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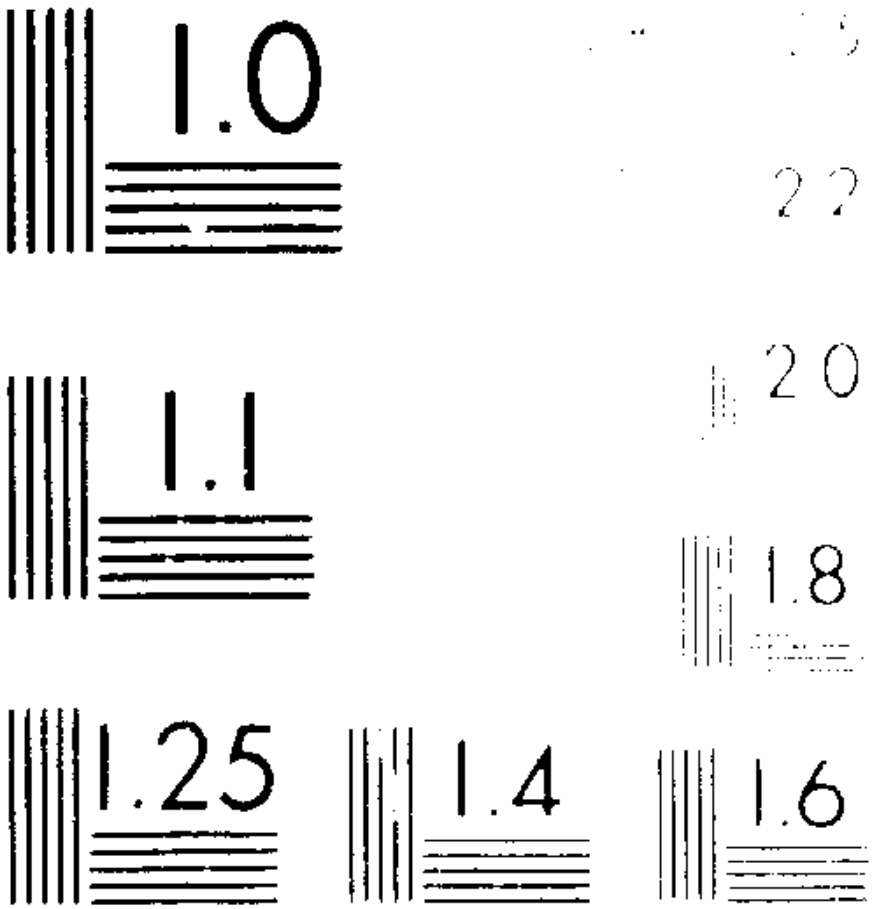
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UNIDO/IO/R.34
2c March 1982

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

English

ASSISTANCE TO THE LIBYAN CEMENT FACTORY, BENGHAZI

TF/LIB/75/002

LIBYAN ARAB JAMAHIRIYA

Mission report: Progress of project from 1 August 1981 to 31 December 1981

Prepared for the authorities of the Libyan Arab Jamahiriya
by the United Nations Industrial Development Organization

Based on the work of A.R. Marei, project co-ordinator

V.82-24019

Explanatory notes

The monetary unit in the Libyan Arab Jamahiriya is the Libyan dinar (LD). During the period covered by the report, the value of the Libyan dinar in relation to the United States dollar was $US 1 = LD 0.296.

A full stop (.) is used to indicate decimals.

A comma (,) is used to distinguish thousands and millions.

References to "tons" are to metric tons (tonnes) throughout.

Mention of firm names and commercial products does not imply the endorsement of the United Nations Industrial Development Organization (UNIDO).

ABSTRACT

This project, "Assistance to the Libyan Cement Factory, Benghazi" (TF/LIB/75/002), is being carried out for the authorities of the Libyan Arab Jamahiriya by the United Nations Industrial Development Organization (UNIDO) under a trust-fund agreement. The project, which was approved in 1975 and has been operating since 1976, is designed to give direct technical assistance to the cement industry.

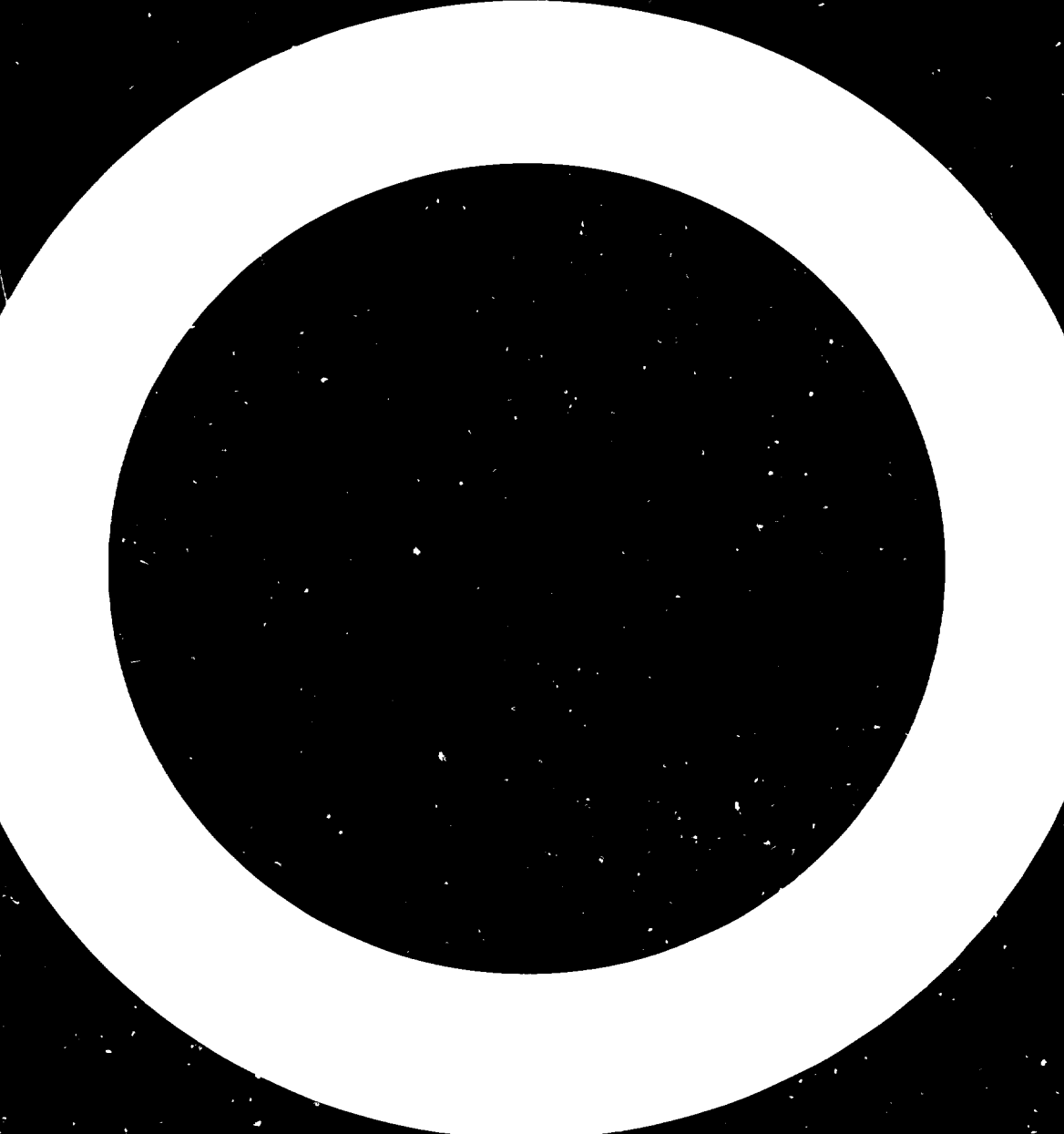
This report covers the mission of the expert who took over as project co-ordinator in May 1980. A progress report on the first stage of the co-ordinator's mission, dealing with the period 10 May 1980 to 31 July 1981, has already been issued (UNIDO/IO/R.33). The present report covers the progress of the project from 1 August to 31 December 1981.

