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CEMENT DEVELOPMENT AND RESEARCH CENTRE

DP/TUR/72/034

TURKEY

Technical report: Cement research equipment

Prepared for the Government of Turkey by the
United Nations Industrial Development Organization,
executing agency for the United Nations Development Programme

Based on the work of Gerhard Griesshammer, expert in cement
research equipment

United Nations Industrial Development Organization
Vienna

id.78-7738

Explanatory notes

The following abbreviations are used*:

APKM	Araştırma Plânlama ve Ko-ordinasyon Müdürlüğü (Research, Planning and Co-ordination Directorate (of ÇİSAN))
ÇMB	Çimento Müstahsilleri Birliği (Turkish Cement Manufacturers Association)
ÇAI	Çimento Araştırma İnstitüsü (Cement Research Institute (of ÇMB))
ÇİSAN	Türkiye Çimento Sanayii T.A.S. (National Cement Industry of Turkey, Ltd)
GHI	Gesteinshütten Institut der Rheinisch Westfälischen Hochschule in Aachen (Institute for Applied Mineralogy, University of Aachen)
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (German Corporation for Technical Co-operation)
PEM	Plan Etüd Müşavirelik Ltd STI. (Planning Engineering Management, Ltd)

Other abbreviations are:

DTA	differential thermal analysis
RFA	<u>Röntgen Fluoreszenz Analyse</u> (X-ray fluorescence analysis)

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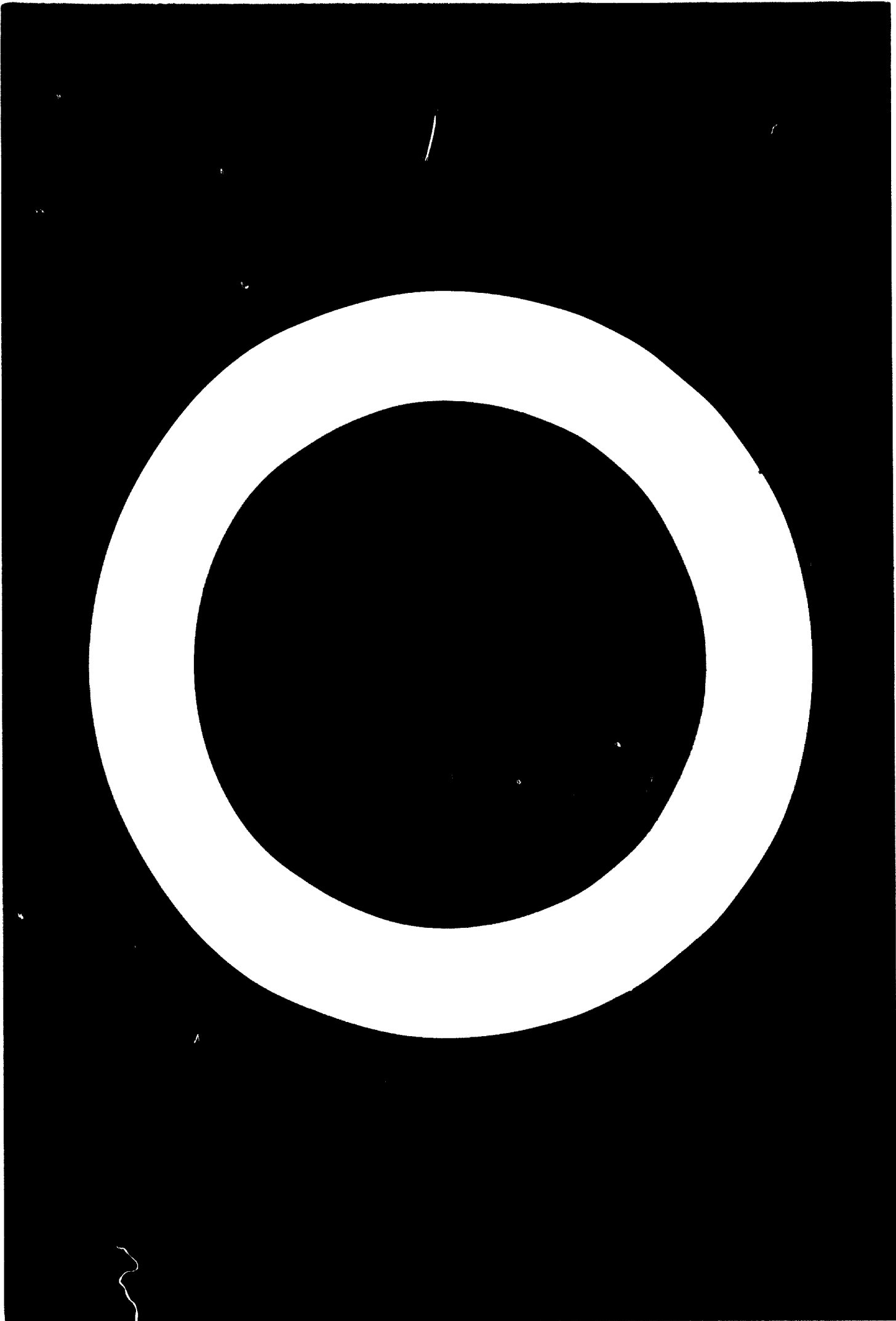
*The English denominations, given in parentheses, are free translation of the official Turkish or German names.

