

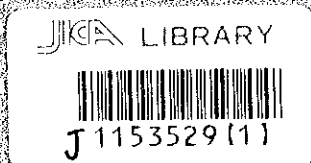
Japan International Cooperation Agency (JICA)

NO. 22

Government of the Kyrgyz Republic
Steering Committee of the Kyrgyz Republic
(Decree of the Government No. 313P)

**MASTER PLAN STUDY
ON
PROMOTION OF MINING INDUSTRY
IN THE KYRGYZ REPUBLIC
FINAL REPORT**

October, 1999



MITSUI MINERAL DEVELOPMENT ENGINEERING CO., LTD

MPN
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Japan International Cooperation Agency (JICA)

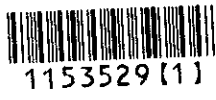
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PREFACE

In response to a request of the Kyrgyz Government, the Government of Japan decided to implement the study of the Mining Master Plan on Promotion of Mining Industry in Kyrgyz Republic (KR), and this study had been carried out by the Japan International Cooperation Agency (JICA).

JICA dispatched survey team consisting of personnel of Mitsui Mineral Development Engineering Co., Ltd. (MINDECO) led by Mr. Masayoshi Nishio to the Kyrgyz Republic four times since January 1998 till August 1999.

This survey team studied the actual situation regarding the mining industry, and discussed with the officials concerned with the state bodies of KR. After returning to Japan, as a result they've completed all works necessary for the final report.

I hope that this report will make a significant impact in drafting a state policy for promotion of the mining industry in KR, and at the same time enhance friendship and good relations between the two nations.

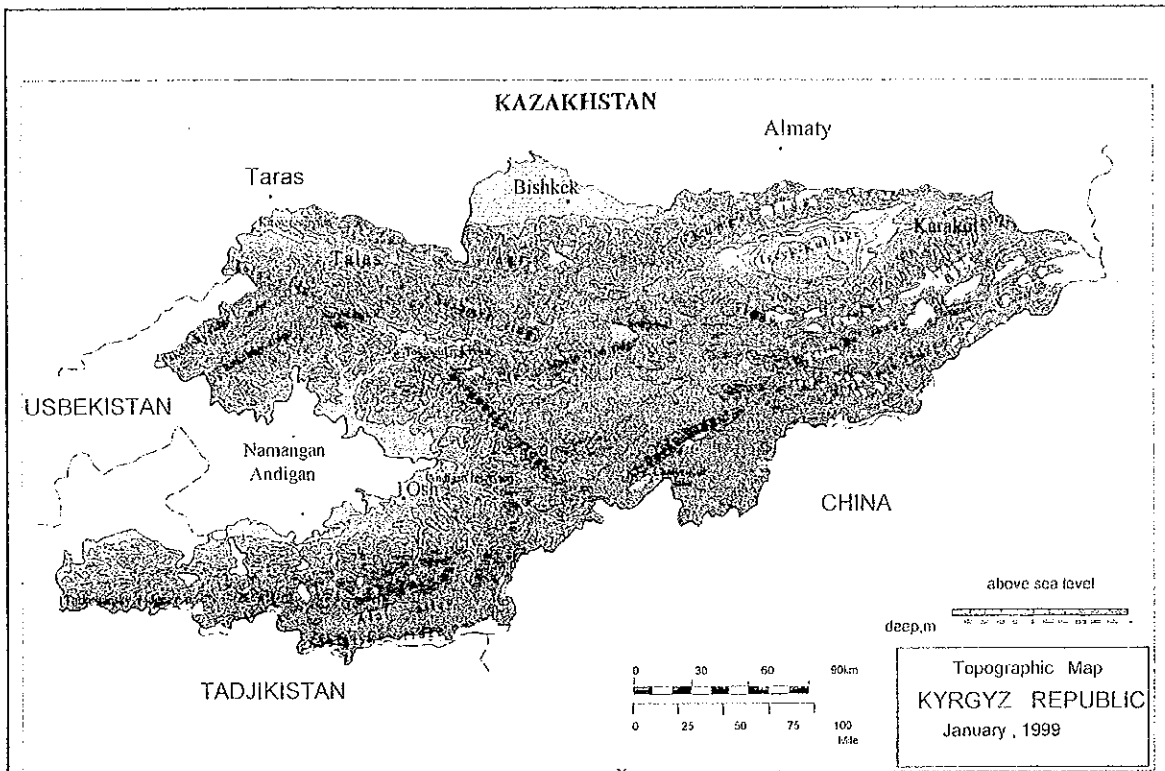
In conclusion, I wish to express my sincere appreciation to all people for their close cooperation throughout this study.

October 1999

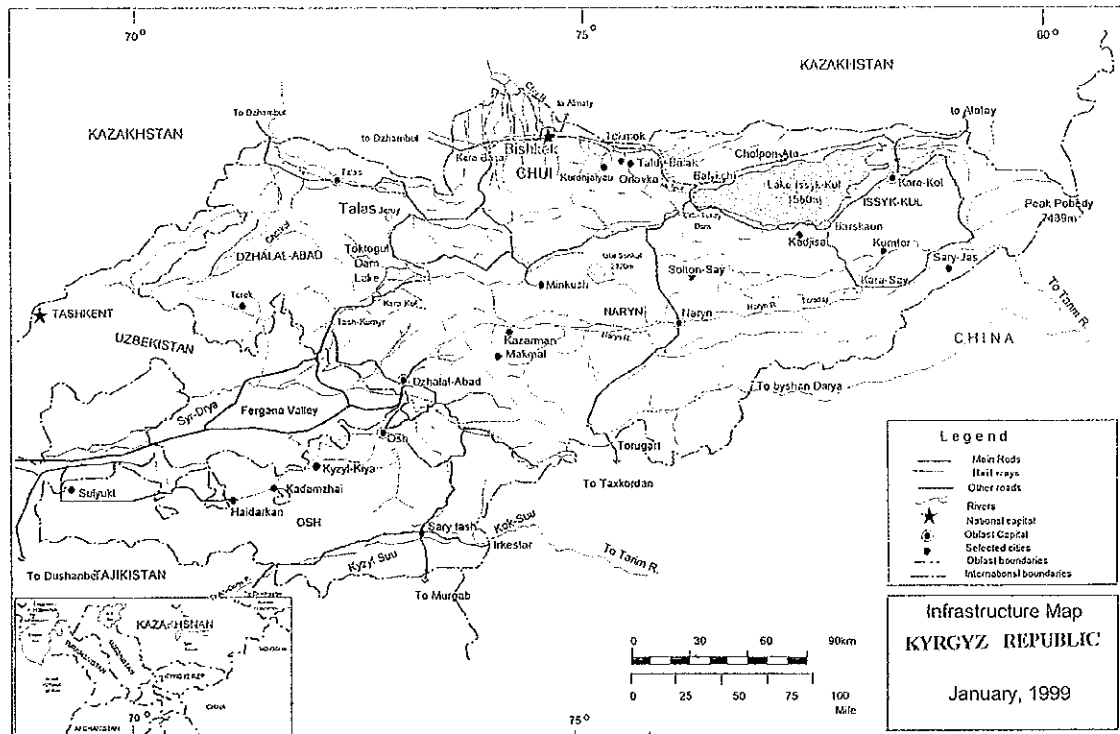


Kimio Fujita
President
Japan International Cooperation Agency (JICA)

