

Mineral investment opportunities in the UAE



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British Geological Survey

NATURAL ENVIRONMENT RESEARCH COUNCIL

Outline of presentation

- Intro & BGS work in the UAE
- Ministry of Energy (MoE)
- UAE geology & mineral resources
- Potential for mineral investment opportunities
- Conclusions



Clive Mitchell

28 years at the British Geological Survey (BGS) as Industrial Minerals Specialist

Chartered Geologist (CGeol), Geological Society of London

Head of Communications, BGS

Since 2002, key role as part of industrial mineral resource assessments projects for the UAE Ministry of Energy (MoE) (limestone, dimension stone & construction aggregate)

Contact me at: cjmi@bgs.ac.uk

Clive Mitchell surveying high purity limestone in the Northern Emirates, UAE (2009-2010)



British Geological Survey

- World leading national geological survey, founded 1835, UK custodian of geoscience information
- Independent not-for-profit public sector research establishment, funded by Government & external income
- 640 staff based in Keyworth, Edinburgh, Wallingford, Cardiff, Belfast & London in the UK
- <http://www.bgs.ac.uk/>



MINISTRY OF ENERGY (MoE) Part 1

- **Functions and Responsibilities of (Geology & Mineral Resources Department)**
- Representing UAE in conferences, meetings, and events of International and Regional organizations that are related to Energy, Water, and Minerals resources in cooperation with the concerned bodies.
- Conducting Geological and Geophysical studies, reports, and surveys and tectonic maps to all UAE lands.
- Providing scientific consultancy and technical support to the local governments regarding investments in mineral resources.
- Drafting legislations in collaboration with the concerned authorities in mineral resources to ensure the best utilization of mineral resources.

MINISTRY OF ENERGY (MoE) Part 2



UNITED ARAB EMIRATES
MINISTRY OF ENERGY

- **Services provided by Ministry of Energy (Geology & Mineral Resources Dept)**
- Geological Maps: with high levels of accuracy. Generated during 2002- 2012.
- Geological maps cover the UAE's lands in different scales.
- Geological Reports: detailed studies on geological deposition, characteristics of rock, content of fossils and tectonic history since its inception till date.
- Geophysical Reports: systematic collection of geophysical data that analyzes magnetic and gravitational fields emanating from the Earth's interior, which contains essential information concerning seismic activities and international structure. Reports also provide an investigation of the depth of groundwater and the geological structure of UAE lands.
- Geological Mapping Films: to look at various high-quality geological maps covering the entire country and investigate certain aspects of the geology of the UAE lands.
- To Whom it May Concern: a letter to facilitate field visits conducted to investigate and look at some of the distinguished geological sites in the UAE.

