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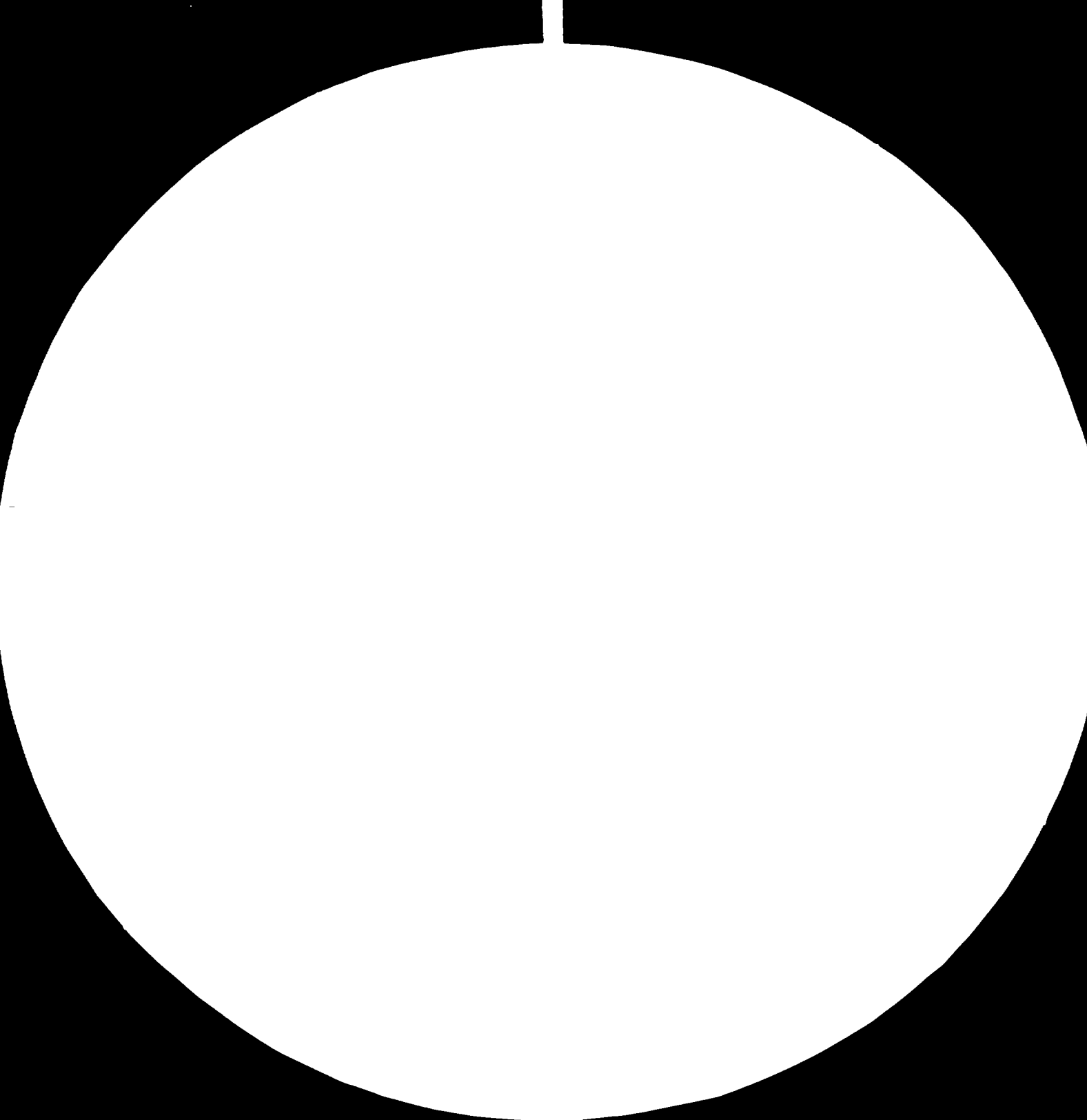
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CEMENT RESEARCH AND DEVELOPMENT CENTRE

DP/TUR/72/034

TURKEY

Technical report: Preparatory work for an interregional seminar  
on energy-saving cement technology

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

Based on the work of A.M. Afify, cement seminar consultant

United Nations Industrial Development Organization  
Vienna

v.81-20687

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Explanatory notes

References to tons (t) are to metric tons.