Details are given of the technical-assistance team, of which 14 groups had been fielded up to the end of the period covered, of the next two groups which are expected, anticipated repatriations and candidates on the standby list. A statistical analysis is given of the technical-assistance team according to fielding group, length of stay at the duty station and whether yet repatriated or not.

An account is given of the administration of the project during this period, including the adjustment of post titles and budget lines of some specialists, alteration of the monthly report form and the solutions finally adopted for long-standing problems such as accomodation, air tickets and salary scales. The review of the project's financial particulars is described and suggestions made for avoiding future differences between UNIDO and Libyan Cement Company (LCC) calculations.

An account is given of preparations made for the Interregional Cement Technology Forum held in Benghazi in April 1982.

With regard to the Southern Region Cement Project, the co-ordinator was asked to evaluate the project study and the feasibility study carried out by the project consultants. A summary of the contents of these studies is given together with the co-ordinator's comments.



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INTRODUCTION

This report deals with the activities of the project co-ordinator and the progress of the project, "Assistance to the Libyan Cement Factory, Benghazi" (TF/LIB/75/002), through the period 1 August to 31 December 1981.

This project, carried out by the United Nations Industrial Development Organization (UNIDO) for the authorities of the Libyan Arab Jamahiriya, was approved in 1975 and fieldwork began in 1976.

The expert was first fielded for a short mission from 10 May 1980 to 9 August 1980 and his mission was then extended. The assignment was financed first under a trust-fund arrangement and then through the 14% overhead costs of the project.

This report deals with the second period of the co-ordinator's mission. His first mission report on the progress of the project from 10 May 1980 to 31 July 1981 has been issued under the symbol UNIDO/IO/R.33.

Project background

The Libyan cement industry started in the eastern part of the country with the setting up of the Libyan Cement Comapny (LCC). This company began its activities in Benghazi in April 1972 with one production line producing 200,000 tons per year of normal portland cement. Consecutive extensions followed with a second production line (600,000 tons per year) which was started up in August 1974. The third production line, with a similar annual production capacity was taken over in January 1977. The last extension in the form of a new cement plant at Hawari with an annual capacity of 1 million tons, was provisionally taken over in August 1978. By this time, the cement production capacity in the Benghazi area had reached a total of 2 million tons per year.

A complex of other building-material industries has also been developed. A lime plant started production in March 1975 with a production capacity of 43,000 tons of hydrated lime per year. This plant was further extended by the installation of a second production line. A paper-bag factory with an installed production capacity of 100,000 paper bags per day started production in June 1975. A second production line was added in December 1978. In June 1978, a concrete-block factory with a capacity of 100,000-120,000 cubic metres per year of finished concrete blocks was put into operation. The complex was completed by the installation of a ceramic-brick factory with a capacity of 60,000 tons per year which was commissioned in June 1979.

With this rapid expansion of industrial projects in the building-materials field, LCC was confronted with a greatly increased need for experienced technical personnel to operate the various factories. UNIDO was requested for assistance in supplying technical personnel and advising on the development and expansion of the industry.

This assistance began in 1976 with the appointment of a building-materials adviser who later acted also as project co-ordinator. By May 1978, a technical-assistance team of 52 experts was in the field and it is hoped to expand the team to include 100 experts with diverse specializations.

The present project co-ordinator took over this function in May 1980. His duties and responsibilities include:

(a) Acting as co-ordinator for all UNIDO technical assistance to the Libyan cement industry;

(b) Being responsible for the administrative, social and public-relations services for the Polish specialists;

(c) Together with national counterparts, overseeing normal daily production and dealing with technical and operational problems which arise;

(d) Giving advice to the technical staff on raw materials, raw-mix designs, quality control, laboratory testing and the evaluation of test results.

As a reference guide, a list of all the reports so far issued in connection with this project is given in the last annex.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Administration

1. In general, assistance to consolidate and develop the Benghazi cement industry through this project has proceeded in a most satisfactory way. This was clearly reflected in the figures for cement production in 1981 which increased by more than 40% in comparison with 1980 Co-operation between LCC personnel on the one hand and the UNIDO co-ordinator and the Polish team members on the other has been good and is developing well.

2. Apart from the specific issues mentioned below, most of the co-ordinator's time continued to be spent in helping to supervise LCC cement production and quality control.

3. The co-ordinator brought up to date all the administrative and personnel particulars of the project from the arrival of the first Polish group in Benghazi in May 1978 up to 1 November 1981. Up to that date, a total of 156 specialists had taken part in the project. Of these, 76 had been repatriated and 80 were still at the duty station. Between 1 November and 31 December 1981, a further two specialists were repatriated so that, at the end of the period covered, the numbers of those still at the duty station and those who had been repatriated were 76 in both cases. The updated lists will help in clarifying the situation of the Polish specialists from the administrative and financial points of view as the specialists' attendance periods as well as their home and sick leaves are now indicated. It was also found necessary for the co-ordinator to readjust the post titles of some specialists who are now occupying posts different from those specified in their contracts.

4. The project personnel situation list shows that there are some differences between the specialists originally requested and those actually at the duty station. These differences will be discussed in detail with the LCC authorities in the light of present requirements and the total number of requested specialists mentioned in the agreement can be changed accordingly.

5. The list of standby candidates from the last interviews held in Poland (March 1981) shows that there is a shortage of technologists, especially control panel operators and burners. The co-ordinator discussed the matter with the LCC and they agreed to hold interviews especially for these two types of post at the begining of February 1982. UNIDO was informed of this decision and was asked to arrange with Polservice for the interviews to be held in Poland.

6. The revision of financial and administrative particulars carried out by the LCC delegation at UNIDO headquarters showed that there are some differences between UNIDO and LCC lists concerning the trust funds transferred for the project TF/LIB/075/002. The difference amounted to $US 19,390. This difference was adjusted by deducting this amnount from the funds transferred in September 1981. The project budget lists also showed a difference of $US 340.7. There were still $US 31,050 which had not been refunded to the LCC project budget having been transferred to another project by mistake.

7. The accommodation problem was finally solved as LCC has arranged with a Turkish company to erect prefabricated buildings capable of accommodating 300 single people. According to the contract, these buildings will be ready at the end of March 1982.

8. The air-ticket problem was also solved as UNIDO agreed to authorize Polservice to pay for the tickets and 10 kg accompanied excess baggage and UNIDO will then reimburse Polservice these costs on receiving the air-ticket stubs attached to the claim.

9. Complaints made by the Polish specialists against the co-ordinator about accommodation, air tickets and overtime also came to an end in the same month when Polservice withdrew the complaints and apologized through a telex sent to UNIDO. This telex stated that the problems mentioned had been clarified and that the complaints had been caused by a misunderstanding of the co-ordinators' duties on the part of the Polish experts.

10. It was agreed at a tripartite meeting held in Benghazi between the LCC, UNIDO and Polservice that the salaries of the UNIDO Polish specialists assigned to the project should be increased by 5.5% from 1 September 1981. Another tripartite meeting will be held in Poland in July 1982 to review the salary scales again.

Interregional Cement Technology Forum

11. This forum is to be held in Benghazi in April 1982 under the supervision of UNIDO. The committee which was responsible for organizing and co-ordinating the arrangements at the Libyan end met many times and agreed on the following:

(a) The list of equipment to be purchased through UNIDO;

(b) The contents of the aide-memoire and the list of the organizations to be invited;

(c) That the forum should be held in the main hall of the Training Centre which is capable of accommodating more than 70 participants;

(d) That $US 220,000 should be transferred to UNIDO to cover UNIDO expenses on the forum (TF/INT/81/003), and to authorize UNIDO to cover the most urgent expenses from the budget of project TF/LIB/75/002 until the transferred money arrived;

(e) That the UNIDO project officer should visit European countries to arrange for the invited cement-equipment suppliers to participate in this forum.