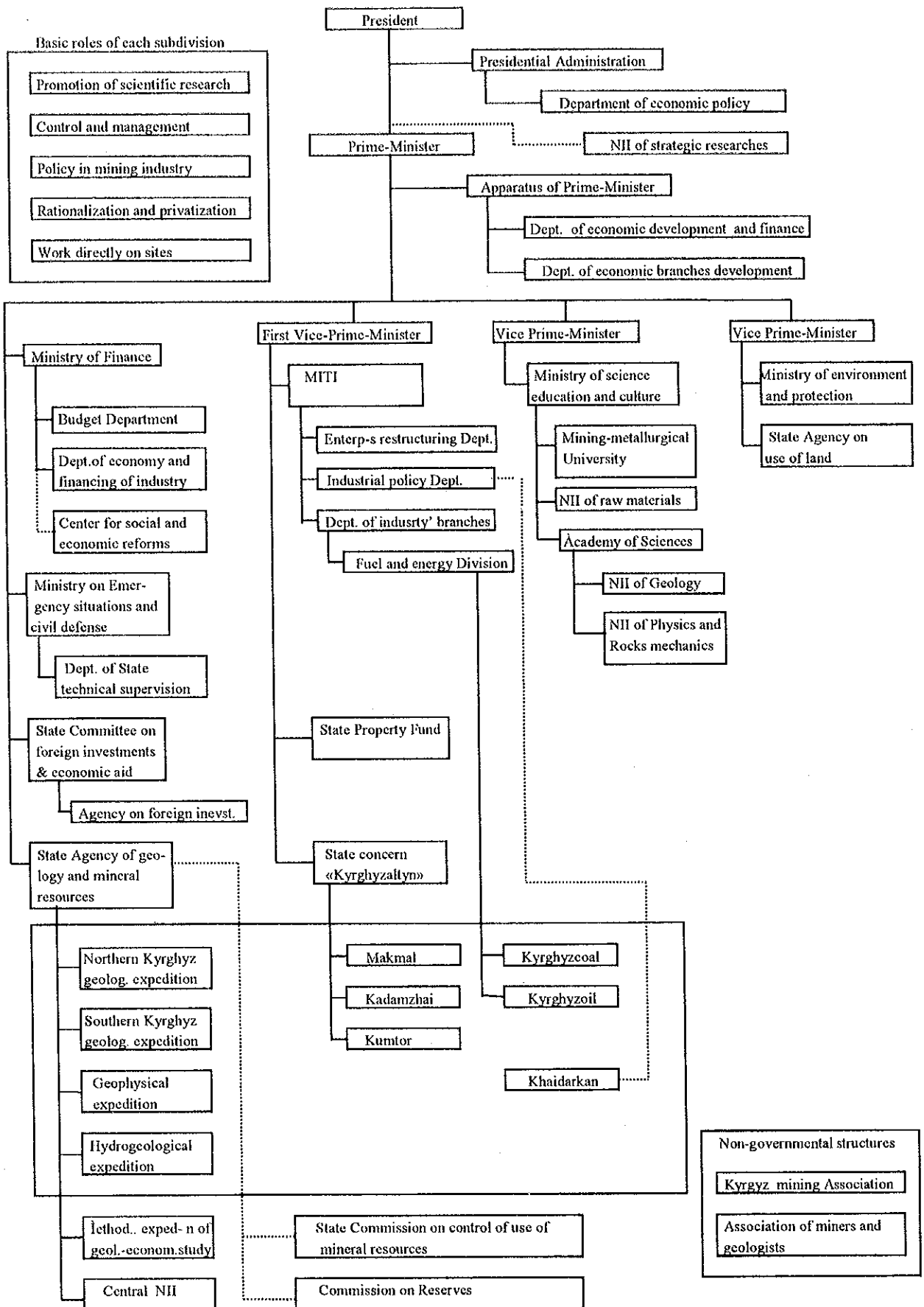




Topographic Map

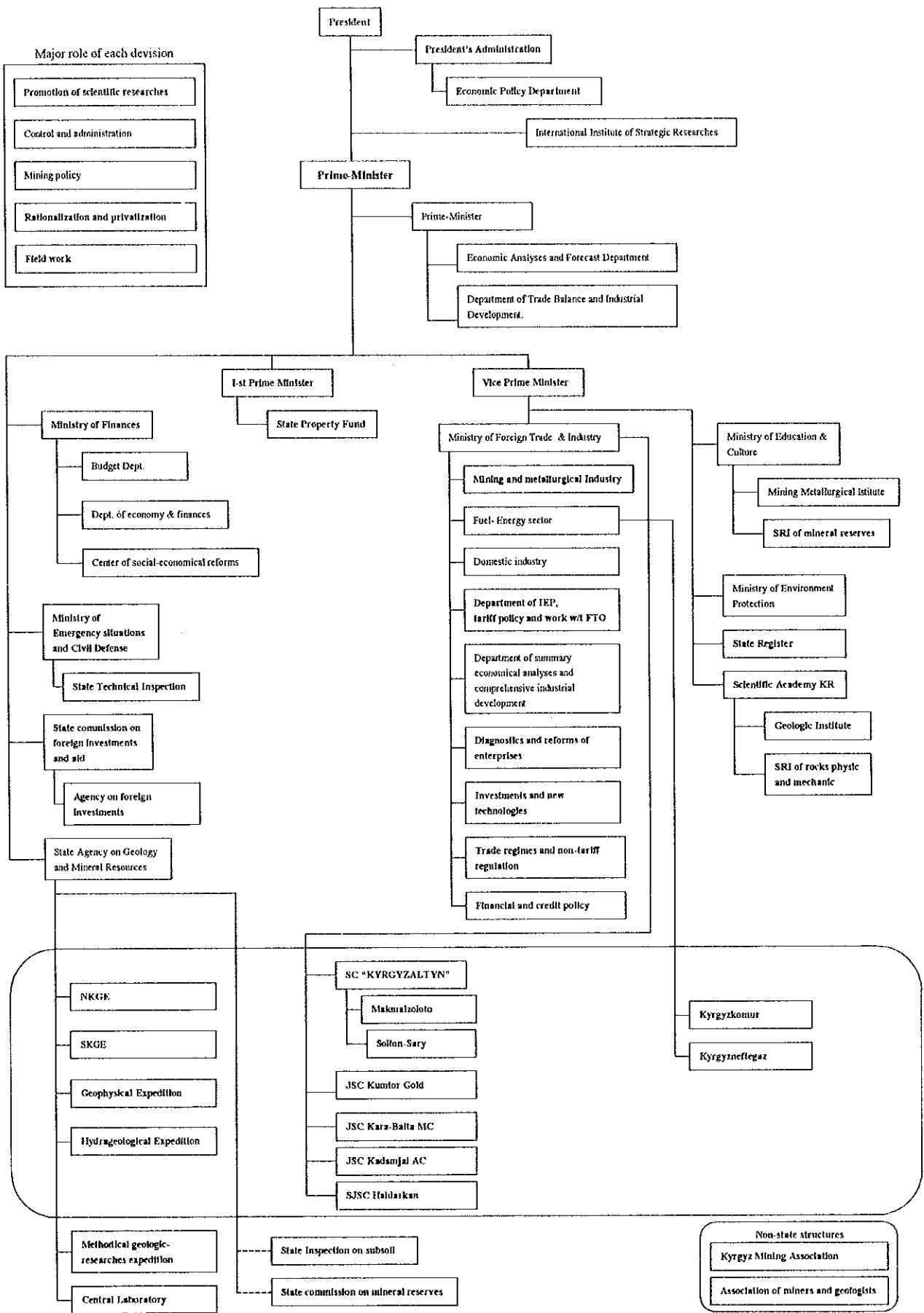


Infrastructure Map



System of governmental bodies on management of mining industry Figure (1)

(in the time of implementation of investigation)



System of governmental bodies on management of mining industry Figure (2)
 (made up as of August 1999)



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

CONTENTS

Topographic Map
 Infrastructure Map
 System of governmental bodies on management of mining industry Figure(1),(2)

	Page
1. Outline of the Investigation	1
2. Present Situation in Mining Industry	5
2-1 Mineral resources - status	5
2-1-1 Geological structure	5
2-1-2 Mineralization	5
2-1-3 Deposits: Characteristic features and distribution	6
2-1-4 Mineral resources potential	8
2-1-5 Competitiveness of mineral resources	10
2-2 Geological explorations	12
2-2-1 Reliability and practical results of geological explorations	12
2-2-2 Geological surveying - status	13
2-3 Exploitation	15
2-3-1 System of mines development and current situation	15
2-3-2 Gold mines economical appraisal	17
2-3-3 License for geological explorations	19
2-4 Present situation in the production	21
2-4-1 Mining industry position in macroeconomy	21
2-4-2 Situation at combines	26
2-5 Mining industry organization and present situation of privatization	34
2-5-1 Mining industry organization and function	34
2-5-2 The structure and role of the most important bodies of mining industry	38
2-5-3 Privatization	52

2-6	The present situation in the sphere of legislation and taxation system	53
2-6-1	The most important laws related to mining sector	53
2-6-2	Tax code in the part of mining activity	57
2-7	Current situation at the model (Khaidarkan) combinat	61
2-7-1	Report of the ERRA research mission	61
2-7-2	Mineral resources in Khaidarkan	62
2-7-3	Production	64
2-7-4	Economic state of the combine	72
2-7-5	Analysis of management of the combine	81
2-7-6	Summary on Khaidarkan Combine	88
2-8	Current status of basic economy spheres relevant for mining industry	91
2-8-1	Current infrastructure status	91
2-8-2	Current status in education	98
3.	Mining Industry Problems	101
3-1	Problem points of mining industry by branches	101
3-1-1	Mineral resources	101
3-1-2	Exploration and development	102
3-1-3	Combines	103
3-1-4	Organizational aspects	104
3-1-5	Mining legislation	104
3-1-6	Law on foreign investments	105
3-1-7	Tax system	105
3-1-8	Environment protection	105
3-1-9	Privatization	105
3-1-10	Infrastructure	106
3-1-11	Education	106
3-1-12	Closely related industries	106
3-2	Systematization of the above-mentioned problems of mining industry	107
3-2-1	Mineral resources	107
3-2-2	Geological exploration and development	107
3-2-3	Combines	107
3-2-4	Organizational aspects of mining industry	108
3-2-5	Legislation and tax system	108
3-2-6	Infrastructure, education and others	108

4. Plan of Mining Industry Promotion	109
4-1 Basic course of mining industry promotion	109
4-1-1 Economic development and promotion of mining industry	109
4-1-2 Basic course of mining industry promotion	110
4-2 Forcing ore exploration and development of deposits	114
4-2-1 Forcing development of gold-bearing deposits	114
4-2-2 Prospective areas for implementation of geological exploration	116
4-2-3 Basic plan of geological exploration	118
4-2-4 Model mine	120
4-2-5 Mineral Resources Research Center	123
4-2-6 Mining industry promotion and environment control	128
4-2-7 Introduction of system of international standards of accounting	130
4-2-8 Openness of information and cultural exchange	130
4-2-9 Financial support for small and middle-size mines	131
4-3 Restructuring of combines	133
4-3-1 Rationalization of each combine	133
4-4 Support system of mining industry	137
4-4-1 Establishing of centralized management structure in mining industry	137
4-4-2 System support for legislation and tax	142
4-4-3 System of environment control	146
4-4-4 Personnel training	149
4-4-5 Privatization	149
5. Plan of Actions	151
5-1 Plan of actions on mining industry promotion	151
5-2 Variants of assistance projects by international organizations	155
5-3 Fund of ore exploration and development and gold mining industry promotion ..	156

Attached Materials

1. System of support of mining industry in highly developed countries
2. Table of Comparison of Mining Law and Tax by Countries
3. Comparative results of deposits evaluation in the terms of taxation system existing in mining legislation of Kyrgyz Republic, Argentina and Philippines(study case)
4. Basic conception of mining industry promotion policy
5. Measures on promotion and growth of small and middle-size enterprises