References to dollars (\$) are to United States dollars.

The monetary unit in Turkey is the lira (TL). During the period covered by the report, the value of the lira in relation to the dollar was \$1 = TL 89.25.

Besides the common abbreviations, symbols and terms, the following abbreviations have been used in this report:

BRGM	Bureau de Recherches Géologiques et Minières, Paris
CERILH	Centre d'Etudes et de Recherches de l'Industrie des Liants Hydrauliques, Paris
ÇISAN	Türkiye Çimento Sanayii T.A.S. (Turkish Cement Industries Company - TCIC)
CRDC	Cement Research and Development Centre
SIDFA	Senior Industrial Development Field Adviser

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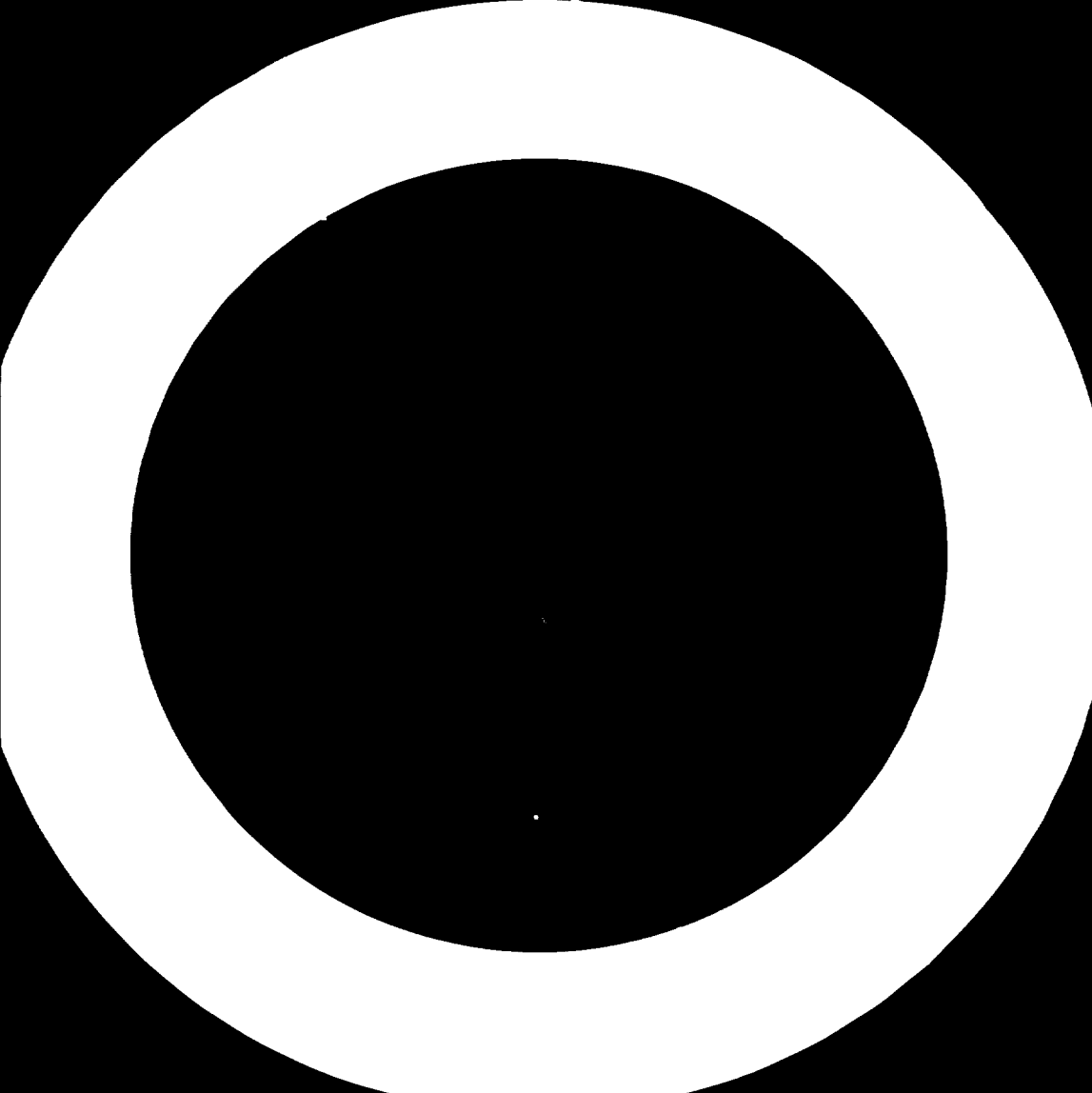
ABSTRACT

