

## **CHAPTER 7**

### **NATURAL RESOURCES DEVELOPMENT**



## **7. NATURAL RESOURCES DEVELOPMENT**

This chapter highlights the achievements of the Fifth Development Plan in the water, energy and mineral resources sectors. The chapter also deals with the key issues to be addressed during the Sixth Plan period, the replacement of non-Saudi manpower by Saudis, economic efficiency and opportunities available for the private sector. Finally, the chapter outlines the objectives, policies and programs of these sectors in the Sixth Plan period.

### **7.1 WATER**

#### **7.1.1 PRESENT CONDITIONS**

In the environment and climatic conditions of the Kingdom, water is the most important of all natural resources and the scarcity of potable water is one of the main constraints on socio-economic development. Under these conditions, the development of water resources is determined by a complex pattern of demand and supply relationships. On the one hand, population growth, rising living standards and economic development in general determine the volume of water demand; on the other hand, the availability, quality and cost of water influence both the potential for growth and the nature and scope of long term economic development. Water planning is, therefore, an integral part of a comprehensive planning process.

Water resources in the Kingdom can be divided into four categories: surface water, ground water, desalinated sea water, and reclaimed waste water. Surface water occurs mainly in the west and south-west of the Kingdom, where periodic rainfall is sufficient to produce run-off. There are two types of ground water aquifer in the Kingdom: renewable aquifers, where ground water is stored in the sediments of valleys and the cracked rocks below them, and non-renewable aquifers, where ground water is stored in the sedimentary rock areas in 16 principal and secondary aquifers which receive only limited re-charge. According to 1414/15 estimates, surface and shallow ground water supply only 13.8 percent of the Kingdom's total needs, while non-renewable ground water supplies around 81.5 percent of the Kingdom's total water needs. Desalinated sea water has reached an advanced stage of development in the Kingdom, which now has the largest desalination plants in the world. This source, however, supplies only 3.9 percent of current water needs. Finally, reclaimed waste water is still in its early stages of development and supplies only 0.8 percent of current needs.

The following developments were undertaken in the water sector during the Fifth Plan period:

- The Kingdom's desalination plants continued to operate at optimal production capacity, producing about 1.9 million cubic meters per day of desalinated sea water. Construction started on four new plants that will add another 1 million cubic meters per day to existing capacity.

- In the area of natural water resources development, three new dams were completed, bringing the total number of dams in the Kingdom to 183, with a total holding capacity of 450 million cubic meters. Other dams with a holding capacity of 325 million cubic meters, including the Custodian of the Two Holy Mosques dam at Wadi Bisha, are also currently under construction.
- Some of the existing water legislation and regulations were reviewed and updated, and a resolution was issued prohibiting water drilling in selected areas of the Kingdom which already suffer from the depletion of non-renewable ground water.
- Many medium-sized water projects have been completed, such as those at Afif and Ad Dawadmi, Sudair Al Kabir, Nafi and Dhurma/Al Mazahimiyah.
- Water continued to be provided to all consuming sectors from available resources.

#### **7.1.2 KEY ISSUES**

While the achievements described above confirm the substantial progress made in satisfying the water needs of the Kingdom, the continuing rapid increase in water consumption raises some key policy issues for the further development of the water sector in the Sixth Plan period and beyond:

- The steady increase in the consumption of non-renewable ground water has further worsened the national water balance and has reduced the quality of remaining reserves in some areas;
- Agriculture continues to consume almost 90 percent of water from all sources, and the expansion in grain production has been heavily dependent on non-renewable ground water in most areas;
- The hydrological and hydrogeological studies needed to support and update the water data base have still not been implemented, while the National Water Plan has still not been issued;
- There has been a serious depletion in the natural water springs used by the Al Hasa Irrigation and Drainage Authority;
- The shortage of national manpower trained in modern water technologies still continues.

#### **7.1.3 SAUDIIZATION**

During the Fifth Plan, the water sector continued its program of Saudi manpower development and reinforced the process of Saudiization in coordination with other related agencies. As a result, the share of Saudis in occupied jobs approved under Chapter 1 of the MOAW and SWCC budgets increased from 94 percent at the beginning of the Fifth Plan to 96 percent by the end of the Plan, and is expected to reach 99 percent by the end of the Sixth Plan.

#### **7.1.4 ECONOMIC EFFICIENCY**

The government's policies in the water sector aim to raise productivity through the continuous development of manpower, the establishment of necessary targets for the economic utilization of water, the conservation and control of water resources, and the adoption of effective techniques and advanced technologies for the efficient distribution of water to the various categories of end user.

Labor productivity in the desalinated water sub-sector improved in the Fifth Plan period, as output per employee increased from 3,512 cubic meters per day in 1409/10 to 3,696 cubic meters per day in 1414/15, an average annual increase of one percent. The production of desalinated water was also made more efficient in the Fifth Plan period through the substitution of fuels from high-cost diesel to natural gas in the East coast plants.