6. Summary of Incentives for Mining Investment in Argentina and Philippines
7. Accounting program
8. Characteristics of Small Scale Water Flow Type Power Generator
9. Features of trackless mining system

Attached Maps

- Geological Map
- Tectonics Map
- Stratigraphic Profile
- Geotechnic History
- Gold Deposit Distribution Map
- Gold Deposit Characteristic Analysis Map
- Gold deposit Grade and Reserve Analysis Map
- Tin, Antimony, Mercury, Copper Deposit Distribution Map
- Gold Deposits including Copper and Arsenic Distribution Map
- Khaidarkan Geologic Map
- Mercury Deposit Map Area by Cut-off Grade in Khaidarkan
- Tereksai Geologic and Deposit Map

Table Contents

Table 2-1-1	Characteristics of Structural Blocks in Kyrghyz Republic
Table 2-1-2	Hg, Cu, Sn, Sb Deposits Au Equivalent Grade & Amount
Table 2-2-1	Target and Situation of Foreign Company Exploration
Table 2-3-1	Kyrghyz Main Mining Related Tax Rates and Items
Table 2-4-1	Rate of Inflation and Officially Registered Unemployment
Table 2-4-2	Amount of Imports and Exports for Industry & Agriculture
Table 2-4-3	State Budget
Table 2-4-4	Annual Production by Mineral Commodity such as Oil, Gas, Antimony and Coal
Table 2-4-5	Employment in Various Industries (people)
Table 2-4-6	Import of Some Kinds of Goods
Table 2-4-7	Present Situation of Mining Combine's Ownership and Issues
Table 2-5-1	Role of Organizations in the Mining Field
Table 2-5-2	Functions of Organizations on the Mining Sector
Table 2-5-3	Role of State Agency on Geology and Mineral Resources
Table 2-5-4	Role of Exploration Expedition
Table 2-5-5	The government organization in related to the environment and their role
Table 2-5-6	International Cooperated Project of Mining Industry
Table 2-5-7	Number of Privatized Enterprises and Facilities
Table 2-6-1	Comparison of Mining Legislation
Table 2-6-2	The Law and Regulation in related to Environment
Table 2-6-3	Mining Industry Related Expense Burden (Tax, Commission, User Fee)
Table 2-6-4	Mining Related Tax Revenue (1997)
Table 2-7-1	Khaidarkan Deposit Reserve & Grade
Table 2-7-2	Annual Production by Mine
Table 2-7-3	Profit-and-loss account of Khaidarkan Combine
Table 2-7-4	Balance sheet of Khaidarkan Combine
Table 2-7-5	Permanent tangible assets in details (Data are given as of December 31, 1997)

- Table 2-7-6 Dynamics of output volumes, shipments and remained reserves
- Table 2-7-7 Credits, interest and penalty
- Table 2-7-8 Amendments into profit and loss account of 1997
- Table 2-7-9 Balance sheet before and after amendment (Data are as of December 31, 1997)
- Table 2-7-10 Cash flow account (as of December 31, 1997)
- Table 2-7-11 Volume of production by subdivisions
- Table 2-7-12 Costs by subdivisions in 1997
- Table 2-7-13 Costs of ore processing on Mine #2 in 1997
- Table 2-7-14 Results of trial calculation of income in 1997 by subdivisions
- Table 2-7-15 ERRA program on marketing and comparison of this program with actual results
- Table 2-7-16 Factors and costs of production according to ERRA program and their comparison with actual results
- Table 2-7-17 Comparison of factors of mercury production with the indicators of ERRA program
- Table 2-7-18 Comparison of factors of fluorite production with the indicators of ERRA program
- Table 2-7-19 Electric power consumption on Khaidarkan Combine
-
- Table 2-8-1 Outline of Rehabilitation Scheme of Main Roads and Present Situation
- Table 2-8-2 Electric power Production
- Table 2-8-3 Major Hydropower Stations
- Table 2-8-4 Present Situation of Domestic Communication
- Table 2-8-5 Number of Universities and Students in Kyrgyz Republic
-
- Table 3-1-1 Distribution of reserves on categories of deposits
-
- Table 4-2-1 Promising Small Scale Deposits
- Table 4-2-2 Basic Design (draft) of Exploration
- Table 4-2-3 Characteristics of deposits at model area and model mines (candidates)
-
- Table 4-4-1 Obligations of unified body of mining industry management and its comparison with currently existing bodies
-
- Table 5-1-1 Plan of Actions on Mining Industry Promotion

Figures Contents

- Figure 2-1-1 Location of Deposits such as Gold, Copper, Mercury, Antimony and Tin
- Figure 2-1-2 Gold Deposits Characteristic Classification
- Figure 2-1-3 Portion of Existence of Gold Deposits Including Arsenic in Kyrghyz Republic
- Figure 2-1-4 Location of Model Projective Gold Deposit Exploration
- Figure 2-1-5 Comparison of Au Deposits with Hg, Cu, Sn, Sb Deposits Equivalent Gold Grade & Amount
- Figure 2-2-1 Independent Exploration, Budget and Personnel
- Figure 2-2-2 Gold Deposit and Mine Property Map
- Figure 2-3-1 Gold Deposit Economic Evaluation Results
- Figure 2-4-1 Changing of GDP
- Figure 2-4-2 Composition of GDP by Industry
- Figure 2-4-3 Imports and Exports
- Figure 2-4-4 Export Amount of Main Export Industries
- Figure 2-4-5 Flow of Antimony Production of Kadamjay Combinat
- Figure 2-4-6 Change of Antimony Production
- Figure 2-5-1 Flow of Making Budget
- Figure 2-5-2 Structure of State Agency on Geology and Mineral Resources
- Figure 2-5-3 Flow of License Acquisition
- Figure 2-5-4 Flow of Data Management
- Figure 2-5-5 J/V Structure
- Figure 2-5-6 Kyrghyzaltyn Structure
- Figure 2-5-7 Organization of Ministries of Environment and Protection
- Figure 2-5-8 Area where the Mining Industry Environment is a Problem
- Figure 2-6-1 Position of Mining Relevant Law for Legislation
- Figure 2-6-2 Tax Regime Comparison (After Tax)
- Figure 2-6-3 Flow of Levy Fee on Environment
- Figure 2-7-1 Model Area of Deposit According to Cut-off Grade
- Figure 2-7-2 Change on Domestic Demands of Mercury in Japan

- Figure 2-7-3 Structure of Khaidarkan Combine
- Figure 2-7-4 Prospective Cross-section and Possession of Ore Reserves at the No.1 Mine
- Figure 2-7-5 Prospective Cross-section and Possession of Ore Reserves at the No.2 Mine
- Figure 2-7-6 Flow diagram of the Mercury Metallurgy Plant of Khaidarkan
- Figure 2-7-7 Flow diagram of the concentrator of Khaidarkan
-
- Figure 2-8-1 Transportation Means of Freight and People
- Figure 2-8-2 Railroad and Road Map
- Figure 2-8-3 Location of Hydropower Stations and Network of Electric Supply
- Figure 2-8-4 Future Concept of Communications System
- Figure 2-8-5 Kyrgyz Training System
-
- Figure 3-1-1 Reserves and Production of Mercury, Antimony and Tin in the World
- Figure 3-1-2 Recent Price Tendency of Mercury, Antimony and Tin
-
- Figure 4-1-1 Image of Promotion of Mining Industry
-
- Figure 4-2-1 Model Area (Draft)
- Figure 4-2-2 Model Mines and Development of Deposits in their vicinity
- Figure 4-2-3 Mineral Resources Research and Development Center
- Figure 4-2-4 Concept of Environmental Control System
-
- Figure 4-4-1 Project of SAGMR Reorganization
- Figure 4-4-2 View Environmental Control and Management
-
- Figure 5-3-1 Forecast of Gold Mining Industry Development

1. Outline of the Investigation

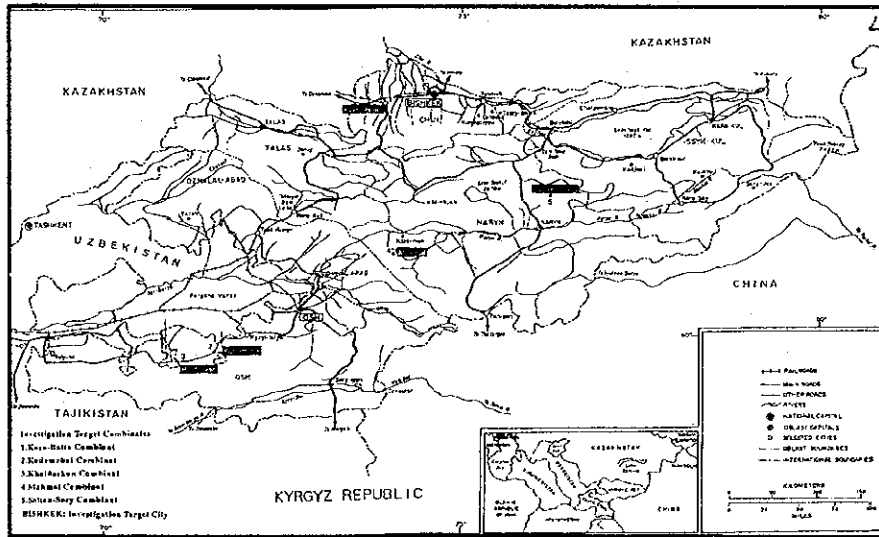


1. Outline of the Investigation

Starting with Independence in August, 1991 the Kyrgyz Republic has been in transition to a market economy. The Republic strives for state economy reconstruction through recourse to International Organizations and donor countries to perfect its monetary system, to liberalize prices, to upgrade its legal system, to privatize the state sector of industry and other structural changes.