ABSTRACT

An expert in cement research equipment was sent to Turkey for the period 18 September to 1 October 1978 as part of the contribution of the United Nations Industrial Development Organization (UNIDO) to the United Nations Development Programme (UNDP) project "Cement Development and Research Centre" (DP/TUR/72/034), for which UNIDO had been designated as executing agency. The mission was undertaken within a provisional arrangement whereby the functions of the centre were being performed by the government-owned corporation Türkiye Çimento Sanayii T.A.S. (ÇİSAN).

During his visit the expert advised the Research, Planning and Co-ordination Directorate (Araştırma, Planlama ve Ko-ordinasyon Müdürlüğü (APKM)) of ÇİSAN and visited the new centre, called Çimento Araştırma İnstitüsü (ÇAI), to ascertain the status of previous work done and to assist the Turkish experts in the planning of the necessary ensuing work steps.

These steps, which are described in the report, are the following: put into operation the first set of equipment for the Raw Material Research Laboratory, decide upon the composition of the additional equipment and plan the training of the Turkish personnel who will have to operate these devices.



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INTRODUCTION

As part of the ongoing project "Cement Development and Research Centre" (DP/TUR/72/034) that is being carried out by the United Nations Industrial Development Organization (UNIDO) as executing agency for the United Nations Development Programme (UNDP), an expert in cement research equipment was sent on a mission to Turkey. The mission extended from 18 September to 1 October 1978. At an earlier stage the expert had already been involved in the planning of the equipment for the Raw Material Research Laboratory on behalf of the German Corporation for Technical Co-operation (GTZ).

The purpose of this mission was to ascertain the progress of work in connection with the erection of the equipment in the Raw Material Research Laboratory, to discuss with the Turkish counterpart current problems and to assist in the planning of additional equipment needed for the laboratory. The expert also had to advise on the kind of and the proper time for the training of the Turkish personnel who will be operating the new equipment.

The expert's job description is given in annex I.

I. GENERAL SITUATION OF ÇAI

The organizational structure of Çimento Araştırma Institüsü (ÇAI), the cement research and development centre that is being set up, is shown in annex II.

Beforehand, there was only a chemical laboratory managed by the Turkish Cement Manufacturers Association (ÇISAN). According to the new organizational plan this laboratory will become part of the Raw Material Research Laboratory. It is also planned to transfer the process control section, a team of 8 members, to ÇAI.

The management of ÇAI is nominated by a board; half of members of this board are from the national cement industry and half from the private cement industry.