Geological Survey in the UAE

2 main geological mapping projects and associated surveys

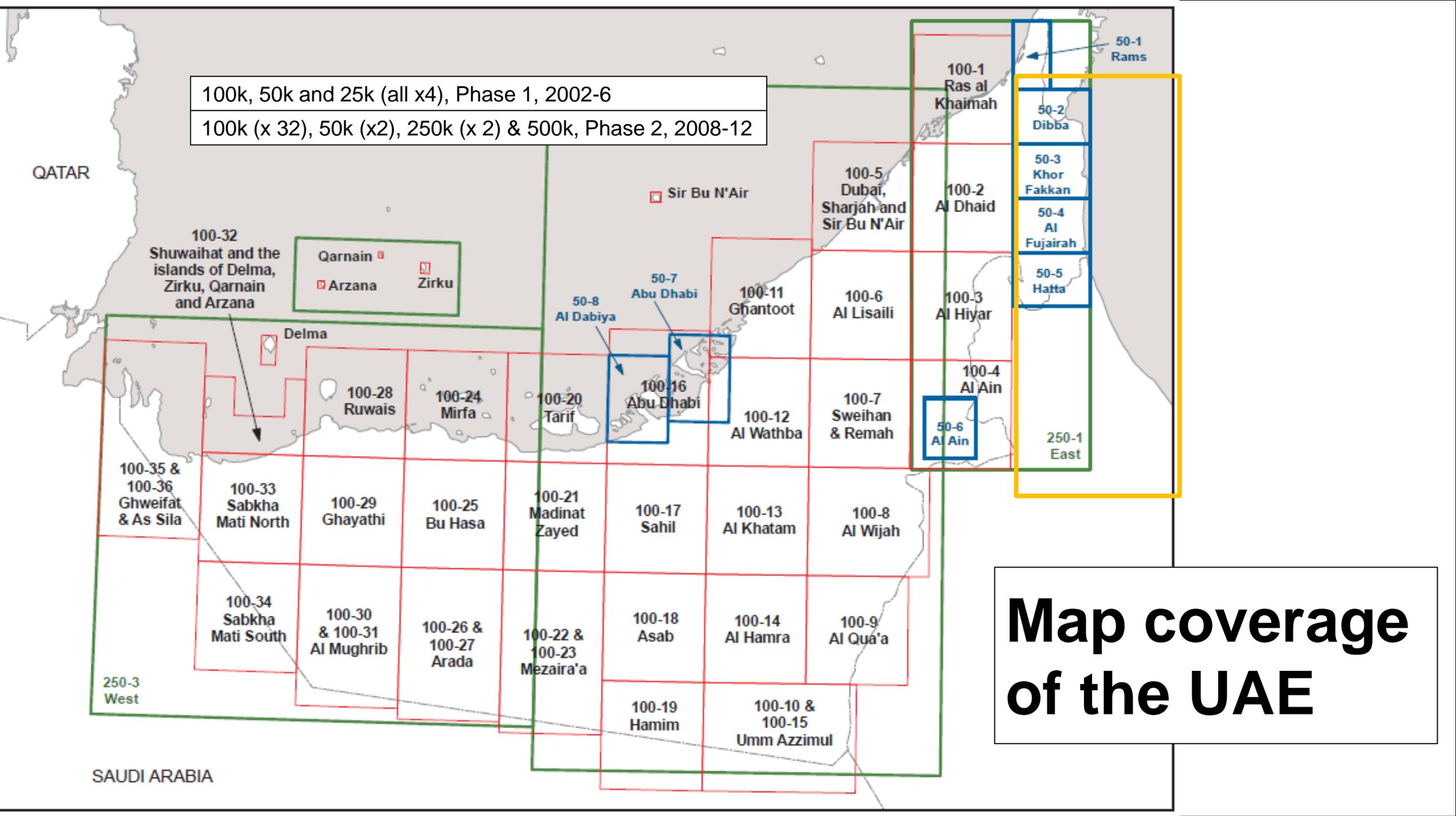
- 2002-2006 Eastern Emirates and Hajar Mountains
- 2008-2012 Abu Dhabi and the western UAE

Work included:

- Full suite of geophysics including aeromagnetic, gravity and seismic data
- Metallic mineral assessment
- Industrial mineral assessment (construction aggregate, limestone and dimension stone)
- Geohazard assessments
- Seismic data
- 3D modelling



100k, 50k and 25k (all x4), Phase 1, 2002-6
 100k (x 32), 50k (x2), 250k (x 2) & 500k, Phase 2, 2008-12



Map coverage of the UAE

BGS resource assessment in the UAE



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AND MINERAL RESOURCES



The Geology and Geophysics of the United Arab Emirates
Volume 9: Survey and testing of hard rock
resources in the ophiolite of the UAE



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The Geology and Geophysics of the United Arab Emirates
Volume 10: Assessment of high-purity
limestone resources of the UAE



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The Geology and Geophysics of the United Arab Emirates
Volume 11: Assessment of the dimension
stone resources of the UAE





mGeology

English

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mGeology app

mGeology – the free app that puts the geology of the UAE at your fingertips!

