



**MA'ADEN**

SAUDI ARABIAN MINING COMPANY



EXPLORATION



MINING



PROCESSING

*In the Name of Allah, the Beneficent, the Most Merciful*



*The Custodian of the Two Holy Mosques*  
**King Fahd Bin Abdulaziz Al Saud**



**HRH Crown Prince Abdullah Bin Abdulaziz Al Saud**  
*First Deputy Prime Minister*  
*and Commander of the National Guard*



**HRH Prince Sultan Bin Abdulaziz Al Saud**  
*Second Deputy Prime Minister*  
*and Minister of Defense and Aviation and Inspector General*



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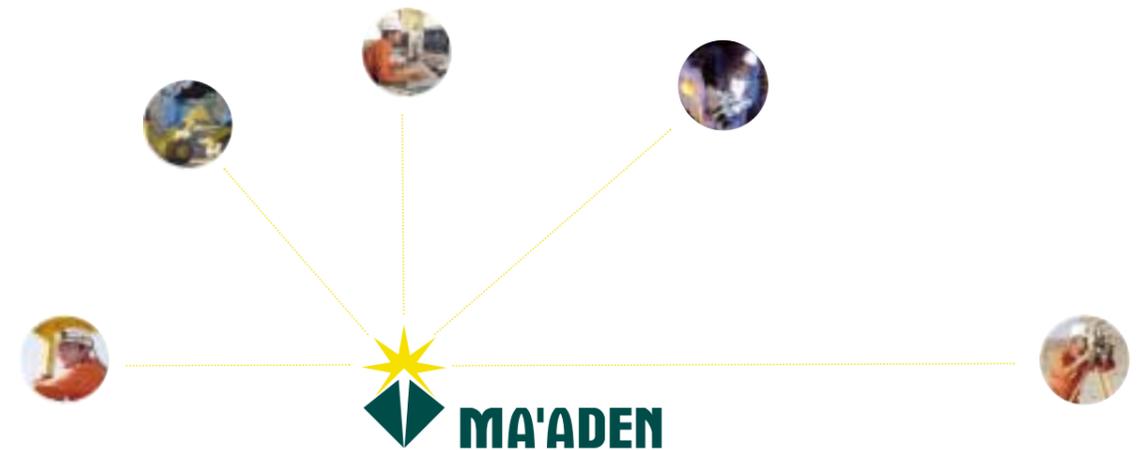
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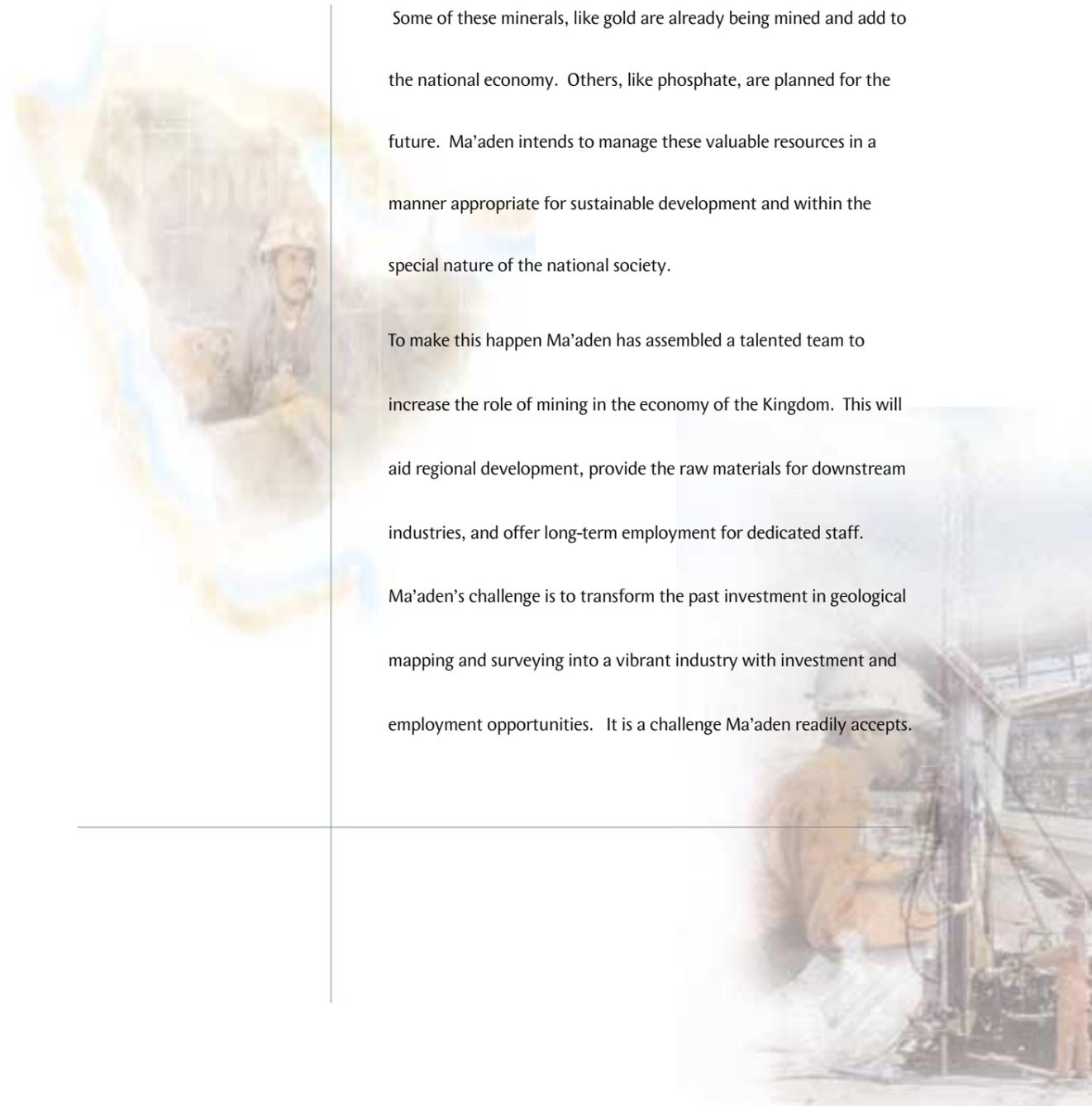
SAUDI ARABIAN MINING COMPANY

Ma'aden was established to develop the mineral potential of the Kingdom.

Some of these minerals, like gold are already being mined and add to the national economy. Others, like phosphate, are planned for the future. Ma'aden intends to manage these valuable resources in a manner appropriate for sustainable development and within the special nature of the national society.

To make this happen Ma'aden has assembled a talented team to increase the role of mining in the economy of the Kingdom. This will aid regional development, provide the raw materials for downstream industries, and offer long-term employment for dedicated staff.

Ma'aden's challenge is to transform the past investment in geological mapping and surveying into a vibrant industry with investment and employment opportunities. It is a challenge Ma'aden readily accepts.





**introduction**

**from the Minister of Petroleum and Mineral Resources**



H.E. Ali Al-Naimi  
Minister of Petroleum and Mineral Resources  
Chairman of Ma'aden's Board of Directors

The natural resources of the Kingdom of Saudi Arabia are highly diverse, both in terms of their variety and their location throughout the country. In my role as the Minister of Petroleum and Mineral Resources, and as the Chairman of Ma'aden's Board of Directors, it is my pleasure to introduce this brochure describing the activities of this company.

Ma'aden is an important instrument of national economic development policy, as well as a means to foster the growth of technical and other skills amongst its employees. Ma'aden also is a vehicle for the expanding employment of qualified Saudi Arabians in many interesting career opportunities.

The Ministry of Petroleum and Mineral Resources looks forward to the continued expansion of Ma'aden, in co-operation with the private sector, during the years ahead.

**from the President of Ma'aden**



Dr. Abdallah E. Al-Dabbagh  
President and CEO of Ma'aden

Ma'aden is developing momentum as a robust participant in the global mining and metallurgical industries. This brochure tells about the achievements to date and provides insights into the company's philosophy for future growth. It is an exciting time.

The company has the financial capital to meet its objectives, and is developing the human capital – its employees – for the job ahead. Strong relations are also being forged with our customers, with the companies that supply Ma'aden with goods and services, with our counterparts in the international minerals sector, and with other groups that have links to the company.

Achieving the proper balance between commercial profitability, corporate responsibilities for the protection of the environment, sound safety and employment practices and national development policies is a demanding task. Fortunately, Ma'aden has the team in place to do this, and anticipates the future with confidence.

**Ma'aden - the company**

**The Board of Directors**  
from left to right

- Mr. Abdullah A. Al-Zaid** Acting Governor of Petromin
- Dr. Abdallah E. Dabbagh** President & CEO of Ma'aden
- Dr. Abdulrahman A. Al-Jafary** Member of MAJLIS ASH SHURA
- Dr. Zohair A. Nawab** Geological Advisor Deputy Ministry for Mineral Resources, Ministry of Petroleum & Mineral Resources
- HRH Prince Faisal Bin Turki Bin Abdulaziz** Advisor to the Ministry of Petroleum & Mineral Resources
- H. E. Ali Ibrahim Al-Naimi** Minister of Petroleum & Mineral Resources, Chairman of Ma'aden's Board of Directors
- Dr. Mohammad S. Al-Jasser** Vice Governor of SAMA
- Dr. Abdulaziz S. Al-Jarbou** Industrial Consultant Private Sector
- Dr. Ziad A. Al-Sudairy** Member of MAJLIS ASH SHURA

*.....a profitable and diversified international mining company that is efficient and effective, recognized for its results and for its concern for human resources, health, safety, environmental and social issues.....*

Ma'aden is a new company that is building on an old mining tradition. Appropriately Ma'aden is the Arabic word for "minerals". Ma'aden began to take its present shape in 1997, with the transfer of mineral titles from Petromin, the General Petroleum and Minerals Organization. Although a new company, it is growing by developing new ventures throughout the Kingdom.