The director of the institute has not yet been nominated, however it is expected that a decision will be taken soon.

The personnel for the various departments of the institute has been trained or is in the process of being trained, so that the following will be available when the institute starts to operate:

- (a) Laboratory for raw material and raw meal research: the group consists of 13 members; 11 members of this group were already trained in the Federal Republic of Germany for the first batch of equipment (group A);
- (b) Laboratory for process control and adjustment. The group consists of eight members, all of which have already undergone training in the Federal Republic of Germany. The equipment and the training for this laboratory was provided by UNIDO;
- (c) Laboratory for cement research: the team consists of three members; so far one member has been trained in France. The equipment of the laboratory and the additional training will probably be provided by France;
- (d) Laboratory for concrete testing: the team consists of two members, who are at present being trained in Japan.

II. APPLIANCES GROUP A FOR THE RAW MATERIAL RESEARCH LABORATORY
- STATUS OF WORK

This group of appliances includes:

- 1 Semi-automatic hammer mill for sample preparation
- 1 Semi-automatic tablet press
- 1 Compressor for compressed air supply for appliances
- 1 Atomic absorption spectrometer
- 1 X-ray spectrometer
- 1 Data recording and evaluating system

The appliances for group A have been stored in a locked room of the institute since January 1978.

Because of a delay in the construction of the building, the erection, assembling and putting into operation of the appliances has not yet taken place.

Before the equipment can be assembled and put into operation the following work has to be performed.

Provision of a stabilized power supply (220 V + 10% - 15%)

The voltage regulator for a stabilized power supply has been installed and the cables are ready to be connected. The Turkish electric installation firm however refuses to lay the three connecting terminals per inlet and outlet. This situation became apparent for the first time during this visit.

It was decided that the manufacturer of the voltage regulator (AEG-Telefunken) should send a fitter, who would also have to be present when the device was started. The Project Manager will arrange for the appropriate order to be made out by UNIDO. The exact date for the fitter's arrival has to be communicated by the Turkish side in good time.

Cable and exhaust ducts

The cable ducts which are sunken into the floor have to be cut off 2 cm above the floor level and their sharp edges have to be sanded off to avoid damage to the cables. According to the information supplied (see GTZ report of December 1976, annex III) the outlets of the ducts have to be underneath the appliances.

The 2" steel pipes for the cable ducts have to be connected with the protective conductor at a central point and earthing clamps are needed.

The power cables shown in the wiring plan (GTZ report of December 1976, annex III) have to be laid and connected separately to the junction box.

The exhaust duct for the atomic absorption spectrometer and the ventilator (pipes and ventilator out of chrome-nickel (V-2) steel are provided) have to be mounted. An opening for the exhaust has to be provided in the wall.

The existing compressed-air seal, which is mounted on the table, has to be removed so that there will be a large enough area free for placing the apparatus. The compressed air connection can be laid in the wall.

Transportation of the appliances to the place of installation

The manufacturers' instructions for the transportation should be followed. The heavier equipment (approx. 1,200 kg) cannot be carried up the stairs but has to be lifted by a block and tackle, which can be hung from the hook that is already in the ceiling of the staircase (all load-bearing capacities should be checked first).

Since the appliances have to be carried in upright position, the height of the door opening will have to be increased.

AEC-Ankara has agreed to provide a fitter for three days in order to supervise the unpacking and the transportation of the appliances.

As soon the above-mentioned work has been carried out, AEC-Ankara will be informed. After verification of the preparatory work by AEC, the earliest possible date for the installation and the first operation of the equipment should be arranged.

III. TRAINING FOR APPLIANCES GROUP A

The training programme mentioned in the GTZ reports of December 1976 and October 1977 is being carried out. Since February 1978 PEM Düsseldorf-Istanbul has been responsible for the completion of the training and for the preparation of the first series of tests; it will also assist in the tests. The description of the appliances and the instructions supplied by PEM should be translated into Turkish.