Other measures for raising economic efficiency and attaining the optimal utilization of water resources in the Sixth Plan include the completion of the National Water Plan and the implementation of water consumption rationalization measures, such as the adoption of a new tariff system for water consumption, efficient maintenance to reduce water loss, the expansion of sewerage networks and the re-use of reclaimed waste water for agricultural purposes.

#### **7.1.5 PRIVATE SECTOR OPPORTUNITIES**

The government agencies responsible for managing and planning water affairs performed their tasks successfully in the Fifth Plan period, and adopted a policy of giving the private sector opportunities to participate in the development process through:

- undertaking many of the economic activities directly financed by the government, such as water supplies and services projects and the construction of desalination plants;
- operating and maintaining the existing water facilities currently operated by the government;
- providing support and technical advisory services that enable the private sector to operate more effectively and flexibly.

During the Fifth Plan period, the private sector implemented many projects financed by the state budget, such as:

***First: Water Services and Supplies Projects (MOAW - Water Affairs):***

- drilling of 245 wells for drinking water and the construction of three reservoir dams;
- implementing water supply projects in large and medium-sized cities and towns, as well as in 107 villages and hamlets in five regions of the Kingdom;

- supplying and installing 254 pumping units in wells;
- providing water by tankers an average of 430,000 times per year, as well as the leasing of 50 indigenous projects;
- operation and maintenance of 183 dams with a total holding capacity of 450 million cubic meters of water;
- operation and maintenance of 1,010 drinking water projects in villages and hamlets;
- operation of the program to re-use reclaimed waste water for agricultural purposes in Riyadh area, with a capacity of 300,000 cubic meters per day;
- operation and maintenance of 9 purification plants.

The total cost of these projects during the Fifth Plan period amounted to about SR 3,800 million.

***Second: Desalination Plants and related facilities construction (SWCC) :***

- starting to implement four new plants with a capacity of 1 million cubic meters per day.

The total cost of these projects was estimated at SR 15,300 million during the Fifth Plan period.

In the Sixth Plan, the private sector will have the opportunity to implement the water projects approved within the Water Development, Services and Supplies program, and is expected to play an important role in the construction of desalination plants.

#### **7.1.6 DEVELOPMENT STRATEGY**

The overall development strategy of the water sector will be implemented through the following objectives, policies and programs.

##### **7.1.6.1 Objectives**

The main objectives for the development of the water sector include the following:

- To provide sufficient quantities of good quality water to meet the needs of the population, the producing sectors and other public services in a more efficient manner;
- To conserve water resources -- particularly non-renewable ground water -- and to develop these resources to meet current and future demand;
- To improve the management, operation and maintenance of operating water facilities, such as desalination plants, and to reduce their costs as much as possible;

- To increase the efficiency and utilization of non-conventional water resources, such as desalinated water, treated waste water and agricultural drainage water, so as to maintain the natural water resources in the Kingdom;
- To raise labor productivity in the water sector and to train Saudi manpower to adapt to the continuous development in water technologies.

#### **7.1.6.2 Policies**

The following policies will be adopted in order to achieve these objectives:

- Water should be considered as the most basic and valuable resource, and as an important factor in measuring the economic efficiency of public and private sector projects.
- The water studies program will be resumed to update the hydrological information on water aquifers, and the water potential studies for some areas.
- The National Water Plan will be issued as soon as possible, based on the review and updating of previous studies on available water resources, and sectoral demand patterns will be determined so that appropriate water policies can be formulated.
- Rules will be established for the operation and maintenance of existing water resources in order to preserve their productive efficiency.
- The implementation of water supply projects will be continued, while giving priority to the population's need for potable water.
- Expanded use will be made of reclaimed waste water for agricultural and recreational purposes, and its potential use for industrial purposes will be studied.
- Suitable training programs will be prepared for the manpower working in the sector.
- Regulations and legislation with respect to the organization of water consumption for all purposes and on an economic basis will continue to be issued, in order to promote the conservation of water resources.
- A revenue collection program will be developed according to a system of water consumption tariffs for various consumer categories to provide financial resources that are sufficient to cover the operating expenses of water production and distribution.

#### **7.1.6.3 Main Programs**

The main programs for the water sector will be implemented by three executive agencies during the Sixth Development Plan, as follows:

The **MOAW - Water Affairs Department** has three major programs:

- *Water Resources Development* : includes the hydrological and hydrogeological studies, the re-use of waste water, digging wells, constructing dams, and preparing the National Water Plan.
- *Potable Water Supply* : aims at establishing potable water networks and projects to meet the basic water needs of the population in areas that have no water departments and that still suffer from a shortage of water supplies.
- *Operation and Maintenance* : of potable water networks, projects and facilities, and supplying potable water by tanker to rural and remote areas.

The **Saline Water Conversion Corporation ( SWCC )** has two main programs : the establishment of new desalination plants, and the operation and maintenance of existing plants.

