

Japan International Cooperation Agency

Steering Committee of the Study on the Strategic Plan of
Mineral Resources Development in the Islamic Republic of Mauritania

**The Study on the Strategic Plan of
Mineral Resources Development
in
The Islamic Republic of Mauritania
Final Report
(Summary)**

March 2006

**Japan International Cooperation Agency
Economic Development Department**

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JR
06-006

Preface

In response to a request from the Government of the Islamic Republic of Mauritania, the Government of Japan decided to carry out the Study on the Strategic Development Plan for Mineral Resources in that country. The study was implemented by JICA, the Japan International Cooperation Agency.

For a total of 7 times between October 2003 and March 2006, JICA dispatched to Mauritania survey teams comprised of members from Mitsui Mineral Development Engineering Co., Ltd., including Team Leader Yuji Nishikawa; Norwest Corporation Ltd.; and Project Environment Co., Ltd.

On-site surveys were conducted with the cooperation of relevant Mauritanian government officials, then the team members returned to their respective home countries where they worked to complete this report.

It is our hope that the present report will help to promote this study and will serve as a vehicle for strengthening friendly relations between Japan and Mauritania.

In closing, we would like to express our sincere gratitude to everyone who helped to make this report possible.

March 2006

Tadashi IZAWA
Vice President
Japan International Cooperation Agency

March 2006

Mr. Tadashi IZAWA
Vice President
Japan International Cooperation Agency
Tokyo, Japan

Letter of Transmittal

It is with great pleasure that we submit to you this final report on the Study on the Strategic Development Plan for Mineral Resources in the Islamic Republic of Mauritania.

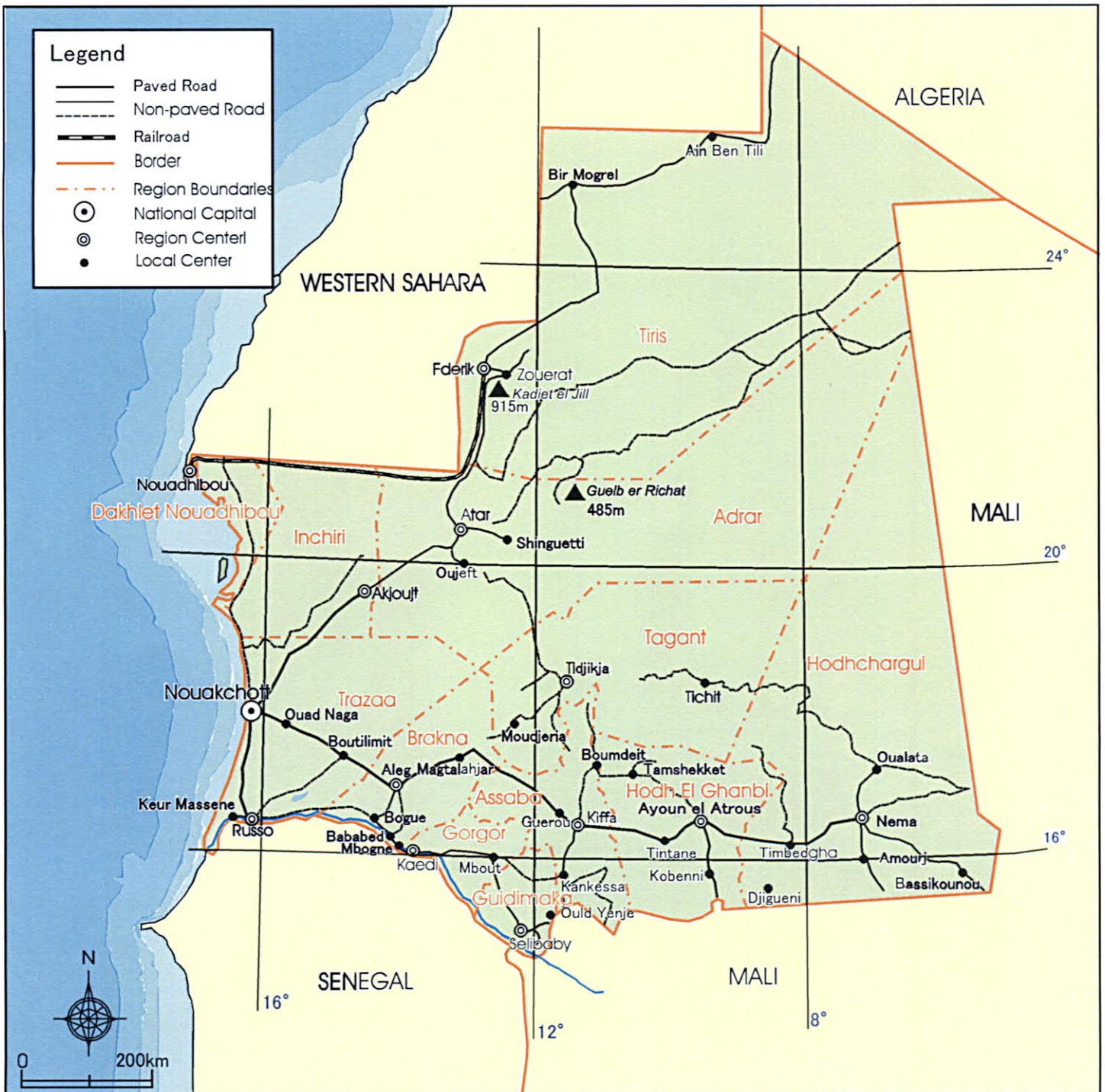
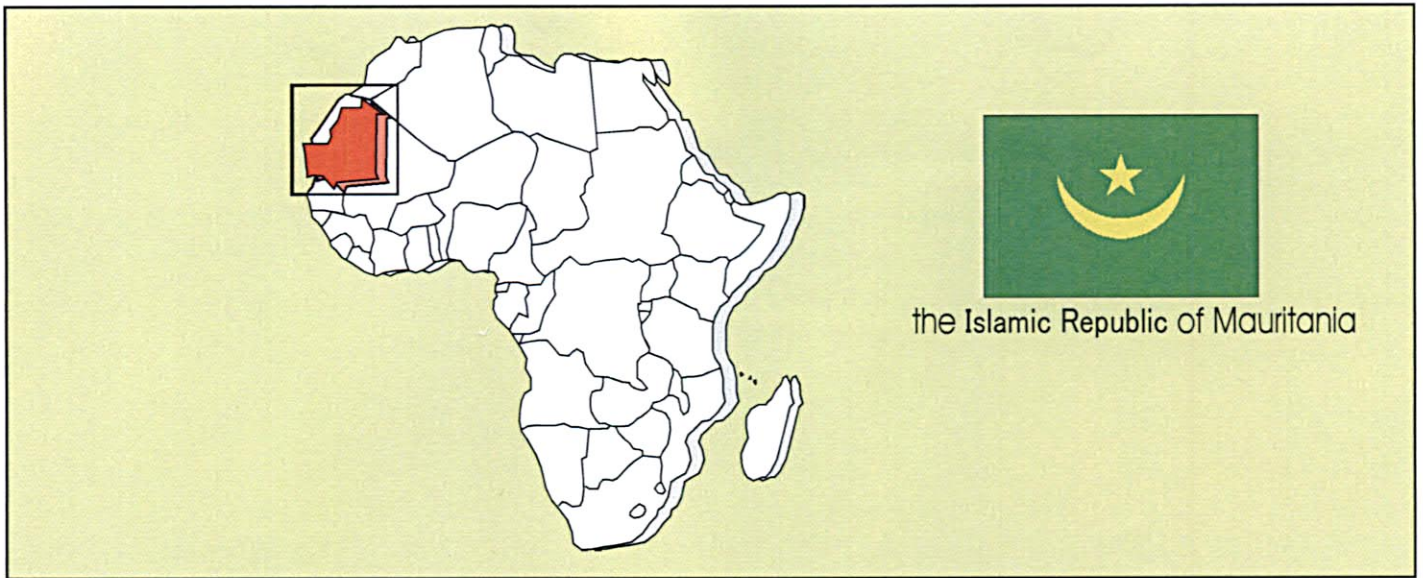
This study was conducted by Mitsui Mineral Development Engineering Co., Ltd. under contract with your organization for a 30-month period from October 2003 to March 2005. This report was compiled to promote the mining industry in Mauritania and to formulate a strategic development plan that will promote exploration to increase the accuracy of data on that country's mineral resources potential.

The strategic development plan proposes a practical strategy and development targets, and provides an effective action program to attract investment from the private sector. Attracting foreign investment, and advancing and promoting exploration, development, and the mining industry in general, are very important to the overall social and economic development of the Islamic Republic of Mauritania. As such, it our expressed desire that the Mauritanian Government make it a top priority to bring this plan to fruition.

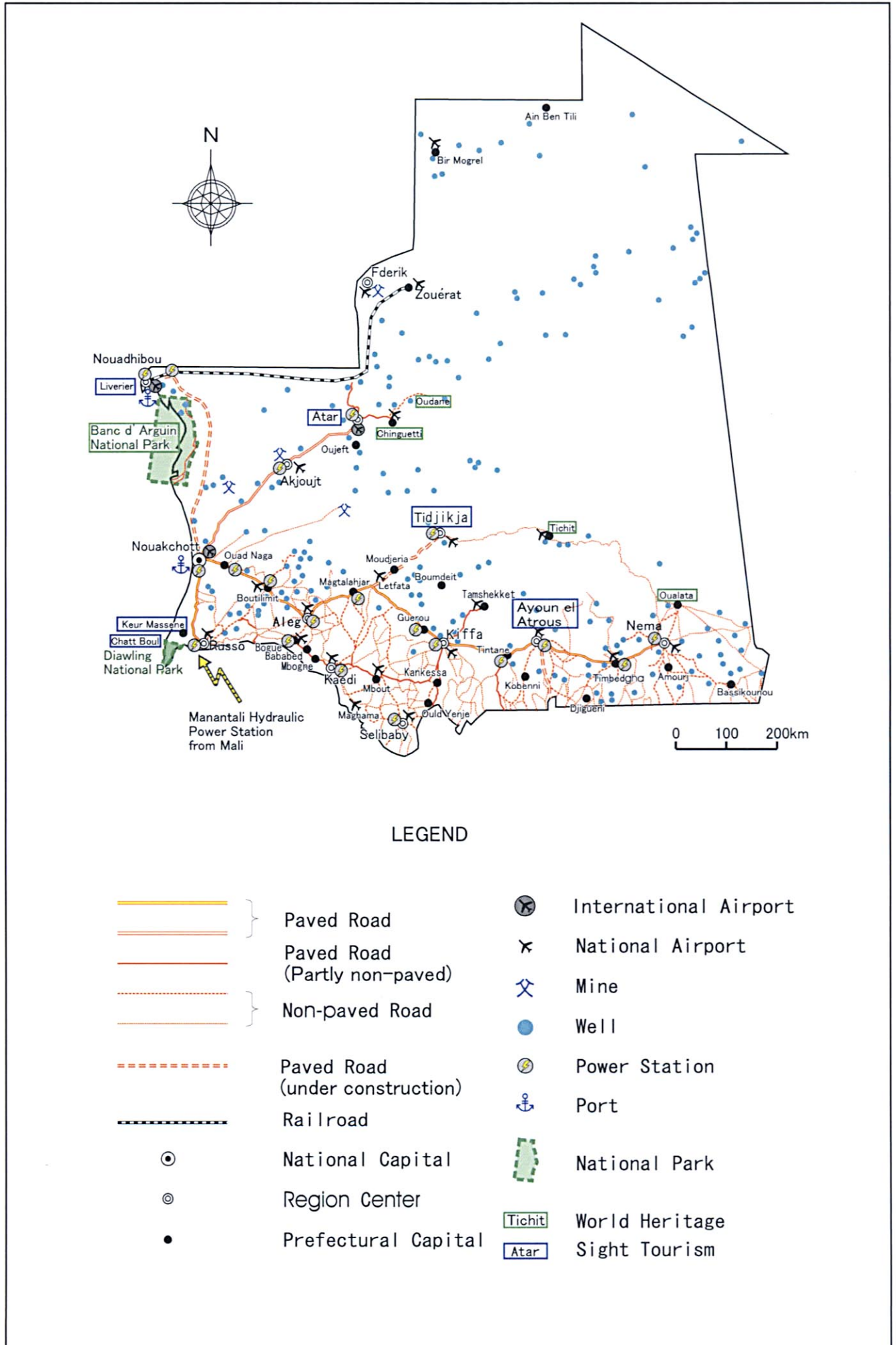
In closing, we would like to express our sincere gratitude to your organization, the Japanese Ministry of Foreign Affairs, and the Ministry of Economy, Trade and Industry for your support and guidance with this project. We would also like to thank the Mauritanian government, the Ministry of Mining and Industry, the Ministry of Economic Development, the Mauritanian Geological Survey, and everyone else who provided their services to assist us with the study.

Yuji Nishikawa
Team Leader

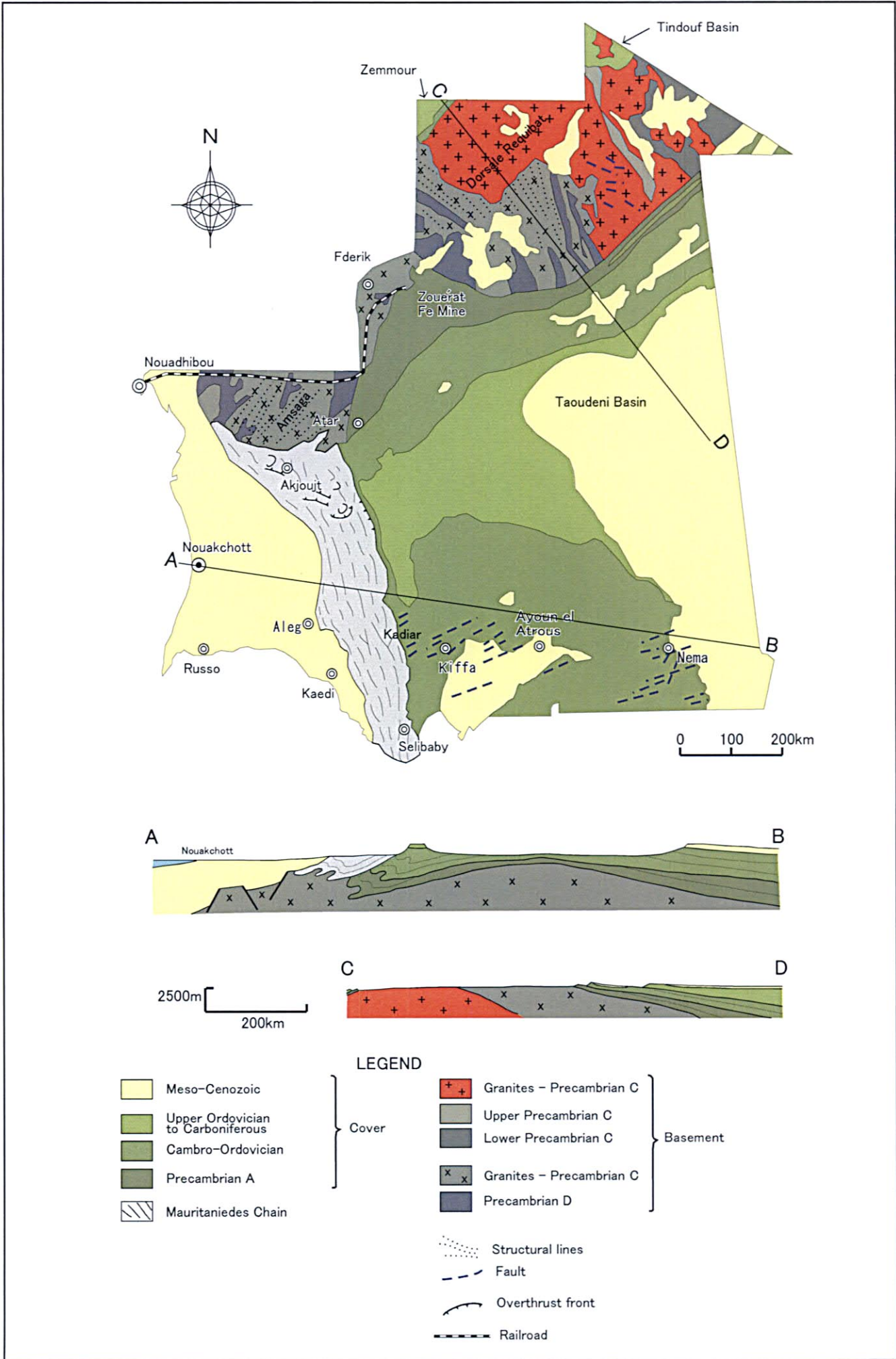
Survey Team for Mineral Resources Strategic Development Plan
for the Islamic Republic of Mauritania



