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STRENGTHENING OF THE ENGINEERING DESIGN AND DEVELOPMENT OF CEMENT PLANTS,

INDIA .

(IS/IND/74/087)

Report prepared for the Government of India

by

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experts of the
United Nations Industrial Development Organization
acting as Executing Agency for the
United Nations Development Programme

id.75-790

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I: SUMMARY

The Indian Cement Industry is mainly based on wet process plants but both the need for cement and the increasing fuel prices make a change to big production units based on the dry process mandatory.

The Cement Research Institute of India has initiated development of appropriate technology for establishment and operation of big rotary kiln plants and rural shaft kiln plants.

The know-how available in India is important but international cooperation is sought especially for training of experts and exchange of experience and know-how to benefit of introduction of appropriate technology in cement production.

The Indian authorities have defined a preliminary programme and are now taking steps to realize cooperation with UNIDO for the development of the cement industry.

II. INTRODUCTION

The development of the Indian Cement Industry has in the past mainly been based on know-how and technology imported from abroad. The cooperation between Indian and foreign consultants, especially during the last few years, has, however, almost reversed the situation.

The Indian Cement Industry as well as the Indian Cement Machinery Suppliers are well equipped technically to expand the cement industry in ratio with the demand. The cement consultants are however faced with certain constraints which at the moment limit the expansion of the cement industry in big units to geographical areas with favorable infrastructure and transport facilities or force consultants to adapt the size of factories to the transport capacity of road and/or railways. The above does not always permit the establishment of the most economic plant size and the situation is about to aggravate with the development of the cement demand and the increasing fuel prices. The magnetude of the problem may be illustrated with the following figures. The present capacity of the cement industry is 20 million tons. During the fifth five year plan additional 17 million tons are expected to be established bringing the total capacity to 37 million tons. The sixth five year planning period will probably require new production capacity for about 20 million ton cement predominantly in big units in order to keep the cement price as low as possible. This will only be possible if either the infrastructure is developed to cope with the transport of heavy equipment of unusual size or a new technology is developed to reduce the size of equipment to be transported. Because the transport system is unlikely to develop in such a short time the Cement Research Institute of India has examined the possibilities for establishment of big economic dry process cement plants adapted for field fabrication in such a way that the transport problem is eliminated. The development of the new technique, the establishment of the new factories and the operation of such plants require an extensive support in practical research and development work. The development work will include design and procurement of equipment, training of personnel for operation of new erection tools and establishment of a feasibility study for the new prototype factory.

Besides having a need for big factories in India, also small factories seem essential for the development of sparsely populated regions. This is another important field benefiting from the research and development work at the Cement Research Institute.

The outcome of both the above mentioned activities is important not only for India but also for other developing countries and it is proposed to consider the organization of an Interregional Cement Seminar held in India in 1977 or 1978 to examine the use of appropriate technology both in big and small cement plants.

Provided the activities qualify for United Nations assistance and UNDP funds are available, UNIDO, as Executing Agency, might assist with a number of support activities, among which transfer of know-how through fellowship training and short expert missions might dominate.

III. TIMING OF THE MISSION

Mr. Rydeng arrived on 21 November and Mr. Boeck on 23 November 1974. The experts participated in the CRI Seminar on Engineering Design and Development of Cement Plants from 23 to 25 November 1974.

The development of the Cement Industry and the need for further UNIDO assistance were subject to careful examination from 26 November to 2 December 1974. A visit to the Sawai Madhopur Cement Plant was organized for Mr. Boeck on 29 November 1974.

IV. OFFICIALS MET DURING MISSION

UNDP :

Mr. R. Polgar, Resident Representative

Mr. Radovic,

Mr. G. Patterson, Assistant Resident Representative

Mr. Malhotra, Programme Officer

WORLD BANK

Mr. Bilsel Alisbah, Deputy Resident Representative

CEMENT RESEARCH INSTITUTE OF INDIA:

Dr. H.C. Visvesvaraya, Director

Dr. J.C. Misra, Chief

Dr. S.K. Chopra

Dr. D.V. Ramana Rao

Dr. N.D. Srivastava

Mr. S. Sukumar

Mr. T.N. Verma

Mr. A.K. Bhatia

Mr. D.R. Bhatia

Mr. S.V. Rastogi

V. FINDINGS

The objective of the mission was to participate in the Seminar on Engineering Design and Development of Cement Plants to provide assistance to identify new solutions for establishment of big cement plants and to discuss possible areas for further UNIDO assistance to develop and strengthen the Indian Cement Industry.

The participation in the Seminar was organized in order to introduce the UNIDO experts to the Indian Cement Industry thus facilitating their understanding of the present situation in the industry and their assistance in identifying areas for immediate and future assistance.