The **Al Hasa Irrigation and Drainage Authority** programs include:

- *Water Resources Development, Research and Studies* : aimed at providing accurate data and information about water; conducting hydrological studies to define the optimal use of water resources; rationalizing the use of irrigation water; identifying the water requirements of crops; and digging wells to meet additional water needs.
- *Operation and Maintenance* of existing water facilities.

The main programs of the **Ministry of Municipal and Rural Affairs (MOMRA)** will include the further expansion, operation and maintenance of the water network, completing the installation of house connections and the waste water treatment system.

#### **7.1.7 Sixth Development Plan Targets**

The main targets in the water sector in the Sixth Plan period are the reduction in total water consumption from 18.2 billion cubic meters in 1414/15 to 17.5 billion cubic meters in 1419/20, and a decline in the use of non-renewable ground water from about 14.8 billion cubic meters to 13 billion cubic meters over the same period. These targets are to be achieved by reducing the rate of water consumption in agriculture at an average annual rate of 2.2 percent and achieving balanced consumption rates for other purposes.

The targeted national water balance in the Sixth Plan period is shown in Table 7.1.



**Table 7.1**  
**Targeted National Water Balance in the Sixth Development Plan**  
**( million cubic meters per year )**

	1414/15	1419/20	Average annual rate of growth %
<b>Water Demand</b>			
Municipal and Industrial	1,800	2,800	9.2
Agriculture	16,400	14,700	(2.2) *
<b>Total</b>	<b>18,200</b>	<b>17,500</b>	<b>(0.8) *</b>
<b>Available Water Resources</b>			
Renewable water ( surface and shallow ground water )	2,500	3,000	3.7
Non-renewable ground water	14,836	13,040	(2.6) *
Desalinated Sea Water	714	1,150	10.0
Reclaimed Waste Water	150	310	15.6
<b>Total</b>	<b>18,200</b>	<b>17,500</b>	<b>(0.8) *</b>

★ negative growth rate

## 7.2 ENERGY

### 7.2.1 PRESENT CONDITIONS

The energy sector occupies a central position in the Saudi economy since the Kingdom is a major producer and exporter of oil and possesses the largest proven oil reserves in the world. It is a main determinant of the Kingdom's trade policy, which endeavors to maximize oil revenues while defending its share of the world oil market. Despite the progress made in reducing the dependence on crude oil exports as the main source of national income and in diversifying the national economy, oil revenues will continue to be a major source of income for years to come. As a result, the energy sector will remain as the primary driving force of economic development.

Owing to concerns about potential cuts in oil supplies from the region, the world oil markets were in a state of instability both prior to and during the Gulf crisis. In response, the Kingdom and other oil producers with available capacity quickly raised their production levels to replenish world oil supplies and thereby restore market stability. This action conformed to the Kingdom's declared strategy to maintain stability in the world oil markets.

The Kingdom's crude oil production reached about 8 million barrels per day (mbd) in 1413/14, or 13.4 percent of world production and 32.6 percent of OPEC production (Table 7.2). Oil and gas exploration programs undertaken during the Fifth Plan contributed a net addition of 3.9 billion barrels to the Kingdom's crude oil reserves, which reached 261.4 billion barrels in 1413/14. Natural gas reserves rose by 160 billion cubic meters over the same period.

These additions to reserves came from both existing fields and new fields discovered in the Central region south of Riyadh city. These new discoveries are especially significant, since their crude oil is the lightest type ever discovered in the Kingdom and has a very low sulfur content. Furthermore, hydrocarbon reserves have been discovered in the Red Sea coastal plain at Jizan, Al Madinah and Al Wajh, as well as in the north-west region at Kahf near Jawf. The use of the latest exploration and data analysis techniques made an important contribution to these positive outcomes.

In the refining sector, primary distillation capacity was maintained at 1.57 mbd, while the production of refined products increased at an average annual rate of 3 percent in the first four years of the Fifth Plan (Table 7.3).

Total domestic consumption of primary energy rose at an average annual rate of 7.8 percent, from 412 million barrels of crude oil equivalent in 1409/10 to 557.4 million barrels in 1413/14, with the consumption of refined products growing at 6.8 percent, crude oil for direct burning at 15 percent and natural gas at 7.2 percent (Table 7.3).

A number of significant developments were implemented in the Fifth Plan period, the most important of which were:

- the consolidation within Saudi ARAMCO of all refining, distribution and marketing activities, inside and outside the Kingdom; this step aims at achieving an integrated petroleum industry and will provide greater flexibility in dealing with developments in local and international oil markets, and for further improvements in efficiency and productivity.
- the addition of substantial new oil transport and storage capacities; the number of oil tankers owned by ARAMCO increased from 4 to 23, with a capacity of 52 million barrels in 1413/14. The capacity of the East-West crude oil pipeline was also increased from 3.2 mbd to 5 mbd during the Fifth Plan period, while the export capacity of the crude oil terminal at Yanbu was raised by 60 percent, to reach 4.2 mbd.
- the establishment of joint venture refining and marketing operations with two companies: Sang Yang in South Korea and Petron in the Philippines; two international marketing companies were also established in the U.K. and Japan.

