THE STUDY ON MASTER PLAN FOR PROMOTION OF MINING INDUSTRY
IN REPUBLIC OF SERBIA
FINAL REPORT

CONTENTS

Pages

List of Tables

List of Figures

Chapter 1 Outline of the Study

1.1 Background of the Study

The Republic of Serbia (hereafter Serbia) is a country rich in metal and mineral resources. Serbia is located in the southern part of the Mediterranean Sea Alps placation belt and has metal ore deposits that formed in the Palaeozoic to Cenozoic eras. The foundation of its mining industries was systematically developed during the Socialist Federal Republic of Yugoslavia era. Serbia was a metal supply station as well as a major European producer of base metals such as copper, zinc, and lead. However, mining production decreased dramatically due to economic sanctions imposed by the United Nations, and competitiveness has decreased during the transition from a socialist economy to market economy. For instance, crude copper ore production in 2001 declined to 25% of its peak year of 1990, and has not recovered since.

However, the mining industry is a pillar of the Serbian economy and exports of non-ferrous metals amounted to 17% of total Serbian exports in 2004. Thus, mining is still a major industry despite the severe economic situation in Serbia. Against this backdrop, the mining industry is an effective way to obtain foreign currency, and reformation and development of the mining industry will make it a significant player in the economic development of Serbia. Therefore, a mining industry policy is needed for internal and external investment promotion.

Considering the importance of the mining industry to the Serbian economy, “The Study on a Master Plan for Promotion of the Mining Industry in the Republic of Serbia” is being conducted at the request of the Serbian government. The purpose and contents of the study are based on the Scope of Work Meeting Minutes that Japan and Serbia agreed upon in February, 2006.

1.2 Purposes of the Study

The purposes of this study are as follows: (1) Elaboration of a Master Plan for developing the Serbian mining industries under a market economy; (2) Creation of a road map for sustainable development of the Serbian mining industry; and (3) Technical transfer so that Serbia can independently expand and improve upon (1) and (2) long into the future. The Master Plan includes the following: 1) A policy for reforming the mining sector; 2) A strategy to modernize mine operation and management; and 3) Measures against pollution caused by mining operations.

1.3 Target Area of the Study

The target for this study is the entire territory of Serbia. Information on surrounding countries geologically similar to Serbia will also be used if necessary to study Serbian geology and ore deposits.

1.4 Method and Content of Study

The study consists of two stages: a basic survey stage and a Master Plan formulation stage. In the first stage, information related to the economic conditions, national development plans, mining policies, mining laws, environmental considerations, geologic ore deposits, potential mineral resources, and mining activities will be collected and analyzed. In addition, an outline of the Master Plan and plans for a case study will be prepared. In the Master Plan formulation stage, a draft Master Plan for mineral resources development will be prepared based on the results of analysis and the preliminary study of the Master Plan conducted at the survey stage. The draft Master Plan will be approved after discussions with the Serbian counterparts. The Master Plan will also reflect a case study to be conducted at this stage. At the same time, the counterparts and people involved with the Serbian mining industry will receive technology transfer according to the Master Plan. Moreover, the development of a GIS database and web sites, as well as capacity development will be supported in the development study. Finally, the results of the study will be presented at international seminars, including Tokyo, AMA in London, PDAC in Toronto, and others, to promote investment in the Serbian mining sector. The main tasks of the study are as follows:

A. The Basic Survey Step

- Review and analysis of information related to investment and the environment
- Review and analysis of information on mineral resources (publications related to geology, exploration reports).
- Support for development of a GIS database for mineral resources
- Preliminary work for an outline of the Master Plan for mining industry development

B. The Master Plan Formulation Step

- Creation of a Master Plan for mining industry development
- Preparation of an action plan
- Case study and feedback for the Master Plan
- Recommendations for mining development

1.5 Local Survey

1.5.1 Implementation of the Study

The first local survey was carried out from January 14 to February 22, 2007 (40 days), the second survey was carried out from May 10 to June 10, 2007 (32 days), the third survey was carried out from July 1 to August 9, 2007 (40 days), and the forth survey was carried out from October 2 to 31, 2007 (30 days). The JICA team completed the local survey with eight to nine members as scheduled. The fifth local survey was carried out from January 27 to February 12 (17 days).

1.5.2 Study Team Members

Table 1.1 Study Team Members

Name	Assignment	First site survey	Second site survey	Third site survey	Fourth site survey
Yuji NISHIKAWA	Team Leader / Mining Promotion Policy / Macro Economics / Investment Promotion	Jan.14-Jan.28, 2007 Feb.14-Feb.22, 2007	May 15-May.31, 2007	Jul 15-Jul 31, 2007	Oct 11-Oct 24, 2007
Richard THOMPSON	Investment Promotion B		May 14-May 23, 2007	Jul 15-Jul 21, 2007	
Mitsuo OZAKI	Mining Accounting		May 13-Jun.1, 2007	Jul 20-Aug 5, 2007	Oct 7-Oct 29, 2007
Masaharu MARUTANI	Geology / Exploration	Jan. 14-Feb.12,2007	May 10-Jun. 3,2007	Jul 9-Aug 1, 2007	Oct 2-Oct 29, 2007
Kazuki SHINGU	Mining	Jan.25-Feb.21,2007	May.10-Jun.7, 2007	Jul 8-Aug 5, 2007	Oct 8-Oct 31, 2007
Hisamitsu OOKI	Mineral Processing / Management of Tailings Dams	Jan.14-Feb.2, 2007	May 13-Jun.10, 2007	Jul 7-Aug 3, 2007	Oct 8-Oct 31, 2007
Shinichiro MUTO	Smelting	Jan.25-Feb.13, 2007	May 19-Jun. 2, 2007	Jul 8-Jul 31, 2007	
Masatoshi MURATA	Environment	Feb.8-Feb.21, 2007	May.10-Jun.7, 2007	Jul 7-Aug 3, 2007	Oct 8-Oct 27, 2007
Kazunari WADA	GIS Database	Jan.25-Feb.21, 2007	May.10-Jun.3, 2007	Jul 1-Aug 1, 2007	Oct 11-Oct 24, 2007
Toshio INOUE	Coordinator	Jan.14-Feb.2, 2007	May.13-May.30, 2007	Jul 12-Jul 26, 2007	

1.5.3 Minutes from the Meeting with the Serbian Side

The Japanese Team had its 1st meeting with the Steering Committee, which represented the Serbian side in "The Study on a Master Plan for the Promotion of the Mining Industry in the Republic of Serbia", and reached an agreement on the following points (the meeting minutes are presented in Appendix II-1).

The MEM, the MSEP, the MIER, JICA headquarters, the JICA Balkan office, and the study team attended and agreed to the following points:

- The content of the Inception Report and the study schedule
- Survey and examination of RTB Bor tailings dam.
- A case study of a small/medium-scale mine will be conducted based on study team recommendations and the counterparts' agreement.

The comments of the recipient country are as follows:

- Environmental laws and regulations should be harmonized with those of the mining industry. Since Serbia aims to join the EU, EU environmental standards will be put in place.
- The Russian standard for ore reserve calculation is currently used. Technology transfer for measuring and managing ore reserves is required.

The 2nd meeting with the steering committee was held on July 17, 2007. In attendance were the MEM, the MEP, and the Ministry of Finance from the Serbian side, and the Japanese Embassy, the JICA Balkan office, and the study team from the Japanese side. The participants agreed to the following points (Appendix II-1).

- The contents of the Progress Report
- Information on the status of the privatization process and the case study implementation
- Schedule and content of the Investment Seminar and Workshop

The following comments were made.

- The MEP organization, etc., described in the Progress Report must be revamped.
- The MEP must cooperate with the MEM in order to make the most efficient use of geological data.
- Data accuracy must be improved for ore reserves and other areas described in the report.

The 3rd meeting with the steering committee was held on October 14, 2007. In attendance were the MEM and the MEP from the Serbian side, and the Japanese Embassy, the JICA Balkan office, and the study team from the Japanese side. The participants agreed to the following points (Appendix I-1).

- The contents of the Interim Report
- The current state of privatization and the case study implementation.
- Schedule and content of the Interim Workshop, Regional Workshop and Tokyo Investment Seminar, etc.

The following comments were made.

- The content and orientation of the Interim Report is reasonable.
- The tailings survey in the case study yielded results.

The 4th Steering Committee meeting was attended by representatives of MEM, MEP, financial officials, the Japanese Embassy, the JICA-Balkan office, and the Japanese Study Team. The Draft Final Report was explained and approved. The following is a list of what was covered at the meeting:

- Contents of the Draft Final Report
- The state of privatization, industrial law, and mining policy
- The results of case studies

In addition, the following comments were received:

- The Draft Final Report can become the Final Report by including the comments from the Serbian side.
- Capacity development is needed at various stages to reform the mining sector.
- The Master Plan proposed by the Study Team is now being materialized. It would be desirable to now receive support from the Japanese government.

1.5.4 Workshop

At the Progress Workshop on May 25, 2007, the Minister of Energy and Mines (MEM), the Japanese Ambassador, the Vice Minister of Environmental Protection (MEP), a JICA

Representative, and the World Bank Serbia task manager presented addresses, and the MEM, the MEP, Belgrade University, representatives from privatized mines, and study team members spoke at the Nikola Tesla Conference Hall. There was a total of 94 participants.

The theme of the workshop was “From State Ownership to Private Sector Management”. To help participants understand the current status of the mining industry and the plans for the future, the study team presented a workshop, which was also useful for creation of the Master Plan (Appendix I-6). Also, the theme of the Interim Workshop to be held on Oct 19, 2007 was “Charting the Course for Rebuilding the Mining Foundation”.

The Minister of Energy and Mines (MEM) and the Japanese Ambassador gave addresses, and the representatives of the MEM, MEP, SIEPA, Privatization Agency, JTI and the study team gave presentations. There were a total of 83 participants. Through this workshop, the mining orientation in the future was understood and also technical transfers were implemented by presentations of the team members.

It should be noted that a regional workshop was carried out in Vranje in Oct 16, 2007 to promote harmonious co-existence between mining activities and local communities. The Mayor of the city, the Japanese Ambassador and a JICA Representative of the Balkan Office gave addresses, and the representatives of the MEM, MEP and the study team gave presentations. There were a total of 77 participants including city related people, the Grot Mine and local companies. Mining activities in local communities, contribution of the mining sector to local communities and environmental conservation were understood and technical transfers were implemented to the counterparts and local people.

On February 6, 2008, a seminar with the theme “Master Plan and Roadmap for the Mining Sector” was hald at the SAVA Center in Belgrade. In attendance were about 130 people involved with the Serbian mining industry, Canadian companies undertaking exploration acativities in Serbia, international organizations (World Bank, EBRD), Japanese companies, the news media, and others. This final seminar entailed discussing and confirming the future course of the Serbian mining sector, with presentations given according to the program (Appendix 4(1), P.22) by the Minister of MEM, the Japanese Ambassador, the JICA main office, the World Bank, MEM, MEP, the Study Team, and Canadian companies. As a result of this seminar, attendees were able to gain a thorough understanding of the Master Plan, and confirm the future course of the mining sector.

1.5.5 International Investment Seminar

In order to give international investors a good understanding about the potential of Serbia ‘s mining sector and mineral resources, an international investment seminar was held in Tokyo on November 27, 2008 under the auspices of the Serbian Embassy, JBIC、JOGMEC、JICA、JOI、and JETRO.

On January 30, the AMA Semonar was held at Armourers' Hall in London, UK. Participating and making arrangements were 5 members of the Study Team (including one from the UK), while the Serbian side was represented by 3 people from the MEM (including the vice minister, whose expenses were covered by JICA), 1 person from SIEPA, and 3 people from Serbian companies. The seminar program (see Appendix 3(1), p.16) included addresses from the Serbian Ambassador to the Court of St. James's and the vice minister of MEM, presentations by MEM and Study Team members, and reports on exploration results and the attractiveness of investment in exploration in Serbia by British and Canadian companies. Attendees included representatives of British mining companies, exploration companies, mining and exploration consultants, international organizations, and banks, among others. Representing Japan were 2 people from the JOGMEC London office, and 1 person from JICA's UK office.

1.6 Case Study

1.6.1 Candidate Mines for the Case Study

Candidate mines for the case study are limited because many mines have already been privatized. The paths to privatization are tender, auction, bankruptcy, and reconstruction. Mines currently under tender or auction processes are not being targeted for this case study, as shown in the following table.

Table 1.2 Candidate Mines for the Case Study

Target		Current Status	Survey	Case Study
Zorka Smelter	Zn	In process for 2nd tender (July, 2007)	Outline surveyed after the 1st tender	
Grot Mine	Zn	Bankrupt, but operating Scheduled for auction Mar 2008	Surveyed on Feb. 12 and 13, 2007	OK for mine
Lece	Zn、Au	Bankrupt	Surveyed on Feb.12 and 13, 2007	OK for tailing dam
Veliki Majdan	Zn	Preparing for reformation and privatization	Surveyed in the 1st survey	
Suva Ruda	Zn、Fe	Sold	Surveyed in the 2nd and 3rd surveys	OK for mine
Karamarica	Zn	Operated in the past as a pilot project, A foreign company currently holds exploration rights	Survey possible	
Zajca	Sb、Zn	3 closed mines were sold	Underground was surveyed	
RTB Bor	Cu	Second tender completed. Contract being negotiated with winning bidder	Surveyed partially	OK for tailing dam

1.6.2 Target Mines for the Case Study

The target mines were selected for the case study which was conducted during the 2nd and 3rd local survey under authorization of the MEM and Agency of Privatization, based on 1.6.1 Candidate Mines for the case study.

Table 1.3 Target Mines for the Case Study

Target Mine	Current Status	Case Study
Grot Mine	To be auctioned in March 2008	OK for exploration, mining, mineral processing, accounting

Lece	Bankrupt	OK for tailings dam
Suva Ruda	Sold, reconstruction started	OK for exploration, mining, mineral processing
RTB Bor	In negotiations	OK for tailing dam

It should be noted that the Rudnik Mine was added for comparison of processing.

1.6.3 Case Study Schedule (Table 1.4)

Table 1.4 Case Study Schedule

RTB Bor Tailings Dam	May 27 to 30, June 1 to 3, July 10 to 12, July 17 to 18, July 22 to 24, July 30 to 31, and Oct. 10 to 11 and 15, 2007
Lece Tailing Dam	May 31 and July 16, 2007
Grot Mine	May 15 to 19, July 25 to 27, and July 30 to Aug. 1, and Oct.17, 2007
Suva Ruda Mine	May 20 to 22, and May 27 to 29, 2007
Zorka Refinery	May 21 to 22, 2007

1.7 Summary of Survey Results (Status of the Serbian Mining Industry)

(1) Privatization

- Privatization of mining companies has not been progressed smoothly, but has been delayed. However, the privatization process is expected to be completed during the first half of 2008. Large State-owned coal mines are not targets of privatization.
- The second tender for the RTB Bor was implemented September, 2007, and was awarded by an Austrian company which is currently negotiating with the government.

(2) Investment Climate and Economic Circumstances

- The draft of the Mining Law was drastically revised by a consultant contracted by the World Bank in July 2007. It was improved to clear the international standard, including transfer of the rights. Currently it is being reviewed by the mining relevant authorities, and will be enforced in 2008.
- Macro economy has been improved, such as increased GDP, lowered inflation and national budget surplus. However, the unemployment rate is high.

(3) Current State of Mines and Smelters

- Production style and mine management of the old regime are still remaining. The international accounting standard has not become common yet. Mining facilities and machines are expected to be renovated or replaced by privatized mines, and some of them have already started.
- Most mines have a lack of ore reserves except the RPB Bor, due to past lack of investment in exploration. Mining activities are based on the present Mining Law, and so there is still strong national management for privatized mines in exploration and production.

(4) Resources Potential and Exploration Activities

- Geological information is not sufficient. Foreign investors joined exploration activities, but

not so many. The investment climate based on the Mining Law has not improved yet, and so exploration activities have not been enhanced yet.

- Potential of zinc and copper lies geologically around the existing mines areas and border of Bosnia and Herzegovina, Montenegro, and others.

(5) Environmental Reservation

- Each mine and smelter has its own environmental contamination, and responsibilities of the government are not clear. The environmental surveys must be implemented by the government. Tailings dams are not managed well and some of them are damaged.
- There are some environmental monitors, but they are not systematical. Existing data is not used sufficiently. It is necessary to identify locations, number and system from viewpoint of the mining monitoring.

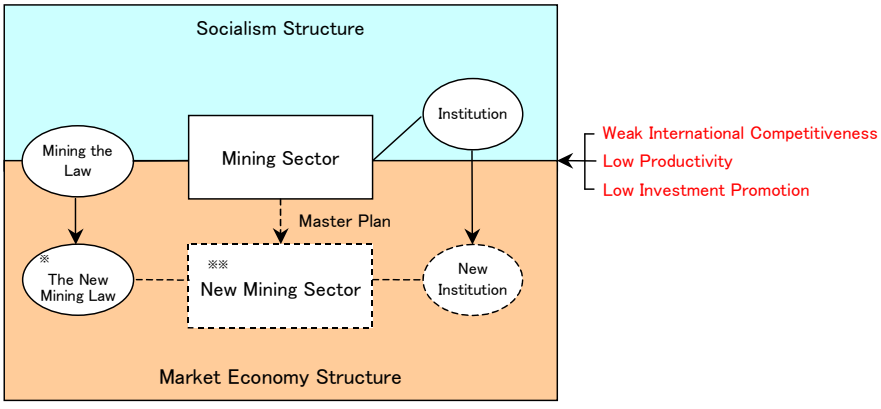
(6) Case Study

- All mines for the case study have many issues such as shortage of exploration, shortage of ore reserve, inefficient production, remaining consciousness of the old regime, shortage of cost management, and others.
- Analyses of samples from tailings dams (partially containing high grade of copper and gold), and copper extraction test by the SXEW method were implemented. It is necessary to conduct a quantitative survey to determine economic viability in the future.

1.8 The Master Plan

(1) Feature of the Master Plan

It is likely that the current location of the mining sector lies on the border between the market economy and socialism system. Old many institutions still remain, and the Mining Law has characteristics of both systems. The Master Plan has a task to shift the mining sector from the current border line to the complete market economy system.



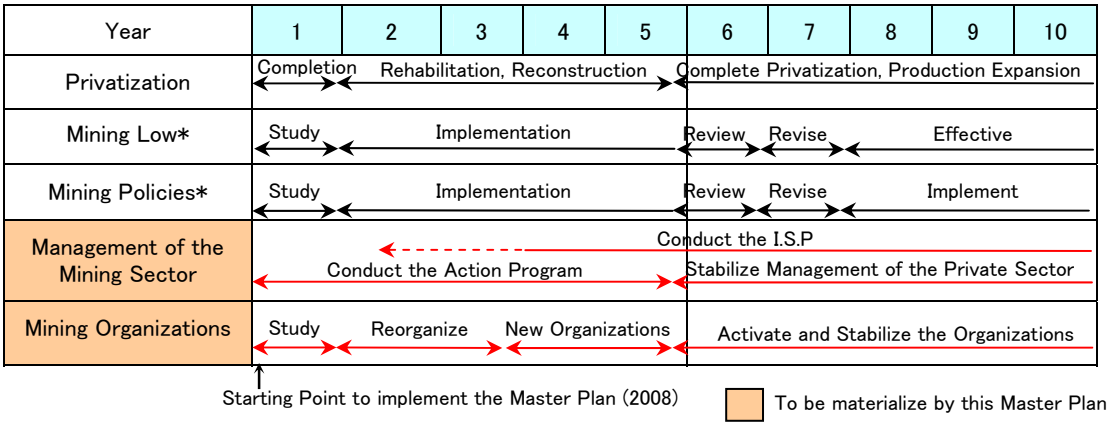
※ The draft of the new Mining Law was made in 2007.
※※ The new Mining sector will be suited for the Market economy.

Fig.1.1 Conceptual Feature of the Master Plan

(2) Strategy and Goals

It is necessary to implement institutional reforms to manage privatized mines. The master plan has a final purpose which the mining industry will be operated by the private sector. The 10-years master plan consists of a mining sector building period (the first 5 years) and a mining promotion period (the second 5 years) which is mainly institutional strengthening program. A goal is that the mining sector will occupy 10% in GDP by implementation of the master plan after 10 years.

Table 1.5 Implementation Schedule of the Master Plan



(3) Detailed Measures

The master plan consists of detailed measures, such as investment promotion, organization reform, institutional reforms, informative systematization, cadastre management and environmental reservation.

Table 1.6 List for Action Program and Institutional Reform Program

Program	Target
1. Mining Organization	functionalize the sector management
2. Investment Promotion	Expand mining investment
3. Management of the mining sector	Abolish old institutions
4. Foster humanresources	Continue mining wokers training
5. Mining Fund	Support the privatized companies
6. Two-step-loan	Help privatized companies
7. Instruction of Accounting System	Healthy mining activities
8. Establishment of the Mining Association	Activate the privatized companies
9. Rehabilitation of the tailings dams and monitoring system	Environmental protection
10. Concession management system	Simplify procedures for application
11. Technical Training Center	Foster human resources (skilled workers)
12. Support for Management Reconstruction	Improve the privatized companies
13. Mining Training Sessions	Attain knowledge and technologies
1. Supporting Institution for the Private Sector	Promote exploration and development
2. Regional Exploration Institution	Acqure basic information
3. Management of the Mining Cadastre	Improve efficiency of mining concessionmanagement
4. Strengthening of Legal System	Review and renovate the Mining Law
5. Information System	Network in MEM and MEP.
6. Monitoring System	Environmental protection
7. Dsiclosure of Information	Disclose environmental information
8. Strengthening of MEM Function	Abolish old institutions
9. Reviewing of the Mining Tax System	Activate mining activities.

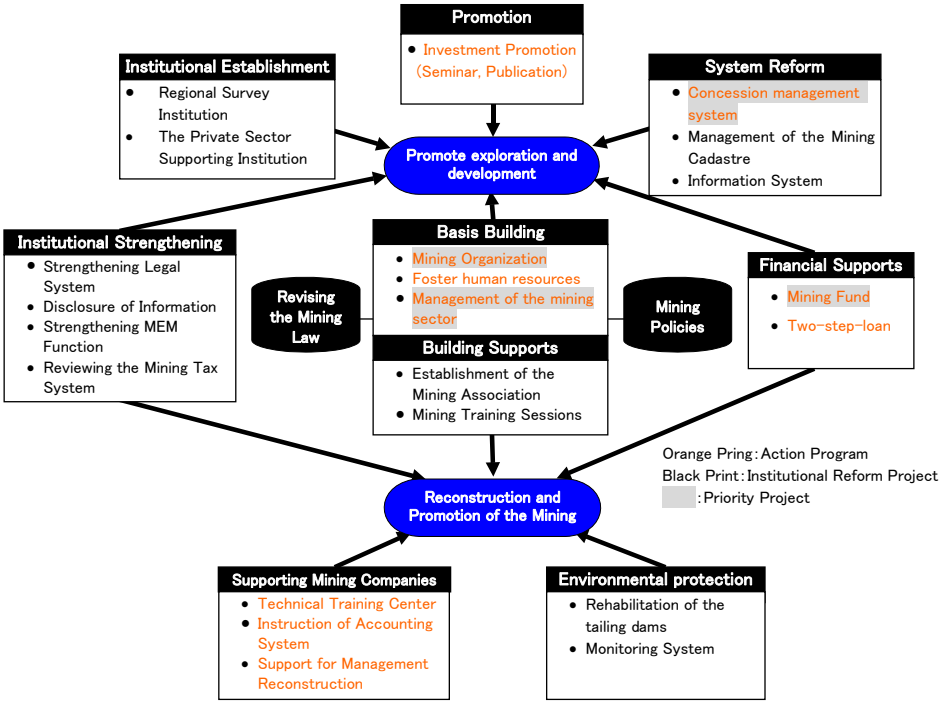


Fig.1.2 Location of each Measure of the Master Plan

Chapter 2 Investment Foundation

2.1 National Economic Development Plan

In November 2006, the Finance Ministry announced "the Memorandum on Budget and Economic and Fiscal Policy for 2007 with Projections for 2008 and 2009" as a national economic development plan. This Memorandum lays out policies, targets and methods through 2009 for Serbia to make the transition to a market economy. There are 3-year plans for economic policy, the financial system, human resources, structural reformation, rebuilding of the public sector and reformation of other sectors in the country. There is also a plan to enhance privatization. This 3-year plan is comprised of the following national plans:

- National Plan for Joining the European Union
- Strategy for Poverty Reduction
- Strategy for National Economic Development
- Strategy for Sector Development
- Strategy for Sustainable Development
- Strategy for Development and Promoting Foreign Investment

Taking the EU membership policy into account, it is a task for the national development plans to formulate above-mentioned strategies, based on analyses of the current economic state and existing social institutions, including the analyzed faced issues.