12. The co-ordinator received a copy of the agreement concerning the forum on 26 December 1981 and handed it on to A. El Gheriani to be signed and to be sent through the United Nations Development Programme (UNDP) to UNIDO.

Southern Cement Plant

13. The Southern Cement Plant project advanced rapidly after the Al Jufrah area was selected. The Libyan authorities agreed that three members of the project committee (including the co-ordinator) should meet the consultants' representatives in London in September 1981 to discuss, check and revise the tender documents which had been prepared. At this meeting, all the details concerning the selection of the most economical unit size, storage capacity, type of storage, type of machinery and equipment, civil works, water and fuel supply systems, quality-control procedure etc. were discussed and agreed on between the committee members and the consultants' representatives.

14. After the Secretariat for Heavy Industry had received copies of the tender documents, the project study and the feasibility study, the co-ordinator was requested to evaluate them. The main comments and advice submitted by the co-ordinator to the committee can be summarized as follows:

(a) Quarry development and opening is not treated according to the contract specifications;

(b) The co-ordinator thinks that it is not advisable to wait until the quarry benches are being prepared to decide whether the marl should be ripped or blasted. Ripping is certain to be successful in the case of marl and is preferable from the cost point of view. This method should therefore be selected from the outset, though the decision about the method of extracting limestone could be left until later;

(c) The co-ordinator is against using the down-hole type of drill with a 7-inch diameter hole as recommended by the consultants;

(d) Costing of production was estimated on theoretical bases and not on specific costs as prevailing locally.

(e) The capacity of the explosives store (40 tons) is not sufficient in view of the distance from which fresh supplies have to be brought;

(f) The salary rates as shown in the project study are insufficient;

(g) Forecasting of the annual production, sales, and market distribution are not based on realistic figures which in turn affects the cement costing;

(h) The feasibility study represents a collection of the reports previously submitted separately. The only new data are those on costs and they are very rough estimates.

Recommendations

Administration

1. In order to reduce discrepancies between UNIDO's and ICC's budget estimates to a minimum, it is recommended that the co-ordinator's monthly reports showing presence and absence of each Polish specialist should be used as the basic source of data in both cases. UNIDO should check Polservice bills against these reports and they should definitely match.

2. An LCC delegation should visit UNIDO headquarters at least every six months to discuss project particulars and any outstanding problems. Two visits would certainly be necessary this year to agree finally on common bases for financial calculations.

3. Any future complaints about the administration of the project should be handled very carefully to avoid putting any partner in a difficult situation. There have been many problems in connection with this project and these have always been treated carefully by the co-ordinator with the full support of LCC personnel and have usually been resolved in favour of the Polish experts.

4. It is recommended that the co-ordinator should be sent a copy of all official correspondence through direct mail as in some cases there have been delays of over a month in the arrival of documents, i.e. the cement forum agreement.

Southern Region Cement Plant

5. It is recommended that the consultants should be asked to supply detailed scale maps of all the proposed raw-material quarries indicating all their requirements including equipment, labour etc., and, based on these, should give a final costing of all the raw materials used in the raw mix.

6. A decision should be taken to use ripping in extracting the marl and to consider, while preparing the limestone quarry, whether ripping can also be used in extracting the limestone.

7. The down-hole type drill with 7-inch (17.8 cm) holes is not recommended. Smaller holes would be altogether preferable.

8. The consultants should restudy their costing of cement production based on the consideration that 75% production will start in the third year and full-capacity production only after five years.

9. As both the studies submitted by the consultants indicated that a proportion of the production surplus would be exported, they should be requested to attach a marketing study of cement in all the surrounding countries.

10. It is advisable to revise the salary scales indicated in the consultants' project study and to increase them in view of the very isolated area in the central part of the country where the project will be sited.

I. ADMINISTRATION OF THE PROJECT

A. Project personnel

UNIDO's technical assistance to the Benghazi cement industry began in the Hawari Cement Plant in May 1978 with the arrival of the first Polish group. This group was followed by a further thirteen groups between then and 1 November 1981. Given the long continuation of this project, the co-ordinator began to think it necessary to analyse more closely how this team of foreign experts working far from their home country had developed and were managing to continue. The co-ordinator began by tabulating information on the 14 groups that have arrived so far to work at the Libyan Cement Company. This information includes the specialists' names, their budget lines, their group, whether still working or repatriated, the duration and the requested extension of their contracts, the reassigned specialists, the period of the specialists' residence at the duty station and the promotion of some of these specialists at the request of the LCC. This information has been made available to UNIDO and the LCC. Based on this tabulated information, the co-ordinator made a statistical analysis of the specialists according to group number and length of residence period. This analysis is given in full in annex I and can be summarized as follows:

Length of stay (months)	Number of specialists		
	Still at duty station	Repatriated	Total
Less than 6	28	5	33
6-12	10	21	31
13-18	20	34	54
19-24	16	7	23
25-30	1	5	6
31-36	-	2	2
More than 36	5	2	7
Total	80	76	156

The specialists who are still assigned at their duty station and those who have been repatriated can be arranged according to their group numbers as follows:

Specialists	Group number														Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Still assigned	2	3	5	2	6	2	14	6	6	5	2	6	10	11	80
Repatriated	23	17	4	8	8	6	5	3	1	-	-	1	-	-	76
Total	25	20	9	10	14	8	19	9	7	5	2	7	10	11	156

There are two specialists, one in group 13 and the other in group 10, who have been reassigned and were originally members of groups 1 and 2 respectively. There is also one specialist who was repatriated twice from groups 2 and 9 respectively. Therefore the numbers can be increased by one specialist in group 1 and two specialists in group 2 and accordingly the total number of all specialists, not taking duplication into account, would be 159. The repatriated specialists would then be 79.

The figures tabulated are for the period up to 1 November 1981. Between that date and the end of the period covered by this report (31 December 1981), another two specialists have been repatriated and a further seven repatriations are expected before 31 March 1982. On the other hand, a total of 10 specialists will be arriving to take up assignments in the fifteenth and sixteenth groups, to be fielded shortly. The total number of specialists at the duty station will, therefore, remain about the same. A summary of all the information on the present state of project personnel is given in annex II.

It was noticed that there is some difference between the posts the specialists occupy according to their contracts and the main jobs they are actually doing in their duty station. The fact is that the LCC try to put each specialist in the most suitable job needing to be filled. At the request of the UNIDO project officer, and after discussions with the heads of all the LCC departments concerned, the co-ordinator prepared a revised list of the Polish specialists according to their actual present posts and budget lines. The summary of project personnel given in annex II is based on this revised list.

In the early days of the project, the Polish specialists were assigned to the Hawari Cement Plant and the lime plant, but now they are also serving in the Benghazi Cement Plant, the ceramic-brick and concrete-block plants and the paper-bag factory. The specialists can be classified according to their main working plant as follow:

Hawari Cement Plant	47
Lime plant	9
Benghazi Cement Plant	21
Ceramic-brick and concrete-block plants	2
Paper-bag factory	1
Total	80

B. Administrative monthly reports

The monthly report form showing annual leave, sick leave and cumulative totals of annual and sick leave of the UNIDO specialists was changed in October 1981 to include time off for injury at work as well. The specialists' names are arranged according to their budget lines. The cumulative total of annual and sick leave and time off for injury at work for the current year are included in the same report, as can be seen in the sample sheet of this report form given in annex III.

The other monthly report showing presence or non-presence of each specialist on each day of the month is still arranged in the same manner as before, showing name, budget line, presence or non-presence and reason for absence. A sample copy of this report form is also given in annex III.

C. Revision of project particulars

During the last visit of the UNIDO project officer to Benghazi, it was agreed that a delegation from the LCC should come to Vienna from 6 to 10 September 1981 to review the financial situation of the project. The LCC delegation consisted of the co-ordinator, M.Z. Ibrahim (the Financial Manager) and A.M. Abd el Mejid.