The most important problem of the Indian Cement Industry is to achieve a continuous development of the industry, reduce the impact of increasing fuel prices and materials cost and train personnel to operate the new plants. Another problem is to establish precisely the size of cement plants, which with the anticipated market and raw material conditions gives the best economy of scale and operation. The Indian road and rail transport conditions do however not permit transport of every size and load of equipment and it appears that the development of the cement industry in various regions will be governed by transport considerations and not by calculations of economy. In order to promote a natural development of the cement industry the Cement Research Institute of India has decided to examine the possiblities for introducing new designs that can facilitate on site fabrication of components for cement plants. The present SIS project IS/IND/74/087, Strengthening of the Engineering Design and Development of Cement Plants, is therefore extremely appropriate and timely in giving advice on the possibilities for on site fabrication and transportation of small components designed for the purpose.

The majority of the present cement plants in India are based on the wet process; however, since new plants to be established will predominantly use the dry process in order to achieve better economy, and a number of the existing wet process cement plants might be converted to the dry process, CRI has identified as desirable that a number of engineers from the cement industry and/or the CRI are sent for training abroad in order to familiarize themselves with this new process which has already for some years been dominating in large scale production in Europe and in other countries.

Transport problems and costs are governing factors also for the development of small cement factories, which are anticipated to supply rural areas with cement without the cost burden of long distance haulage. The small factories are at the moment anticipated to be developed on the technology of the shaft kiln process in a modernized version without sophisticated process control equipment.

A CRI development project is well under way and appears to combine a number of known elements in a simple and robust construction called for in the development of rural cement industry. Only one component is not easily available in India and is considered referred to United Nations assistance in order to secure speedy implementation of the project. The CRI shaft kiln development is followed with great interest both by UNIDO and other developing countries because a successful establishment of the new kiln could represent an important break-through for appropriate technology in the cement industry. The results from CRI's development work for both field fabrication of large dry process plants as well as for the shaft kiln plant are expected to be available for other developing countries in an Interregional Seminar on appropriate technology proposed by Dr. Visvesvaraya to be held in India 1977 or 1978

VI. CONCLUSIONS

The Cement Research Institute of India is in the middle of development work for appropriate technology to further the expansion of the cement industry. The development policy is aimed at making the Indian Cement Industry less dependent on know-how from abroad and develop technical solutions adapted to the Indian environment.

Ordinary process equipment is available in India and Indian suppliers are capable of developing their manufacturing facilities to respond to any requirements in size and capacity. Having stated the above, it is noted with concern that the introduction of appropriate technology in the cement industry may not always qualify for full co-operation from Indian suppliers because some of the technical

principles used both in the establishment and the operation of appropriately designed factories are expected to lower the suppliers' specific turnover per factory as well as the cement price. The lower turnover per factory for the equipment supplier is, however, expected to be compensated for by an increased rate in the establishment of new factories.

The development of the cement industry according to the strategy defined by the Cement Research Institute will follow a pragmatic approach in which the solutions to the problems will be sought first at the fundamental level when benefits might be available for all heavy industries facing transportation problem and secondly at the processing level where Indian engineers are already now gathering experience abroad and at home.

The Cement Research Institute of India will act as co-ordinating and executing office for the development activity related to appropriate technology in the cement industry. For that purpose the Institute will make experienced engineers available for accumulation, development and transfer of know-how required for introduction of appropriate technology in both rural and normal scale cement industry.

The first target set by the Institute is the establishment of a prototype factory in which both some construction and processing details referring to appropriate technology can be tried out in full scale. The CRI team will further be reinforced with UNIDO experts in accordance with requirements as they develop. The first prototype factory to be established will aim at making use of Indian know-how from a variety of industries so dependency of know-how and skills from abroad to install and service sophisticated process control equipment in the cement industry can be avoided. It is expected that the Resident Representative of the World Bank group will be kept informed about the development work at the CRI so that the resulting feasibility studies for cement plants starting with the prototype plant, based partly on the field fabrication technique, can be worked out in accordance with the requirements of the World Bank so that financial support from this side is not ruled out for procedural reasons.

The elements of the future UNIDO assistance have been defined by CRI and include the following activities:

ACTION NOTE

Sl No	Action	Action to be taken by	Target date completion of action
1	Exchange of technical correspondence in continuation of personal discussions held in November 1974	Mr H C Beeck	March 1975
2	Identifying the right type of technical consultants	UNIDO AND CMI	March 1975
3	Completion of present SIS	UNIDO AND CMI	December 1975
4	Arranging visit of CMI technical personnel to modern plants and physical exposure to newer technologies	UNIDO	June 1976
5	Arranging fellowships for technical personnel from India for working on short-term basis in modern cement plants, cement machinery fabrication units and cement machinery design organizations.	UNIDO	December 1976
6	Organizing an international seminar possibly titled "Engineering Design & Development of Cement Plants for Developing Countries"	i/ Sponsoring, securing experts and cooperation - UNIDO ii/ Organizing - CMI	February 1977
7	Putting up a 2000 or 3000 tpd cement plant on the basis of new approach to design and development of cement plants to be made a UNDP Project	50 percent of the finances to be provided by UNDP and 50 percent by the Government of India	December 1979
8	Supply of Cast Steel and Rotary Grate, Rotary Feeder, Rotary Grate Drive and a Roller Mill estimated to cost in all about US $ 50,000/- for the pilot vertical shaft kiln mini-cement plant.	UNIDO	April 1975