The report deals with the preparatory work undertaken for the holding of an interregional seminar on energy-saving cement technology. The mission of the cement seminar adviser, which took place from 11 to 31 December 1980, was part of the overall project "Cement Research and Development Centre" (DP/TUR/72/034) that the United Nations Industrial Development Organization (UNIDO) is carrying out as executing agency for the United Nations Development Programme (UNDP). The seminar activities will represent the realization of one of the main objectives of the Cement Research and Development Centre (CRDC) at Ankara in the field of international co-operation.

During negotiations with the Turkish authorities concerned and with representatives of the Centre d'Etudes et de Recherches de l'Industrie des Liants Hydrauliques (CERILH) it was agreed to hold the seminar from 11 to 22 May 1982 in two parts, the first week in Paris where CERILH would host the seminar, the second week at Ankara at the premises of CRDC. The report contains a tentative programme of the seminar, including the topics of lectures and group discussions, as well as guidelines for the preparation of country monographs by participants.

An agreement was further reached on the number, the country of origin, the qualifications and the selection procedure for participants, and on the financing of the participants' and lecturers' stay and part of the travel costs.

The expert recommends to have all agreements and commitments so far made by various authorities confirmed in writing and to resolve any open questions, such as financing part of the travel or ordering furniture and other equipment for CRDC's conference hall, as soon as possible so as to ensure that the seminar will proceed smoothly.



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## INTRODUCTION

This report deals with the preparatory work undertaken for the holding of an interregional seminar on energy-saving cement technology, the cement industry being one of the biggest energy consumers. The mission of the cement seminar adviser, which took place from 11 to 31 December 1980, was part of the overall project "Cement Research and Development Centre" (DP/TUR/72/034) that the United Nations Industrial Development Organization (UNIDO) is carrying out as executing agency for the United Nations Development Programme (UNDP). The seminar activities will represent the realization of one of the main objectives of the Cement Research and Development Centre (CRDC) at Ankara in the field of international co-operation, namely to collect and disseminate information on matters of interest to that industry.

It is anticipated that by the year 2000 the total world cement consumption will approach 1,500 million t/y which corresponds to a fuel consumption of about 135 million t, and which would create various problems with regard to economy and availability. Since cement is fundamental for the development in almost any industry, it is essential to treat the matter with utmost care and to seek appropriate solutions for the near future. It is therefore envisaged to discuss at the seminar topics which are industrially oriented and deal with the appropriate application of additives to reduce energy consumption. Considerable energy savings can be achieved by grinding clinker with additives such as natural or artificial pozzolanas having appreciable hydraulic properties, which are activated by reaction with the lime mixed into compound cements. Since the additive does not need to be burned, there will be a significant reduction in fuel costs. This trend promotes the production of compound cements and calls for the rationalization of its composition and binding qualities.

One of the most distinct purposes of the seminar is to disseminate information on the production and application of compound cements. In particular their use should be promoted by providing a classification and description of adequate procedures to rationalize their hydraulicity and by their recognition in building materials standard specifications and codes.

The expert was attached to the CRDC at Ankara, and, in close co-operation with the project manager, the Turkish authorities, the Centre d'Etudes et de Recherches de l'Industrie des Liants Hydrauliques (CERILH) and the Bureau de

Recherches Géologiques et Minières (BRGM) as well as UNIDO headquarters personnel, accomplished a study in preparation of the seminar in question. As foreseen in post description DP/TUR/72/034/11-04/U-33.1.A, the mission lasted three weeks, including two days of consultations in Paris (15-16 December 1980), two days of consultations at Vienna (18-19 December 1980), and nine days for studies at Ankara (20-28 December 1980).