The delegation met with the UNIDO project officer and with members of the Division of Administration to carry out the following tasks:

(a) To review all the amounts transferred to UNIDO (trust funds deposited for the project TF/LIB/75/002) for the years 1980 and 1981 up to the arrival of the delegation;

(b) To review the costs that UNIDO has put down to the LCC budget for 1980 and compare these to the costs listed by LCC against their budget for 1980;

(c) To discuss with UNIDO personnel the following points which remained outstanding from the last revision of project particulars at UNIDO headquarters in November 1980;

(i) The $US 31,050 transferred from this project (TF/LIB/75/002) to project TF/LIB/78/002 according to the letter (ref. A/S 79-06-325-FHR/JMJ) sent by the Financial Services Section on 26 June 1979 to the UNDP Resident Representative in Tripoli,

(ii) Clarification of the exact sa[illegible] which UNIDO has to pay to all the specialists accordi[illegible]ir budget-line category.

The resulting discussion on these po[illegible]s summarized below.

Review of the trust funds deposited for the project for 1980 and 1981

Between December 1979 and September 1980, $US 1,096,000 were transferred according to LCC official bank records. The amount transferred to the project, according to UNIDO records, was $US 1,095,960. The difference of $US 40 may represent bank charges, mailing etc. Accordingly, LCC will be charged with this difference. For the first half of 1981 until 30 June, LCC records indicate that $US 1,352,000 had been transferred between October 1980 and 15 June 1981. On the other hand, UNIDO records showed that $US 1,371,390 had been deposited for the project. It was agreed that the difference between these amounts ($US 19,390) should be subtracted from the amount to be transferred in September 1981. This has already been done, only $US 132,610 being transferred in September instead of $US 152,000.

Review of UNIDO costs for 1980 for the Polish specialists

The LCC authorities agreed to transfer to UNIDO an average of $US 2,000 for every UNIDO specialist still at the duty station at the middle of every month according to the presence and non-presence monthly report submitted to UNIDO by the co-ordinator. According to LCC records, the budget for 1980 was charged with $US 1,184,127 for UNIDO specialists' and experts' salaries and expenses. On the other hand, UNIDO computer records showed that the project budget was charged with the following:

	$US
Salaries	832 499
Air tickets	7 659
Miscellaneous	3 225
Total	843 383

(14% overhead costs were not included)

It is clear that there is a difference of $US 340,744 between the project budgets for 1980. This difference was rechecked and discussed. It emerged from the discussion that the difference was likely to be due to one or more of the following causes:

(a) UNIDO charges the budget only with the bills received from Polservice. Accordingly, it may be that about two months (November and December 1980) were not included in the 1980 budget on the UNIDO computer record as bills for these months could have been received at the beginning of 1981;

(b) From the computer record, it can be deduced that the computer was fed with wrong data, especially concerning the specialists' working days (man/months). For example, the data shows budget line 11-25 as 23 man/months worked during this year. The fee scale for this budget lines is $US 1,462 which means that this budget line ought to be charged with 23 x 1,462 = $US 33,626. The UNIDO computer record, however, showed that this budget line was only charged with $US 10,960;

(c) There were some differences between UNIDO and LCC lists in the budget lines of some specialists and, accordingly, these differences were reflected in their salaries. This difference amounted to $US 2,009.

Matters pending

At the meeting to revise project particulars on 10-14 November 1980 at UNIDO headquarters, it was found that $US 31,050 had been transferred from the LCC budget for TF/LIB/75/002 to another budget. Accordingly, LCC requested UNIDO (letter dated 18 November 1980) to refund the sum mentioned to the credit of project TF/LIB/75/002. A letter dated 27 January 1981 was sent to the UNDP Resident Representative in Tripoli informing him that the LCC project was never involved in these transactions and that, apparently, the misunderstanding had been caused by a typing error in a letter of 26 June 1979 from the Division of Industrial Operations.

At this last meeting to revise project particulars, it was found that the sum in question had still not been refunded to the LCC project. It was agreed that UNIDO would take action to refund this amount to the project as soon as possible.

UNIDO was requested by the LCC delegation to send copies of the Polservice bills to be checked by LCC with respect to the attendance of the Polish specialists at the duty station, their budget lines etc. This proposal was not accepted and it was instead agreed that:

(a) The project budget for 1980-1981 will be revised and rechecked and that action will be taken on matters raised by the delegation;

(b) UNIDO will refund $US 31,050 to the LCC project before the end of this year i.e. before the next revision takes place at the end of January 1982;

(c) That the salaries of repatriated specialists should include compensation for their annual leave.

As the main differences between LCC and UNIDO lists centre around the residence period of the specialists at their duty station, the co-ordinator proposed that, to reduce differences to a minimum, common data bases should be used both in UNIDO and in the LCC as follows:

(a) The monthly report of the presence and non-presence of UNIDO specialists prepared by the co-ordinator can be considered as the main sources of data applicable in both UNIDO and LCC;

(b) Polservice bills have to be checked against the co-ordinator's monthly reports. The data should be the same, as Polservice has a team leader at the site;

(c) Up-to-date computer records have to be received monthly by the co-ordinator for him to check;

(d) Common records of annual leave can also be based on the monthly report by the co-ordinator, prepared according to UNIDO instructions, and any queries concerning these monthly reports can be dealt with by telex or letter;

(e) Periodically, and at least every six months, a delegation from LCC ought to meet with the relevant personnel at UNIDO headquarter to check and revise the financial and administrative situation of the project.

It was agreed with the UNIDO project officer that the LCC delegation should return to UNIDO at the end of January or the beginning of February 1982 to finally clarify all matters relating to the project for 1980 and 1981. It was in order to assist this clarification at the next meeting that the co-ordinator prepared all the necessary data concerning the project from its beginning up to 1 November 1981, as described above. The information needed to bring these records up to date till the end of 1981 will be added at the beginning of 1982 and before the departure of the delegation to UNIDO headquarters.

D. Shortage of technologists in the standby list

Interviews were held in March 1981 in Poland to select personnel for the technical-assistance team. From these interviews, a list of standby candidates was compiled consisting of 113 specialists (a further three candidates subsequently turned out not to be available).

A summary of the standby list is given in annex IV. From this, it can be seen that there are very few specialists in certain fields, particularly control panel operators and burners. LCC is already in need of more burners than are on the list.

After discussions with the LCC, the co-ordinator will ask UNIDO to arrange with Polservice for further interviews for the required technologists.

E. Major problems tackled

Accommodation

In his first progress report, the co-ordinator explained that the present accommodation was not sufficient for more than 80 to 85 specialists and that accommodating the 100 specialists originally envisaged in the project agreement was impossible. This problem is now about to be solved as the LCC has contracted a Turkish company (Libko Türk) to erect some prefabricated buildings in an area adjacent to the Hawari Cement Plant. The buildings will be able to accommodate 300 single people. According to the contract, the buildings will be ready for use at the end of March 1982. The Turkish company already started work on the buildings in October 1981 and it is to be hoped that this major problem with all its associated difficulties will now come to an end.

Air tickets

The question of how to arrange payment for specialists' air tickets was one of the main problems throughout the last year. In his last progress report, the co-ordinator proposed three alternative solutions. The same problem had previously been dealt with by the UNIDO project officer and by A. Afify in his report.

Following action taken by UNIDO in June 1981, UNDP in Tripoli confirmed that they will contact Libyan Airlines as soon as possible after receiving a UNIDO authorization to issue air tickets, providing this is at least two weeks in advance. At the tripartite meeting (LCC, UNIDO and Polservice) held in August 1981, the co-ordinator discussed this matter again with the Division of Industrial Operations and the Division of Administration at UNIDO and it was agreed, after reviewing the present situation, that the project co-ordinator will request the Personnel Administration Section to authorize tickets for annual leaves, repatriation or family visits. UNIDO will, in turn, authorize Polservice to pay for the tickets and 10 kg accompanied excess baggage. UNIDO will reimburse Polservice the cost of the tickets and the excess baggage on receiving back the air ticket and the excess-baggage stubs attached to the travel claim. Since UNIDO began to authorize Polservice in this way, there has been no further difficulty with this problem.

