DEVELOPMENT OF NATURAL RESOURCES OF FUJAIRAH EMIRATE

THE SECOND INTERNATIONAL INDUSTRIAL ROCKS AND CONSTRUCTION MATERIALS FORUM AND EXPO, 2014
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Presented by
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The Fujairah emirate, unlike the other six emirates of the UAE federation, lies in the east coast facing the Gulf of Oman. This strategic geographical location is marked by its easy access to major shipping ports all over the world which makes Fujairah a lucrative port for investors and entrepreneurs across the world.

The unique geographical position amongst the seven emirates of the UAE and the mountainous topography of the Fujairah emirate plays an important role in the economy of the Fujairah emirate.

The emirate of Fujairah covers approximately 1,450 Km² which is about 1.7 % of the total (83,600 Km²) of the UAE area. It is marked by a chain of rough and rugged mountains. The mountains occupy about 77 % of the total surface area of the Fujairah emirate. According to 2012 statics the population of Fujairah was estimated to be over 182,000.
UNITED ARAB EMIRATES
Under the Edict No 1, of 2009, promulgated by HH Sheikh Hamad bin Mohammed Al Sharqi, Ruler of Fujairah, an autonomous financial and administrative entity under the Government of Fujairah was established in 2009 and is named FUJAIRAH NATURAL RESOURCES CORPORATION, (FNRC).

The Corporation is the custodian of all natural resources of the Fujairah emirate and aims at developing the rocks and mineral resources and extends its full administrative and technical support and cooperation for the development of mineral resources. Furthermore FNRC exert much effort to streamline all activities related to mining, quarries and crushers, including licenses, rights, leasing, agreements and concessions and further facilitate the setup procedures of the projects by the investors.

Detailed geological studies and mapping of Fujairah emirate have been carried out by one South African company and more recently by the British Geological Survey under UAE Ministry of Energy.
These studies form the basis for detailed local geological investigations and selection of the sites according to the specific requirements by various investors.

**Services Provided to Investors and New Companies**

- Any investor interested in setting up any mining industry is provided with all the technical information and geological map of the area for his selection.
- Site visits are carried out jointly by the FNRC and the company’s team.
- Reconnaissance survey is carried out and surface samples are collected for laboratory testing.
- Based on the initial results site is selected after topographical survey, for detailed site investigations including drilling and coring (if necessary) is carried out.
- The samples and cores are tested in laboratory and a Report is submitted by the company to the FNRC for approval.
If the site is in accordance to the qualitative and quantitative requirements and specifications of the proposed investor the site is surveyed and final sketch is prepared for Lease.

After the completion of administrative formalities the land allotment lease is finalized and site is handed over to the company for mining operations.
The following are some important services being provided to the investors and clients by the FNRC.

1. Issuing maps of the proposed areas of exploitation for mining investment.
2. Issuing the location maps for exploration sites.
3. Receiving applications for Permission for investigations and exploration.
4. Issuance of Permits for Reconnaissance survey.
5. Issuance of Permits for geological surveys, Investigations and Exploration.
6. Issuance of Permit for Exploitation in exploration areas.
7. Issuance of Permits for Exploitation the Quarries.
8. Issuance of No Objection certificate for Export of the material
Introduction (Continued..)

9. Issuance of No Objection letter to procure Explosives with the cooperation of the Police Department.
10. Issuance of No Objection letter for Blasting in quarries with the cooperation of the Police Department.
11. Permit for internal transportation of material.
12. Issuance of computerized identification cards for weigh bridge system for transport companies.

As mentioned above mountains occupy about 77% of the land area of the Fujairah emirate the scarcity of land is an obstacle in the development plans of the civil authorities. FNRC is giving priority in its mining plans to reclaim the land from quarrying. Close coordination in this respect is maintained with the Master Planning team.
Goals of FNRC are following:-

1. To conduct geological studies, researches and surveys of the geological interesting areas identified through the studies and surveys carried out by various agencies with aim to develop the mineral and rock wealth and other natural resources whether exposed or underground located within the parameters of the Fujairah emirate.

2. To process and facilitate the issuance of licenses, permits, leases, agreements, to carry out geological surveys and investigations for rocks and minerals. Streamlining the procedures of setting up the mining activities and related projects in order to utilize the mineral wealth in a manner that would boost the domestic as well as foreign investment by providing equal opportunities and competition in the market of rocks and minerals.