2.2 Economic Conditions

2.2.1 Economic Policy

The following is a list of Serbia's main economic policies covered in the above 3-year development plan.

- Maintaining the stability of the macroeconomy and Serbian currency, and keeping inflation under control
- Rapid implementation of economic and social reforms (completing economic reforms and privatization)
- System reform (including national and local governments)
- Increase employment and living standards

Policy targets include a GDP growth rate of 7.2%, and the inflation rate to be reduced to 4.5% by 2009. These high-priority economic policies are each composed of individual policies. In other words, this means the formulation of policies for inflation, exchange rates, finance, international relations, employment, raising revenues, and so on.

Since the 1999 aerial bombing by NATO, there has been rapid economic growth. The main economic policies for 2006 included controlling financial policy, budget reductions, stabilizing prices, keeping inflation under control, strengthening the currency, accelerating privatization,

restructuring state-owned enterprises, and further acceleration of the transition to a market economy. In addition, regional differences actualized by market economy must be emphasized for materializing the economic policy.

2.2.2 National budget

The national budget is formulated and implemented based on the Budget System Law that was implemented in 2002. This law, which covers preparations, procedures, and implementation of budgets, bonds and guarantees, budget accounting and reports, budget management and auditing, and the national treasury, among other things, lays out detailed rules for making draft proposals at the ministry level, obtaining government (ministry) approval, obtaining approval from the national legislature, and so on. The budget contains detailed information, including the nation's overall budget, the budgets of all ministries and government agencies, assets, loans, and payments made on government bonds.

These rigorous budgeting rules appear to be maintaining transparency in the system. However, the 2006 Serbian budget indicates accelerating privatization reflecting on the economy policy mentioned above, with characteristics of transition to the market economy. The reconstruction from the planned economy of the socialist era to the market economy system is the target of the budget, and 16 years after independence from the former Soviet Union, it is still in the redevelopment stage. Seen from this perspective, the reconstruction from the old Soviet system, which was delayed for 10 years, slower than expectation, and it will take time to achieve. Furthermore, since, unlike the Soviet system, Serbia's socialist system was based on autonomous management, it is not easy to convert one system into another. A 10-year plan will have to be implemented and steady progress achieved until economic growth is toed to reforming the system reform, accelerating investment, and restoring the mining industry.

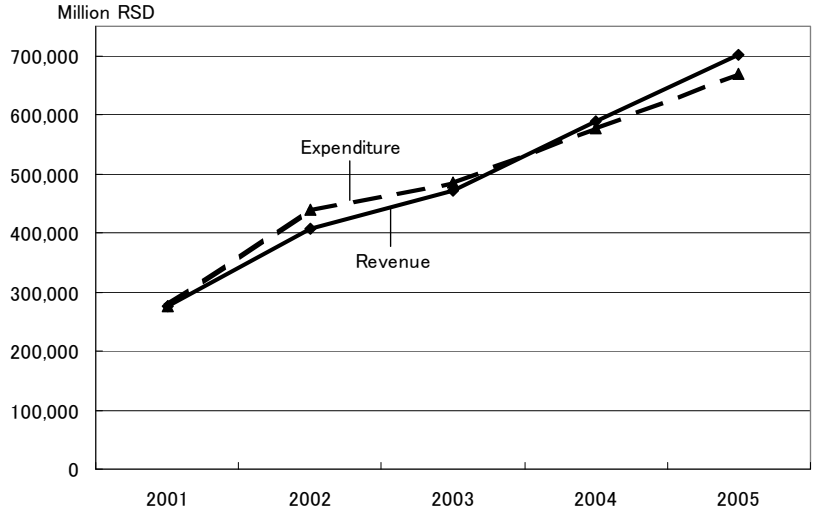


Fig. 2.1 Trends in Revenues and Expenditures

Looking at revenues and expenditures in the national budget, both are sharply increasing, and there has been a budget surplus since 2004. This means that rebuilding is having a desirable effect on the budget and may be reducing the economic burden imposed by national debt. If production in the private sector will be more active in the future, national revenues will be increased and the national budget would be more effective and efficient for the national reconstruction.

2.2.3 Macroeconomics

(1) Macroeconomics

The macroeconomics since 2001 that have involved economic policies such as finance and budgetary reform, keeping inflation under control, free trade agreements, bank restructuring, and promotion of privatization have been undergoing a rapid transformation. In 2005, GDP growth stood at 6.5%, while per capita GDP has been rising steadily, reaching US $3,158 (Finance Ministry data).

This is the result of promoting investment, restructuring enterprises, and restoring productivity. While imports have dramatically increased (amounting to US $11.8 billion in 2005), exports have also rapidly increased (US $6.2 billion in 2005), and improvements are beginning to be seen in the trade deficit. The increased production in fields that can quickly recover, such as clothing and food, is contributing to the deficit reduction. The equipment, machinery and chemical industries will soon start to contribute to the macroeconomy. In addition, government expenditures have been in the plus column since 2004, in part because of increased revenues coming from revitalized industries. In addition, unemployment has been still high, and it was slightly increased in 2005. It should be a task to be solved urgently in the macroeconomics indices.

Table 2.1 Main Indices for Economic Growth (2001-2005)

Items	2001	2002	2003	2004	2005
GDP in current prices, in billion CSD *	784	1,020	1,172	1,431	1,750
GDP, real growth, in %	5.1	4.5	2.4	9.3	6.8
Inflation, period average, in %	91.8	19.5	11.7	10.1	16.5
Inflation, end of the period, %	40.7	14.8	7.8	13.7	17.7
Current account of the balance of payments, without donations, % GDP	7.4	11.0	9.6	13.5	9.8
Unemployment rate, in %**	24.7	27.1	27.8	28.0	29.2

* Estimates ** Including insured farmers (Source: MoF and NES)

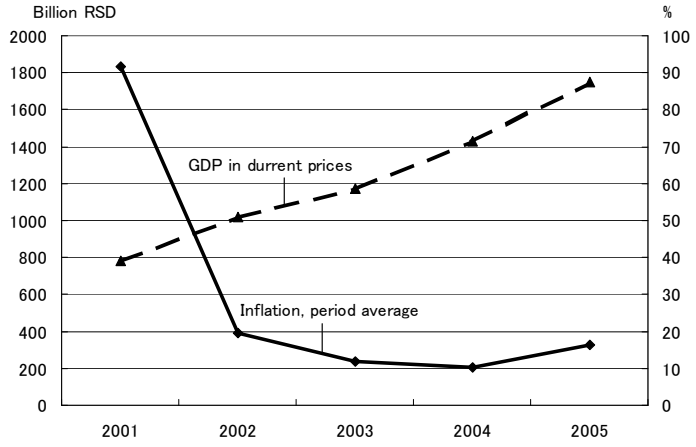


Fig.2.2 Trends in GDP and the Inflation Rate, 2001-2005

(2) Investment Promotion

The Serbian Investment and Export Promotion Agency (SIEPA), which is under direct control of the Deputy Prime Minister, serves as a window for private investors. SIEPA, which has 35 employees, consists of departments such as Investor Services, Market and Analysis, and Export Promotion. With support from JICA, various types of investment promotion pamphlets have been created, and work has started on individual industries (automobile parts, forest products, etc.). Indeed, SIEPA is a clearinghouse for materials and information to help investors understand the investment climate of Serbia. The recent increase in direct foreign investment (rising from US $1.5 billion in 2005 to US $4 billion in 2006) is closely linked to the development of the investment climate.

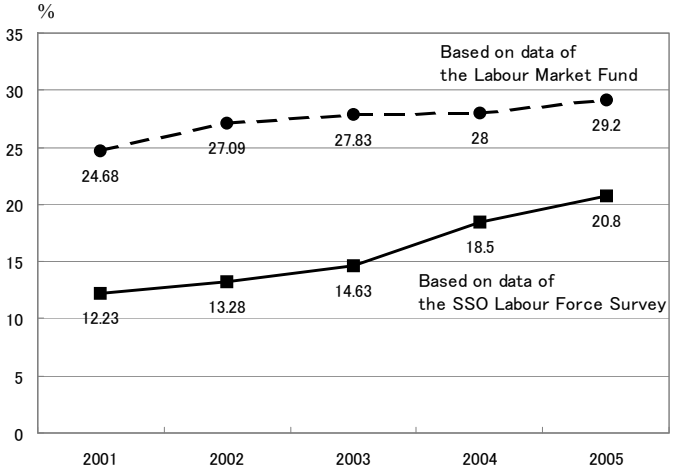
However, there has been relatively little investment in the mining sector. Although SIEPA considers mining to be a major sector, investment has not been actively promoted, and it still falls outside the range of SIEPA activities. This is because, among other things, there are still not many materials available to attract investors in the mining sector, it takes at least one year to acquire mining rights, there is still a considerable "autonomous management socialism" attitude that has remained from the Yugoslavia era, and there are still many instances where the law is in conflict with a market economy. If the current efforts at privatization finish in the first half of 2008, the investment in reconstruction will be begun in the second half of 2008 and the mining sector will be able to play a role in increasing investment. If a vision for mining sector management after privatization will become clear, the investment will be continued and promoted more.

On the other hand, the employment growth rate was at a comparatively low 0.9% in 2005, and, while the actual figure is not known due to discrepancies in survey data among the various survey organizations, the unemployment rate exceeded 20% (see Table 2.2, Figure 2.3). This indicates characteristics of the transition period toward the private sector. Thus, policies must be formulated that will not only guarantee employment in privatized enterprises, but will also help investment to increase employment.

Table 2.2 Indices for Population, Wages, and Productivity

Item	2001	2002	2003	2004	2005
Population, in thousands	7,534	7,500	7,481	7,463	7,450
Population growth rate	-0.26	-0.40	-0.25	-0.24	-0.17
Active labour force, in thousands	5,072	5,045	5,024	5,008	5,002
Number of employees, in thousands	2,102	2,067	2,040	2,051	2,069
Employment growth rate	0.2	-1.7	-1.3	0.5	0.9
Number of employees in the public sector, in thousands*	395.2	405.4	406.9	416.0	422.0
Employment growth rate in the public sector	4.0	2.6	0.4	2.2	1.4
Unemployment rate (ILO**)	12.2	13.3	14.6	18.5	20.8
Real growth rate of the average net wage	16.5	29.9	13.6	10.1	6.4
Labour productivity growth rate for the overall economy	4.9	6.3	3.8	8.8	5.6

* Excluding employees in state-owned enterprises ** ILO is the International Labour Organization (Source: MoF, SSO, NES)

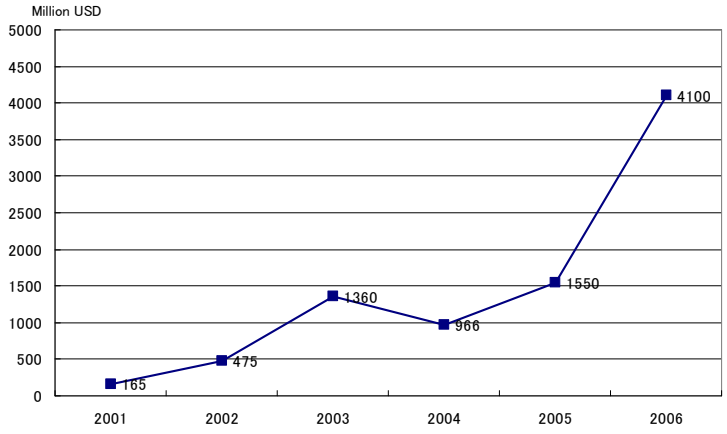


Source: MoF, SSO, NES

Fig. 2.3 Trends in the Unemployment Rate

Foreign investment has been increasing dramatically, rising from US$ 1.55 billion in 2005 to US$ 4.1 billion in 2006 (Fig. 2.4). This increase shows the progress of privatization, the revitalization of economic activities, and the on-going improvement of the Serbian investment climate. At the same time, however, there is potential for a rise in the unemployment rate.

Fig.2.4 Trends in Foreign Investment



2.3 General State of the Mining Industry

2.3.1 Role of the Mining Industry in the Economy

The revitalization of the mining sector has only just begun. Most of the industrial, stone and other materials are extracted small and medium-scale mines that have already been privatized. Currently, metal mines are being privatized. However, large-scaled coal mines have been kept as the national company without privatization plan so far. As energy prices are currently high, there is existence value of the national companies. But from the viewpoint of energy prices in the future, privatization of coalmines is desirable.

Metal mines especially produce international commodities which are directly linked to processing industries, so they can be considered both as domestic suppliers and as producers of

industrial products for export. In addition, they are instrumental in local community development, provide places of employment, and are sources of government revenues from royalties and taxes. In this way, the mining industry not only makes a macroeconomic contribution to GDP, government revenues, trade revenues, employment, etc., but also has an enormous effect on the economy as it is directly related to local economies, industrialization, export industries, and derivative industries. Therefore, it is necessary to fix rates of reasonable royalty and tax in the Mining Law, based on the role and contribution of the mining industry in national economy as well as the current state of the mining industry.

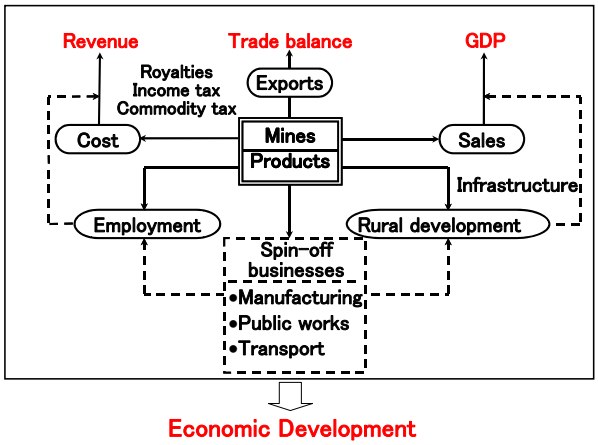


Fig.2.5 Role of the Mining Industry in the Economy

The Serbian mining industry is involved with the extraction of coal, industrial materials, building materials, and metals, primarily copper and zinc. Its estimated contribution to GDP was 3%, and is moving at about the same rate as it was in the late 1990s. In terms of production volume, however, it is only 1/3 of what it was in 1990. If privatization is completed and the private sector takes over the exploration, development, and the management of mines and smelters, then the mining industry will have the potential to account for up to 10% of GDP.

2.3.2 State of the Mining Industry

Serbia is now working hard to rebuild its institutions, its economic strength and its reputation as an economic power at the heart of the new Balkan economies. Mining has a long tradition at the foundations of the Serbian economy and dates back over 3000 years. By 1990, annual mineral production revenues were nearly US$3.5 Bn at today's prices but unfortunately, since then, output has declined to an estimated US$1.3 Bn.

The Government of Serbia is well acquainted with the former importance of its mining sector as all mines were previously owned by the Government and managed as public sector enterprises. Furthermore, Serbia recognizes the future potential of its mining industry and the role that this can play in the context of its further economic and industrial development based on free market principles. In the past metallic minerals have been concentrated, processed and the metals

used as raw materials within the Serbian industrial sector, whilst surplus production has been exported. Coal, lignite and petroleum are all used in power generation and to support Serbia's liquid fuel needs and industrial minerals have been quarried throughout the country for mainly construction uses. Following the break up of the former Yugoslavia in the 1990's the new government, with the help of external agencies such as the EU and World Bank, has embarked on a program of restructuring the economy. To achieve this, the government has launched a privatization strategy embracing virtually all sectors of economic activity and including most State-owned and managed enterprises. (It was recognized that the energy sector was vital to Serbia's recovery following the hostilities of the 1990's and to date lignite mining and the associated power generation and distribution has been left under State control and is likely to remain there for several more years.)

Since 2000, only a few coal mines have been privatized.

Modern mining had its start in 1904, when a French businessman established the Bore Mining Company and began full-scale operations. After the Second World War, a wide range of mining activities was developed; for a long time, mining was one of Serbia's premier industries and formed one of the foundations of the country's economy. This was especially the case with the RTB Bor complex which was comprised of core companies possessing mining and smelting facilities and equipment. The complex had 15,000 employees, and more than 6,000 others were employed in subsidiary companies that were involved in the processing of copper or the refining of precious metals from copper ore.

However, due to the money-consuming operations, unsustainable financial situation, etc., of the "autonomous management socialism" era, the industry ran up enormous debt. The excessive number of employees and a lack of investment in replacing aging machinery had a direct effect on declining production, and falling copper prices led to a decline in management. Revitalization plans were drafted that included company production, organization and financial integration, etc., and in September 2006, work started on the privatization of RTB Bor. With assistance from privatization, the World Bank, etc., plans have been made that should help to reduce the large debt that had been amassed, resolve pollution problems, and make reinvestments in equipment and machinery to prevent environmental and other mine-related problems.

In addition, lead and zinc are being mined at the Rudnik, Lece, Grot, Veliki, Majdan, Suva Ruda and elsewhere Mines, with total annual production of lead and zinc concentrate. Precious and rare metals are recovered as by-products at base metal processing plants. Some slag actually contains a higher grade of precious and/or rare metals than deposits in the mines. However, with the exception of Rudnik which has already been privatized and is operating in the black, these mines, like the abovementioned Bor, are either stalled in the privatization process, or are privatized but dormant, because of difficulties in management. Only some mines started to prepare their reopening.

Coal is being mined in large open pits in the Kolubara and Kostolac coal regions. About 95% of this coal is destined for coal-burning power plants. Large-scale coal mines are currently being revitalized, and the privatization process is not materialized yet. 99% of these mines belong to the state-owned Electric Power of Serbia (EPS). Small- and medium-scale open pits, quarries, etc., are producing industrial materials, building materials, etc., and they are playing an important role in the Serbian mining sector.

In Serbia, the RTB Bor is facing some serious environmental difficulties. The main problems include the slag heaps of the open pit (fine particles, soil degradation), tailing ponds, wastewater discharge from the mine and smelter, and air pollution. In addition, heavy metals contained in the tailings dam may also be polluting the environment, and if the damage done to water collection functions of the streams of the tailings dam is not repaired, the dam could rupture and cause an environmental catastrophe.

Because the Bor is located near the border with Romania and Bulgaria, it is also a source of transborder pollution. In addition, like Bor, zinc and lead mines show signs of soil and water contamination from heavy metals, and there is concern that tailings containing heavy metals may be carried downstream. There is precedent: in 2001, part of the tailings dam at Velijki Majdan ruptured, discharging liquid tailings downstream. Despite these problems, there is still no concerted effort being made to address them.

The mining sector is still being managed with approaches from the old socialist era, but mining policy, mining law, etc., are being reformed with support from the World Bank.

Table 2.3 Features and Current State of the Serbian Mining Industry

Features	Current State
• Possesses "full set" of technologies (exploration, mining, dressing, smelting, manufacturing) • All mines except Bor are small/medium scale • Both underground and open-pit mines exist • Mostly base metals are mined • Mining methods, geological survey methods, regulations, etc., remain from Socialism era	• Privatization is leading to the restructuring of all mines and smelters • There is still a sense of self-managed Socialism • Technologies, equipment, etc., are aging • The system will be made more economical • Pollution is becoming more noticeable

2.4 Finances and Accounting

2.4.1 Serbian Accounting Standards and the Introduction of IAS

As a result of the implementation of the Accounting and Auditing Law in 2002, Serbian accounting standards have begun adopting International Financial Reporting Standards (hereafter, IFRS) and International Accounting Standards (hereafter, IAS). The 2002 law applies to all corporations, companies, banks, financial institutions, insurance companies, brokerage houses, etc., regardless of their size. In addition, individuals who undertake economic activities for the purpose of making a profit and who must file income tax returns are also subject to this law (Appendix I-1).

The 2002 law was Serbia's first attempt to systematically adopt international accounting

standards (IAS, IFRS), but there actually has not been a concerted effort to implement these standards. To strengthen the law's effectiveness, the Serbian government implemented the Accounting and Auditing Law in 2006, and it is currently in effect.

The 2006 Accounting and Auditing Law picks up where the old 2002 law left off. The new law stipulates that corporations and individual business owners to whom Articles 15 and 24 apply should record their transactions using accounting forms (designated by the Ministry of Finance) that are completely compatible with IAS and IFRS. As a result, corporations and individual business owners are required to do their accounting on unified forms designated by the Ministry of Finance or the National Bank of Serbia (in the case of financial institutions) in an effort to fully adopt international accounting standards (IAS, IFRS).

In addition, to enhance the implementation of international accounting standards, the Chamber of Certified Auditors (hereafter, "Chamber") has been recently established. The Chamber is a public organization under the jurisdiction of the Minister of Finance that has been given important duties related to the monitoring and dissemination of international accounting standards through observations of accounting practices and by improving the quality of auditors through education, training, and the issuing of licenses. The Accounting and Audit Commission, which was in charge of auditing under the old law, has been renamed the National Accounting Committee and has transferred its auditing authority to the Chamber. Its duties mainly include monitoring for strict adherence to EU directives in the field of accounting, and monitoring related to changes and additions to international accounting standards.

The new law also features a new chapter on supervision (Chapter 13), which contains new provisions for inspection and auditing authority for auditing companies of the Ministry of Finance. Inspectors who have been delegated authority by the Ministry of Finance are required to inspect auditing companies in person at least once a year to ascertain, among other things, whether or not they are adhering to international accounting standards.

Thus, one of the special features of the 2006 Accounting and Auditing Law is the establishment of the Chamber of Certified Auditors which is designed to make an all-out effort to promote and disseminate international accounting standards by improving the quality of accounting auditors, and auditing companies that have been granted auditing authority by the Ministry of Finance.

2.4.2 Overview of Accounting Standards

With the implementation of the Accounting and Auditing Law in 2006, Serbian accounting standards are being given clearer guidelines for creating accounting statements that are in accordance with IFRS and IAS. The following is an overview of these standards.

(1) Scope of Application of the 2006 Law

All corporations and sole proprietors are responsible for creating and reporting financial statements based on international accounting standards. However, it would be more desirable if small companies and sole proprietors could do this on a voluntary, rather than mandatory, basis (Article 2). It should also be noted here that in principle, all foreign companies with branches in Serbia are also subject to the new law (Article 1). However, there is no clear definition of "branch", which apparently is causing problems with the bookkeeping and tax related work of these branch offices.

(2) Classification of Company Size

Article 7 of the 2006 Accounting and Auditing Law maintains the same categories and standards for company size as the old law. The categories and standards are as follows:

Table 2.4 Classification of company size

Size	No. of employees	Annual profit	Assets
Small	Less than 50	Less than 2.5 million euros	Less than 1 million euros
Medium	50～250	2.5 million～10 million euros	1～5 million euros
Large	More than 250	More than 10 million euros	More than 5 million euros

In the same company scale row, if at least two of the three standards (number of employees, annual profit, assets) apply, then the company in question is considered to be that size. All companies that are classified as either medium- or large-scale companies must compile and report financial statements based on IAS and IFRS. When two or more related companies have controlling rights, then all companies in the group must create a combined statement.

(3) Auditing

Article 37 stipulates that all medium- and large-scale companies which are subject to the 2006 Accounting and Auditing Law must undergo an audit in accordance with International Audit Standards by an auditor having the same type of license as under the old law. In addition, companies that are required to file a combined statement, and companies that issue stock, are also required to undergo the same type of audit. Article 38 states that an auditor can express any of three opinions: Positive, Negative, and Withheld. In the case of small companies and sole proprietors, financial statements can be checked by the tax office (Article 37).

(4) Registration and Keeping of Financial Reports

Medium- and large-scale companies must register a financial report with the National Bank of Serbia once a year. (In Article 31 of the old law, the registrar is referred to by the ambiguous term of "the authority"). The accounting year in Serbia begins on January 1 and ends on December 31 of each calendar year. Annual reports must be submitted no later than February 28 of the following year, the Auditor's Opinion must be submitted by September 30, and combined financial reports must be submitted no later than April 30 (Article 31).