Complaints of some Polish specialists

The co-ordinator was informed in July 1981 by the Polservice representative in Tripoli that he had received a letter from some of the Polish team members complaining about the co-ordinator in respect of their problems with accommodation, air tickets and overtime. This letter was sent on in turn to Polservice, to UNIDO and to UNDP, Tripoli.

As Polservice is well aware, the project is making good progress and relations between the Polish team, the co-ordinator and the LCC authorities are generally good. The complaints are more general than personal in nature, having to do with long-standing problems which existed also under the previous project co-ordinator, A. Afify.

With regard to overtime, the co-ordinator should not be involved in this matter according to UNIDO rules. However, he had discussed this complaint (involving only three specialists) with the LCC and the problem was solved entirely in favour of the specialists. The other problems over housing and air tickets were also in the process of being settled in favour of the specialists who had expressed themselves completely satisfied. It was, therefore, with great surprise that the co-ordinator heard of the complaints against him.

It was explained to the Polservice representative that the air-ticket problem had been solved, the housing problem will soon also be resolved by the construction of prefabricated buildings and that UNIDO cannot be involved in negotiations about overtime as compensation for overtime is not included in the specialsts' contracts and that any agreement about overtime must be made between the LCC and the Polservice representative. This matter was also discussed in the tripartite meeting and the LCC representatives explained that the specialists are quite often asked to work overtime since they are needed to run the LCC plants all the time these are operating and that the LCC is compensating them by way of ex-gratia payments. LCC also promised to finish the new housing as soon as possible in order to accommodate the 100 specialists orginally agreed upon. This should reduce the overtime required to a minimum and in emergency cases only.

In view of all this, the co-ordinator requested that an official apology should be made to him. On 2 November 1981, UNIDO received a telex from Polservice withdrawing the complaints and apologizing for any trouble caused. The telex stated that all problems had been clarified and that the complaints had been caused by a misunderstanding of the co-ordinator's duties on the part of the Polish experts.

UNIDO asked UNDP on 10 September 1981 to convey this message to the Libyan authorities and to close the matter.

Increasing the team salaries

As already mentioned in the last progress report, a tripartite meeting was held from 25 to 27 August 1981 between LCC, UNIDO and Polservice representatives at the Libyan Cement Company offices in Benghazi. The meeting discussed the request of Polservice, through UNIDO, that the salaries of Polish specialists assigned to the project should be increased by the following amounts:

		$US
Grade A:	from	2,236 to 2,561
Grade B:	from	1,806 to 2,077
Grade C:	from	1,462 to 1,681

This would represent a salary increase of about 15%.

The representatives of LCC, Polservice and UNIDO came to the following agreement:

(a) The LCC agreed to revise the salaries of the Polish team as follows;

			$US		
A:	Engineers, university graduates	from	2,236	to	2,360
B:	Foremen, central control operators and x-ray specialists	from	1,806	to	1,900
C:	Technicians	from	1,462	to	1,550

(b) The new rates will be effective as of 1 September 1981 and will be valid till 31 August 1982;

(c) In July 1982, a new tripartite meeting will be held in Poland to re-examine the rates now established;

(d) Polservice can withdraw its participation in the present agreement giving 60 days' notice;

(e) LCC will increase the availability of flats for the Polish specialists so that 100 specialists plus 6 supporting persons can be accommodated in reasonable quarters.

At the suggestion of the Secretariat for Heavy Industry, LCC subsequently asked Polservice to amend section (d) as follows:

(d) Polservice can withdraw its participation in the present agreement giving 60 days' notice if the tripartite meeting mentioned in (c) does not succeed in coming to an agreement.

Polservice agreed to this admendment;

II. INTERREGIONAL CEMENT TECHNOLOGY FORUM

The idea of holding an interregional cement technology forum in Benghazi arose after A. B. El Saltany reported to A. El Gheriani on the cement seminar he had attended in Beijing from 9 to 22 October 1980. This had been organized by UNIDO in co-operation with the Government of the People's Republic of China. A. El Gheriani sent a letter to the Secretary of Heavy Industry proposing to hold a similar seminar in Benghazi to be organized by UNIDO and under its supervision. The Secretary of Heavy Industry agreed to hold and finance such a seminar in the Training Centre, Benghazi. It was agreed that the participants to be invited by UNIDO should be as follows:

Participants representing developing countries	20
Lecturers from cement organizations in developed countries	10
UNIDO staff	5
Total	35

UNIDO was informed by LCC of the Secretary's decision on 8 February 1981. The UNIDO project officer, on his mission to Benghazi in June 1981, discussed the matter with A. El Gheriani, A. B. El Saltany, A. Afify and the co-ordinator. Agreement was reached on the developing countries that could be directly invited by UNIDO, the principles determining the main subjects to be discussed in this seminar, the organizations to be invited as contributors and the date and duration of the seminar. All the details of the proposed seminar were outlined in the aide-memoire which was sent to LCC and which is included as annex V, together with a full list of participants to be invited.

The aide-memoire shows that the main purpose of this Interregional Cement Technology Forum is the collection and dissemination of information regarding all technological aspects of the cement industry, examples of the application of special know-how and experience, reduction of investment and operating costs, improvements in production and maintenance and advice on problems of pollution, transport, climate, raw materials etc.

During the co-ordinator's mission to UNIDO with the LCC delegation, the cost estimate and budget and the facilities which the Libyan authorities can offer for this forum were discussed. Agreement was reached on hotel accomodation, the conference room, bus to be provided during the conference, equipment needed and many other points.

After his return to Benghazi, the co-ordinator started to consult with the Libyan authorities concerned with the forum, i.e. the LCC and the Training Centre. Many meetings were held concerning this forum at which the participants were:

M. El Neihoum	General Director of LCC
A. El Dursi	Director of Training Centre
A. B. El Saltany	Director of Projects and Planning Department
R. Lofti	Technical Consultant of Training Centre.

The decisions taken in these meetings can be summarized as follows:

(a) The list of equipment to be purchased through UNIDO was agreed after it had been checked and commented on by the university experts;

(b) The list of organizations mentioned in the UNIDO proposal was agreed on;

(c) It was agreed to transfer $US 220,000 to UNIDO account TF/LIB/81/003 to cover all UNIDO expenses according to the UNIDO telex dated 5 November 1981;

(d) The forum will be held in the Training Centre hall which is 16 x 8 metres with two entrances. The hall is fully equipped with the necessary electric plugs, video projectors etc. The participants will sit in a U-shape of tables to take 35 people. Behind this, another row of tables can be arranged to accomodate more than 70 people;

(e) Action will be taken through a special committee selected by the Secretariat of Heavy Industry to prepare all the facilities requested for the forum such as hotel reservations, reception of participants, transportation and so on;

(f) To facilitate the progress of arrangements, it was agreed that UNIDO will purchase one stencil machine plus four typewriters (two English and two Arabic) and can charge the forum budget with the cost;

(g) It was agreed that the UNIDO project officer shall travel to various European countries to encourage the invited cement-equipment suppliers to participate;

(h) To facilitate financial matters, it was agreed that UNIDO can cover all the expenses from the project budget of TF/LIB/75/002 until the arrival of the money transferred to the budget for the forum, TF/LIB/81/003;

(i) Concerning the proposal of Holderbank to contribute a paper to the forum about either;

(i) Organizing and running a training centre for a cement idnustry, or

(ii) Improving the operation and management of cement plants,

it was agreed to select the second subject only as the Libyan Training Centre for the Cement Industry has already been operating for one year.

The copy of the agreement on this forum between UNIDO and the Secretariat of Heavy Industry was only received very late on 26 December 1981. The co-ordinator took it to Tripoli for signature by A. El Gheriani, and A. Afify will then send it to UNDP.