### RECOMMENDATIONS

1. Although there is more than one year's time before the beginning of the seminar, all details should be discussed with the parties concerned as soon as possible so that no question would be left to resolve until a few months before the starting date. It is recommended that various points be clarified during the first half of 1981 and that a definite budget for the seminar expenditures be established for the year 1982. A close follow-up will be necessary for that purpose.
2. All particulars so far concluded and agreed upon during negotiations, as detailed in this report, should be confirmed in writing by the authorities concerned, with special reference to their financial contribution. The topics to be presented at the seminar and the names of lecturers should be made known in due course. The aide-mémoire should be amended taking into consideration the comment made by the expert.
3. Financing should be sought as soon as possible for flights from the home bases of participants to Paris, for participants and French consultants from Paris to Ankara, and for the remaining part of the return trip not covered by the service of the Turkish Airlines. The total costs are presented in annex III.
4. It is the intention of the Turkish authorities to provide the main conference hall in the CRDC with locally-manufactured furniture, modern simultaneous translation facilities with wireless installation, sound-absorbing panels etc. Should these supplies be delayed for unforeseen reasons, the Seminar could be held e.g. in the conference hall of the State Highway Research Institute, in that of the State Statistical Institute or at one of the Universities. However, it would be much more beneficial if it were held in the CRDC and it is therefore recommended to start the necessary work without further delay.
5. To ensure that the objectives of the seminar will be met and to produce effective proceedings, the country monographs should be industrially oriented and concentrate on the subjects of the seminar, namely: energy conservation in the cement industry, appropriate technologies for energy saving, and occurrence of mixing materials suitable for blending with clinker in the final grinding to produce mixed or compound cements. It would also be most beneficial if the observers would submit papers of techno-economic content, reflecting their experience with aspects of energy conservation in the cement industry and making special reference to appropriate technologies for developing countries.

## FINDINGS AND CONCLUSIONS

In order to profit from the capacities which CERILH has to offer in various fields of research including studies on the application of cement with specific intensive investigations in the area of pozzolanic activities, and considering the appreciable experience which that research centre has gained with interregional seminars, scientific conferences and international congresses, it was felt that it would be most beneficial to start the seminar in France. High level research workers and heads of study sections could be asked to contribute their latest findings to the seminar. The seminar would then be continued at CRDC, Ankara, where the research team, experts from industry, and university professors would present subjects of interest in the field of energy conservation in the cement industry. This second part may be considered an arena for case studies; discussions of specific topics, group meetings and consultations could bring about conclusions and recommendations for the rationalization of existing technologies experienced by the participants in general, and specifically by the Turkish industry.

Arrangements for the seminar were therefore made in France and Turkey.

### A. First part of seminar to be held in France

The expert had negotiations with J.P. Meric, General Director of CERILH, and details were discussed with Ms. Cardey who is responsible for the organization of seminars, M. Regourd, Head of Microstructure Department, P. Longuet, Head of Department for Chemistry of Cements and P. Terrier, Head of Department for Standardization. A meeting was also held with Mr. Lotel, Deputy Director of BRGM.

It has been emphasized that CERILH will put all facilities of the Centre, free of charge, at disposal of the seminar, including but not limited to: lecturers, consultants, conference hall, secretarial staff, technical and administrative organization. The financing of other expenditures such as full board and lodging for 20 participants, 10 consultants and 3 UNIDO delegates; local transportation; simultaneous interpretation (English and French); and industrial visits; will be sought by CERILH from the Union of Cement Producers. A preliminary consent has been attained and a letter was addressed to the Union requesting the official approval.

It is proposed that the seminar would last two weeks, including five working days in France, namely 11-15 May 1982. On Sunday 16 May 1982 participants would fly from Paris to Ankara. The seminar would then continue at Ankara for another five working days, 17-21 May 1982, and departure would be arranged for the weekend, 22 and 23 May 1982.

It was agreed that the first session would start with an introduction to be presented by a UNIDO delegate in which he/she would summarize the current energy-saving technologies in the cement industry and give a general survey of mixed cements of the masonry type as well as of compound cements with mixing ingredients of natural or artificial pozzolanas.

