.5	3.07	3.11	3.12	3.05	3.07	3.24
Ag	g/t	20	15	15	10	12	12	9	9	13
Cu	%	-	-	-	-	-	-	-	-	-

Production in Mine «Lece» at Medvedja

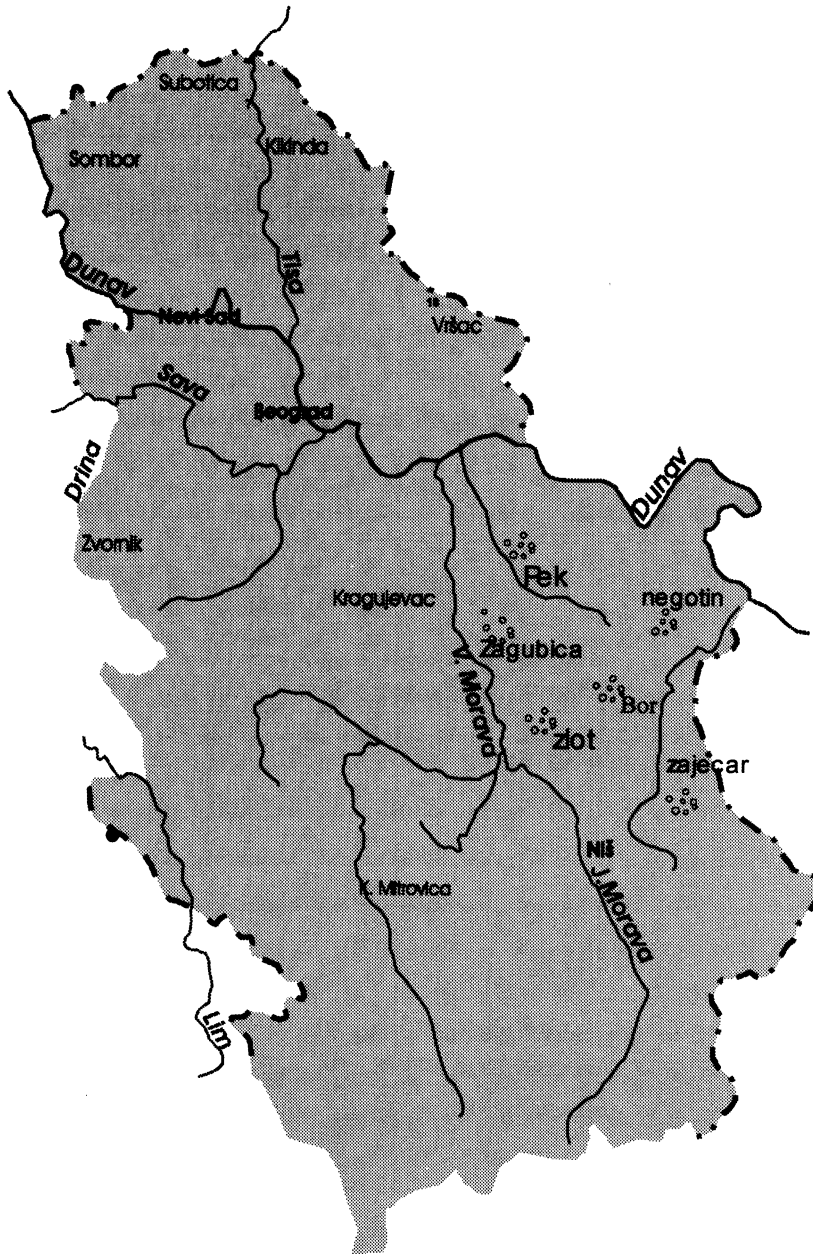
Production		1993	1994	1995	1996	1997	1998	1999	2000	2001
Ore(10 <sup>3</sup> )t		7.7		11	45	58	60	23	7.7	12
Pb	%	-	-	-	1.08	1.06	1.02	1.02	1	1
Zn	%	-	-	-	2.12	2.11	2.11	2.11	2	2
Ag	g/t	-	-	-	12	11.8	12	12	11	11
Au	g/t	-	-	-	1.8	1.8	1.9	1.9	1.8	1.8