III. THE SOUTHERN CEMENT PLANT PROJECT

As stated in the last progress report, the Al Jufrah area was finally selected as the most suitable area for the erection of the new cement plant, which is to have a capacity of 1 million tons. The committee working on the project and the firm of consultants were asked to continue with the Al Jufrah cement plant project and to wait for a final decision of the General People's Committee on whether a small-scale cement plant should be erected in Wadi Ash Shati or not. It was also agreed that the consultants would continue to prepare the tender documents in co-operation with the committee members and would have them ready by the end of September 1981.

At the beginning of August 1981, the Secretariat of Heavy Industry was informed by the consultants that they were ready to discuss the preliminary tender documents with the committee members at their offices in London. The General People's Committee and the Secretary of Heavy Industry authorized three members of the Project Committee to travel to London to review and discuss the prepared tender documents with the consultants' representatives. The committee members who were sent to London were M. El Taher, M. Jouda and the co-ordinator. The co-ordinator, who had been in Vienna with LCC representatives for the revision of the project particulars, travelled to London on 11 September 1981 and met the other two committee members and the consultants' representatives. The tender documents were thoroughly studied and the committee's comments were then discussed with the consultants' representatives. Some amendments were made, after securing agreement from both sides, during the long discussions which took place from 11 to 20 September 1981.

The co-ordinator had also been asked to evaluate the project study which had been prepared by the consultants, the Kuljian Corporation. The details of the proposed Southern Cement Plant which are given below are all extracted and summarized from this project study. The co-ordinator's comments follow in section J of this chapter.

A. Selection of most economical unit size, storage capacity and type of storage

Design basis

Clinker production	-	2 lines @ 1 600 t/d = 3 200 t/d x 310 d/a = 992 000 t/a clinker
Cement production	-	With 4% gypsum addition = 1 033 333 t/a

Specific heat consumption

for clinker burning	-	825 kcal/kg clinker (assumed)

Raw-material proportions (%)

Limestone	44	-	67 average 54.5
Marl	24	-	50 average 36.7
Sand	4	-	11 average 8.0
Iron ore	0.3	-	1.1 average 0.8

Lump size in state of supply

Limestone	-	1 200 mm (max.)
Marl	-	800 mm (max.)
Sand	-	2.85% retained over 0.25 mm sieve (grain-size range from 0.06 to 0.25 mm)
Iron ore	-	800 mm (max.)
Gypsum	-	300 mm (max.)

Operating hours and operating days

Main plant groups	Shifts per day	Effective hours	Days per week	Days per annum
Limestone quarry	1	7	6	310
Marl quarry	1	7	6	310
Limestone/marl crushers and transport	1	7	6	310
Gypsum/additive crusher and transport	1	7	6	310
Raw-material pre-blending storage	1	7	6	310
Raw-material reclaiming and transport to raw mill	3	22	6	310
Raw grinding and transport	3	22	6	310
Blending and storage of raw meal	3	24	7	335
Kiln, cooler and clinker transport	3	24	7	310
Cement grinding and transport	3	20	6	310
Cement packing and dispatch	2	12	6	310
Fuel-oil unloading	2	12	6	310

Water supply, treatment and distribution	3	24	7	365

Physical properties of material

Material	Condition	Particle size (mm)	Bulk density (t/m3)	Angle of repose (degree)
Limestone	as mined	1 200 max.	1.6	35 - 40
Limestone	crushed	0 - 25	1.5	38
Marl	as mined	800 max.	1.5	35 - 40
Marl	crushed	0 - 25	1.4	38
Iron ore	as received	800 max.	2.0	35 - 38
Sand	as received	0 - 0.25	1.4	35
Gypsum	as mined	800 max.	1.4	35
Gypsum	crushed	0 - 25	1.4	35
Additive (pozzolana)	crushed	0 - 25	1.4	38
Raw meal (homogenized and stored)			1.0	35 - 40
Clinker (stored)		30	1.3	38
Cement (stored)		3 200-4 500 (Blaine)	1.2	38 - 40
Fuel oil			0.9	

Requirement of raw materials, fuel and water

(Tons)

Item	Daily	Weekly	Annually
Raw meal	2 x 2 608 = 5 216	36 512	1 616 960
Limestone	2 x 1 421.36 = 2 842.72	19 899	881 243
Marl	2 x 957.14 = 1 914.28	13 400	593 427
Sand	2 x 417.28 = 417.28	2 921	129 357
Iron ore	2 x 20.86 = 41.72	292	12 933
Gypsum	2 x 91.67 = 183.33	1 100	56 832
Additive (pozzolana)	2 x 320 = 640	4 480	198 400
Fuel	2 x 138.95 = 277.9	1 945	86 147
water	1 440	10 080	

Note: Clinkerization factor = 1.63 (assumed)

Calculation of production capacities of major equipment

Limestone crusher

Required capacity $2 \times 1\,600 \times 1.63 \times \frac{7}{6} \times \frac{1}{7} \times 1.1 \times \frac{54.5}{100} = 521.16$ t/h

Recommended number of crushers and capacity 1 @ 550 t/h

Marl crusher

Required capacity $2 \times 1\,600 \times 1.63 \times \frac{7}{6} \times \frac{1}{7} \times 1.1 \times \frac{36.7}{100} = 350.95$ t/h

Recommended number of crushers and capacity 1 @ 400 t/h

Gypsum/additive (pozzolana)/iron crusher

Required capacity $(1\,100 + 4\,480) \times \frac{1}{6} \times \frac{1}{7} \times 1.1 = 5\,580 \times \frac{1}{6} \times \frac{1}{7} \times 1.1 = 146.14$ t/h

Recommended number of crushers and capacity 1 @ 200 t/h

Material-handling system 240 t/h minimum

Raw mill (closed circuit)

Required capacity $2 \times 1\,600 \times 1.63 \times \frac{1}{22} \times \frac{7}{6} \times 1.1 = 304.27$ t/h

Recommended number of mills and capacity 2 @ 155 t/h

Grate coolers for clinker cooling

Recommended capacity 1 600 x 1.1 = 1 760 t/d for each kiln line

Number of grate coolers 2

Cement mills (closed circuit)

Required capacity $2 \times 1\,600 \times \frac{100}{96} \times \frac{7}{6} \times \frac{1}{20} \times 1.1 = 213.89$ t/h

Recommended number of mills and capacity 2 @ 110 t/h at 3 200 Blaine fineness

Packing plant

Required capacity $\frac{1\ 033\ 333}{310} \times 1.2 \times \frac{1}{12} = 333.33$ t/h

Recommended number of machines and capacity 4 @ 90 - 100 t/h

All feeding and transporting equipment

In general, all feeding and transporting equipment, if not otherwise specified, shall be capable of handling an output of at least 120 per cent of the rated output of the major items of the plant which they directly serve.

Summary

The required rated capacities of all major equipment and the number of each kind of equipment to be installed at the plant are summarized below.

Main machinery	Number and rated capacity
Crusher, limestone	1 @ 550 t/h
Crusher, marl	1 @ 400 t/h
Gypsum/additive/iron ore crusher	1 @ 200 t/h
Travelling stacker, limestone	1 @ 650 t/h
Travelling stacker, marl	1 @ 420 t/h
Bridge-type reclaimer	2 @ 200 t/h
Scraper-type reclaimer	1 @ 150 t/h
Raw mill	2 @ 155 t/h
Rotary kiln	2 @ 1 600 t/d
Grate cooler	2 @ 1 760 t/d
Cement mill	2 @ 110 t/h
Packing machine	4 @ 90-100 t/h

The recommended storage capacities and types of storage will therefore be as below.