3. Optimum utilization of the mineral resources in accordance with highest mining trade standards of safety and environment protection regulations for all mining operations.
We are committed to maintain high standards of corporate responsibility with particular reference to Environment, health and safety. The FNRC is responsible for monitoring of all mining activities and evaluating the ecological impact in order to secure the consumers’ protection, public safety and environment protection in relation to all mining operations and implementation of rules and regulations enforced by the government. Continuous monitoring and follow up of the mining operations are carried out to make sure that all the rules and regulations are being observed by the companies.
We are in process of acquiring and installation latest monitoring equipments which shall be installed at all quarry and crushers areas. Inspection vehicles are being fitted with cameras and computers for Remote Monitoring and Inspection of quarries and crushers which will be connected to central monitoring base in FNRC offices.
ENVIRONMENT MONITORING (Continued....)

The air quality monitoring network provides data concerning local air quality so that we can assess compliance with the UAE Ambient Air Quality Standards.

The ambient air quality monitoring network consists of measurement device of devices for one or more pollutant data acquisition system (computer, software and data logger) data transfer connection and data base storage unit.
ENVIRONMENT MONITORING (Continued….)

Benefits from Installing Monitoring Equipment

• Compliance with the national regulations
• Environmental and health benefits for the companies
• Saving money and time
• Connecting to the national network will help local authorities establishing guidelines
ENVIRONMENT MONITORING (Continued….)

Road Map for Installation and Connection of the Equipment

- Main milestones:
- UAE’s Standard / Specifications? Future UAE standard?
- Phase 1: Basic study & data collection.
- Phase 2: Purchasing & Installation (upwind & downwind)
- Phase 3: Data acquisition system.
- Phase 4: Connection to the local authority via direct line.
- Phase 5: Connection to ministry of environment.
ENVIRONMENT MONITORING (Continued….)

**Beta-gauge**

- 24 h floating average (PM Trend)
- Cumulated average on a 24 h cycle
- TSP/PM10/PM2.5 Dust sampling head
- Graphic LCD screen
- USB & Ethernet for software update and data retrieval
- Equipped with a Temperature Regulated Sampling Tube
ENVIRONMENT MONITORING (Continued....)
A Nephelometer is a portable instrument for measuring the concentration of suspended particulates in a liquid or gas colloid.

A Nephelometer measures suspended particulates by employing a light beam (source beam) and a light detector set to one side (often 90°) of the source beam. Particle density is then a function of the light reflected into the detector from the particles.
AIR QUALITY MONITORING EQUIPMENT
The discussion of natural resources of Fujairah starts with the mountains and a brief geology of Fujairah Mountains is as follows:

- The rocks of Fujairah are classified into two units, Autochthonous Unit and Allochthonous Unit.

  - **Autochthonous Unit** (insitu deposits), Permo-Triassic to Cretaceous age, collectively called Hajar Group consists of Musandum, Elphinstone, Ruus al-Jabal and Ramaq groups. These groups consists a variety of sedimentary rocks mainly, Limestone, Dolomite, Shale, Siltstone, Sandstone and Chert.

  - **The Allochthonous Unit** (denoting a deposit or formation that originated at a distance from its present position), upper Cretaceous to pre Permian age consists of Semail Ophiolites Suite and Hawasina Series.

  - The Ophiolites is a section of the Earth's oceanic crust and the underlying upper mantle that has been uplifted and exposed above sea level and often emplaced onto continental crustal rocks. Semail Ophiolites in Oman and the United Arab Emirates, are widely considered one of the best exposed Ophiolites sequences in the world.
Geology (Continued..)

- Semail Ophiolites Suite consists of a variety of igneous rocks such as Gabbros, Diabase, Harzburgite, Dunite, Serpentinite and Lava Pillow structures etc.
- Hawasina Series consist of Metamorphics, Chert / Limestone Facies and volcanics.
- Under certain mineralization conditions Gabbro often contains valuable amounts of chromium, copper, and nickel, cobalt, gold, silver and platinum.
- Based on comprehensive geological mapping carried out by the UAE Ministry of Energy the presence of Platinum Group Elements in the chromites and ultramafic rocks in Fujairah has been established. However the viability of commercial extraction needs further detailed studies and consideration of cost benefit ratio. The future rise of the precious metal prices will make the extraction of such metals commercially viable.
LIMESTONE

28 – 01 - 2014
LIMESTONE

P17 : - 413734E, 2793521N
GABBRO
The rocks and mineral of commercial importance can be divided into the following two groups.