Ma'aden operates along commercial lines as a shareholder-owned company. Today, the sole shareholder is the state but there are firm plans to sell a portion of these shares to Saudi Arabian investors in a few years time. When this partial privatization occurs, it will broaden the ownership base of the company and provide an opportunity for Saudi Arabians to invest directly in their country's mining and metallurgical sector.

The company's vision is to be a profitable and diversified international mining company that is efficient and effective, recognized for its results and for its concern for human resources, health, safety, environmental and social issues.

The mission will be accomplished through exploring, developing and extracting mineral resources and developing associated processing industries in the Kingdom and by training and developing the skills of Saudi nationals in the mineral industries. Ma'aden aims to take advantage of those mineral investment opportunities where it can make a profit.

To achieve these goals, the company is assembling a talented team of mining people from Saudi Arabia and other countries; professionals who have the requisite skills, experience and enthusiasm. Working together, they aim to make Ma'aden a success. Today, there are several hundred employees and as new projects mature, career opportunities will increase accordingly. Joint venture partnership with international companies in large projects will enhance Ma'aden's capabilities.

.....New mines and associated investments will also create employment opportunities in the Kingdom.....



LOCATION MAP

establishment of Ma'aden



La Huf gold prospect



Exploration drilling in the north of the Kingdom



Exploration geologists at Al Amar

Diversifying the national economy is a strategic goal of the country. One way to expand those non-oil activities that offer considerable potential is to invest more into the mining and mineral processing opportunities that have already been identified. Planning targets for mining and its related processing businesses are ambitious, and it is hoped that this sector will become a major source of revenue generation for the Kingdom during the next decade. New mines and associated investments will also create employment opportunities in the Kingdom.

Ma'aden was formed in response to the need for a business enterprise that would unite several separate mining-related activities in the Kingdom of Saudi Arabia. On one hand, there was a large body of scientific knowledge that had been collected during many years of geological field surveying. Also, there were mines in which the state held an equity interest, and there were numerous prospects that justified further commercial evaluation.

The potential for a much larger mining and metallurgical sector has been

acknowledged widely in the course of national planning. A mining industry can make a high-technology, high value-added contribution, creating new jobs and fostering regional economic development. Consequently, this sector has been assigned a high priority. Ma'aden is the designated vehicle to transform these plans into reality.

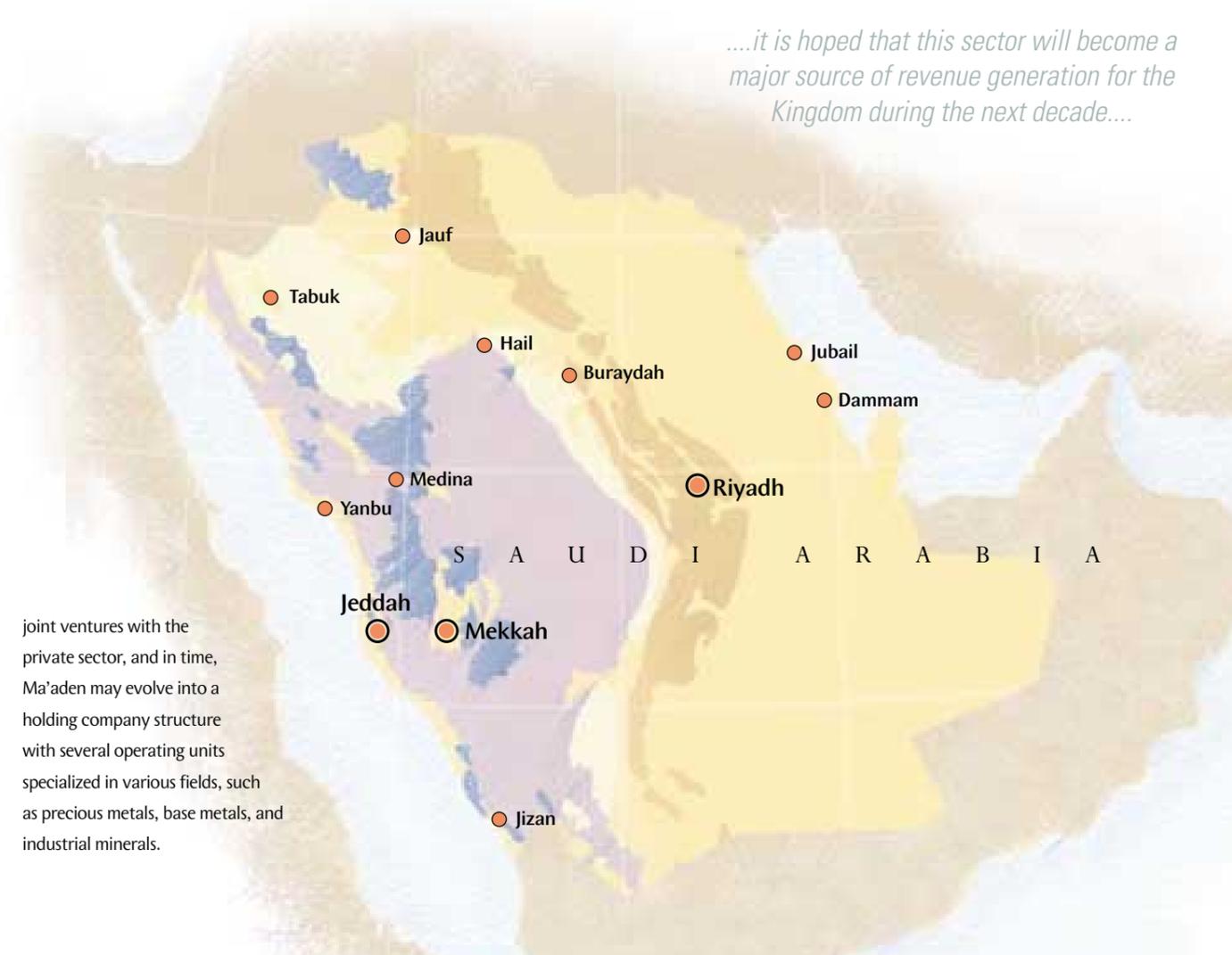
As the culmination of efforts to advance mining and metallurgical projects, and to increase the commercial efficiency of these undertakings, Ma'aden was formed in 1997 to be a focal point and operator in the minerals sector. Mining projects owned in whole or in part by the government have been consolidated into Ma'aden and made more cost-effective. In addition, Ma'aden will help provide the basic infrastructure, such as electricity and water, that will be required for cost-effective mining projects in remote locations.

Ma'aden is not replacing the private sector. It will co-operate with private investors to move forward the process of enlarging the Saudi Arabian minerals sector. The long-term strategy could incorporate

Operations at Mahd ad Dahab



....it is hoped that this sector will become a major source of revenue generation for the Kingdom during the next decade....



joint ventures with the private sector, and in time, Ma'aden may evolve into a holding company structure with several operating units specialized in various fields, such as precious metals, base metals, and industrial minerals.

Stacking leach pad at Sukhaybarat





.....Ma'aden has clear objectives that will help to achieve its mandate.....



**objectives**



EFFICIENCY, COST-EFFECTIVENESS AND PROFITABILITY



ANNUAL INCREASE OF ORE RESERVES OF PRECIOUS AND BASE METALS



DEVELOPMENT OF NEW MINES WITHIN SAUDI ARABIA



EMPLOY BEST INTERNATIONAL MINING PRACTICES WITH HEALTH, SAFETY AND ENVIRONMENTAL STANDARDS A PRIORITY



OPTIMIZE VALUE-ADDED OPPORTUNITIES IN INDUSTRIAL MINERALS



SERVE THE DOMESTIC AND INTERNATIONAL MARKETS FOR MINERALS



DEVELOP PUBLIC AWARENESS OF MINING IN SAUDI ARABIA



OFFER CAREER OPPORTUNITIES AND DEVELOP THE SKILLS OF ALL EMPLOYEES



PROMOTE THE EXPANDED ROLE OF EMPLOYMENT FOR SAUDI ARABIANS IN THE WORK FORCE.

.....the Ma'aden approach is to consider the environmental management required during the entire life cycle of the mining project, from the inception of mining through to mine closure and beyond.....



## Ma'aden and the environment

Environmental protection is a significant priority for Ma'aden. The fragile ecosystems of the Kingdom of Saudi Arabia must be sustained for present and future generations, and this requires the continuous application of current best practices in environmental management.

Water management is a particular concern, as is dust control, because of the relatively dry climate in which most of the company's operations take place. The safe storage of tailings and related waste management issues is another important area that requires special attention to ensure that the environment is protected.

The Ma'aden approach is to consider the environmental management required during the entire life cycle of the mining project, from the inception of mining through to mine closure and beyond. Future costs of proper environmental management are identified and provided for, so that there is adequate funding for these purposes at all times during the life of the venture.

Asir region of the Kingdom



.....a proven tradition of liberal, open-market private enterprise policies.....



## Doing business in the Kingdom

11

A visitor to Riyadh, the capital city of the Kingdom, to Jeddah or any other major city, will see familiar international brand names everywhere, which is just another way of saying that many companies are actively involved in the national economy.