Material	Storage time (days)	Useful capacity (tonnes)	Type of storage
Limestone	14	2 x 20 000	Enclosed type
Marl	14	2 x 14 000	Enclosed type
Iron ore	30	1 x 1 250	Bin cylindrical solt feeder

Sand	15	1 x 6 250	Enclosed type
Raw meal	4.5	4 x 6 000	Cylindrical type
Clinker	20	1 x 65 500	Enclosed type
Gypsum	37.3	1 x 5 000	Enclosed type
Additive (pozzolana)	10	1 x 7 000	Enclosed type
Cement	9	4 x 10 000	Cylindrical type
Palletized cement (in bags)	1	1 x 3 200	Sheltered type (future)
		(cubic metres)	
Fuel	60	2 x 10 000	Cylindrical type
Raw water	6	2 x 5 000	Cylindrical type
Drinking water	4	1 x 500	Water tank of RCC construction
Cooling water	.21	1 x 1 000	Water tower of RCC construction

B. Planning, design standards and concept of civil and architectural work

The design of the plant shall take the local conditions into consideration and the specification shall require that the most economic and effective methods and materials are used. Each building and structure shall be functionally designed so as to provide enough space for the operation, maintenance or removal of the machinery and give plant staff a good and safe work environment.

All buildings shall be designed to harmonize in external appearance with adjacent structures. All facilities shall be planned and designed taking into account the safety of human lives and the requirements of plant equipment and machinery.

The following buildings are envisaged:

Administration building (2 floors)

Gatehouses (nos. 1 and 2)

Sales office

Truck scale house

Security building

Canteen and locker room

Fire station

Secretariat guest house

Secretariat and consultants' housing (11 units)

Workshop

Store

Control room/laboratory (3 floors)

Maintenance garage

Quarry office

Shop and store

Brick and lubricant store

Raw mill building

Cement mill building

Secretariat and consultants' site office — Packing plant building

C. Water supply and treatment

The plant will need about 65 m^3/h of water as make-up water and about 5 m^3/h of water as drinking water. This water will have to be drawn from a lower aquifer through bored wells which must be suitably located near the plant site depending on the water table. The depth of these wells is likely to be between 450 and 500 metres. The chemical analysis of water samples collected by the consultants from the water-supply system of the agricultural project at Sawknah is shown below. (N.B. This water is drawn from the upper aquifer.)

	8.6 parts per million
pH	
Total dissolved	1 784
Total hardness ($caCo_3$)[a/]	556
Alkaline hardness to pp[b/] (as $CaCO_3$)	24
Alkaline hardness to MeO[c/] (as $CaCO_3$)	220
Calcium (Ca)	129
Magnesium (Mg)	56
Nitrate (as NO_3) semi-quantitatively	approx. 10
Total manganese (as Mn)	less than 0.1
Total iron	none detected
Sodium (Na)	282
Potassium (K)	29
Chloride (Cl)	493
Sulphate (SO4)	298

a/ Calcium carbonate

b/ Phenolphthalein end-point

c/ Methyl orange end-point

This water is hard water which cannot be directly used as cooling water. It will need softening. This water is suitable for drinking purposes after proper chlorine treatment. The water will be softened to a total hardness of about 90 parts per million (as $CaCO_3$) at the rate of about 65 m^3/h.

D. Fuel-oil system

The station has been designed to burn no. 6 oil as the primary fuel. Two vertical welded-steel storage tanks, each of 10,000 m^3 storage capacity, have been provided. This would suffice for 60 days supply. During the initial stages of plant operation, fuel oil will be delivered by road tankers. A truck-unloading system suitable for emptying at least six trucks at a time will have to be provided. Two unloading pumps, each of 100% capacity rated for 120 m^3/h at a discharge pressure of 5 $kg/cm^2(g)$(500kPa) will take the oil from the trucks and deliver it to the storage tanks. To heat the no. 6 oil to maintain the proper viscosity for atomization at the burners, the use of thermal liquids, Dowtherm, Hydrotherm or the equivalent, has been envisaged. The thermal-liquid system will be in a closed loop incorporating an oil-fired boiler (no. 2 oil) and circulation pumps. The hot thermal liquid will be utilized in the tank suction heaters and the main fuel-oil heaters after the burner pumps to maintain the proper oil temperature. The suction heaters at the main fuel-oil tank will be sized to maintain a temperature of 40°C at the fuel-oil suction pumps, while the main fuel-oil heaters after the pumps will raise the oil temperature to 60°C (or as recommended by the manufacturer) to achieve the atomizing viscosity. Temperature control will be provided at each of the heaters. Two 100% capacity fuel-oil pumps will be provided for each kiln. The pumps will be rated for 4 m^3/h capacity at a discharge pressure of 40 $kg/cm^2(g)$(4,000 kPa). Pumps will be of the positive-displacement type. The return oil from the burners will be directed to the main storage tank. All fuel-oil lines will be electrically traced and insulated. The station will also have a 60-day capacity storage tank (100 m^3) for the no. 2 oil needed for the thermal-liquid boilers. A separate truck-unloading facility comprising two unloading pumps (50 m^3/h at 3.5 $kg/cm^2(g)$ [350 kPa] discharge pressure and modified) will be provided for no. 2 oil.

E. Source and amount of electric power

The power requirement of the proposed one million tons per year cement plant, which will have two production lines, each of 1,600 t/d capacity, is estimated to be 25 MVA.

A grid substation with two 63 MVA, 220/66 kV transformers and four outgoing feeder bays is being constructed at Hun about 30 kilometres from the site. The Secretariat of Electricity will supply power from this substation to the cement plant by a double circuit, 66 kV overhead line. Each line is rated for a minimum of 100% of the plant capacity (25 MVA) and will terminate at the receiving substation of the cement plant. Two transformers, each rated at 100% of the plant load, will be provided at the receiving substation to step down the voltage from 66 kV. The various load-centre substations will be fed at 6.6 kV from the receiving substation.

F. General description of process and service departments

The process flow sheets A-F given in annex VI show the flow of the material and gases in the plant and the interrelation of the various process departments.

G. Instrumentation and control system of the production lines

The control system is based on a centralized control concept which will provide complete and comprehensive monitoring of significant variables in each section of the process and will ensure complete control of all operational requirements and safety measures needed for the plant.

Central control

The main plant process, starting with withdrawal from pre-blending stockpiles and ending with cement transport to cement silos, will be monitored and controlled from the central control room. There will also be six other small control rooms, common to both the lines, which are known as auxiliary control rooms. They are responsible for various sections of the process.

Auxiliary control rooms 1 and 2: raw-material crushing and handling system.

Auxiliary control room 3: gypsum/additive (pozzolana)/iron ore crushing plant and handling station.

Auxiliary control room 4: cement packing and dispatch section.

Auxiliary control room 5: water-treatment plant and house, to control water-treatment process and the related pumps.

Auxiliary control room 6: fuel-oil pump house, to control fuel-oil unloading, storage and pumping to day tanks.

Computer control

The instrumentation and control system envisaged for the main plant will be based on a central computer with analog back-up for kiln control. The computer system will be employed to perform multi-directional activities which can be principally split up as:

Data acquisition	To supply comprehensive and digested operation information in readable form.
Closed and open loops	To perform various pre-programmed control loops such as kiln control, raw-material proportion control and all the open-loop control and operator log.
Programmable logic control	To carry out sequential motor-control logic and various other inter-locking activities throughout the plant.

The following variables, at least, will be brought under computer control; kiln burning-zone temperature, kiln back-end temperature, and O_2 content in the outgoing flue gas of the kiln.

The sort of instruments that will be supplied with the equipment include instruments to measure local pressure and temperature, gauges, switches, flow switches, level indicators etc. These will be provided with the rotating equipment and heavy-duty motors for safety and to give local readings. Two multi-channel, closed-circuits colour television sets are proposed for the central control room to monitor the kiln burning zone, clinker at kiln discharge, clinker in the grate-cooler hot chamber, pre-blending storage hall and all material-handling transfer points.

Two X-ray analysers, along with the equipment needed for table preparation of pellets will be installed in the chemical laboratory to analyse the various samples collected automatically through pneumatic tubes from different sampling points. A paramagnetic-type O_2-content analyser, infra-red absorption-type CO-content analyser and an infra-red or thermal-conductivity-type CO_2-content analyser will be provided at appropriate parts of the process with a view to ensuring perfect combustion in the kilns and safeguarding equipment like the electrostatic precipator. Infra-red detectors with a swivelling mechanism for quick and continuous scanning of the kiln-shell temperature profile are envisaged. Ultrasonic- and nucleonic-type level switches are envisaged for the silos, bunkers, hoppers and cyclone stages of the preheater depending on the application. For continuous level monitoring in the silos, electro-mechanical level detectors are envisaged.