It should be noted that in the 2006 Accounting and Auditing Law stipulates that the accounting year of a parent company may be used as the accounting year, if approved by either the

Serbian Ministry of Finance or the National Bank of Serbia (Article 24). Financial reports field in this manner are handled as public information that can be viewed at any time during that 20 years that it is stored by the National Bank of Serbia (Article 33).

There are 6 documents that must be included in a company's registered financial report. Article 25 of the new law has added the Statistical Annex to the financial statements that were prescribed by the old law. These 6 documents are as follows:

- ○ Balance Sheet
- ○ Profit-Loss Account
- ○ Cash-Flow Statement
- ○ Report on Changes in a Company's Capital
- ○ Notes to the Financial Statements
- ○ Statistical Annex

Financial statements must be kept for 20 years, while journals and general ledgers must be kept for 10 years.

(5) Penalty Provisions

When a corporation is in violation of the 2006 law, it can be subject to a fine of 100,000 to 3 million dinars; sole proprietors who commit a violation can be subject to a fine of 5,000 to 500,000 dinars Articles 68, 69).

2.4.3 Special Features of the Serbian Accounting Standards

Accounting standards in effect in Serbia include the 2006 Accounting and Auditing Law which already includes provision for the application of international IAS and IFRS accounting standards. There are no discrepancies between Serbian accounting and auditing standards and international standards. However, in actual practice, the implementation of the 2006 law is in accordance with the rules and bylaws of the Ministry of Finance (Article 15 designates the Account Framework and official financial statement forms). As a result, there may be subtle differences between Serbian and international standards. The main differences between the rules and regulations of IFRS and the 2006 law are as follows:

- In IFRS, the assets and liabilities listed in the Off-balance Sheet are sometimes listed in the Balance Sheet in Serbian accounting standards. For example, assets in a lease contract, assets that can serve as collateral, etc., as listed in the Off-balance Sheet in IFRS, but in the Balance Sheet in Serbian national standards.
- When there is negative shareholder equity, it is listed as a 'loss exceeding equity' in the Balance Sheet in Serbian standards, but in IFRS, there is no listing or definition of this as an asset.
- Exchange rate profits and losses incurred by stockholders for which payment has not been

completed are listed as shareholder equity in Serbian standards. However, they are not considered in IFRS.

- In Serbian accounting standards, the release of information required by IAS・1-'Presentation of Financial Statements' is somewhat abbreviated.

Such discrepancies do not mean that there are differences in financial statements, or fundamental differences with the structure, concepts, etc., of financial statements. They are listed in Notes to Financial Statements, in the Balance sheet, etc., in a way that they can be readily judged, so they do not pose a major problem. Furthermore, cases of exchange rate losses or gains affecting shareholder equity do not occur with any regular frequency, and essentially there are no differences between Serbian and international accounting standards.

However, the biggest difference between accounting and auditing under the old socialist system, and under the new laws implemented since 2002 appears to be that in the old system, fixed assets were appraised only by book price and there was no use of the current (market) price appraisal system (although fixed assets were reappraised in times of severe inflation). Under the socialist economy, price controls and government-mandated prices were the norm, but these concepts are almost non-existent in a market economy, so these differences might have arisen because there was no concept of current market price of fixed assets in the socialist economy.

In addition, in the use of accounting standards, the National Bank of Serbia, which receives financial statements and is responsible for their management, conducts the final monitoring and evaluation. However, this central bank manages all the financial statements of all corporate and single proprietor industries, not just financial institutions.

2.4.4 Accounting Standards and Issues with Financial Affairs

As stated earlier, Serbian accounting standards are mandated by the 2006 Accounting Law to employ IFRS. Where there are still a few minor problems remaining, for all intents and purposes the legal system has reached a level that is compatible with international standards. Thus, both the system and legal framework of Serbian accounting standards conform to IFRS and IAS, and there are no major discrepancies between Serbian and international accounting standards. However, in actual practice it is possible that international standards are not being implemented exactly as prescribed by the 2006 Accounting Law.

Opinions expressed during interviews with large international accounting companies gave the impression that the only companies in Serbia that are strictly adhering to international standards are some multi-national corporations, large domestic companies, etc., that use the services of large international accounting companies. As seen from the eyes of an international auditing company, there is concern that there is still an inadequate amount of knowledge of, and quality control training for, international standards. As a result, there is a fear that despite the adoption of international

standards in the Serbian accounting system, they actually are not being implemented in the manner prescribed by law. However, given the current state of Serbia, this may be an unavoidable situation. For example,

a. It has only been 5 years since international accounting standards were introduced.
b. There are still cases where there are no official Serbian translations of IFRS, IAS, etc., making it difficult to understand and implement them at the business level.
c. The Certified Accountant system in Serbia is still making the transition from socialism to a market economy, and the laws that are in place to cover the opening of accounting firms, the licensing of accounts, etc., are sometimes non-functional, so the past few years (2000-2006) have been a period of much confusion. As a result, there are sometimes problems with the quantity and quality of accountants and auditors.

In order for the Serbian government and the Ministry of Finance to promote the practical implementation and dissemination of international accounting standards, the Chamber of Certified Auditors system was established in 2006, and work is moving quickly to define its organization, functions, roles, etc., within the policy framework. Once the Chamber of Certified Auditors becomes functional, there should be gradual improvement in the quantitative and qualitative issues associated with accountants and auditors.

In the case of financial statements of mining companies, they are not publicly disclosed because the mining industry is still being privatized. The Grot Mine, for example, only discloses its balance sheet and profit-and-loss statements, and does not compile other financial statements at the present time. At the Rudnik Mine, which has been privatized with Serbian capital, international accounting standards (current Serbian standards) have only recently been introduced, and financial statements are only now starting to be created.

2.5 Serbian Infrastructure

Serbian infrastructure is comparatively well-developed, and it is attractive to potential investors in mining. The following is a basic description of the country's roads, railways, river transportation, electricity and electronic communications.

2.5.1 Roads

Serbian roads are categorized into primary roads, regional roads and local roads according to the Road Law. In 2002, the total length of Serbian roads was 40,845km. Detailed data are shown in Table 2.5.

Primary roads include 383km of motorways and 222km of 1st phase motorways, as well as 3,098 bridges and 78 tunnels. The tolls for motorways shown in Table 2.6 are for foreign-registered vehicles; tolls for domestic-registered vehicles are approximately 40% less.

Table 2.5 Serbian Road Network (as of 2002)

Category	Length (km)	Ratio (%)	Paved ratio (%)	Macadam ratio (%)	Unpaved ratio (%)
Primary	5,525	13.5	96.4	2.1	1.5
Regional	11,540	28.2	79.4	12.8	7.8
Local	23,780	58.3	42.8	31.7	25.5
Total	40,845	100.0	–	–	–

Table 2.6 Tolls for Motorways (in Dinars)

Car Category	Beograd–Novi Sad	Novi Sad–Subotica–Feketic	Beograd–Nis	Nis–Leskovac	Beograd–Sid
Ⅰ	300	300	790	180	380
Ⅱ	480	480	1,160	300	560
Ⅲ	780	900	2,320	600	1,125
Ⅳ	1,500	2,000	4,640	1,300	2,245

Note Ⅰ: Vehicles up to 1.3m height from the front axle/ motorcycles and passenger cars
Ⅱ: Vehicles with or without trailers up to 1.3m height from the front axle/ with at least 2 axles
– passenger cars with trailers
Ⅲ: Vehicles over 1.3m height from axle of the towing vehicle with 2 or 3 axles
– station wagons, lorries with 2 or 3 axles
Ⅳ: Vehicles over 1.3m height from the front axle of the towing vehicle with at least 3 axles
– all vehicles with at least 3 axles

The density of the road network is 0.46km/km^2, which classifies it as moderately developed by European standards.

The following is an overview of road quality:

- Most of the primary roads have an asphalt or cement carriageway,
- About 13 % of the roads in the regional road network have a macadam carriage way,
- Only 43％ of local roads have an asphalt or cement carriage way.

The quality of roads is also classified as moderately developed.

Technical and exploitation characteristics of the road network do not meet the required standards. This is particularly apparent in the:

- low percentage of motorways in the primary road network,
- high percentage of primary roads passing through cities (24%),
- insufficient quality and capacity of carriageway construction and conditions of road facilities, and
- poor road safety conditions.

Fig. 2.6 shows mainly the primary roads of the Serbian road network. This map does not include all regional and local roads.

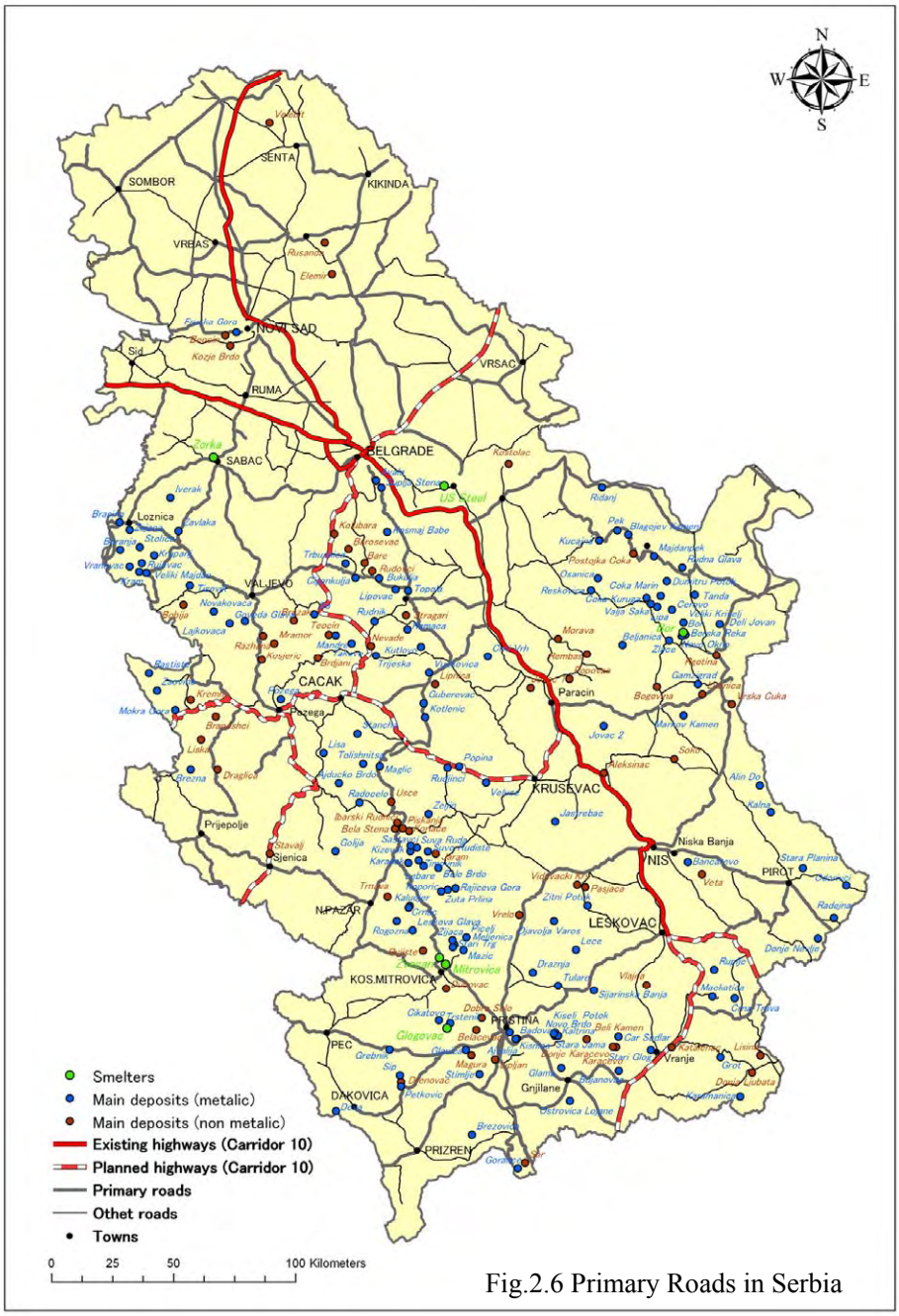


Fig.2.6 Primary Roads in Serbia

Approximately 40% of the length of the primary road network includes major thoroughfares connecting Europe with the Middle East of 2,150km total length. In the 3rd Pan European Transport Conference held in Helsinki, Finland in 1997, Corridor 10 was included in the European road network. The length of the Corridor 10 network in Serbia is 800km.

Taking into consideration the existing planning documents, the Master Plan of the Republic of Serbia, the study on road network development and strategic planning documents of the EU, the Ministry of Capital Investment has defined the priorities for development of the road network. The main motorway network will consist of:

- Corridor 10 (the main thoroughfare and branches B and C)
- E-763 (Belgrade-South Adriatic motorway)
- E-70
- E-761

Possible sources for funding the construction of the motorway network include loans, concessions, budget resources and PPP. Some sections of the future motorway network are being financed from sources received by EBRD and EIB and are under construction. A joint venture of Spanish and Austrian companies contracted the concession with the government. This joint venture will begin constructing the highway under the concession with the term of 20 years in the near future from the Hungarian border. However, the Vojvodina Autonomous Region is collecting tolls for the current principal roads, and it is the important revenues for the region. Therefore, the autonomous region is not necessarily welcoming this concession.

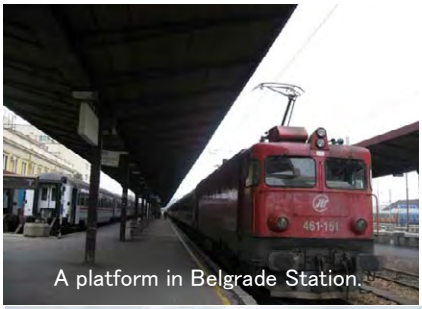
A new highway will be constructed here.

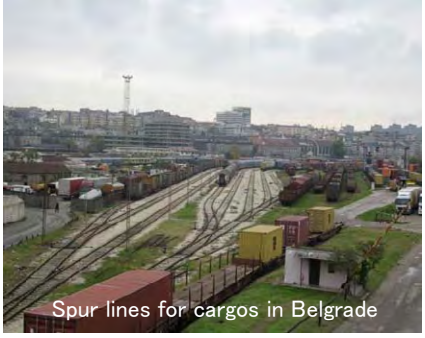
The Serbian mining industry depends heavily on roads, especially for transporting ore from mines to processing plants and concentrate from plants to smelters.

2.5.2 Railways

Basic activities of the Serbian railway system include the carriage of passengers and goods, hauling trains and cargo, maintenance of traction units, trains and rolling stock, track maintenance and inspection, and inspection of permanent way and station structures, among others. The following is a list of some basic facts about the Serbian railway network.

Line length: 3,808.7km
Electric line length: 1,196.051km
Main route length: 1,767.5km
Private sidings length: 772.6km
Tractive stock: 417
Passenger rolling stock: 797
Number of train cars: 4800
Annual carriage amount: 9.325 million tons (as of 2002)
Number of employees: 22,271


A platform in Belgrade Station.


Spur lines for cargos in Belgrade

Using loans from EBRD and the European Investment Bank, Serbian Railways will upgrade and modernize freight rolling stock, particularly in the international Corridor 10. This modernization will be able to increase the

capacity for goods transport and have a positive effect on overall economic growth in Serbia.

Priority strategic development targets in the business plan for the railways are as follows:

- Financial consolidation of the enterprise
- Corporate and ownership transformation of the railway (separation between operation and infrastructure) and definition of its relationship with the state
- Harmonization with European standards and regulations in all relevant areas.

Railways are also widely used by the Serbian mining industry to, for example, transport concentrates from the Majdanpeck Mine to the smelting plant at RTB Bor, and to transport coal produced at the Kolubara Mine to the generation plant. Fig.2.7 shows the Serbian railway network.

Fig.2.7 Railway Network in Serbia

2.5.3 Waterway Transportation

The Danube River is the backbone of the Serbian inland waterway system and is part of the Rhine-Main-Danube system of the Trans-European inland waterway, which is the main inland waterway system in Europe.

The Danube River, as a major river, is distinguished from all other systems by some unique features. The Danube is not particularly noted for its natural properties, such as total length of some 2,680km or catchment area of 817,000km^2, but rather for its strategic and economic position in Europe. This is the only river in the world which is fully navigable through ten countries.

In Serbia, the navigable Danube flow splits up into two parts, considering its total length from the mouth at Sulina to its source in the town of Kelheim, Germany near the entry to the Danube-Main Canal. Three significant tributaries flow into the Danube in the Serbian section of the river; two of them are the fully navigable Sava (207km) and Tisa (164km) rivers, and the third is the partly navigable Velika Morava River, which is for smaller vessels only.

A ferry lying to Belgrade in the River Sava

In addition to the natural inland waterways, the Serbian navigable network includes a system of artificial navigable inland waterways, i.e. the Danube-Tisa-Danube canal system in the Volvodina area, which is 600km long. Vessels and barges having a capacity of 500 to 1,000 tons can use this system.

According to European classification of the system of inland waterways, the Serbian part of the Danube River is ranked in the highest class (6 or 7) of international waterways, permitting the navigation of large barges with carrying capacities of over 20,000 tones and river-sea and sea-river ships with carrying capacities of 5,000 tones.

Unfortunately, according to the available data, the currently used transport capacity of the entire Danube River is only 10%, and even less than that in Serbia, especially after the NATO bombing and destruction of bridges in Novi Sad in 1999. At that time, the international transport on the Danube was virtually stopped, and the internal river transport was carried out under restricted and dangerous conditions.

In the mining industry, products of US Steel are transported by inland waterways to foreign countries. Fig.2.8 shows the Serbian waterway transportation network.

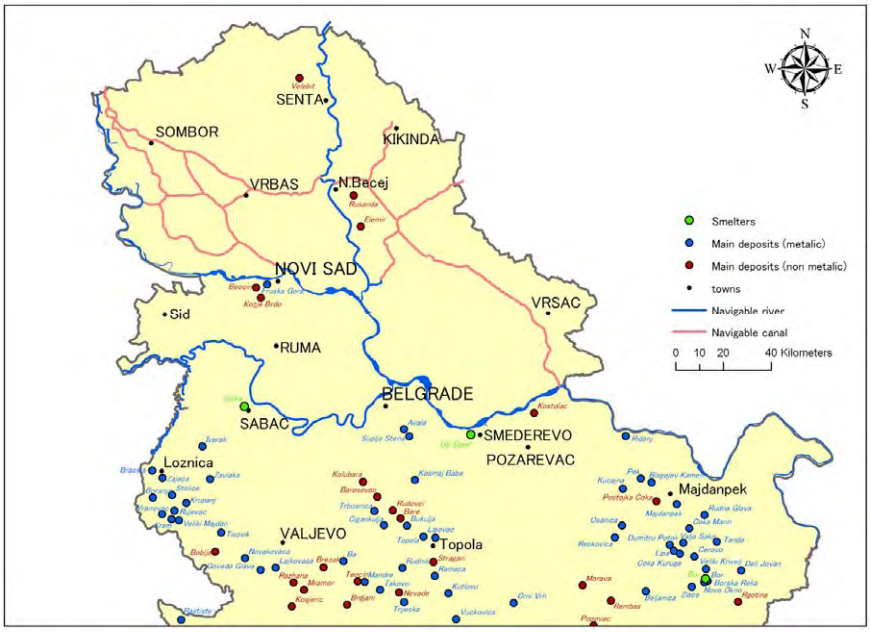


Fig.2.8 Waterway Transportation Network in Serbia

2.5.4 Electricity

(1) Electric Conditions in Serbia

- Administration of Electric Power: Department of Electric Power in MEM, which consists of Analysis Division (5 staff) and Inspection Division (7 staff).
- Ratio of Generation: 2/3 by lignite-fired thermal power and 1/3 by hydro power.
- Total generation: 35～38GWh.
- Supply/Demand Balance: shortage in winter (October to March), surplus in summer (April to September). Annual supply is balanced with demand.
- Electricity price: Price for family-use is different from industrial use. The price system is complicated, but the average price is 4.72 euro cents/kwh.
- New generation plant: there is a plan to construct a new generation plant (two 700Mw) in 2012. Construction budget is 1,000euros/kwh.
- International support: Much has been received, mainly from Europe, such as construction of a 1.3 million euro transformer in the Nikola Tesla Plant (August 2004).
- Main issues with electric power supply are as follows:
  - Large electric consumption
  - Cheap electric price is under the profit margin, but it is impossible to increase it due to low per capita income.
  - Superannuated facilities of plants have low generation efficiency.
  - Electric power infrastructure is insufficient.
  - Heating loss is large in family housing due to insufficient weatherproofing.

(2) EPS (Serbian Public Electric Power Enterprise)

The EPS ("Public Electric Power Enterprise"), which was established on July 1st 2005, is a 100% -owned enterprise of the Serbian government, which appoints all board members.

The basic task of EPS is to meet all the electric power requirements of the economy and people of Serbia. Supply and sales of electric power to almost 3.3 million people in Serbia are carried out in the scope of electric power distribution activities of EPS. Its organization consists of 11 economic associations (5 power generation associations, 1 coal mine and 5 power distribution associations), whose activities are to manage thermal and hydropower generation, power distribution, coal production, etc. EPS is the largest enterprise in Serbia with a total of 35,000 employees. The most current figures (January 2007) show the total installed capacity of EPS's power plants to be 8,355MW. It consists of lignite-fired thermal power plants with a capacity of 5,171MW (62%), gas-fired and liquid fuel-fired combined heat and power plants with a capacity of 253MW (4%) and hydro power plants with a capacity of 2,831MW (34%).

EPS is the largest lignite producer in Serbia, with annual output of about 33.65 million tons (as of 2004). EPS has two main coalmines, Kolubara and Kostolac, which are somewhat close to thermal power plants. Kolubara produces 75% of all lignite and Kostolac produces the other 25%. Lignite produced from the former mine is transported 30km by train to the Nikola Tesla Power Plant, and lignite produced from Kostolac is used in the Kostolac Power Plant.

In 2004, annual stripped waste was 67.73 million m^3 in Kolubara and 22.72 million m^3 in Kostolac. The basic development objectives of EPS in the period 2002 -2006 were as follows:

- Reduction of electricity deficit, in order to continuously meet the demand in Serbia without systematic imports,
- Rapid economic and financial consolidation and transition to profitable operations,
- Better cooperation with other European electric power industries and a greater role in the regional electricity market,
- Implementation of priority measures and establishment of a new attitude toward environmental protection.

The most important assumptions for the realization of the aforesaid objectives are:

- Increase electricity prices, in order to make operations profitable as soon as possible,
- Regulation of relations between SCG and international financial institutions and creditors,
- Reforms in the electric power sector which will, by making changes in the organizational and subsequent ownership structure and by introducing market elements, lead to more efficient operations.

2.5.5 Telecommunications

(1) Fixed Telephones

"Telekom Srbija" is the only public telecom operator that has a license for the public landline telecommunication network and for providing public landline telecommunication service. Since 2003, "Telekom Srbijahas" has been owned by two shareholders: Public Company of PTT Traffic "Srbija" (80%) and OTE Greece (20%). In 2005, the number of landline telephone users reached 2.53 million, accounting for about 37% of all Serbian households.

Current tasks for the Serbian landline telephone system are as follows:

- Develop a more equitable tariff policy based on a cost-oriented method,
- Increase the number of subscribers in order to reach the current EU average, with penetration rate of ca. 42%,
- Complete full PSTN digitization,
- Eliminate party-lines by the end of 2008,
- Modernize landline network architecture by replacing the existing networks with next-generation networks, which will be able to provide, in addition to the existing services, new convergent multimedial IP-based services,
- Increase the internet penetration rate to over 30%,
- Increase the number of broadband service users.

(2) Mobile Telephone Service

Currently, about 90% of Serbia is covered by mobile telephone service. During 2006, RATEL (Republic Telecommunication Agency) issued three 10-year licenses for public mobile telecommunications networks and services, one each to Telekom Srbija, Telenor ASA and Mobilkom Austria AG. In recent years, the number of mobile phone users has increased dramatically, reaching 5.5 million in 2005.

Current tasks for mobile telephone service are as follows:

- Improve the quality of service of mobile telecommunications under all conditions (indoors, outdoors; in urban, suburban and sparsely inhabited areas; use during high-velocity and low-velocity motion and in stationary positions),
- Introduce EDGE and LIMTS systems,
- Increase the possibilities for international roaming.

(3) Internet Service

Internet users have increased rapidly, reaching 756,675 in 2005. However 93.6% of them use the old dial-up system, and there is still little use of other systems. The strategy for telecommunications development from 2006 until 2010 is to focus on broadband access and cable internet.