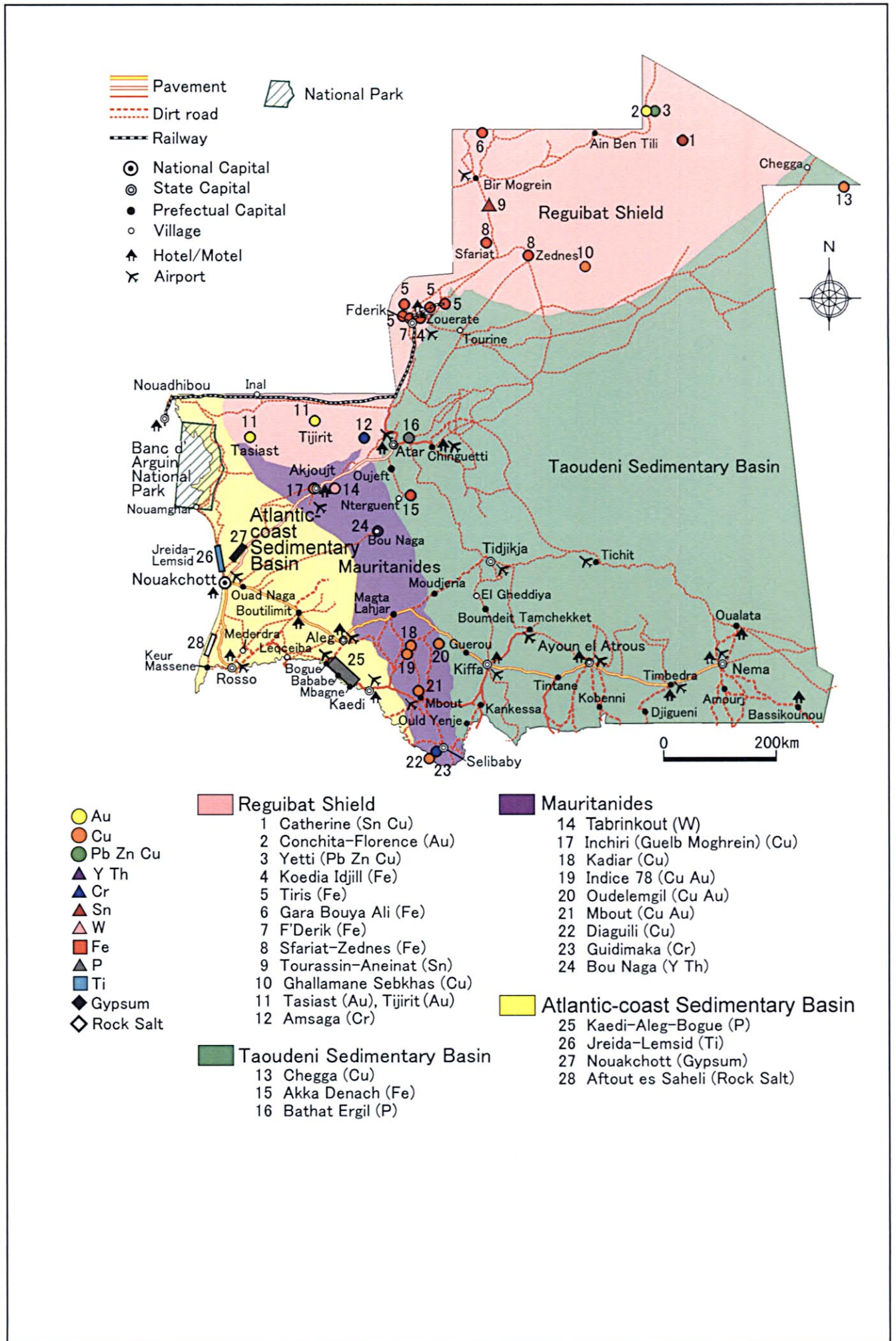
Location Map of the Islamic Republic of Mauritania



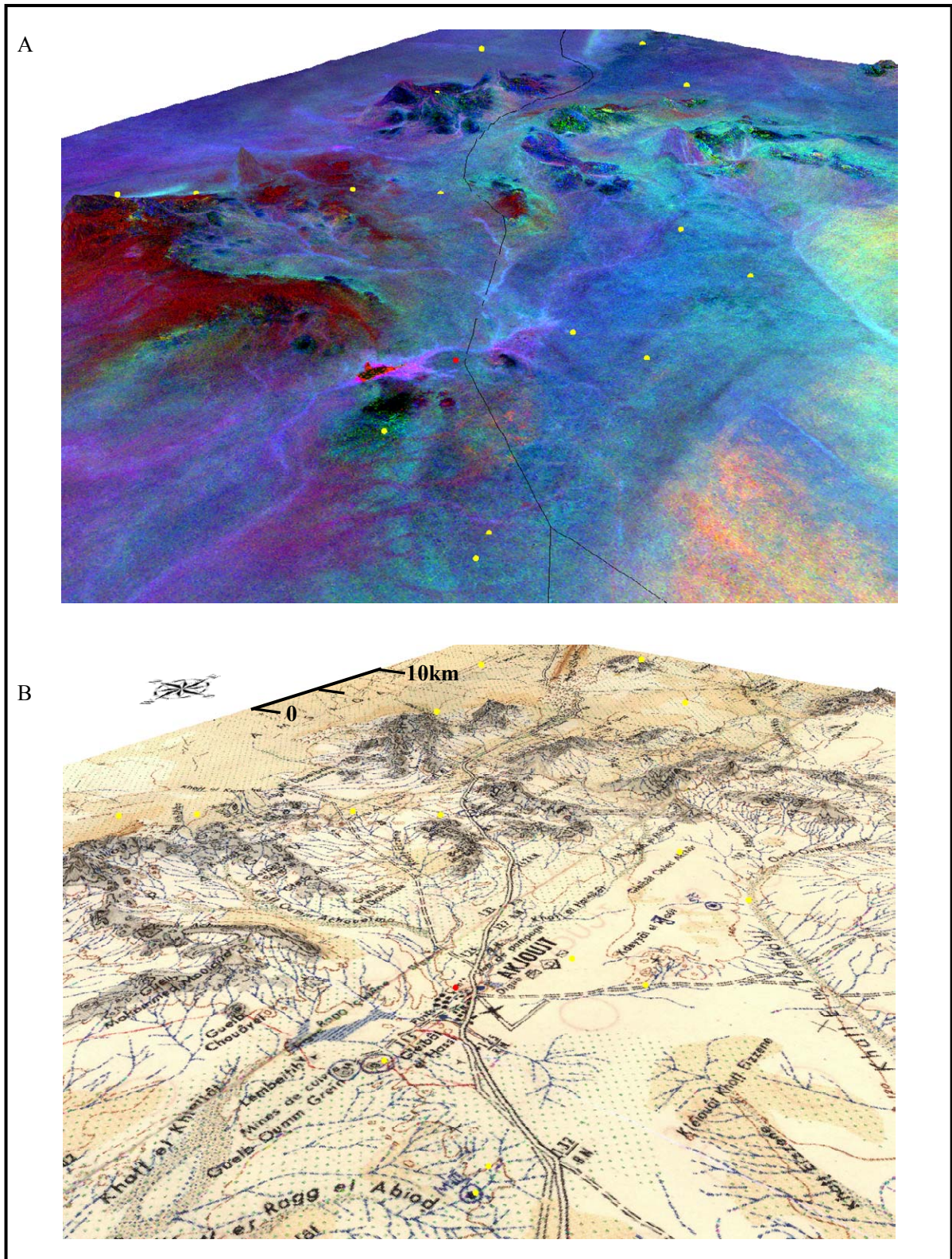
Infrastructure Map of Mauritania



Geological Map of the Mauritania



Distribution Map of Mineral Deposits and Manifestations of Mauritania



Three dimensional view using processed satellite imagery and topographical map of Akjoujt area *

A) Satellite imagery data : Landsat **, yellow points: mineral occurrences, curve : road data ***

B) Topographical map : 1/200,000 ***

* Elevation data : ASTER DEM ** Abrams rationing *** based on PRISM database



Open pit at the Akjoujt mine (Guelb Moghrein deposit). Having a small diameter of 400m S-N (left to right in the photo) and large diameter of 500m E-W, the mine was excavated until 1978. Currently, it is closed.



Camp scene at the Tijnirit deposit survey site. Workers live in tents, and water and food have to be brought in.

Camp scene at the Tasiast deposit Survey site. This is the exploration base for the Tasiast Gold Company. There are no developed roads leading to the site, and it is a roughly 100km ride across sand to the nearest national highway.



Views of Deposit Areas

THE STUDY ON THE STRATEGIC PLAN OF MINERAL RESOURCES DEVELOPMENT
IN THE ISLAMIC REPUBLIC OF MAURITANIA
FINAL REPORT (SUMMARY)

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Chapter 1 Overview of the Study

1.1 Background of the Study

The mining sector in the Islamic Republic of Mauritania has been the backbone of the country's economy since the 1960s when Mauritania gained independence from France. However, almost no exploration has been carried out due to several factors including the limited availability of geological information and poor legal/fiscal framework, in addition to the country's vastness, severe climate and lack of infrastructure.

Though Mauritania's potential for mineral resources is being revealed gradually, the geological information is still not sufficient. The Government gives top priority to the promotion of the mining industry by strengthening private investors' activities in the exploration of potential mineral deposits and their development. At present, the Government is trying to make an appropriate climate for private investments by carrying out the "Project for Mining Sector Capacity Building" (PRISM) supported by the World Bank.

1.2 Purpose of the Study

The purpose of the study was to consolidate the information related to geology, mineral resources, etc., for promoting the mining industry, to make a strategic plan for promoting exploration and to construct a GIS database of geologic ore deposits for increasing the potential mineral resources and to contribute to promotion of investment in mining industry.

1.3 Target Area of Study

The target for the study was the entire territory of Mauritania. Geological information from surrounding countries having a similar geological backbone as Mauritania was also used when necessary to study the Mauritanian geology and ore deposits.

1.4 Method and Content of Study

The study consisted of two stages: A – the basic survey stage, and B – the stage for strategic plan of mineral resources. At the basic stage, the information related to the national development plan, the mining policy, the mining law, environmental consideration, geologic ore deposits and potential mineral resources were collected and analyzed; deposits were defined and promising areas were selected based on remote sensing analysis and supplementary geological field surveys. At the stage for strategic plan of mineral resources, a draft strategic plan of mineral resources development was prepared and approved after discussions with Mauritanian counterparts (Fig. 1.4.1). At the same time, the counterparts received technical transfer concerning the strategic plan for mineral resources. The final results of the survey will be presented at the international seminar of PDAC in March, 2006.

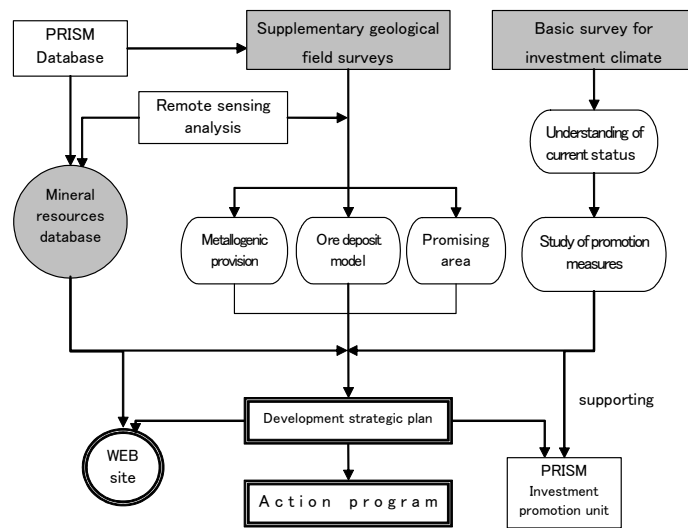


Fig.1.4.1 Flow of the Study

1.5 Site Study

The site study was conducted six times as follows;

- The first site study was carried out from November 15 to December 11, 2003 (27 days).
- The second study lasted from January 10 to March 4, 2004 (55 days).
- The third study lasted from May 31 to July 2, 2004 (32 days).
- The fourth site study (1) was carried out from October 12, 2004 to December 12 (62 days) and (2) lasted from January 17 to March 13, 2005 (56 days).
- The fifth site study was conducted from June 8 to July 9, 2005 (32 days).
- The sixth site study was conducted from November 8 to 24 (17 days).

Furthermore, some team members supported MMI preparation for Investment Seminar in AMA (the Association of Mining Analysts) in London and participated in AMA.

The study team consists of eleven members totally and the assignment of the work is as follows;

Nishikawa, Yuji	Team leader/Mineral Resources Evaluation
Watanabe, Yasushi	Promotion of Mining Industry
Murakami Hiroyasu	Activities of Mining Industry
Thompson, Richard Terry	Investment Promotion
Marutani, Masaharu	Geology A
Higashihara, Masami	Geology B
Teeuw, Richard Michael	Remote Sensing Analysis
Shibata, Kenichi	Remote Sensing Analysis
Shingu, Kazuki	Environmental Consideration
Wada, Kazushige	GIS Database Construction

Itoh, Atsushi

Japanese French Interpreter

Inoue, Toshio

Coordinator

The Japanese Team had five meetings with the Steering Committee, which represented the Mauritanian side in the “Study on the Strategic Plan of Mineral Resources Development in the Islamic Republic of Mauritania”, and reached an agreement (minutes presented in Appendix in Final Report).

It is noted that the Japanese Team procured the necessary equipment and materials indicated by JICA and set them up in OMRG.

A seminar and workshop were held for the purpose of technical transfer.

The Mining Seminar, Workshop on GIS and Remote Sensing (June 21 to 23, 2004), Geological Deposit Seminar (October 18, 2004 and June 24, 2005), Remote Sensing Seminar (February 28, 2005) and Technical Transfer Seminar for Strategic Development Plan (November 17, 2005). Presentations in each seminar were published (supplementary volumes: seminar materials).