Compilation of this Master-Plan was undertaken through cooperation of the Kyrgyz Government and Japanese Government since the first one deems its mining industry as a base economy to provide the government with hard foreign currency. The investigation purpose and its content have been discussed between both countries and agreed upon on the 11th of September 1997. This is depicted in the following documents: "Scope of Work" and "Minutes of the Meeting".

- | | |
|---------------------------------------|--|
| ● Target Areas Allocation | The whole Territory of the Kyrgyz Republic |
| ● Task Elements (5 types of ore) | Gold, mercury, antimony, copper, tin |
| ● Combinates (Combines) (5 Complexes) | Kara-Balta, Kadamzhai, Khaidarkan, Makmal, Solton-Sary |
| ● Model Combinate (Combine) | Khaidarkan |



Investigation Target Combinat and Main Cities

During the Soviet period the mining industry of the Kyrgyz Republic has been developing as a raw material producing base for mercury, antimony, uranium and rare earth metals. After the Soviet Union collapse the Mining Complexes are facing such structural problems as markets loss and contraction, price rise on fuel, lubricants and electricity, worn-out and cumbersome equipment etc. Restructured and rationalized business on (the ERRA Plan) the Khaidarkan Combinate became even more complicated, if compared to previous years, due to the world mercury market curtailment and some problems with fluorite. Because of a lack of raw ores and decreased antimony prices the Plant has experienced a major crisis. The situation at the Makmal Gold mine, which used to be the only one in Kyrgyzstan, is presently very complicated because of delays in changing the open pit workings over to underground workings. As for privatisation in the mining industry, apart from the Kara-Ballet Combinat where the present situation is comparatively normal, there are a lot of problems for solution within other Combinates.

Problems of mining industry are as follows:

- Reduction of content of main deposits (deepen ore occurrence, low grade)
- Worn- out industrial equipment, played-out technology
- Electric energy prices rise
- Loss of skilled manpower due to restructuring
- Deficit of production management in accordance with new market conditions
- Deficit of circulating capital

Since the Canadian gold mining Joint Venture, "Kumtor" has started to production, the production of gold has risen up to 17 t, which contributed to expansion of GDP in the Kyrgyz Republic (10%). The Government of the Kyrgyz Republic tends to keep up the production of mercury and antimony and at the same time plans to develop major gold deposits such as "Kumtor" providing foreign investment can be provided. The Government of Kyrgyzstan greatly hopes that development of the mining industry will assist economic reform. Nevertheless, financing of geological studies has been decreased in comparison with the level during the period of Soviet Union involvement. Presently, domestic geological activity, is almost suspended and foreign companies whose main purpose is to have a profit, carry out the major part of exploration.

Thus, during the transition period to a market economy some organisations and enterprises related to mining industry of the Kyrgyz Republic, still operate however, there is no single governmental body for regulation and control of the industry of Kyrgyz Republic. Also, there is no common opinion concerning the course that mining industry development should follow.

The principal problems of mining industry are as follows:

- Aims and tasks of mining industry development are not defined. Specific measures on mining industry development are not undertaken.
- So-called “Soviet system” is still present in mining industry management, thus, all functions are scattered among numerous organisations due to absence of a united superior body to regulate the activity.
- The re-estimation of the resources according to the new market economy has not duly done and the old “Soviet” estimates are still used.
- In spite of “Law on Entrails”, “Law on Foreign Investment”, and numerous “Tax Codes” virtually everything is as a result of negotiations.
- State Agency on Geology and Mineral Resources has mixed administrative functions (license issue on exploration and exploitation of ore deposits etc) and functions directly connected with geological exploration work.
- Presence of many small and medium size gold deposits where work is either temporarily suspended or still in the study stage.
- There are many deposits where underground working is required. Also, there are many kinds of ores with complicated ore recovery. Promotion of advanced technology of exploitation is not duly promoted.

Perpetual mining industry development providing the Republic with the foreign currency is an important issue for accelerated economy reform, so it is very essential to perform a restructuring of Mining Combines to expand the gold mining industry ASAP. In order to facilitate these developments, it is necessary to secure public support for the mining policy, which the Government decides.

The task of mining industry development is co-ordinated with the Japan Study Group and the Steering Committee of the Kyrgyz Republic:

1 Reconstruction and strengthening competitive power of mining combines (Makmal, Kadamzhai, Khaidarkan)

Re-evaluation of reserves of studied deposits from the market conditions point of view, review of production scales, introduction of new mining technologies

2 Speeding up foreign capital involvement in geological exploration and mining works

Taking preferential measures with respect to the foreign capital, development of a flexible policy in defining foreign capital share in JV's, study of the influence of the tax system upon the mining industry

3 Development of small and medium deposits by own means and improvement of mining technologies

Determination of area to be developed, making favorable tax system for mining industry, establishment of Development Fund, softening of different limitations, like exploitation norms, for the development of natural resources.

4 Establishment of Center on study and development of mineral resources (based on international assistance of Japan and other states)

Geological study of underground resources, industrial evaluation of deposits, working up mining projects, ore processing technology, environmental control, teaching personnel for mining industry

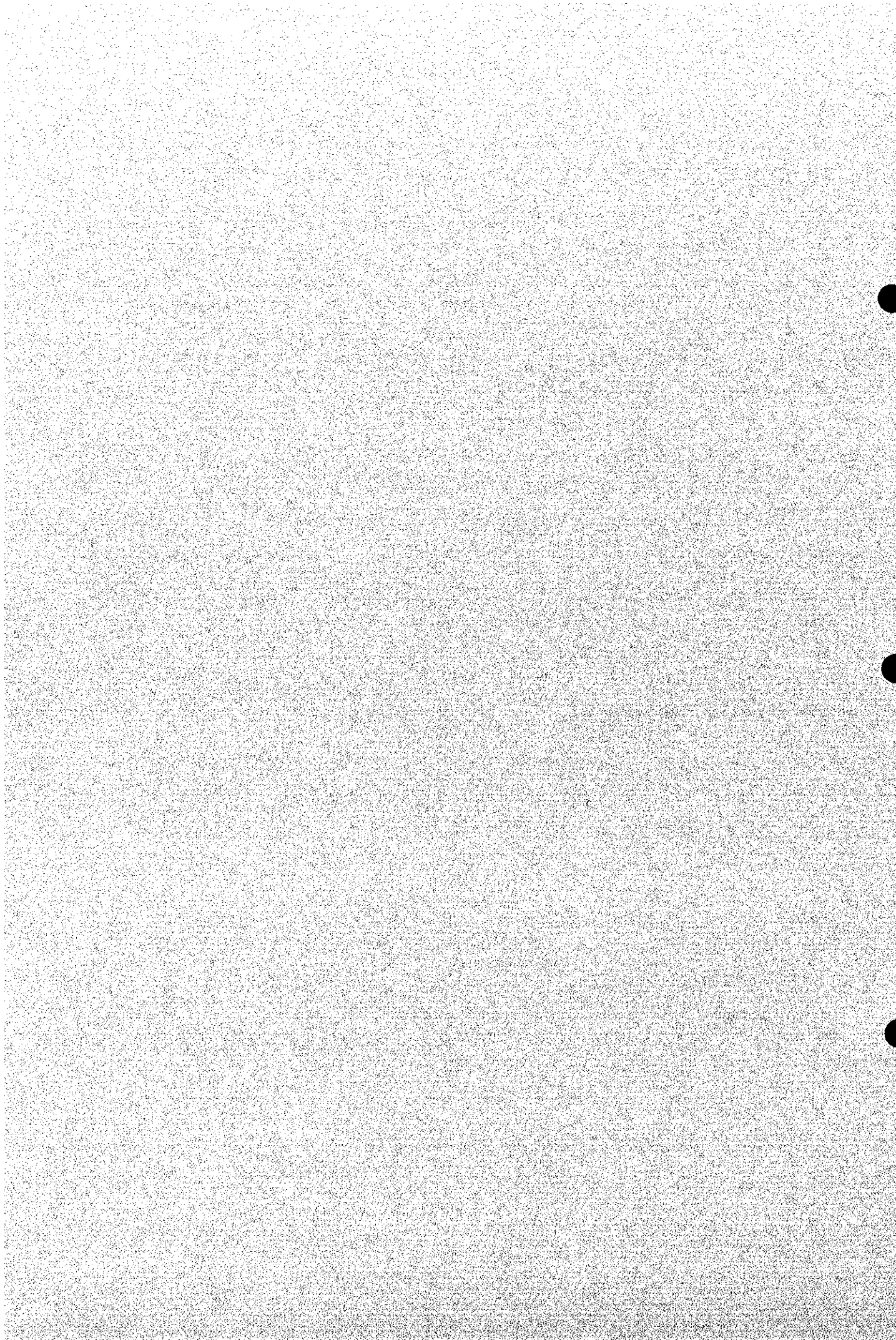
5 Consideration of possible establishment of unified mining industry managing state body and privatization of sphere of direct production

Creation of system supporting independent development of small and medium deposits, establishment of private geological exploration and mining companies

6 Promotion of international personnel and information exchange with countries having highly developed mining industry

Modernization of geological data storing in Agency on geology and Mineral Resources, holding seminars to increase the level of education of industry's personnel, sending groups of specialists to the countries with advanced mining industries to study their experience in this field

2. Present Situation in Mining Industry



2. Present Situation in Mining Industry

2-1 Mineral resources – status

2-1-1 Geological structure

The geological structure of Kyrgyzstan is complex and consists of three structural blocks—Northern, Central and Southern Tien-Shan. They were formed from sedimentary and igneous rock of Archeozoic and Paleozoic age; and differ significantly in stratigraphy and lithology. Cenozoic and Mesozoic sedimentary rocks are widely represented and cover the structural block. The blocks are oriented from east to west, separated from each other by a defined structural line or faults (See Attachment).