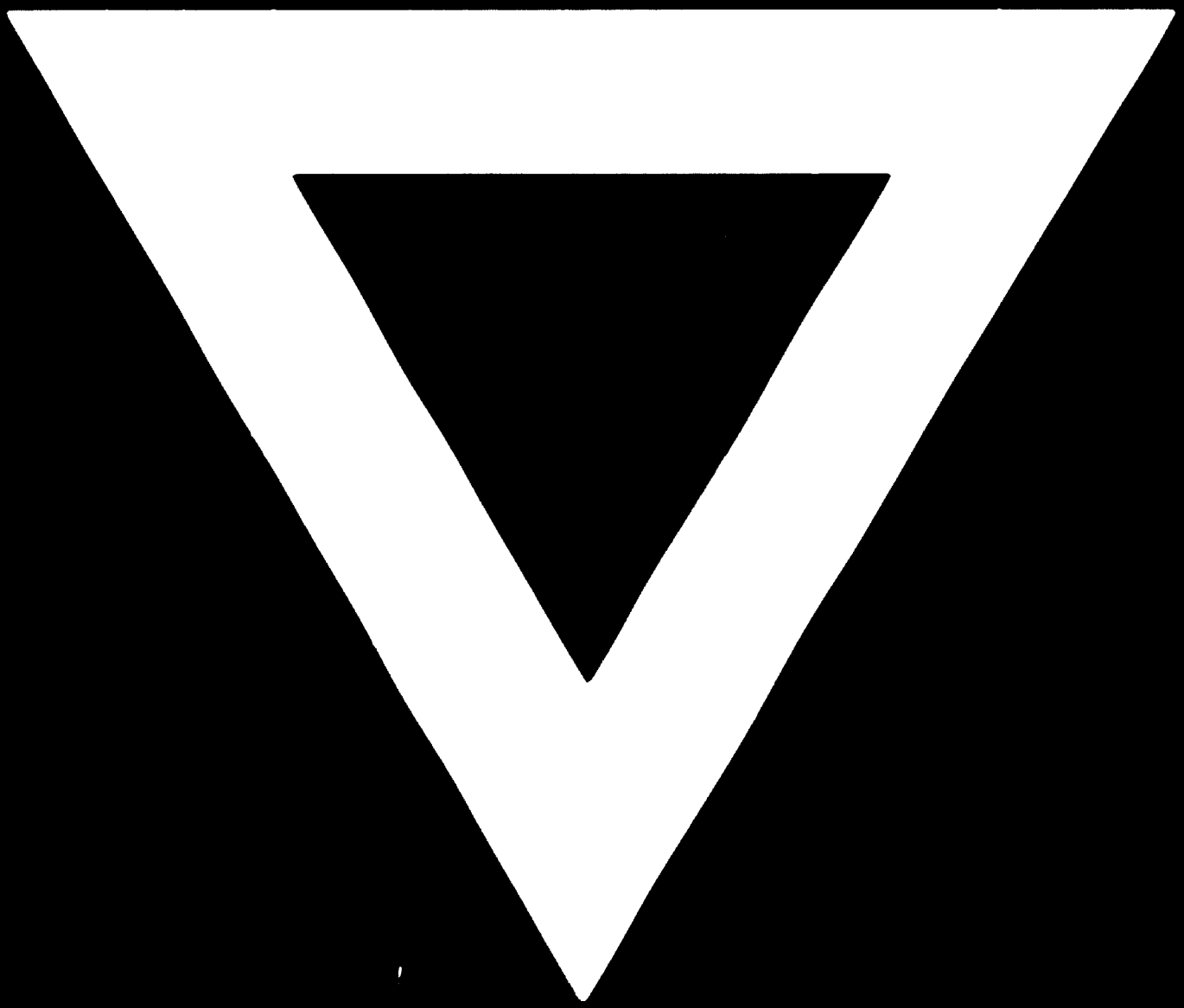
Point 1, 2 and 3: are a continuation of activities started in November 1974 and technical correspondence has been initiated with international specialists with relevant experience.

Point 4 and 5: will be referred to executive fellowship training and normal fellowship training and CRI is expected to select experts for training and to programme the training in time and substance so that a project document can be elaborated and funds made available according to UNDP routines.

Point 6: is an interregional activity preliminarily programmed for 1977 . A first programme proposal will be provided by CRI for UNIDO consideration.

Point 7: needs further clarification before financing can be referred to any particular international promotor.

Point 8: is concerned about ongoing development activities and CRI is expected to prepare a project proposal for UNIDO assistance to complete a shaft kiln plant and make the accumulated experience for establishment and operation available in the planned Interregional Cement Seminar on appropriate technology.



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