(4) Cable System

RATEL issued authorizations for distributing radio and television broadcasts via the cable network in December 2006. In 2005, there were 540,000 subscribers to the cable system.

Chapter 3 Current State of the Mining Industry

3.1 Privatization

Privatization of the mining sector has been steadily implemented by the Privatization Agency since the first auction for privatization was held at Rudnik Mine (Pb、Zn、Cu) in September, 2004. Due to the high prices of base metals, gold, and rare metals in 2006, privatization of mines has accelerated, and closed mines, such as Zajaca (Sb), Velijki Majdan (Zn) and Suva Ruda (Cu), have been privatized through auctions. RTB Bor also started a tender offer process for privatization in September 2006, and the government negotiated with the awarded company in April 2007, but the negotiation was unsuccessful. In September 2007, RTB Bor restarted a tender. Currently, Grot Mine (Zn) and Lece Mine (Zn, Au) are managed by an assignee due to its bankruptcy, and their auctions are scheduled in 2008. Sabac Smelter (Zn) started a tender process in February 2007, but this tender was not successful, and restarted a tender in July. Currently, the government is negotiating with the awarded company. Generally speaking, privatization of metal mines is delayed, because preparations for privatization seemed insufficient, and also sufficient time for interested companies to evaluate mines and smelters is not given. In particular, new owners of mines privatized through auctions are responsible for pre-existing conditions. For example, even if pre-existing environmental problems are found, the buyers, not the government, are fully responsible for them. This is deeply linked to the lack of plans and vision for growth of the mining sector.

Because environmental problems could develop after privatization, pre-existing problems in each mine need to be identified for the government to take responsibility for them.

It should be noted that consultants selected by the Privatization Agency evaluate the assets of each mine and make plans for privatization. Privatization of small and medium sized mines is implemented through government budgeting.

Table 3. 1　Mine Privatization

Target	metal	Current state
Zorka Smelter	Zn	Tender was rejected as of February 2007 and second tender was carried out in July.
Grot Mine	Pb, Zn	Bankrupt, but operating. Auction is scheduled.
Lece Mine	Zn, Au	Bankrupt, and auction is scheduled.
Veliki Majdan	Pb, Zn	Privatized, preparing to reopen.
Suva Ruda	Zn	Bankrupt, and auction was finished. Under preparation to reopen.
Karamarica	Zn	Operated in the past, foreign company attaining exploration license.
Zajaca Mine	Sb, Zn	Closed, 3 mines privatized. Under preparation to reopen.
Rudnik Mine	Zn, Cu	Privatized in 2004
RTB Bor P	Cu, Au	In progress of the second tender as of September 2007. Under negotiation with the awarded company.

rivatization of mining facilities is not always successful, due to following factors;

- Shortage of compiled data on mines and smelters.
- National companies increase debt through privatization.

- Underestimation of reopening costs.
- Insufficient clarification of governmental responsibilities in environmental issues.
- Lack of governmental support for privatized mines.
- Lack of negotiations with buyers in auctions.
- Governmental management of privatized mines unchanged since the socialist era.
- Insufficient preparation time for participants after announcements of tenders and auctions.

There are still other issues. For example, evaluation of the management abilities of participants in tenders and auctions is lacking. Zajaca (Sb) was sold through auction in March 2006 to a company which had no mining experience. The company has not begun preparations to open the mines. 3 years have passed since Rudnik Mine was privatized in September 2004. The mine enjoys profitable production, due to very high recent metal prices, but it would be in a difficult situation if metal prices were the same as they were in 2000. Auction was conducted for Suva Ruda which is now preparing to reopen. Auctions are scheduled for Grot and Lece Mines. Both RTB Bor and Zorka (Zn) Smelter are in progress of second tender and they need reconstruction now under high metal price, however production is decreased or stopped. On the whole, privatization processes are delayed, and production after privatization is also delayed. It is a problem to be improved in the future.

The Privatization Agency and the MEM have not changed their attitude, from focusing only on the privatization and sale mines, to the creation of solutions for the issues mentioned above. Therefore, achievement of substantial mining production may experience significant delays, even if privatization is completed by the middle of 2008.

Large issues in Serbian privatization are 1) no consideration of supports to privatized mines for production, 2) no mining ability evaluation of companies which intend to attain mines.

There is lack of considerations for specific conditions of the mining industry and investment climate for the mining industry. These are main reasons for unsuccessful privatization. In order to recover the mining production after privatization, supporting system and measures to improve production and management must be studied for companies which attain mines.

3.2 Investment Climate and Investment Promotion

3.2.1 Investment Climate

Current metal prices are very high, creating a good opportunity to increase mine and smelter production to previous levels through foreign investment.

However, the lack of opportunities for investment while the mines were state-run has resulted in the following;

- Mineral exploration to delineate new reserves at mines was not possible for financial reasons.

- Needing to meet centrally planned production objectives, some operations did not attach to environmental and social obligations.

These factors, and also the age of some mines and smelters, appears to have lead to unfavorable economic results and bankruptcies, due to the age of the infrastructure and equipment. The legacy of environmental and social issues, uncertainty over ore reserves, and the resulting inability to make meaningful estimates of return on investment, together with the significant costs of upgrading equipment and processing plants, and the retraining of personnel in new techniques and modern processes suitable for the market economy, have all contributed to the unattractiveness of these operations to any investor. To create a privatization plan, an understanding of the current investment climate and conditions within the sector are needed. To improve the investment climate under the market economy, the following points are required;

- A commitment to implementing policy, legal, and fiscal reforms to reinforce macroeconomic stability and contribute to sustainable growth.
- A thorough understanding of the geological resources, in order to maximize the benefits derived from the country's mineral resources, and compilation of data for investors.
- Review, evaluation, and prioritization of geological resources and mineral prospects to determine those that favor growth.
- Policy, legal, regulatory, and sector fiscal regime need urgent reform. Currently this reform is in first process. Up to two years may be needed before these reforms are debated and put in place.

From the social point of view, a program of mine closure, redundancy payments and site clean up, followed by a longer term program of job creation and training, are able to decrease anxieties of the investors and local communities. The EU has an extensive experience in implementing these programs in France, Benelux, the UK, Poland, and Germany, and would be able to provide guidance concerning the implementation of such programs. As Serbia comes closer to joining the EU, they will be able to be materialized by supports from the EU. The World Bank has started to address the privatization of RTB Bor. This is essentially the same plan that should be used for other privatizations, not only RTB Bor, as it will improve the investment climate.

3.2.2 Analysis of Investment Climate

Investors are confused by the current legal and administrative structure in the mining sector. At the present time, the legal framework in the sector is governed by the Mining Law of 1995 with amendments made in 2006, and the Law on Geological Exploration dating from 1995. Regulatory control is a combined responsibility of the Ministry of Energy and Mines, the Ministry of Agriculture (and water), and the Ministry of Environment. Also, laws governing concessions for exploration and exploitation were recently enacted. The different laws and the involvement of

several ministries causes confusion and creates administrative inefficiencies due to these parallel systems of legislation and regulation.

In Serbia, minerals belong to the state. Current law requires that a Serbian legal entity (company) applies for exploration and exploitation licenses through the Ministry of Energy and Mines. The implication here is that foreign investors need to establish a Serbian registered business (office or company). However, this is not always good for investment promotion. Serbia has no mining regulations to support the 1995 legal framework for mining sector development. These are the most serious issues, confronting investors with a lack of clarity and transparency, as well as the burden of administration and inefficiency. These are all causes for concern at the risks involved in investing in Serbia.

The main tasks faced by such investors can be summarized and categorized as follows:

(1) Political and Economic Stability

For investors, political and economic stability is important. Mining requires significant initial investment of capital, and returns are earned over a long term. This requires that investors find a regulatory regime that will remain stable throughout a project's life.

To maintain investor confidence, it is important that there no conflicts between different regulatory provisions across the different government ministries. A new cabinet was established in May 2007, and the reorganization of some ministries was carried out. This could generally be viewed as invitation to political instability. Serbia's moves to prepare a national mineral policy should remain in harmony with laws applied to the mining sector.

(2) Legal

The confidence given by clarity of the law may be further improved by ensuring that the implementation of the law is accompanied by transparency in all legal and regulatory transactions between the investor and the government. The law should be there to encourage the investor, and not to be used by government to impede the investment process.

In Serbia, the current mining law is incomplete and divided across several ministries. This needs to be corrected, so that one ministry holds all the responsibility and is appropriate for this purpose.

In case of disputes, if arbitration between an investor and the government is needed, a clear process for this arbitration needs to be stated within the mining law.

(3) Concessions and Permits

General international practice allows investing companies the right to explore for and mine all minerals found on a licensed property. The administration of all permits and concessions is today, normally undertaken by a cadastral office and is based on an internationally agreed system of geographical coordinates. Serbia needs to establish an office or organization to oversee this.

Once a permit is granted, the investing company must be assured of the security of their

tenure. In this respect, the new law should allow for permit holders to move from exploration to mine development, and then to production, based on principles enshrined in law. If an investor complies with the laws and license requirements, they must have the right to move forward through the stages of the mining process. Applications for exploration rights should be handled on a first-come-first-served basis. There should be no barrier to the transfer of rights, so long as such transfers are conducted in accordance with the governing laws. For an investor to move from exploration to production, they may need to introduce new partners, or even owners, and the rights of the original investors should be transferable without barriers to new investors or lenders, so that projects may proceed to completion.

Currently, private land owners may prevent permit holders from exploring for minerals, which are the property of the state. This is confusing and obstructive to investors. Except for areas of national importance, for example heritage sites and national parks, Serbian mining law should provide for exploration of private land. Clear regulations should be implemented to protect the rights of all parties in these cases.

New mining laws, already created, are currently being investigated by the MEM, and have be improved in regards to the points mentioned above. Information disclosure is limited in the mining sector. Serbia should sign up and adopt the principles of the global Extractive Industries Transparency Initiative (EITI) which is enhanced by the World Bank. This is designed to ensure transparency in the administration of the sector by governments, and includes a list of principles that underpin the administration of the sector accordingly.

It should noted that Serbia compensates for some of its shortcomings in the legal and administrative aspects of its mining sector by having a very competitive corporate income tax rate, set at 10% of profits. Serbia has also introduced mineral royalties which vary from 1% (for coal) up to 5% of total income for construction materials. Metals are assessed at a 3% net smelter return.

(4) Geological Information

Serbia needs to provide better geological information to investors. Good practice today is based on the provision of detailed 1:25,000 scale geological survey maps of a jurisdiction. 1:100,000 and 1:250,000 scale regional maps, and 1:1,000,000 scale national maps are also provided. Since two ministries are currently legally responsible for geoscience matters and each administers different aspects, there is a shortage of geo-scientific data for potential investors to consider. One Ministry clearly responsible for the planning, mapping, and distribution of all geo-science data would resolve this issue.

Another geological issue is the need for investors to obtain approval for technical decisions on exploration techniques, the drilling patterns and disposition of drill holes on a concession, and the drilling data to be processed and reported. It is vital to remove these hurdles by giving investors the freedom to drill properties based on their own initial assumptions concerning the

appropriate level of investigation related to the potential and subsequent infill drilling based on initial results, to reinforce the data. Also, a maximum of mineral data should be published within the public domain, to attract investor interest. Similarly, exploration data related to specific opportunities should also be published. These days, the Internet is typically the vehicle used to publish this information. There are thus various tasks identified through analysis of the current state of the investment climate.

3.2.3 Investment Promotion

Investment promotion is led by the SIEPA, with steady improvements the investment climate. However, it should be noted that social tax and meal expenditures borne by the company are regulated by labor laws, and are a significant expense for privatized companies. Debt and investment in reconstruction of national companies is an requirement for investors. Also, it needs time to recover production by the private sector. Therefore, there might be a negative impact on investment promotion unless some exoneration is allowed while improvements are made to management and the laws and regulations to meet the market economy.

For that purpose, it is necessary to identify unfavorable issues for investment promotion and address them. In particular, national enterprises should not investment in staff and materials, as competitiveness in the mining sector is comparatively low. It would be more effective to support privatized mines in decreasing expenditures, which could be linked with investment promotion. It would be difficult to achieve sustainable development without systematic improvements such as revising mining laws and changing the organization of the sector, even if the government appeals the use of Serbian resources and the reconstruction of privatized mines through international seminars. Therefore, it is necessary to study systematically which governmental organization, the SIEPA or a newly established tentative investment committee, should be in charge of improvements to the investment climate. The SIEPA (or the committee) needs to identify the tasks for investment promotion after privatization

The Zorka Smelter was operated by Indian consultants since 2002, but they withdrew in March 2007. After that, a tender for privatization was carried out, but negotiations were unsuccessful. When the Indians managed the smelter, concentrates came from foreign countries such as Greece. During the Yugoslavia era, concentrates came to this smelter from local mines in Serbia or Bosnia, but will be very difficult to continue due to independence of the countries and low mine production. Unless the government shows a vision to network with mines for the smelter to attain concentrate, increased investment cannot be expected. If the current mining sector were not improved, the investment promotion might have serious negative impacts.

3.2.4 Investment from Japan

Only one company invested in the Serbia is Japan Tobacco International (JTI). The JTI opened a local office in 2001 and investigated the investment climate including marketing for neighboring countries for 5 years. Based on the investigation result, the JTB bought and upgraded a former national cigarette factory in May 2006, and also constructed a new factory with Japanese yen 17bln, and started production in March 2007. The JTB's successful investment points in Serbia are as follows;

- The investment climate in Serbia has become better year by year.
- Serbian people are high in quality as human resource, so production activity is possible according to management.
- After risk analysis, strategy was made based on 5-year investigation of the investment climate.
- Marketing targets are not only Serbia, but also neighboring countries.
- A new cigarette factory was built to establish a full-scale production system.
- The project has been promoted by the team consisted of Serbians, Japanese and Americans since opening the local office.

The Serbian government and SIEPA are looking forward to the Japanese investment followed by the JTB. However, the mining sector is still in progress of privatization, and the investment climate is delayed with many legal restriction of the socialism age. Therefore, implementation of the master plan suggested by this study is strongly linked with the foreign investment including Japan.

3.3 World Bank and Internationally Supported Projects

3.3.1 World Bank Projects

The World Bank is supporting financial analysis of the reconstruction plans for RTB Bor and relevant areas, finance for environmental protection, and measures for displaced workers. After the Serbian government accepted the plan in June 2006, a detailed program began.

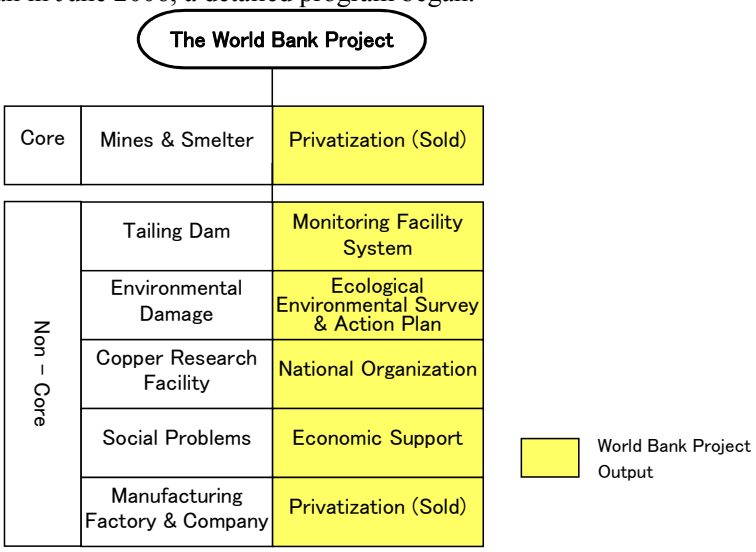


Fig.3.1 The World Bank Project

This plan targets a significant reduction in production due to superannuated facilities and machines, insufficient management and production systems, and lost markets, accumulated deficits (US$ 500 million, as of 2004), contaminated environments, and socio-economic reconstruction of the Bor area. The World Bank program consists of core and non-core parts. The core part is the privatization of the production parts (mines and smelter) of RTB Bor, to be sold by bid tender. The non-core part is the reconstruction of the Copper Institute as a national new organization, analysis of environmental issues (ecological issues) at RTB Bor and vicinity, privatization of manufacturing plants, to be sold by bid tender, and support for economic development of the Bor area. Of these programs, the privatization process of RTB Bor is in the final stage. The privatization of the manufacturing plants was begun in 2005.

3.3.2 International Support

International support for the mining sector has been implemented mainly through the World Bank. The World Bank addresses the privatization of RTB Bor, including investigation of and solutions for environmental and social issues. It also addresses the revision of mining laws, and formulation of mineral laws. Other projects include the monitoring of mineral resources, supported by the Norwegian government, and the building of a GIS database for evaluation of resources, and strengthening of institutes by the EAR. BRGM created a GIS database in 2002, and software was given to the MEM by the UNDP.

3.3.3 EU Fund

The EU Fund is called as IPA (Investment for Pre-accession Assistance), and Serbia has received it to prepare joining the EU since 2001.The EU government has received annually 1.8 million Euros every year from the EU. It is gratis in aid. Annual budget for projects is 5 to 20 million Euros per project, and more than 10 projects have been selected by the Ministry of Finance. Outline of project concept is submitted by each ministry, and is reviewed and investigated by the Ministry of Finance and EU. 4 projects submitted by MEM were selected in 2007, and are now being implemented. They are diminution of exhaust gas from the power plants, supports from the Agency of Energy Coordination, and others. However these projects have not been announced officially. Each project is evaluated by the European Integration Office of the Serbian government, and informed to the EU and Ministry of Finance.

In this year, the mining sector of MEM submitted concept for Agency of Mining to the Ministry of Finance in order to establish this agency. However, projects supporting directly to the mining sector does not come up to purposes of the IPA, and so it is necessary to check the supporting projects to adjust purpose of the EU in the future.

3.4 Mining Policy

A draft for the framework of a Mineral Policy was created by a Canadian mining consultant (John Gamman Associated Inc.) with World Bank support in May 2007. The draft covers the global mining sector managed by the MEM, and linked the national mining policy with a strategic action plan based on Serbian mineral resources. The framework of the policy intends to create a national mining development policy, addressing sustainable development, environmental protection, rural development, and the necessary potential contribution of human and mineral resources to the national economy.

Strategic points in the framework contain the following content;

- Creating a competitive business environment and attracting private sector participation.
- Fostering world-class environmental stewardship and oversight.
- Ensuring beneficial synergies between mining communities and other people.

MEM is currently reviewing the draft of mineral policy, and final agreement is expected to be completed in the first half of 2008 after discussion with mining related people. The Mineral Policy is a document illustrating the general background and framework for formulating policy, by reviewing its current state. However, strategically locating geophysical characteristics, the characteristics of Serbian mineral resources, and the orientation of Serbia in the future, are not fully depicted, and are a task for the future.

This mining policy must be harmonized with national policies, such as the National Economic Development Plan, and others.

3.5 Mining Administration

3.5.1 Ministry of Energy and Mines (MEM) and Ministry of Environmental Protection (MEP)

(1) MEM

The MEM is responsible for the steady fulfillment of mining regulations, and coordinates all mining activities in the country, as shown in the new mining law enacted in 1997. The principal purposes of the MEM are; 1) to take charge of the production of mining, energy, oil and natural gas; 2) to implement detailed geological exploration (excluding ground water), and create annual and medium-term plans; 3) to take charge of the application of laws, such as mining laws, geological exploration laws, and energy laws. The total staff of the MEM is about 70 and its organization is shown at the right.

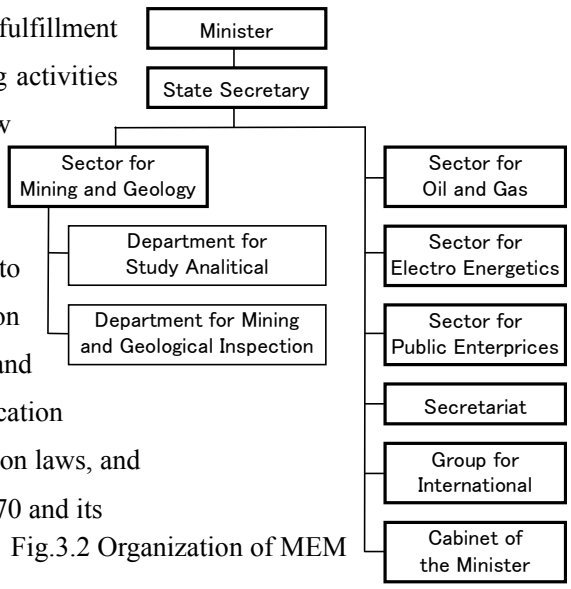


Fig.3.2 Organization of MEM

(2) MEP

The organization of the MEP is shown below, and its main services are as follows;

- Establishment of systems concerning maintenance of natural resources and their continued use, planning and research on programs concerning sustainable use of natural resources
- Establishment of plans for research and basic geological investigation of groundwater resources, and establishment of standards for geologic map making
- Establishment of a system for environmental preservation and improvement
- Warning of environmental pollution accidents and environmental crisis management
- Ionizing and non-ionizing radiation protection
- Chemical substance management
- Waste management
- Control of fishing and hunting
- Management of the protection and conservation of nature in wildlife parks
- Integration with EC and intraregional cooperation with EU
- Environmental inspection and services for pollution control

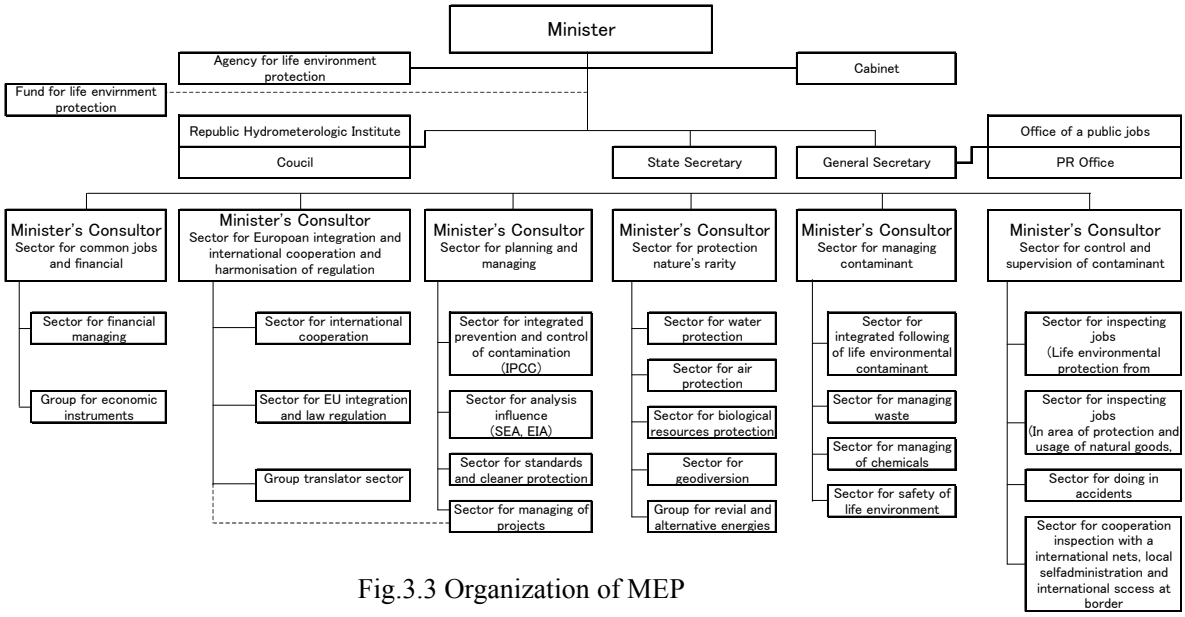


Fig.3.3 Organization of MEP

There are 9 staffs for the SEA and EIA investigation. EIA for more than 100 projects are investigated annually by 7 staffs, and half of them are related to mining.

(3) Geological Institute

The Geological Institute is a governmental organization which merged with the "Geozavod" on September 1, 2006, as an independent institute that doesn't belong to any ministry. The "Geozavod" was established by the government of the Kingdom of Yugoslavia in 1930 as a comprehensive geo- science institute.