- Each of the blocks represents a continental massif or microcontinent exposed to intrusion and volcanic activity.
- The boundary between the Northern and the Central Tien-Shan is the Nikolayev's Structural Line, the boundary between the Central and the Southern Tien-Shan is the At-Bashy-Enylchek Fault.
- The presently active NE-SW trending Ferghana Fault divides the blocks, the structural line and the mentioned fault.

2-1-2 Mineralization

The mineralization process in Kyrgyzstan is diverse, and comprised of porphyric, lode, polymetallic and skarn deposits, all closely associated with igneous activity. Mineralization of each of the blocks has its own peculiarities (Table 2-1-1).

1) Gold mineralization

The whole of the Kyrgyz territory shows gold mineralization. Besides those 95 gold deposits identified by the SAGMR (Figure 2-1-1), it is said that there are some 100 more gold ore manifestations. Mesozoic and Cenozoic sediments do not show any of gold mineralization.

- Gold mineralization occurred mainly during the Paleozoic era (the age of mineralization varies depending on blocks).
- Gold deposits are divided into three types: lode, mineralized and stockwork.
- Gold occurs in association with, or is included within, pyrite, bornite, chalcopyrite, pyrrhotine, arsenopyrite and other metallic minerals.
- Gold mineralization in some parts of Central and Southern Tien-Shan is accompanied by arsenic. The Northern Tien has developed a porphyric-gold-copper mineralization of the "Island Arc" type.

2) Mineralization of copper, mercury, antimony and tin

Copper mineralization is typical of the Northern Tien-Shan while mineralization of mercury, antimony and tin characterise the Southern Tien-Shan. It is believed, that

mineralization of the above metals took place either almost simultaneously or at the same time as the gold mineralization.

- Various metals are found in the blocks – copper, mercury, antimony, tin etc – each of which reflects a specific process of mineralization.
- Deposits occur as veins or as stratified occurrence in sediments containing numerous empty cracks.

Table 2-1-1 Characteristics of Structural Blocks in Kyrgyz Republic

	Northern Tien-Shan	Middle Tianshan	Southern Tianshan
Geological framework	Micro-continent+island arc	Island+island arc	Continent
Main Rocks	Metamorphic Rock, Terrestrial volcano	Sedimentary Rock (including limestone) Metamorphic Rock	Sedimentary Rock (including limestone)
Intrusive Rock and its geological age	Granite, Syenite Ordovician, Silurian, Permian	Granite Silurian, Carboniferous	Granite (partially Syenite) Permian
Deposits	Au, Cu	Au, Sb, Cu	Au, Hg, Sb, Sn, W, Cu

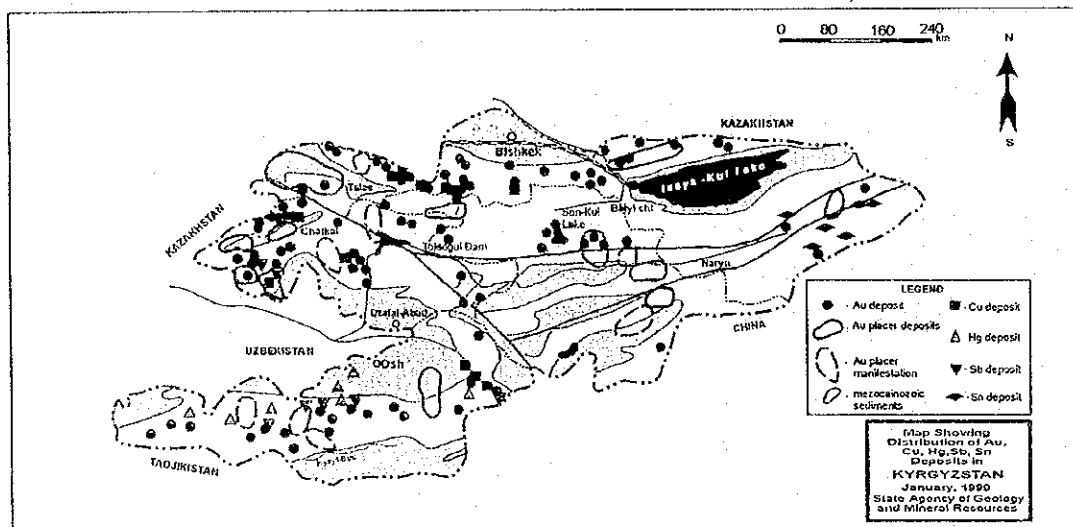


Figure 2-1-1 Location of Deposits such as Gold, Copper, Mercury, Antimony and Tin

2-1-3 Deposits: Characteristic features and distribution

1) Gold deposits

Ninety-five gold deposits have been classified and offered by SAGMR. These deposits are classified as lode (45%), mineralized (39%) and stockwork (16%) of which 10% are big deposits (>70tn of Au), 20% medium (20-70tn of Au) and 70% small (<20tn of Au). Vein deposits are comprised of gold-quartz (40%) or gold-sulphide (60%) assemblages (Figure 2-1-2). It is made clear that gold bearing deposits are widely represented all over the country as well as ore manifestations and signs of mineralization (although their proper affirmation

depends on the degree of exploration).

- Lode deposits consist of gold bearing quartz veins in metamorphic, sedimentary and granite rocks. They are high grade with more than 10 g/t. Small and mid-size deposits (Solton-Sary and others are most common).
- Mineralized zones are developed along the contact of granites and limestone and consist of skarn precipitations and well-developed network of faults usually containing sulfides (Makmal and others).
- Stockwork deposits are characterised by gold in quartz and calcite stockwork veins of porphyric type. The deposits are large and low-grade associated with sulfides (Kumtor and others).
- Deposits in the structural block are gold-quartz-vein ones accompanied by copper in Northern Tien-Shan; normally sulfide type in the Central and Southern Tien-Shan– they are characterised by the presence of arsenic and antimony (Figure 2-1-3) in the Southern Tien Shan.

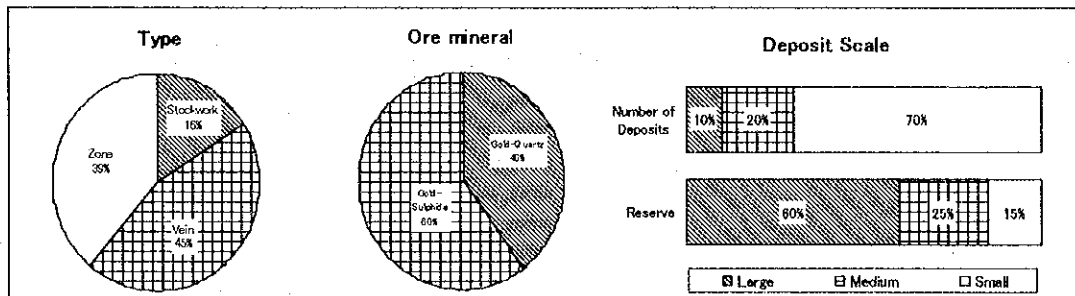


Figure 2-1-2 Gold Deposits Characteristic Classification

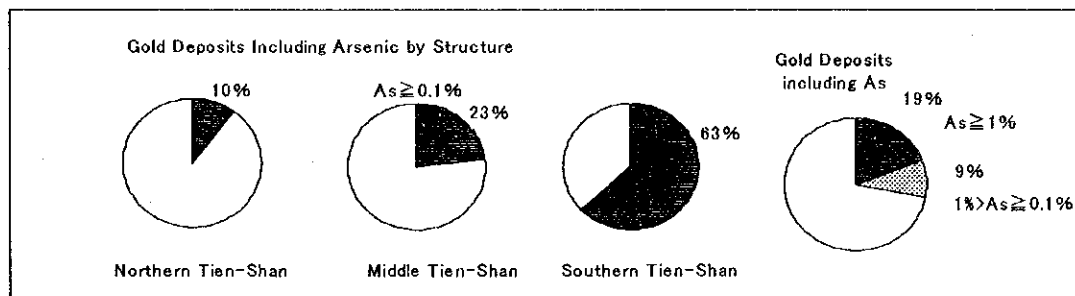


Figure 2-1-3 Portion of Existence of Gold Deposits Including Arsenic in Kyrgyz Republic

2) Placer gold

Gold placers are wide spread throughout the Kyrgyz Republic: the SAGMR has compiled a list of 20 placer gold deposits, consisting of 12 placer gold deposits in alluvium sand formation and 8 manifestations of placers along the rivers in the premises of primary deposits (Figure 2-1-1).

- The scales of gold placers are as follows: thickness – 0.5-5.0m (max – 30m), width – 5-

1000m, length – 1-30km, depth from the surface – 0-50m.

- The gold content varies from 0.1 to 0.5 g/m³, rare from 1 to 2 g/m³. Registered balance in stock – merely 21 t (category C – 7 t).

3) Other deposits

Copper precipitates are found in gold-copper deposits in the Northern Tien-Shan (western part of the Ferghana Fault); mercury and antimony occurs as dense disseminations (along the Alay Ridge of the Southern Tien-Shan) and form a zone of mercury-antimony accumulation. Tin metal deposits are locally concentrated in the eastern part of the Southern Tien-Shan (Figure 2-1-1).