Access to the Ministry of Energy's full national surface geology (1:100,000 scale)

Displays sabkha & veneer deposits, geological cross sections and photographs

Apple (IOS) only (iPhone)

CALCIUM CARBONATE



HIGH
POTENTIAL

High-purity limestone in UAE

- UAE imported 60,000 tpa of calcium carbonate (and dolomite) in 2016, the main import sources were Iran, Jordan, Greece, Saudi Arabia, Egypt and Turkey (>90% by weight; source: UN Comtrade Database)
- Limestone survey identified high-purity limestone (and dolomite) resources in the northern Emirates (Ras Al Khaimah, Fujairah & Al Ain)
- Suitable for manufacture of high-grade fillers in paint, paper, plastic, rubber, adhesives, glass, ceramics, food and pharmaceuticals.
- Development of these resources has potential to make substantial contribution to the economic diversification objective of the UAE

DIMENSION STONE



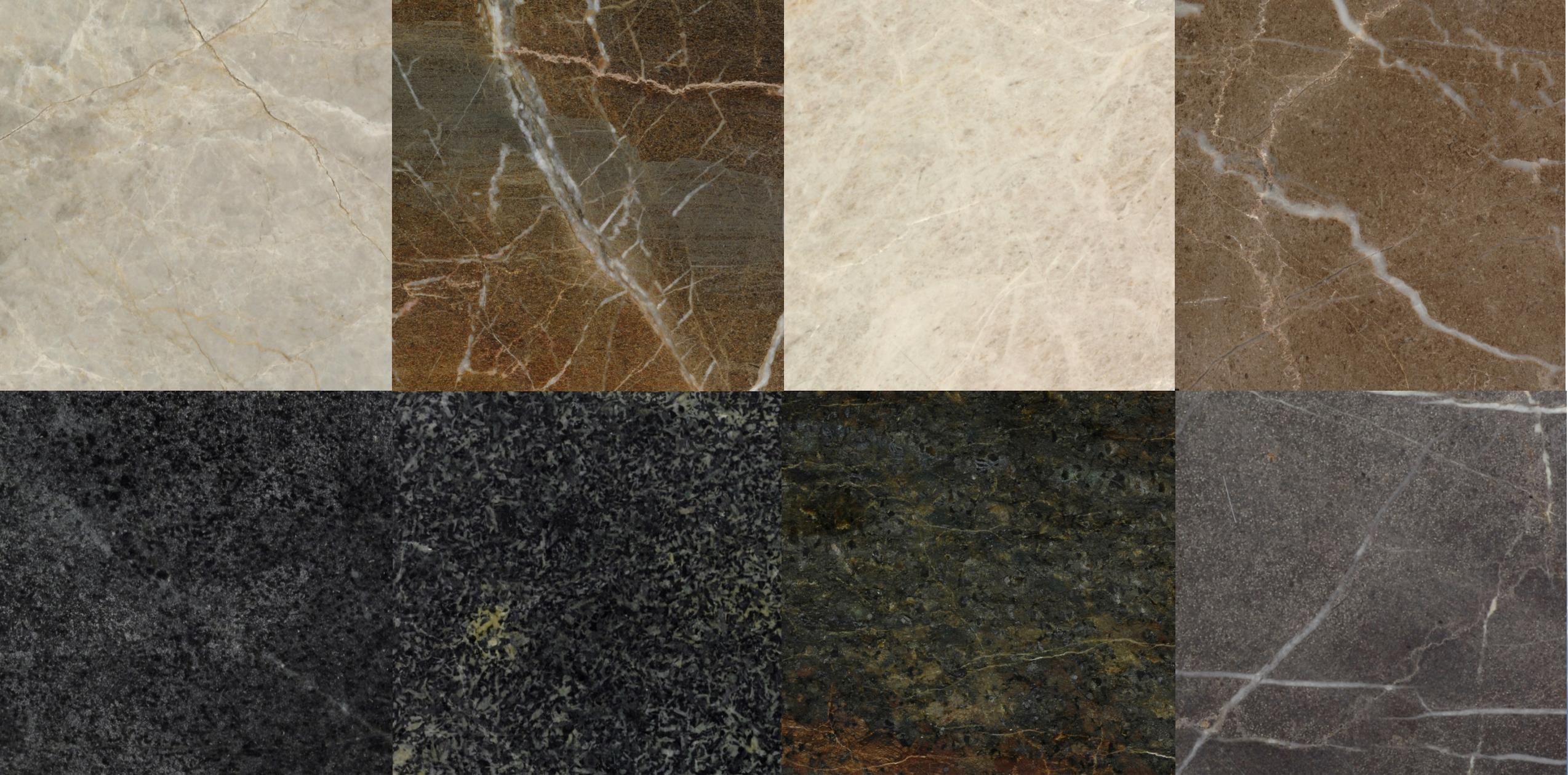
HIGH
POTENTIAL

Dimension stone resources

- UAE has a thriving dimension stone industry, however this is based on imported stone. The top ten import sources in 2016 were: China, India, Oman, Turkey, Italy, Spain, Syria, Jordan, Greece and Egypt (88% by weight; source: UN Comtrade Database)
- To my knowledge there is no significant quarrying of dimension stone in the UAE, few local examples of building stone production
- Resources suitable for dimension stone include limestone, gabbro and harzburgite in the Hajar Mountains of Ras Al Khaimah and Fujairah.