Production in Mine «Veliki majdan» at Ljubovija

Production		1993	1994	1995	1996	1997	1998	1999	2000	2001
Ore(10 <sup>3</sup> )t		15	13	31	28	22	30	13	6.1	6.3
Pb	%	4.9	4.5	5	4.3	4	3.6	3.6	-	-
Zn	%	3.9	3.8	4.1	3.3	3.4	3.2	-	-	-
Ag	g/t	-	103		200	180	180	-	-	-
Cu	%	-	-	-	-	-	-	-	-	-

Production in Mine «Suva ruda» at Raska

Production		1993	1994	1995	1996	1997	1998	1999	2000	2001
Ore(10 <sup>3</sup> )t		138	103	100	128	109	141	62	79	94
Pb	%	1.77	1.72	-	1.78	1.87	1.5	1.41	1.27	1.29
Zn	%	3.11	3.00	-	3.18	3.25	2.96	2.98	2.68	2.77
Ag	g/t	-	33	-	-	-	-	-	-	-
Au	g/t	-	-	-	-	-	-	-	-	-



Occurrence  
of gold  
alluvium  
East Serbia

Location:  
Zagubica, Pek  
, Zlot  
river, Bor,  
Negotin,  
Zajecar

Also  
production  
Au and Ag  
from ore  
Cu and Pb-  
Zn.



## Process -Procedure of application of PL, EL and ML

### Procedure of application of PL and EL

In Serbia may be performed prospecting and detailed geological exploration of all kinds of minerals such as: energetic minerals, metallic and non-metallic minerals, thermo-mineral and mineral waters for drinking purpose. The procedure ( process to get an approval of exploration ) is very simple:

In accordance with article 28. of Geological Exploration Law, for approval purpose the following documents are needed:

1. the inquiry for exploration rights
2. the certified copy of decree that proves the company is registered in Serbia
3. the project of geological exploration ( must be done in a accordance with "Rule of contents for projects of geological exploration". That project must contents the verification, issued by another authorized company, of technical revision
4. the topographic map ( in appropriate ratio ) with borders and coordinates X,Y of the requested field
5. the proof of payment of administration fee

The standpoint of Ministry is that the surface of exploration field, which is granted, may not be bigger than 100 km<sup>2</sup>.An exploration right may be given only at free field (it is not allowed to any other company to do any exploration or exploitation works) which does not exists in protected areas, announced by Government of Serbia.

The average duration from application to approval is around one month and investors are obliged to give report, after finishing activities in case of prospecting licenses and as a annual report in case of exploration licenses.

### Procedure of application of ML

In the procedure of issuing mining licenses there are two different stages, the **first** one is issuing the exploitation field, article 18 of the Mining Law, and the requested documents are:

1. the Situation Plan ( 1: 25000 ) with borders of exploitation field, the type of mineral which will be excavated, term of beginning exploitation statement of ore reserves issued by state commission (under regulations for geological explorations )
2. the feasibility study with investment plan
3. rehabilitation plan
4. agreements of ministries in charge ( for agricultural soil, for environ. protection, for water level )

The **second** stage is an approval to start mining operations and according to article 36. of the Mining Law, the requested documents are:

1. Mining project with verification, issued by another authorized company of technical revision which confirms that project meets technical standards
2. Certification issued of local community authority that project is appropriate to local urbanity plan
3. Agreement with private land owners
4. Proof of payment for changing purpose of agricultural land
5. Statement (agreement of Ministry in charge for environmental protection)
6. Project for rehabilitation of land
7. Others ( if it is related with starting operations )

The average duration from application to approval is one month.

