

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



هيئة المساحة الجيولوجية السعودية
SAUDI GEOLOGICAL SURVEY

SAUDIS AS LEADING EXAMPLE IN MENA MINING

THE MENA MINING' 2013
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**We Believe on Environmentally Friendly and Sustainable Mineral
Development**

What Makes Saudi Arabia, leader in MENA Mining?

Saudi Arabia by virtue is on the leading position in MENA Mining:

- Favorable geological environment and access to all areas.
- Large resources of diversified industrial and metallic minerals.
- Well developed infrastructure.
- Sustainable and flourishing economy.
- Geopolitical stability.
- Well developed banking and financing system
- Strategic geographic location – Access to Asian, African and European markets.
- Availability of fuel, electricity, utilities on reasonable rates in industrial cities.
- Strong law and order situation.



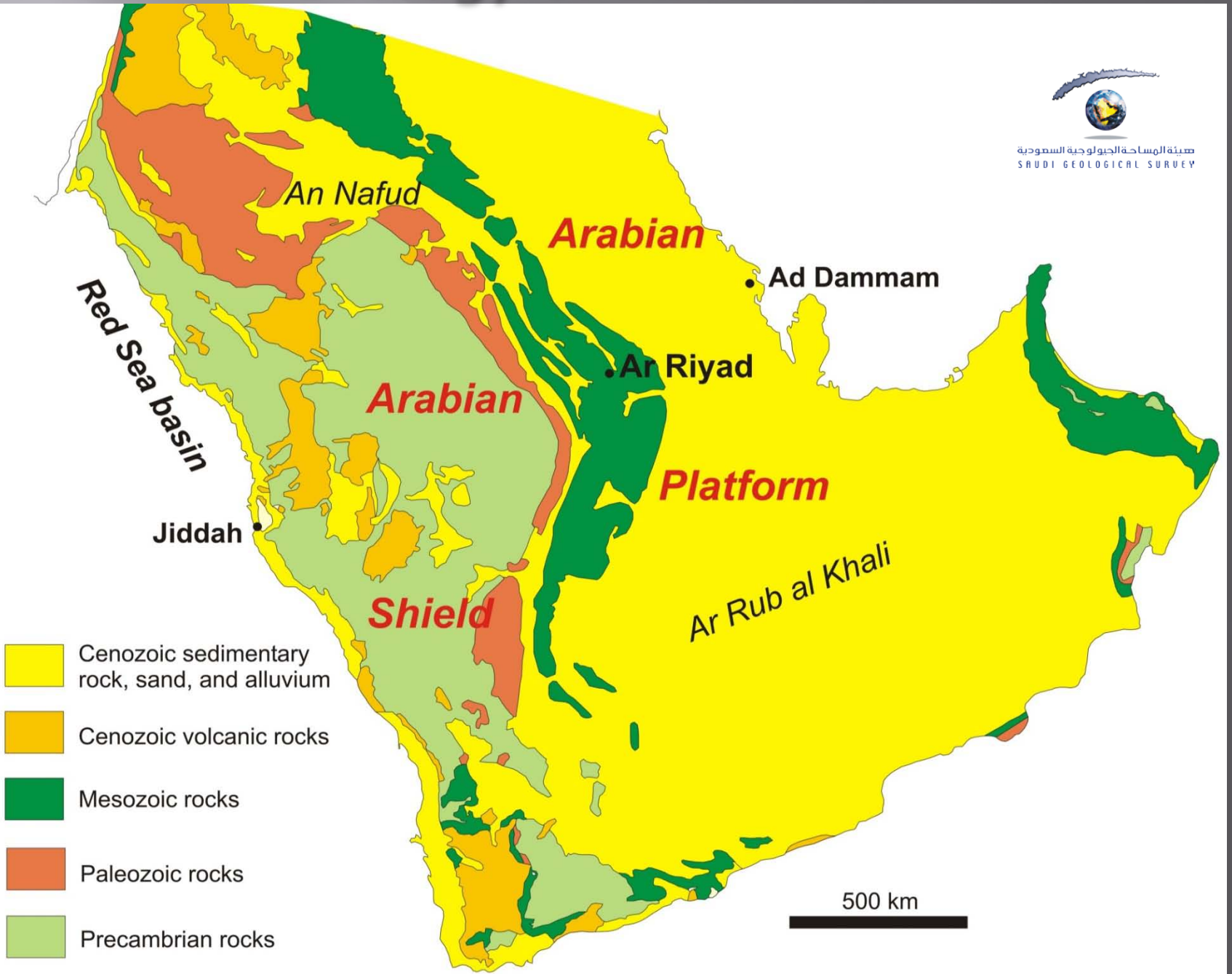
Saudi Arabia – Facts and Figures

- ▣ The Arabian Shield on the east is bound by Arabian Platform rocks which are rich in limestones and sandstone (the main source of high quality silica sand).
- ▣ About one half of Saudi Arabia is covered with desert (dune sand).
- ▣ The Eastern region has the richest reservoir of oil in the world.
- ▣ Population of Saudi Arabia is about 24 million

Geology of Saudi Arabia



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Most important mineral occurrences in Saudi Arabia

- Although, a variety of industrial and metallic minerals are found in Saudi Arabia, but I will discuss only the most important resources:

Silica Sand

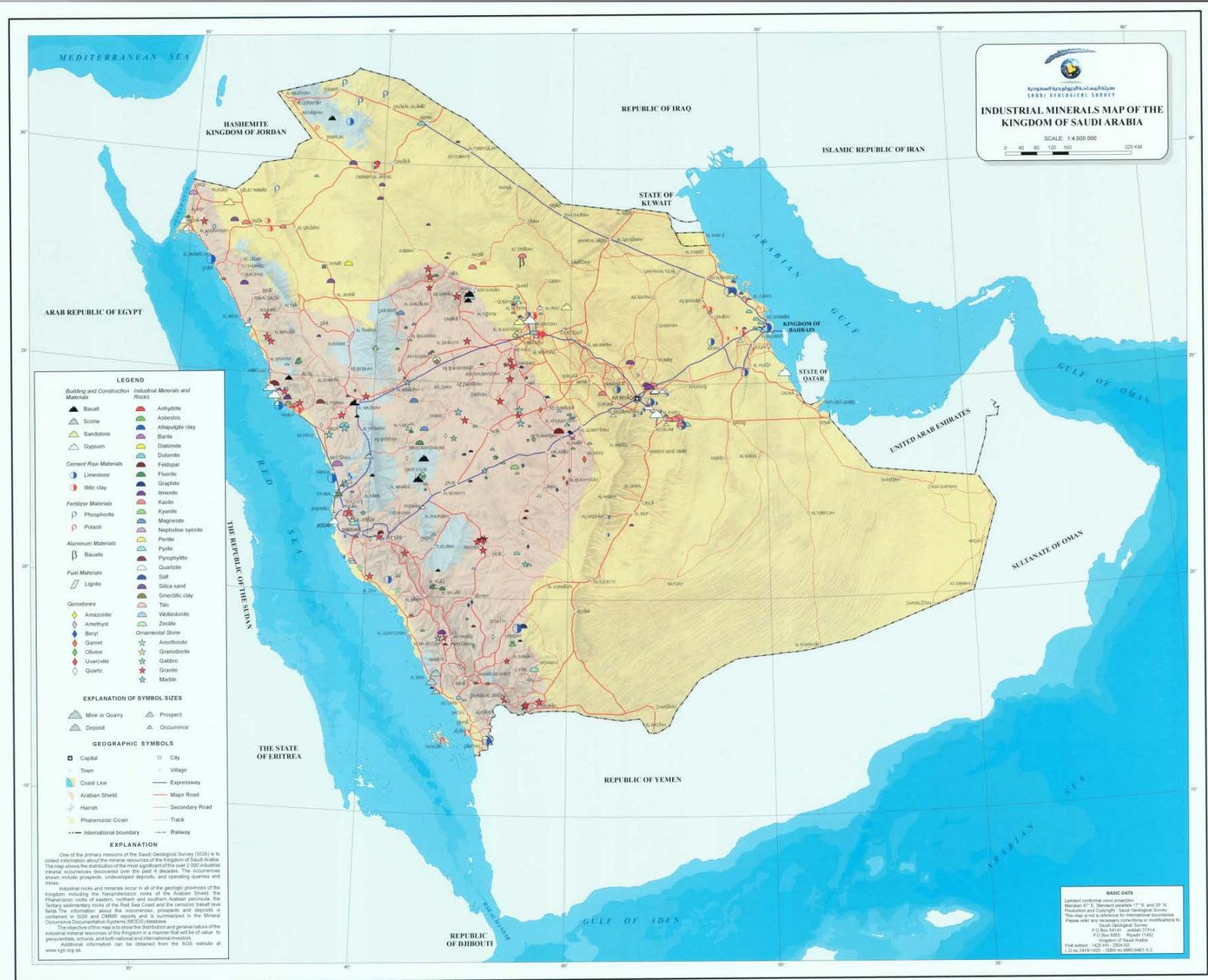
Quartz,
Limestone & Dolomite
Feldspar (pegmatite)
Basalt & Scoria
Magnesite
Nepheline Syenite
Granite & Marble
Bauxite
Phosphate
Red Clays
Calcium Bentonite
Gypsum and Salts