In addition, the study team participated in IGCP (International Geoscience Programme) on 5-7 December 2004, and gave two presentations (the History of the Formation of Metal Deposits in the Western Reguibat Shield, and another topic) and at the “Responsible Experts Conference” held by Japan Mining Industry Association in June 8, 2005, the results of the study were presented (Metallic ore deposits in the Islamic Republic of Mauritania). Moreover, the team opened “Draft Final Seminar” (November 17, 2005) with published seminar document. Furthermore, the team coordinated and supported “the 1st Roundtable Meeting” between the mining companies and mining agencies of the Mauritanian government (November 17, 2005). During the site survey period above-mentioned, the supplementary geological field surveys were conducted on thirteen promising ore deposits and technologies were also transferred to Mauritanian counterparts. Situation surveys were also implemented to understand the current state of environment and infrastructure.

Chapter 2 Current Status of Investment Basement

2.1 Outline

Mauritania launched the Poverty Reduction Strategy Paper (PRSP) as a national development plan in 2001, conducting policies for economic promotion, manpower, local development and health care in order to reduce poverty. Because its main industrial structure consists of mining, fisheries and agriculture, and exporting income is gained by the former two industries, its economic basement is weak. Therefore, industrial reforms and growth are tasks for the construction of an industrial foundation. Tax income is not sufficient for a national budget that depends on support from international organizations and donor countries. Mining position in economy is important, accounting for 14% of GDP and about 50% of exports. The Mauritanian mining industry, however, is almost exclusively iron mining. There are not many foreign companies working in the country yet. The mining basement is supposed to be enhanced by support from the World Bank.

The steady growth of mining will have an important role largely, because it will influence PRSP, national finance and construction of economic foundation.

2.2 National Development Plan

The Mauritanian Government has set an objective to achieve economic independence from external funding and, therefore, foreign debt. The Government is making progress in this with the support from many international organizations by reforming its legal and institutional frameworks such as economic policy, the foreign exchange system and the tax regime and by liberalizing financial markets. Mauritania is still among the least developed countries (LDCs) based on the United Nations standards.

Poverty is the most pressing issue. Upgrading of human resources is needed to increase the capability. Mauritania's low literacy rate means that significant improvement is still needed. Industrialization is still at the growth stage and diversification of the economy has not progressed and the number of private companies has not grown. To start on the path to poverty reduction in January 2001, the Government issued a 15-year poverty reduction strategy paper (PRSP). (Appendix 1)

This PRSP is composed of four basic themes, economic development promotion, proportion of economic activity in poverty-affected areas, increasing the capability of human resources and promotion of democracy, usually an action program, and a mid-term plan from 2001 to 2004, which is based on 15 years of strategic vision. The national budget was adjusted in accordance with the needs of this program (Fig.2.2.1).

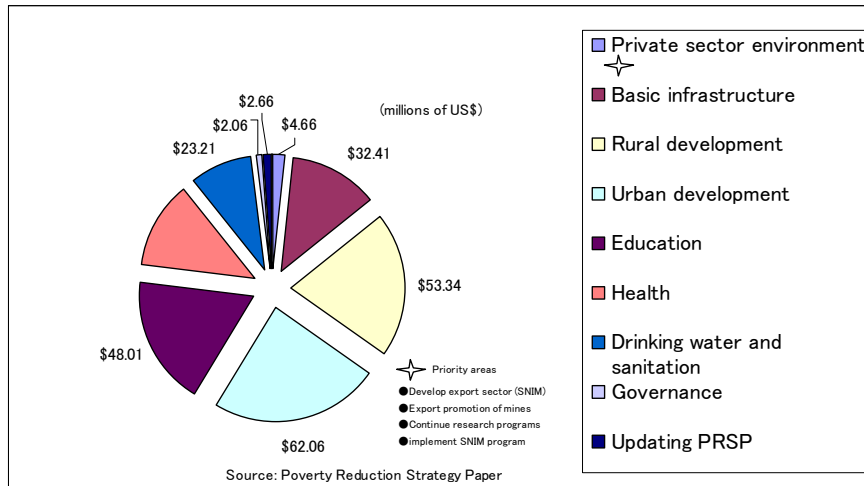


Fig. 2.2.1 Budget for PRSP Action Program

The budget for the action program until 2004 totals MU 12,000 million or US \$475 million.

To implementation the action program, funding from donors is indispensable. And

The effectiveness of multipliers in each sector is unclear, so there is need for analysis. And there is a need for a concrete plan to expand activity in each sector every year, but there is almost no interaction among sectors, and there is a lack of suitable human resources for implementation.

One concern is that the growth targets for the years 2001-2004 in the original PRSP were based on an assumed increase in mining activities. The plan had anticipated an increase in iron ore output by SNIM of 2 million tons/year by 2003. This was delayed due to declining sales, particularly to the recession European economies of France and Germany in 2004, but China buying an additional 1m tons from Mauritania, sales are increasing iron ore output again. Other improvements in the mining sector are taking time to consolidate with Tasiast and Akjout mines now respectively planning start up and recommencement of operations in 2005.

2.3. Administrative Organization

Mauritania is politically organized as a democratic, constitutional and multiparty state. There are political parties such as the Democratic Republican and Social Party (PRDS), Reunion of Democratic Forces (RFD), Union of Forces for Progress (UFP), Justice and Democracy Alliance (AJD), Action for Change (AC), Popular Front (FP).

Mauritania is an Islamic Republic with an elected President as Head of State. Its parliamentary system consists of two chambers, the Upper (Senate – 56 members) and the Lower (National Assembly – 79 members). Members of both houses are elected, to the Senate every 5 years and to the National Assembly every 6 years.

Mauritanian administrative organization composes of Ministries of National Defense, Justice, Finance, Economics & Development, Communication, Foreign Affairs, Mines & Industry,

National Education, etc.

Mining is related to the Ministry of Mines and Industry (MMI) and the Ministry of Economic Affairs and Development (MAED). In May 2005, the Ministry of Energy and Hydrocarbons (MEH) was separated from MMI.

MMI is responsible for the mining sector which provides in excess of 50% the country's foreign exchange earnings. In 2004 this ministry had a budget allocation of MU 88.234 million (US\$ 294,000). Its main works are; planning and implementation of mining and industry policy, direction of the Cadastral Office, management of the operations of the Mauritanian geological survey, application of mining law, granting and managing mining concession, assisting with mine planning and the mines inspectorate as well as environmental management and supervision related to mining activities.

2.4 Status of the Economy

2.4.1 Economic Policy and National Budget

Since the mid 1980s, Mauritania has implemented a number of programs based on its economic policy with support from international organizations such as the IDA and IFC. Economic policy has focused on liberalizing prices, eliminating barriers to international trade, liberalizing the exchange regime, stabilizing the financial sector, gradual privatization of State enterprises and fiscal and customs reforms. Macro-economic policies have allowed Mauritania to register a steady GDP growth, a modest level of inflation, and a marked improvement in public finance and the balance-of-payments (Appendix 2).

- Since 1993, Mauritania's GDP has increased at an average annual rate of 4.5 percent.
- This has resulted in a substantial growth of the Real GDP per capita since 1992.
- Such a rate of growth has depended on government investment but has also been financed by external funds.

Despite the progress achieved, there is still a high level of poverty in Mauritania and it is still classified as a least developed country (LDC). Furthermore, Mauritania's foreign debt remained at a high level throughout the 90s rising to around US\$2.15 billion in 2002, which was equivalent to over 260 per cent of the country's GDP.

During 2001 to 2004, economic policy is still macro-economically stable and is growing by applying a sound budgetary policy based on the PRSP with increasing the production of iron ore by 17.5% and investment in the infrastructure, etc (Table 2.4.1). Also the policy for monetary liberalization is furthermore being promoted and direct taxation is being reformed, but the private sector has not promoted so much. Factors hindering investment include the lack of infrastructure especially ports, roads, water facilities, etc. which must be developed to reduce costs of doing business, strengthen competitiveness and attract new investment.

Table 2.4.1 Macroeconomic Key Points in 2001-2004 Objectives

Indicators	Objectives
GDP Growth per capita for	More than 3% per year (13 % for the period)
Share of private consumption of GDP	68% in 2000 to 77% by 2004
Incidence of poverty	Reduce to 38.6% by 2004

National Investment Enhancing Budget is made in accordance with Poverty Reduction Strategy Paper (PRSP). The purpose of the Investment Enhancing Budget is to create employment opportunities, improve living conditions for citizens and reduce poverty.

As a half of the total debt, US\$ 1.1 billion, was relieved at Paris Conference in 2002, the amount repaid decreased to half of that in 2003. Accordingly, the investment fund was increased to allot more funds for improving living conditions of the citizens. Therefore, the total Investment Enhancing Budget in 2003 was increased to MU 46.2 billion.

The main investment program in industrial development and gave priority to constructing urban infrastructure and connecting roads with neighboring countries in land development. Increasing the iron ore production system of SNIM and mineral resources surveys to promote mining apart from SNIM was deemed important in mining (Table 2.4.2).

Table 2.4.2 Main Programs in Investment Enhancing Budget in 2003

Sector	Main Programs	
Industrial Development	<ul style="list-style-type: none"> ● Strengthening inspection of exclusive economic zone (EEZ) ● Protection of fishery resources and a follow-up study ● Construction of oil-related facilities in urban areas. 	
Land Development	<ul style="list-style-type: none"> ● Establishing basic administrative organizations in local capitals ● Construction of urban infrastructure ● Construction of roads connecting with neighboring countries 	
Mining	SNIM	<ul style="list-style-type: none"> ● Increasing iron ore production and exporting capacity ● Enhancing total process (production, transportation, ports, etc)
	Others	<ul style="list-style-type: none"> ● Continuing mineral resources surveys

In the national budget, the part of self-finance is 47.56% and the portion of supported finance is 52.44% (Appendix 3). Supported finance by foreign countries consists of grants (39.24%) and bonded debt (60.72%), which indicates a clear dependency on foreign support. The bonded debt which shows the weakness of the national financial structure, partially paying back the debt and getting new loans (Appendix).

2.4.2 Industrial Structure

The three major productive sectors in Mauritania are fishing, mining and agriculture. The industrial structure is mainly composed of primary industries. In addition to the three key industries, GDP is increasingly being supported by a very small portion of the manufacturing sector, the mainly banking- and finance-based service sector and the nascent telecommunications sector (Fig. 2.4.1).

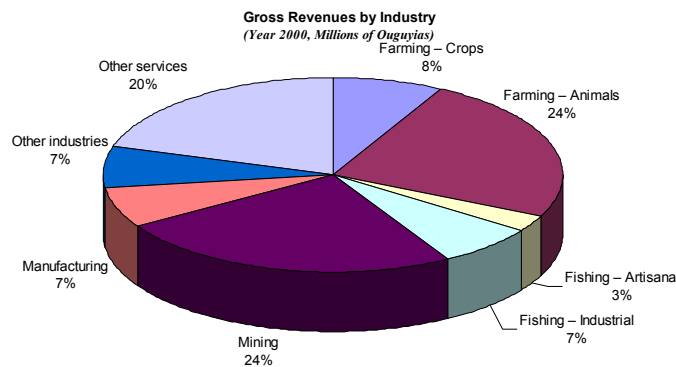


Fig. 2.4.1 Gross Revenues by Industry

In 1995, the fishing sector was Mauritania's largest foreign currency earner, representing 53% of total exports although the annual catch had started to decrease. Fisheries and the added value activities of fish processing are seen as important employment opportunities and as a source of foreign currency earnings. Two sectors, agriculture and livestock, play an important role in Mauritania's economy, employing about 40% of the labor force and generating nearly 20% of GDP. This sector depends upon the rainfall, which in good years helps to increase the GDP and improve the balance of payments. The Government reduces dependence on food (cereal) imports and is encouraging private investment in the agricultural sector to modernize the production system. In the Senegal River valley, it has recently provided irrigation, and increased productivity.

The Mauritanian mining industry consists only of iron mining. Gold and other nonferrous metals had been mined to a certain extent in the past, but they are now merely in the exploration/development phase and have no share of GDP. Mauritania has annually produced and exported between 10 and 12 million metric tons of iron ore, which accounts for 50% of total exports by value (in 2002). Iron mining is the most important industry in the country. SNIM, the national iron ore mining company, is the only producer of iron ore; its activities comprise the whole mining industry of Mauritania. Iron ore production has increased since the construction of new production facilities and reorganization of SNIM supported by EU and others. Based on the importance of mining and potentiality of mineral resources, the World Bank launched PRISM in 1999 to support the preparation of a new Mining Code, design of stable institutional framework, and the creation of geological maps and an environmental management system.

Exploration/development has not been promoted so much because the infrastructure of Mauritania is still largely undeveloped and geological information is still being prepared by PRISM. Furthermore, there is no exclusive port for exporting nonferrous metal concentrate in large quantity. Full-scale exploration for copper is not currently carried out.

2.4.3 Condition of Economy

Deregulation of the banking sector led to the establishment of private banks in 1996. The newly privatized banks are short of long-term resources and this has led them to specialize in short-term loans at high interest rates. Though private sector confidence in the banking system has increased and financial intermediation has deepened, loans are limited to the short term with a maximum interest of 13% per year. Domestic confidence in the banking sector remains low and 60% of cash is still not placed in banks.

The Mauritanian economy is still, to a great extent, dependent on aid flows and earnings from its two largest industries, fish and iron ore. The IMF stated that in order to achieve the macroeconomic objectives of the program, which include sustaining high levels of growth (at 5 – 6% by 2005), low inflation (less than 4%) and a lower level of debt servicing (less than 26% of exports by the end of 2004), the government must maintain “an effective management of bank liquidity, flexibility in exchange rate management and strict debt management.” However, this robust macroeconomic performance has still had little effect on the lives of most Mauritians. Around half the population lives below the poverty line and GDP per capita is about US\$350 per year (Fig.2.4.2).

Mauritania belongs to the Arab Maghreb Union (UMA), together with Algeria, Libya, Morocco and Tunisia. The UMA resolved food security issues and strengthened trade ties throughout the region. Principal exports are fish and fish products and iron ore. Principal imports are foodstuffs (typically 30-40% of total), petroleum products (24-30%), transport equipment (8-12%), and consumer goods (8-12%). The agricultural and fishing sectors account for around a quarter of GDP and employ two-thirds of the working population. Less than 3% of the total area is cultivated arable land and 10% is pasture. The industrial sector contributes around 10% to GDP but employs just 6% of the workforce. The main industrial activity is fish freezing. In addition, there are various small import substitution industries (brewing, footwear, dairy processing, etc) and oil refining Fishing contributes up to 10% of GDP and provides considerable amount of export earnings as well as being an important source of food for Mauritians. The mining sector contributes around 13% to GDP and employs 5% of the working population whilst producing 42% of export earnings.