Apparently, no seminars have been foreseen to prepare the staff who will have to work with the appliances of group A and no translations are available to make the subjects that were taught during the training more comprehensible.

IV. PLANNING OF APPLIANCES GROUP B

GTZ entrusted the Turkish firm PEM with the task of planning the equipment. PEM in turn consulted with ÇISAN and GHI.

GHI recommended the following amendments to the range of appliances originally suggested in GTZ report of March/April 1976:

(a) Deletion of the automatic sample preparation and the automatic feeding device for samples in the RFA-appliance.

This item should be replaced by a new semi-automatic melting and preparation-appliance. The samples will be fed manually into the RFA-appliance.

ÇISAN suggested that this decision should be reconsidered. An automatic sample preparation for powder would be of great importance with regard to the future introduction of automatic process control in cement plants (chemical compound of the raw meal) and because of the desired practical orientation of the institute.

Any experience that would be made with such automatic equipment would be useful in the future and the staff of the Institute would get the necessary training for the maintenance of the appliances.

(b) Replacement of the originally suggested tube furnace by a muffle furnace. With this type of furnace the sample temperature is not set by a programmed electronic regulation of the furnace temperature, but by manually moving the tube along the temperature gradient.

The furnace has to be equipped with additional constructions by the Turkish counterpart.

(c) The interface between the DTA-apparatus and the computer will not be made because there is no possibility of preparing a suitable evaluation program in the near future.

Instead of the interface a recorder with several channels will be provided.

(d) The purchase of the following additional equipment should be considered:

Aerometer

Primary grinding mill for the preparation of a larger number of samples

No changes were suggested for the remaining six groups of appliances.

V. TRAINING FOR APPLIANCES GROUP B

It was decided to begin with the training of staff for this group of appliances. CAI will employ a mineralogist (with completed university education) for mineralogical research (X-ray diffraction, polarizing microscope, scanning electron microscope) and a chemist (with completed university education) for high-temperature research (DTA, burning tests).

For each apparatus an additional technician will be trained, for the operation of the equipment and for the sample preparation. For maintenance an electronic engineer will be trained by the manufacturer of the respective equipment. A rough outline of the training schedule is given in annex IV.

Annex I

JOB DESCRIPTION

Post title: Expert in oement research equipment

Duration: One month

Date required: As soon as possible

Duty station: Ankara, with travel within the country

Duties: The expert will be attached to the Government of Turkey and will, in close co-operation with the Project Manager and Turkish experts, advise and assist the cement industry in preparing for the development of the Cement Research and Development Centre.

The expert will also be expected to prepare a final report, setting out the findings of his mission and his recommendations to the Government on further actions which might be taken.

Qualifications: Industrial engineer with relevant experience in the field of cement.

Language: English; German an asset.

Background information: The first cement plant in the country was set up at Darica, Istanbul, in 1911, with an annual capacity of 20,000 tons.