This lecture would at the same time introduce subjects to be dealt with in proceedings and contributions supporting the seminar. The introductory statement would be followed by a lecture describing natural pozzolanic materials, the possibilities of their prospection and identification and the environment of their occurrence. This survey would be presented by a lecturer from BRGM, who is a leading institute in the field of geological prospection and research and has covered many countries all over the world. The main subjects of the conference in France would then be tackled by lecturers from CERILH. CERILH is a well known industrial and technical centre for hydraulic binders; it has high-class and up-to-date scientific equipment for a competent and experienced research staff, performing intensive scientific investigations, among other in the field of pozzolanic activity. CERILH also participates in the conception and establishment of relevant standards. Through advanced research work it further contributes to the development of energy-saving techniques, including testing of additives to clinker in the form of natural or artificial pozzolanic materials.

It is therefore adequately justified that leaders of the research work of CERILH would present experience on: testing and classification of natural pozzolanas; description of artificial pozzolanas, their production - whether from appropriate raw materials or from by-products of other thermal processes, and their activities; economic aspects in the production of Portland cement with clarification of particulars involving energy conservation; comparison of

various binding materials, specifically masonry and compound cement; appropriate technologies for developing countries; durability of pozzolanic cements; and standard specifications of binding materials. The tentative programme for this part of the seminar is set out in annex I.

B. Second part of seminar to be held in Turkey

Time and place of the two parts of the seminar were approved before going into further particulars. Most of the events during the second week would take place in the CRDC at Ankara. S. Abaffy, Project Manager, G.L. Narasiman, SIDFA, and the expert discussed and agreed on the main outline with Dr. F. Yagis, Director of Research and Planning Department, Turkish Cement Institutes. Relative details were worked out with the government counterpart Ms. K. Burian, Deputy Director of the CRDC for Technical Affairs.

The Turkish authorities agreed to finance the part to be settled in local currency including:

Daily subsistence allowance for participants, 6 French consultants and the UNIDO delegates

Local transportation

Simultaneous translation (English and French)

Secretarial and administrative work

Preparation, editing, translation and printing of final report and proceedings

Excursions, including industrial visits

Miscellaneous, including local publicity and information of the return flight, the part which can be undertaken by the regular service of the Turkish Airlines, from Ankara to intermediate or home airports.

An estimate for the afore-mentioned items is given in annex II.

The main conference hall of CRDC will be put at the entire disposal of the seminar after having being provided with furniture. It was decided to ask for nominations of participants from the following 20 developing countries, comprising representatives from Africa, Asia, Europe and Middle East, Far East and Latin America: China, Egypt, Guatemala, Hungary, Indonesia, Iraq, the Libyan Arab Jamahiriya, Malaysia, Mali, Morocco, Niger, Pakistan, the Philippines, Somalia, the Sudan, the Syrian Arab Republic, Tunisia, Turkey, Uganda and Upper Volta. Twice the number of required candidates should be nominated for selection of the 20 participants.

The following main topics to be dealt with at Ankara were identified:

- (a) Energy-saving measures in raw materials preparation: quarry operation, transportation, grinding;
- (b) Energy-saving measures in the operation of cement making units: drying, preheating, burning, utilization of exit gases, milling;
- (c) Energy-saving in production: pozzolanic admixtures, use of industrial wastes with special emphasis on the increase of pozzolanic activity, admixtures and systems to facilitate the combustibility of cement.

Lectures on these subjects will be presented by Turkish researchers, industrial engineers, and university professors. Subject matters will be investigated by questions following the lectures, group meetings, and round table discussions. The tentative programme is given in annex I.

#### C. Comments on the aide-mémoire

All stipulations made in the aide-mémoire, which has been drawn up before, are acceptable; in the light of his findings, the expert would suggest to make the following amendments.

#### Date and place of the seminar

The seminar will be held within the second and third weeks of May 1982 (11 to 22 May 1982). It will be divided into two parts; the first part will take place in France, and the second part in Turkey, five working days each being foreseen for the seminar activities. It is anticipated that the flights from the home base to Paris, from Paris to Ankara and ultimately from Ankara to the home base will be effected over the week-ends. A total of two days stop-over may be considered necessary for connecting long flights.

#### Participants

Selected developing countries in Africa, Asia, Europe and Latin America will be invited to nominate two candidates each. Participants should have a university degree in engineering or chemistry and at least three years of practical experience in a supervisory or managerial capacity in the field of cement industry in their home country. They should further be development planners, decision makers and/or officials from industry, or officials expected to assume duties similar to the above. The programme is open to female and male candidates.