2-1-4 Mineral resources potential

1) Gold Deposits

Total gold reserves in the 95 gold deposits are 2840 ton of gold, graded as B+C+P categories, although few deposits are well studied. The occurrence of many ore manifestations and mineralization in the deposit neighbourhood imply that one might expect an increase of the total reserves. Deposits with 7 g/ton, with total reserves of 30 ton, make up more than a half of the total deposits: only a small quantity of reserves has high gold grades (Figure 2-1-5). Additionally, 19% of all of the deposits contain more than 1% arsenic (Figure 2-1-3). Within the potentially rich territories allocated by the SAGMR, there is enough potential to more than double the existing gold budget stock. Therefore, it is important to analyse potentially rich monometallic gold-bearing deposits to determine their reserves and development potential under the conditions of market economy.

- Gold deposits in Kyrgyzstan are associated with intrusive granitoids
- Sulphides and arsenic containing ore fields are regionally split
- Gold-bearing deposits along the Nikolayev's Structural Line are monometallic and of high grade
- Even in the regions where arsenic is normally present placers deposits contain little or no arsenic

2) Gold Placers

Most of the 20 gold placers and ore manifestations listed are under preliminary exploration. Known gold placers (containing more than 0.5 g/m³), with gold extraction potential, are insignificant and make up less than 3 ton of gold total for the whole of the territory. Since primary deposits occur throughout the country, and future exploration may discover new deposits for possible development, the potential for the discovery of new placer deposits, in association with known and future deposits, is high.

3) Other deposits

The Northern Tien-Shan with its copper-gold deposits has a complex geological structure and unfavourable geological conditions for the formation of large porphyric deposits. Known mercury deposits are low grade at 0.1 – 0.8% and richer deposits are not likely to exist. The same is true for antimony deposits. Hardrock tin deposits are economically non-competitive because of the large number of lower cost placer tin deposits which occur worldwide. Access to tin metal fields is restricted and complicated which makes them presently unattractive as targets for explorations and development.

4) Perspective Gold Bearing Ore Fields

Considering deposit characteristics and economic potential of several prospective gold-bearing ore fields have been singled out as requiring increased foreign exploration both to create a national capital and to define economic gold deposits for development.

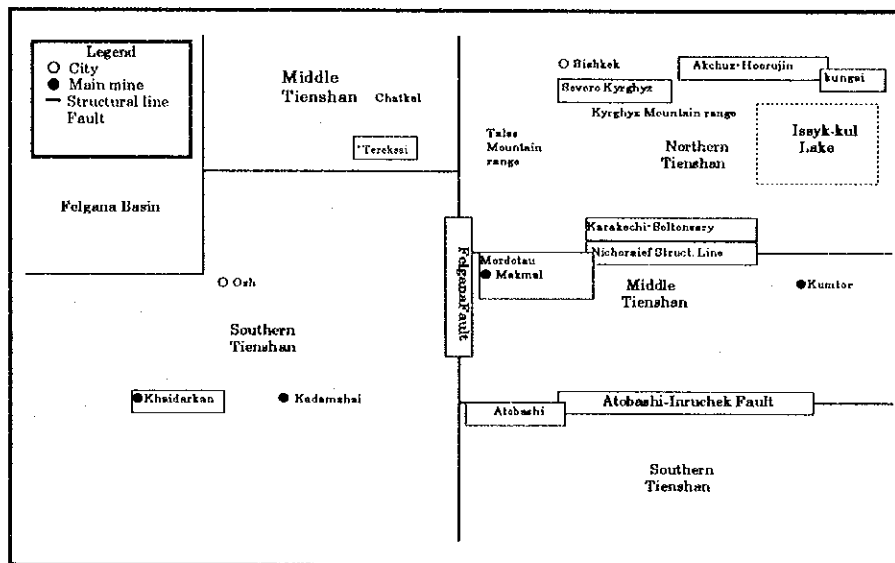


Figure 2-1-4 Location of Model Prospective Gold Deposit Exploration

- Promising Gold Bearing Ore Fields rich in monometallic mineralisation
 - Along the Kyrgyz Ridge (Northern Kyrgyzstan, Ak-Tjuz-Kungey, Bohordin)
 - Along the Nikolayev's Structural Line (Karakich, Solton-Sary, Moldo-Too)
 - Along the At-Bashy-Ilchinsky Fault
- Promising Ore Fields to create the national capital
 - Small and mid-size deposits presently of limited interest to foreign enterprises.
 - Fields within the premises of the Khaidarkan, Terek-Sai and other rare earth ore mining and processing plants (contain gold deposits, numerous ore manifestations, and possibility exists to utilise the existing equipment for development and facilities operation)

- AT present JICA, MMAJ and SAGMR are performing exploration in the fields in the neighbourhood of Khaidarkan Mercury Plant (there is a number of small-size deposits, such as Altyn-Jylga, Karakyzzyk, Tyaksuu with low arsenic content)
- There are some 15 gold bearing areas in Terek – neighbourhood of Terek-Sai Antimony Plant (Terek, Perevalnoye, Terskan with low arsenic content)

Prioritised Areas for Geological Exploration

- Karakich and Solton-Sary situated along the Nikolayev's Structural Line
- Alay Field within Khaidarkan vicinity and Terek-Sai neighbourhood

2-1-5 Competitiveness of mineral resources

1) Au

The number of monometallic high-grade gold bearing deposits in Kyrgyzstan is small, (Figure 2-1-5) yet they can be competitive within a market economy environment, however, there is a need to develop economically beneficial treatment technology for most prevailing ores. In particular for the treatment of high arsenic containing polymetallic deposits containing various sulphide inclusions and gold in sulphides. Without such developments, it will not be possible to compete in the world's gold mining industry where they prefer larger deposits with low development costs.

Table 2-1-2 Hg, Cu, Sn, Sb Deposits Au Equivalent Grade & Amount

	No	Deposits	Grade %	Metal	Au conversion *	
					Grade g/t	Au amount, t
Hg	1	Haidarkan	0.200	4,630	1.1	2.70
	2	Chonkoi	0.258	22,698	1.4	13.60
	3	Chauraiy	0.226	875	1.2	0.50
Cu	4	Kurutegerek	0.850	343,200	1.9	82.40
	5	Bozumchak	1.140	203,400	2.6	48.80
Sn	6	Trudovoe	0.580	149,000	3.2	86.80
	7	Uchojgon	0.540	60,700	2.8	3.50
	8	Saribulak	0.930	18,004	5.4	5.80
	9	Atdjoilyan	1.970	675	11.5	0.40
Sb	10	Kadamjai	3.170	40,816	6.3	8.50
	11	Tereksai	3.140	23,115	6.2	4.80
	12	Kassanskoe	1.728	60,739	3.4	12.70

* Average 1997 prices of Hg, Cu, Sn, Sb, Au. Reference: Metal Bulletin Price & Data, Mineral Facts and Problems, Mineral Commodity Summaries.
 Au 331\$/TOZ, Hg 5.80\$/kg, Cu 238.1¢/kg, Sn 583.005¢/kg, Sb 2,089\$/t

2) Hg, Sb, Cu, Sn

- As for mercury and antimony there are very strong competitors (mercury – Spain; antimony – China). Mercury and antimony deposits are not high-capacity and are non-competitive as can be seen from the Gold Equivalent Chart (Table 2-1-2, Figure 2-1-5).
- World copper production is characterised by low cost SX-EW (Solvent Extraction and Electrowinning) however, the properties of copper deposits in Kyrgyzstan are different and this method is not likely to be used here. Additionally, the deposits are small to medium scale and

the country does not have copper smelting facilities and technology, which makes their development difficult.

● Major tin metal suppliers to the world markets are Brazil, Indonesia and Malaysia where the ore enrichment is performed at low cost due to favourable geological and technical conditions. The tin metal deposits of Kyrgyzstan are mainly hard rock deposits such as Greisen deposits. Therefore, it is hard to expect an industrial tin metal mining to become a reality under a market economy environment; unless there can be significant in-country value added processing.

3) Competitiveness of mineral resources

Potential of each mineral resource and competitiveness are evaluated as follows;

① Au

The potential of gold bearing deposits is high. At present, monometallic gold bearing deposits can be regarded as serious target areas.

② Increasing the number of commercial deposits can be achieved through the application of economically acceptable technologies for the treatment of arsenic containing, and polymetallic, ores.

③ The scale and the quality of copper deposits and mines in Kyrgyzstan will not allow implementing of electrochemical and dissolution extraction methods (SX-EW).

Mercury and antimony reserves of the country are small and low-grade which makes them noncompetitive.

④ Tin metal deposits have complicated mining conditions and their development will require large capital investments.