On the other hand, the Geological Institute was established by the Government of the

former Federal People's Republic of Yugoslavia in 1948, and after several transformations and reorganizations, it became a scientific and exploration institute under the Ministry for Science, Technologies and Development of the Republic of Serbia in 1994. From 1948 to 1966, the institute was exclusively engaged in uranium exploration. Since 1966, the institute has broadened its activities and is now engaged in all fields of geological and geophysical exploration in the former Yugoslavia and abroad.

The organization of the institute consists of six basic departments (Fig. 3.4).

- Department of Geology
- Department of Mineral Exploration (metallic and non-metallic)
- Department of Hydrogeology and Engineering Geology
- Laboratory Department
- Computer Data Processing
- Drilling Department

There is a total of about 200 staff, including 120 geologists, geophysicists, and chemists. In 2006, the budget was 4 million euros. 86% of the work was done by domestic and overseas companies and public organizations, and the remaining 14% was geological and exploration work by the MEP.

- The main tasks are as follows:
  - Conducting a baseline survey under the City of Belgrade (surface stability survey for the construction of buildings, roads and underground structures)
  - Investigating cement deposits
  - Formulating and implementing exploration plans for small-scale mineral resources (metallic and non-metallic)
  - Conducting underwater exploration and work
  - Undertaking international projects in Libya, Iran, Egypt, Turkey, Mozambique, and Guyana
  - Implementing geological mapping and mineral exploration in Libya since 1974
  - Investigating and developing zeolite resources

Because utilities from MEP reduced and became an open tender, it become business chance for the institute to obtain public utilities from other governmental and municipal authorities. Even though it is a governmental organization, the Geological Institute has been well run independently. The institute takes on the character of a survey consultant company rather than a governmental organization. Therefore, the role of the institute should be reconsidered as a governmental organization.

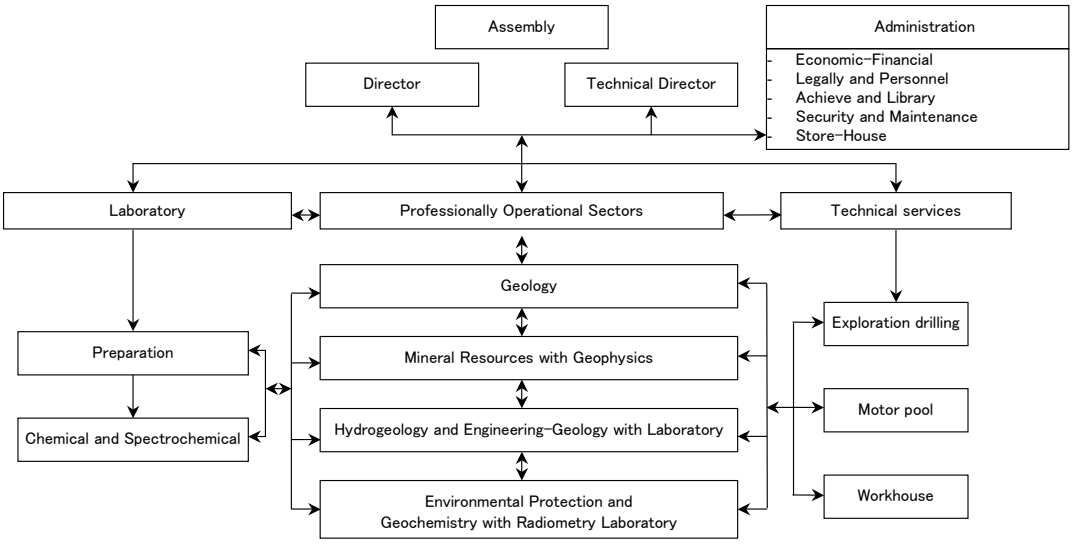


Fig. 3.4 Organization of the Geological Institute

(4) Mining Institute

The Mining Institute in Belgrade was established in 1960 by the government and a group of mining companies with the purpose to create a leading organization designed to introduce the newest methods and technologies to the Yugoslav mining industry, by means of extensive research and transfer of knowledge and experience, and with a view to provide optimum safety at work and environmental protection.

The activities and development of the Institute have been conducted in following two principal trends;

(1) Research, fundamental and applied investigations in the field of technical, technological and natural sciences being directly or indirectly related to the mining industry and mining technologies. Fundamental investigations mainly consist of theoretical and experimental research (laboratory/pilot and industrial scale) with a purpose to gain new knowledge and information to be applied in determined professional field.

(2) Design and process engineering enable the Institute to use and employ recent technological solutions and to be permanently involved in resolving different kinds of problems in the field of the mining industry in developing new mines, or rehabilitating/updating existing mines. These solutions exposed in techno-economical studies or in other forms of investment and technical documentation principally are based on the Institute's own research and investigation.

The Institute operates as an independent enterprise, and was recognized as an institution for research and investigation, based on the resolution issued by the ministry of Science and Technology. It is provided with necessary specialists and staff, equipment and facilities.

The Institute conducts research, fundamental and applied investigations in laboratory, pilot

plant and industrial scale, particularly in;

- Evaluation and development of new technological and technical solutions in exploitation of solid minerals (coal, metals and non-metals), by open pit and underground exploitation methods, which include:
    - ✓ Study and determination of factors causing sliding at open pit mines and waste dumps and adequate reclamation solutions
    - ✓ Study of optimal exploitation conditions and disposal of waste materials in open pit mines by application of recent technologies
    - ✓ Geological and mining modeling of deposits
    - ✓ Selection and modeling of optimal excavation methods
    - ✓ Optimization of production capacity
- Research, laboratory, pilot plant and industrial tests in the field of mineral and coal processing and concentration of solid minerals:
    - ✓ Non-ferrous ores
    - ✓ Iron ores
    - ✓ Non-metallic ores
    - ✓ Coal preparation, cleaning, drying, briquetting
- Investigation works including programming and interpretation of results in the field of hydrology, geology, geo-technics, soil mechanics, etc.
- Rational energy consumption problems and substitution of fuels
- Solution for pollution problems and environmental protection/reclamation, waste waters and air pollution
- Waste treatment plants
- Waste waters treatment plant

Design and process engineering particularly in:

Reports on expert opinion, evaluation and investigation; preliminary, technical and economical reports; designs and other investment and technical documentation; supervision of erection works, installation of equipment; putting into operation, consultations regarding development concepts, designing and tender documentation, etc.

Therefore, engineering activities carried out by the Institute cover:

- Development, planning, preliminary, technical and feasibility studies and reports as well as preliminary and detailed design for open pit exploitation of soil minerals
- Development, planning, preliminary, technical and feasibility studies and reports as well as preliminary and detailed design for underground exploitation of solid minerals
- Optimization of mine production schedules and mine planning
- Preliminary and detailed designs of technological processes and plans for preparation and

concentration of solid minerals

- Studies and designs for de-dusting in industrial plants, mines, iron works, cement mills, etc.
- Studies and designs for ventilation, heating and air-conditioning in industrial plants
- Studies and designs for air pollution in industrial plants and urban settlements, monitoring, control and technical solutions
- Analysis of mechanical equipment in thermal power stations, guarantee tests of thermal power equipment and normative testing of thermal power equipment
- Computer processing of hydro-geological parameters and control of underground water level changes
- Computer deposit processing with computation of masses and quality per bench and mapping
- Preparation of tender documentation and validation of foreign design; participation in selection and acquisition of domestic and foreign equipment
- Supervision of erection and installation of equipment
- Commissioning of revitalization and modernization of existing plants and facilities
- Putting into operation and running-in the technological process and plant designed either by the Institute or other companies
- Control of technological process in an industrial plant
- Consultancy services and project management
- Organization and mediation in construction, supply and installation of equipment, engineering services

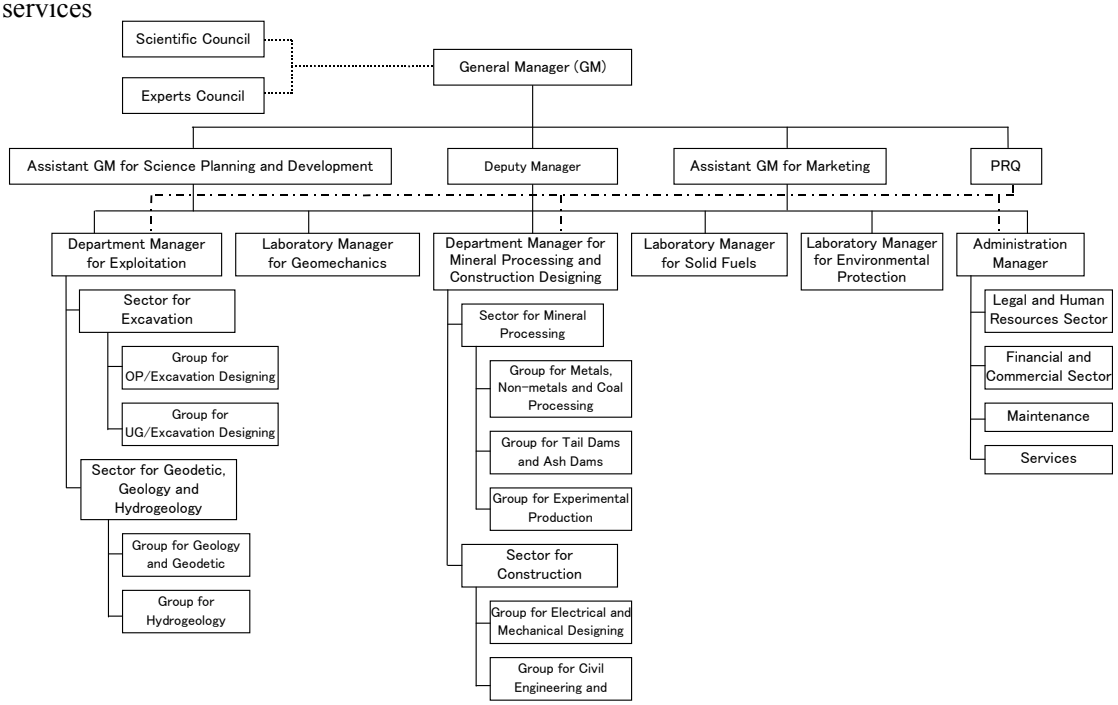


Fig.3.5 Organization of the Mining Institute

Its order volume was about Euro 1 million in 2006, and most work was coal mining

related. The main clients of the Institute are the electrical power companies's captive lignite and it has carried out only a little metal mining related work. With a total staff of 97 professional engineers the institute consists 6 departments as shown Fig.3.5.

Apart from its domestic mining related activities the institute has also done mining work abroad in more than 10 countries like Czech, Myanmar, Germany, Macedonia, etc.

(5) Reserves Verification Commission

The Reserves Verification Commission is a national organization whose purpose is to verify mineral resource reserve reports submitted to the MEM by mining and exploration companies, and to register the reserves with the government. Membership is determined by the Ministry of Energy and Mines according to geological exploration laws. Members serve for one year terms, but these terms are commonly extended for several years.

The commission is basically composed of five members, including three core members (three geologists), another geologist, and a mining engineer. Until the 1980's, the commission was comprised of nine members: four geologists and five mining engineers. Now, core members include a professor of Mining and Geology from the University of Belgrade, a chairman, and two geologist officers from the MEM. Two additional members are selected, one each from the University of Belgrade and the MEM.

- Mining and exploration companies report mineral resource reserves every 5 years.
- A report on mineral resource reserves should be prepared by a licensed project organization.
- Licensed project organization regarding a report on mineral resource reserves is an institute or a private company including mining company, prospecting company and consultant company which must engage two specialists in minimum of geologists, mining engineers and doctors. The institute or the company should have a certificate from Serbian Business Registers Agency for mining activity and geological activity.
- Criteria for verifying reports on mineral resource reserves are made available.
- Verification results are classified into good, revised, and failed.
- Commission meetings are held almost each month usually at least 10 commissions per year, only Vojvodina commissions are held every 3-4 months.
- At each meeting, six or eight petroleum, coal, metal and nonmetal deposits are discussed. Common deposit types are lead, zinc, marble, limestone, and building stone.
- The writers of the reports on mineral resource reserves are involved in the discussions.
- The contents of mineral resource reserve reports are published according to regulations.
- The latest chemical analysis values and latest data should be included in the reports.
- The latest underground maps should be used as the basis for interpreting survey data.
- Previous and current exploration results, an additional exploration policy, a specific

exploration plan, and a planning map are needed.

- The economic value of ore deposits, and the values of ore based on a market economy, will be calculated.
- In the cases of report modification or failure after discussions, the report will be resubmitted 6 months later, and one year later, respectively.

However, even in the case of failure, the present exploration and subsequent exploitation plans can still be carried out.

(6) Other Organizations

In addition to the organizations mentioned above is the Copper Institute at RTB Bor. Mining administration must be reviewed comprehensively with a view to transfer the management of mining to the private sector, and homogeneous functional reorganization is necessary to establish the Mining Agency as defined by mining law.

3.6 The Mining Law and Procedures for Mining Licenses

3.6.1 The Mining Law and Issues

Serbia has mining laws and geological exploration laws. The former were revised partially (new mining laws) in April 2006 with World Bank support. There is no major difference between these laws, except for the establishment of a Mining Agency and provision of royalties. There is no procedure to transfer mining rights to third parties, nor a procedure to transfer rights through privatization.

The geological exploration laws define the conditions and methods for geological exploration, payments for information provided to the MEM (5% of exploration costs), and reporting on exploration results. Some national management of exploration still remains from the socialism era. Both laws have barriers to free exploration and mining activities in a market economy, and need basic amendments. Both laws are written in the Serbian language, which may be barrier to attracting foreign investors.

3.6.2 Acquisition of Mining Rights

The maximum area for exploration is 50km^2 and exploration is permitted for one year. After exploration results are submitted, and a new application excluding unpromising areas is approved, another year is permitted for exploration. Exploration rights are thus basically annual.

Although the procedures for obtaining exploration licenses take about 2 weeks to 1 month, it takes about 1 year to actually acquire an exploration license, including the study time for the reports. Moreover, there are many issues, such as lack of disclosure of concession maps, overly complicated procedures, and unclear exploration periods, which are barriers to promoting exploration activities. It is thus necessary to establish an office or company to issue exploration

licenses.

To obtain exploitation licenses, it is necessary to calculate Category A, B or C1 reserves after detailed exploration and to acquire a certification of reserves of mineral resources from the Reserves Verification Commission. It is also necessary to get approval for the mining exploitation project and to include measures to protect agriculture, forests, water, and the environment from the relevant departments of the Ministry of Agriculture, Forestry, and Water Management and the MEP. This matter will be improved in the draft of the Mining Law which was materialized by the World Bank.

3.6.3 Procedures and Issues for Geological Exploration Rights

The procedure for acquiring exploration rights are based on the Law on Geological Exploration, as follows:

(1) Procedure for Acquiring Geological Exploration Rights

1) Procedure for Acquiring Rights

1. Inspection of the cadastral conditions of the proposed exploration area

   Applicants for exploration licenses apply to the MEM for confirmation of the cadastral conditions of existing licensed areas. However, foreign investors must establish and register a domestic company in Serbia, and the Serbian company submits the application. The application fee is 1,500 Dinars (€ 20).

   The Mining and Geology Division of the MEM will inform the applicant of the cadastral conditions within 60 days after the application date.

2. Preparation of a geological exploration plan

   A geological exploration plan shall be prepared by a licensed project organization. The content of the plan shall be determined according to Serbian laws and regulations. The plan must include a 1:25,000 topographic map with coordinates representing the exploration license area, the technical project on geology and exploration, and financial information for the geological exploration.

3. Obtaining permission for geological exploration from related ministries and organizations

   In cases where an exploration site comes into conflict with laws and/or regulations, the MEP, the Nature Protection Institute, the Institute for Protection of Cultural Monuments, and national and municipal authorities determine the requirements for geological exploration in protected areas. Applicants for exploration licenses must obtain the permission of these organizations to conduct geological exploration.

4. Technical review of the project by another licensed organization

   The geological exploration project shall undergo a technical review by another licensed organization.

5. Submission of a geological exploration plan

The license application shall be submitted to the MEM along with a geological exploration plan. The fee is 33,000 Dinars (€ 400).

6. Approval of geological exploration rights

Geological exploration rights are approved and issued by the MEM. The time until approval is 60 days from the date the application is officially received. In cases where two or more companies apply for geological exploration licenses in the same area, the company that proposes the best conditions for the terminal stage of exploration, best price, and other conditions will be favored. However, the final decision will be made by the MEM.

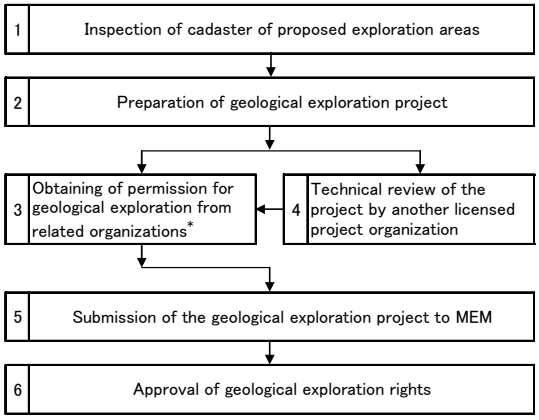


Fig.3.6 Flowchart for Obtaining Geological Exploration Rights

2) Issues

The following are issues associated with acquiring geological exploration rights:

- Before applying to the MEM for a geological exploration license, a plan for the geological exploration project should be prepared in detail. If the exploration site is in a protected natural or cultural area, the applicant should obtain the permission of the MEP, the Institute for Protection of Cultural Monuments, and municipal authorities. Also, a separate licensed organization should undertake a technical review of the geological exploration project. The applicant can expect these procedures to take one year.
- In reality, it takes the MEM three or four months to investigate a project.
- After obtaining geological exploration rights, a mining rights holder should submit three quarterly-reports and one annual report on the geological exploration results at each licensed area for each year. The preparation of quarterly-reports imposes a burden on the geologists of the project, making it difficult for them to concentrate their energy on exploration work.
- Exploration rights are good for one year. After geological exploration, unpromising regions should be removed from the exploration area. Geological exploration rights can be extended for one year. Therefore, the procedure for acquiring concessions takes a great deal

of time.

- Because cadastral maps of existing concessions are not made available, it is necessary to confirm whether or not concessions exist in the proposed area, before preparing a detailed project and applying for rights.
- Because geological exploration rights are non-transferable, exploration in Serbia is highly risky for European and American subsidiary companies.

(2) Verification of Mineral Reserves and Acquisition of Certification of Mineral Resources

1. Notice of commencement on geological exploration work

The license holder (company) shall give notice of commencement of geological exploration work to the MEM, the municipal authorities concerned with the exploration area, and nature protection organizations not later than 15 days before the beginning of geological exploration.

2. Execution of detailed geological exploration

Geological exploration will be executed based on the geological plan. Sampling is carried out to confirm and category A and B mineral deposits.

3. Preparation of reports on the geological exploration results

Reports on the geological exploration results will be prepared by a registered company or a licensed project organization. Three quarterly reports and one annual report on the geological exploration will be submitted to the MEM. The contents of the reports will be made on the basis of regulations.

4. Technical review of the report on exploration results

A technical review of each report on exploration shall be made by another licensed organization independent of the company or organization that planned the project.

5. Preparation of reserve studies of mineral resources

Reserve studies of mineral resources shall be evaluated by a registered company (licensed organization). The content of the studies will be made on the basis of the Law on geological exploration and rules on classification and category.

6. Submission of reports on reserve studies of mineral resources

The geological exploration license holder must submit a report on the reserve study to the MEM.

7. Review of the reserve study

A technical review of the report on reserve study will be made by two reviewers. One reviewer must hold at least a B. Sc. degree in Geology, with a specialization in mineral exploration and the other reviewer must hold at least a B. Sc. degree in Mining. The two reviewers are appointed by the MEM, and they must submit a report on the review to the Reserves Verification Commission.

8. Oral explanation of the reserve study at the Commission for Verification of Reserves

The geological exploration license holder must make an oral explanation about the reserve study to the Reserves Verification Commission. The Reserves Verification Commission will then decide to accept, modify or reject the results of the reserve evaluations. In the case of modification, the reserve study shall be resubmitted by a specified deadline.

9. Issuance of certification on reserves of mineral resources

The Reserves Verification Commission will issue the geological exploration license holder a certification of reserves of mineral resources. Certifications of reserves are good for five years. A certification of reserves is needed to apply for a mineral exploitation license

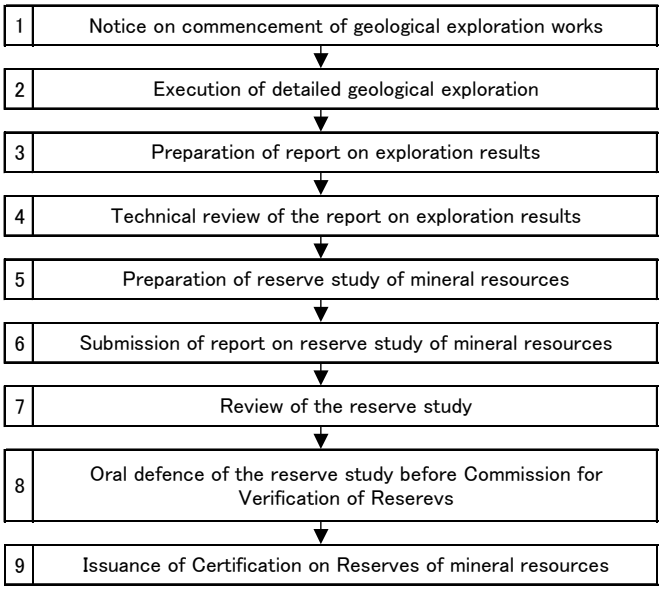


Fig. 3.7 Flowchart for the Verification of Mineral Reserves and Acquisition of Certification of Mineral Resources

(3) Acquisition of Mineral Exploitation Licenses

1. Preparation of plans for mining projects

A company that seeks to develop a mine must prepare a mining project plan and submit it to MEM. The plan must include a 5-year exploitation project, as well as means of procuring financing, based on the regulations governing feasibility studies of mineral deposits and raw materials.

2. Technical review of the mining exploitation project

Another licensed organization will review the mining exploitation project.

3. Obtaining approval from the relevant ministries

The company shall obtain authorization for mineral exploitation projects that include protection of agriculture, forests, water, and the environment from the relevant departments of the Ministry of Agriculture, Forestry, and Water Management and the MEP.

4. Application for mineral exploitation licenses

The company must submit the prescribed application form to the MEM to obtain a mineral exploitation license. The fee is 66,300 Dinars (€ 840).

5. Obtaining an exploitation license

After receiving the application form, a mineral exploitation license will be issued within 60 days.

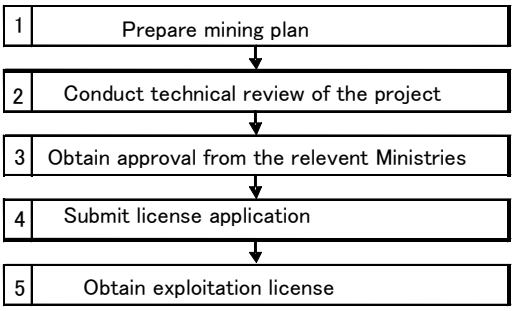


Fig.3.8 Flowchart for Obtaining a Mineral Exploitation License

(4) Obligations and Implementation of Mineral Resource Exploitation

1. Technical supervision, preparation, and maintenance of geological documents

A company that seeks to implement a project shall prepare, supervise, and maintain the relevant geological documents.

2. Creation of an ore reserve table

The company shall create an ore reserve table

3. Implementation of geological exploration and exploitation

The company undertakes geological exploration and mining operations.

4. Submission of a reserve study to the Reserves Verification Commission

The mining company shall submit a report on a reserve study conducted by a registered company to the Reserves Verification Commission every 5 years.

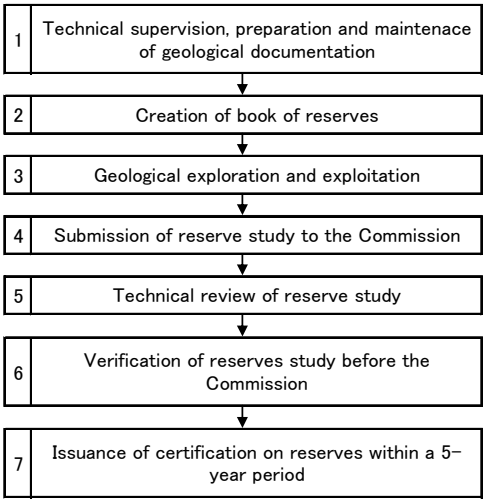


Fig.3.9 Flowchart of Obligations and Execution of Mineral Resource Exploitation

5. Technical reviews of the reserve study

The report on the reserve study shall be investigated by two reviewers who are appointed by the MEM, as described earlier.