Saudi Arabia has an enviable fiscal stability overseen by the Saudi Arabian Monetary Agency (SAMA). There are 10 operating commercial banks as well as a number of development funds, all of whom are willing to consider investment loans. The Riyadh stock exchange complements the financial institutions and is expanding its listings as the private sector develops.

The country has a proven tradition of liberal, open-market private enterprise policies. There are no restrictions on foreign exchange and the Saudi Arabian riyal is one of the strongest of currencies, pegged to the American dollar at an exchange rate of 3.75 riyals per dollar. There are no restrictions on repatriating capital and profits. From the earliest days of its industrial development, the Kingdom has sought to benefit from the

experience and expertise of foreign companies.

The government supports foreign investment with Saudi Arabian partners and special incentives are available to companies that operate with a minimum of 25% Saudi Arabia equity ownership. However wholly foreign-owned companies may operate in the Kingdom without restrictions.

Saudi Arabia continues to encourage foreign companies to participate in the economic growth of the nation in a manner that will allow the Kingdom to absorb the benefits of modern technology and knowledge, while at the same time preserving its traditions.

The private sector is actively encouraged to expand export markets for Saudi Arabian products. Of special interest are those ventures that can compliment the mineral resources of Saudi Arabia, including mineral processing, and especially metallurgical plants, that can take advantage of the unparalleled energy endowment of the Kingdom.



Operations planning meetings



Riyadh - center of commerce



Well connected - King Khalid Bin Abdulaziz International Airport



.....the 'golden age' of mining occurred during the Ummayyad and Abbasid Caliphates which marked the flowering of Arab culture .....



history of mining in the Arabian Peninsula

Mining has been carried on in the Arabian peninsula for over 4,000 years. The first record of mining has been dated to 2100 years BC. At around 1000 BC mining was underway at the Madh Ad Dahab mine, a date confirmed by carbon dating of smelting charcoal. Some historians believe that it may have been Ophir, or King Solomon's mine.

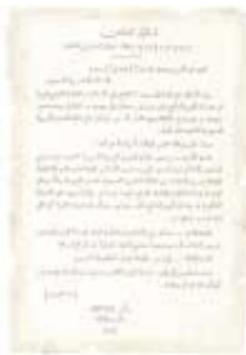
Historically, however, the 'golden age' of mining occurred during the Ummayyad and Abbasid Caliphates which marked the flowering of Arab culture, science and empire through the Middle East, North Africa and the Iberian peninsula. Between 750 AD and 1150 AD over 1,000 mines and workings were developed in the Arabian Shield with gold, silver and copper the principal metals sought. Gold from Arabia was transported to Baghdad along the famous Darb Zubaydah, the pilgrim's highway to Mecca.

Mining was conducted by tribes skilled in exploration and mineral processing. Of these, the Banu Furan and Banu Salim were paramount and often had mines named after them. They used stone hammers and firesetting, the thermal shattering of rock,

often to depths of 15m and occasionally to 80 m. The inflow of ground water at depth usually caused mining to cease. Mineral processing was by crushing and grinding, using hammers and stone querns, smelting recovered gold, silver and copper using charcoal and bellows (sometimes powered by horses or camels) and also the use of fluorite as a flux.

Often ore was transported to near-by villages that had fuel and water, and the necessary expertise. A number of authors of the period, such as Abu Bakr al-Razi, wrote volumes on mining and metal working. These works were later translated into Latin, spreading the technology. Skilled Arabian miners of this period are also known to have crossed the Red Sea to search for gold in the Sudan.

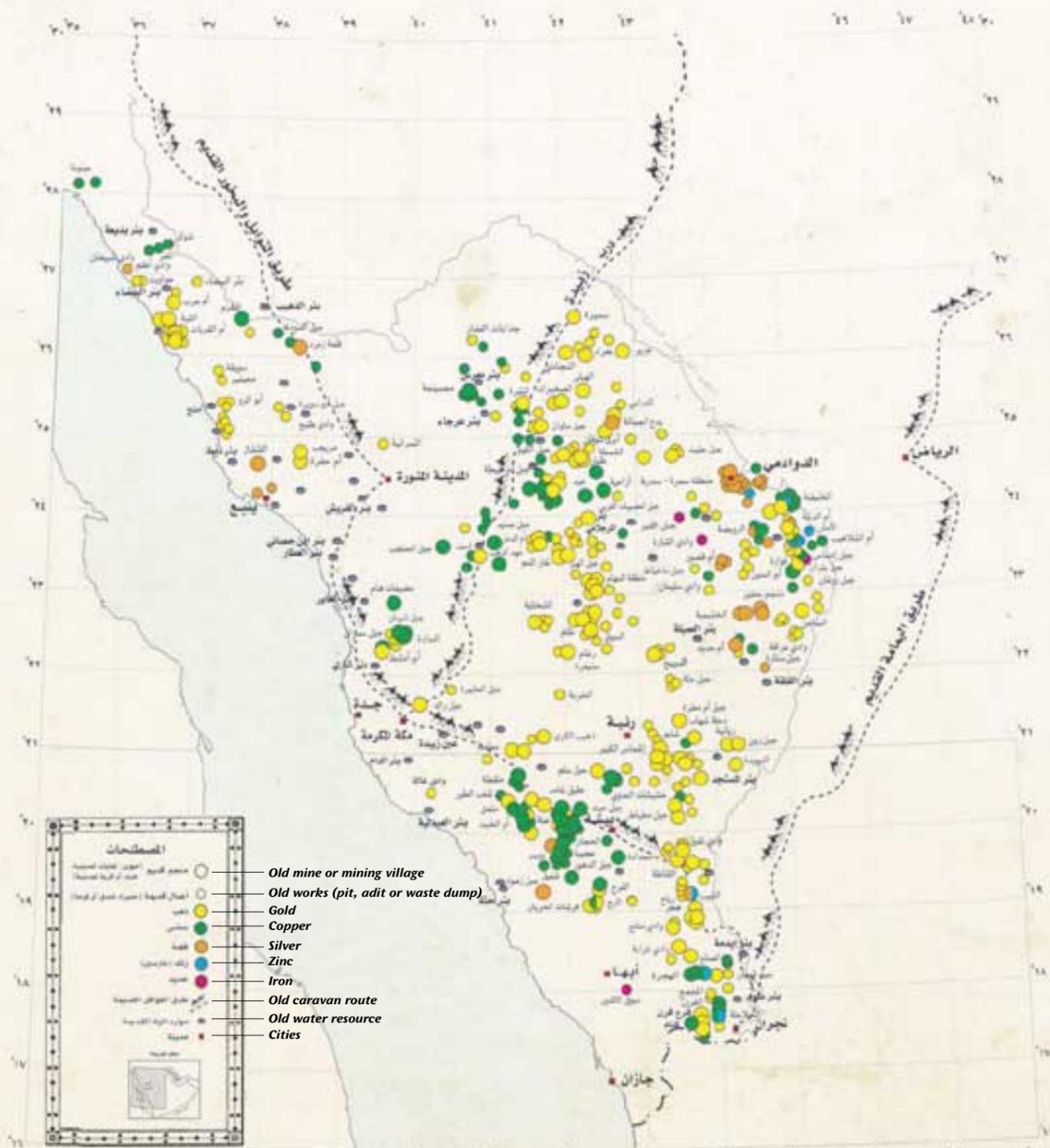
Following the decline of the Caliphates, mining activity decreased until the 20th century. In the 1930s gold was again mined at Madh ad Dahab, this time using the machinery of the day which allowed greater reserves at depth to be reached. Ma'aden is proud to be continuing this tradition.



Facsimile of licence granted to Mr Twitchell of the Saudi Arabia Mining Syndicate on 23rd December 1934



Workers at Mahd Ad Dahab circa 1935



Scale 1:2.5 million

.....the processes that formed the Saudi Arabian Shield are known to be primary in the development of metallic mineral deposits .....

geology

Ma'aden is a part of the long history of mining in the Arabian Peninsula, but what exactly is the geological endowment of the country? The Kingdom of Saudi Arabia is large, extending over 2 million km<sup>2</sup>. It is located between the African Shield to the south and the more recent Alpine-Himalayan Zagros mountains to the north. This geological junction has been active over the past thousand million years, and has given rise to a number of important mineral deposits that were formed during the geological development of Saudi Arabia.

The geology of the Kingdom can be divided into two main zones: the Shield area in the west, adjacent to the Red Sea, covering about one third of the Kingdom, and the surrounding sedimentary rocks that dip gently towards the Arabian Gulf. The Shield, formed during the period about 1,000 to 500 million years ago, is geologically part of the African plate that extends south into Egypt and the Sudan. During this time interval, a number of important geological events occurred including volcanic outpourings, the intrusion of numerous granites and the rapid recycling of eroded sediments. These events took place in an ocean island arc environment which eventually came together to form the land mass now underlying the Kingdom.

The processes that formed the Saudi Arabian Shield are known to be primary in the development of metallic mineral deposits, particularly of precious and base metals. Past exploration, including that by ancient

miners, and current activities of Ma'aden illustrate this fact, with more than 50 gold prospects including two producing mines and several base-metal deposits also identified. Further exploration, using models developed at the two operating gold mines, will undoubtedly reveal additional potential.