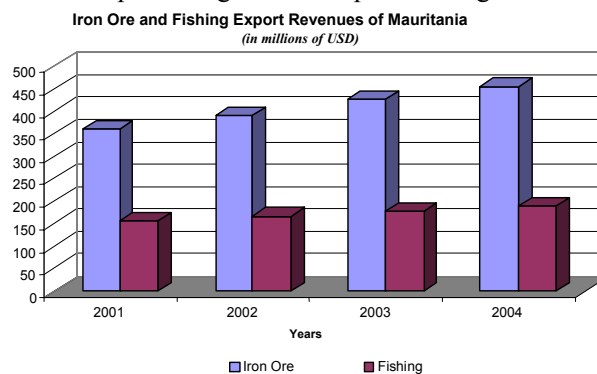


Fig. 2.4.3 Iron Ore and Fishing Export Revenues of Mauritania

Although Mauritania has identified potentially large oil reserves with estimated proven reserves of 370 million barrels. Production will start in early 2006. China is planning to build an oil refinery near the port of Nouadhibou. Mauritanian oil has a good opportunity to become a driving force for economic growth in the future. A majority of thermal generation is provided by isolated diesel generators in Mauritania. Completion of work on the Manantali dam on the Senegal River has led to an increase in hydroelectric power supply to Mauritania, Senegal and Mali. In addition, there is a plan to construct a thermal plant in Nouakchott to respond to increasing demand on electricity. The foundation for industrial activities is preparing steadily for the future.

2.5. Outline of Mining Industry

2.5.1 Position of Mining Industry

Since the time of Mauritania's independence from France in 1960, the mining sector has been the driver of the country's economy. Since 1991, through economic reforms with the financial backing of international financial institutions such as the World Bank and the IMF, the government has delivered economic growth. The sector now contributes between 12 and 15% of GDP, representing 55% of Mauritania's exports. However, the mining industry is a "monoculture" consisting only of iron mines, and thus is greatly affected by projections in the iron mining industry.

The mining sector has seen much renewed activity and infrastructure development by the PRISM project initiated in 1999 by the World Bank and the IMF. The implementation of the New Mining Law in 1999 did not create any problems for the mining tax system and foreign investment, but rather improved the country's competitiveness vis-à-vis its neighbors. This project set out objectives for new geological mapping and information data bases and work has begun on developing an infrastructure for geological information. During the last five years this has led to permits being granted for exploration that has targeted diamonds, gold and oil and other hydrocarbons. As mentioned earlier, investment is now being made in gold mine development and copper mine redevelopment, and investment in oil production is also starting.

Mauritania has a geological environment that indicates the existence of a wide range of minerals. Today, mining is one of the most important sectors of the country's economy. For over 50 years this iron ore mining, which has been conducted by the State-owned mining company SNIM, has dominated the Mauritanian mining scene. The government has assigned the highest priority to the mining sector due to the substantial mineral potential. The government has implemented a program for development promotion of the sector, which aims to create a framework for investment climate.

- Reviewing and updating current mining legislation
- Establishing a modern and legally binding mining code
- Installing a modern, high precision geodesic network comprising 32 landmarks to cover the whole country of Mauritania

- Increasing the availability of geological information by implementing medium scale (1:500 000 for the entire country) and large scale (1:200 000 for the zones of resource potential) geological and metallogenic surveys
- Creating a Geographical Information System for geological and mining information (SIGM) to ensure centralized archiving, processing, updating and distribution of the data for potential investors
- Establishing a Geographical Information System for the Management of Environment (SIGE)
- Reinforcing the capacity of the public (government) institutions responsible for the mining sector.

Large multinational exploration and mining companies are already conducting exploration in Mauritania, including Ashton Mining (part of Rio Tinto Plc), Rex Mining, Diamet (part of BHP Billiton), De Beers and Defiance Mining (Tasiast). Gold and diamonds are the main commodities targets due to the lack of infrastructure (water, ports, roads, etc.). While most activities have stalled at the survey stage, the development of gold at Tasiast and the reactivation of an old copper and gold mine at Akjoujt have started. Most of the existing information about mineral resources in Mauritania concerns iron, copper and gold, but there are exploration programs under way for various other minerals particularly diamonds, chromite, titanium, platinum group metals, rare earth metals and semi-precious stones, as well as hydrocarbons.

The Mauritanian hydrocarbon sector (oil, gas, etc.) is likely to become an important contributor to the country's economy. The Mauritanian Government's objective is to ensure the oil and gas sector will play a major role in the economy and it will refine the legal and fiscal regime to accelerate the growth of Mauritania's hydrocarbon industry. To assist with this process the Government proposes an attractive model contract to the oil companies, which includes favorable provisions. A number of international oil companies, including majors such as Woodside, Dana, Brimax, IPG and Hardman Resources, have signed contracts and have been carrying out exploration work in Mauritania. The Australian company, Woodside Petroleum has discovered three oilfields in the Mauritania Coastal Basin. Woodside anticipates that initial production from its first discovery will start some time in 2006. The Taoudeni basin will be a future exploration target in the shield.

Chapter 3 Current Status and Issues of Investment Climate

3.1 Mining Administration

Ministry of Mining and Industry (MMI) is responsible for total coordination among all activities of national mining sectors, including implementation of improvement based on the new mining policies adopted in March, 1997 by the government as well as the result of PRISM. Also, MMI is responsible for administration of Mining Law and mining regulations and activities of the mining and industrial sectors. Basic goals in the two sectors, mining and industry are to develop and enhance extraction of mineral resources in mining sector and to regulate and coordinate the industrial activities within the current legal framework in industrial sector.

Mining Administration is under the jurisdiction of Ministry of Mining and Industry, which consists of Direction of Mine and Geology (DMG), Unit for Mining Cadastre (UCM), Direction of Industry and Direction of Finance and Administration (Appendix 4).

3.1.1 Direction of Mine and Geology (DMG)

Top administrating organization for mining industry is Direction of Mine and Geology (DMG), which consists of Service for Mines (SM), Service for Geology (SG) and Service for Environmental Affairs (SAE). Main objectives of DMG are to draw up the mining policies, make drafts of mining laws and regulations and follow up the application of regulation as well as to collect geological data and save and present them to developers who are engaged in effective utilization of mineral resources.

Service for Mines (SM) supervises mining activities of private companies and examines their activity reports, formulates regulations for exploration and extraction of mineral resources and implements the current laws and regulations respecting exploration, extraction and fabrication.

Service for Geology (SG) is participating in planning, collecting geological data, plan and adjusting measurement surveys for geological mapping, gathering and systemizing the geological, geophysical and geochemical data presented by the mining companies, and prepares GIS databank, and aerial survey drawings for management of technical documentation for geology, related fields, mines etc.

Service for Environmental Affairs (SAE) submits a proposal on environmental regulations and examines the EIA or environmental monitoring reports under collaboration with related organizations, prepares specifications for EIA in the mining sector together with the related organizations, and formulates plans for basic environmental surveys and supervises its implementation in some mining districts with other related organizations.

3.1.2 Mining Cadastre Unit

The Mining Cadastral Unit (UCM) was established, like the DMG, on the 13th April 1999

directly resulting from the adoption of the Mining Code of 1999. The function of the unit is to issue and manage exploration and mining licenses. The establishment of a transparent mining registry system is essential for the provision of a favorable climate for investment. An efficient licensing system was completed. The main functions of the Mining Cadastral Unit in carrying out the administrative duties related to mining titles are:

to take responsibility and charge of administrative procedures relating to mining titles and exploration authorizations, including title documentation, payment of fees and submission of reports to control the validity of the titles, and (connect sentences)

to ensure that the operators of mining titles and exploration licenses comply with mining law and corresponding rules, etc.

3.1.3 Mauritanian Office for Geological Research (OMRG)

OMRG was established in 1980 under the direction of the Minister of Mines and Industry with the goal of reactivating the mining sector. Since its formation, its primary role on behalf of the state has been to survey and prospect for all minerals resources, with the exception of hydrocarbons. OMRG fulfills its role through:

- implementation of small-scale geological mapping projects
- implementation of small-scale mineral exploration projects in the areas which are considered to have certain mining value
- evaluation of mineral resources potential
- provision of the latest information on the exploration and mining sector.

OMRG consists of administration department and survey department, with seventy employees (Appendix 5). In the Service of Geological Studies, there are about twenty geologists for geological and exploration works.

3.2 Legal System of Mining

3.2.1 Mining Law

In June 1999, as a component of PRISM reforms targeted at mining industry, the Government of Mauritania enforced a new Mining Code No.99/013. The new code simplifies and clarifies the legal and regulatory framework, and streamlines the procedures and processes of mining investment. The Mining Cadastral Unit was built in April 1999 (Decree No. 99/160 on Mining Titles), which resulted in the establishment of the office that liaises with investors on issues related to exploration and mining titles. The new system also provides guarantees to all investors in terms of both technical and legal security of mining titles.

The Mining Code has categorized four types of titles applicable for exploration work and development of mineral resources in Mauritania: prospecting authorization, exploration license,

small-scale mining license and mining development license. The exploration and mining licenses are initially granted for 3 years and can be renewed both mining and exploration companies can own 100% of the permits. Characteristics of the Mining Code are as follows:

- Mineral are separated into seven groups (Table 3.3.1). Royalty and retention number of a license differ according to the groups.
- Survey or perambulation by government organizations can promote exploration.
- The development license for medium- or small-scale mines is defined.
- Validity of the exploitation license is 30 years. It can be renewed several times by a period of 10 years.
- It is possible to get an exemption in taxes and reduction in royalty during the prospecting stage and for five years after the commencement of operations.

Table 3.2.1 Groups of Mineral Resources by Mining Code

Group	Kinds of mineral
1	Iron, manganese, titanium, chrome, vanadium
2	Nonferrous metals, precious metals
3	Coal, inflammable fossils
4	Uranium, radioactive materials
5	Industrial materials, construction materials
6	Jewels (excluding diamonds)
7	Diamonds

The Mauritanian Mining Code has no problematic issues, comparing with the mining codes of other countries (Appendix 6). However, in case a license holder abandons the exploration license or the exploration period expires, the license holder must submit all exploration data to the MMI. All data is disclosed after three years (Article 51, Mining Code). It can prevent the developer from exploration expenditure. . The maximum area for the mining license is 1,500km² in the target district. These items should be improved in the future.

The Mauritanian Mining Code has been proved to be favorable for investment in the period/ renewal of the mining license, area of the mining license, royalty and concession fee. Therefore, Mauritania is “competitive” among the compared countries (Appendix 6).

3.2.2 Laws related to Environment

The main Mauritanian laws related to environment, particularly, the laws respecting deserts, rivers, ports, water, air, ground, forests, etc. have been formulated independently since 1972. In response to the rising interest towards environment around the world since the second half of 1990, the Nature Protection Law and Environment Code were elaborated to administrate the entire field. The Mining Code was also improved in 1999 through PRISM supported by the World Bank, but their legal improvement is still needed due to the following reasons: it is hard to elaborate adequate laws; some decrees are not applicable; many of the laws are contradictory.

The Environment Code of Mauritania was enforced in 2000, to show the principles of environmental

protection policy and accord the sustainable economic and social development with environmental protection. However, there are issues, such as lack of the necessary decrees for legal enforcement and black boxes left for the Government's discretion

It is noted that legal framework of the mining sector consisted of the Mining Code, Law related to Model Mining Convention as well as Decrees about Mining Titles and Mining Inspection. There was no special decree for environmental protection in the mining sector, except for only a general philosophic description given in the Environment Code. PRISM pointed out legal gaps for environmental impact in mining activities (Appendix 7).

A decree for mining environmental protection was prepared in 2004 and enforced in July. This decree covers environmental scheme for mining operation (in large mines, small mines and large quarries) and exploration works, EIA environmental management system, environmental factors for permanent deprivation of the mining right, mine rehabilitation, committee decision on environment, public hearing, etc.

3.2.3 Investment Law

A new Investment Law of Mauritania was enforced in January 2002. The purpose of the law is to promote direct investment in the country, establish an investment guarantee system and simplify investment procedure. Investments in the mining and hydrocarbon sectors are excluded from the investment target. Investments in the mining sector are based on the mining law and mining convention. Characteristics of the investment law are described as follows:

- Mauritania guarantees any individual or corporation freedom to set up and invest in business activities in that country.
- Foreign-owned businesses will not be nationalized, confiscated, or expropriated.
- There is a freedom to transfer foreign assets and profits caused by businesses.
- Mauritanian and foreign individuals/corporations are treated equally under the law.
- Up to four foreign nationals can be employed, if local people with the same skills are not available.
- The rights outlined in the Investment Code are transferable to the new owners of the same enterprise.
- No customs tax is charged on the import of building materials, machines, tools, equipment, spare parts, and utility vehicles.

There is not any problematic issue in the investment law. It is a future task to systemize the investment law with concrete decrees and detailed regulations according to its every article. In addition, it is necessary to elaborate concrete conditions for the government investment guarantee system. It is likely that limitation of foreign employees will have to be assuaged flexibly in the practical management.

3.2.4 Tax

Mauritania has a favorable tax regime for mining with income tax set at 30% on profits, with a five-year tax holiday for new mining operations. Furthermore, there is a favorable tax regime for exports. In customs regime, there is a complete exemption from customs duty at the exploration stage. At the exploitation stage, there is a five-year exemption period from customs duty after the start of production.

Mining companies in Mauritania are subjected to mining royalties calculated at the selling price of a product resulting from the last stage of processing of a mineral. As set out in the Mining Code and Model Mining Convention 2002, all mineral product sales will be subjected to a royalty rate, fixed according to the substance group as follows: 3% for gold, 1.5 - 2.5% for nonferrous metal and 1.5 - 2.5% for iron (Table 3.2.1).

Table 3.2.2 Royalty for Mineral Groups

Group	Kinds of mineral	Royalty
1	Iron, manganese, titanium, chrome, vanadium	1.5 – 2.5%
2	Nonferrous metals, precious metals	3.0% for gold
3	Coal, inflammable fossils	3%
4	Uranium, radioactive materials	1.5 – 2.5%
5	Industrial materials, construction materials	1.0 – 1.5%
6	Jewels (excluding diamonds)	3.0 – 7.0%
7	Diamonds	

Tax regime for mining activities in Mauritania (Appendix in Draft Final Report) has no negative points in comparison with the world mining countries (Appendix 8).

3.3 Role of PRISM and Implementation Status

3.3.1 Content of PRISM

In 1999, the Mauritanian Government in association with the World Bank started PRISM (Project for Institutional Strengthening of the Mining Sector) with the objective to improve Mauritania's capacity and competitiveness in attracting private investment to develop the mining sector.

The project's overall objectives are to improve Mauritania's capacity to attract private investment in the mining sector and strengthen institutional capabilities to deliver efficient and transparent administration services.

PRISM is planned and managed in two stages, PRISM 1 (1999 to 2004) and PRISM 2 (2003 to 2004), which is shown in Fig.3.4.1. The basic targets of the two-stage project are as follows:

- Rationalization of the role of the State by reducing its involvement in mining exploration and development activities
- Sustainability of the Ministry of Mining and Industry and its agencies involved in monitoring and regulating mining activities
- Environmental management capacity building

- Promotion of private sector investment in the mining sector

Total budget of PRISM is US\$4,120 million, US\$1,500 million allocated for PRISM 1 and US\$26.2 million – for PRISM 2. (All results of PRISM are shown in Appendix in Final Report.)