6. Oral explanation of the reserve study to the Reserves Verification Commission

The geological exploration license holder will make an oral explanation about the reserve study to the Reserves Verification Commission.

7. Issuance of certification of reserves

The Commission for Verification of Reserves will issue the geological exploration license holder a certification of reserves of mineral resources that is good for 5 years.

(5) Issues

- Before obtaining a mineral exploitation license, the license holder shall acquire a certification of reserves of mineral resources.
- The acquisition of a certification of reserves involves a lot of procedures, such as obtaining the MEM's approval and execution of a detailed geological project, reviewing a report of exploration results by another licensed organization, and submitting geological and exploration documents to the Reserves Verification Commission for examination. Thus, exploration activity and evaluation of mineral reserves are under government control.
- Every 5 years, the license holder will prepare the above-mentioned documents, and submit them to the MEM. The holder should be undertaking exploration activity, and reporting it to the government.

The above matter imposes an undue burden on the license holder, so a simpler procedure is needed. The matter is a stumbling block to promotion of exploration and exploitation. The Serbian government is advancing privatization, but it plays a major role in the acquisition of mining licenses. This has a negative effect on attracting foreign capital.

3.6.4 Mining Law

There are not large differences between the old Mining Law and current Mining Law revised in May 2006, except regulation of royalty rates and establishment of the Mining Agency. A German consultant (Bergassesor Dipl-Ing) made a draft for the completely new Mining Law under supports of the World Bank. The study team had meeting with this consultant and confirmed that it was changed basically from the current Mining Law to the international standard law.

This draft of the Mining Law will be provided to people related the mining industry, revised based on their comments, and presented to the parliament after authorization of the MEM and government to be acknowledged. It may be enacted March to May 2008, if all goes smoothly.

However, as people who will be provided by the draft have acquainted themselves with the old Mining Law, and have little experience of mining activities and management under the international standard mining law, there is a concern that the draft of the Mining Law would approach to the old Mining Law. So far unfortunately there has not been a conversation between the German consultant and the mining associated people. Therefore, they must understand the international standard mining law through sufficient conversation in the future.

3.6.5 Compilation of Digital Spatial Datasets and Information Disclosure

In 2001, the MEM created a text-based mineral resource database and GIS spatial datasets through a project supported by the Bureau of Geological and Mining Research, France (BRGM). In 2002 a capacity building project was created by the United Nations Development Programme (UNDP) to implement GIS software and training. Then, the MEM constructed a database for information related to mining licensed areas, and has now started to manage GIS spatial datasets such as mining license areas, mineral deposits and occurrences, abandoned mines and their reasons for abandonment, tailing dam sites and infrastructural datasets through voluntary projects. However, a part of the fundamental information, such as geological datasets is missing, because of a lack of communication between the MEM and the Geological Institute regarding data sharing. This communication needs improvement.

The present MEM website provides information, such as government announcements, mining policies, mining laws and related regulations, taxes, organizations, a list of active state/private companies. The content is revised and updated frequently and seems to show a commitment to utilize the website effectively. On the other hand, some important information, such as mining laws and related regulations are simply shown on the page without any instructions for clients. Thus, it can be said that there is a lack of user's perspective. Furthermore, there are no spatial datasets, for instance geology or distribution of ore deposits. Although translation to English is said to be in progress, and the frame windows for future English content are already shown, progress seems to have stalled. The MEM-DGM developed a pilot system of web-GIS for mining licensed areas and other spatial information. But due to a governmental budget shortage, there was no web server installed, a lack of spatial datasets, need for coordinate conversion to the WGS84 world standard coordinate system, and need for further development of additional web site functions, that information has still not been made available on the Internet.

The MEP has fundamental databases for environmental monitoring and underground water development. On the other hand, the MEP started a three–year project called "The Geological Information System of Serbia", or GEOLISS from 2004, to design a database structure for future geological information, with financing of Euro 125,000, and faculty from the Mining and Geology department at the University of Belgrade. Furthermore, the MEP started to forecast geology and mineral resource potential areas, and to construct a database of mineral deposits and occurrences in a five-year project (from 2006 to 2010) in cooperation with the faculty of the Mining and Geology department at the University of Belgrade and the Geological Institute. Based on this, the MEP plans to establish mid and long-term geological exploration strategies.

The Geological Institute has produced geological maps, hydro-geological maps, and other maps with the scales from 1:50,000 to 1:2,000,000 in Serbian territory. Especially for 1:50,000 scale geological maps, the Geological Institute started to create GIS datasets based on the GEOLISS database structure. However, the process of converting geological information to GIS datasets is

moving slowly at the present time, because of a lack of budget for field surveys, and there is some dissatisfaction with the current situation.

The databases for "mineral deposits" and "mining districts" of Serbia which were constructed by the Bureau of Geological and Mining Research, France (hereinafter, BRGM) and the DMG in the MEM in 2002~~1~~ were provided to the JICA Study Team from the BRGM. The content is analyzed to pick up issues and things which shall be improved. The website for the DMG was constructed, making a flow-chart of mining license application procedure, introducing the international aid organizations' activities and designing a download function for reports by this research in English and Serbian language. A web-GIS database which is able to provide spatial information such as a current mining license and mineral resource information, and geological maps and satellite imagery, has developed, confiding the local consultant. The site is expected to be opened until the end of January 2008. On the other hand, the results derived from the GEOLISS and the related projects such as "a compilation of mineral resource information of mineral deposits and occurrences" and "Metallogenetic and Minerallogenetic Geological Economic Estimation", will be a backbone for mineral resource information archive in Serbia, and their proceedings are evaluated and considered on future usage approaches and are incorporated into the MP.

3.7 Mining Activities

3.7.1 Foreign Investor Activities

So far, 104 exploration licenses have been issued. About 90% of these are non-metallic, and 10% are metallic. Gold exploration is being carried out by Canadian companies Ivanhoe and Dundee. Rio Tinto is exploring for borate. The targets of Phelps Dodge are gold and copper. Non-metallic targets, which include groundwater, limestone, and quarrying, can be exploited on a small scale, so they are mined actively and mainly by Serbian companies. However, metallic exploration demands greater investments of capital and time, requiring foreign investors. But currently there are not many foreign investors in Serbia.

After negotiation with MEM in 2006, Rio Tinto took a concession for borate deposit which assures 5 years exploration and 25 years exploitation. Each contract with individual companies like this should have transparency based on the Mining Law.

Rio Tinto discovered borate deposits in the Neogene Jarandol Basin. The current reserves are believed to be around 7.5 million tons, and Rio Tinto will carry out further exploration in the area. It has been estimated that a total investment on the order of €140 million will be needed to establish a mine and processing plant to produce between 30,000 and 100,000tpy of refined boric acid. Once established, this mine will employ 600-700 people.

It was recently announced that Dundee Precious Metals, a Canadian company, has taken exploration concessions for 153km^2 in areas situated northwest and west of Bor.

3.7.2 Current Status of Mining Concessions

A list of mining concessions, including geological exploration rights, exploitation rights, names of license holders, administrative districts, areas, kinds of ore, and stages of exploration or exploitation, has not been made available. However, companies implementing detailed geological investigations in 2006, based on MEM data.

- A total of 104 companies conducted detailed geological investigations. These investigations were: 46 water (mineral water), 24 limestone, 14 quarry, 8 brick, 5 gold (silver and copper), 2 lead & zinc, one iron, one boron, 2 oil, one clay.
- The 5 companies that investigated gold were: Balkan Mineral Exploration, CMR Balkan, Dundee Precious Metals, South European Exploration, and South Danube Metals.
- The Grot and Suva Ruda mines were the two companies that investigated lead & zinc.
- Metalfeer investigated iron.

3.7.3 Metal Deposit Exploration Activity

Exploration activity is mainly conducted by Canadain, USA, and UK exploration and mining companies that are prospecting epithermal gold deposits.

- Hereward Venture (Target: Gold)

Hereward Venture had formed a joint exploration project with Ivanhoe Mines at the Lece mine. The company carried out a pre-feasibility study. After that, Dundee Precious Metals bought Hereward Venture.

- Dundee Precious Metals (Target: epithermal gold)

This is a Canadian junior company that is currently conducting three geological explorations:

1. West of the Timok magmatic complex zone,
2. Around the Lece mine, and
3. Near the Grot mine.

West of the Timok magmatic complex zone and west to northwest of the Bor mine is an area where geological exploration has been started in three sectors, Coka Kuruga, Coka Kupjatra and Tilva Njagra, which cover an area of 153 km^2. Diamond drilling for 40,000m, trenching for 18,000m, geochemical work and aero-electromagnetic survey were implemented in 2007. Consequently, porphyry style copper-gold-molybdenum mineralization and high-sulfide type gold-(copper) mineralization were discovered. Specifically, mineralization for the former consisted of geophysical anomalies of 1.5km long overlapping with geochemical anomalies. In stockwork silicified zone, copper-gold mineralization of 101m length with 1.0g/t Au, 0.81% Cu, and 81m length with 0.89g/t Au, 0.76% Cu was found. Specifically, confirmed mineralization for the latter consisted of gold mineralization of 51m length with 1.58g/t Au and 21m length with 2.38g/t Au, and it is clear that

gold mineralization occurs along the intersection of the NW and ENE structures.

In the Surdulica area which is located 20km north of the Grot mine, geochemical surveys of stream sediments and soil and ground magnetic surveys were conducted to target molybdenum porphyry mineralization in dacite. Drilling surveys to confirm mineralization have been conducted in the mined areas of the Mackatica mine and the Borovik prospect where molybdenum ore had been extracted during the Second World War. Drilling resulted in confirmation such as mineralization of 37m length with 0.106% Mo and 21m length with 0.114% Mo. Total length of 20,000m drilling work was undertaken in 2007. According to old records, reserves of B1+C1+C2 category amounted to 121 million tonnes with 0.06% Mo. In the concentrate record, molybdenum concentrate grade ranged from 30% to 50%, including from 150g/t to180g/t rhenium.

- Dinara Nickel (Target: Nickel)

The company is subsidiary of London-based Europe Nickel. The company targets nickel in ophiolite zones. However, due to environmental concerns, it did not explore. Instead, it moved to Albania to undertake drilling work.

- South Danube Metals (Target: Gold and Copper)

The company is a subsidiary of Euromax Resources, a Canadian junior company. It carried out geological survey in the northwest area of the Suva Ruda mine.

- Rio Save Exploration (Target: Boron)

The company is a subsidiary of Rio Tinto. It has contracted with the MEM for a concession which includes a 5-year geological survey and a 25-year mining project near the Ibarski coal mine in Jarandol basin, which is located near Raska in central Serbia.

- South European Exploration (Target: Epithermal Gold)

The company is a subsidiary of Canadian junior company, Reservoir Capital. It has six geological licenses, one each in the Zajaca, Plavkovo, Lece, Zlot-Brestovac, Deli Jovan and Stara Planina areas.

The Zajaca concession is located In the Boran area (antimony ore field) of northwestern Serbia. It is a 28km^2 area concession. Geochemical prospecting revealed the existence of gold mineralization, similar to Carlin-type, occurring near carbonate rocks and granitic rocks.

The Plavkovo concession is situated in a 10km area south of the Suva Ruda mine in the southwest of Serbia. Hydrothermal alteration is widely developed there in andesite and pyroclastic rocks of the Miocene. Silica-alunite cap was discovered in one sector, showing a good correspondence with geochemical and geophysical results. Three holes will be drilled with lengths of 200m to 250m.

The Lece concession area is located adjacent to the western boundary of the Lece mine in southern Serbia. The area contains andesite and pyroclastic rocks of the Miocene Epoch. There are two types of mineralization: lead & zinc mineralization with gold, and gold and silicification. A

300m hole has already been drilled, and the company plans further drilling of 300m.

The Zlot-Brestovac concession is located to the south of the Bor open pit. The company is targeting low-sulfidication epithermal gold deposits. Plans call for two holes to be drilled in 2007: one 450m, and the other one 500m.

At an old adit of Deli Jovan in the south-eastern part of the Bor open pit, gold mineralization of 150 g/t Au has been confirmed.

The Stara Planina concession is close to the Bulgarian border and south of the Grot mine. Two types of mineralization have been confirmed: quartz-sulfide type mineralization, and Cu-Mo mineralization (porphyry copper deposit), both in granodiorite.

- Bosilmetal (Target: Lead and Zinc)

The company has geological licence for geological exploration in Karamanica, which is near Grot mine.

3.7.4 Mining Activity in Regions and Provinces (the Vojvodina Autonomous Region)

The Vojvodina Autonomous Region is potential area for oil and coal, and also it has their production activities. In addition, there are mining activities of limestone and quarries, so the regional government has the Mineral Resources Department which employs experts including geological engineer and others as its staffs. Mining activities are managed under the current Mining Law and environmental related laws in close relationship between the central and regional governments. Application for a mineral survey in the region must be firstly submitted to the central government (MEM) to attain its certificate. An expert of the regional government joins the survey. The expert also joins inspections of MEM in the region. According to the draft of the Mining Law, opinions and intentions of the Vojvodina Autonomous Region will be reflected on the decisions of the central government by the demand from MEM. On contrary, there is no supports to the region from the central government.

3.7.5 Medium-Term Mine Plans

There are neither long-term plans nor reconstruction plans for medium/small mines, with the exception of RTB Bor. RTB Bor created a 20-year long-term plan in 1999, and a 6-year medium-term plan for the Veliki Krivelj Mine in 1999. Majdanpek created a 14-year long-term plan in 1999, and revised it in 2004 and again in 2006. In these plans, annual investment, profitability, and improvements to production are discussed, based on a production schedule and financial analysis. However, the plans to reconstruct RTB Bor were unrealistic, resulting in deviation between the plan and the implementation due to shortage of funds. Medium/small mines have concentrated on immediate management, because their production dropped due to post-1990s internal conflicts. They have not been able to afford to prepare long/medium plans. Also, mine management based on a

self-managed model has not harmonized with the market economy, and there is lack of staff to create plans. The privatized Rudnik Mine is preparing a long/medium plan, but this is currently still very general in scope. The Zajaca Mine (Sb), which was privatized in March 2006, intends to create an action plan including long/medium plans in 2007.

3.7.6 Mining Technology

Mines and institutes have not invested in developing mining technology due to domestic confusion and the battered post-1990s economy. Serbia has full basic technologies, including exploration, mining, ore-processing, and smelting. However, the specific technologies that form the mining industry have not advanced efficiently due to socialist-era mine management. For example, the transportation systems from mines to ore-processing facilities are inefficient because the corresponding equipment has different capacities. Also, there is no consideration for systemization of layout, such as the location of the plant and underground structures. Exploration work is also inefficient due to lack of technical development in systemization. Therefore, it is indispensable for each mine and smelter after privatization to study an effective production system as well as renovation of facilities and machines.

3.8 Geology and Mineral Potential in Serbia

3.8.1 Geology of Serbia and Southeastern Europe

The geology of Southeastern Europe is composed of the Variscan shield in Meso-Europe in the European tectonic province, the Alpine orogenic belt in Neo-Europe, and sedimentary basins. The major physical divisions of Serbia include the mountainous Carpathians, Balkanides, Dinarides, and Hellenides of the Alpine orogenic belt, and the Pannonian Basin.

The Carpathians and Balkanides cover eastern Serbia. They are mainly composed of Late Paleozoic and Mesozoic sedimentary rocks underlain by Precambrian – Early Paleozoic metamorphic and granitic rocks. Intermediate and acidic volcanic activities are known to have occurred in this area during the Late Cretaceous and Paleogene periods.

The Dinarides and Hellenides are widely distributed in western and southern Serbia. They are composed of Precambrian metamorphic rocks, Paleozoic sedimentary rocks, and Mesozoic sedimentary and volcanic rocks. These orogenic belts are characterized by ophiolite formations composed of volcanics and ultra-basic rocks of the Jurassic to Early-Cretaceous periods. The Pannonian Basin covers northern Serbia, Hungary, and Romania, and it consists of Late Neogene sediments.

3.8.2 Metallogenic Province of Serbia

Serbia has high potential for metal resources in Europe, and various types of deposits have

formed through various geological ages. The metallogenic provinces of Serbia from east to west are divided into the Dacian, Carpatho-Balkanian, Serbo-Macedonian and Dinaric provinces.

An extremely small area in the far northeastern part of Serbia is included in the Dacian metallogenic province, but it will not be considered in this paper. The Carpatho-Balkanian metallogenic province occupies the eastern part of Serbia, and it extends northward to Romania and southeastward to Bulgaria. The Carpatho-Balkanian metallogenic province is divided into the Caledonian, Hercynian, Early Alpine, and Alpine metallogenic epochs. Ore deposits that formed there in the Caledonian metallogenic epoch include volcano-sedimentary iron deposits. In the Hercynian metallogenic epoch, various types of deposits, such as skarn iron, gold, and lead and zinc, were formed. Sedimentary iron and chromium deposits formed in the Early Alpine epoch. Ore deposits from the Alpine epoch occur in the Ridanj-Krepoljin and Bor zones. The Ridanj-Krepoljin zone contains deposits of skarn iron, skarn lead and zinc, hydrothermal lead and zinc and sedimentary copper. Porphyry copper and molybdenum deposits, massive copper sulfide deposits and copper and gold vein-type deposits formed in the Bor zone.

Table 3.2 Ore Deposits and Metallogenesis in Serbia

Geochronology	Age (Ma)	Major metals	Type	Magma complex	Tectonic environment
Neogene	30 - 5	Pb-Zn Sb Cu, Mo	Skarn Hydrothermal Porphyry	Granodiorite Volcanic - intrusive complex	Regional fracture zone
Cretaceous to Paleogene	100 - 50	Cu, Mo, Pb-Zn, Fe	Porphyry Vein, skarn	Volcanic - intrusive complex	Global rift
Jurassic	170 - 150	Cu Cr, Ni	Massive Magmatic	Ophiolite complex	Oceanic crust
Middle Jurassic	220 - 200	Zn, Cu Mn Pb, Zn, Cu	Massive Stratiform Hydrothermal	Basaltic magma	Graven
Carboniferous to Permian	350 - 250	W, Au U, Fe	Skarn Hydrothermal	Granitic complex	Orogeny?
Devonian	400	Fe, Mn	Volcano- sedimentary		Rifting?

The Serbo-Macedonian metallogenic province and the Carpatho-Balkanian metallogenic province occupy the central part of Serbia, and are divided into the Caledonian, Hercynian, Early Alpine and Alpine metallogenic epochs. Magnetite deposits accompanying crystalline schists were formed in the Caledonian metallogenic epoch. A few uranium deposits in pegmatite were formed in the Hercynian epoch. In the Early Alpine epoch, volcanic antimony deposits, lead and zinc deposits, and chromium deposits accompanying ophiolite were formed. The important lead and zinc deposits and antimony deposits in Serbia originated in the Alpine epoch, and they are widely distributed with Late Cretaceous granitic rocks. Antimony and lead and zinc deposits are associated with Tertiary granodiorite.

In the Dinaric metallogenic province, ore deposits were formed in the Early Alpine metallogenic epoch. Typical deposits are chromium and nickel deposits accompanied by mafic to ultra-mafic complexes, and residual deposits derived from these.

Detailed information on each metallogenic province in Serbia is from Jankovic et al. (2003). The Carpatho-Balkanian metallogenic province is composed of the Ridanj-Krepoljin zone (Fe, Pb, Zn, Cu), Neresnica-Bbeljanica metallogenic zone (Fe, Mn, Au, W), Bor metallogenic zone (Cu, Mo, Au, Pb, Zn), Porec-Stara Planina metallogenic zone (Fe, Au, Cr), and Stara Planina district (U, Au). The Bor metallogenic zone, which is also called the Timok magmatic complex zone, is a typical mineralized zone in Serbia.

The Serbo-Macedonian metallogenic province consists of the Sumadija metallogenic zone (Pb, Zn, U, Ni), Kopaonik metallogenic zone (Pb, Zn, Ag), Lece-Halkidik zone (Pb, Zn, Au, Ag, Cu), Besna Kobila –Osogovo zone (Pb, Zn, Mo, U), Golija district (Pb, Zn), Boranja district (Sb, Pb, Zn, Cu), Lajkovaca district (Cu), Cer district (W, Sn), Fruska Gora district (Ni, Pb, Zn), Maljen district (Ni), and Drenica district (Ni). This metallogenic province contains the most important antimony, and lead and zinc mineralized zones in Serbia.

The Dinaric metallogenic province is composed of the Zlatibor (Ni, Cr), Srednje Polimlje (Cu), Orahovac (Cr) and Djakovica (Cr) districts.

3.8.3 Mineral Potential in Serbia

Since 2006, the Serbian government has implemented the "Strategy for Sustainable Development of Mineral Resources in Serbia" project with support from EBRD. The MEP is in charge of this project, and it is assisted by the MEM, the faculty of the Mining and Geology Department of the University of Belgrade, and the Energy and Mineral Resources Department of AP Vojvodina. The final report, will include information on future strategies for mineral resource development and the latest data on mineral reserves and resources. Draft data from the report are shown in Table 3.3. The data is based on results of survey and exploration works, but it does not include grass route prospecting projects.

Geological reserves and potential resources of copper ore in Serbia amount to 2,467 million tons and 528 million tons, respectively. Metallic copper in geological reserves and potential resources amounts to 9.4 million tons and 8.1 million tons, respectively. Almost all of this copper is in the Timok magmatic complex, which includes Bor, Veliki Krivelj, and Majdanpek. Copper deposits in the Timok magmatic complex are accompanied by 154 tons of gold as geological reserves.

Geological reserves and potential resources of lead and zinc ore amount to 105 million tons and 46 million tons, respectively. Lead and zinc metals in minable reserves amount to 650,000 tons and 490,000 tons. Lead and zinc metals of potential resources amount to 2.05 million tons and 2.75 million tons. Geological reserves from Kosovo correspond to 88 million tons. In Serbia, almost all of the 2,940 tons of silver occurs in lead and zinc deposits.

Table 3.3 Ore Reserves and Potential in Serbia (after MEM and MEP 2007)

Commodities	Geological reserves	Minable reserves (Balanced reserves)		Non-minable reserves (Non-balanced reserves)		Potential resources		Grade		Comment
		Ore	Metal	Ore	Metal	Ore	Metal			
	Mt	Mt	Mt	Mt	Mt	Mt	Mt			
Cu (whole Serbia)	2,467	1,090	4.2	1,377	5.2	528	8.1			
Cu (Timok magmatic complex)		1,088	4.145	1,367	5.195	470		0.39% Cu	0.14 g/t Au	(as of 31.12.2006)
Au (by-product)			Au 153 t		Au 1 t		Au 50t			
Ag (by-product)			Ag 1,120 t							
Cu (ophiolite melange)		1.89		9.78		58				(as of 31.12.1993)
Cu (Leckom volcanic complex)				150						(as of 31.12.1994)
Pb-Zn (whole Serbia)	105.03	16.27	Pb 0.65 Zn 0.49	2.69		46.17		4% Pb	3% Zn	(as of 31.12.2005)
Pb-Zn (Kosovo)	88.07	31.26	Pb 1.27 Zn 0.95			27		4.05% Pb	3.03% Zn	(as of 31.12.2005)
Ag (by-product, whole Serbia)			Ag 2,940 t							
Ag (by-product, Kosovo)			Ag 1,920 t							
Cd (by-product, whole Serbia)			Cd 110 t							
Fe (whole Serbia)	119.39	3.97	1.49	115.42	27	52.6				
Cr (whole Serbia)		0.089	0.014			0.1	0.02	20% Cr_2O_3		(as of 31.12.1993)
Ni-Co (whole Serbia)	38.65	19.92	Ni 1.49 Co 0.011	18.73	Ni 27					
Ni-Co (Starog)						8	Ni 0.064			
Ni-Co (Kopaonic)						30	Ni 0.345 Co 0.015			
Ni-Co (Sumadijski)						3	Ni 0.045			
Mo (whole Serbia)	1,115	1,115	0.035			1,645	0.249			
Mo (porphyry copper)		1,090	0.012			1,500	0.126	0.0011% Mo		(as of 31.12.2006)
Mo (Mackatica)		25.16	0.023			145	0.123	0.09% Mo		(as of 31.12.1993)
W (whole Serbia)	0.33			0.33	700 t		1,000 t	0.24% W ?		(as of 31.12.1993)
Sn (whole Serbia)						500 t				
Sb (whole Serbia)	4.198	0.978	0.015	3.22	As 0.012	3.1	0.03	1.53% Sb		(as of 31.12.1993)
Al (whole Serbia)	3.89	2.69	0.69	1.2		19.9	4.2	48% Al_2O_3		(as of 31.12.1998)
Al (Kosovo)		1.66	0.43							
U (whole Serbia)	3.654	2.154	727 t	1.5		7	1,000 t	337g/t	U_3O_8 ?	(as of 31.12.1993)

Geological reserves of nickel and cobalt ore amount to 38 million tons, with 1.5 million tons of nickel metal and 11,000 tons of cobalt metal in minable reserves.