Iron Ore

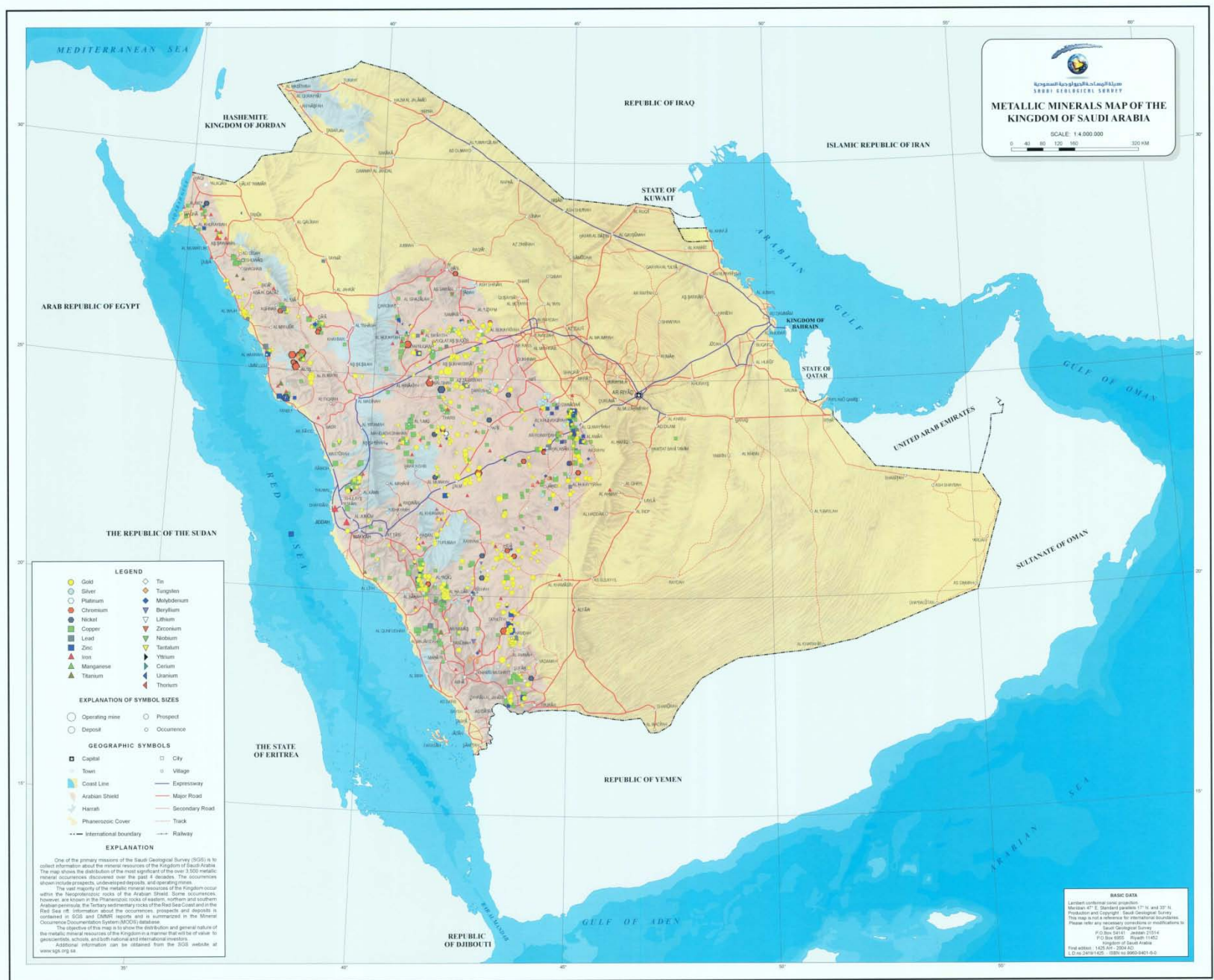
Gold
Silver
Lead
Copper
Nickel
Rare Earths
Niobium-Tantalum
Tin
Zinc