These steps have been taken in the context of policies that aim to maintain and extend the role of Saudi oil in the world market.

**Table 7.2**

**Crude Oil and Natural Gas Indicators in the Fifth Plan**

	1409/10	1413/14	Average Annual Growth 1409/10 - 1413/14 %
Crude Oil Production (mbd)	5.06	8.05	12.3
Cumulative crude oil			
Production (billion barrels)	57.2	68.5	4.6
Crude oil reserves (billion barrels)	257.5	261.4	0.4
Natural gas reserves (billion cubic meters)	5,106	5,265.8	0.8
Kingdom's share of crude oil production (%)			
— OPEC production	23.2	32.6	8.9
— World production	8.3	13.4	12.7

**Table 7.3**

**Refining Capacity and Domestic Energy Consumption in the Fifth Plan**

	1409/10	1413/14	Average Annual Growth 1409/10 - 1413/14 %
Refining capacity (mbd)	1.76	1.57	(2.8)
Refined products production (million barrels)	487.6	548.8	3.0
Refining capacity utilization (%)	76.3	96.1	5.9
Domestic consumption of primary energy (million barrels of crude oil equivalent)	412.0	557.4	7.8
of which:			
- Refined products	215.4	280.1	6.8
- Crude oil for direct consumption	40.6	71.1	15.0
- Natural gas	156.0	206.2	7.2

( ) negative value

### **7.2.2 KEY ISSUES**

The energy sector faces the following key issues :

#### **Pattern of Domestic Demand for Oil**

The pattern of domestic energy consumption is inhibiting the maximization of potential economic returns from the production and marketing of crude oil and its products, as well as the optimal operation of refineries. The use of crude oil and diesel as fuel for electric power generation and desalination plants, instead of lower quality and abundant heavy fuel oils or natural gas, puts unnecessary pressure on domestic supplies of higher value diesel and reduces its export potential.

#### **Domestic Pricing Levels**

Low prices for oil products and crude oil in the domestic market have led to rapidly rising consumption, thus hindering rationalization of such consumption and the conservation of national resources, while imposing a high opportunity cost in relation to export prices. These low prices reflect a high level of indirect subsidies for oil products in the domestic market, which have reached as high as 77 percent in the case of diesel, 76 percent for crude oil and 41 percent for gasoline in 1413/14 (1993).

#### **Financing Oil Sector Investments**

Expanding and maintaining oil production capacity require substantial amounts of investment. The Public Investment Fund (PIF) has played a major role in providing the required finance to the sector. Saudi ARAMCO has also financed some expansions in the past through its own resources. However, the required investments are substantial and entail reviewing all potential sources of finance, including local sources, and utilizing such sources in a manner that achieves the most efficient expansion of investment.

#### **Redefining the Role of Petromin**

Following the restructuring of the Saudi oil industry and the consolidation of refining, distribution and marketing activities within ARAMCO, and the re-organization of the lube oil and mining activities, it has become necessary to review the future role of Petromin.

### **7.2.3 SAUDIIZATION**

All operating companies in the petroleum sector, and most prominently ARAMCO, play a leading role in the education and training of the work force, with the twin objectives of improving their productivity and effectiveness, and advancing the process of replacing non-Saudis with Saudi nationals

in all technical and administrative positions. In 1412/13, Saudis constituted 73 percent of ARAMCO's work force of 58,301 and 94 percent of the 738 employees of the Ministry of Petroleum and Mineral Resources.

It is expected that the process of re-structuring in the sector will further advance the Saudiization process during the Sixth Plan period and, in the Ministry of Petroleum and Mineral Resources, Saudis are expected to make up 96 percent of the work force by 1419/20.

#### **7.2.4 ECONOMIC EFFICIENCY**

Enhancing economic efficiency in the energy sector is one of the principal motives behind its recent restructuring. Building an integrated petroleum industry and consolidating lube oil activities are not objectives in themselves; rather, they are ways of enhancing economic efficiency and managerial effectiveness through the rational use of resources and an effective response to the requirements of the domestic and international petroleum markets. The restructuring process will be completed in the Sixth Plan period by consolidating the steps already taken and completing those currently being implemented.

#### **7.2.5 PRIVATE SECTOR OPPORTUNITIES**

The private sector is a primary partner in the various activities of the energy sector. It undertakes all support activities and provides the equipment, systems and materials used by the oil, gas and refining industries. Furthermore, the private sector participates directly in the distribution and retailing of petroleum products and in the manufacturing and marketing of lube oils. The complementary role of the private sector in the energy sector is expected to expand in the Sixth Plan period. Programs will be implemented to inform the private sector of the energy companies' various service needs. In addition, local banks will be encouraged to extend loans to the private sector for investment in support services and other activities associated with the petroleum industry.

