



MINISTRY OF ENERGY AND MINERAL RESOURCES
Mineral Status and Future Opportunity

CHALK

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Chalk

1. Introduction

Chalk is a fine grained white limestone or micrite. On average, it consists of 97.5 – 98.5% calcium carbonate. Clay and quartz are the most common impurities. Most chalk is soft friable rock that does not required explosives in mining.

Chalk, typically consists of smooth, rounded weakly bonded coccolith structures which themselves consist of minute individual calcite crystals in the order of 1 micron in size.

2. Uses

Chalk as a form of carbonate rocks containing high calcium carbonate can be used in many industrial applications such as:

- Chalk can be used as a building stone, and chalk rubble is often used in road construction.
- When heated, chalk becomes lime, which has a great many applications, Lime is used in the production of steel, Aluminum, Glass, Paper, Sugar, Cement, and Fertilizer.

3. Locations

Chalk deposits exposed over an area extend from east of Zarqa to the area of Al Azraq Fig. (1).

3.1. Al – Umary (Abar Al Hazim) / Dahikiya Area. Fig. (2)

This area is located about 45km south east of Al- Azraq. It can be defined by the following coordinates (Palestine Belt):

E: - 349000 – 355000
N: - 1107000 – 1115000

3.2. Wadi Al-Ghadaf Area. Fig. (3)

This area is located about 35km south of Al-Azraq. It can be defined by the following coordinates (Palestine Belt):

E: - 333000 – 337000
N: - 1117000 – 1120000

3.3. Qaser Al-Harrana Area. Fig. (4)

This area is located about 50km east of Amman. It can be defined by the following coordinates (Palestine Belt):

E: - 287000 – 292500
N: - 1119000 – 1127000

3.4. Wadi Al- Dha'abi Area. Fig (5)

This area is located about 60km east of Amman. It can be defined by the following coordinates (Palestine Belt):

E: - 292750 – 298000
N: - 1116000 – 1123000



Figure (1): Location map of Chalk deposits in Jordan.

4. Geological Setting

Chalk occurs in rocks of different ages. In general, Chalk can be found throughout Jordan in the Muwaqger Chalk Marl and Wadi Shallala Formations. **Wadi Shallala Formation (W.S.C)** (Middle Eocene) is considered the most important resource of chalk due to the high thickness of chalk and the wide coverage over the areas. The thickness of this formation is about 88m. It consists of two members, the lower member is the **Thulaythuwat Chalk (TT)**, with a thickness about 63m and it composed of white, buff to yellow chalk with, lenses of chert. Bituminous with a chalk with Barite nodules is locally present. The upper member is **Dahikiya Sandstone (DHS)**, its thicknesses is about 25m; and consist of quartz arenite and coquinal sandstone with sandstone at the top of the member.

5. Mineral Properties

5.1. Chemical and Physical Properties

Table (1): Chemical and physical properties of the studied areas.

Area	CaO %	Brightness
Al – Umary – Dahikiya	38.9 – 49.6	74.8 – 81.7%
Wadi Al-Ghadaf	43.6 – 52.6	79.5 – 81.4%
Qaser Al-Harrana	47.9 – 52.6	76.6 – 83.5%
Wadi Al- Dha'abi	51.59 – 53.15	76.6 – 85%

5.2. Mineralogical Properties

Calcite is the main mineral; other trace minerals are kaolinite, dolomite, quartz and halite.

6. Reserves

Table (2): Reserves of chalk deposits.

Area	Reserve (Mt)
Al-Umary – Dahikiya	1325
Wadi Al-Ghadaf	161
Qaser Al-Harrana	976
Wadi Al- Dha'abi	3364

7. Background

Geological mapping survey of northern east areas of Jordan carried out by NRA indicated the presence of chalk and chalky limestone in Azraq basin (Fadda, 96 and 98), (Rabba', 98) and (Hunjul, 2001).

Abu Qudera (1998) studied the occurrences of chalk in the Azraq basin areas.

Within the exploration activities carried out by Exploration Studies Division in 2002, many boreholes were drilled and samples were tested. Reserves were estimated of the chalk in the Azraq basin areas (Madanat and Ghannam, 2002).