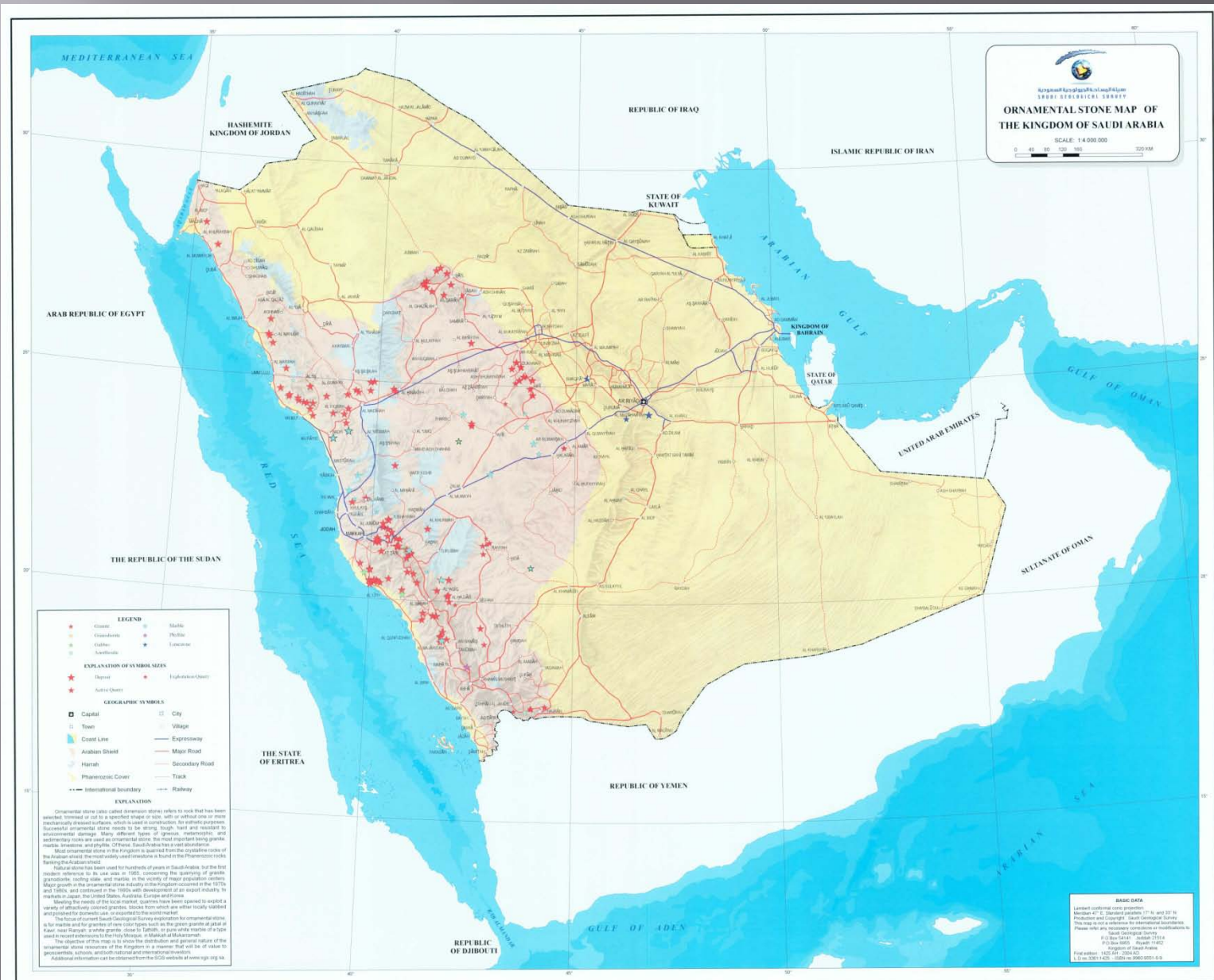
Industrial mineral occurrences



Metallic mineral occurrences



Ornamental Stones occurrences



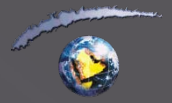
Our vision as a leader in MENA mining

- ▣ The following points will explain our vision for mining and manufacturing sectors:
 - ❖ Sustainable mineral development – keeping share for next generations.
 - ❖ Environmental preservation and protection.
 - ❖ Upgrading and value-adding – producing most viable products.
 - ❖ Producing high grade raw materials and semi finished products which is consumed by Saudi industries.
 - ❖ Mine closure and rehabilitation plans an integral part of licensing applications.
 - ❖ Taking care of local communities and using mineral resources for the benefit of Saudi society.



Mining Objectives – 9th five year plan (2010–2014)

- ▣ Saudi Arabia's 9th “five year development plan” (2010-2014) has given especial attention to support and enhance growth in mineral sector.
- ▣ The current five year development plan of Saudi Arabia encourages the diversification of production base and development of minerals, mining and manufacturing sectors.
- ▣ Saudi government supports and promotes integration of mining and mineral sector with other economic activities.
- ▣ The main focus in the current five year plan is on ensuring the added value products from exploitation of national mineral resources.



- ❑ Saudi government is making efforts to identify and protect all mining areas, and provide the required infrastructure for investment.