Geological reserves of molybdenum amount to 1,115 million tons in all of Serbia. These are broken down into 1,090 million tons that are accompanied by porphyry copper, and 25 million tons in the Mackatica molybdenum deposit located in southeastern Serbia. Minable molybdenum metal amounts to 35,000 tons in all of Serbia, and molybdenum metal from porphyry copper amounts to 12,000 tons, with 23,000 tons from the Mackatica deposit. There are large amounts of potential resources and molybdenum metal, at 1,645 million tons and 249,000 tons, respectively.

Geological reserves of antimony amount to 4 million tons and minable antimony metal reserves amount to 15,000 tons. Potential resources amount to 3 million tons and there are 30,000 tons of metallic antimony.

Among the above mineral commodities, copper, lead, zinc, gold and antimony are particularly important in Serbia. Western Junior companies have a great understanding of the high potential of mineral resources in Serbia, and they have implemented exploration activity including

geophysical and geochemical surveys and drilling work around operating mines and old mining sectors. Mineral potential areas in Serbia are shown in Table 3.4 and Fig.3.10 including the above-mentioned exploration activity.

Table 3.4 Mineral Potential and Explored Areas

No	Zone	Commodity	Deposit Type	Main Deposit	Exploration Activity
1	Bor metallogenic zone	Cu	Porphyry	Veliki Krivelj, Majdanpek	Coka Kurga (DPM)
		Cu, Au	Porphyry		Brestovac-Durian Potok (SDM)
		Cu, Au	Volcanic Massive Sulfide	Bor, Borska Reka	Brestovac (SEE)
2	Ridanj-Krepoljin zone	Pb-Zn	Skarn, vein	Ridanj	Au: Rakita (SEE)
3	Besna Kobila Osogovo zone	Pb-Zn	Skarn	Blagodat	Karamanica (Bosilmetal)
		Mo	Porphyry	Mackatica	Surdulica (DPM)
4	Lece Halkidik zone	Cu, Au	Epithermal vein	Lece	Ivan Kula (DPM-Ivanhoe)
		Au, Pb-Zn	Epithermal vein		Lece (SEE)
5	Sumadia metallogenic zone	Pb-Zn	Skarn	Rudnik	(DPM)
6	Kopaonic metallogenic zone	Pb-Zn	Vein, stockwork	Kizevak, Stari Trg	Rudnitze North (SDM)
		Cu, Au	Porphyry		Rudnitze (SDM), Plavkovo (SEE)
7	Boranja-Lajkovaca zone	Sb	Hydrothermal	Zajaca	
		Au	Hydrothermal		Zajaca (SEE)
		Pb-Zn	Volcanic	Velijki Majdan	

DPM: Dundee Precious Metals
SEE: South European Exploration, a subsidiary of Reservoir Capital
SDM: South Danube Metals, a subsidiary of Euromax Resources

The Timok magmatic complex (Bor metallogenic zone; Cu, Mo, Au, Pb and Zn) has a high potential for the existence of porphyry copper-gold deposits represented by the Veliki Krivelj and Majdanpek deposits, and volcanic massive sulfide deposits represented by the Bor and Borska Reka deposits. In this zone, exploration is being concentrated around the known deposits, targeting porphyry type and VMS-type deposits.

On the other hand, there is high potential for epithermal gold mineralization in the east of the Bor deposit and in the Rakita area. The latter is located near the border with Bulgaria in the south-southeast extension of the Bor metallogenic zone. In the Trun area in Bulgaria which borders on the Rakita area, several gold mines have been developed since the 1960s, and exploration financed by Teck Cominco and EurOmax Resources has confirmed a number of gold mineralizations with average grade of 2.0g/t Au.

The Besna Kobila Osogovo zone (Pb, Zn and Mo) where the Blagodat deposit (Pb and Zn) occurs has a high potential for lead-zinc and molybdenum deposits. Lead and zinc exploration is carried out in the Karamanica lead and zinc ore field, and porphyry molybdenum prospecting is conducted in the Mackatica and Surdulica molybdenum ore fields.

In the Lece-Halkidik zone (Pb, Zn, Au, Ag and Cu), several Junior companies are exploring for epithermal gold deposits around the Lece mine and north of it. Tertiary volcanic rocks related to mineralization and hydrothermal alteration are scattered in the periphery of the mine; therefore, systematic regional exploration is needed there.

In the Sumadija metallogenic zone including the Rudnik mine (Pb and Zn), there is no prospecting project, but applications for exploration licenses of lead and zinc have been submitted to MEM. At the same time, the Rudnik mine has conducted several drilling surveys in the east sector of the mine to get new lead and zinc reserves. This area has lead and zinc potential.

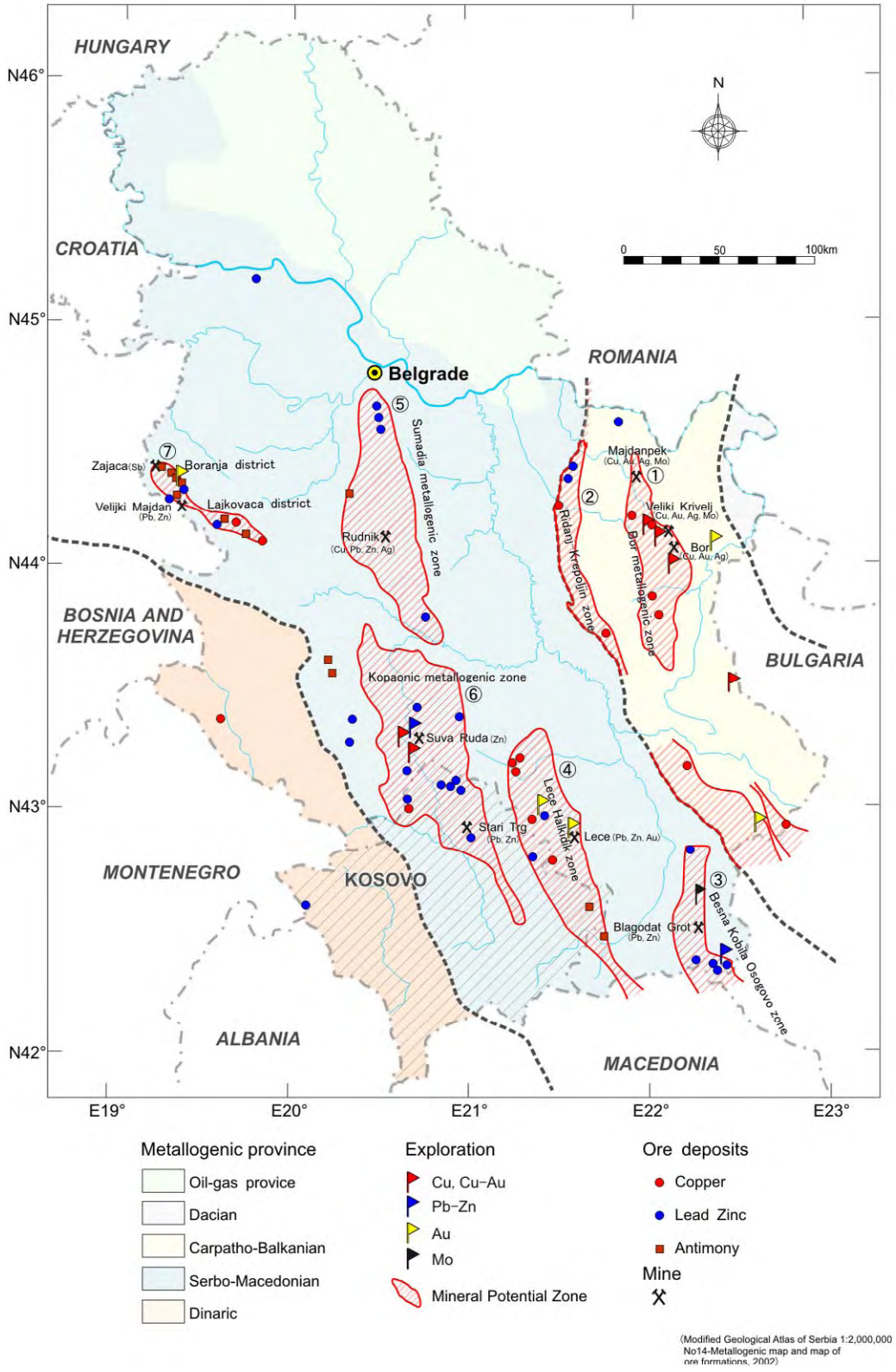


Fig.3.10 Mineral Potential and Explored Areas in Serbia

Mining has been conducted around the Kizevak deposit (Pb and Zn) of the Suva Ruda mine in the Kopaonik metallogenic zone (Pb, Zn and Ag) of southwestern Serbia since the ancient Roman Empire times, and this sector has potential for mineral resources. In the southern extension

of this sector is the most important lead and zinc producing area in Serbia where the Srai Trg mine (total reserves of 39.8Mt with 5.7% Pb, 3.7% Zn and 77g/t Ag) and Belo Brdo mine (ditto 5.1Mt with 5.0% Pb, 4.1% Zn, and 76g/t Ag) are located in the territories of Kosovo and Metohia. Presently, prospecting for hydrothermal lead and zinc mineralization and gold mineralization is being implemented in the sector.

The Boranje-Lajkovaca ore district (Sb, Pb, Zn and Cu) of western Serbia has an epithermal gold mineralization related to hydrothermal antimony mineralization. Further prospecting is needed, due to insufficient exploration in the periphery of the antimony and lead-zinc mines.

3.9 Current State and Tasks of Mining Activities

3.9.1 Geology of the Bor Metallogenic Zone

This zone is located in the Carpatho-Balkanian metallogenic province. The Timok magmatic complex of the Late Cretaceous period is widely distributed in this zone, and contains important Serbian copper deposits.

The Timok magmatic complex covers an area of 80km from north to south and 20km from east to west. Ninety percent of the magmatic complex is composed of pyroclastic rocks, and two main volcanic events are recognized (Jankovic, 1990).

(a) Early stage andesitic breccias and tuffs of are distributed on the eastern side of the complex.

(b) Andesitic-basaltic intrusives, diorite, gabbro, granodiorite, quartz diorite, and quartz diorite porphyry dykes of the late stage are distributed on the western side of the complex.

In the Timok magmatic complex, porphyry copper deposits and massive replacement deposits occur along a mineralization zone covering an area of 50km from north to south and 5km from east to west. Mineralization is assumed to have occurred as volcanic dykes intruded along the rift. Ore deposits in the metallogenic zone are genetically related to faults oriented NNW-SSE, with post-mineralization faults trending E-W. The Bor segment of the major fault runs 30-40km toward the northwest. The Krivelj fault runs on the east side parallel to the Bor fault. The fault is a reverse fault, dipping 60° - 70° west. The Majdanpek deposit of porphyry copper is situated along the northwest extension of these faults.

3.9.2 Ore Deposits

(1) Porphyry Copper Deposits

a) Veliki Krivelj

The deposit is located 7km north of Bor city. A porphyry copper deposit is situated in fracture-developed zones which trend NE-SW and NW-SE in andesite and quartz diorite porphyry. The deposit is distributed in an oval shape that has a NW-SE orientation. The scale of the deposit is 800m along the NW-SE axis, 400m along the NE-SW axis, with a vertical extension of 1,000m or

more. Mineralization of 0.55% Cu until 492m below sea level has been confirmed by the deepest drill hole. The bottom of the orebody has not been confirmed.

Most of the copper grades 0.3-0.4%, with high-grade copper tending to occur in the central and peripheral parts. Hydrothermal alteration shows zoning of biotite, sericite, argillized, and silicified zones from the center to the periphery. Ore minerals are mainly chalcopyrite and pyrite.

A block model of the deposit was made using Geocom which is a GIS software of mine control and is used for ore reserve calculation and optimum exploitation planning in Bor. There are 32 geological sections made with 292 vertical drills. Grade analysis was carried out for each drill hole. The average length of drilling holes ranged from 400m to 500m. Analyzed elements were Cu, Au, Ag, As, Pb, Zn, Mo, and S. The As was a low grade of less than 0.04%.

b) Majdanpek

The ore deposit is located 60km north-northwest of Bor city. The deposit is situated in the northern end of the Timok magmatic complex. The deposit has high gold mineralization compared with other porphyry deposits in the complex.

The area is composed of metamorphic rocks-- mica schist, phyllite, gneiss and marble of the Paleozoic era-- and conglomerate, sandstone and limestone of the Jurassic era. These rocks are part of an intruded igneous complex that consists of andesite, tuff, dacite, diorite and quartz diorite. A porphyry copper deposit was formed in a fracture zone 300m to 600m wide, trending north-south, when andesite and quartz diorite intruded as stock in gneiss and schist.

The deposit is divided into north and south pits. The south pit is oval shaped, running 2.5km north to south and 1.6km east to west. The top of the pit is 580m above sea level, and the bottom of the pit is 120m asl. The dimensions of the ore deposit are 800m north to south, 100-300m east to west, and 1,000m or more in vertical extension.

The north pit is also oval shaped, running 1.9km north to south and 1.1km east to west. The top of the pit is 670m above sea level, and the bottom of the pit is 360m asl. The dimensions of the ore deposit are 400m north to south, 60-70m east to west, and 1,000m or more in vertical extension. Drilling prospects have confirmed that mineralization continues at least 100m below sea level. Replacement polymetal deposits (Cu, Pb, Zn) of the Tenka I and Tenka II deposits and satellite deposits of the Dolovi I, Dolovi II, and S. Dusan deposits occur in the northwestern side of the north pit.

Hydrothermal alteration is characterized by strong potassium alteration, and silicification, biotitization and sericitization have been confirmed. High-grade copper ore is related to potassium alteration and strong silicification. Ore minerals are mainly composed of chalcopyrite with bornite, tetrahedrite and molybdenite.

In the northern part of the south pit, corresponding to the central part of the deposits, molybdenum mineralization is found, with the molybdenum grade ranging from 70ppm to

100ppm.The deposit is accompanied by mineralization of platinum group elements. Platinum grade shows 3.5 g/t in copper concentrate.

(2) Massive Hydrothermal Deposit

a) Bor

Andesite and pyroclastic rocks of the Late Cretaceous to Tertiary eras cover the area around the deposit. Country rock in the deposit is porphyrytic andesite. The deposit occurs in an area 5km long by 1km wide. The Bor deposit is a volcanic massive copper sulfide deposit that occurs from the surface (about 400m asl) to 800m in depth, and changes into a porphyry copper deposit in the deeper part. By the Bor fault, the deposit is limited to the western side of the fault. Non-mineralized conglomerate is distributed on the eastern side of the fault, corresponding to the footwall side (Fig.3.11 and Fig.3.12).

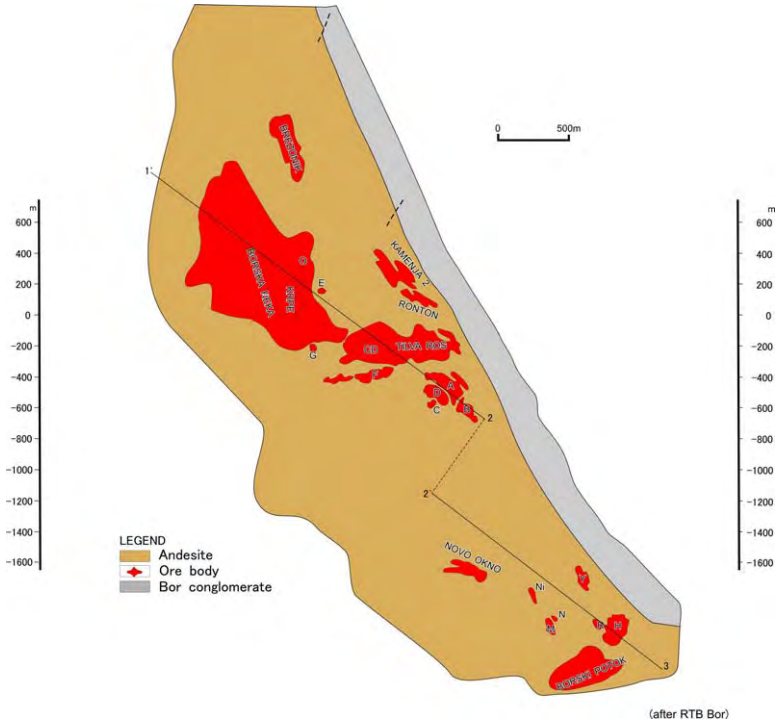


Fig.3.11 Geological Map of the Bor Deposits (Source: RTB Bor)

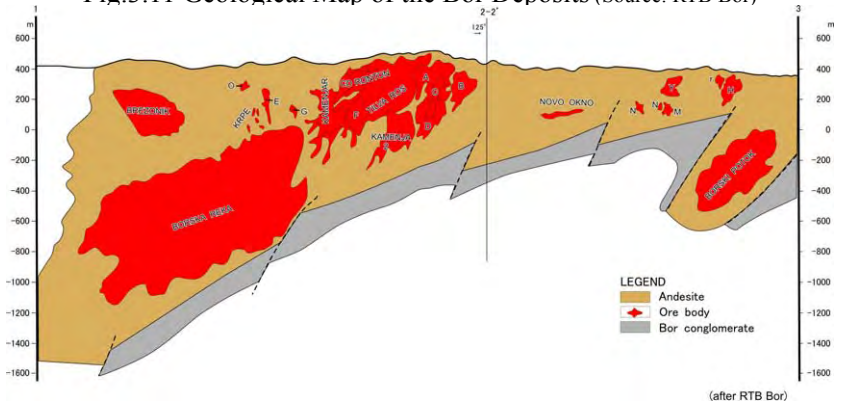


Fig.3.12 Vertical Projection of the Bor Deposits (Source: RTB Bor)

The deposit is divided into the northwestern, central, and southeastern bodies. The most important orebody was the central body, but it has already been mined out. The orebodies occur in andesite which has been subjected to intensely argillized alteration. Ore is commonly massive, and sections of ore are disseminated and stockwork. At one time there were 25 orebodies, but most of them have been mined. Currently orebodies occur in the Brezonik, Tilva Ros (lower part of the Bor open pit), and P2A areas.

Ore minerals are dominantly composed of pyrite, with chalcopyrite, energite, bornite, chalcocite and covellite. The copper grade of the ore ranges from 1 to 2%.

Cerovo deposits occur around 10km northwest of the Bor open pit orebody. However, the chief orebody of the Cerovo Primarno open pit has already been mined out.

3.9.3 Reserves

The Bor mine started operations in 1902; since then it has produced 200 million tons of copper ore with 1.5% Cu and 3.2g/t Au, and 3 million tons of copper metal. The Veliki Krivelj mine stared operation in 1982; since then, it has produced 150 million tons of copper ore with 0.3% Cu and 0.1g/t Au, and 450 thousand tons of copper metal. The Majdanpek mine started operation in 1961; since then, it has produced 359 million tons of copper ore with 0.44% Cu and 0.2g/t Au, 1.6 million tons of copper and 83 tons of gold.

Table 3.5 List of Reserves in RTB Bor

Ore deposit	Orebody	Class	Category (Western)	Category (Serbian)	Ore thousand t	Cu grade %	Au grade g/t	Copper thousand t	Gold t	Cutoff % Cu
Veliki Krivelj		Geological reserves	Proven	A+B+C1	560,460	0.34	0.07	1,858	38.1	0.2
		Minable reserves	Proven	A+B+C1	465,150	0.34	0.07	1,512	31.6	0.2
		Exploitation reserves	Proven	A+B+C1	152,739	0.35	0.07	514	10.4	0.2
Bor Underground	Brezanik	Geological reserves	Proven	B	1,972	1.28	0.27	25	0.5	0.4
		Minable reserves	Proven	B	1,495	1.31	0.26	20	0.4	0.4
		Exploitation reserves	Proven	B	1,023	1.21	0.26	12	0.3	0.4
	Tilva Ros	Geological reserves	Proven	B	3,890	0.76	0.13	29	0.5	0.4
		Minable reserves	Proven	B	2,903	0.86	0.14	25	0.4	0.5
		Exploitation reserves	Proven	B	991	0.81	0.17	8	0.2	0.5
	P2A	Geological reserves	Proven	B	8,509	0.71	0.33	60	2.8	0.4
		Minable reserves	Proven	B	2,865	0.89	0.32	25	0.9	0.6
		Exploitation reserves	Proven	B	1,776	0.83	0.46	15	0.8	0.6
	Borska Reka	Geological reserves	Proven	A+B+C1	556,911	0.57	0.21	3,151	114.6	0.3
		Geological reserves	Probable	C2	450,922	0.49	0.11	2,223	49.4	0.3
		Minable reserves	Proven	A+B+C1	319,969	0.50	0.20	1,601	65.2	0.3
		Exploitation reserves	Proven	A+B+C1	142,159	0.53	0.23	752	32.6	0.3
Cerovo	Cementario 2	Geological reserves		?	26,580	0.31	0.07	82	1.9	?
	Cementario 3	Geological reserves		?	9,144	0.33	0.07	30	0.6	?
	Cementario 4	Geological reserves		?	4,028	0.28	0.07	11	0.3	?
	Cerovo Primami	Geological reserves		?	238,359	0.38	0.07	906	16.7	?
	Drenovo	Geological reserves		?	45,778	0.28	0.06	128	2.8	?
	Kraku Bukaresku	Geological reserves		?	1,600	0.62	0.62	10	1.0	?
	Total				325,489	0.36	0.07	1,168	23.3	
Majdanpek	South pit	Geological reserves	Proven	A+B+C1	409,171	0.34	0.18	1,344	72.2	0.2
		Minable reserves	Proven	A+B+C1	246,083	0.36	0.19	882	46.7	0.2
		Exploitation reserves	Proven	A+B+C1	98,757	0.40	0.23	391	22.5	0.2
	North pit	Geological reserves			210,658	0.32	0.25	678	52.9	?
Coka Marin		Geological reserves	Proven	B+C1	271	2.04	5.34	6	1.4	?
		Minable reserves	Proven	B+C1	221	2.16	5.91	5	1.3	?
Total		Geological reserves			2,527,982	0.42	0.14	10,537	354.3	
		Exploitation reserves			397,445	0.43	0.17	1,693	66.7	

(Source: RTB Bor)

Table 3.5 summarizes the geological reserves[1] and exploitable reserves of each ore deposit collected from RTB Bor. The Veliki Krivelj deposit has 560 million tons of reserves, but reserves

[1] "Geological Reserves" in Serbian terminology corresponds to ore reserves.

that can be exploited with the current pit design amount to 152 million tons. The Borska Reka deposit, which is the target for the next exploitation, has 556 million tons of reserves, but currently exploitable reserves amount to 142 million tons.

Total ore reserves of RTB Bor amount to 2.5 billion tons, but only about 397 million tons, or 15% of these, are exploitable reserves.

3.9.4 Deposit Potential

To maintain a balance between ore reserves and exploitable reserves at the Veliki Krivelj deposit, 410 million tons will be the future target reserve after open pit mining. However, reserves will need to be recalculated in consideration of economic aspects.

Satellite orebodies of polymetal occur around the north pit of the Majdanpek deposit. Combined with the central orebody, there are 210 million tons of ore reserves. In the north pit, exploitable reserves have not been calculated due to insufficient development. There should be more exploration around satellite orebodies.

Drilling of the lower extension of the Borska Reka orebody has confirmed mineralization down to 900m below sea level. Therefore, ore reserves between -500m and -900m amount to 450 million tons with 0.49% Cu and 0.11g/t Au as Category C2 reserves. Although it is future issue whether there is the economic feasibility of deep mining or not, there are enough reserves to be considered potential resources.