8. World Chalk

Example of chalk occurrences and uses in the world (UK)

Chalk cliffs are a familiar feature of the south and east coasts of England, and chalk down land runs between Devon and Yorkshire and across the countries of the south east. Chalk also extends underground beneath London, the North Sea and the channel. The chalk was.

The extraction of Chalk for use as agricultural lime has traditionally been carried out on a small scale throughout the chalk area of Hampshire. In more recent years chalk has also been extracted for specialist industrial uses and as aggregate, particularly in the south east of the county. Table (3) shows the amount of chalk used for industrial and agricultural purposes in 2004.

Table (3): Quantity of chalk used in industry and agriculture.

Uses	Quantity (Thousand tones)
Constructional uses	705
Cement making	5177
Industrial uses	2114
Agricultural uses	Not available

Source: Annual Minerals Raised Inquiry, ONS.

The UK is a modest net exporter of limestone, chalk and lime for industrial purposes, the latter contributing some £9 million to the balance of trade in 2002. Table (4) shows the net trade in Limestone, Chalk and lime, 1999 – 2004

Table (4): Trade in limestone, chalk and lime.

Year	Limestone (a)	Chalk (a)	Lime (a)
Tonnes			
1999	143 398	25 958	122 953
2000	228 445	19 700	121 913
2001	73 906	20 478	109 876
2002	71 824	21 039	75 041
2003	242 679	21 011	345 097
2004	224 946	34 793	97 412

(a) Aggregates and building stone
Source: HM Revenue and Customs

9. Investment Opportunities

The mineral is open for investment and mining / exploration companies are invited on the basis of detailed exploration, evaluation and exploitation.

Chalk deposits are soft to medium hard and exposed on the surface, almost without overburden, so it is easily removed by open – pit mining and without using explosives. The easily accessibility, close to the main roads, and far from the towns, agriculture areas are advantages for the exploitation of chalk.

Chalk can be used in many industrial applications such as in cement industry, in agriculture and for producing lime which used in many industries.

10. References

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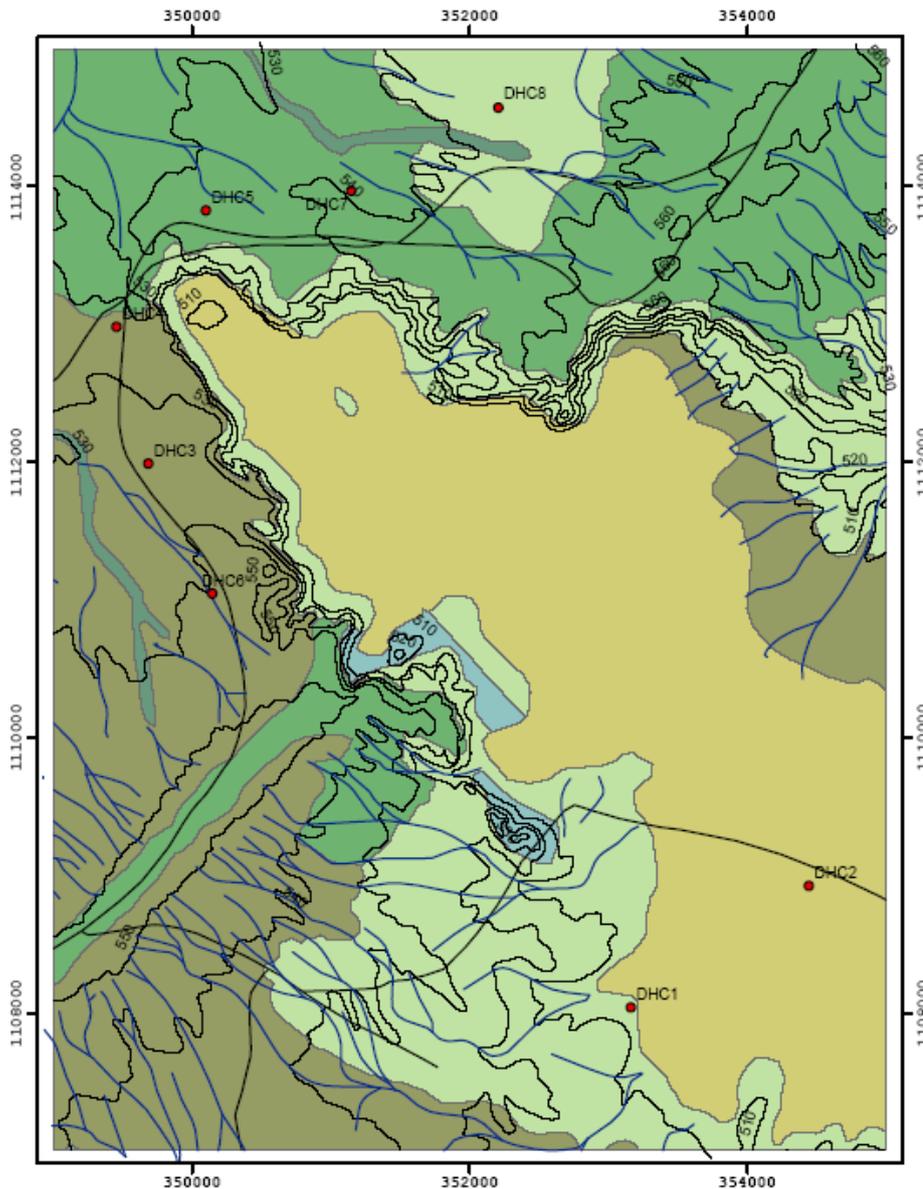
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Al Umari (Abar Al Hazim) Well Location