The geological history of the most recent 500 million years has been marked by the gradual erosion of the continental area, and the deposition of carbonate and clastic sediments in a slowly declining trough extending towards the Arabian Gulf. This deposition has been quietly continuous until recent times and is responsible for over 18,000 meters of cumulative sedimentation. The marine conditions under which most of this deposition took place enabled the accumulation of a wide variety of minerals, mostly related to the evaporation of sea water. This process has naturally upgraded the concentrations of these minerals to form the valuable economic mineral deposits of today. These sedimentary rocks cover two-thirds of the Kingdom and host the oil and gas reserves, the most important mineral resource of the Kingdom. Petroleum reserves exceed 250 billion barrels, or one-quarter of reported world reserves. These sedimentary rocks also host important industrial mineral deposits that will add to the industrial base of the country.

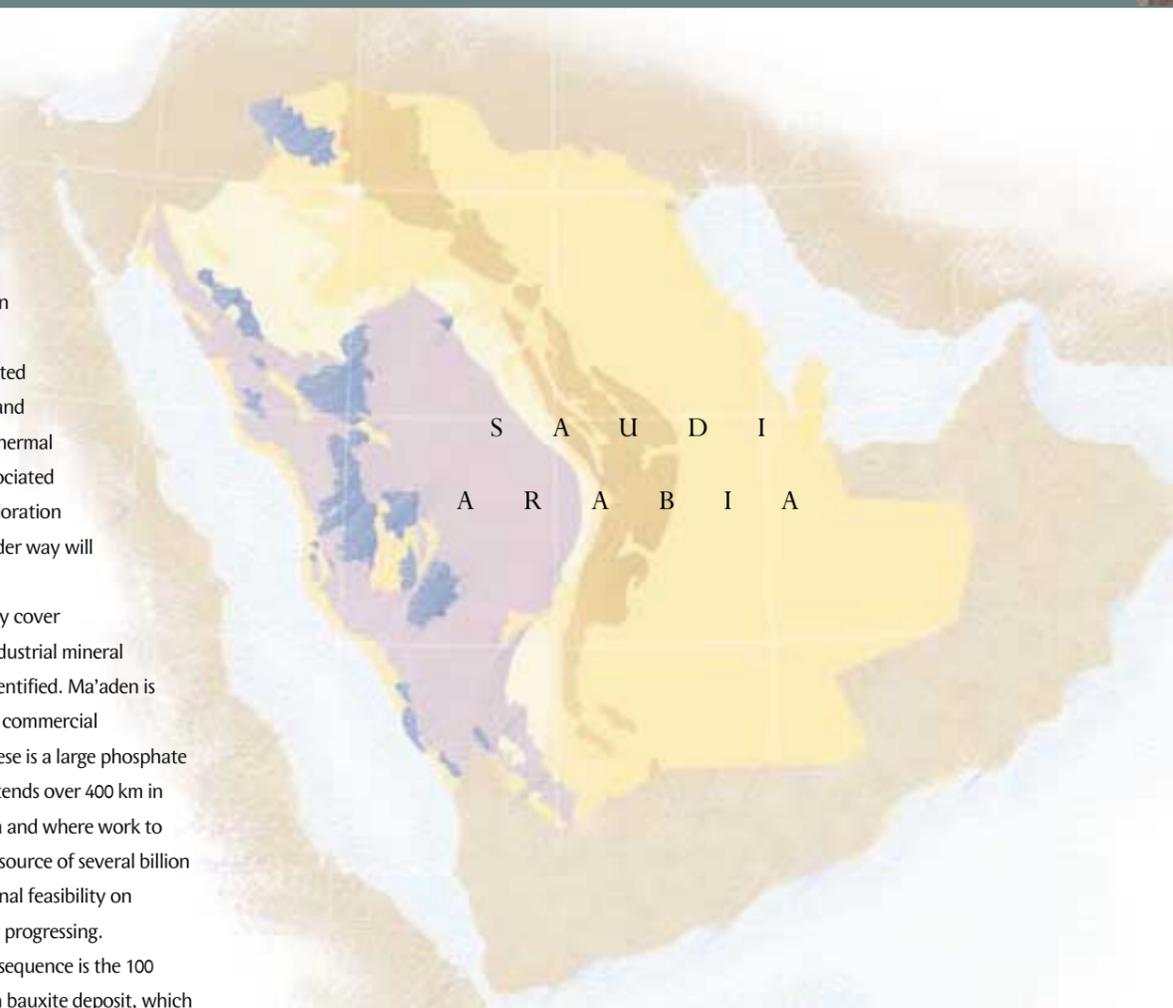
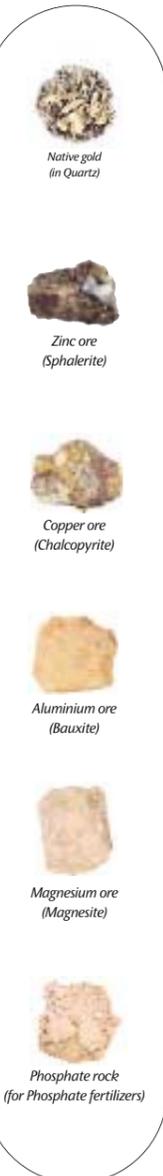
Ma'aden has begun to develop these mineral resources. It has two operating gold mines that together produce 150,000 oz annually. It is also assessing several other gold



and base-metal prospects. All of these metal projects are located in the Arabian Shield area. Here, several types of mineralization have been identified, including gold associated with intrusions, gold and base metals in hydrothermal systems, and gold associated with shear zones. Exploration programs that are under way will extend these targets.

In the sedimentary cover sequence, valuable industrial mineral deposits have been identified. Ma'aden is proceeding with their commercial evaluation. One of these is a large phosphate rock resource that extends over 400 km in northern Saudi Arabia and where work to date has revealed a resource of several billion tons. Work towards final feasibility on specific targets is now progressing.

Also in the cover sequence is the 100 million ton Az Zabirah bauxite deposit, which given regional development, could become feedstock for the large Arabian Gulf aluminium industry. There is also magnesite at Zarghat and this deposit is the subject of a feasibility study undertaken by Ma'aden. The high quality of the resource at Zarghat makes it suitable as feedstock for the manufacture of refractory bricks, used in steel making round the world.



- KEY TO GEOLOGICAL AREAS OF SAUDI ARABIA
- TERTIARY - QUARTERNARY SEDIMENTARY ROCKS
  - TERTIARY - QUARTERNARY VOLCANIC ROCKS
  - MESOZOIC ROCKS
  - PALEOZOIC ROCKS
  - PROTEROZOIC ROCKS

.....bore hole logging, mineral analysis and beneficiation tests that provide a substantial advantage to exploration and evaluation.....



Bore hole in the Eastern Provinces defining sub-surface geology



Exploration from space; Landsat image of the Arabian Shield, exposed rock (blue), sand dunes (yellow), sabkha deposits (white)

### minerals data base

The Kingdom has benefited from a considerable amount of mineral exploration during the past 50 years. Much of the early work focused on oil exploration and as a consequence the stratigraphy of the eastern provinces is well understood. The Shield area has also benefited from extensive geological investigation. Here a number of geological missions undertaken by a wide range of international companies and survey organizations under the auspices of the Deputy Ministry for Mineral Resources (DMMR) have mapped most of the Shield and have identified a great many mineral occurrences.

The Kingdom also benefits from good rock exposure in the upland areas. This allows accurate mapping, structural interpretation and lithological control, and it is difficult to imagine a more suitable landscape for the application of aerial and satellite data to mineral exploration.

In addition to this mapping, the geological missions have carried out extensive geophysical, geochemical and drill testing of many of the current exploration targets. These studies include bore-hole logging, mineral analysis and beneficiation tests that provide substantial advantage to exploration and evaluation, in comparison with many other parts of the world.

Ma'aden is now adding to this database through its own exploration programs and will take forward the surveying and mapping of the past decades. An example is the