UNIDO, in co-operation with the Turkish authorities, will select 20 participants, taking into account professional qualifications, level of experience and other relevant factors. Participants will, although nominated by their country, attend in their individual capacity; they will be required to follow the whole programme according to the schedule prepared by UNIDO and the host authorities and will have to comply with the rules and regulations laid down for the programme.

They are also expected to be fully informed about the development conditions in their home country and to participate in the discussions, group activities and other work assigned by the seminar administration.

Participants will further be expected to submit a country monograph on energy conservation concepts for the cement industry in their home countries. For further details see annex IV. They should also be prepared to present a summary of their monograph during the seminar sessions if so required.

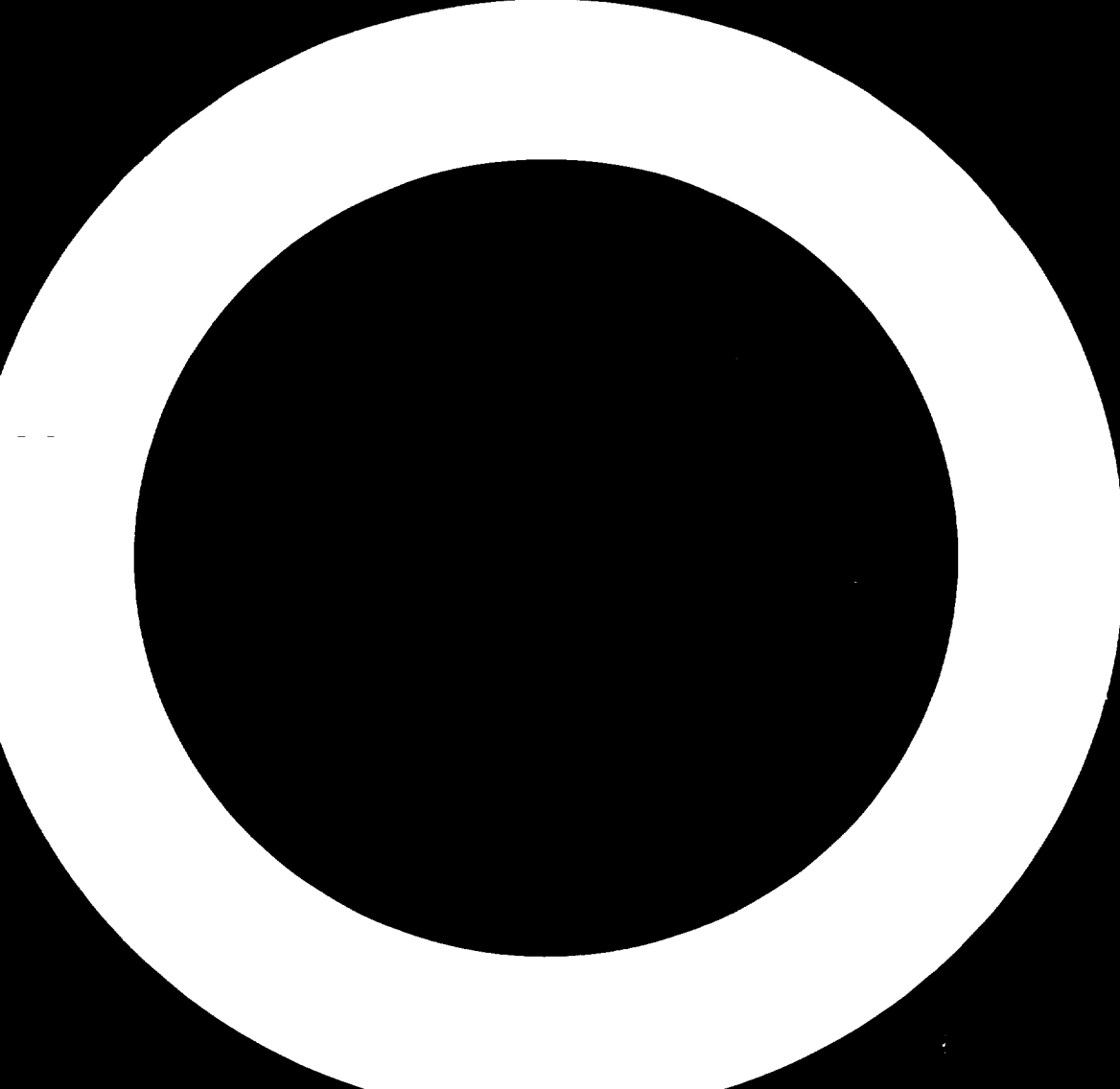
#### International co-operation

Observers from developing countries and United Nations organizations will be accepted in a limited number, provided that they participate at their own expense. They will be requested to submit papers on subjects related to energy conservation technologies in cement manufacture reflecting the techno-economic experience of their organization.

