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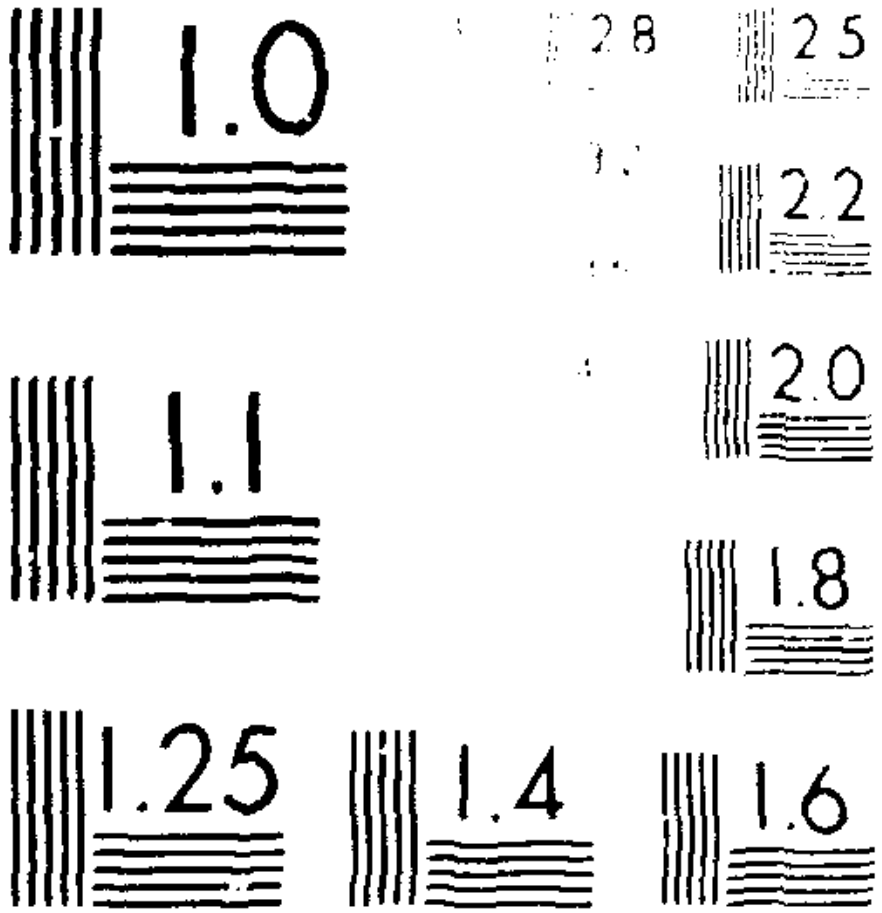
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Workshop on Research, Utilization and Processing of Non-Metallic Minerals with Special Focus on Building Materials for the Construction Industry*

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NON-METALLIC MINERALS AND PROCESSING IN ETHIOPIA**

* Organized by the United Nations Industrial Development Organization (UNIDO) in co-operation with the Government of the Socialist Republic of Yugoslavia.

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Background

Ethiopia is situated in the horn of Africa covering an area of 1,221,900 sq. km. with a population of 29,705,600. The capital city is Addis Ababa. The country has become a Socialist State since 1975.

"Taking into consideration the geological composition of Ethiopia territory, there are three main group of rocks, from a genetic point of view, which are important for mineral deposits. The first group includes the basement rock complex and their secondary deposits, which are composed mostly of metamorphic rocks intruded by various igneous rocks. This complex is very interesting as far as precious metals, base metals, iron, industrial minerals, and building material deposits are concerned. The second group is represented by sedimentary rocks of the paleozoic, Mesozoic and Caenozoic Ages, which are of importance for petroleum, gas, coal, salts, gypsum, and certain metals. The third group includes volcanics and inter volcanic sedimentary rocks which may yield materials for building, coal, bituminous rocks, sulfur and clays, as well as being sources of thermal and thermomineral water."