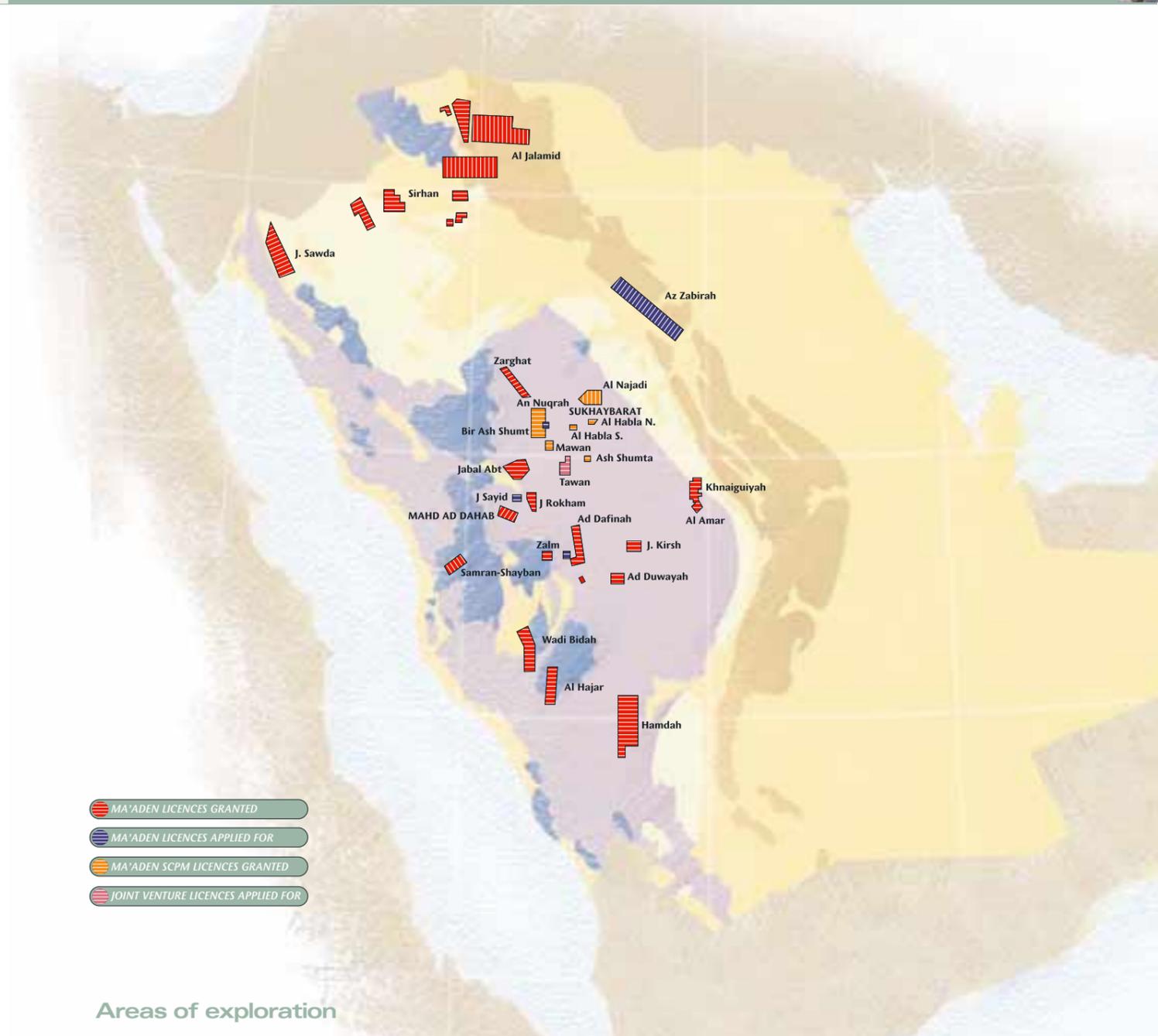
extensive exploration drilling that Ma'aden is undertaking at its mine sites and licensed properties. Analysis of cores from these bore-holes have added to reserves of gold, base metals and industrial minerals. They have also allowed the development of detailed models of the origin of precious and base metals in the Shield and industrial minerals in the sedimentary sequences of the eastern provinces. These data will be crucial in Ma'aden's continuing acquisition and evaluation of mineral properties.

Without doubt, the formation of Ma'aden will provide an impetus to mining in the Kingdom. Its mines, projects and exploration work will take forward the extensive survey work of the past.

The map opposite shows Ma'aden's operating mines and exploration licences, including those with joint venture partners, overlying an outline of the geological map. This illustrates the relationship of the metal mines with the older rocks of the Arabian Shield. Its age, origin and tectonic history favor the development of precious and base metal deposits. The large-scale industrial mineral deposits are associated with the sedimentary platform sequences that surround the Shield where the interplay between erosion of the elevated shield and marine conditions to the east have preserved large economic deposits of industrial minerals.



### EXPLORATION LICENCES GRANTED AND APPLIED FOR



### Areas of exploration

Ma'aden has a large exploration portfolio covering a wide range of minerals. In 1998 the company carried out 11,000 metres of exploration drilling and 15,000 geochemical analyses in addition to geophysical and geological mapping. This resulted in indications of

4 t of gold at Hamdah, and 3.5 t at La Huf and inferred resources of 3 t of gold at Shayban and 300,000 t of contained zinc at Khnaiguiyah. Exploration activity, particularly for phosphates and other industrial minerals, will increase in the coming years.

*.....since its establishment, Ma'aden has put into place a human resources strategy that makes the company an attractive, safe and healthy place to work.....*

## what is Ma'aden doing now

19

Ma'aden aims to become a profitable, diversified mining company through exploring, developing and extracting minerals within the Kingdom of Saudi Arabia. The company is well on the way to achieving that goal, with the Mahd Ad Dahab and Sukhaybarat gold mines, its gold projects at Al Hajar and Al Amar, and industrial mineral projects at Al Jalamid, Al Zabirah and Zarghat.

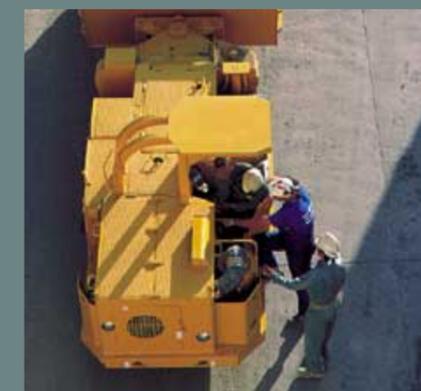
Ma'aden has the financial and technical qualifications to bring these projects into production. They are all at differing stages of development and require careful economic appraisal before the next investment stage. Each of them can add significantly to the industrial diversification of the Kingdom.

Ma'aden's geologists are currently reviewing a number of gold and base metal deposits in the Arabian Shield. The company has already identified additional reserves at Mahd Ad Dahab whilst at Sukhaybarat it has extended the life of the mine.

Ma'aden has mining plans for its Al Hajar project and is developing extraction techniques at the Al Amar gold mine. In the industrial mineral sector, plans are advanced at Zarghat for the production of electro-fused magnesia, whilst the bauxite reserves at Az Zabirah are being assessed for their potential use in alumina production for supply to Arabian Gulf aluminium plants.

The most ambitious project is the Al Jalamid phosphate venture, based on very large reserves in the north of the Kingdom. Several international companies have expressed their interest in developing Al Jalamid with Ma'aden by establishing a downstream fertilizer industry to supply markets especially in India, Africa and the Far East.

Ma'aden is more than the sum total of its mineral properties. Its major assets are its employees. Since its establishment, Ma'aden has put into place a human resources strategy that makes the company an attractive, safe and healthy place to work. In addition, a management development program is active to enable each employee to reach their potential within the company. This program includes managerial and professional development, as well as offering scholarships to outstanding Saudi students.



*LHD at the Mahd Ad Dahab mine entrance*

.....mining gold at an annual rate of around 100,000 ounces.....

◆ Mahd Ad Dahab



SAUDI ARABIAN MINING COMPANY

**Mahd Ad Dahab** gold • silver • copper • zinc

.....in addition to being an excellent gold mine, Mahd Ad Dahab is a training ground for the next generation of Saudi Arabian mining and mineral processing professionals.....

The company has two operating gold mines. The larger of the two in terms of gold output is Mahd Ad Dahab with several hundred employees. Ownership of this mine was transferred to Ma'aden at the time that the company was created.

The Mahd Ad Dahab mine is located near the center of the Arabian Shield. It was first mined over 3,000 years ago and again for several centuries beginning about 1,200 years ago. It is estimated that over one million oz of gold have already been extracted from the mine. This is more than 30 tons of gold. Today, Mahd Ad Dahab is mining gold at an annual rate of around 100,000 oz. Copper concentrates, also containing gold, are shipped from the mine to Europe for smelting. Some silver and zinc is also produced as by-products, at the rate of 900 tons of copper, 4,000 tons of zinc and 280,000 oz of silver annually.

The progressive development of the deposit reflects the technology of the era

with the initial ancient workings limited to visible gold in steep veins to a depth of about 50 meters. In the 1940s and 1950s, gold was won from shafts to a depth of 200 meters before the reserves were exhausted. By the 1970s, geological surveying identified new resources at depth. Today, these reserves are exploited by trackless methods. Recently an additional 1.4 million tons of reserves have been indicated. This continuing development of reserves demonstrates the scale and extent of the mineralization at Mahd Ad Dahab. It means that the mine will keep operating for at least another seven years, and efforts to find additional reserves to extend the mine life are continuing.

At the mine, gold occurs in quartz veins hosted in rhyolites and tuffs that extend over one km<sup>2</sup> and are open at depth. The veins contain copper, iron, lead and zinc sulphide minerals with which the gold is associated as fine grained (5-10 micron) tellurides (about 70%) and as native gold and silver (30%).

The distribution of the veins containing the gold is primarily constrained by structures and fractures within the Proterozoic host rock and it is generally believed that the gold-mineralising fluids are most likely to have originated in a deeply-buried granite.

This explanation augers well for gold exploitation in the Arabian Shield as many such granite batholiths are known elsewhere. Geologists at Ma'aden are working on the development of these geological models for gold mineralization within the Shield, and expect to identify other gold deposits as a result.

Mining at Mahd Ad Dahab is underground. Although the grades of the gold ore are very good, at over 16g/t, the mine management and work force is keen to reduce costs and improve margins. Changes in the operating methods and an ongoing modernization program are helping to achieve these objectives.

New developments in addition to the recently increased reserves include new underground development work, improved maintenance and management, and investment in new mining and transport equipment. As a result, cash costs of ore production in 1998 decreased.

Ma'aden has also been inventive in the exploitation of old tailings (some over 60 years old), old stope fill material and gold-bearing rock removed from adits during mine development. The fill material alone accounted for 200,000 t grading 2.3 to 3.2 g/t gold and is being treated along with the other material in the surface heap-leach plant. All have added to the profitability of the mine.

In addition to being an excellent gold mine, Mahd Ad Dahab is a training ground for the next generation of Saudi Arabian mining and mineral processing professionals. The skills and experience gained at this mine can be applied at other Ma'aden projects elsewhere in the Kingdom.