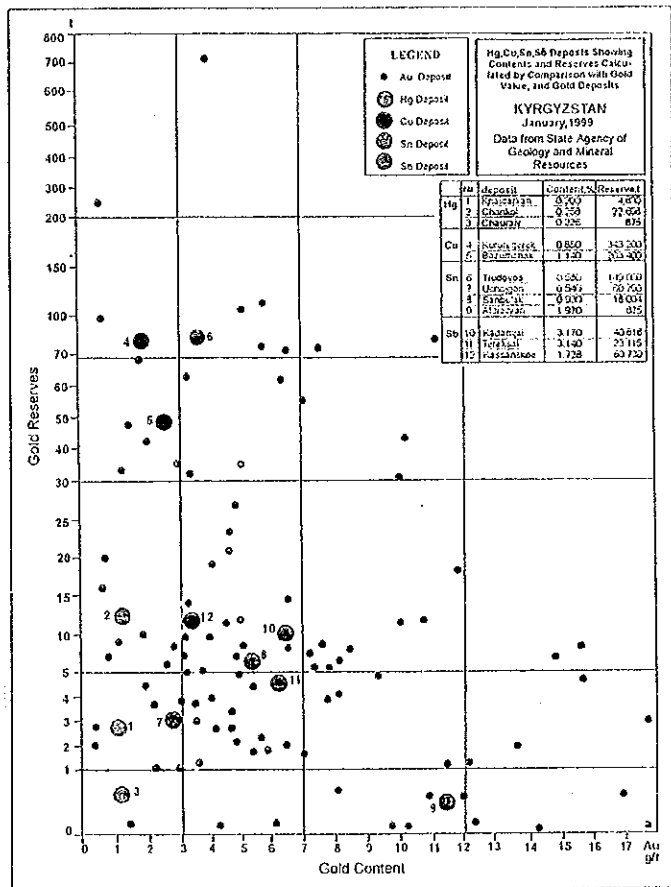


Figure 2-1-5 Comparison of Au Deposits with Hg, Cu, Sn, Sb Deposits Equivalent Gold Grade & Amount

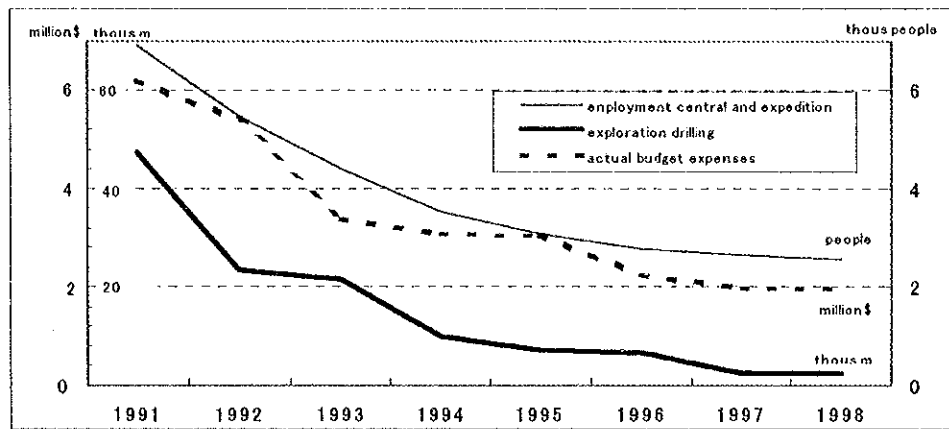


Figure 2-2-1 Independent Exploration, Budget and Personnel

2-2-2 Geological surveying – status

1) Geological Survey by Government

The State Agency on Geology and Mineral Resources (SAGMR) of the Kyrgyz Republic is the public authority responsible for geological surveying. The SAGMR's mandate was defined in 1997.

- Achieving maximum efficiency at minimum expense. On completion of a reconnaissance survey further exploration will be transferred either to private sector or to a joint venture. A preference is shown for exploration of gold resources)
- All geological prospecting expeditions are self-financed
- Perform a search for, and exploration of, deposits and minerals to establish new industries which did not exist in the country before (for instance, manufacture of pottery and high glazed articles, hi-tech branches of industry)

Due to the budget cut-backs in 1998 the state budget had allocated some 2 mln. USD, the number of employees dropped to 2500. SAGMR carries out its geological prospecting work to compile an index map, scale 1:50 000, of gold, crude oil and coal deposits through a detailed surveys and exploration though these works are (limited to and by the reconnaissance the second stage inclusive). Each geological expedition performs its activity mainly based on requests of foreign joint venture companies. However, as they are economically indept their equipment, tools and devises are extremely worn out and outdated which hampers the progress of performance.

2) Foreign Companies Activity

There are about 10 foreign companies from Canada, the USA, Great Britain (Cameco, TEK, Newmont, Phelps Dodge, Oxsus etc)– presently operating in Kyrgyzstan and who have created joint geological exploration companies with local mining and exploration businesses

(SAGMR Expeditions, SC “Kyrgyzaltyn”) to promote survey and geological exploration works (Table 2-2-1).

- They are seeking new deposits of gold within the vicinity of already existing ones
- The target deposits are large-scale deposits with reserves of gold metal exceeding 100 tons
- Geological surveys are made by implementing new approaches to tectonics

Today 85% of the 95 gold deposits identified are situated within the license areas of foreign companies (Figure 2-2-2). The joint ventures emerged and became active during 1994-1997. The budget of one geological survey JV requires approximately 1-2 mln. USD which includes office expenses and retainers to representatives of foreign companies. Therefore its actual expenditures for surveying and exploration are in fact much lower than the amount indicated. As a result, JV activities are largely confined to evaluation and appraisal activities.

Table 2-2-1 Target and Situation of Foreign Company Exploration

	Newmont	CAMECO	TECK
Employees	9 (7)	11 (10)	8 (5)
Exploration Stage	general, mapping, drilling	economic evaluation	geological survey, drilling
Budget (US\$)	1.5 million	1-1.5 million	2 million
Target	Au, 100 t reserves	Au, 100 t reserves Explored 2-3 years	Au, new deposit, 100 t reserves

() local people

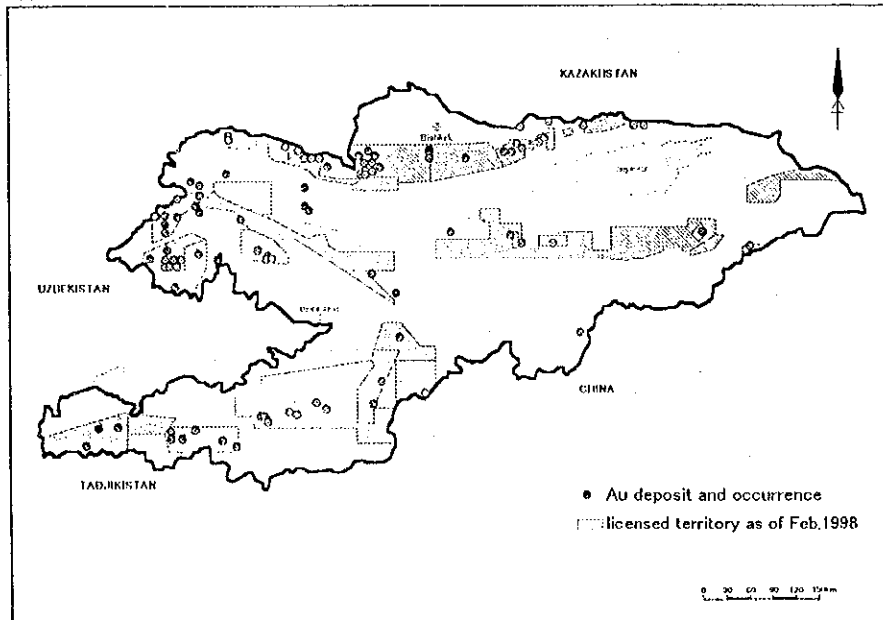


Figure 2-2-2 Gold Deposit and Mine Property Map

2-3 Exploitation

2-3-1 System of mines development and current situation

During the Soviet period the system of mines development embraced a complete course – from geological explorations to creation and exploitation of mines, with required financing being allocated by the central government. After independence in 1991 the integrated scheme of labour allotment fall apart, planners, design engineers and experienced construction personnel left the country. Later part of them returned and won employment in Research and Development Institutions and public institutions. Overall, the general capacity of mineral resources exploration significantly decreased. In 1992 the Kyrgyz Government established the State Concern “KyrgyzAltyn” leaving to the State Committee on Geology (now SAGMR) the realm of surveying and prospecting. The general management of precious metals mining plants and mine development, by means of their construction, exploitation and foreign investments attraction is the responsibility of “KyrgyzAltyn”. At the present time only the Makmal combine remains within Kyrghyzaltyn as all others were placed in other Ministries. The Kara-Balta Mining Plant broke free and became an independent enterprise; the Khaidarkan Mercury Plant accepted the jurisdiction of the Ministry of Trade and Industry; and the Kadamzhai Combinate is now attached to the State Property Fund. Other than the successful implementation of the Kumtor Project, owing to foreign capital investments, other large projects such as Taldy-Bulak Left Bank and Dzherooy, are not progressing despite government desire to promote their development

The reasons for this are as follows:

- ① Lack of (a) know-how to manage and maintain the plants, (b) specific technologies and skilled maintenance of mining; (c) skilled personnel at smelting and dressing shops and a need to reorient metallurgical divisions to a free market economy approach where competition is the main principle.
- ② The geological services and Mines Development Divisions are separated, therefore, there is no unified system to properly maintain mining industry development.
- ③ Despite government’s desire to attract more foreign investments to speed up the large-scale projects development, it does not undertake any of specific moves to encourage such foreign investments indeed; its trends and tendencies needed have not been identified or determined yet.

The system of mineral resources development during the Soviet period and now is like this:

- | | |
|--|--|
| • Surveying, geological prospecting | Kyrgyzstan (SAGMR) |
| • Planning, design (feasibility study reports) | Russia (Ministry of Industry)
R & D on Physics and Rock Mechanics |
| • Construction and Installation | Kazakhstan (a division within the Ministry of Construction) |

Foreign Construction Companies
Kyrgyzstan (Kyrgyzaltyn)
Combinates and other mining enterprises

- Production

In the following, the present situation and problems related to technical, technological and financial issues; issues of legislature encouragement and fiscal system, and the attraction of foreign investments.

