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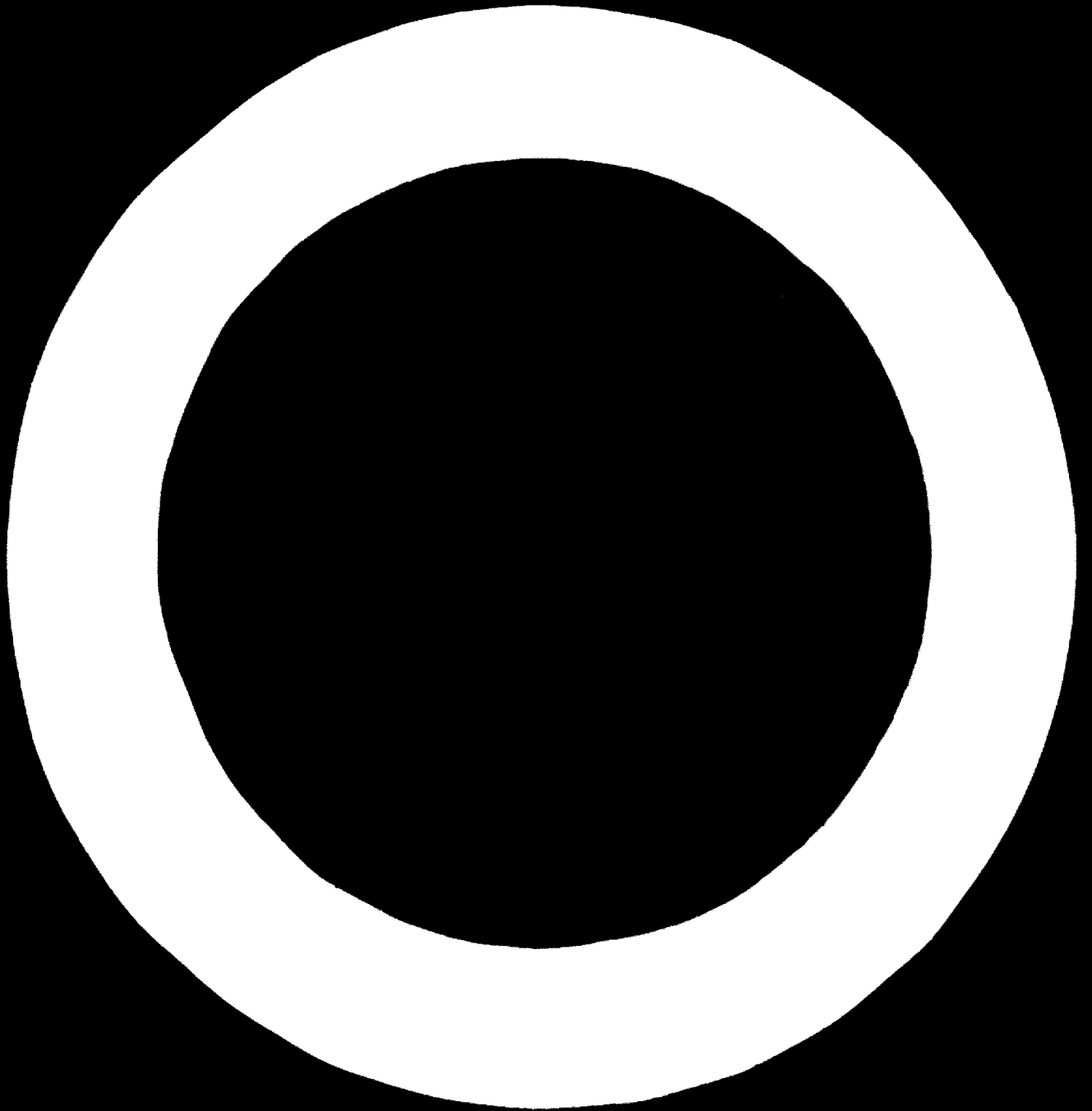
**NOTES ON INVESTIGATIONS OF CLAY RESOURCES
OF LIBYA ^{1/}**

by

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Introduction

Clay resources, in adequate supply are essential requisites for development of structural clay products industries in any country. Although in some cases deposits of such natural resources are so obvious that they can't be missed, more often discovery requires positive thinking, understanding of the mode of formation of various types of deposits, recognition of the possible potential of minor or chance discoveries, combined with a willingness to chance failure in exploration.