**S I L V E R**

Over 25% of world silver consumption is used in the manufacture of jewelry and silverware. A similar amount is used in silver halide, the light sensitive material in photographic film. The remaining 45% is used for industrial purposes, mainly in the manufacture of solders where its excellent conductivity has boosted demand in electronics

Ore conveyors at Mahd ad Dahab



Processing plant at the mine



Jumbo drilling production holes underground



Part of the gold treatment facility



...gold occurs as fine flakes at crystal boundaries and in internal cracks in arsenopyrite.....



Sukhaybarat gold • silver

The Sukhaybarat gold mine is located 250 km north west of Mahd Ad Dahab in the Nuqrah-As Safra area. This remote region is the center of historical gold and copper workings which were rediscovered in the 1930s. Sukhaybarat is just one of a number of gold occurrences in this area, where the precious metal is found in both diorite and sedimentary formations. Modern development of the deposit began in 1986 with a feasibility study instigated by the Saudi Company for Precious Metals (SCPM), a joint venture between Petromin and the Swedish mining company Boliden. In 1991, this partnership began open-pit mining of the reserves, which are now estimated at 2.5 million tons grading around 2.0 g/t (grams per ton) gold.

The host rocks at Sukhaybarat are diorites and the Murdama formation of volcanic-derived sediments which form part of the Arabian Shield. The gold mineralization is structurally controlled with the highest values seen in a shear zone. Initially, mining was confined to quartz veins within the diorite, but subsequent studies identified gold within the metasediments and led to the development of the open pit mine in 1991. Exploration is continuing.

Current reserves at the mine are sufficient for another four years at 50,000 oz of gold per year. This is achieved by re-profiling the present open pit to recover ore in the base and sides.

The ore is mined now down to a depth of 130 m using conventional drill and blast techniques. The gold occurs as fine flakes at crystal boundaries and in internal cracks in arsenopyrite. Gold is recovered by treatment with cyanide through a carbon-in-leach plant, whilst oxide ores are processed by heap-leaching with 83% recovery. The successful operation of the joint venture indicates the favorable climate for mining in the Kingdom.

Exploration has indicated that there are a number of gold prospects in the surrounding area that will enable the plant to continue after the Sukhaybarat ores are exhausted. One of these is at Bulghah, some 65km to the south west. Here, a resource of low-grade (1 g/t) ore of 30 million tons has been identified.

The experience gained from operating at Sukhaybarat will be useful in developing other gold deposits of this nature throughout the region.



Blast sequence in the open pit

Maintenance at the large grinding mill



Dissolved gold is collected on carbon



.....mining costs will be low due to the friable nature of the ore and the very low stripping ratios.....



- ◆ Sukhaybarat
- ◆ Al Hajar



Al Hajar and other gold prospects

At present Ma'aden has two major advanced gold projects, at Al Hajar and at Al Amar. The Al Hajar deposit, which is nearest to commercial production, is located in the Asir region in the south west of the Kingdom, about 60 km west of Bishah. The deposit is an oxidized gossan related to a massive sulphide stratiform body hosted in rhyolitic lavas with flanking breccias and tuffs. Gold mineralization within the sulphides is below 1g/t but the top 50 to 70 meters of these horizons have been intensely oxidized. Within the oxide zone, a resource of 4.0 million tons grading 3.4 g/t gold and 38 g/t silver has been identified. This translates to 350,000 oz of gold and 3.9 million oz of silver.

The deposit occupies two adjacent hills and is amenable to surface mining and, in addition, mining costs will be low due to the friable nature of the ore and the very low stripping ratios.

A number of beneficiation and metallurgical tests have been undertaken by Ma'aden. These tests indicate that heap leach cyanidation will offer low cash production costs. Recovery rates for gold in industrial-scale tests indicate up to 80% recovery. Silver recovery, however, is only 30% as most of the silver is hosted in jarosite, an iron oxide mineral which is not amenable to leaching. Work at present aims to refine the processing method to minimize capital expenditure. The mining plan has been optimized as a five-year operation to produce a recoverable 260,000 oz of gold and over 1 million oz of silver at a mining rate of 700,000 tons per annum of ore. The area is known to contain other resources. At Jamdah, some 4 km west of Al Hajar, a small resource (0.3 Mt) of gossan has

been identified to a depth of 60 m. The gold grade here is higher than Al Hajar at 5.5 g/t and 56 g/t silver. Plans are being formulated to mine the resources as a satellite operation to Al Hajar.

These examples of Ma'aden gold projects within the Kingdom demonstrate the diverse precious metal wealth of the Arabian Shield. Although, with the exception of Mahd Ad Dahab, no massive reserves have yet been identified, there is sufficient and diverse mineralization to create profitable mines. Ma'aden is gaining expertise in the economic development of these numerous Shield hosted deposits.

The company is committed to an active gold exploration program. In total, the company has exploration licences that cover nearly 22,000 km<sup>2</sup> of land that is prospective for gold mineralization. Many were acquired during Ma'aden's active exploration programs, others were assigned to Ma'aden's subsidiary, the Saudi Company for Precious Metals.

Among these properties the Bulghah gold deposit may be the most likely to be developed in the medium term with an annual production of 80,000 oz/y. It is close to the Sukhaybarat mine and may benefit from some of its infrastructure if brought into production. Similarly, the La Huf deposit near the Mahd Ad Dahab mine may ultimately act as a source of additional ore.

The company has several other gold projects that may be developed at Al Suq, Shabah, and Hamdah at a later date. In the mean time exploration is ongoing. Finally, Shayban and Jabal Samran are also being explored for their gold potential and silver, copper and zinc by-product credits.

G O L D



Gold is historically the most famous source of wealth. Its ease of working, its permanent bright appearance, and high value for weight have ensured its popularity. Gold is used as a store of wealth against which money can be secured, as contacts in electronics, and most importantly in jewelry where it accounts for 75% of use. The demand for gold jewelry continues to rise in all countries.

Exploration camp at Shayban



...an interesting deposit that offers different variables to challenge the mine planners.....

◆ Al Amar



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**new gold prospects: Al Amar** gold • silver • copper • zinc

The Ma'aden licence for the Al Amar gold mine is located on the eastern margin of the Arabian Shield, some 250 km west of Riyadh. Like Mahd Ad Dahab, it has also been the site of historical workings that probably dates back over 1,200 years. A nearby stream bed was the site of ancient smelting where copper, and probably gold and silver, were recovered.

Al Amar is a sulphide deposit with associated gold and copper although here the principal base metal is zinc. In fact, the gold ore is comparatively zinc-rich and this metal could make an economic contribution as a by-product.

The mineralization at Al Amar is hosted in volcanics surrounded by clastic rocks. Later, the area was intruded by diorites and granites. The ore occurs in three zones (North, Mid and South), the former being open at depth and extending over 700 meters. In a recent feasibility study, 3.5 million tons of ore grading 3.7% zinc, 0.5% copper, 7 g/t of gold and 14 g/t of silver was considered for mining. By selective underground mining and raising the cutoff grade, average reserve grades improve to 6.0% zinc, 12.1 g/t gold and 14.0 g/t silver with a corresponding reduction to 2.4 million

tons. At present, exploration drilling is continuing, both underground from the decline and from the surface to extend known mineralization and to delineate additional mineable reserves.

The precious and base metals will be recovered using a combination of flotation and cyanidation, utilizing a similar flowsheet to that developed at Mahd ad Dahab. Metallurgical testwork for improved metal recoveries and basic design criteria continues. Underground development to-date has resulted in a surface stockpile of approximately 100,000 tons of gold ore grading 13 g/t.

Mining of the North Vein Zone (the current reserve) will be by underground methods. However, at higher metal prices and appropriate economics, later surface mining may be considered for the currently non-economic Mid- and South Vein Zones; possibly in conjunction with the development of high grade zinc ores from the Khnaiguiyah project to the north.

The relative economics of these options depends on the outlook for metal prices, which have significant bearing on the size of the mineable reserve; as well as the ultimate mine life.



Entrance to the Al Amar mine

Large dumps of 13g/t ore for processing



Project site and ore body in distance



...part of the company's vision is to diversify its existing mineral investment portfolio...



◆ Khnaiguiyah  
◆ Jabal Sayid



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### Khnaiguiyah zinc and Jabal Sayid copper

Ma'aden is not, however, focussing its efforts on gold and precious metals alone. Zinc and copper deposits also occur within the Proterozoic Arabian Shield and part of the company's vision is to diversify its existing mineral investment portfolio.

At the present time, the company produces annually some 1,000 tons of copper and 3,600 tons of zinc, principally from the processing of gold ore mined at Mahd Ad Dahab.

Ma'aden is investigating two deposits, the Khnaiguiyah zinc near Al Amar and the Jabal Sayid copper deposit near Mahd Ad Dahab. These were initially identified from an analysis of ancient workings, a tribute to the skills of the Abbasid period miners.

At Khnaiguiyah, four zinc-rich oxide and sulfide horizons with lesser copper are contained in lenses of carbonate-rich sediments. The deposits are generally steeply-dipping lenses to depths of 150 meters; although one flatter, shallow zone occurs at the south end of Zone 3. Ongoing exploration activity will include magnetic surveys to identify additional near surface targets for drill investigation.

Drill indicated resources are 2.3 million tonnes averaging 12.2% zinc and 0.4% copper, using a cut-off of 4.0% zinc. Early metallurgical tests indicate that a quality zinc concentrate can be produced. Although development of the multiple ore zones would be primarily from underground, the potential for open pit mining of the shallow part of the resource is being evaluated. Because of its relative proximity (40 km), Khnaiguiyah's development will most likely be linked to Al Amar's.