#### **7.2.6 DEVELOPMENT STRATEGY**

The development strategy of the energy sector will be implemented through the following general objectives, policies and programs during the Sixth Development Plan:

##### **7.2.6.1 Objectives**

- to enhance the role of oil in world energy markets ;
- to achieve the optimal use of energy in the domestic market ;
- to ensure self-sufficiency in basic oils and improve their export potential, while producing a greater number of high quality lubricants and greases ;

- to encourage more private sector participation in the petroleum industries ;
- to promote the development of qualified Saudi manpower ;
- to employ appropriate technologies for protecting the environment from possible pollution in the production, transportation, storage and refining stages of petroleum products ;
- to conserve water resources and rationalize its use in the various production processes.

#### **7.2.6.2 Policies**

The objectives of the energy sector will be achieved through the following policies :

- Support the pricing of crude oil and oil products, both domestically and internationally, with the aim of achieving maximum economic returns and thereby enhancing national income, while preserving the share of oil in the world energy market.
- The Kingdom will make all necessary efforts in its international relations to oppose the imposition of excessive and discriminatory taxes on oil and oil products.
- Support will be given to scientific and technological activities aimed at limiting the impact on the natural environment of energy use in general, and oil in particular.
- The process of restructuring the Saudi oil industry will be completed, in order to achieve a higher level of integration and improved performance.
- The rational consumption of energy will be encouraged, by directing consumers of internationally high-priced crude oil and refined products towards low-priced products.
- The Kingdom will participate in the ownership of oil refineries and marketing outlets in major markets, constructing or upgrading refineries both inside and outside the Kingdom.
- The development of a domestic pipeline network to transport and distribute oil products will be studied with a view to implementing what is practical and economical.
- A study will be undertaken to review the upgrading of domestic refineries to produce light and clean products.
- The production capacity of basic oils in the Kingdom will be raised, with a view to increasing Petromin's share in local and international markets.
- The Saudiization program will be continued.
- The private sector will be acquainted with the support activity needs of the oil companies, while local banks will be encouraged to grant loans and facilities to the private sector for investment in such supporting activities.
- Local, regional and binding international environmental codes will be applied, and environmental awareness promoted among workers in the oil sector.

### 7.2.7 GROWTH TARGETS IN THE SIXTH PLAN

Local consumption of primary energy is expected to grow at an average annual rate of 5.3 percent during the Sixth Plan, from 1.55 mbd (of crude oil equivalent) in 1414/15 to 2.0 mbd in 1419/20. Refined products are expected to account for 42.1 percent of total consumption, crude oil for direct burning 14.2 percent, natural gas 30.7 percent and liquid gas for 13.0 percent in 1419/20 (Table 7.4).

Other major targets for the energy sector in the Sixth Plan also include :

- to increase the production capacity of basic lubricating oils from 1.8 million barrels in 1414/15 to 3.8 million barrels in 1419/20;

**Table 7.4**

**Forecast Indicators for the Energy Sector in the Sixth Plan**

	1414/15	1419/20	Average Annual Growth Rate ( % ) 1414/15 - 1419/20
Local consumption of primary energy (thousand barrels of oil equivalent per day)	1,548.0	2,007.0	5.3
Percentage share in total consumption (%):			
- Refined products <sup>★</sup>	50.5	42.1	(3.6)
- Crude oil for direct burning	12.5	14.2	2.5
- Natural gas	30.3	30.7	0.3
- Natural gas liquids	6.7	13.0	14.3

★ including lubricating oils ;

( ) negative value

## 7.3 MINERAL RESOURCES

### 7.3.1 PRESENT CONDITIONS

The diversification of the economy has been a consistent objective of the Kingdom's development plans and in this regard the development and utilization of the country's extensive mineral wealth has an important role to play. The state has made great efforts to ensure the appropriate development of mineral resources and adequate levels of investment in the mining industry.

In the course of previous development plans, exploration efforts by the government led to the discovery of many mineral deposits with promising long term economic potential for the establishment of a substantial and advanced mining industry (Figure 7.1). Thus, the number of active mines has been increasing and the mining sector's contribution to GDP has grown accordingly.

A thriving mining industry has an important role to play in the diversification of the Kingdom's economy and it can make a positive contribution to the balance of payments. At the same time, the output from the mining industry has important linkage effects with other parts of the domestic economy, particularly with the construction sector, and can stimulate the establishment and expansion of new intermediate and manufacturing industries. Finally, it can play an important role in generating employment and training opportunities and in supporting the economic development of the regions.

In the Fifth Plan period, the **Deputy Ministry for Mineral Resources** ★ evaluated some of the economically promising mining deposits. Several studies were completed, including the feasibility study for the phosphate deposits in Al Jalamid, the pre-feasibility study for bauxite (for aluminum) in Az Zubayrah, the pre-feasibility study for zinc in Al Khunayqiyah, and a feasibility study to improve the quality of iron ore in Wadi Al Sawawin. Four other pre-feasibility studies for industrial mineral deposits were also undertaken.