- ❑ Beside promoting and supporting minerals and mining activities, Saudi government is fully aware of its duties to preserve, protect and tackle environmental issues in mining areas.
- ❑ Mine closure and rehabilitation plans are integral part of licensing and approvals.

How Saudi mining sector is progressing Achievements in 8th development plan (2005– 2009)?

- ▣ Extraction of raw materials increased from 237 millions tons in 2004 to 325 millions tons in 2008 with an average growth rate of 8.2%.
- ▣ Mining licenses has increased from 1179 licenses till 2004 to 1408 licenses during 2008.
- ▣ Significant growth has been recorded in exploration and mining activities. The number of mining locations has been increased from 165 in 2004 to 254 in 2008.
- ▣ The private sector is playing an important role in mining and mineral based on manufacturing activities.
- ▣ The details of mining achievements during 8th development plan is shown in table 1 and table 2.



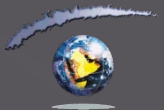
Mining activities in 8th development plan (2005–2009) (Ministry of Petroleum and Minerals of Saudi Arabia)

Mining Activity	2004	2008	Annual growth %
Reconnaissance licenses	43	84	18.2
Exploration licenses	28	61	21.5
Small mine licenses	31	58	17.0
Quarry permit (building material)	1045	1148	2.4
Raw material for cement	13	22	14.1
Other industrial minerals & ornamental stone licenses	9	21	23.6
Total licenses	1179	1408	4.5
Sites allocated for mining	165	254	11.4
Area reserved for mining activities (1000 km ²)	11	53	48.2
Area under exploration license (100 km ²)	123	140	3.3
Operating private companies	640	750	4.0
Volume of exploited raw material (million tons)	237	325	8.2