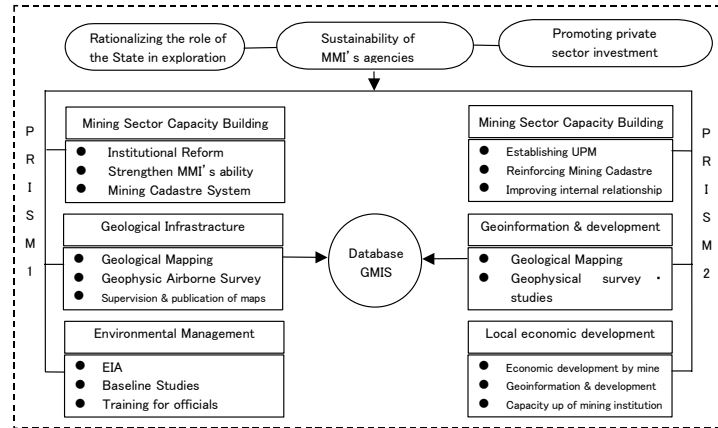


Fig.3.3.1 Concept of PRISM

3.3.2 Results

(1) Establishment of information infrastructure

One of the subjects in PRISM is to establish and update a geological information infrastructure and supply geological and geophysical information to private investment sector. PRISM has conducted several works such as geologically mapping, establishing SIGM, geological and mining information system, supplying available output for potential investors data acquiring data by airborne-geophysical surveys.

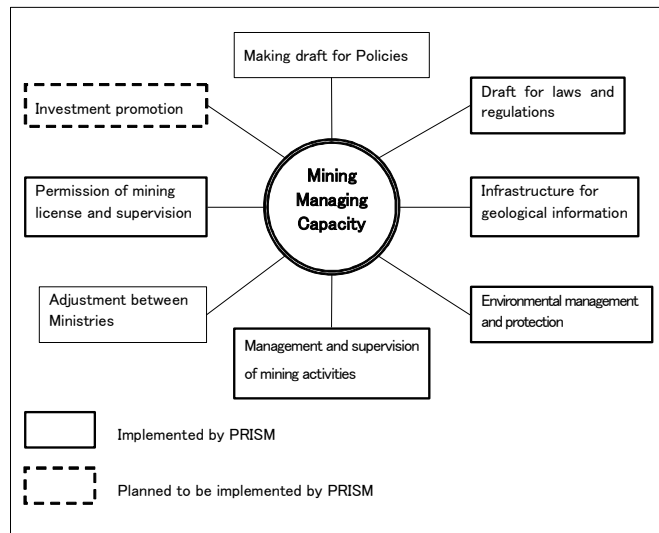
Geological mapping is intended to produce geological maps with the scale of 1/500,000 covering the entire country and those of 1/200,000 scale covering 40% of the whole territory. The SIGM database comprises various kind of datasets, topographical maps, national and administrative boundaries (Wilaya, Moumata), cities, villages, rivers, infrastructure – like roads and railway, geological maps with scale of 1/500,000 and 1/200,000, geochemical data, mineral occurrences, hydro-geological maps, satellite imagery data, airborne geophysical data, concession areas, elevations (points and contours), which are stored in one of the most common GIS software, ArcView version 3.2. Furthermore, a lot of bibliography is stored in the Adobe PDF file format. To date, a wide range of information including databases, maps and bibliographic data has been integrated into the system. Products from the ongoing PRISM projects are also entered into the system, and some of them, for instance, geological and hydro-geological maps.

(2) Program to strengthen the mining management capacity

With the object to strengthen mining management capacity, PRISM has carried out a structural reform of DMG in MMI improving work functionality, developing a new mining code, establishing Mining Cadastre Unit, building a mining environmental management system, compiling and managing of the geological infrastructure.

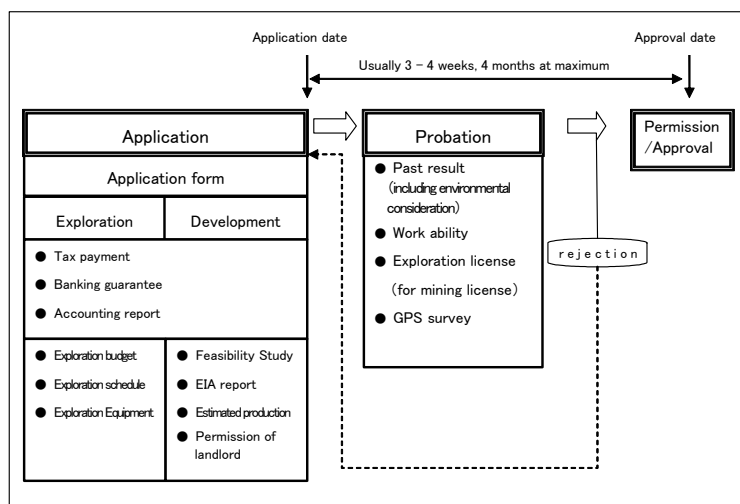
The mining management capacity is improving largely due to the implementation of PRISM programs. In particular, the main tasks for the mining management capacity is comprised of formulating policies, formulating drafts of laws and regulations, promoting investments, licensing and managing mining concessions, managing and supervising mining activities, managing mining environment and developing the geological infrastructure (Fig. 3.3.2, Appendix 9), and it has already been yielding the results for the five years after PRISM was launched.

Fig.3.3.2 Main Tasks to Strengthen Mining Management Capacity



Regarding investment promotion, Investment Promotion Unit will be established in 2006 by PRISM 2 and its activities will further strengthen its administrative capacity. Issuance of mining licenses and supervision has been achieved and proved successful. Approval procedures for applications have been simplified using IT systems (Fig.3.3.3).

Fig.3.3.3 Procedure for Mining License



(3) Investment Promotion

With regard to investments PRISM consists of two directions a. investment climate improvement and b. implementation of direct promotion activities for investment, in order to promote the investment on the exploration and development. A program to strengthen the mining management

capacity mentioned above in (2) is a core for a., and Mauritanian mining management capacity has been steadily strengthened. The infrastructure program in PRISM is limited. The above-mentioned b. is implemented as a program component of PRISM 2 in 2005, and is currently being designed.

Table 3.3.1 Main Tasks and Current Status for Investment Promotion

Task	Current Status
Mining Policy	No direct policy for investment promotion
Mining organization building	Implemented by PRISM 1. Systemization and functionality improvement are necessary.
Geological infrastructure	Implemented in PRISM. Inadequate in mineral resources. Necessary to study means of its utilization.
Legal improvement	Legal framework has been established. (Inadequate decrees and regulations)
Establishment of tax system	Concerned in the mining code by PRISM 1.
Infrastructure	Hydro-geological survey will be conducted in some district within PRISM framework. No infrastructure improvement program stipulated in PRISM.
Exploration system	No program in PRISM.
Staff training	Training only by OJT in PRISM. No systematic training.
Investment promotion	Planning to establish Investment Promotion Unit. Inadequate in information disclosure.

(4) Environmental management and protection

A Canadian consultant, Techsult International (hereafter Techsult), has implemented the environmental works in PRISM 1 with cooperation of SAE in DMG. From 1999 – 2004, PRISM 1 undertook the following environment-related tasks : survey of the natural environment, survey of the human environment, study of legal and institutional frameworks, interviews in the northern region, and baseline surveys. PRISM implemented the general environmental surveys (the natural and human environment) and analyzed the legal and institutional framework. However, basic data regarding environment is amazingly shorted. The data gained by PRISM 1 will be a base for environmental monitoring. The main environmental works in PRISM 2 (2004 to 2008) is programmed, based on the result of PRISM 1, as follows:

- To enhance environmental management institutions.
- To implement an environmental survey in the Akjoujt copper mine site and Fedrik iron mine site operated by SNIM.
- To analyze the EIA report for phosphor development in Bofal-Loubboira.
- To compile a distribution map of wild animals sensitive to mine development.

When PRISM 2 completes, the capacity for mining environmental management of MMI will be considerably improved. Therefore, it will become possible to fully control the mining environment, even if the mining operation is activated.

(5) Influence on the local economy

Several programs are implemented also to contribute to the local development in PRISM. One of these is a technical supporting program to be carried out in the Zouerate iron mining district in 2004-2005 for a local economical development. In other words, these are means of support to the society, whose

economical foundation is the mine and which is fully dependant on the iron mining industry. These programs are participation of PRISM in the co finance of small projects, which have some relationship with socio-economical improvement of the mining community, and a technical support

(6) Location and system of PRISM

PRISM is an organization for program making, forming, arranging, supervising and evaluating. Implementation of programs is ordered to professional consultants. In addition, PRISM acts as a coordinator for the government organization. Respecting the main project of PRISM, geological mapping of 1/500,000 and 1/200,000 scales a consultant is dispatched to DMG with the purpose of ensuring a smooth proceeding of the program specific contents and supervising the activities of the other consultants. PRISM intends to carry out the programs effectively, taking advice from the World Bank.

3.3.3 Tasks in Future

Considering the implementation status of PRISM programs, there are still many tasks to resolve to lead to the promotion of mining activities; they are shown in Table 3.3.2 3-4.4. Therefore, a follow-up mining policy (after the completion of PRISM) will be necessary to elaborate and implement in order to strengthen the mining management capacity. Furthermore, medium- and long-term environmental protection programs will be indispensable for a proper development of mineral resources. The issues related to the use of the database (SIGM) in PRISM have not been discussed yet. The database will directly lead to its utilization and information disclosing system for to the investors to add the data; this function will be fulfilled in the future. Respecting the local economical development, PRISM intends to support diversifying the economy in the mining district managed by the state company. It will lead to the promotion of private companies to study building methods for the local economy including the business opportunities related to the mine development (transportation, maintenance of machines, production of explosives, surveys, material sales, etc.) in the developed area. PRISM has had a tremendous effect and contributed greatly to the promotion of mining.

Table 3.3.2 Tasks in Future

Fields		Tasks
Mining management capacity	Capacity Strengthening	<ul style="list-style-type: none"> ● Making mining policy ● Information disclosing method and system ● Keeping specific technologies
	Environmental Management System	<ul style="list-style-type: none"> ● Adding the information to SIGE and its use ● Mineral resources development and protection program ● Monitoring system
Compiling the geological infrastructure		<ul style="list-style-type: none"> ● SIGE use method ● Added information on mineral resources ● Geological maps with a scale of 1/100,000 in the potential areas
Local economical development		<ul style="list-style-type: none"> ● Infrastructure plan in the mineral potential areas ● Compiling the water resources data in the mineral potential areas ● Business opportunities in the mine developed region

3.4 Mineral Resources Data Management and Information Publicity

3.4.1 Storage Situation of the Information and Management System and Methods

Original datasets of Mauritanian related to mineral resources, such as research reports, geological maps and so on, are stored in the information room of the OMRG. A part of the documents has been scanned and converted to PDF format, as well as maps have been converted to polygon and/or line datasets and input into the SIGM database. Almost all the reports are archived just manually, maps have not been and a certain part of the hardcopy documentation (i.e., reports) is totally abandoned in the OMRG.

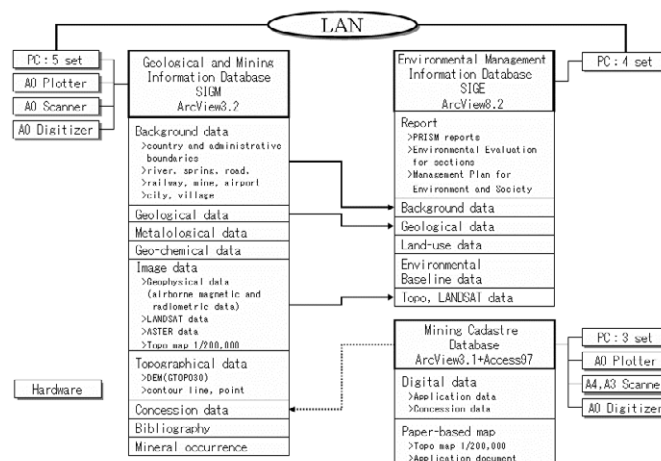
The OMRG disposes of a GIS system, which were procured within the framework of a joint project with BGS carried out from 2000 to 2003. Currently the data in the existing GIS are not used efficiently. A lot of existing survey data or reports are still in unused because they have been inadequately, due to a lack of PCs and no LAN connection in OMRG. Geological maps, some thematic maps and spatial information in the data stocked at random in the OMRG should be managed by the ArcView GIS procured during this study.

3.4.2 Present Status of Compilation and Disclosure of Information

Products from the on-going PRISM, including survey results and reports, are entered into the SIGM database.

General information, data on governmental organizations related to Mauritanian mineral resources, PRISM project, the SIGM and the SIGE database, are presented in MMI website (<http://www.mmi.mr>) in English and French, PDF files, including mining law can also be downloaded from the site. Various kind of PRISM's products, geological maps or relevant mineral resource information, can be ordered in the MMI site. Disclosure of information related to mineral resources has recently started and it can be obtained from the website.

The SIGM (Geological and Mining Information System) database system, which was established in the DMG, has been constructed through the PRISM (Project for Institutional Strengthening of the Mining Sector) project supported by the World Bank. The SIGM database is set up in MMI. Various kinds of datasets, topographical maps, national and administrative boundaries (Wilaya, Moumata), cities, villages, rivers, infrastructure like road and railway, geology, mineral occurrences, satellite imagery data, airborne geophysical data, concession areas, elevations (points and contours) are stored in one of the most standard GIS software, ArcView version 3.2 of ESRI, United States. The GIS platform will be changed to the latest ArcView version 8.3 or 9.0 in PRISM2. All the airborne geophysical data are treated in Oasis Montaj (Geosoft, Canada), a world-standard geo-scientific data processing software, and a part of it is stored as imagery data files in this GIS database. Furthermore, a lot of bibliography is also stored in Adobe PDF format.



As of June 2005, storage of geological information with the scale of 1/500,000, covering whole territory of Mauritania, has been completed. The creation of new 1/200,000 geological maps (geophysical maps) is proceeding now in PRISM2 and 29 sheets of GIS data, geological maps with index maps and a 1/500,000 geological map and an ore deposit map were stored into the SIGM database. Airborne (aero-magnetic and radiometric) geophysical data in the southern Mauritania and metalogical maps with the scale of 1/500,000 were also stored. However, more editing operation is required to complete them for final commercial products.

Within the PRISM, SIGE (Environmental Management Information System) has been constructed and is operating in the DMG. The SIGE database is equipped with a web-style opening menu and icon buttons for document database (mainly PRISM reports) and GIS database.

As the contents of SIGE are at their medium stage, there exists an acute shortage of usable datasets and their practical application will start in the future.

The OMRG staff's capacity of applying GIS and satellite imagery data are limited and still at beginner level, but they started to use the GIS database for their daily activities. Through technical transfer actions in this study understanding of GIS deepened and voluntary utilization was started gradually in OMRG. The independent usage movement for the GIS technology like oversea training (sending the OMRG staff for GIS training in BRPM in Morocco) also can be seen.

3.4.3 Present Situation with Usage of Websites

Usage of websites is expanding from government organizations to the private sector in Mauritania. However, the users mostly connect to the internet through analog lines, and actual connection speed is at several kb/sec. The poor communication infrastructure of domestic analog telephone lines makes practical usage of websites hardly possible. Cyber-cafes connecting to the web through high-speed lines are to be found only in urban area (Nouakchott). Computer laboratory in Nouakchott University has 24 PCs connected by LAN and links to Internet by high-speed (DSL) satellite connection, which was established with the support from the Canadian government.