Within the framework of geological services, the Deputy Ministry for Mineral Resources extended its geological survey of the Kingdom, focusing in recent years on the sedimentary cover-rocks and continued to provide geological information for the benefit of society as a whole. A major achievement was the publication of the Atlas of Industrial Minerals and Mineral Resources of Saudi Arabia.

Direct services to the community included the issue of a geo-technical map of Riyadh city, the installation and operation of eight advanced seismic stations for earthquake observation around Al Madinah, and the provision of ongoing advice to communities about the risks from geo-hazards.

To identify the direction of future exploration and geological survey work, 5,000 documents have been reviewed and evaluated, 33 technical reports have been issued on the present conditions of all mineral deposits in the Kingdom, and recommendations have been made relating to future activities. The sector has been further supported through the activities of the Deputy Ministry for Mineral Resources Mining Investment Department, which is currently administering 16 mining leases (issued by Royal Decree), 5 small mining licenses, 5 exploration licenses and 22 reconnaissance permits.

The mining activities of Petromin developed considerably during the Fifth Plan. In 1413/14, the ore extracted from Mahd ad Dhahab mine (a 100% Petromin project) reached 189,353 tons, which exceeded design capacity by almost 50 percent. Net gold production, all of which is sold to SAMA, amounted to almost 670,000 ounces between 1408/09 and 1413/14.

The first gold bar from Sukhaybarat mine (where Petromin holds a 50 percent share) was poured in 1411/12, while the gold produced at this mine amounted to 81,868 ounces in 1413/14. The exploration activities near the mines were encouraging, as they will lead to an increase of exploitable

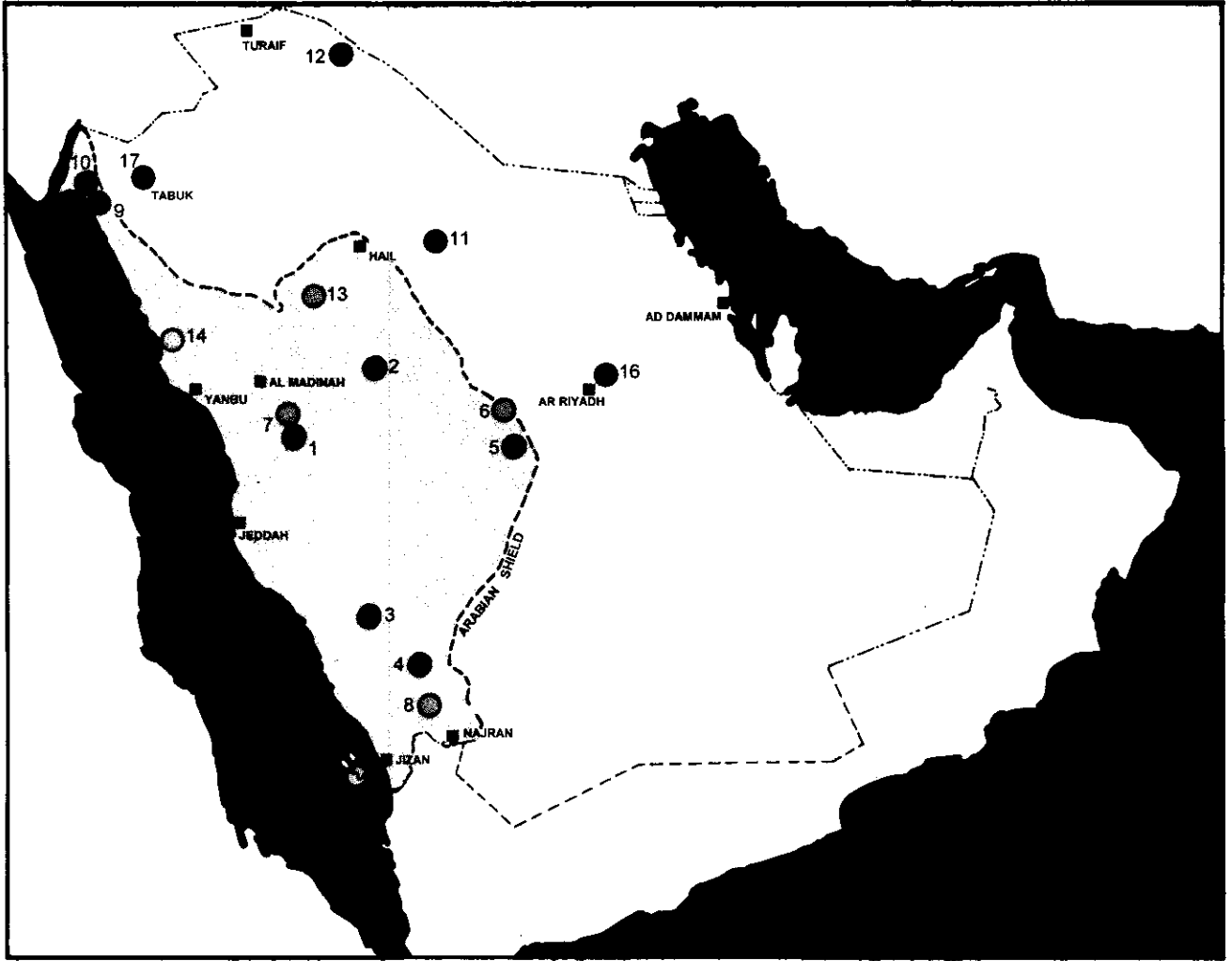
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★ Within the ministry of petroleum and mineral resources