#### **Number of inquires of mineral licenses from foreign investors in 2004.**

In previous year in Serbia ,6 foreign companies got an exploration rights ( EL ) for performing exploration works on a 20 exploration fields in total. They are:

1. **Rio Sava Exploration( part of Rio Tinto )- 3 exploration rights**
2. **Hereward Ventures – 3 exploration rights**
3. **SEE- 6 exploration rights**

4. South Danube metals( part of Phelps Dodge ) – 3 exploration rights
5. Dundee precisions metals – 3 exploration rights
6. Dinara Nickel ( part of Europe Nickel ) – 2 exploration rights

The total project value of the exploration works is around 3, 2 mil. EUR and it is more 3 times than in 2003. when only 3 foreign companies were present. Generally speaking we may say that foreign companies mostly are interesting in exploration metals (gold and copper and after that in poly- metallic ores- Pb,Zn,Ag,Ni etc.) and there is also interest for non-metallic minerals.

### Environment

#### *The situation of environmental pollution in each mining area – National environmental monitoring, environmental standards and environmental impact assessment*

1. Based on the Law on Environmental Protection (Official Gazette Republic of Serbia No.135/04, facility which can affect environment in higher extent), Regulation on Environmental Impact Assesment (Official Gazette Republic of Serbia No.66/92) and List of facilities and works for which it is mandatory to make environmental impact assesment, according article No. 8., item 2., 29., 30. and 31., investor is legaly obliged to produce environmental impact assesment in regard to the mineral exploitation (coal, bitumen shales, metal ores, non-metal ores). Environmental impact assesment shall be verified by Directorate for Environmental Protection – Department for impact assesment, and it is one of the most important conditions necessary in the procedure of obtaining Exploitation permission and Permission for construction work, performed according to the main mining project, and which are issued by Ministry for energy and mining.
2. Concerning mining activities, following laws and regulations should be consulted:
  - Low on the Environmental Protection, published in Gazzete of RS No.135/04

- Low on Environmental Impact Assessment, Gazzete of RS No. 135/04
- Low on Strategic Environmental Impact Assessment, Gazzete of RS No. 135/04
- Low on Integrated Prevention and Pollution Control, Gazzete of RS No. 135/04
- Low on Mining, Gazzete of RS No. 44/95
- Low on the Geological Researches, Gazzete of RS No. 44/95
- Low on Planning and Constructing, Gazzete of RS No. 47/03
- Low on Waste management, Gazzete of RS No. 25/96
- Low on Water, Gazzete of RS No. 46/91
- Low about Ministries, Gazzete of RS No. 19/04
- Low about national parks , Gazzete of RS No. 39/53, 53/93, 67/93, 48/94
- Low about forests, Gazzete of RS No. 46/91, 83/92, 53/93, 67/93, 48/94, 54/96
- Low about agricultural soil, Gazzete of RS No. 49/92, 53/93, 67/93, 48/94, 14/00
- Regulation on trashhold values, imission measuring methods, and criteria for setting-up of measuring points and data evidention, Gazzete of RS No. 54/92, 30/99
- Regulation on emission trashhold values, method and deadlines for measuring, and data collecting, Gazzete of RS No. 30/97
- Regulation on permitted noise level in environment Gazzete of RS No. 54/92
- Regulation on handling waste which has characteristics of hazardous substances, Gazzete of RS No. 12/95
- Regulation on permitted quantity of dangerous and hazardous matters in the soil, Gazzete of RS No. 23/94
- Regulation on dangerous matters in the water, Gazzete of RS No. 31/82
- Decree on watercourses classification Gazzete of RS No. 03/68

3. Every year, Government of the Republic of Serbia approves Decree on systematic air control monitoring. Pursuant to the Decree, there are 3 types of stations:

- Basic meteorological stations
- Basic urban stations
- Basic local stations (mostly in rural areas and small municipalities)

Basic meteorological and urban stations are under surveillance of the Republic hydro-meteorological Institute, while the main local stations are under surveillance of the Institute for Health Protection. Mostly, the main pollution parameters are monitored (SO<sub>2</sub>, CO, NO<sub>x</sub>, O<sub>3</sub> and soot). Depending on the type of industry, specific parameters are measured as well (Institute for Health Protection performs that). In the Republic of Serbia, 40 municipalities are covered in this manner.