*source:- Mineral occurences of Ethiopia
Ministry of Mines 1966

Technically speaking, the exploitation of the non metallic minerals and their use is many and varied. It plays a major role in the manufacture of house products, and paints etc. Perhaps the major share of industrial products based on non metallic minerals goes to building construction.

The Industrial exploitation of non metallic minerals as such is not extensive in Ethiopia. Almost all of the rural population and some of the urban group live in wooden tukuls plastered with mud or "Chicka". The lifetime of these "Chicka" houses is between 15-20 years. Due to indiscrimante deforstation in the past the availability of wood is becoming scarce both for building houses and for fire wood. This problem is being seriously considered by the government. It is waging a campaign with encouraging results by teaching the people to plant trees on allocated areas.

The Ministry of Industry of Socialist Ethiopia being aware of the above potential problems has established the Ethiopian Building Materials Corporation, to formulate development startegies and to chart the path for appropriate technology in the field of building material industries. In effect its role is to deal with the explcitation, industrialization and processing of non metallic minerals for producing building materials and household products. Its task for the 1st 3 years of its establishment in 1976 was:

(a) to incorporate all the various building materialsprocessing plants
(b) coordinate the function of various plants under the Corporation
(c) ensure optimum production of building materials
(d) assess the needs of building materials for the country and
(e) conduct feasibility studies concerning the development of production technology in promising areas this sector. As a result a new cement plant with a capacity of 300,000 tons/year is under construction another of 600,000 tons/year is under design. The feasibility study of bricks and roof tile plant for the production of 15,000,000 bricks and 3,000,000 roof tiles is under preparation. The preliminary studies of establishing a tuff cutting and stone processing operations, ceramic factories, lime processing and window glass manufacturing plants are under preparation.

1. Existin Plants

(a) The oldest cement producing plant in Ethiopia was established in 1963 in Dire Dawa with an annual production of 19,000 tons per year. Wood charcoal was the fuel used then. By adopting the burning system for fuel oil the capacity of the plant was later raised to 40,000 tons of cement per year. It is now possible to produce either lime or clinker with the same Lepil kiln. The charcoal mill was converted to lime mill.

This plant scarcely met the growing need of cement in the country. The need of establishing an additional cement plant become overdue.

(b) To satisfy the growing need of Cement the Addis Ababa Cement Plant was established in 1964 with the assistance of a Yugoslav firm called Ingra. The capacity of the plant was 70,000 tons of portland cement per year but its capacity was later raised by 20% with the addition of pumic from a nearby deposit. The plant site which is situated within the city territory of Addis Ababa was a wrong choice, since the raw material is 80 km from the plant site. It is evident that this is a costly operation as the loss on process is transported to the plant site.

(c) Later the Massawa Cement Plant came into operation in 1965 It uses marly limestone for cement production. Its capacity is 70,000 tons per year.

(d) The asbestos plant which is situated near Addis Ababa Cement Plant fabricates asbestos sheets and pipes. The raw material, asbestos fiber is imported. Occurances of asbestos mineral are being identified locally.

2. Project Under Implementation

A cement plant of 300,000 tons per year is being established at Mugher 100 km. from Addis Abab. The infrastracture is under construction A dam is being built accross a nearby river and the water excess from the factory needs water supply is expected to the used for irrigation.

3. Project Under Design

The establishment of another cement plant Of 600,000 tons/years would start in 1983 in the vicinity of Dire Dawa city 330 km. from Addis Ababa adjucent to a rail way line. The engineering design is expected to be completed in April 1982.

4. Project Under Preparation

(a) Tuff Cutting And Stone Technology

Natural stone in its raw form or crudely diamensioned by chisel is one of the building components in Ethiopia. The building material is "Chicka" (mud + straw). One can see that most old churches are made from locally produced natural stone chiseled to the required dimension. The stone should be soft for chisel work. Tuf (Tufa), a volcanic material is suitable for this work. This material is found in various places in Ethiopia. Unfortunately this is not industrially exploited. Ethiopian Building Materials Corporation with UNIDO assistance is studying the feasibility of setting up a Tuf Cutting pilot project to explore the possibility of introducing modern stone technology in Ethiopia. As Ethiopia had once been a volcanic area , raw material (tuf) would not be a problem. The introduction of this technology has advantage over other building components mainly for the following reasons:-

1. The tuf cutting machine can be transported to any working area
2. It is economical as it does not consume as much fuel as brick plants.
3. The machine can run either with electricity or fuel
4. Once the system is set up it requires semi-skilled people to run it.