Mineral Resource production (2004–2008)

(Ministry of Petroleum and Minerals)

Mineral Type	2004	2008	Ave. Annual Growth %
Gold (Tons)	5.4	4.0	- 14.5
Silver (Tons)	4.9	9.0	16.4
Lead (tons)	50	347	62.3
Copper (Thousand tons)	0.7	1.5	21.0
Zinc (Thousand tons)	0.5	3.6	63.8
Building material (Million tons)	200.0	273.0	8.1
Raw material for cement (Million tons)	33.0	42.1	6.3
Cement (Million tons)	23.8	31.8	7.5
Clays (Million tons)	5.6	5.0	-2.8
Gypsum	2.1	2.3	2.3
Salt	1.7	1.6	-1.5
Ornamental stones	1.2	1.2	0.0
Other industrial materials	2.5	1.6	-10.6



2008 Global economic slowdown and Saudi endurance

- ❑ World prices of mineral products falls sharply in the second half of the year 2008.
- ❑ Global demand of mining products abruptly decreased as a result of financial crisis.
- ❑ As a result many large mining and manufacturing industries either halted their projects or reduced the investment.
- ❑ Saudi industry mainly relies on the domestic investment, therefore, the negative impact of the economic crisis on the local demand for mineral resources and products were limited.
- ❑ More than 90% of mineral products are consumed in the domestic building and construction industry.
- ❑ In the 9th five year development plan it is expected that domestic market demand will remain strong at an average annual rate of 5.7% from 344 million tons in 2009 to 453 million tons in 2014.



Main focus of Saudi mining industry

- ▣ We are putting efforts to produce added value mineral products and materials for the consumption of domestic manufacturing industry.
- ▣ Export of unprocessed mineral commodities are discouraged.
- ▣ Thorough research and study on the advanced products, markets and how to use mineral commodities to produce most viable products is undergoing.
- ▣ We have conducted intensive exploration and mapping during last four decades and we have good mineral occurrences documentation system for all Saudi minerals. Now we are evaluating these resources for use in high-tech applications.
- ▣ Currently, a joint evaluation team from Saudi Geological Survey (SGS), the Deputy Ministry for Mineral Resources (DMMR) and National Industrial Cluster Development Program (NICDP) is streamlining the procedures for issuing new silica licenses.



SGS Development Strategy

(9th Five year development plan)

- ❑ We can foresee a modern Saudi Arabian mining sector that make use of advanced technologies in mining and processing; offering secure and attractive environment for domestic and global investors to fulfill local demand and export surplus.
- ❑ Contributing to the wealth of the Kingdom of Saudi Arabia, diversifying the economic base and substituting local for imported raw materials and products.
- ❑ This strategy will increase investment opportunities, increase the job opportunities for Saudis, providing protection to the most promising mining areas, offer incentives to local and foreign investors to set up mining projects preferably, integrated to the present manufacturing projects.
- ❑ Ultimately this strategy will enhance and improve mining database and support research activities in geosciences.



Our main Targets & Achievements

- ❖ **Saudis are tackling two main issues in mining:**
 - Raw materials produced from minerals applying advanced processing techniques
 - Making sure that these materials are required and consumed by the domestic industries manufacturing high-tech products.
- ▣ **One good example that can explain our vision is the recent advances in silica industry:**
 - Silica producers are encouraged and advised to process silica sand and to produce high quality raw material.
 - Many silica sand producers are putting up world class processing plants and upgrading silica sand to meet the requirements for clear high performance glasses.
 - Silicon carbide production is underway.
 - Many investors have taken interest in processing silica sand to produce fracturing (Fracking) sand for oil and gas production.
 - Attempts are made to produce chemicals and specialty silica in KSA.