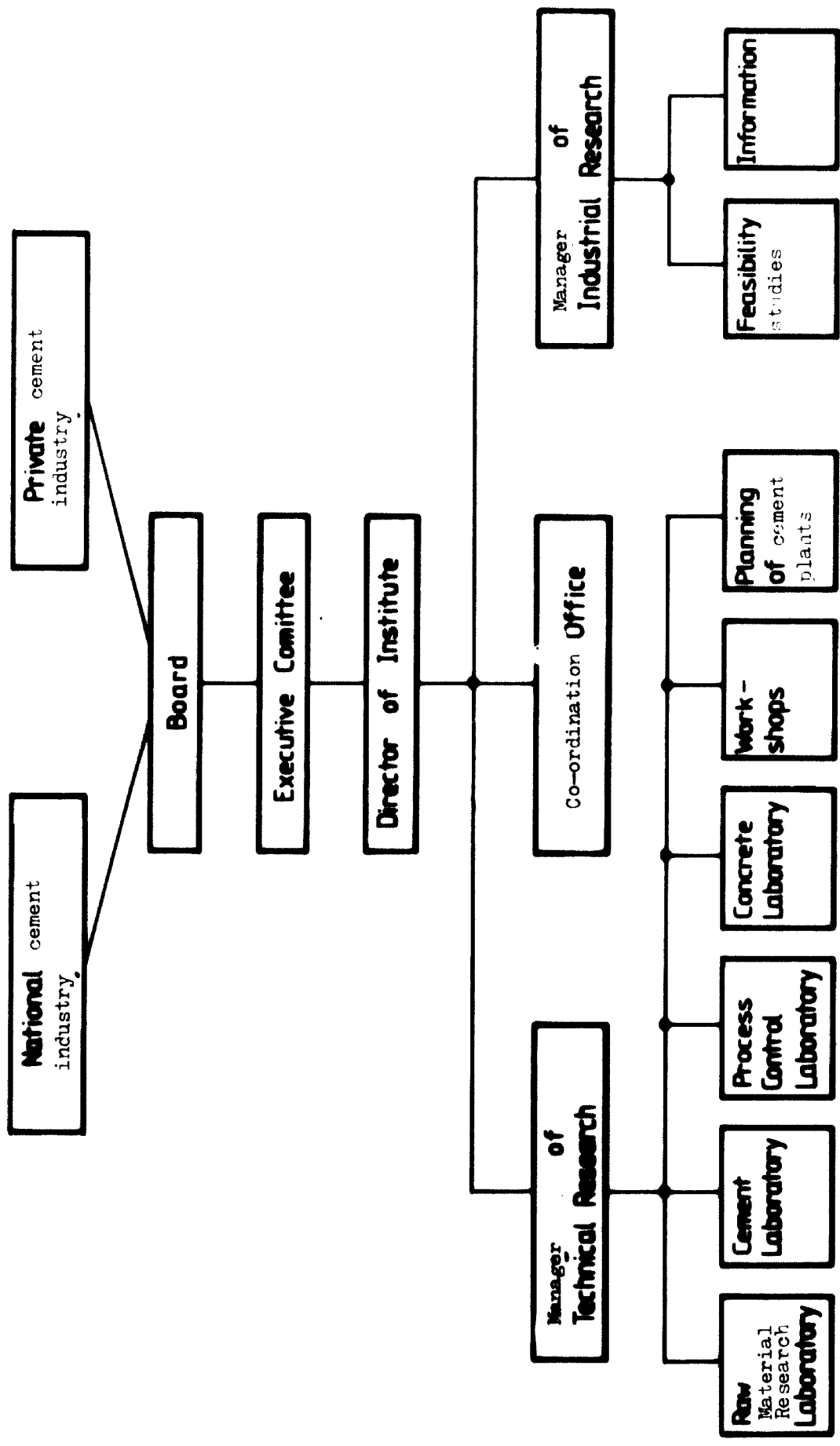
This plant was expanded in 1923. Other factories and expansions followed in the period from 1923 to 1960 when the installed capacity passed 2 million tons per year.

Participating in the development and playing a role of growing importance since its establishment in 1953, the Turkish Cement Industry Corporation has now a dominating position in the cement industry. The accelerated development of the oement industry is illustrated by the rapid doubling of both production and consumption. From about 2 million tons in 1960, 4 million was reached in 1966 and 8 million in 1972. The rapid growth of the cement industry in the past and projected growth in the future combined with the introduction of large and sophisticated plants with modern process control equipment has not enabled the oement industry to train suffioient personnel to maintain and use the principles of modern production control in the factories. Process and plants are designed abroad and the factories are erected and commissioned under supervision of foreign experts. When local personnel

continue operation after the guaranteed performance has been reached and plants taken over, a deteriorating performance has been experienced. In particular production size and economy have suffered because the instrumentation without proper maintenance has failed to record important production parameters. The results have been large and incidental variations in production increase both fuel consumption and wear on equipment.