The number of web sites on Mauritania is increasing. Almost all of the Mauritanian domestic sites are made in French or Arabic, and number of English sites is few. Quantity of supplied information is also insufficient.

3.4.4 Content of Database and General Concept of Website

(1) Contents of Database

The new OMRG/JICA mineral resources GIS database constructed in this study is based on the GIS database supplied from SIGM and has been supplemented by collected relevant datasets, results of supplementary geological surveys and proceeded satellite imagery data (Landsat and ASTER), which are listed in Appendix. New 1/200,000 geological and 1/500,000 metalological, and airborne (magnetic and radiometric) geophysical data created in the PRISM were stored in the OMRG/JICA mineral resources GIS database as GIS data and PDF output files with index maps. On the other hand the JICA team supplied ASTER and Landsat data for the SIGM database. Currently existing websites in Mauritania is listed in Appendix 10 and general features of the new mineral resources GIS database are illustrated in Fig.3.4.2.

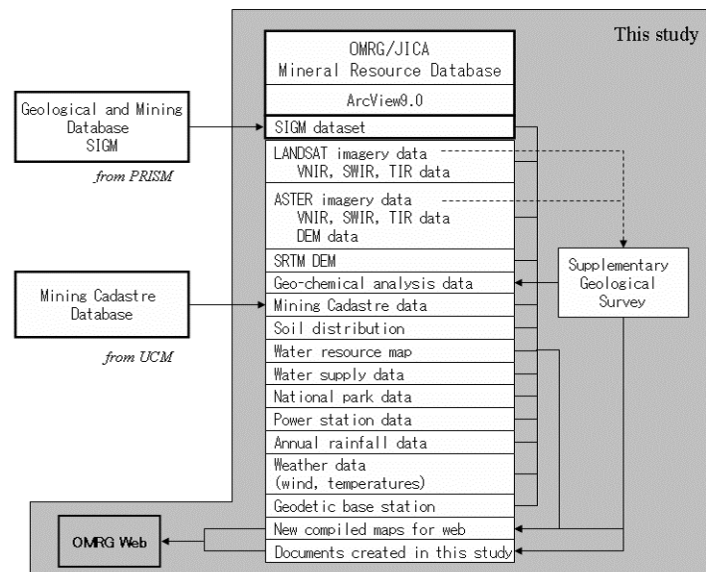


Fig.3.4.2 General Structure of Mineral Resources Database

The GIS database and relevant information in this study collected has used as mineral resources information for foreign investors in a new OMRG website, which is also created in this project to promote and accelerate foreign private investments. General features of the website are listed in Table 3.4.1.

Some representative pages of the OMRG/JICA website are shown in Appendix.

Table 3.4.1 General Features of the OMRG/JICA Website

Items	Specifications
Contents	Mineral resource information for exploration and exploitation in Mauritania <ul style="list-style-type: none"> • Reports and related documents, supplementary geological survey results, processed satellite imagery and maps created in this study • Imagery and maps supplied from OMRG/JICA mineral resource database
Address	http://www.omrg-mining.mr/
Web server	Contents is stored the following web server, considering Internet communication status in Mauritania Main server: Office at Top Technology in Nouakchott Mirror server: Office at subsidiary of Top Technology in Virginia, USA
Web type	Dynamic web type by ASP
Language	English and French
Storage	Maximum 100Mbytes
Download service	Downloadable materials: PDF files for reports, related documents, pamphlets (OMRG, AIST)
News et al.	Government announcements, projects progressed, personnel movements and so on
e-mail	Contact us: info@omrg-mining.mr
Database retrieval tool	All contents in the web site is stored in database and managed by retrieval tools developed in this study
Counter	Counter tool for number of visitors
Maintenance	Server maintenance: Top Technology
Administrator	Two trained engineers in OMRG and a JICA expert
Links	<ul style="list-style-type: none"> • Mutual links with MMI and PRISM sites • Mauritania relevant information is linked with existing government or international organization sites

3.4.5 Technical Transfer

(1) Hardware

Computers and peripherals procured within this project are listed in Table 3.4.2. They were set up in OMRG computer room and project working space (Fig.3.4.3). All basic components for construction of GIS database dealing with geographical information and remote-sensing datasets were procured and prepared.

Table 3.4.2 List of Procured PCs and Peripherals

	System	Set	Company	Model	Specification
1	Desktop PC	1	DELL	GX270	Pentium4, 2GHz, 100Gb HD, 1Gb Memory, CD-RW, LG Monitor 17"
2	Laptop PC	2	HP	Latitude D600	Pentium4, 1.4GHz, 512Mb Memory 40Gb HD
3	Hard disk	1			120GB
4	Printer	1	HP	LaserJet5100tn	A4 Black & White
5	Printer	1	HP	DeskJet1220C	A3 Color
6	Scanner	1	HP	Design Jet Scanner 4200, Model Q1280A	A0-size

7	Digitizer	1	Cal Comp	Drawing Board IV	A0-size
8	XY Plotter	1	HP	Plotter 500 Color A0	A0-size

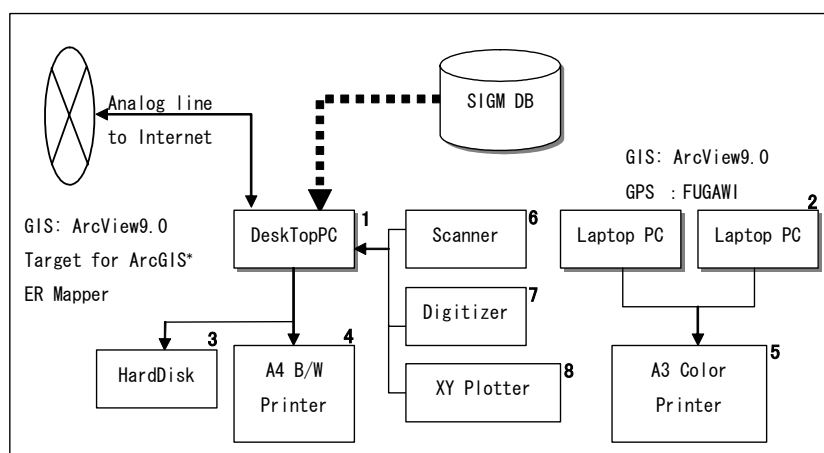


Figure 3.4.3 Procured PCs and Peripherals

(2) Software

In order to construct a database of mineral resources, ArcView 9.0 (GIS) including three extension applications, “Target for ArcGIS” (boring data handling software in ArcView) ”FUGAWI” (GPS navigation software) and “ER Mapper” (remote-sensing data processing software) were procured in OMRG (Table 3.4.3).

Table 3.4.3 List of procured GIS Systems

System	Developer	Module	Basic function
ArcView v.9.0	ESRI, USA	Basic module	GIS Basic module ArcView: English version Hardware key: Parallel port
		Spatial Analyst	Creation of raster data, Conditional retrieval function, Mapping and Analytical functions, Spatial calculation
		Geo-statistical Analyst	Interpolation function based on geo-statistics, Surface modeling, Spatial analysis, probability analysis, Analysis, Threshold analysis
		3D Analyst	Visualization of topographical data, Perspective analysis and topographical modeling functions, 3D Analysis, TIN and GRID Top data, Perspective view presentation, VRML
Target for ArcGIS	Geosoft, Canada		It enables handling of boring data in ArcView
Fugawi	Northport Systems Inc., Canada		Navigation with GPS and PC, Marking positions, data transfer
ER Mapper	Earth Resource Mapping Australia		Data processing software for ASTER and Landsat

(3) Technical Transfer

GIS technical transfer has been carried out mainly for OMRG staff possessing a certain experience in using the GIS database, satellite imagery datasets (ASTER and LANDSAT). Furthermore, a workshop was held in the University of Nouakchott for OMRG, MMI and the University of Nouakchott staff on the utilization of ArcView, Fugawi and other software.

As a result, it appeared that expectations and desire of the trainees to master GIS technology

are very large. Though they have a conceptual understanding of using GIS systems, there are some gaps of GIS structural understanding and knowledge which is necessary skill to the staff in charge of GIS database construction for this country.

3.5 Infrastructure

3.5.1 Actual Situation of Infrastructure

Mauritania has a vast area with population of only 2.8 million. Undeveloped arid deserts occupy most of the territory. The current undeveloped infrastructure may be a bottleneck for the foreign investment aiming at the development of mineral resources.

(1) Roads and Railway

Roads have been constructed by international organizations or donor countries. There are three principal national roads, which are Route 1, from Nouakchott northward to Atar; Route 2, from Nouakchott southward to Rosso; and Route 3, from Nouakchott eastward to Nema. Also, there are many other paved or unpaved roads connecting the above-mentioned principal roads to smaller towns. At present the total length of the roads is about 2,300km. Owing to the vast territory and small population, the road network is not still sufficient (Fig. 3.5.1).

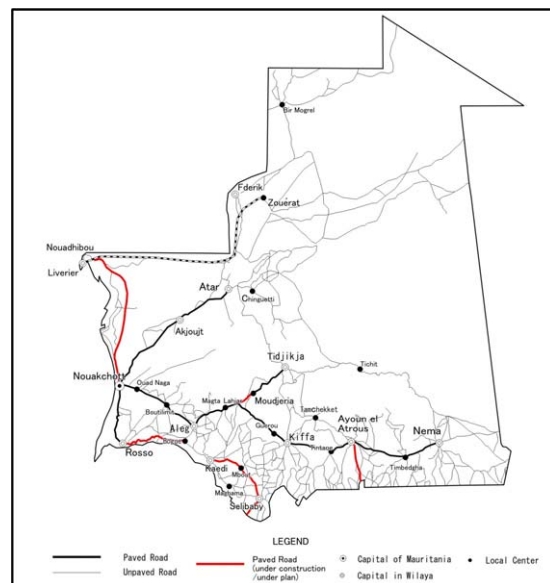


Fig.3.5.1 Road Network in Mauritania

The area between Atar and Zouerat has resource potential, and the highway would be important for exploration and development. However, in this region it will be very difficult to ensure the water supply needed for this project, so it will be necessary to take groundwater surveys. In the northern part, which is a high mineral potential area, unsatisfactory economic conditions prevent from projecting construction of new roads because there are neither many inhabitants nor major industries. New roads may be constructed if mines are developed in the future. However the burden of road construction cost may be an obstacle for mining investors.

Ore is transported with a railway connecting Zouerate to Nouadhibou with total length of 677 km. Iron ore is shipped to Point Central in Nouadhibou. The railway is managed by SNIM, and transports the necessary goods as well as passengers except iron ore. As the railway runs in the desert area, it is always necessary to clean sand dunes covering the rail. And there are some other sand-related issues like excess rail abrasion which causes additional expenditure to SNIM. Regarding

construction of a new railway, there is an idea to transport the phosphate ore to Nouakchott in the phosphate development in Bofal Loubboira which is located in the suburbs of Kaedi City.

(2) Water Management and State of Water Supply

Water is managed by several organizations. Each organization (Table 3.5.1) has its independent role like water supply, utilization of the Senegal River, surface water management and research and study.

Table 3.5.1 Water Management Organizations in Mauritania

Name of Organization	Content of Main Work
DHA, MHE	Responsible authority of potable water to make policies and water supply plan.
OMVS	International organization consisting of three countries for water utilization of Senegal River, with three purposes: 1. development of irrigation systems, 2. development of energy, 3. improvement of shipping operation services
DEAR, MDRE	Management of surface water except the Senegal
ANEPA	Responsible of potable water management and repair for large villages or small cities.
SNDE	Potable water supply for main cities. Management of the Project Aftout.
CNRE	Scientific water-research organization. Management of various data on potable water.

(NB)DHA: Department of Hydrology and Sewage in the Ministry of Hydraulics and Energy, DEAR: Environmental and Rural Management Directorate in Ministry of Rural Development and Environment, ANEPA: National Agency of Potable Water and Sewage System, SNDE: National Company for Water, CNRE: National Center for Water Resources.

CNRE – a water research organization founded in 2001 – evaluates the Mauritanian water potential and discloses some information on water. It has data for 8,700 wells which are supposed to be more than 70 % of total wells in Mauritania. Those data are used in PRISM SNIM manages water supply from the northern iron mining district to Nouadhibou. From the global viewpoint of Mauritania, the current water supply is somewhat limited and finding a new water source is an important task for the mineral resources and local development. Water is supplied from Senegal River or groundwater in Mauritania. Current water supply demands in main cities are met, but some measures to respond to the shortage in future will be needed in order to prepare for the increment in the population or industrial promotion.

(3) Electrical Supply

At present, necessary electricity is generated. There are diesel power stations for twenty two major cities (Nouakchott, Nouadhibou, Zouerate, Sélibaby, Nema, Timbédra, Aïoun, Kiffa, Géroou and etc.). In the areas (Nouadhibou-Zouerate) where SNIM, operating large power plants, works it also in charge of electrical. There is another electrical source. At present, 15% (max. 120 MW) of total generated electricity is supplied to Rosso by a high tension transmission line from OMVS's Manantali Hydraulic Power Plant in Mali (800MW at max. capacity). Capacities of the diesel power stations in 22 cities are 400kw to 28,000kw. Demand for electricity is growing at a rate of 10% a year. But it is estimated to be cut down in the future, so there are plans to construct power stations in Nouakchott and Nouadhibou by 2007. It is noted that the electricity needed for exploration and development in regions with mineral resource potential is being provided by the users themselves with diesel generators.

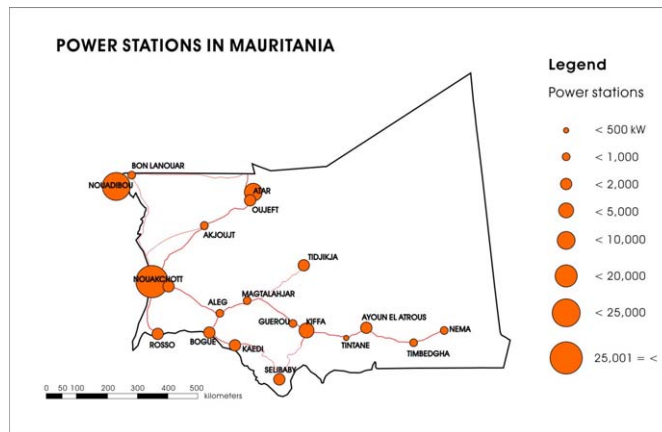


Fig.3.5.3 Generated Electricity in Mauritania

(4) Telecommunication

Mauritanian communication system was privatized in 1998 with the object of improvement and contribution to national development. Mauritel was established from a state enterprise (Mauritanian government: 46%, Moroccan and French private companies: 51% and its employees: 3%). There are two mobile phone companies: Mauritel Mobil, a subsidiary company to Mauritel and Mattel, a private company. Three million stationary telephones are used widely all over the country and all wilaya capitals can be connected to each other. Optical cable is also installed between Nouakchott and Rosso. On the other hand, mobile phones have increased rapidly up to 340,000 for only three years since November, 2000 and are commonly used in the capital and local cities. However, a relay antenna for mobile phones has not been constructed between the capital and local cities.

(5) Airports

There are three international airports: Nouakchott, Nouadhibou and Atar. The former two airports are used for regular flights and the latter for charter flights. There are twenty four airports in total in most capitals of wilayas. There are two airlines, Air Mauritania and CMTA. There are many flat places like grassy plains or deserts which can be used by smaller planes to take-off and land. There is a project of New Nouakchott Airport about 20 km in the north from the downtown.