Well coordinated efforts and integration Key to MENA mining leading position

- Mining a large number of resources and high tonnage does not place someone on the leading position.
- Well coordinated efforts by government and private sector, mining and manufacturing and integration between industries are the key for the MENA mining leadership.
- We are doing these efforts in silica industry aiming to produce all silica value chain.
- Saudis are putting up new processing plants and modernizing existing processing facilities to fulfill the domestic demand of high quality raw materials.
- In last few years, clear, high performance glass manufacturers have emerged on Saudi horizons where there were only colored container glass producers. Coordination between manufacturers of high performance glass and raw material producers are bringing processing industry on fast track.
- Silicon carbide and silicon chemical productions are in pipeline. Fracturing sand is required by Saudi oil and gas producers.



Silica Value Chain production

A strong economic base for diversification

- ▣ Abundant silica resources not only provide opportunities in glass manufacturing, there are many other profitable products that can be manufactured from silica sand.
- ▣ Saudi Arabia produces sodium silicate from silica sand and soda ash, currently, soda ash is imported but the production of soda ash is in its early stage.
- ▣ Sodium silicate produces precipitated silica, silica gel and silica sol. The process is not energy intensive.
- ▣ Precipitated silica has a large number of applications but in Saudi Arabia it can be used as additive in animal feed, filler in plastics and paint industries, in rubber, foodstuff and many other applications.
- ▣ Sodium silicate is used in many other industries producing cleaners and detergents.



A view of silica sand mining from sandstone in Tayma area



Silica sand processing plant



- ❑ Saudi Arabia is among the few MENA countries who have abundant resources of **quartz**.
- ❑ During last few years we have evaluated our quartz resources to find out their quantity and quality.
- ❑ We are characterizing quartz resources for use in making **Silicon metal**, **High Purity Quartz (HPQ)** , **EMC fillers*** and other high value products.
- ❑ Going downstream, there are three Saudi companies in the early stage of manufacturing **silicon compounds (silane)**, **Solar grade silicon and silicones (rubbers, elastomers, plastics etc.)**
- ❑ Once the solar silicon is produced, Saudi companies will be producing solar cells, solar panels etc.
- ❑ On the other hand, flat glass manufacturers will be producing solar glass to cover the solar panels produced from solar grade silicon.
- ❑ Very interesting to know that **silicon carbide** produced from silica sand will be used in making cutting wires to cut wafers from silicon ingots.
- ❑ Saudi Arabia is in the process of developing whole **Silica Value Chain** with well integrated industries.



High grade quartz body near Qassim Region



High Purity Quartz - Saudis as new entrant

- ▣ High purity quartz is an intensively processed quartz produced from natural quartz upgrading. The purity level reaches to 99.998% silica or better than that.
- ▣ UNIMIN (USA) is the largest manufacturer of high purity quartz in the world which produces >99% of the world demand.
- ▣ High purity quartz is used in a large number of high-tech applications ranging from semi-conductor industry, optic fibers, telecommunication devices, high temperature lamp tubing and crucibles for monocrystalline silicon.
- ▣ Saudi Arabia is currently, evaluating some of its quartz resources for viable production of high purity quartz.



Exploitation, shipment and product manufacturing of Az Zabirah bauxite

- ▣ Large sized deposit of bauxite near Az Zabirah has been exploited for aluminum manufacturing.
- ▣ The designed production capacity of bauxite mine is 4 million metric tons.
- ▣ Ma'aden has signed a contract with Alcoa Inc., to build a \$10.8 billion aluminum industrial complex to fulfill local demand and to export.
- ▣ The bauxite ore will be shipped to alumina refinery at Ras Al Khair (Arabian Gulf coast) via newly built railway track. The capacity of alumina production is 1.8 million metric ton per year.
- ▣ Aluminum smelting plant at Ras Al Khair will produce 740,000 metric tons of aluminum per year.
- ▣ World's renowned GHD executed environmental impact assessment study prior to the construction of mine and plant in 2005.