1) Technical and Technological Aspects

- Equipment and machinery intended for mine development are outdated and worn out
- Absence of know-how for mineral resource development, in particular, the inability to compile a feasibility study report, to perform proper calculations, and to undertake necessary planning and design for mining industry
- An outdated technology for mining shaft construction and minerals extraction
- Absence of a training system to produce highly qualified and skilled personnel
- There is a modern gold mine on Kumtor Mine Site, which is a good model for open pit mining however, there is no such modern model for underground mining utilizing track-less haulage systems such as LHD equipment or big drilling machines of the “Jumbo” type
- The present underground mining technology does not require large equipment for stoping and chamber-shaft system
- The present underground mining method using shrinkage, room and pillar, etc., does not require large equipment
- The absence of R&D in regard of complex ores treatment currently only allow for the development of plain gold-quartz veins
- The technology of economic appraisal in a free market environment has been introduced, however, it is not well understood or utilized at the present time

2) Financial Aspect

- Kyrgyzstan is considered high risk by international financial institutions due to the economical situation in the country and the reliability of feasibility studies. Thus, the provision of development financing is totally dependent on foreign companies
- There is no Government support of financial provision
- Kyrgyzaltyn has its own fund for the development of the gold mining industry however, they are inadequate to support the industry

3) Issues of Legal and Taxation Systems

- The size of licensed territories is in activity not limited to the actually allotted area. As a

result some foreign companies monopolize larger areas thus reducing the access of the other companies to the same areas.

- Royalty fees (5%), Tax for Road Use (0.8%) and Emergency Fund Deduction (1.5%), which creeps u to a total 7.3% based on the total amount of sales and their aggregate tariff and are too high.
- Compensation for, and obtaining the rights to, usage of land is subject to negotiate with local authorities and the amount of compensation is not established. The negotiation of the amount of compensation, which may be substantial, is a complex and time consuming process
- To perform minerals and mines development it is required to invest reasonable amount of funds for electric power lines installation and infrastructure development which is a sole burden and responsibility of a foreign investor
- The system for dealing with public relations and information dissemination does not exist

4) Foreign Investments Attraction

At present Cameco Company of Canada operates the Kumtor Gold Mine, negotiations are in progress with Oxsus Company of Great Britain to settle the matters about the Dzherooy Gold Mine and a Malaysian company is developing the Taldy-Bulak Left Bank Deposit. Besides, additionally the US's largest mining companies Phelps Dodge and Newmont, continue to perform gold mine exploration and development activities.

The recent stagnation in the activities of these companies has resulted from the decline in the price of gold and from changes of policy by the Kyrgyz Government with respect to inactive advantages offering.

2-3-2 Gold mines economical appraisal

During the Soviet period the economics of gold mines were carried out using their procedure: free market analyses was not performed. As a result the data SAGMR makes available in their Table of 95 gold deposits, shows only the soviet evaluations.

1) Methods of Evaluation

- American Standard: based on the former U.S. Bureau of Mines cash flow analysis
- Software: PREVAL (Pre-feasibility Software Program for Evaluating Mineral Properties). This software program is for a preliminary evaluation of properties of minerals
- The mentioned software has been tested by the former U.S. Bureau of Mines, it is easy for PC users. The parameters of the models depend on statistical data available in the USA: which, therefore do not accurately reflect the real circumstance of the countries being studied. This makes the software primarily useful for circumstances of approximate evaluations

The Table 2-3-1 provides basic tariffs and types of taxes in connection to mining industry which were used for an economic evaluation.

Table 2-3-1 Kyrgyz Main Mining Related Tax Rates and Items

Item	Kyrgyzstan
Corporate income tax (on taxable income)	30%
Royalty	5% of GR
Value added tax on imported equipment	20% for goods/commodities none for equipment
Typical import duty	Variable
Typical export duty	no information
Dividend withholding tax (on previous year's cashflow)	15%
Interest withholding tax (on accrued interest)	15%
Foreign ownership restrictions	None
Government equity requirement	None
Other significant taxes	Road tax-0.8% X GR Emergency fund - 1.5% X GR land tax-depends on soil, location and area, etc.
Concession fee	Depends on the deposit value
Feasibility study costs	None
Pre-production exploration costs	None
Depreciated equipment	Declining balance method (up to 30% of equipment value)
Depreciation buildings	Declining balance method (up to 10% of building value)
Loss carry forward	yes, 5 years
Loss carry back	None
Tax holidays	None

- Depreciation: Declining balance method is currently adopted. In case of annual machinery depreciation it is possible to pay off up to 30% of present equipment value (and up to 25% in case of big size equipment). Annual depreciation for buildings - up to 7%
- Expenditures for feasibility study report and detailed explorations before the operation start-up: is included to the cost of development, possibility of annual depreciation – up to 25%
- Infrastructure expenditures: is included to the cost of development, possibility of annual pay-off – up to 25%
- Other: generally applicable regulations do not envisage accelerating measures to speed up the process of development

2) Results of Evaluation

The results of economical evaluation of the 95 gold deposits are as shown on Figure 2-3-1.

- Prospective deposits – 10% to the total amount, they are Kumtor, Ak-Tjube, Karakzyk, Taldy-Bulak Left Bank, Dzherooy, Kichi-Sandyk, Makmal, Kyzyl-Kia, Solton-Sary: four of

them are regarded as being small sized

- 10% of the deposits require further detailed examination
- The remaining 80% have been explored and studied only up to the first stage, which makes the currently available data inadequate for an economic analysis.

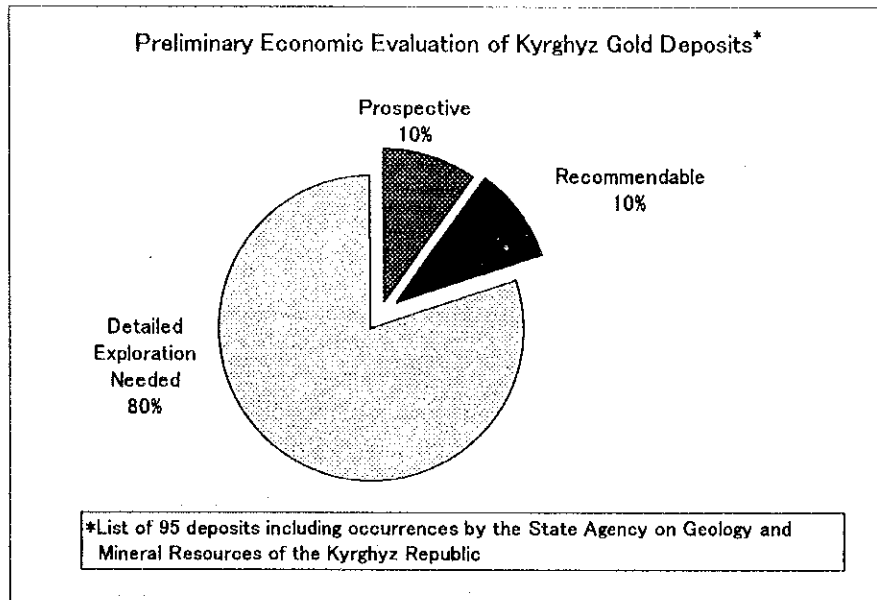


Figure 2-3-1 Gold Deposit Economic Evaluation Results

2-3-3 License for geological explorations

SAGMR issues a license for geological exploration and extraction. An Application Request, normally accompanied by a Geological Exploration Plan, is simultaneously submitted to the local authority. The latter is vested to issue permits for land lot use.

- Endorsement Fee. Is paid to SAGMR in the amount of 1100 soms regardless of the size of the pending lot allotment
- Land Compensation Fee is not required. However the local authority produces an invoice for compensation for actions done to the existing land lots.
- Exploration Activity Compulsory Fee. Initial exploration (surface survey, trenches making, drilling) – over 200 som/km² a year. Detailed exploration (thorough geological explorations at the stage of Feasibility Study) – 1500 som/km² a year

As for industrial and access roads construction in the areas of exploration only compensation for existing land lots is needed, however, if road construction is to cut or to be made within the special areas then the appropriate Ministries and Authorities would require compensation for land use. When it comes to hewing down forests then it is necessary to obtain a

permit from the State Agency on Forestry, the latter will also produce the compensation invoice.

- The issuance of a license to perform any and all geological exploration works in National Parks is absolutely prohibited
- Licenses for further development are prioritized so that the preference is shown to those businesses who have already completed their initial exploration work
- Further below are the details touching upon the stage of development preceding the initial stage

There is a possibility to switch to development prior to completion of initial exploration and with no regard to the category of reserves provided the company agrees to take the risk. Kyrgyzaltyn, the Concern, being a State owned formation does not fall under these provisions.

As a result, it is allowed to simultaneously perform exploration, development, and test mining.

Kyrgyzaltyn is also allowed to perform selective mining of the richer parts of an ore body, but if the Internal Rate of Return (IRR) exceeds the norm of the feasibility study report then it is required to so adjust the zone of mining/excavation that the IRR will not be exceed the acceptable level of 15%. This is made by mixing richer parts of ore body with poor ores.

When submitting the Application Request to obtain a License for Development it is also required to submit a Business Plan. The Attachments will contain results of the Feasibility Study Report (FSR), permits for land use (with marked boundaries of the allotted land lot, size of the lot, the amount of compensation etc). This License is the subject to evaluation by and within the following authorities:

- SAGMR: checks for legislative compliance and conformity, economic validity, technical expertise and the general outcome
- Ministry on Environment Protection: checks ecological aspects
- State Inspection on City Planning and Design: check for security reasons.

To verify all the appropriate data the Inspection will inform the local authority about the application for License but the latter has no right of veto

Endorsement Fee: Paid to SAGMR in the amount of 1100 som regardless of the size of the challenged land lot.

Permit for Land Use: The Business Plan is expected to contain a calculated amount of money for land use. The amount is paid to SAGMR with a further allocation with the State Agency on Organisation of the Use of Land.

Payments for the damage done to the existing land lots, for road construction and forests clean-up are made in the same manner as that for geological exploration works.