 Natural Resources Authority
 Administration of Geological Survey
 Information Directorate
 GIS Division
 Processing GIS by: Geol. Wasfi Al omari
 Fig 111
 Scale 1 : 40000

- Legend
- Wells
 - Alluvium and wadi sediments
 - Pleistocene Gravels
 - Alluvium Mudflat
 - Thulaythuwaat Chalk Member
 - Azraq Formation
 - Dahikiya Sandstone Member
 - Stream
 - Road
 - Contour

Wadi Al Ghadaf Study Area

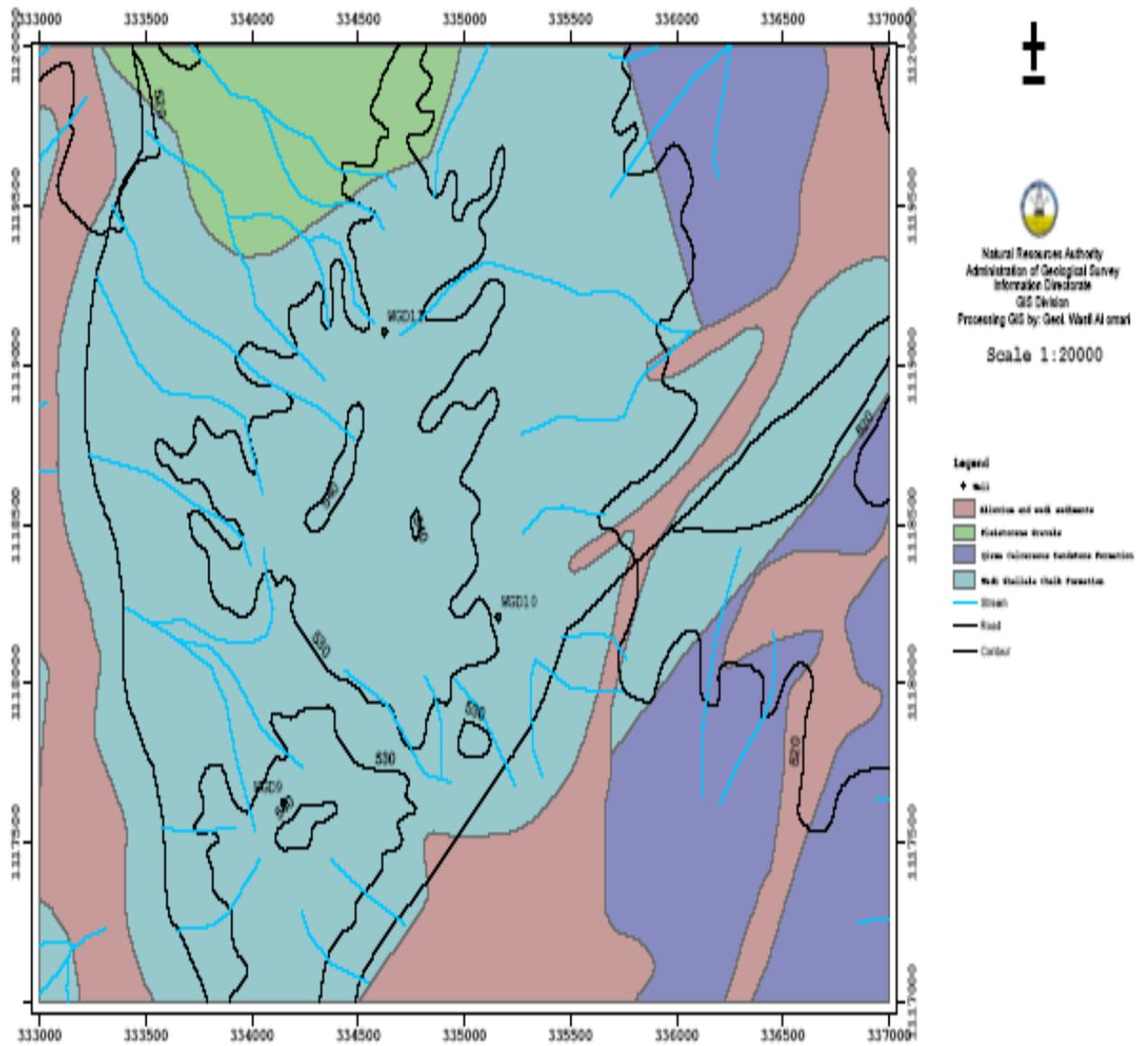


Fig101

Qasr Al Harrana Well Location

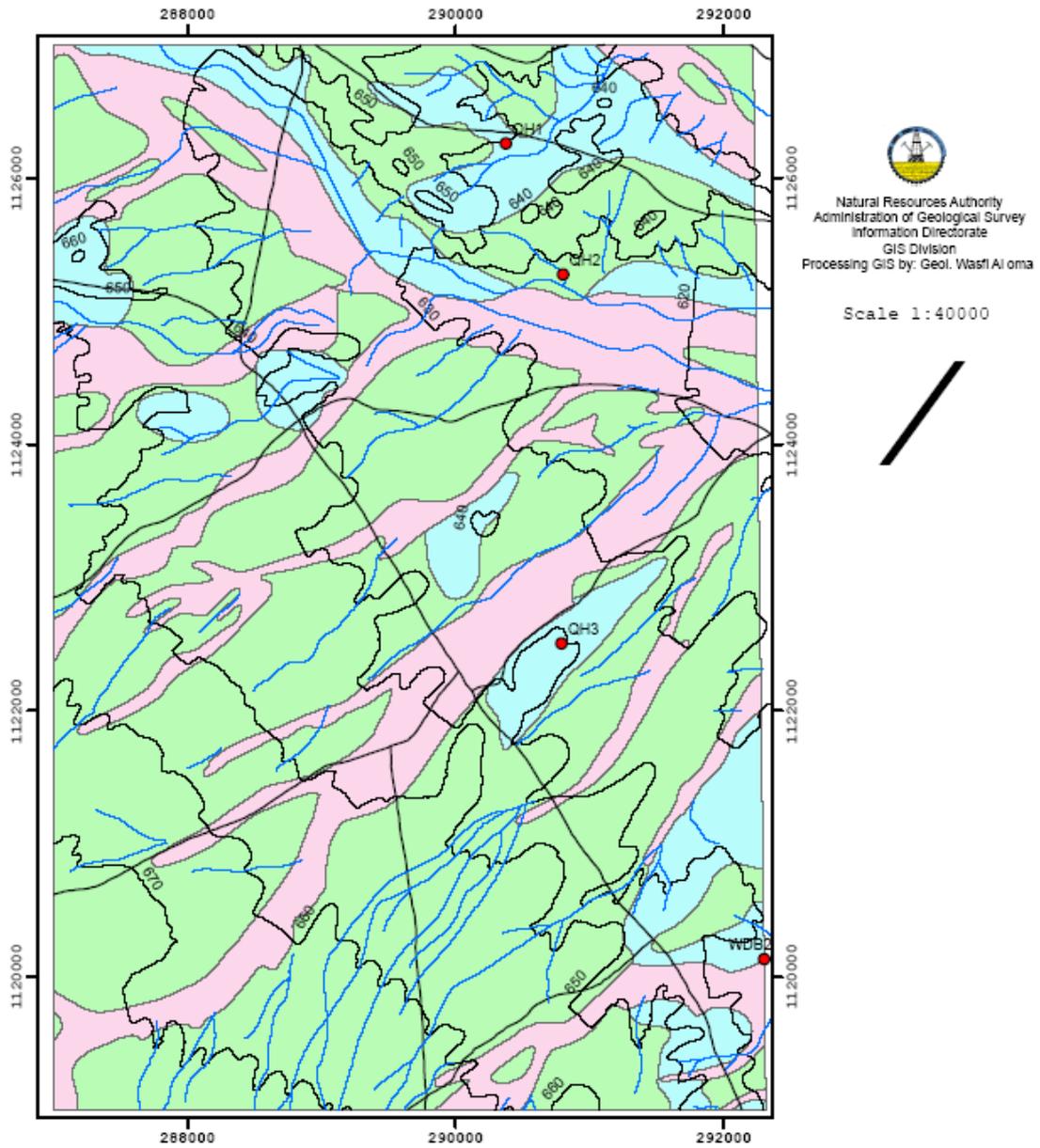
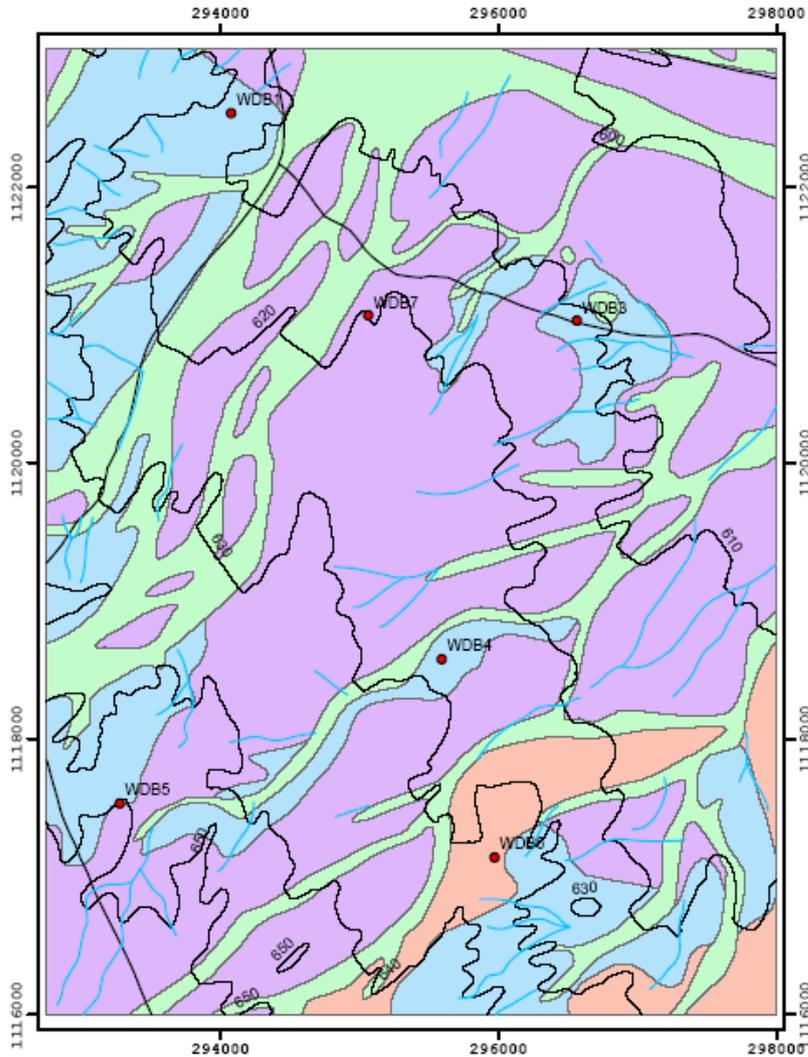


Fig) 3 (

Legend

- Well
- Alluvium and wadi sediments
- Pleistocene Sediments
- Wadi Shallala Chalk Formation
- Stream
- Road
- Contour

Wadi Ad Dabi Well Location




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Scale 1:40000

Fig) 4 (

Legend

- Wells
- Alluvium and wadi sediments
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- Pleistocene Gravels
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