Exploitation, shipment and product manufacturing of Al Jalamid Phosphate

- ❑ One of the world's largest deposit of phosphate (534 million metric ton) near Al Jalamid is mined for the production of fertilizers. The mine production is about 11.6 million ton per year.
- ❑ Ma'aden phosphate company (MPC) exploits the phosphate deposit at Al Jalamid and produces Diammonium Phosphate (DAP) fertilizer at the processing plant at Ras Al Khair on the Arabian Gulf coast.
- ❑ Local natural gas and sulphur resources are used in the production of fertilizer.
- ❑ The phosphate concentrate is shipped by newly built railway track from Al Jalamid to Ras Al Khair for processing.
- ❑ Ras Al Khair is located about 90 km north of Jubail, the industrial city with all facilities and utilities for manufacturing.
- ❑ At full capacity, Ma'aden phosphate company will produce about 3 Million ton per year granular Diammonium Phosphate and a surplus of about 0.4 million ton per year of excess ammonia.



Jubail and Yanbu Industrial Cities

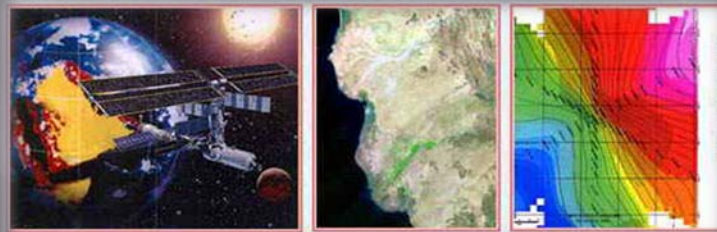
- ▣ Industrial cities of Jubail and Yanbu are managed developed by the Royal Commission of Jubail and Yanbu (RCJY) . A total public and private investment at the two sites is about SR 519 billion creating 107,000 jobs.
- ▣ Jubail Industrial City: Jubail Industrial City is the largest civil engineering project in the world located in the Eastern Province, Arabian Gulf coast of the Kingdom of Saudi Arabia covering 1,016 km square.
- ▣ With the population of more than 100,000, Jubail accounts for 7% of Saudi Arabia's gross domestic products.
- ▣ Jubail has developed as a major player in the global petrochemical market attracting top technical and business companies from all over the world.
- ▣ Jubail has all facilities including fuel supplies, electric power, gas, water, sewerage, banking, schools, residential area, commercial centres, play grounds etc.
- ▣ Yanbu Industrial City: Yanbu industrial city located at the Red Sea coast covering 187 km square and constitutes 9.6% of National GDP in 2010. Its foreign direct investment is about SR 159 billion.
- ▣ There are 104 light, primary and secondary industries with all facilities and 19 are under construction. Total private sector investment in this city is about SR 140 billion

SGS Services

- Field logistic support with drilling, vehicles, field camping and earth-moving equipments.
- Aerial logistic. support with SGS helicopter and sky-van planes available to speed up field works and provide access to rugged localities.



- Geophysical, GIS and topographic surveys to assist in fulfilling mineral exploration.

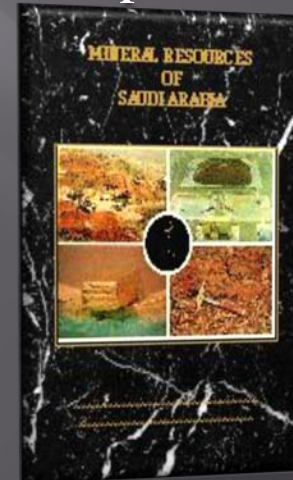


🌐 Chemical, petrologic, water, environmental, engineering geology and industrial applications laboratories.



🌐 Support all kinds of geological and geotechnical research.

🌐 Publications and Publishing Center with technical editing, translation, electronic production, printing, and aerial photo lab processing facilities.



Summary

- Well developed infrastructure, great mineral resources, strategic geographic location, industrial cities with all facilities put Saudi Arabia at the leading position in MENA mining.
- Mining and mineral based manufacturing offers strong economic base for diversification, which is the main target of Saudi government.
- Saudi Arabia is focused on modernizing mining and processing industries and taking care of environmental protection and sustainable mineral development.
- Production of added value mining products that can be consumed by domestic manufacturing industry is the main priority.
- Improving the standard of life, providing jobs and business opportunities of communities living in mining areas is our main concern.





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Thank you.....

for attending....

www.sgs.org.sa