#### Language requirements

The seminar will be conducted in English and French with simultaneous interpretation. All participants must have a good working knowledge of one of these languages. Applicants from non-English or French-speaking countries will have to take a language test and submit a certificate confirming an adequate knowledge of English or French before being considered eligible for participation.





Annex I

TENTATIVE PROGRAMME OF THE SEMINAR

A. First part in France

<u>Tuesday, 11 May</u>	Arrival, registration
<u>Wednesday, 12 May</u> 9.00-12.00	Introduction to the seminar: energy conservation in the cement industry, mixed and compound cements, raw materials with special reference to natural and artificial pozzolanas, their characteristics (UNIDO)
	Description of natural pozzolanic materials, possibilities for their prospection and identification, the environment of their occurrence (BRGM)
	Testing and classification of natural pozzolanas (CERILH)
12.00-13.30	Lunch
13.30-17.30	Description of artificial pozzolanas, their production from appropriate raw materials or as by-products from thermal processes, their reactivities (CERILH)
	Round table: Comparison of reactivity of natural and artificial pozzolanas
	Presentation of participants' country monographs and observers' papers
<u>Thursday, 13 May</u>	Industrial visits
<u>Friday 14 May</u> 9.00-12.00	Economic aspects in production of Portland cement, energy conservation (CERILH)
	Comparison of various binding materials specifically the masonry and compound cements (CERILH)
12.00-13.30	Lunch
13.30-17.30	Appropriate technologies for developing countries (CERILH)
	Standard specifications of binding materials (CERILH)
	General discussion
<u>Saturday 15 May</u>	Industrial visits
<u>Sunday 16 May</u>	Flight from Paris to Ankara

B. Second part in Turkey

<u>Monday, 17 May</u> 9.00-12.00	Energy-saving measures in raw materials preparation and transportation (grinding, quarry operation)
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12.00-13.30	Lunch
13.30-17.30	Energy-saving measures in cement production (drying, preheating, burning, milling, utilization of exit gases)
	Country reports
<u>Tuesday, 18 May</u> 9.00-12.00	Energy saving by use of admixtures ( admixtures, use of industrial wastes with special emphasis to increase the pozzolanic activity, admixtures and systems to increase combustibility of cement)
12.00-13.30	Lunch
13.30-17.30	Durability of pozzolanic cement (CERILH)
	Country reports
<u>Wednesday, 19 May</u> 9.00-12.00	Group meetings
12.00-13.30	Lunch
13.30-17.30	Round table discussions
<u>Thursday, 20 May</u>	Departure to Istanbul by bus
15.00	Visit to Marmara Scientific and Technical Research Institute
<u>Friday, 21 May</u> 9.00-13.30	Visit to a cement plant
	City tour
13.30-15.00	Lunch
15.00-18.00	Presentation of draft report, discussions, summing up, closing of the seminar
<u>Saturday, 22 May</u>	Departure to home countries

Annex II

ESTIMATED CONTRIBUTION OF THE TURKISH GOVERNMENT<sup>a/</sup>

	<u>TL</u>	<u>Equivalent in \$</u>
DSA of TL 3,500 for 20 participants and 6 French consultants for 7 days	637,000	7,137
Organization costs comprising	350,000	3,922
Local transportation		
Simultaneous translation (English and French)		
Secretarial and administrative work		
Preparation, editing, translation and printing of final report and proceedings	300,000	3,361
Excursions	190,000	2,129
Miscellaneous (including publicity and local information facilities)	266,397	2,985
Part return flights covered by Turkish Airlines	<u>1,006,603</u>	<u>11,278</u>
Total	2,750,000	30,812

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<sup>a/</sup> Estimates include anticipated inflation.