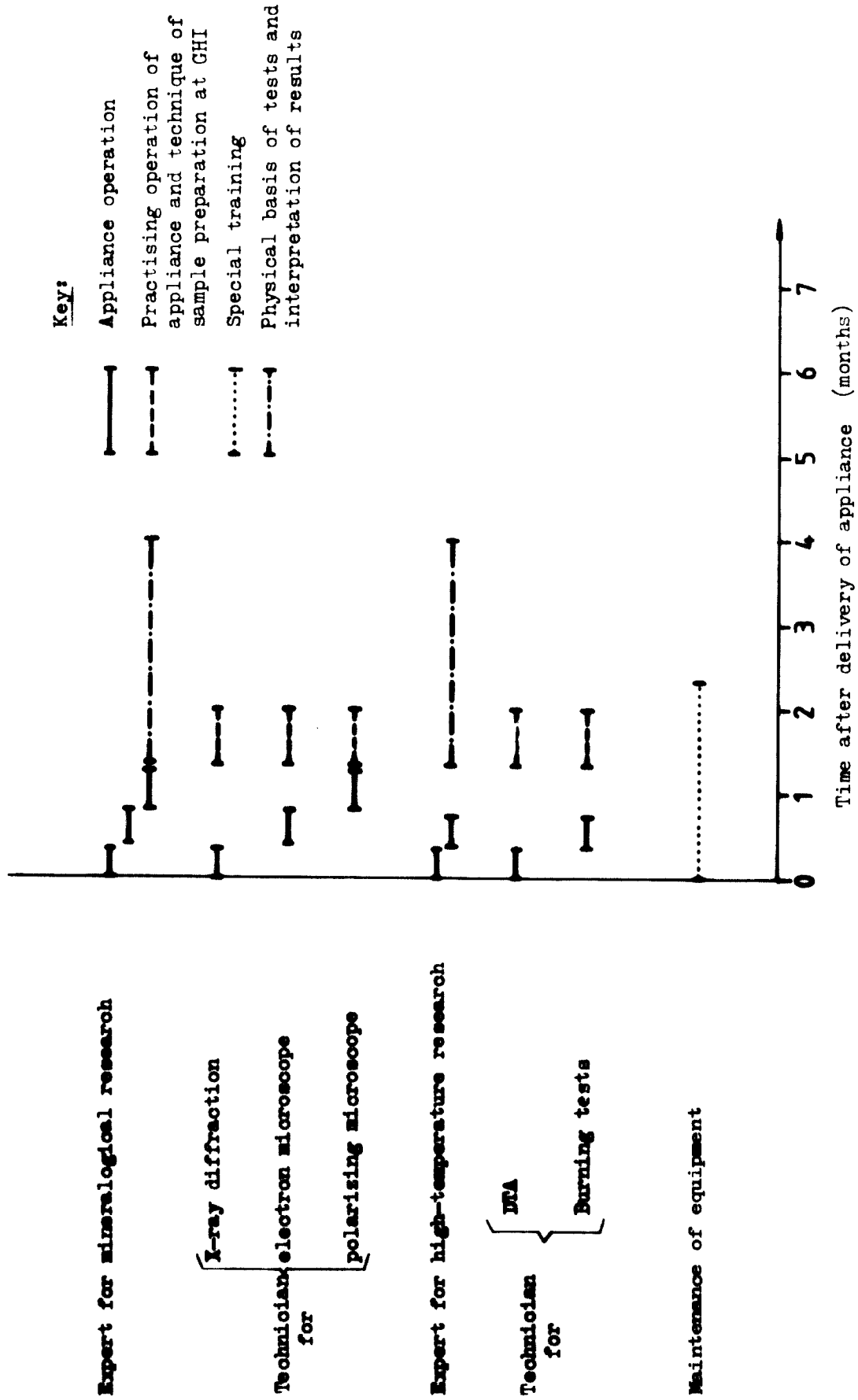
Annex II

ORGANIZATIONAL STRUCTURE OF CAI

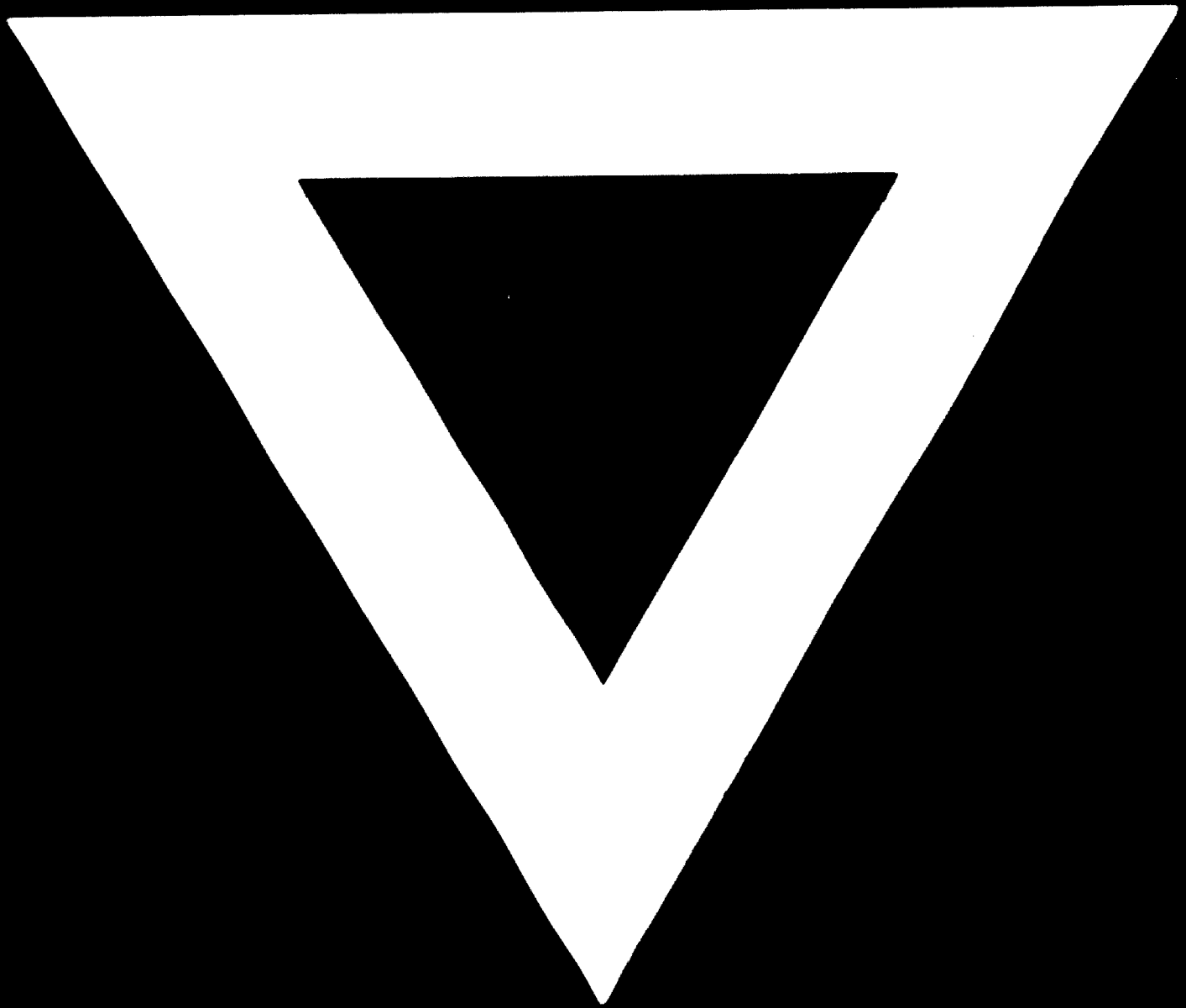


Annex III

TRAINING SCHEDULE FOR EQUIPMENT GROUP B



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