1. Base metals
2. Industrial Minerals

**Base Metals**
- Copper
- Chromite
Industrial Minerals

- Gabbro is used for aggregate, marine armour and dimension stones
- Limestone has many industrial uses such as cement, construction and building, paint, paper, plastic, rubber, adhesives and sealants, agriculture, ceramic, food and pharmaceutical, animal food, and glass etc.
- Shale, used as feedstock for cement manufacturing and in ceramics.
- Diabase / dolerite / micro-gabbro is a mafic, (45-52% SiO2) equivalent to volcanic basalt or plutonic gabbro. It is being used as feedstock for the manufacture of rock wool.
- Wollastonite is a calcium inosilicate mineral (CaSiO3) occurs as a common constituent of a thermally metamorphosed impure limestone, It is used in many industries, mostly by tile factories which have incorporated it into the manufacturing of ceramic. Also used in rubber and plastic industry.
Economic Geology (Continued..)

- Magnesite, MgCO$_3$ (Magnesium Carbonate). Magnesite occurs in veins as alteration product of Ultramafic rocks, serpentinite and other magnesium rich rock types. Large quantities of magnesite are burnt to make magnesium oxide an important refractory material used as a lining in blast furnaces, kilns etc. Magnesite can also be used as a binder in flooring material. Furthermore it is being used as a catalyst and filler in the production of synthetic rubber and in the preparation of magnesium chemicals and fertilizers.

- Dunite is an igneous, plutonic rock, of ultramafic composition, with more than 90% olivine, (Mg, Fe)$_2$SiO$_4$. The aluminium foundry industry uses Dunite sand to cast objects in aluminium
Mica and Feldspar. Varieties of mica are present in ultra mafic rocks such as peridotite. Also as biotite and muscovite in many igneous rocks and in metamorphic schists. Ground mica has many uses depending on quality, it is used in rubber industry, paint industry and in cosmetics. Feldspars crystallize from magma as veins in both intrusive and extrusive igneous rocks. Feldspar is a common raw material used in glassmaking, ceramics and to some extent as a filler and extender in paint, plastics and rubber industry.
Rock mining is being carried out throughout the mountain area of Fujairah and crushers are producing various grades of aggregate, and rock armours to meet the demands of fast growing cities within the country and the Gulf Co-operation Countries. The materials are used in the construction of high rise buildings as well as in the continued expansion of the excellent road works and infrastructure.

Presently there are 77 crushers and quarries spread over 75.2 Km², 5% of the total area of the Fujairah emirate, producing aggregates for construction industry and raw material for cement and ceramic factories.

Site investigation including core drilling for Chrome mining has been completed and commercial viability has been proved and mining operations will start soon.
The high purity grade limestone deposits have a large potential for the industrial uses and for the production of high value calcium carbonate products. The local and international demand for high purity limestone as raw material as well high value calcium products like Calcined lime, quick lime and allied products for industrial uses, makes it more feasible to produce it locally to meet the local market demands and also to avail regional export opportunities. In 2008 the UAE imported 170,301 tonnes calcium carbonate products valued at US$ 17.3 million. Regional export opportunities for calcium carbonate produced in UAE include India, Oman, Pakistan, Saudi Arabia and Sri Lanka. All of these countries import calcium carbonate products. For example in 2009 India imported approximately 153,000 tonnes of calcium carbonate worth US$ 21 million. Congenial working atmosphere, ease of doing business relatively cheap labour, “One Window” paper work processing, the excellent infrastructure, world class network of high ways, its unique geographical location, Fujairah is marked by its easy access to major shipping ports all over the world, which has made the Emirate an attractive port for investors and entrepreneurs across the entire world. With the forthcoming Etihad Rail net work in 2017 that will connect Fujairah industrial and mining areas with all the ports and major cities within the UAE and with the GCC countries at a later stage will make transportation of goods and rock material more convenient.
CRUSHER PLANT
AGGREGATE STOCK
# LIMESTONE (HABHAB AREA)

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# LIMESTONE (TAWIAN AREA)

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# Red Shale (Tawian Area)

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# GABBRO (SJI AREA)

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# Gabbro (Al Hayl Area)

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Dams and Groundwater

- Last but not the least, discussion of natural resources will be incomplete without mentioning water. In the absence of any perennial surface water resources in the UAE the runoff from mountains and wadi flows during the rainy season is a precious source and to prevent its flow into sea a number of dams have been built in UAE. There are 42 dams in Fujairah emirate. These dams store the rain water which is recharged into ground water aquifers. The dams not only effectively recharge the groundwater which is being over pumped, but also prevent loses to human life and property.
SAFAD DAM (2013 RAIN)
SAFAD DAM (WATER RELEASED FOR GROUND WATER RECHARGE)
Thanks