STRATIGRAPHIC STUDIES ON THE EXPOSED EOCENE ROCKS AT BIR GINDALY-GEBEL EL HAI AREA EASTERN DESERT, EGYPT

By

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N O T E

The present thesis is submitted to the Faculty of Science, Ain Shams University in partial fullfillment for the requirements of the degree of Master of Science in Geology.

Besides the research work materialized in this thesis, the candidate has attended ten one-semester, post-graduate courses in the School year 1985/1986 in the following topics:

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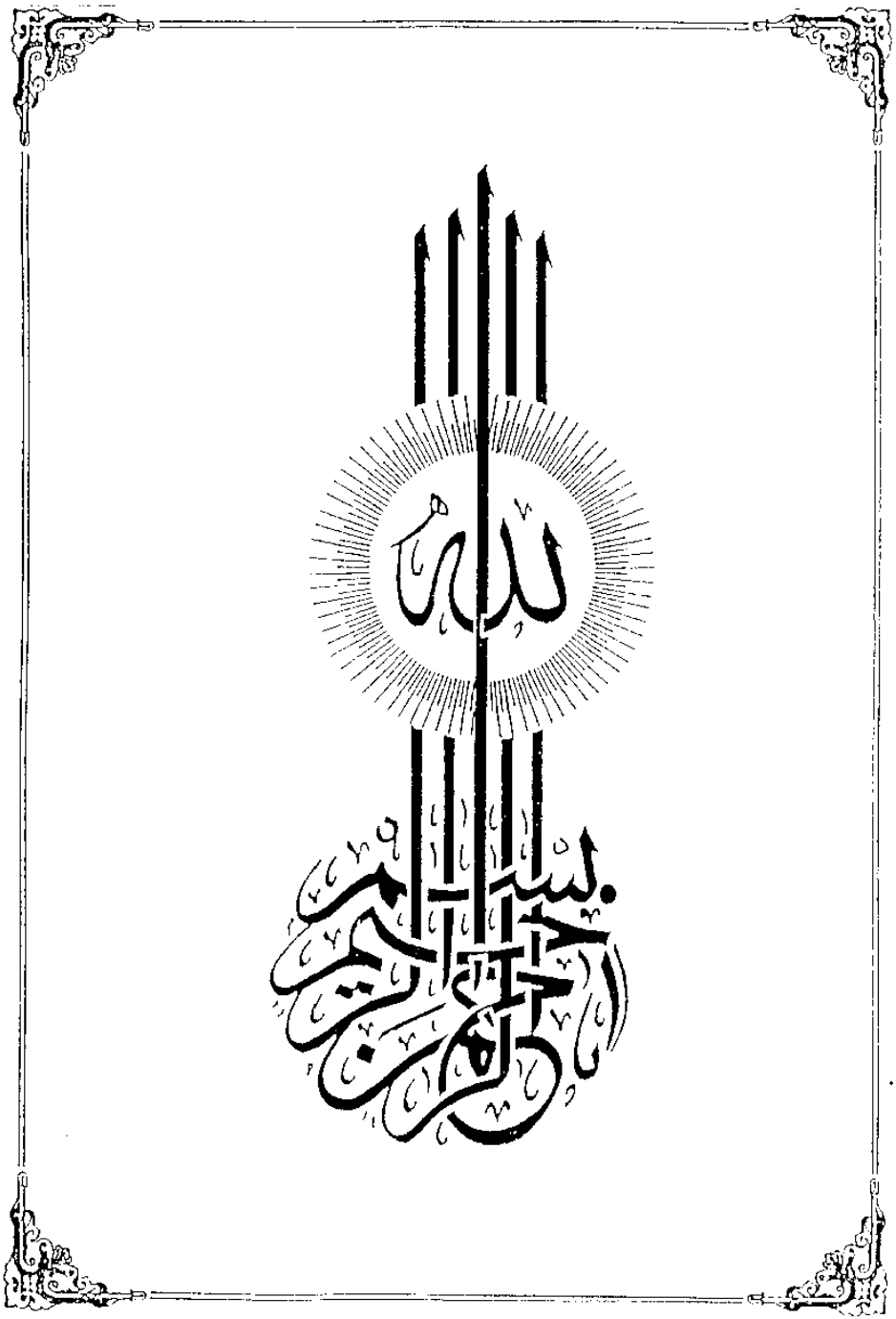