Number of investigations have been carried out in respect of mineral resources in Libya. This paper is designed to summarize data presently known on the clay resources of Libya.

The data is presented for two regions viz, Western Region known as Tripolitania and Eastern Region known as Cyrenaica. For Southern Region, Fezzan, data was not available.

Clay Deposits of Tripolitania

Tripoli:

Clay is known to exist near the surface in much of the coastal area extending as far south as Azizia. Although some of this clay has been used in the past for the manufacture of brick and tile, there has been no reported effort to systematically locate and test potential clay deposits.

Garian - Abu Ghaylah:

Several clay deposits are known in the Garian - Abu Ghaylah area. The upper deposit, found in beds of upper Cretaceous age, has been mined quite extensively near the village located just above the Abu Ghaylah scarp. This clay appears to be of good quality and seems to be at least 6 m. thick. The main known exposure has been extensively mined and there appears to be little remaining, but good geological work should easily define new reserves.

A clay deposit of apparently good quality has been mined from a deposit at the Southwest edge of the village of Abu Ghaylah. The staff of the Geology Section of the Ministry of Industry have taken samples from this deposit, and three other locations along the extensions of this deposit. It is hoped that these samples will be tested and that one or more will prove to be of good quality.

Jefren:

Investigations have shown that Abu Ghaylah clay deposits extend over a large area as far as Jefren and village of Rumia. There are clay formations extending over a wide area here, along Jefren-Azizia road and on the way from Jefren to Rumia village.

The National Industries of Minerals Co. (NIMCO) of Tripoli, have carried out detailed investigations on clay deposits of this area and have obtained concession for mining clay for manufacture of building bricks. NIMCO is constructing a large mechanized factory for manufacture of building bricks and other structural clay products, with an annual capacity of 50,000 tons. The factory is expected to go in production by middle of 1971.

Homs and Azizia:

A short statement has been found concerning clay in the Homas area. It is as follows:

A clay bed of good quality occurs at kilometer 116 of the Tripoli road - that is at 4 kilometers west of Homas on the north side of the road. Its thickness is about 3 meters.

Table 1
Homs Clay Analysis

Silica (SiO ₂)	54.2%
Alumina (Al ₂ O ₃)	21.5%
Ferrous Iron (Fe ₂ O ₃)	7.8%
Calcium oxide (CaO)	1.5%
Magnesium oxide (MgO)	2.1%
Different elements (Na, Cl, TiO ₂)	2.5%
Ignition loss - mainly water	+10 %

A second locality for the occurrence of clay is found below the hill at kilometer 111 immediately west of the above mentioned one. Its thickness cannot be measured easily because it dips below the surface. However at a distance of little less than 3 kilometers, such a layer crops out with a thickness of 10 meters. An average analysis shows the same figures as already given for the previously mentioned layer.

Clay deposits in Homs area are now being utilized to some extent in Portland cement manufacture and making of building bricks.

Clay Deposits of Cyrenaica

Benghazi:

Superficial red clay deposits of a large extent are available in sufficient quantity, especially along the main roads south and southeast of Benghazi. These occurrences of red clay represent decarbonatized residual soil usually deposited into shallow flat depressions "in situ" all over the parent carbonate rocks. At the same time this is fertile cultivated soil wide-spread south of Benghazi decreasing in thickness going towards the sea.

A typical deposit of red clay examined by the experts of Holderbank Technical Centre (Swiss) is situated 11 km. southeast from Benghazi on the surface of about several square kilometers (Wadi Quatrah). Average thickness of red clay estimated by means of several bore holes, alongside the main road Benghazi-Scluq, reach approximately 5 m. It consists of red porous earthy clay more or less homogeneous, interbedded by more loamy clay in lower position.