# Figure (7-1)

## MAJOR MINERAL DEPOSITS



- |  |   |                               |   |  |   |
|--|---|-------------------------------|---|--|---|
| ● Silica<br>16- Al Butayn<br>17- Tabuk | ● Magnesite<br>13- Zarghat                          | ● Aluminum<br>11- Az Zubayrah | ● Rare Earth Elements<br>9- Al Ghuraysh | ● Copper & Zinc<br>6- Al Khunayqiyah<br>7- Jabal Sayid<br>8- Al Masani | ● Gold & Silver<br>1- Mahd Ad Dahab<br>2- Sukhaybarah<br>3- Al Hajar<br>4- Hamdah<br>5- Al Amar |
|  | ○ Potasium<br>14- Ras Karkoma<br>15- Farasan Island | ● Phosphate<br>12- Al Jalamid | ● Iron<br>10- Wadi Al Sawawin           |  |   |



ore reserves or even to the development of new mines. After completion of the positive feasibility studies for the Al Amar, Al Hajar and Hamdhah gold projects, as well as the Zarghat magnesite deposit, (where Petromin will hold the exploration licenses) more mines will be developed and brought to production during the Sixth Plan.

### **7.3.2 KEY ISSUES**

Despite the sector's successes, a number of key issues must be addressed if the goals of developing a sound mining industry are to be met.

#### **Limited Contribution by the Private Sector to Mining Development**

With the exception of its small mining licenses, quarrying concessions and building materials licenses, the private sector's initiatives and contributions to the development of mineral resources have been limited. Apart from Petromin's mining of gold and precious metals at Mahd ad Dhahab and Sukhaybarah mines, only one major concession has been issued to a private sector company to exploit and utilize base metals (copper and zinc) in the Al Masani area. The main reasons preventing the private sector engaging in mining activities are : the long procedures involved in obtaining mining concessions, the fact that many promising mining deposits are often located in remote areas, and inadequate financial support on borrowings by investors because mining projects are viewed as long term investment projects.

If the private sector is to play a more active role in minerals exploration and mining activities in the future, a more positive investment climate must be created for the benefit of investors. This would include the provision of basic infrastructure in mining areas, the re-consideration of incentives available to mining projects (including those related to income tax regulations), an extension of the customs exemption period, the use of reserves depletion allowances and the carrying forward in financial accounts of losses in accordance with international practice in this field.

#### **Lack of Qualified Saudi Manpower in Mining Exploration**

The sector still suffers from a lack of sufficient national expertise in the fields of geological surveys, exploration and mining investment. This has led to a continued dependence on foreign experts and contracts with specialized missions.

#### **Shortage of Infrastructure in Potential Mining Areas**

Mining prospects are often situated in remote areas with sparse populations and are therefore burdened by a lack of basic infrastructure such as water, electricity, telecommunications and roads. In recognition of the importance of adequate infrastructure for mining development, the government will increase its efforts to coordinate related agencies when considering priorities for infrastructure projects in mining areas.

### **7.3.3 SAUDIIZATION**

The Deputy Ministry for Mineral Resources Saudiization program has been fully achieved (100 per cent) during the Fifth Plan period for all of the 542 occupied jobs authorized under Chapter 1 expenditure. All 56 job vacancies are expected to be filled by Saudis during the Sixth Development Plan.

### **7.3.4 ECONOMIC EFFICIENCY**

Considering the enormous size of the country, and the limited amount of exploration drilling that has been undertaken, the efficiency of the Saudi mining industry is evident by the high rate of discovery of mineral prospects and deposits. This can be attributed to considerable improvements over the years in the volume and quality of geologic information provided by the Deputy Ministry for Mineral Resources in the form of reports, studies and maps. It is important that this trend be continued so that productivity and efficiency levels in the Saudi mining industry are comparable to best international standards. In the Sixth Plan greater efforts will be made to improve administrative efficiency in this sector through the implementation of extensive training programs. The objective will be to raise the quality of administrative services in line with the needs of the rapidly growing public and private mining activities.

In the case of Petromin's producing gold mines, efficiency has been raised by reducing production costs by about 24 percent in the Mahd ad Dhahab project and 32 percent in the Sukhaybarat project. If this trend can be continued in the future, higher profitability can be expected, although more intensive exploration activities in the license areas will have to be carried out during the Sixth Plan period.