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A B S T R A C T

The observatory and El-Qurn Formations (Middle Eocene) have a wide geographic extension in Helwan-Maadi-Qattamiya area. Allover the area they attain considerable thickness (177.2 m), composed of different varities of limestones and outcrop in surrounds of one of the major complexes of cement industry in Egypt. The microfacies types of the Observatory Formation are mudstone, foraminiferal wackestone, forminiferal grainstone and cherty dolomitic foraminiferal wackestone while El Qurn Formation includes foraminiferal Wackstone, silty wackestone and foraminiferal grainstone.

The limestones of the Observatory Formation,after stripping of the thin dolomitic beds, can be exploited for manufacturing the white cement. Other raw materials for this type of cement are kaoline and white sand (as corrective material). Kaoline quarries are 200 km to the east, at Abu El-Darag, and the white sand is available from El-Maadi Quarries to the northwest of the study area.

Geochemically, the Observatory limestones are high grade as the carbonate content is 95% with very low content of silicon oxide, aluminium oxide and iron oxide. Among the colouring elements, only the iron oxide is recorded with average content of 0.2%. These limestones are soft and have a high whiteness degree (80-85%), low

dense, highly porous, low humidity (less than 1%) and low compressive strength.

The suggested proportions of the raw mix for producing white cement are 82.44% limestone, 8.4% kaoline and 9.16% white sand.

The carbonate rocks of El-Qurn Formation have the qualifications for the production of the ordinary portland cement, especially the soft marly limestone beds in its lower part. It will require adding argillaceous material and sand, as corrective, from the upper units of the Eocene sequence in the area, i.e. Wadi Hof and El-Anqabia Formations.

In these limestones, the average carbonte content is about 90%, the silicon oxide 5%, the aluminium moxide 1.41% and the iron oxide is 0.61%. Besides, they are soft, less dense, highly porous with low compressive strength.

The suggested proportions of the raw mix for producing ordinary portland cement are 77.52% limestone, 21.27% clay and 1.21% sand for the observatory formation and 82.5% limestone, 16.5% clay and 1% sand for El-Qurn Formation.

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CHAPTER I

INTRODUCTION

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A- Location and Accessibility

The study area represents a part of the (Cairo-Suez District) North central part which extends from longitude 31° 34' 35"E to longitude 31° 47' 05"E and from latitude 29° 41' 46"N to latitude 29° 55' 03"N (Fig. 1). This area is about 520 Km².

The area is bounded from the north by two paved roads, Cairo-Suez road and Maadi-El Qattamiya road, they are connected together by Bir Gindaly (paved) road and El Qattamiya-Observatory (paved) road, while the upward Helwan-El Sheikh-Ain Sukhna road passes through the studied area and is connected to the main roads by two unpaved roads. There are several roads branch from the main roads into different parts of the study area. El Qattamiya Cement Company and its limestone and clay quarries are located in the northern part of the studied area close to the Maadi-El Qattamiya road. (Fig. 2).

B- Aim of the Study

The Eocene carbonate rocks of the area of study are considered as one of great potentialities for cement manufacture in Egypt where the carbonate rocks, argillaceous rocks, kaoline, sands, white sands and the gypsum are present in or nearby the area of study. The Eocene carbonate rocks are investigated from the geologic and the geochemical points of view to be evaluated for cement manufacture at Gebel Abu Shama, Gebel Sid El Naam (Bir Gindaly area), Gebel El-Hai, Gebel Abu Melisat (Gebel El-Hai area). The raw materials of the study area can be exploited for the manufacture of ordinary portland cement and white cement by mixing with the argillaceous material from the Upper Eocene sequence (Wadi Hof Formation and Anqabiya Formation) and the corrective sand material in case of producing O.P.C. or by adding with the kaoline from Abu El-Darag (200 Km east of the area of study) and the white sand from El-Maadi quarries (northwest of the study area) in case of producing white cement.

C- Methods and Techniques

Different available methods were utilized for the geologic and geochemical evaluation of the carbonate rocks for cement manufacturing.