In order to evaluate the relative advantages of the area covered by red clay south of Benghazi city the following tabulated review is given.

CRITERIA	WADI QUNTARAH Just opposite of the BCP* area	QUARCIA East of the main Road Benghazi - Ghemines
Average thickness of quarryable red clay	5m	1 - 2 m.
Groundwater level in m. below surface	about 30 m.	Unknown
Road accessibility and proximity to the market	Excellent (11 km)	Excellent (3 km)
Suitability of raw ma- terial for manufacture of construction brick	Probably Good. Chemical, Physical and Semi-industrial tests are required	Probably Good
Inferred reserves	At least 2.800.000 tons of red clay are expected.	Insufficient quantity
Max. extent of the land for quarry and plant site	App. 35 ha.	A few square Kilometers

Geological evaluation of the red clay deposits south of Wadi Quntarah (Benghazi Cement Plant), its estimated thickness and chemical and mineralogical composition, investigated earlier, indicate this locality as the most suitable for further semi-industrial exploration and evaluation of raw materials for brick making.

The area which lies west of the main road (app. 35 ha.) just opposite of the Benghazi Cement Plant property would be enough to meet the demands for industrial production of bricks and roofing tiles for more than 60 years, for a brick factory with capacity of 30,000 tons per year.

A proposal is under consideration for establishing a brick factory with a capacity of 30,000 tons per year, in Benghazi area utilizing clay from these deposits.

*BCP = Benghazi Cement Plant

Barce and Derna:

Owing to the fact that superficial red clay deposits near Benghazi represent suitable sources of Alumina and Silica as additional raw material for cement manufacturing (Benghazi Cement Plant) attention was focused on searching for similar red clay deposits close to Barce and Derna.

The main intention of the investigation was to establish and to limit the convenient area covered by red clay not far away from the available limestone deposits as well as to carry out the corresponding prospection and sampling of red clay.

Many occurrences of red clay exist at Barce and Derna territory varying in thickness and extent. They are usually deposited in karst depressions and through (Barce through for instance) over the parent carbonate rocks and, at the same time represent decarbonatized residual soil.

Two localities covered by red clay were selected and limited as the most suitable ones for further detailed geological prospection and evaluation:

- a. Barce area (app. 6 Km. east from the old Barce town near of the existing limestone quarry, and
- b. Derna area (between the pumping station and air-strip a few kilometers south-east from Derna).

Both Barce and Derna localities were prospected and sampled. More than 15 samples of red clay were collected by means of shallow pits from the surface. All samples were laboratory tested.

Preceding examinations of red clay carried out by the experts of Geological and Mining Section of the Ministry of Industry and same chemical analyses of the samples collected from the surface (Barce area) didn't confirm a suitable chemical composition of red clay (very high or in some cases too low Alumina ratio).

The above mentioned investigations, however, are not sufficient for establishing a quite negative conclusion about the possibility of discovering some more suitable red clay at Barce area.

On the basis of chemical assays Guarcia - Wadi Qunttarah clay is suitable for blending with limestone and represents, together with the underlying limestone, mineral raw material basis for the Benghazi Cement Plant.

Some Data on the Structural Clay Products in Libya

Our knowledge on the industrial brick production and consumption is rather limited to the available statistical information. According to the report prepared by V. Vardjan (1968) there are two brickworks in Libya at present both situated in Tripoli.

The actual production state appears to be about 7 mil. of standard bricks and a small quantity of tiles per year. The 1966 output is estimated at about 25,000 tons of construction bricks, floor (ceiling) elements and roofing tiles.