### **7.3.5 PRIVATE SECTOR OPPORTUNITIES**

The role of the government in the mining area is to establish the regulatory and administrative framework for the development and exploitation of mineral resources, in addition to providing a range of geologic services throughout the Kingdom. The Deputy Ministry for Mineral Resources is responsible for exploring for metallic and non-metallic mineral deposits, for establishing a substantial geologic data base, and for conducting a geological survey in all parts of the Kingdom in order to bring the mineral deposits to an economically feasible stage in preparation for exploitation in the near or longer term future.

Currently, the mining of precious metals in the Kingdom is conducted almost exclusively by Petromin, with private sector participation up to the end of the Fifth Plan limited to a single successful joint venture between Petromin and a Swedish company. In the longer term, when the profitability of Petromin's precious metals activities becomes more firmly established, shares in Petromin's minerals company will be offered to private investors.

In the field of base metals, a mining lease has been granted to a national company for the Al Masani copper and zinc deposits. At the same time, new investment opportunities are continuously being created by the completion of feasibility studies for a number of base metal deposits and industrial minerals, followed by the issuing of tender invitations to national and international mining companies.

The private sector plays a major role in the development of other mineral resources, such as construction materials, industrial minerals, and ornamental stones for national consumption. By the end of the Fifth Plan, 548 permits had been issued to the private sector to extract sand, gravel, clay, gypsum, granite, white marble and other materials used largely (but not exclusively) in the construction industry.

The mining of these materials does not normally require advanced technology or major capital inputs and the economic return in such industries is rather quick. In the Sixth Plan, the Deputy Ministry for Mineral Resources Investment Promotion Department will become increasingly active in supporting private sector development activities in this field, in order to stimulate the most effective use of the Kingdom's mineral resources in compliance with existing laws and regulations.

#### **7.3.6 DEVELOPMENT STRATEGY**

The development strategy for the mining sector in the Sixth Plan will be implemented through the following objectives, policies and programs.

##### **7.3.6.1 Objectives**

The major development objectives for the mining sector in the Sixth Plan are :

- to support regional development through the establishment of a substantial mining industry ;
- to encourage the private sector to invest in the development and economic exploitation of mineral deposits ;
- to provide domestic alternatives to imported raw materials where economically feasible ;
- to develop qualified Saudi manpower capable of establishing a firm foundation for mining activities in the Kingdom.

##### **7.3.6.2 Policies**

The development objectives and the necessary support for a national mining industry can be achieved through the following policies during the Sixth Plan :

- Studies will be conducted to evaluate promising economic deposits.
- Exploration for all mineral deposits will be continued and geological survey methods developed in support of inland and off-shore exploration activities.

- The geologic and mining data base will be continuously updated.
- Geological services will be provided for the benefit of society, while geologic information and technical consultations will be supplied to relevant agencies.
- New investment opportunities will be identified for both existing and potential national, joint venture and international private mining companies.
- Investors will be informed periodically of the results of mining studies and encouraged to explore for and invest in mineral deposits.
- Technical and administrative capabilities of the sector will be continuously developed through training and Saudiization, in order to meet the sector's qualified manpower needs and to increase efficiency.

### 7.3.6.3 Programs

The main programs to be undertaken by the Deputy Ministry for Mineral Resources during the Sixth Plan are as follows :

*Exploration and Surveys :* This program will continue the data collection and exploration for mineral materials of all kinds, with particular emphasis on the use of modern technology. Geologic information in the form of reports, new and updated maps will be prepared, and technical consultations and advice offered to concerned agencies. Geologic risks will be identified and evaluated in those regions vulnerable to earthquakes and other geo-hazards.

*Mining Development and Investments :* Under this program, economically promising minerals prospects will be further evaluated. Private and public sector companies will be encouraged to invest in the exploration and exploitation of economically feasible mineral deposits. Executive procedures and mining regulations to control and administer mining activities in the Kingdom will be reviewed and further developed.

*Saudi Manpower Development :* This program will aim to increase the employment of Saudis in the mining industry, to develop Saudi technical and administrative capabilities in response to the sector's needs, and to raise productivity through ongoing training activities.

### 7.3.7 SIXTH DEVELOPMENT PLAN TARGETS

As new mines at Al Amar, Al Hajar and Hamdhah and the magnesite deposit at Zharghat come into production, and the efficiency of existing mines is increased, value added in the precious metals sector is expected to grow by up to 40 percent over the Sixth Plan period. The Kingdom's first base

metal mine is scheduled to start production by the end of the plan period and the positive outcome of the tendering process for deposits at the end of the Fifth Plan will give a major boost to growth in this sub-sector. In the quarrying sector of the mining industry, the growth will increase due to the rising demand for locally produced construction materials and the ongoing trend towards import substitution by national mineral products.

The mining sector is expected to grow faster than any other sector in the Sixth Plan period, with value added growing in real terms at an average annual rate of 9 percent.