The only authorized institution for surface water monitoring is Republic Hydro-meteorological Institute (stations network on the rivers and lakes). They are dealing pursuant to the Decree on the systematic air quality control monitoring of the Government of the Republic of Serbia – for two years period. Hydrological, biological, physical and chemical parameters are being monitored.

#### EIA aspect

Concerning mining activity – companies dealing with this activity are stipulated to do environment quality monitoring, especially related to the dust matters emission and quality of water which is realising to recipients. Each impact analysis which deal with this matter, has to comprise segment of further environmental parameters monitoring, in order to be verified in this Ministry / Directorate. Concerning water, apart from Republic Hydro - meteorological Institute, Institutes for Health Protection deal with sample analyses for drinking water. These Institutes are set out in the way that each region in the republic has one of them, while emission and imission of dust matters are measured by authorized institutes if necessary. Feedback information about measured parameter values come to the inspection, since inspection, according to their duties, control realisation of environmental parameters monitoring. There is a fact that equipment is outdated, samples analyses are done in deteriorated conditions, and laws are too old – e.g. Law on watercourses classification is from 1968, so now, mostly, bonity class of watercourses is in a great collision with current state of water quality.

\* According to Serbian legal system, laws are enacted by the Parliament, Regulations by the Government and Decrees by the Ministry.

## **Environment – RTB Bor**

### **MONITORING OF AIR QUALITY IN BOR**

**Equipment:** meteorological station, two fixed stations for SO<sub>2</sub> in real time, two fixed stations for SO<sub>2</sub> with 24<sup>h</sup> samples, two stations for flying particles (size - PM 10; PM 2.5 and PM 1), 30 air-sedimentators (sedimentary matters).

**Pollution matters under control:** SO<sub>2</sub>, flying particles (heavy metals - Pb, Cd, Mn, Ni, As, Hg, Cu), sediment matters (pH, undissoluble matters, ash, combustible matters, dissoluble matters, total sedimentary matters, SO<sub>4</sub>, Pb, Cd, Zn).

**Analysis of pollution matters:** laboratory capacities are in use.

### **Laboratory capacity**

#### **Applied methods with suitable equipment:**

- Classical determination methods (gravimetry, volumetry)
- Instrumental methods: Atomic Absorption Spectrophotometry (flame technique, graphite oven, hydride technique, mercury analyzer), Spectrophotometry, Atomic Emission Spectrometry (ICP), Optical Emission Spectrometry (unidirected arc and spark), Electrochemical Methods (electrogravimetry, potentiometric titration, ion selective electrodes, polarography, pH-metry), Mass Spectrometry, Dokimastic Method (determination of precious and platinum metals).
- **Operation power:** 14 VSS , 100 SSS.

#### **Counter-measures for environment pollution caused by mining activities**

##### **Open pit exploitation**

- Use of wet method for dust lowering,
- Use of dry and wet method for dust lowering in crushing,
- Replacement of truck transport with belt system,
- Use of diesel fuel with constant elementary content,
- Control of gas emission by good organization of machine operation,

- Dewatering of open pits with water direction into ecological system (pre-settler, settler and water collector),
- Recultivation of dumps,
- Determination of sanitary zones.

#### **Underground exploitation**

- Determination of caving zone,
- Dewatering of pit with water purification by cementation method,
- Pit ventilation with air quality control in environment.

#### **Flotation tailing dumps**

- Controlled collection of dewatered water and their return into process,
- Control of water level in sedimentary lake,
- Water spraying of dry flotation tailing dumps before recultivation,
- Recultivation of dams, rim dikes and «beaches» by the use of optimum recultivation method