Import of bricks and tiles, 1964-1967:

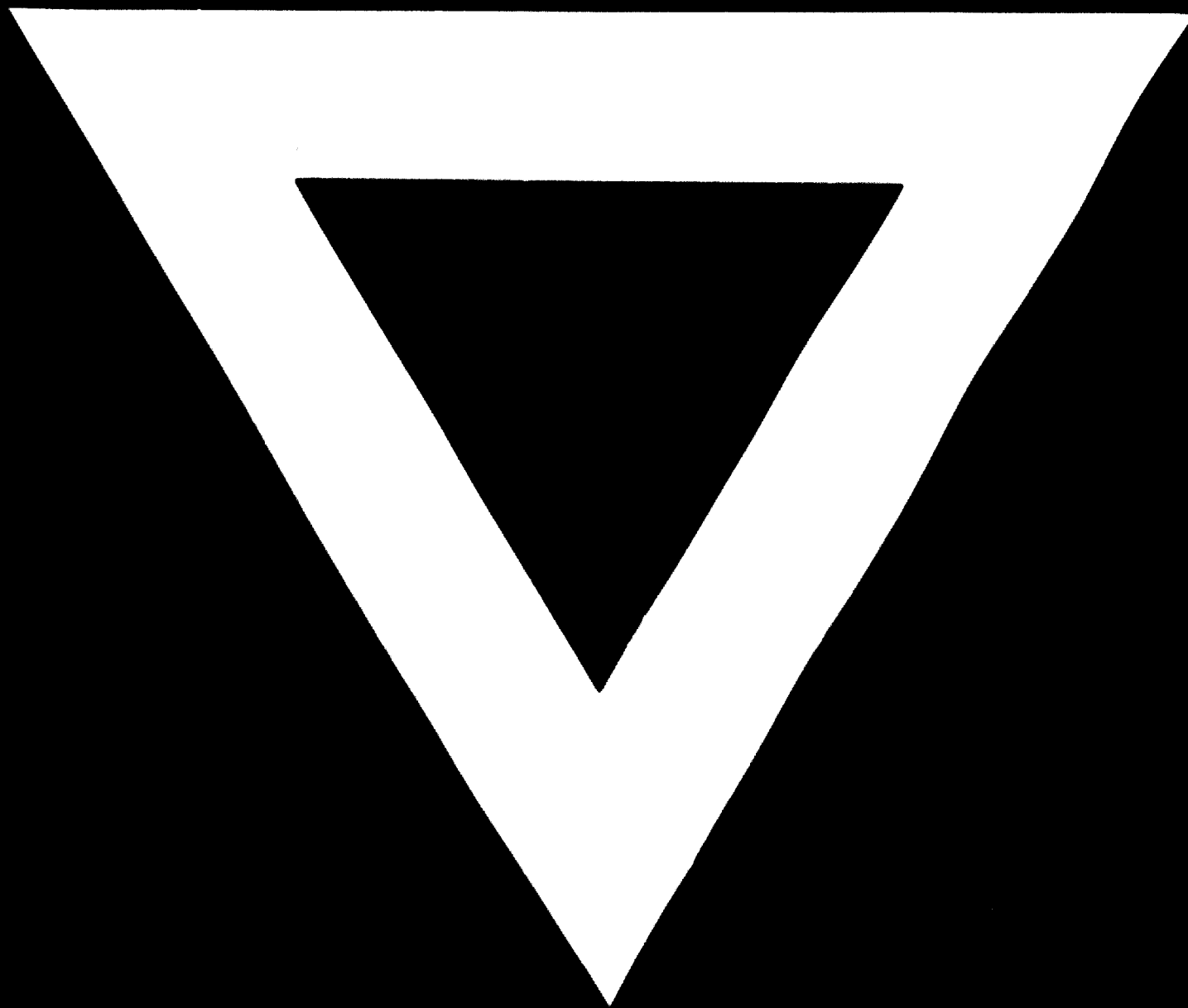
	Bricks (Tons)	Tiles (Tons)
1964	32,647	7,453
1965	51,492	2,082
1966	75,545	3,532
1967	85,042	1,687
1968	92,434	2,007
1969 (First nine months)	79,311	2,814

In regard to the same statistical information consumption of structural clay products in Libya is still low in comparison with European countries. As has been shown above domestic production of bricks is also low in comparison with imported bricks and roofing tiles. At present, more than 70% of demands are met by imported structural clay products.

With the new mechanized brick factory under construction near Tripoli and contemplated brick factory in Benghazi area, it is hoped that about 80% of the demand of structural clay products in Libya would be supplied by indigenous production within next five-year period.

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