Ma'aden has submitted an exploration proposal for the Jabal Sayid area in response to a public tender released by the DMMR. Substantial work done by the DMMR and its contractors has resulted in the identification of four copper zones with significant zinc values. Jabal Sayid is located 40 km north of Madh ad Dahab. It is hosted in lavas in a similar geological environment to the Iberian pyrite belt.

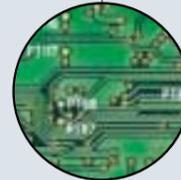
Our exploration proposal is designed to identify higher grade copper zones within the current resource or to discover additional resources which will significantly improve the project's economic viability.

#### Z I N C



Over 55% of zinc is used for galvanising, that is the plating of steel to prevent rusting. This market is growing strongly as auto manufacturers offer guarantees against corrosion. 30% of zinc is used in alloys, adding special qualities to copper, tin and other metals for use in castings for both small consumer goods and in industrial plants. Other uses include agriculture and pharmaceuticals.

#### C O P P E R



Most of the copper mined today is used in the construction industry, in water pipes and electrical cables. These products are used throughout the world and consumption is growing. Copper is also an important alloying metal in brass, bronze and other alloys with special properties. It is also used in modern electronics and historically, was used in the manufacture of household goods and weapons.



Cross sections of ore bodies I, II and III at Khnaiguiyah

Drill core store at Knaiguiyah



Infill exploration drilling at Jabal Sayid



Setting charges for pit development





.....a major competitive advantage on world markets for Saudi Arabia.....



## industrial minerals and regional development

29

Ma'aden's plans not only include base and precious metals. The sedimentary sequence of the Arabian platform contain a number of valuable minerals that are used to make building materials, fertilizers and feedstocks for metallurgical plants.

These minerals are often described as industrial minerals as they form the basis of many manufacturing, and especially chemical, industries. Most industrial minerals are formed during sedimentation in oceans and occur under defined chemical conditions on the ocean floor often related to temperature and the availability of oxygen. As a consequence industrial mineral deposits can occupy many km<sup>2</sup> and have reserves into millions and even billions of tons. This is indeed the case in Saudi Arabia.

Ma'aden is currently formulating plans for the development of a number of important industrial mineral projects in the central and northern part of the Arabian platform. Several of these industrial minerals have a strong potential for exports and will be the basis of major new industries in the future. Of specific interest is phosphate rock which can be converted into fertilizer, and magnesite, an insulating material with applications in metallurgical plants. There are also extensive deposits of bauxite, the source of most of the world's aluminium.

These minerals have several common features that make them particularly attractive. First, they require extensive processing to create marketable final products, and much of this processing is energy-intensive. Energy availability is a major competitive advantage on world markets for Saudi Arabia.

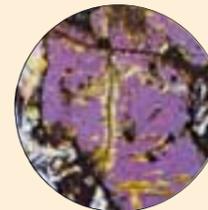
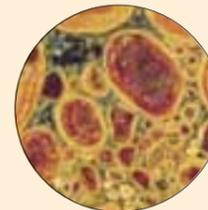
Second, they occur in regions of the Kingdom that would benefit significantly from further capital investment and the construction of additional infrastructure in the form of roads, railroads, electric power plants, water supplies and telecommunications links, as well as the creation of many new jobs. Projects that help to justify such infrastructure improvements are part of the overall responsibilities of Ma'aden.

Third, these minerals offer the potential basis for export-oriented industries that can diversify the non-oil foreign exchange earnings of the Kingdom. And fourth, they are comparatively big undertakings, with large-scale associated processing opportunities and sizeable capital investments that would have a commercial life of several decades. This is a plus because it means they can affect the national economy over a long period of time.

For all of these reasons, Ma'aden is interested in developing their potential. The timing of these large-scale, export-oriented regional development projects will depend in part on the overall health of the global economy.

The development of these industrial mineral deposits will mark a significant milestone in the growth of Ma'aden as an important company in world mining. It will also have an impact on economic regional development as export industries, particularly that of phosphate fertilisers, are established. Ma'aden may develop its industrial minerals in a series of focussed separate subsidiaries. Partnership with other companies, for specific purposes such as marketing, may be warranted.

The long-term benefits of mining as a foundation of economic activity in an under developed region can be seen throughout history in all continents. Ma'aden' anticipates that its industrial mineral projects will act as a catalyst for the development of the northern part of the Kingdom.



Photomicrographs of industrial minerals

Extensive outcrop near Zarghat, prospective terrain for industrial minerals



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phosphate deposits of the northern region

Saudi Arabia hosts some of the largest known but undeveloped phosphate rock deposits in the world. These deposits are found in a north-west trending belt stretching across the entire northern section of the Kingdom. The phosphate rock is hosted in a sedimentary sequence of Palaeocene to Eocene age (65-38 million years ago) that extends to the north into Iraq and Syria and west into Jordan.

The phosphate reserves are part of a shelf sequence of rocks that marks the edge of the Tethys sea, an ocean in past geological time that is now occupied by the Mediterranean and the countries surrounding its shores. It is the largest and most extensive phosphate province in the world.

Within the Kingdom, these shelf sequences of limestones, cherts and phosphate rocks, known as the Turayf Group were laid down in flat lying sequences extending over great distances. Subsequent

earth movements associated with the opening of the Red Sea have preserved the phosphate bearing beds in a series of grabens or downfaulted basins. Each of the three formations of the Turayf Group (Um Wu'al, Mira and Al Jalamid formations) has a phosphate horizon at its base extending from 2m to over 40 m in thickness.

These deposits were first identified in outline by water boreholes located beside the trans-Arabian oil pipeline. Subsequent investigation gave scope to the extensive nature of the deposits estimated at over 7,000 million tons of phosphate rock in a number of discrete deposits. From the east they are the Al Jalamid, Umm Wu'al, Al Amud, Quraymiz, Thaniyat Turayf and As Sanam deposit, each with potential for commercial development.



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.....extensive nature of the deposits estimated at over 7,000 million tons.....

Al Jalamid phosphates

The largest single project that is occupying the thinking of Ma'aden planners is centred on a world-class deposit of phosphates at Al Jalamid in the north of the Kingdom. This resource could become a significant new source of exportable fertiliser in the form of diammonium phosphate (DAP), which contains double the nutrient value of unprocessed rock. This is a big project. Its location in the northern undeveloped part of the country, would require the establishment of infrastructure for mining, processing and transport.

Ma'aden's in progress feasibility study has revealed a resource of over 400 million tons within an 18 km<sup>2</sup> area with good stripping ratios and excellent beneficiation characteristics. The P<sub>2</sub>O<sub>5</sub> contents ranges between 16% and 32%, averaging 20%. The beds are as much as 17 m thick (average thickness 6.5 m) and dip gently to the southwest. Proven reserves at Al Jalamid are sufficient to mine 4.5 million tons per annum of phosphate rock for over 50 years, which in turn converts to 1.3 million tons per annum of P<sub>2</sub>O<sub>5</sub> content. Ma'aden is currently evaluating these reserves with a view to production within the next few years and has

recently been awarded the exploration licence for the phosphate region.

Ma'aden is currently assessing the mining plan at Al Jalamid to optimise equipment utilisation. Following drilling and blasting, draglines would remove the overburden and front-end loaders and 85 t trucks would transport the ore to a semi-mobile crushing station.

Ore processing tests conducted on Al Jalamid ores favor the use of flotation. The result is 4.5 million t/y of concentrate averaging 32.5% P<sub>2</sub>O<sub>5</sub> from 11.2 million t/y of ore. Tests using the calcination method revealed an unacceptable high use of water. Energy for the project is available via turbine generators fired by fuel oil. Water is available from a number of well holes in the area of the projected mine site of sufficient quality for processing. It will however require treatment to reach potability requirements.

These concentrates will require transport to Jubail where the Kingdom has a plant capable of producing one million tons of DAP annually from imported phosphoric acid. One option is to build a slurry transport pipeline, another option under consideration is the building of a railway to transport

PHOSPHATE



Almost all phosphate is used to make fertilisers, upon which the high yields of today's agriculture depend. These fertilisers use rock phosphate, such as those at Al Jalamid, as the source material. Most phosphate rock is made into DAP (diammonium phosphate) which has twice the nutrient content of natural phosphate rock.

Trial shaft to assess reserves at Al Jalamid



Clearing overburden at Al Jalamid



KEY TO PHOSPHATE AREAS

- BASALT
- MIOCENE
- UMM WU'AL FORMATION
- MIRA FORMATION
- JALAMID FORMATION
- CRETACEOUS AND OLDER



Map of phosphate in resources in the north of the Kingdom  
White area of top map shows position of map

.....proven reserves at Al Jalamid are sufficient to mine 4.5 million tons per annum of phosphate rock for over 50 years.....



Examination of phosphate horizons at Al Jalamid

upgraded ore to Jubail. The economics of these transport options are currently being evaluated by international civil engineering companies. If a railway is selected as a result of these studies, then it will act as a stimulus for economic development of the whole region.

The processing plant at Jubail will require enlarging, including the sulphuric acid, ammonia and granulation plants, to convert the concentrate to DAP. These chemical plants will become the largest in commercial operation. Molten sulphur and natural gas are already available at the Jubail industrial city. The planned capacity of 4.5 million t/y of concentrates translates into 2.9

million tons per annum of DAP and a large portion could be exported to Asian markets. A venture on this scale may require an experienced partner to assist in marketing.