Annex III

GUIDE FOR FINANCING OF FLIGHTS

Participants' / consultants' home countries	Home-base-Paris- Ankara		Ankara-home base (B)				Cost of round trip (A + B)	
	(A)		Turkish Airlines		Other airlines			
	Routing	Cost (\$)	Routing	Cost (TL)	Routing	Cost (\$)	TL	\$
China	PEK-PAR-ESB	1 750	ESB-KHI	48 350	KHI-PEK	800	48	2 550
Egypt	CAI-PAR-ESB	1 020	ESB-CAI	16 580	-	-	16 580	1 020
Guatemala	GUA-PAR-ESB	1 380	ESB-PAR	35 610	PAR-GUA	1 170	35 610	2 550
Hungary	BUD-PAR-ESB	730	ESB-VIE	25 560	VIE-BUD	124	25 560	854
Indonesia	JKT-PAR-ESB	1 850	ESB-KHI	48 350	KHI-JKT	720	48 350	2 570
Iraq	BGW-PAR-ESB	1 130	ESB-BGW	20 090	-	-	20 090	1 130
Libyan Arab Jamahirya	TIP-PAR-ESB	880	ESB-TIP	32 730	-	-	32 730	880
Malaysia	KUL-PAR-ESB	1 690	ESB-KHI	48 350	KHI-KUL	580	48 350	2 270
Mali	BKO-PAR-ESB	1 250	ESB-PAR	35 610	PAR-BKO	780	35 610	2 030
Morocco	RBA-PAR-ESB	790	ESB-PAR	35 610	PAR-RBA	320	35 610	1 110
Niger	NIM-PAR-ESB	1 280	ESB-PAR	35 610	PAR-NIM	810	35 610	2 090
Pakistan	KHI-PAR-ESB	1 450	ESB-KHI	48 350	-	-	48 350	1 450
Philippines	MNL-PAR-ESB	1 803	ESB-KHI	48 350	KHI-MNL	730	48 350	2 533
Somalia	MGQ-PAR-ESB	1 440	ESB-KRT	32 340	KRT-MGQ	950	32 340	2 390
Sudan	KRT-PAR-ESB	1 220	ESB-KRT	32 340	-	-	32 340	1 220
Syrian Arab Republic	DAM-PAR-ESB	1 020	ESB-BGW	20 090	BGW-DAM	140	20 090	1 160
Tunisia	TUN-PAR-ESB	720	ESB-PAR	35 610	PAR-TUN	245	35 610	965
Turkey	ESB-PAR-ESB	950	-	-	-	-	-	950
Uganda	EBB-PAR-ESB	1 520	ESB-KRT	32 340	KRT-EBB	330	32 340	1 850
Upper Volta	OUA-PAR-ESB	1 360	ESB-PAR	35 610	PAR-OUA	880	35 610	2 240
France (3)	PAR-ESB	<u>1 425</u>	ESB-PARx3	<u>106 830</u>	-	-	<u>106 830</u>	<u>1 425</u>
<b>Total at present rates</b>		<b>26 658</b>		<b>774 310</b>		<b>8 579</b>	<b>774 310</b>	<b>35 237</b>
<b>Total including an anticipated inflation until May 1982 of 30%</b>							<b>1 006 603</b>	<b>45 808</b>

Annex IV

GUIDELINES FOR THE PREPARATION OF  
COUNTRY MONOGRAPHS

The monographs to be prepared for the seminar will serve a dual purpose. First they should provide statistical information on individual countries illustrating the situation of the cement and lime industry. Secondly, the preparation of the monograph should assist the participants in familiarizing themselves with some of the problems to be discussed at the seminar.

The main points which should be covered in the monographs are indicated below.

Development of the cement and lime industry up to the year 2000

The forecast of the development of the cement and lime industry should indicate production extension plans and expansion requirements. Estimates have to take into consideration the increasing energy costs and availability of domestic energy resources. The survey should illustrate possible means of and economical benefits to be gained from the creation and promotion of mixed or compound cements.

Existing production facilities and techniques

Present technological processes are to be described with special reference to planned rationalization to achieve savings in energy.

Energy conservation measures

This survey should point out various means for energy conservation whether included in development schemes or applicable to specific cases. It should include the availability of natural resources and industrial by-products to be used as mixing ingredients together with an economical analysis of their impact on energy-saving.