- An airport for small plane was constructed for exploration in Tasiast and is still available for use.
- Half finished products from dored-metal (gold) and diamond are transported by air. It bears no problems in current air port facility.

(6) Ports

In Mauritania, there are two large ports; Port Nouadhibou and Nouakchott.

Shallow water depth at Nouadhibou port will make it problematic for large ships to use the wharf. In Port Nouakchott, there are several problems: the sea runs high at the current wharf; water becomes shallow due to the accumulation of scattered sand; and the coastline is eroded by high waves.

There is a project to construct a new wharf in Nouakchott. Nouakchott has a port with 3

wharves that is handling 1.5 million tons of cargo a year, but this is fast approaching the port's capacity. Therefore, with assistance from the Chinese government, a fourth wharf is being planned (at a cost of US \$80 million. It is not being designed to accommodate loads of bulk concentrates for export, so goods will have to be in containers. Therefore, in order to explore and develop medium to large-scale base metal deposits, either special facilities or a special wharf exclusively for loading mineral resources will have to be constructed. The Mauritanian shore is generally shallow so opportunities for the construction of a new port are limited; however export of mineral products except iron or oil requires a new port where the large ships could berth. It is an important point for mining promotion.

(7) International Support

Mauritania has had chronic financial problems. Accordingly it cannot avoid international support in the development of infrastructure, which is a capital intensive sector. The biggest portion of the construction of infrastructure in Mauritania is done by the financial support of international organizations and donor. The international organizations supporting this sector are: the World Bank, BAD (African Development Bank), EU, IDB (Islamic Development Bank), OPEC (Organization of Petroleum Exporting Countries), FADES (Arab Development Funds), GAFD (French Agent Group for Development), GTZ (German Technical Cooperation), CE (Spanish Cooperation), JICA and so on. Donor countries presented here are Japan, France, Germany, China and etc. Above all, EU occupies an important position in the construction of infrastructure, especially in construction and maintenance of roads.

(8) Future Planning of Infrastructure and Issues

There are some ideas and plans on the short-term development of infrastructure represented by roads, railways, electricity, water, ports, etc., but the most difficult problem in infrastructure is to find the international organizations or donor countries because, Mauritania cannot construct them by itself owing to deficit of national finance. Promotion of mineral resources development in inadequate infrastructure may make it difficult for the investors to attain the reasonable profit. Therefore, the government needs to invest in infrastructure according to the economical priority in the development target areas with a serious consideration of mineral potentialities. This kind of attention to infrastructure makes a shortcut to the promotion of the foreign investment.

3.6 Environmental Consideration

3.6.1 Actual Status of Environmental Administration

The organization of MDRE covers the total environmental management, including rural and urban environment, pollution, natural resources protection, natural infrastructure, agriculture and grazing.

Environmental administration is not still established due to a shortage of technology and data on Mauritanian environment. Some problems have occurred owing to a lack of communication

and unclear jurisdiction limit between ministries related to environmental issues. Main environmental protection work conducted by SE of DEAR was forestation.

There are two international cooperation projects, which MDRE is currently implementing: PGRNP (Project for Development of Natural Resources in the Rainy Areas) and PDIAIM (Project for Development of Irrigable Agriculture in Mauritania) by the World Bank. Departments related to agricultural development are in charge of these projects.

3.6.2 Actual status of Monitoring and Environmental Issues

Neither environmental monitoring nor environmental protection has been implemented so far in Mauritania. There is a suggestion at DEAR to accomplish an environmental project to create a national strategic action plan under the cooperation of the World Bank, which is preparing a draft now. There are several concrete environmental issues in MDRE as follows:

- There is no laboratory which can analyze wastewater, surface water, groundwater, soil and atmosphere.
- There is not any environmental regulation and standard yet.
- Environmental protection is limited to agricultural and grazing sector.

There is no strong governmental leadership for the environment.

In Mauritania, economic activities are not currently so large. Accordingly environmental contamination caused by human economic activities is low. Environmental issues are described as follows:

- Series of environmental problems have arisen by desertification (sandy dust problems, decrease of flora, etc.)
- Some groundwater is damaged by fecal pollution of domestic livestock owing to inadequate management of wells.
- In Nouadhibou, the sea is contaminated by iron powder dropped from the belt conveyors when iron ore is shipped.
- In Zouerate, large amount of waste oil leakage occurs from the operating mine.
- The domestic waste is not properly managed in the cities.

3.6.3 Administration of Mining Environment

The mining environment is administrated by SAE (Service for Environmental Affairs) and DCE (Division of Environmental Control) belonging to SM (Service for Mines), in cooperation with DEAR (Direction of Environmental and Rural Management) belonging to MRDE (Ministry of Rural Development and Environment). SAE is in charge of PRISM and is responsible mainly for managing the baseline database as well as for examining and evaluating Environmental Impact Assessments (EIA) submitted by private companies. SAE is also responsible for preparing draft laws and

regulations regarding the environment.

SM is responsible for the environmental study at the mine sites by sampling and analyzing soil, water and atmosphere. Whereas there had not been any decree to investigate and evaluate environment by 2004, SAE, DCE and DEAR did not take any definite environmental actions.

3.7.4 Environmental Protection Measures for Mining Sector

There has not been so far any decree for environmental protection in mining activities, so no environmental measure has been taken for mining. However, a decree for mining environment was passed in June 2004 and it became a legal base for environmental protection in mining sector. Environmental management plans will be prepared within two years after promulgation of the decree. There are the SNIM's Zouerate iron mines and the Akjoujt Copper Mine which was operated in the past. Baseline surveys for actual environment in these mines will be carried out in PRISM2 programs. Environmental protection measures will be formulated based on the results of the surveys. The environmental protection measures and environmental management plans for the Zouerate and Akjoujt mines may become the models or guidelines for the Mauritanian mines in the future.

3.6.5 Environmental Impact Assessment (EIA) in Mining

In the Environmental Basic Code implementation of EIA is mandatory. Accordingly, EIA is indispensable for all large-scale projects, but there have not been many examples in Mauritania. For gold development in Tasiast, the EIA is carried out. On the other hand, offshore production of petroleum in Well Chingetti will be started by Woodside, an Australian company in December, 2005. A draft of the EIA has already been submitted.

After a private company submits an EIA to MMI, MMI and MDRE form an EIA committee to discuss the summary of the EIA prepared by the company. The committee consists of members representing MMI (SAE), MDRE (DEAR), Ministry of Hydraulics and Energy, Ministry of Interior and Ministry of Public Health. This is regulated by the article in the "Environment Basic Law" on organizing a committee composed of related ministries. The discussion takes three months and three more months are then needed for a questionnaire survey for inhabitants around the mine site. This questionnaire informs the inhabitants of the mine development and collects their opinions. In Mauritania, a mode of questionnaire is needed for nomadic people who come periodically to the mine site during the rainy season. Careful consideration of the environment is necessary when a mine is opened because mining activity has serious impact on the environment. Legal and institutional improvement for the environment management is needed at this time. Some cheaper and effective methods are necessary to be begun for environmental supervision, like remote sensing for macro monitoring.

Environmental standard is a base for evaluation of the EIA before mine development. There

is the EIA law in Mauritania and decree for mining environment, which regulates the law to put it into practice, but there are no environmental standards. At present, a mining developer can easily adopt other countries' regulations, which are not necessarily suitable for Mauritanian situation. The environmental standard must be urgently made. When an environmental standard is established, standards according to the population density should be considered.

3.7 Actual Status of Mining Activities

3.7.1 Mining Activities of National and Private Companies

(1) SNIM

SNIM has its head office in Nouadhibou, and its mine site is located in Zouerate (Appendix in Draft Final Report). Annual production of about 10 million iron ore is transported 650 km to Nouadhibou by railway, and all ore is exported in annual amount sale of US\$ 200 million (Fig.3.7.1 and able 3.7.1).

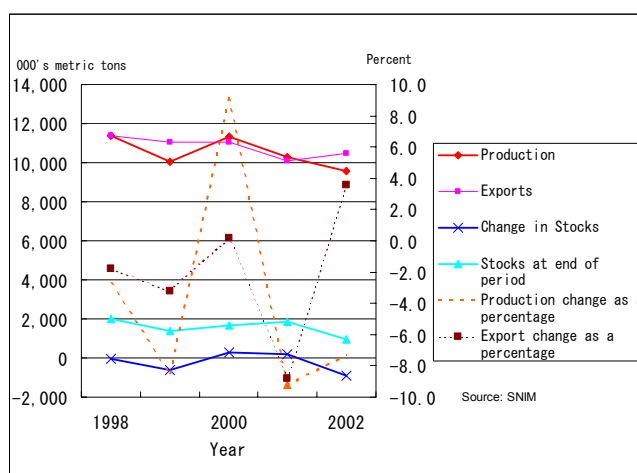


Fig.3.7.1 Main Production Indexes for SNIM

SNIM's capital is shared by seven organizations such as Islamic

Republic of Mauritania 78.35%, Kuwait Real Estate Investment Syndicate 7.17%, Arab Mining Company 5.66%, etc. Total number of employees is 3,782 (1,341 in Nouadhibou, 2,441 in Zouerate) as of 2003. SNIM enhanced the mineral processing plant to increase exportation supporting from EU.

Table 3.7.1 Principal Exporting Countries for SNIM (as of 2002)

Country	Amount of sale (kt)	Share (%)
France	3,026	28.9
Italy	2,653	25.3
Belgium	1,932	18.5
Germany	1,480	14.1
Spain	686	6.5
Pakistan	264	2.5
Others	439	4.2
Total	10,480	100.0

Also, SNIM has a plan to renovate and increase the berth in the port. This objective is to strengthen the competitiveness to improve the management practices. Otherwise, IT, workers training and quality control etc. are proceeding. SNIM was established by French and English investors in 1955, and then nationalized. Mine operation has been managed by Mauritians since 1980.

(2) Current Status of SNIM Iron Mines and Related Facilities in Nouadhibou

1) Zouerate Mine Site

Zouerate is located in the eastern inland rocky area by about 700 km far from Nouadhibou which is an exporting port at the Atlantic coast. Just before opening the mine Zouerate was in severe natural conditions and without any infrastructure. The infrastructure like roads, railway, electricity, water etc was constructed for the mine operation. The current population of the city is about 30,000. 20% of it has relation with SNIM and others engage in commercial pursuits.

Table 3.7.2 Brief Summary of Ore Deposits in Zouerate

Ore Deposits	Summary
Kedia	Pits belonging to this ore deposit are F' derik, Azouazil, Seyal, Rouessa and Tazadit, from west to east. F' derik finished its operation, and others intermittently operate in small scale (400,000t/y). The current main pit is TO14 in Tazadit. It contains fine hematite, and ore reserve is 170mt.
Guelb El Rhein	Coarse-grained magnetite, and ore reserve is 342 mil. t with a grade of 37% of Fe.
M' Haoudat	Fine hematite, the annual production is 14 mil. t.
El Aouj	Coarse-grained magnetite, and the ore reserve is 287 mil. t with a grade of 40% of Fe.
Atomai	Coarse-grained magnetite, and the ore reserve is 616 mil. t with of a grade 36% of Fe.

The iron ore deposits of Zouerate are roughly divided into two groups: the Tiris Group which is coarse-grained (0.2-3mm in diameter) magnetite in an Archean metamorphic formation and the Idjill Group which is fine-grained hematite in Precambrian weak metamorphic rocks.

The Zouerate mine site has total 8 mines with 17 pits; 6 closed pits, 6 pits in shutdown

and 3 mines with 5 pits in normal operation. Normal full operation is carried out in the three main mines with five pits, TO14, El Rhein and M'Haoudat. All the operating pits work in three shifts, working 365days/year. Production has not been always stable (Fig.3.7.2).

This was the result of rapid mining caused by the good market price. Therefore, stripping must advance more energetically for more stable production in future.

Beneficiation is done in El Rhein mine, and only ore-crushing operation is in progress in other mines. In case of the hematite, ore grade is about 60 to 65% for the high grade ore and 55 to 58% for the low

grade ore, which is crushed and transported directly to Nouadhibou. In case of magnetite, the crude ore with grade of 35 to 40% is beneficiated by magnetic separators to receive concentrate with 65%

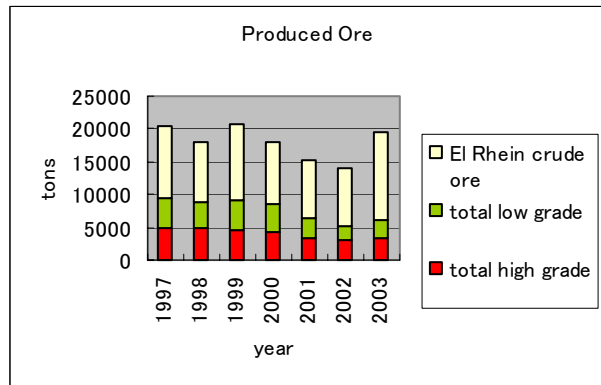


Fig.3.7.2 Production in Zouerate

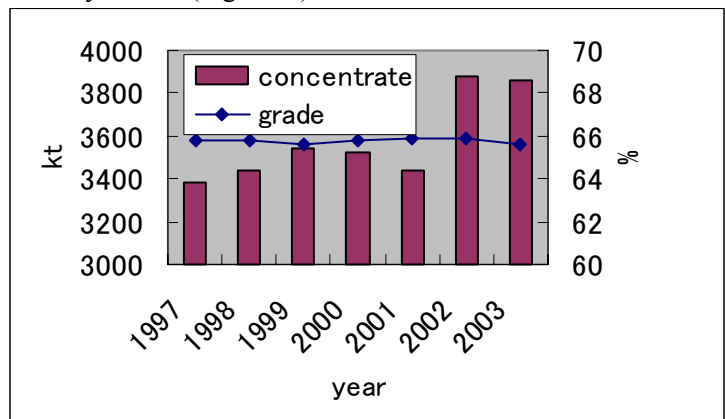


Fig.3.8.3 Production of Magnetite Concentrate and its grade

which is afterwards transported to Nouadhibou.

In the technological process in El Rhein plant, the magnetite ore is crushed, milled and beneficiated by magnetic separators (Appendix 11) using its magnetization characteristic. The high grade ore production of the hematite (TO14 and M'Haoudat) decreased to 40% of 1997 in 2002 since 1997. And the production of the magnetite ore (El Rhein) could make up only 15% of 1997 in 2002.

The tailing dam located in the corner of the mine site is in about 5 km from the dressing plant, and the tailings are transported on conveyors.

Environmental management system has not been established but the periodical patrol from the Nouadhibou head office is in charge of the environmental control at the mine. Therefore, SNIM has not taken any concrete action (management organization, management facilities, measuring tools, monitoring etc.) about the environment. The most problematic environmental issue in Zouerate is supposed to be dust. However, there is no dust pollution in the city at present because the nearest operating mine, TO14, is in 15 km from the city. A large amount of waste oil from the heavy machinery used has been abandoned in the mines, but it could contaminate groundwater.

The road distance between Nouakchott and Nouadhibou is about 650 km. 450km in its route is paved (National Route No.1: Nouakchott-Atar). The route loses the paved road around Atar, apart from Route No.1. However there is no supply of water between Atar and F'derik, so water would be a bottleneck for construction. From F'derik the route is paved about 30 km to Zouerate. This paved road covers SNIM's operation areas.