With this venture brought to fruition, the Kingdom would become one of the premier exporters of DAP, ranking amongst the top three countries in the world. Ma'aden would probably create a special subsidiary to give clear focus to this project. Creation of an industrial minerals export business on this scale is of course a major enterprise but it is one that Ma'aden is prepared to undertake, for its export potential and also for its contribution to regional development.



...potential to provide the foundation for export-directed sales.....



Zarghat magnesite

M A G N E S I T E



Magnesite is the oxide ore of magnesium. The principal use of magnesite is in refractory bricks that are used to line furnaces such as those that produce iron and steel. This is because of their very high melting point. Other uses of magnesia compounds are in rubber, plastics and pharmaceuticals.

A project that can diversify Ma'aden's mining portfolio is the development of the Zarghat magnesite deposit in the north-central region. Ma'aden holds an exploration licence in this area that covers some 3,300 km<sup>2</sup> including Zarghat.

The Zarghat magnesite reserve is 1.6 million tons and comprises four separate bowl-shaped orebodies that outcrop within 300 meters of each other. Mining will be by open-cast methods with on-site treatment limited to crushing and screening to 3 mm, which removes most of the undesirable silica.

Further processing will occur at a state-of-the-art calcining and fusion plant that will be built at Yanbu on the Red Sea coast. This will be a long-life project with a resource base sufficient to operate for more than 35 years based on an annual production rate of about 50,000 metric tons of raw magnesite. This will be used to produce 20,000 tons per annum of high-grade, high-value electrofused magnesia (EFM) for the global refractories markets. The world market for this speciality product is in excess of 300,000 tons per annum.

B A U X I T E



Bauxite is the principal ore of aluminium which has a wide range of use from kitchen foil and drink cans to high-tech alloys for aircraft. The demand for aluminium is growing as its light weight for strength property is chosen for auto castings, cable for power lines, and construction cladding. The Arabian Gulf is an important producer of aluminium.

Az Zabirah bauxite

Another major new venture under consideration is the extensive Az Zabirah bauxite deposit in the northeast region. This resource extends over 100 km and has an indicated mineable resource of 100 million tons grading 58% alumina and 6% silica. Ma'aden will be carrying out exploration and test work on the deposit which also has the advantage of associated kaolin suitable for use in the ceramics industry.

This project could provide a useful alternative to imported alumina consumed at existing and proposed aluminium smelters in the Arabian Gulf. Tapping this bauxite resource can become part of a regional

development plan and provide feedstock for a dedicated alumina plant on the Gulf.

In addition to the possible projects that are briefly described in this brochure, there are other industrial mineral occurrences throughout the country that may be considered as development targets by Ma'aden. These include niche market materials that will require high-technology upgrading to enter world markets.

The common denominator of all of these minerals and ores is their potential to provide the foundation for export-directed sales and focus regional development in the Kingdom.

.....a project that can diversify our mining portfolio.....

integrity is at the heart of Ma'aden's relationships with its employees, customers, suppliers and indeed all of its shareholders

.....what will be the shape of the company in the years ahead?

human resources



Operating a loader at Mahd Ad Dahab

A strong and lasting relationship with its employees is a central part of the management philosophy at Ma'aden. Good internal communications, from the board room to the mines and mills, are an essential part of this endeavor. An open and honest approach will build the teamwork and co-operation that are vital to success.

To attract and keep the best people at all levels of the organization, Ma'aden strives to pay highly competitive wages. In addition, the employees of Ma'aden are provided with a wide range of benefits as part of their overall compensation. These programs include medical care, relocation benefits, housing benefits and assistance with educational programs.

A safe work place is another aspect of employment at Ma'aden. It goes without saying that mining demands nothing less. Everyone is instructed in proper procedures in all aspects of mining and mineral processing. We want our safety record to reflect this emphasis.

Over time, more and more Saudi Arabian nationals are joining Ma'aden to forge their careers. The company will continue to provide training and professional development programs for its employees, at existing operations and as new projects are brought to fruition.

Integrity is at the heart of Ma'aden's relationships with its employees, customers, suppliers and indeed all of its stakeholders.

Computer controlled processing of gold ore at Sukhaybarat



the shape of things to come



Looking to the future

As these summaries of various activities demonstrate, the Ma'aden team is busy. Stepping back from the details, what will be the shape of the company in the years ahead, not only in the short term of the next couple of years, but also in the longer term? At present, Ma'aden is producing on the order of 150,000 oz of gold annually from its two operating mines. By-products from Mahd Ad Dahab include more than 280,000 oz of silver, 900 tons of copper and 4,000 tons of zinc each year .

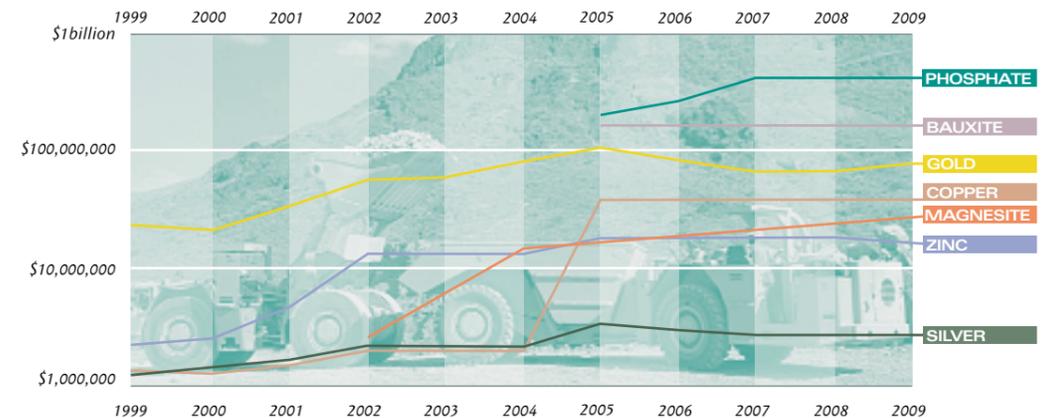
In the immediate future, Ma'aden will continue to emphasize gold mining. There are four active mining leases, at Mahd Ad Dahab, Al Amar and Al Hajar, and Sukhaybarat. The operations at Mahd Ad Dahab and Sukhaybarat are expected to continue to yield 150,000 oz of gold annually. Within the next couple of years, these two mines should be joined by Al Hajar, where annual gold production is projected to be in the order of 50,000 oz. Other gold projects such as Al Amar may add to this total.

Together these developments will nearly double gold production to 270,000 oz per year. By-product silver in 2003 may have almost doubled to 560,000 oz and copper increased to 1,700 tons. Zinc production, from three sources: Al Amar and Mahd Ad Dahab by-product, and from Khnaiguiyah, could total 17,000 tons.

If this short-term expansion is achieved, the value of metals production will more than double, from approximately \$50 million annually now to more than \$100 million in 2003. Gold will continue to contribute 85% of the gross revenues arising from mining operations.

Ma'aden is also planning to bring its Zarghat magnesite property into production within the next few years. This project is not dependent upon regional development and it is expected to add to Ma'aden's income in the near future. In the shorter term Zarghat could be the source of 5,000 tons per annum of electro-fused magnesite. At maturity some 20,000 tons per year is planned.

Ma'aden Base Case Revenues



.....these undertakings represent major commitments to the regional development of the Kingdom.....



## and ten years into the future

Looking further into the future, Ma'aden expects to maintain gold and by-product base metals production and diversify by the initiation of one or more large industrial minerals projects. Phosphates and bauxite are good examples. Both of these undertakings represent major commitments to the regional development of the Kingdom.

These industrial minerals developments will like any other mining project depend upon proven economic returns based on feasibility studies with which Ma'aden is pressing ahead. The most important of these (both in scale and financial commitment) is the phosphate fertilizer venture based on the reserves in the northern region and specifically at Al Jalamid. This project could be on stream and exporting in seven years and could provide more than 3 million tons per annum of di-ammonium phosphate (DAP). This will be the largest investment by far. It could account for three-quarters of the company's capital budgets during the next

decade and create 1,500 direct new jobs. It will allow Ma'aden to be the third largest phosphate producer in the world. Clearly, the timing of a decision to proceed with a project of this magnitude will require great care.

By the end of the next decade Ma'aden may also bring into production the bauxite resource at Az Zabirah. This will be part of a regional development plan. Together with the other metal and industrial mineral projects Ma'aden could be positioned as a diversified, export-oriented mining and mineral processing company. Its markets will be global, and it will be able to point to a successful track record of efficient, safe and environmentally responsible mining and processing based on the varied mineral endowments of the Kingdom.

These are exciting prospects, and Ma'aden has the right people to do the job. Ultimately, success will rest on the skills and commitment of its current and future employees.



## in conclusion

**This is the Ma'aden story. Or rather it is one chapter in a very long story, the story of mining in the Kingdom of Saudi Arabia. It is a story that shows no sign of ending.**

**Mining is a business that is constantly changing, as new resources are found and as technology advances. As part of this global industry, Ma'aden will be changing too as time goes on. The mining professionals of Ma'aden are looking forward to the future with enthusiasm and with confidence.**

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SRM Ltd, London

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Brockway Associates, London



SAUDI ARABIAN MINING COMPANY

Saudi Arabian Mining Company (Ma'aden)  
Al Ma'ather Street  
P O Box 68861  
Riyadh 11537 Kingdom of Saudi Arabia

Telephone  
+966 (0)1 472 1222

Facsimile  
+966 (0)1 472 1333

e-mail  
[maaden@maaden.com.sa](mailto:maaden@maaden.com.sa)