3.9.5 Issues

Exploitable reserves are not recorded in the JICA preliminary mission report (December, 2005) or in the privatization data for mines published by the Serbian government (Environmental assessment of RTB Bor operations, Final report, ERM, 2006). Ore reserve calculations in Serbia are made in accordance with the old reserve standard of the former USSR. Not only ore reserves, but minable reserves[2] and exploitable reserves are calculated. When investigating reserves, it is necessary to confirm their classification.

As described in the section on reserves, the total ore reserves of RTB Bor amount to 2.5 billion tons, but there are only 397 million tons of exploitable reserves, which represents only 15 % of the total. It is not advisable to evaluate ore deposits based only on reserve figures.

The Cerovo deposit contains 320,000 tons of reserves, but 240,000 tons are of low economic value ore scattered under the mined open pit of Cerovo Primarno. If there is to be exploitation, these reserves will have to be reevaluated. Because geological maps of open pits and underground areas were not investigated, it is not possible to identify the process for deposit and potential areas analysis.

[2] "Balance Reserves" in Serbian terminology

3.10 Geology and Deposits of the Veliki Majdan Mine

3.10.1 Geology and Deposits

This area is located in the Serbo-Macedonian metallogenic province, where there are a number of lead and zinc deposits and important Serbian lead and zinc mines and smelters. Most of these deposits are skarn-type and hydrothermal deposits associated with intrusives of Tertiary granodiorite activity.

Around the Veliki Majdan deposit, antimony and lead & zinc deposits occur widely in association with Tertiary granodiorite. One deposit is a small-scale lead and zinc deposit which formed in the boundaries between limestone and schist of the Triassic period, and andesite to dacite intrusives of the Tertiary period. Another deposit is a massive skarn type that occurs in pipe-like and irregular shapes. The deposit, which consists of small orebodies, is 10m to 15m long and 1m to 3m wide. The horizontal area of orebodies ranges from 20 m^2 to 200 m^2. Due to the skarn, the boundaries between deposits and country rock are clear (Fig.3.13). Ore grade shows 1 – 20% Pb and 1 – 20% Zn. Ore minerals are chiefly composed of pyrite, galena and sphalerite, with lesser amounts of pyrrhotite, arsenopyrite, magnetite and chalcopyrite.

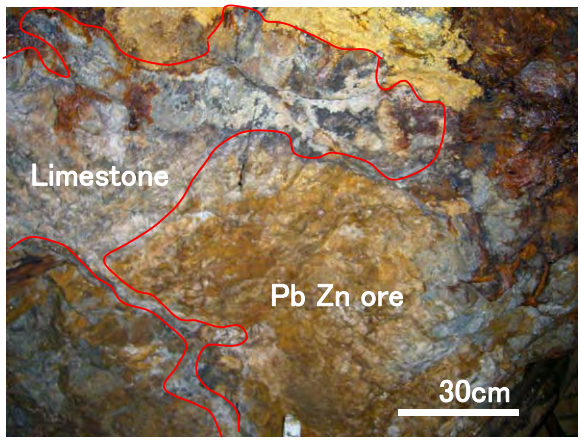


Fig.3.13 Occurrence of Lead and Zinc Ore (at the Veliki Majdan Mine)

3.10.2 Reserves

The Veliki Majdan mine, which started operation in 1952, produced 1.8 million tons of crude ore consisting of 4.50% Pb and 3.71% Zn, which yielded 82,000 tons of lead and 67,000 tons of zinc (according to the mine data). Ore reserves in December 31, 1987, which is the latest data kept for the mine, amounted to 113,000 tons with 6.14% Pb, 4.64% Zn and 188g/t Ag in A+B+ C1 category. Probable resources are presumed to amount to between 65,000 and 70,000 tons (source: MEM).

3.10.3 Issues

Though there are underground maps, underground geological maps, and assay maps, there are

no large-scale geological maps, so it is not possible to clarify the limits of mineralization and to analyze the formation of deposits. Therefore, the potential of reserves cannot be determined. The density of underground drilling prospects is quite high, but there is enough in only 30 % to 50 % of the total length of prospects. The mine has implemented drilling work because the interval of drilling prospects is regulated due to the Serbian reserve calculation. Although the lower parts, under 280asl, of the Rudevac orebody in the east and the Lipnik orebody in the west have not been explored, potential areas are indicated due to the lack of geological maps. There is no clear basis for calculating presumed resources.

3.11 Geology and Deposits of the Zajaca Mine

3.11.1 Geology and Deposits

(a) Geology

The Zajaca mine is located in the Boranja ore field of the Serbo-Macedonian metallogenic province. Important antimony deposits are distributed in this district, including at Zajaca, covering an area 15 – 20km from east to west and 4 – 5km from north to south. A great deal of antimony was produced in this district during the former Yugoslavia era. The Boranja ore field is composed of schist, sandstone, limestone of the Late Paleozoic era (Carboniferous to Permian period), and schist and limestone of the Triassic to Jurassic periods of the Mesozoic era. Boranja granodiorite, andesite, and dacite of the Tertiary are intruded (Fig.3.14).

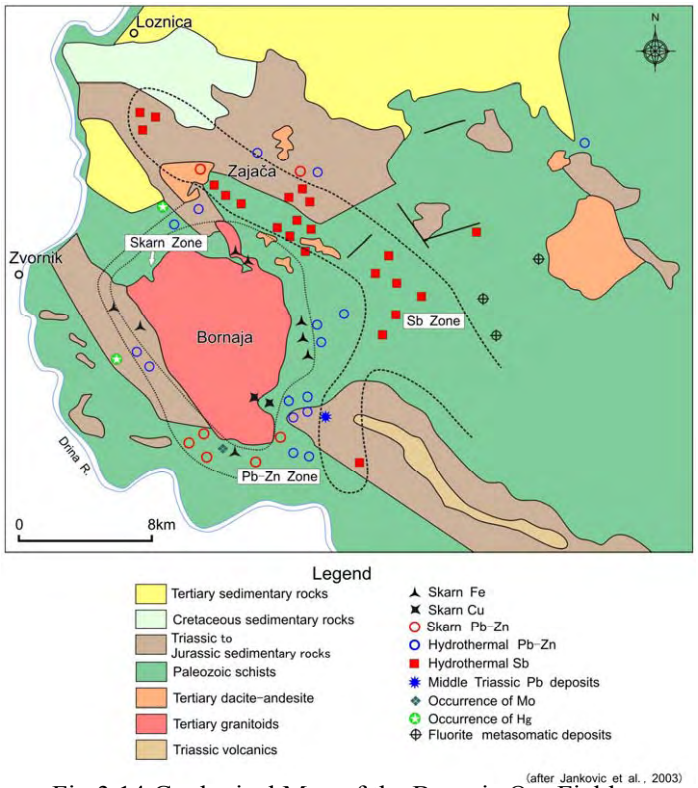


Fig 3.14 Geological Map of the Boranja Ore Field

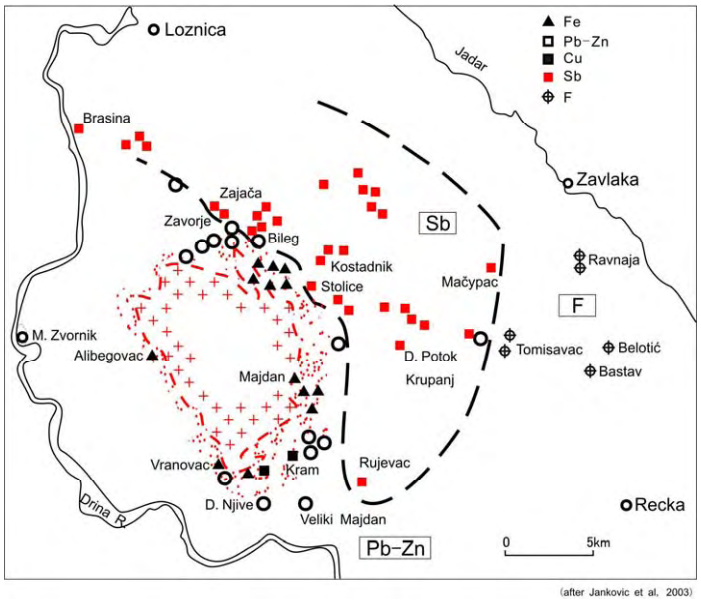


Fig 3.15 Zones of Mineral Deposits of the Boranja Ore Field

Mineral deposits in the Boranja ore field are distributed in zones around the Boranja granodiorite and are composed of skarn-type iron deposits, skarn-type lead-zinc deposits, hydrothermal lead-zinc deposits, hydrothermal antimony, and metasomatic fluorite deposits (Fig. 3.15).

(b) Mineral Deposits

The Zajaca deposit is a stratiform and lenticular antimony disseminated orebody (sulfide and oxide ores) which formed along the boundaries between limestone and schist of the Carboniferous period (Fig.3.16 and 3.17). The deposits are associated with a stratiform epithermal antimony vein, in which the country rock is jasperoid.

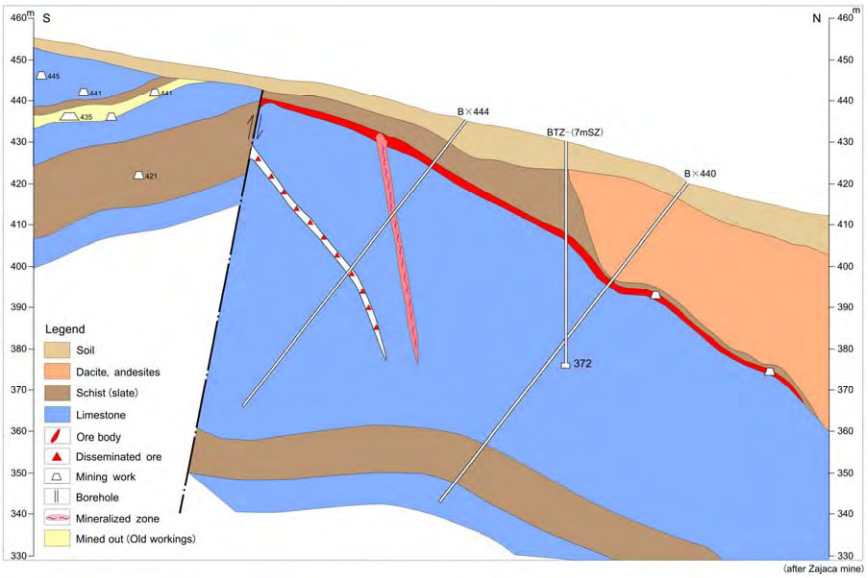


Fig.3.16 Geological Profile of the Turin Orebody at Zavorje Mine

The Zavorje deposit to be exploited at the present time, shows an elongation in the direction of the WNW-ESE strike, dips 60 ° – 70 ° to the east, and comprises several orebodies. The

scale of the deposit is 30 – 170m long, and 2 – 3m wide, with 0.5 – 2m thickness. At the present time, the Zavorje deposit is divided into three parts: Turin, Pit28, and Pit500, which are all under mining control.

There is low-grade (0.9 – 2%) Sb ore, and high grade (more than 10%) Sb ore. During the peak development of the 1960's and 1970's, the mine produced high grade ore with more than 20% Sb.

Main ore minerals are composed of stibnite and pyrite, and observed valentinite (Sb_2O_3) and senarmontite (Sb_2O_3) that the stibunite is oxidized to. It is associated with chalcopyrite and galena. Calcite consists mainly of gangue minerals with quartz. Quartz veinlets and silicification and carbonatization occur in footwall limestone. Empirical evidence shows that antimony ore occurs around those alterations.

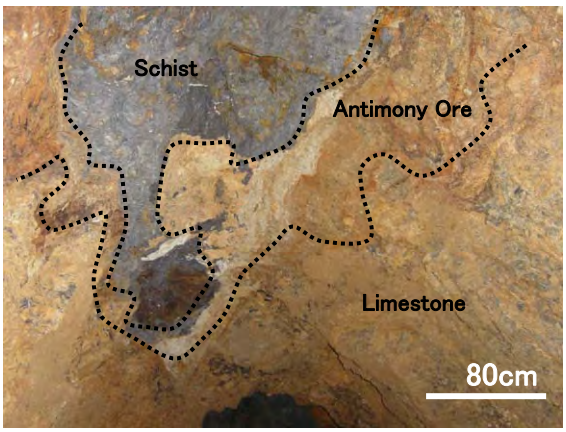


Fig.3.17 Occurrence of Antimony Ore (1-2% Sb), Limestone (footwall), and Schist (hanging wall) (At 372 mL, Turin, Zavorje Mine)

3.11.2 Prospecting

Prospecting was implemented in basic order of surface drilling, underground tunnel (adit, drift and sub-level drift). Surface drilling was carried out in dense intervals ranging from 20m to 60m, due to the small ore body size. Currently, preparations are being made to reopen an adit of 372m over sea level, and to do a drift exploration by scraper to confirm Category C1 antimony ore situated in the upper 20m of the orebody, because the Turin orebody at the Zavorje deposit is currently an object of exploration.

3.11.3 Reserves

The Zajaca mine started operation in 1890. Over the next 100 years, it produced 90,000 tons of antimony metal with average grade of 2.5% Sb (MEM, 2002).

Present ore reserves data is a mixture of 1990 data and 1997 data. According to data from the mine, the total proven reserves of categories A+B+C amount to 967,000 tons with 1.55% Sb, and

mineral resources (Category C2) amount to 700,000 tons with 0.97% Sb (Tables 3.6 and 3.7). Within the total proven reserves of 967,000 tons, 51 percent (500,000 tons) is Category C1, so drift exploration will be needed to confirm exploitation of the Category C1 ore.

Table 3.6 Reserves at the Zajaca Mine

Ore deposit	Class	Category (Western)	Category (Serbian)	Reserves t	Sb grade %	Sb t
Zavorje	Geological reserves	Proven	A	–	–	–
	Geological reserves	Proven	B	1,590	3.75	60
	Geological reserves	Proven	C1	57,910	1.49	863
			A+B+C1	59,500	1.55	922
Štira	Geological reserves	Proven	A	–	–	–
	Geological reserves	Proven	B	2,517	2.28	57
	Geological reserves	Proven	C1	21,372	1.82	389
			A+B+C1	23,889	1.87	446
Brasina	Geological reserves	Proven	A	4,628	2.89	134
	Geological reserves	Proven	B	–	–	–
	Geological reserves	Proven	C1	23,083	1.22	282
			A+B+C1	27,711	1.50	415
Kik	Geological reserves	Proven	A	3,725	1.90	71
	Geological reserves	Proven	B	13,715	2.85	391
	Geological reserves	Proven	C1	37,925	1.70	645
			A+B+C1	55,365	2.00	1,106
Dolic	Geological reserves	Proven	A	–	–	–
	Geological reserves	Proven	B	4,510	2.82	127
	Geological reserves	Proven	C1	19,087	2.44	466
			A+B+C1	23,597	2.51	593
Kolicina	Geological reserves	Proven	A	112,396	2.33	2,619
	Geological reserves	Proven	B	325,179	2.00	6,504
	Geological reserves	Proven	C1	337,781	0.71	2,398
			A+B+C1	775,356	1.49	11,521
Stolice	Geological reserves	Proven	A	–	–	–
	Geological reserves	Proven	B	1,063	2.24	24
	Geological reserves	Proven	C1	1,296	1.20	16
			A+B+C1	2,359	1.67	39
Total	Geological reserves	Proven	A	120,749	2.34	2,823
	Geological reserves	Proven	B	348,574	2.05	7,162
	Geological reserves	Proven	C1	498,454	1.01	5,058
			A+B+C1	967,777	1.55	15,044

(Source: Zajaca mine)

Table 3.7 Mineral Resources at the Zajaca Mine

Area	Category (Western)	Category (Serbian)	Resources t	Sb grade %	Sb t
Zavorje	Probable	C2	140,140	0.81	1,135
Štira	Probable	C2	28,275	0.81	229
Brasina	Probable	C2	60,512	0.80	484
Kik	Probable	C2	93,385	1.80	1,681
Dolic	Probable	C2	–	–	–
Kolicina	Probable	C2	387,620	0.87	3,372
Stolice	Probable	C2	–	–	–
Total			709,932	0.97	6,901

(Source: Zajaca mine)

3.11.4 Issues

Among the mining geologists there is only one senior geologist, who was formerly a mine chief. There is insufficient exploration planning and maintenance of documents due to lax organization. Moreover, there are insufficient underground maps and underground geological maps, and no underground assay maps. Also, there is no basic document showing ore reserve calculations. So, these calculations are not reliable.

When redeveloping a mine, one has to reconfirm the highest priority ore assay using

analytical equipment and techniques. When there is no assay map, the ore needs to be analyzed and mapped, because ore grades and reserves are fundamental data for mine redevelopment. They are also important items for comparing exploitation reserves and potential resources with the actual situation. Exploration to determine the above-mentioned mineral resources in Table 3.7 has been insufficient for map preparation.

According to recent geochemical surveys of steam sediments and soil conducted by a private exploration company (SEE) near the Zajaca mine, geochemical gold anomalies are distributed around antimony mineralization fields. Jelenkovic and Obrenovic (2005) detected gold anomalies of greater than 0.1ppm Au in seven districts. It is thought that these geochemical gold anomalies could reflect a Carlin-type gold mineralization that has replaced carbonate rocks and calcareous shale. This means there is a high possibility that epithermal gold deposits exist.

Investigation targeting gold has not been implemented at the Zajaca mine. Therefore, to re-open this mine, it will be very important to 1) collect ore samples from old adits and drifts, 2) collect surface samples of ores and rocks, 3) undertake RC (reverse circulation) drilling, and 4) analyze the existing gold and antimony.

3.12 Geology and Deposits of the Rudnik Mine

3.12.1. Geology and Mineral Deposits

Cretaceous limestone, sandstone and breccia are distributed around the Rudnik mine. The strata have developed a folding structure having a NW-SE axis with a plunge of 20° toward the SE. Dacite intrusives of Cretaceous to Tertiary occur with the chief direction of NE to SW in the Cretaceous system around the mines

Deposits are skarn-type that formed between the limestone and dacite. Main skarn minerals are clinopyroxene, garnet and epidote, and pre minerals are galena, sphalerite, chalcopyrite and pyrrhotite. The mineralized area is 2.5km long trending NW-SE, and 1.5km wide trending NE-SW. Nearly 90 orebodies occur in a 5km^2 area.

3.12.2. Reserves

Cut-off grades in the Rudnik mine are 1.2% Pb, 1.2% Zn, 0.25% Cu and 60g/t Ag. As of 31 December, 2006, ore reserves amounted to 2 million tonnes with 1.8% Pb, 1.8% Zn, 0.525 Cu and 92g/t Ag. The ratios of category B and C1 in reserves are 14% and 86%. There are 26 orebodies with calculated ore reserves, with an average reserve of 80,000 tonnes.

3.12.3. Exploration Personnel

There is a total of seven staff, including four geologists and three technicians. Their chief tasks are as follows:

1) Exploration in currently exploited sections and new prospecting zones

2) Grade control of mined ore from mining to mineral processing.

3.12.4. Exploration

Exploration in 2007 is divided into exploration in currently exploited sections and exploration in newly-prospecting zones. In the exploited sections, a total of 200m of drift prospecting and underground drilling of 10,000m are planned to confirm a C1 category reserve. The lengths of drill holes range from 150m to 200m. The mine has five drilling machines, comprised of two old ones and three new ones. Maximum drilling length is 600m.

Exploration in newly-prospecting zone is done by surface drilling survey in the 7km to 8km east zone of the mine. A total drilling length of 1,200m (400m x 3 holes) is planned in 2007.

Underground geological survey is done on a scale of 1:500 geological sketches. Geological profiles are made in addition to the results of drilling surveys. Drilling planning is made on the basis of geological profiles. Thus, a logical series of exploration work is being conducted.

3.12.5. Issues

Dilution at the working face is high, ranging from 20 % to 30%. Because the average grade of mined ore is a low 3% Pb+Zn, the reduction of dilution will help operations directly. In working face, dilution is being reduced by painting the boundary between ore and waste. There are 60 working faces, and about 20 monthly working faces. It is important to improve each shining hour from a moving to working faces () 1.5 hours per one way) on foot to a car-transportation.

The latest geological report which the mine submitted to the government, was prepared by the staff of the Rudnik mine. It took five staff members three months to produce this report. A lot of time has been spent on it. Reports to the government increase the burden on the business.

The introduction of IT skills including the use of scanners and digitizers will be necessary for geological investigations, but training school for IT skills is limited in Serbia.

3.13 Activities of Serbian Non-Ferrous Mines

Serbian non-ferrous mines have historically operated against a backdrop of rich mineral resources. During the Yugoslavia era, there were many production mines such as RTB Bor. However, in recent years all mines have suffered considerably from political impacts such as the United Nations Sanctions Resolution of 1992 and the economic sanctions imposed by Western European countries in 1998 followed by the Kosovo conflict, and they have not returned to normal production yet. Currently all national non-ferrous mines are targets for privatization, and are under privatization with destination to finish by the end of 2007. However, its progress is currently delayed, and it is expected to be completed in the middle of 2008. As there are no data on past production in Serbia at

the Ministry of Energy and Mines (MEM), non-ferrous crude ore production after 1990 in Serbia-Montenegro is shown from USGS reports, as following figures.

These two figures show 2 sharp drops in production after 1990; the first was in 1993 and the second was in 1999. The former was caused by sanctions imposed by the United Nations in 1992, and the latter resulted from economic sanctions imposed by Western Europe, etc., in 1998. It is easy to understand how these and other actions had such a tremendous impact on Serbian mines. By 2004, production of copper ore had dropped to less than 20% of 1990 levels, and lead and zinc ore production had fallen to about 11% of 1990 levels.

It should be noted that copper ores were produced mainly by RTB Bor, but lead and zinc ores were produced primarily by the Trepca Lead and Zinc Mining Complex in the Kosovo District, which is not a target of this study.

The next chapter is a description of the current state of each mine by scale of operation.

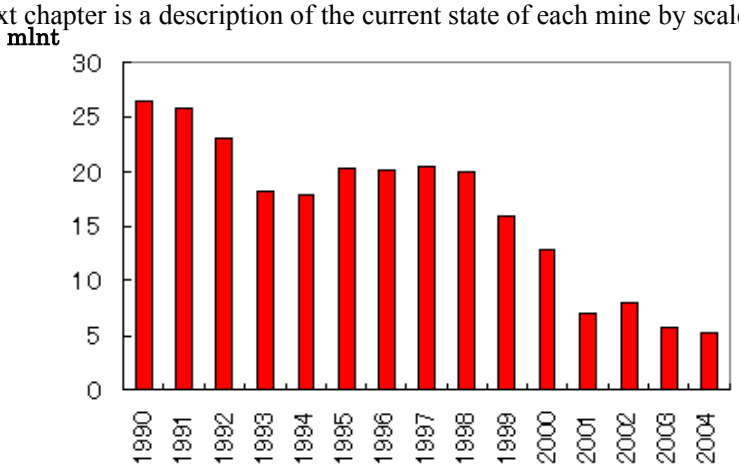


Fig.3.18 Production of Copper Ore in Serbia Montenegro (source: USGS)

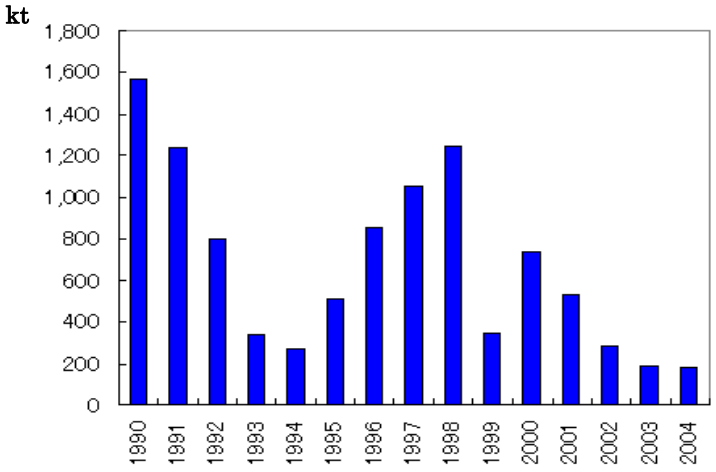


Fig.3.19 Production of Lead and Zinc Ore in Serbia and Montenegro (source: USGS)