A team from the British Geological Survey are scouring the country for useful deposits of marble to reduce imports and boost the local economy. Above, Richard Ellison, left, and Clive Mitchell in Wadi Bih in Ras al Khaimah. Story, page a5. Jaime Puebla / The National



Polished samples of Limestone, Gabbro and Harzburgite from the UAE

CONSTRUCTION AGGREGATE



HIGH
POTENTIAL

Hard Rock resources

- UAE has a well established construction aggregate industry working the hard rock resources of the UAE
- There are approx. 100 small to large-scale quarries, the largest being Stevin Rocks Khor Khuwair limestone quarry (60 million tonnes per year capacity) 20km NE of Ras Al Khaimah
- Issues that need addressing:
 - Over-capacity, due to number of quarries, and its impact on market
 - Deep-water port facilities to improve export potential
 - Environmental concerns e.g. dust, visual intrusion

GYPSUM



MEDIUM
POTENTIAL

Gypsum resources

- In UAE gypsum is primarily used for cement production, over last 20 years cement production has climbed (currently 20 plants with 40m tpa capacity)
- Gypsum production in the UAE has increased from 90,000 tpa in 1992 to 700,000 tpa in 2016 (source: USGS Minerals Yearbooks), presumably this is based on imported raw material
- Currently, over 1 million tonnes of gypsum are imported, Iran and Oman supplied approx. 95% in 2016 (source: UN Comtrade Database)
- Massive gypsum beds occur in the Paleogene Lower Fars Formation, formerly worked near Jebel Ali – there is no current extraction in UAE.

CHROMITE



MEDIUM
POTENTIAL

Chromite resources

- Chromite mineralisation mainly occurs as pods and veins in the serpentinitised dunite ultramafic rocks of the Oman-UAE ophiolite
- Past production by Derwent Mining Ltd yielded more than half a million tonnes of chromite ore over a 20 year period from the early 1990s (source: USGS Minerals Yearbooks)
- The chromite prospects are exhausted around Fujairah, but further south there is potential for podiform chromite in the undeveloped ultramafic rocks in the area of Masfut near the Oman border

SILICA SAND



MEDIUM
POTENTIAL

Silica sand resources

- Despite the abundance of sand, UAE has no silica sand production
- In 2016, 760,000 tonnes were imported (import value US\$40m) mostly from Saudi Arabia (88%) & Egypt (10%) (source: UN Comtrade Database)
- Potential silica sand deposits exist in Abu Dhabi Emirate with high silica (SiO_2) and low iron (Fe_2O_3) contents
- Completion of Etihad Rail network through the UAE will make this more attractive as it would enable fast and cost effective transport to the glass works and other consumers in the industrial centres of Abu Dhabi, Dubai and Ras Al Khaimah

OTHER MINERALS

Asbestos

Barytes

Clay

Celestite

Copper

Feldspar

Magnesite

Manganese

Mica

PGEs

Phosphate rock

Quartzite

Rock salt

Talc

Wollastonite

LOW

POTENTIAL

Conclusions

- Good availability of geological & geophysical data for UAE
- High potential: calcium carbonate, construction aggregate, dimension stone, dolomite
- Medium potential: chromite, gypsum, silica sand
- Low potential: copper, PGEs, other metals, other industrial minerals
- Interested? Discuss with Ministry of Energy (MoE) at Mining Show in Dubai or HQ in Abu Dhabi

Thank you for your attention!

A man wearing sunglasses and a light-colored jacket is sitting on the ground in a desert landscape. He is holding a hat and looking towards the camera. To his right is a large, gnarled tree. In the background, there are rocky, mountainous hills under a clear blue sky.

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