There are three water tanks in El Rhein for water supply in the mine site. 473 m³ of water is sent monthly through a conduit 300 mm in diameter from Srey which is located in about 80km from the mine site. There are the wells in TO14 and M'Haoudat Mines to meet their demands, but water in El Rhein contains salt so water is supplied from Srey. There are two power stations in the mine site, one in El Rhein (output: 192.06GWh) and another in Zouerate (output: 1.94GWh). Problems in the power stations are breakdowns in summer season (June to September) due to high temperature.

The largest issue in production of iron ore is to build a system enabling scheduled production. The efficiency of supplementary pits has some influence to total production, and also has some relation to the increase in the production. The important issue in mineral processing is to stabilize the recovery and availability of the plant.

- Scheduled production by advanced stripping and production increasing measures.
- Increase the production efficiency by appropriate integration of machines and labors.
- Improvement of the concentrate grade, recovery and availability in El Rhein plant.
- Stable electrical supply.

Increasing the water sources.

2) Related Facilities in Nouadhibou

Nouadhibou is equipped with relevant railroad and port facilities. Main facilities for the railroad transportation consist of the periodical maintenance shop for locomotives, wagons repair shop, etc. Locomotives need special facilities for protection from the sand dust and their maintenance costs are slightly more expensive, and rails are easily abraded by the sand so constant rail check and modification of rail shape are needed. These problems can affect the total production cost to the maintenance of the iron mine in future.

Main port facilities consist of a wagon tippler, an ore stock yard (1 million tons for crushing and 1 million tons for shipment), six classifiers (0~200mm), four crushers (possible under 1.6mm), three reclaimers (one for classifying and crushing, one for shipment, one for backup), two samplers, one berth for ore shipment (for 150,000t ore carriers). As the water depth is shallow around the port, ore carriers need sometimes more time to anchor to the berth according to the sea condition without a tug boat. Feasibility study for renovation of berth for 240,000 ton carrier has finished, because the existing berth for 150,000 ton carrier became too old and loading efficiency should be increased.

As environmental management was mentioned above, no monitoring system exists.

(3) Mining Activities of Private Companies

Almost all the mining activities of private business are carried out by foreign companies. SOPHSMA is a local private company which has a project of phosphor development. The project is at the phase of feasibility study, partially supported by German finance. Furthermore, SAMIA, a subsidiary company of SNIM, is excavating gypsum in Nouakchott suburbs.

The foreign mining companies are from England, Canada, Australia and Spain. Total of 12 companies are conducting exploration/development activities for diamond and gold. There is a reopening project for copper/gold and also a gold development project. Other activities are at the phase of perambulation. In exploration and development works in Mauritania, acting companies are pointing out the issues, such as shortage of infrastructure, water supply, geological information and experienced workers for exploration and development, etc.

Guelb Moghrein is ready to re-develop the mine in 2005. The Mining Concession at Akjoujt is estimated to be 23.7 Mt at a grade of 1.88% of copper and 1.41 g/t of gold.

Rex Diamond and Rio Tinto are implementing the exploration for diamond. Rex Diamond discovered the first diamond-bearing kimberlite near the Tenoumer and the Touajil properties in November 1999. At Touajil, micro diamond and macro diamond concentrations had been found. Ashton, which initiated diamond exploration activities in Mauritania in 1995, had discovered kimberlite in 1998. At present, Rio Tinto which bought Ashton continues diamond exploration as the owner and operator.

3.7.2 Actual Status of Exploration and Development

(1) Approval of Licenses

The current explorations (licenses) are mainly on gold and diamond. As of 2003 August, 92 exploration and 5 exploitation licenses were permitted. There are only 18 license holding companies. Among the 92 licenses issued, there are 37 licenses for diamond and 52 licenses for gold (Table 3.7.3).

Table 3.7.3 Issued Licenses in Mauritania

Group	Kinds of Mineral	Exploration	Exploitation
1	Iron, manganese, titanium, chrome, vanadium	3	1
2	Nonferrous metals, precious metals	52	3
3	Coal, inflame fossils	0	0
4	Uranium, radioactive materials	0	0
5	Industrial materials, construction materials	0	1
6	Jewels (excluding diamond)	0	0
7	Diamond	37	0
Total		92	5

(2) Actual Status of Exploration

There are five foreign companies currently implementing exploration activities (Appendix 12). All the activities are still at the initial stage. Rio Tinto (diamond), BRICK Capital (gold and diamond) and BHP Billiton (gold) are carrying out the exploration. Under the circumstances of scarce geological information, inadequate infrastructure and severe natural environment, it is very hard to expect a more active exploration from the foreign companies, because their exploration risks are large. Targets for exploration are currently selected mainly for gold and diamond in Mauritania. These are places such as Tasiast-Tijirit district, Ouassates-Sfariate district and the south of the Mauritanides where reconnaissance survey and basic prospecting have been implemented by Mauritanian Office for Geological Research (OMRG), National Exploration Agency.

In the Ouassates-Sfariate district, additional exploration has been implemented by foreign investment based on results of exploration carried out by OMRG, and some foreign mining companies have attained exploration licenses and continued surveys on gold. In the Tasiast area, the Tasiast Gold Mine started the construction work for the mine development. Another GGI gold exploration project started in the Inchiri district around the Akjoujt city in 1991.

SNIM has implemented its own exploration activities, focusing on non-ferrous minerals, especially diamond and gold and recently concentrating on gold, diamond, platinum (to the south of Kedia), etc.

Table 3.7.4 Exploration Targets and Areas

Target	Exploration area		Target deposit
	Geologic province	Area	
Gold	Reguibat shield	Tasiast-Tijirit	Vein and network type deposit in BIF
	Reguibat shield	Ouassates-Sfariate	Vein and network type deposit in BIF
	Mauritanides	Akjoujt	Carbonate replacement
Diamond	Reguibat shield	North Reguibat shield	Kimberlite

OMRG currently implements exploration mainly by geochemical method. In the past, explorations were carried out using several methods accompanied by instructions of geologists from BRGM and the former Soviet Union. However, no leading engineer and insufficient equipment due to

shortage of funds are disincentive for continuous surveys.

OMRG owns boring machines, vehicles for exploration, etc. However, all the machines are superannuated. Concerning geophysical survey, OMRG carried out electronic prospecting method in the past. At present, however, there is no geophysical engineer, and there is no available equipment to use. SNIM has a large boring machine with capacity of maximum depth of 500m. There is a chemical laboratory in OMRG with jaw crushers, vibrating mills, atomic absorption analyzers, polarization microscopes and a diamond rock cutter. Specific analysis using the atomic absorption analyzer in OMRG is carried out on gold only owing to the superannuated equipment and inadequate replacement of parts. Some foreign companies request OMRG to prepare samples and analyze them for gold content by the atomic absorption analyzer. SNIM has a chemical laboratory in Zouerate, which analyzes the ore for iron content.

Exploration projects are financed by foreign companies from sources abroad. Therefore, they have no inconvenience in financing. Mauritania has adopted a financial liberalization system, so there is no limitation for money flow into the country. However, there is an exchange risk, because it is prohibited to pay in hard currency. The domestic companies can obtain finance only from domestic banks, and loan is the sole financing system. Currently short-term banking loans are. The interest rate is 13% for 1 year at maximum, and is too high to apply in exploration.

(3) Activities of OMRG

OMRG has implemented the geochemical and geophysical exploration in areas which have mining potential, and also evaluated mining occurrences through detailed work e.g. regional trenching and drilling. The goal of the work carried out by OMRG is to “provide up to date and complete geological data to the exploration and mining sector.” OMRG is rich in experiences of exploration with more than twenty years and has carried out the mineral resources survey, with international organizations like EU, the foreign research agencies like BGS and BRGM and the international mining companies like Rio Tinto and etc. Recent activities are as follows; gold exploration in the Tasiast-Tijirit district, gold exploration in the Ouassates-Sfariate district, copper and gold exploration in the southern Mauritanides, sulfur survey to the north of Nouakchott and peat survey in the southwest of Mauritania, as mentioned before.

OMRG has its own medium and long term program for gold, platinum, nickel, chromium and other industrial materials (Table 3.7.5).

Table 3.7.5 Medium and Long Program for OMRG

Mineral	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	
Gold (Base Metal)	█						█				
Platinum	█										
Nickel			█			█					
Chromium						█					
Clay and Kaolin			█								
Black Sand					█						
M. C.	█										
Barite							█				
Fluorite							█				
Salt	█				█						
Regional Maps	█										

NB M.C is Materials for Cement

3.7.3 Mining Development Situation

Except iron production by SNIM in Zouerate, there is copper production. Copper was produced in the Guelb Moghreïn district. The Guelb Moghreïn is located at Akjoujt in the Precambrian Mauritanides, in an area where copper had been found in Neolithic times. Checkup and engineering of machines and equipment in the old mine have been implemented now for re-development. In addition, the ore reserve is intended to be increased by exploration nearby the deposit. Production will start in 2006, with a plan of copper concentrate of 12,000t a year under initial investment of US\$ 50 million.

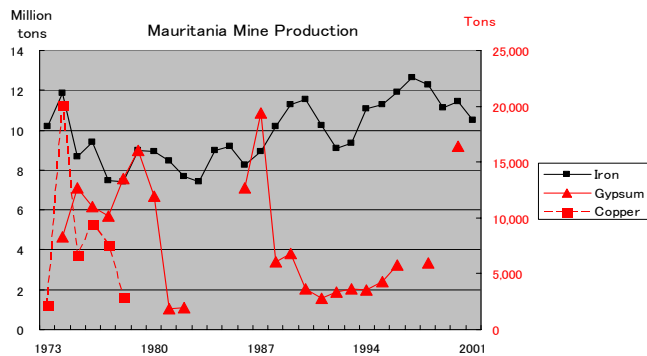


Fig.3.8.9 Result of Mineral Development in Mauritania

The Tasiast Gold Company financed by the Rio Gold Mines (Canada) are just implementing development works such as water supply pipeline with length of 70km, wells boring, access roads, an airstrip, a mineral processing plant, camps, etc. The initial investment is estimated about US\$ 60millions. Operation will start in September, 2006. Annual gold production is planned to be 120,000 ounces and the dore with Au grade of 85% to 90% will be produced at the mine site and be refined in Europe. They intend to employ foreign engineers (Canadians or Spaniards) for engineering works.

The mineral resource with production result for thirty years same as iron ore is gypsum. Gypsum is mined by SAMIA which Mauritanian government established in 1975 as a 60 % shock holder. Privatization was done in 1994, and current stock holders are SNIM by 50 % and Koeit (an investment company) by 50 %. There are three gypsum ore deposits. Current annual production is 20,000 tons, 16,000 tons for domestic demands and 4,000 tons for exportation.

3.7.4 International Assistance

There are two international assistance opportunities to mining activities: improvement of the iron mining through SNIM by EU cooperation and to strengthen the mining foundation in MMI for promotion of the investment through PRISM, by the World Bank support. These are loan projects. As technical cooperation, there are certain cases of EU support to OMRG for gold surveys and a technical support to OMRG for document database and construction materials surveys by the Spanish International Cooperation agency. Furthermore, this study is also implemented by JICA as a technical cooperation (Table 3.7.6).

Table 3.7.6 Recent Cases of International Assistance in Mining Sector

Organization/countries		Type	Target	Project
EU		Loan	SNIM	Processing plant Renovation of berth for iron ore shipment
		Technical cooperation	OMRG	Gold survey in Tasiast (1993 to 1996) Gold survey in Ouassates ('01 to '04)
WB		Loan	MMI	PRISM (1999 to 2008)
Donors	Spain	Technical cooperation	OMRG	Document database (2004) Construction survey (2003)
	Japan (JICA)	Technical cooperation	OMRG	Strategic plan of mineral resources development (2003/2006)

Main core of international assistance is to strengthen iron mining industry and build a foundation for nonferrous metal mining, considering the mineral potentiality. The current status of assistance is steadily proceeding for mining promotion under the above mentioned two purposes. Mining-related support is still necessary, considering that mining is an economic basis for Mauritania

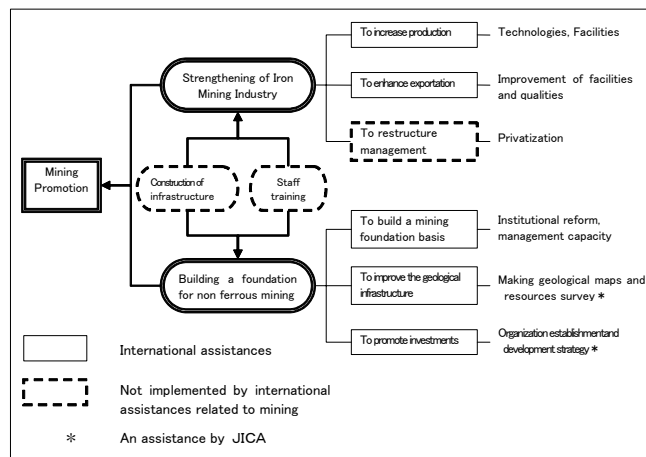


Fig.3.7.4 International Assistance for Mining Promotion

3.7.5 Tasks for Exploration and Development

There are many tasks to promote the exploration/development providing the current situation in Mauritania. At present, foreign activities are not sufficient, while number and capacities of domestic companies hardly grows. First of all, it is necessary to introduce foreign companies to promote exploration/development; and then promote actual mining by the domestic companies. Any disincentive factor for promoting exploration and development must be eliminated.

- To show an infrastructure arrangement plan, and identify opportunities for government supports.
- To obtain more information related to financing and environmental protection.
- To train manpower to support the activities led by foreign companies.

Table 3.7.7 Tasks to Promote Foreign Companies' Activities

Item	Exploration	Development
Infrastructure	<ul style="list-style-type: none"> ● Government support to water supply ● Plan of infrastructure for medium and long term 	<ul style="list-style-type: none"> ● Plan of infrastructure for medium and long term ● Construction of exporting port ● Government support/subsidy to water supply ● Government subsidy to road construction
Presentation of Information	<ul style="list-style-type: none"> ● Enhancing/replenishing of information ● Geological map in 1/100000 ● Utilization of database ● Submission of exploration data to the government, when the license is lost. ● Disclosure of information 	<ul style="list-style-type: none"> ● Replenishing environmental management data ● Baseline data survey, monitoring data
Manpower	<ul style="list-style-type: none"> ● Training of experts and engineers for geology, ore deposits and evaluation. ● Improvement of English capacity 	<ul style="list-style-type: none"> ● Training of engineers for mine development, operation management ● Improvement of English capacity ● Training of technical engineers
Funds	<ul style="list-style-type: none"> ● Exchange risk ● Domestic financing 	<ul style="list-style-type: none"> ● Domestic financing for operation etc. ● Exchange risk ● Government guarantee for capital
Others	<ul style="list-style-type: none"> ● Mineral analysis and laboratory center ● Policy to promote exploration 	<ul style="list-style-type: none"> ● Environmental monitoring system ● Laboratory center ● Technical development center

Regarding domestic companies, following tasks can be appointed out:

- To master general mining and specific technologies.
- To exert OMRG function as a survey organization and instruct private companies.
- To transfer technologies/engineers of SNIM to domestic companies through privatization.