In general it is technically and technologically viable for processing building components in the country.

(b) The feasibility study of establishing a brick plant, whose capacity is 20,000,000 bricks and 5,000,000 roof tiles is under preparation The plant would be established near Addis Ababa.

5. Projects Under Preliminary Studies

(a) Ceramic Products

Wall and floor tiles, and masonary bricks are industrially produced in Asmara and Addis Ababa respectively.
Pots and potteries are locally produced through-out the country. The Ministry of Industry is trying to upgrade the skill of local craftmen by encouring cottage industries. Currently it is looking for expert assistance to investigate the various raw materials and to give advise on the improvement of the quality of these products by adopting suitable technology. The production of sanitary ware is a field not yeat explored.

(b) Lime

Limestone and dolomitic limestone are identified in may places. Lime production would perhaps be one of the oldest and forgotten production technologies in Ethiopia. Churches as old as 400 years were built with lime. Paradoxically, we can not witness any significant penetration into the rural areas. Lime is industrially produced near three major cities namely Addis Ababa, Dire Dawa and Asmera. The introduction of the much talked mini-lime plants to the country side and the production of lime pozolana would soon be the major task of the Building Materials Corporation. This Corporation is making an increasing effort to share the experience of other countries in this field.
If properly studied and implemented lime or lime pozzolana could serve as substitute for portland cement in rural housing.

(c) The Glass Industry

Glass bottles are locally produced. However, window glass is imported. Preliminary study is going on to acertain the viability of establishing a plant to produce the later.

6. Research And Development

The preliminary investigation would continue for some time. Recently the need for producing cheap building materials is being recognized. It is the policy of the Corporation to materialize this idea through research and development center, the establishment and formulation of which is currently being discussed with UNIDO.

The objective of this center would be:

- Raw material incestigation and testing
- development of technological processes appropriate to local natural resources, needs and priorites
- collection and dissimination of technological information in the field of building material development
- provision of consultancy services in all aspects of the industry including energy use and conservation
- training of personnel at all levels
- conducting studies in support of low cost housing schemes.

With the establishment of such an institute it would be easy to facilitate the development and the transfer of suitable building material technology to Ethiopia. Although occurances of raw materials such as brick clay, asbestos, dolomite, gypsum etc. for the production of building materials are identified in many places in Ethiopia a systematic assessment of the extent of these deposits, quality of materials must further be explored. The information must be compiled and catagorized for future reference. In this regard the Ethiopian Building Materials Industry must try for a long time to come to search and identify already known technologies then select and adopt suitable ones.

7. Existing And Potential Problems

Real and potential problems facing the industrial production of non metallic industries.

a) The occurrences of these resources in the country is not fully identified.

b) There is no detailed study of the quality and quantity of those identified resources

c) Some reserves are inaccessible

d) Initially the introduction of even the cheapest production technology may not give an immediate result in rural areas because:-

1. The purchasing power of the rural population is weak
2. Training of rural population is a prerequisite
3. Fuel for processing is becoming expensive and wood is depleting.
4. The infrastructure is not well developed in the country side

e) The transfer, adopting, and operating of even a suitable technology is becoming difficult for developing countries like Ethiopia specially because:-

1. The investment cost of a suitable production technology is increasing.
2. Fuel cost is high to run the plant
3. The price of spare parts is increasing. Here it should be interesting to note the outrageous act of technology supplies of penalzing under developed countries by demanding the price of spares, three or four times the original price. The fact is that either you have to run the factory an exorbitant cost or close down also together.