Quality-control procedure

The number and frequency of samples to be collected from various sampling points in the plant for analysis will be established during commissioning of the plant. Given here is a general scheme for collecting samples and for analysis work which could be followed by the plant.

Location of sampling point	Material sampled	Frequency of sampling	Type of analysis
Quarry	Limestone and marl	To be established during quarry operation	Complete chemical analysis
Limestone storage hall	Limestone	1 sample every week	Complete chemical analysis
Marl storage hall	Marl	1 sample every week	Complete chemical analysis
Additive-crushing plant	Iron ore	1 sample per batch of iron ore	Complete chemical analysis
Additive-crushing plant	Gypsum	1 sample per batch of gypsum	Complete chemical analysis
Additive-crushing plant	Sand	1 sample per batch of sand	Complete chemical analysis

Additive-crushing plant	Pozzolana	1 sample per batch of pozzolana	Complete chemical analysis
Limestone feed bin	Limestone	1 sample per day	Complete chemical analysis
Marl feed bin	Marl	1 sample per day	Complete chemical analysis
Raw-meal transport to blending and storage silo	Raw meal	1 sample per hour for each raw mill	Complete chemical analysis. $CaCo_3$, moisture, fineness
Kiln feed	Raw meal	1 sample every 4 hours per kiln line	$CaCo_3$, moisture, fineness
Kiln and electro-static precipitator dust transport screw	Partly-calcined raw-meal dust	1 sample every 12 hours per kiln line	Complete chemical analysis and $CaCO_3$
Clinker after grate cooler	Clinker	1 sample every hour per kiln line	Complete chemical analysis and physical test for a day's average sample
Cement transport to cement silo	Cement	1 sample every hour for each cement mill	Fineness, SO_3 once every hour, chemical analysis and physical test once every day
Packing plant	Cement	1 sample every shift per silo	Fineness, SO_3 once every hour, chemical analysis and physical test once every day

Mode of sample transport to laboratory

Raw-meal and cement samples will be collected by automatic sampler and transported to the plant laboratory by a pneumatic-tube transport system. The possibility of manual collection of samples will also be provided for. Spot sampling will be used for collecting the other samples described above.

Physical and mechanical testing of samples

The plant laboratory will be properly equipped for carrying out all the physical and mechanical tests according to the Libyan Standard 21 or British Standard specifications.

H. Estimated cost of project

Summary of capital costs

	(thousands of Libyan dinars) Total	Local	Foreign
Consultancy services	1 200	100	1 100
Mechnical equipment	15 900	900	15 000
Electrical equipment	4 600	200	4 400
Instrumentation	1 100	-	1 100
Erection of equipment	5 900	1 500	4 400
Start-up and testing	600	100	500
Transport from port, customs duties	1 500	1 125	375
Civil work and building construction	17 700	8 000	9 700
Steel structures	1 900	100	1 800
Infrastructure facilities	5 200	800	4 400
Mobile equipment	3 200	-	3 200
Spare parts	3 000	-	3 000
Training and technical assistance	1 000	400	600
Subtotal	62 800	13 225	49 575
Contingency allowance (1.9%)	1 200	200	1 000
Total	64 000	13 425	50 575

Cost of financing (during construction years):

Assuming about 40% of the capital cost is financed at 10% compound intrest rate, the following should be allowed, subject to final interest rate and principal amount borrowed;		
Cost of arranging financing @ 1.6% for bank fees etc.	386	386
Estimated interest	5 168	5 168
	5 554	5 554

Items not allowed for:

Cost of land
Owner's staff costs
Housing development and associated infrastructure

Breakdown of capital costs

	(thousands of Libyan dinars) Total	Local	Foreign
Consultancy services:			
Engineering; tenders, evaluation and award of contracts	250	52	225
Construction; management, start-up and test runs	950	75	875
Total	1 200	100	1 100
Mechnical equipment:			
Major equipment	9 300	500	8 800
Auxiliaries, conveyors	6 600	400	6 200
Total	15 900	900	15 000
Electrical equipment:			
Major equipment	1 500	75	1 425
Auxiliary equipment	3 100	125	2 975
Total	4 600	200	4 400
Instrumentation:			
Major panels	900	-	900
Auxiliary equipment	200	-	200
Total	1 100	-	1 100
Erection of equipment:			
Mechnical	4 100	1 400	2 700
Electrical	1 300	75	1 225
Instrumentation	500	25	475
Total	5 900	1 500	4 400
Start-up and testing:			
Check-out and testing	400	75	325
Start-up	200	25	175
Total	600	100	500
Transport of equipment to site, customs clearance and duties:			
Transport (30,000 t x 850 km x LD .029)	750	375	375
Customs and duties (approx. 3%)	750	750	-
Total	1 500	1 125	375
Civil work and building construction:			
Process equipment, foundation and structures	9 300	3 000	6 300
Storage buildings and transport	3 500	2 600	900
Electrical, water, fire, fuel	2 500	500	2 000
Auxiliary buildings	1 600	1 200	400
Miscellaneous	800	700	100
Total	17 700	8 000	9 750
Steel structures:			
Process and conveyors	1 100	50	1 050
Auxiliaries, stair towers, supports	800	50	750
Total	1 900	100	1 800

	(thousands of Libyan dinars) Total	Local	Foreign
Infrastructure facilities:			
Quarry opening and haulage road	300	30	270
Plant access road (36 km)	4 300	470	3 830
Miscellaneous, utility line	600	300	300
Total	5 200	800	4 400
Mobile equipment:			
Quarry	2 500	-	2 500
Plant	700	-	700
Total	3 200	-	3 200
Spare parts: (Spare-parts allowance can vary to a great degree. Due to the plant's remote location, the following is recommended);			
Major items, motors, gearboxes etc.	1 500	-	1 500
Auxiliary items	1 500	-	1 500
Total	3 000	-	3 000
Training and technical assistance:			
Training programme	750	300	450
Technical assistance	250	100	150
Total	1 000	400	600
Contingency allowance: For estimates at this early stage of a project a contingency allowance is recommended	1 200	200	1 000
Cost of financing: Assuming 50% financing at 10% compound interest rate applied to the projected cash flows, the cost of financing up to the acceptance test runs can be estimated as follows:			
(Libyan dinars)			
250 000 ÷ 2 x .4632 (10% for 4 1/2 years)	579	579	-
7 000 000 ÷ 2 x .3547 (10% for 3 1/2 years)	1 242	1 242	-
37 000 000 ÷ 2 x .2521 (10% for 2 1/2 years)	4 664	4 664	-
12 000 000 ÷ 2 x .1505 (10% for 1 1/2 years)	903	903	-

6 750 000 ÷ 2 x .5	(10% for 1/2 years)	1 688	1 688	-
Total		9 076	9 076	-
(rounded up)		9 100	9 100	-

Production costs

	(thousands of Libyan dinars per annum)
(a) Fixed costs	
Staff salaries	315
Employee benefits @ 20%	64
Expenses and supplies	80
Base power	50
Base labour (upkeep)	105
Benefits	20
Technicians	58
Taxes, fees, water charges, security	136
	828

(b) Depreciation schedule

Allocated cost ('000 LD)	Item	Rate per annum (%)	Amount ('000 LD)
nil	Land and raw deposits	-	-
24 800	Buildings and civil works	3.33	826
33 600	Machinery and equipment (including installation)	5.0	1 680
3 200	Mobile equipment	20.0	640
1 322	Machine tools and other equipment	20.0	264
828	Office and miscellaneous	20.0	166
250	Others	20.0	50
64 000			3 576

Production costs per ton of cement

At a capacity of 3,200 tons per day, 1,000,000 tons per year of 310 working days:

	Cost per ton of clinker (Libyan dinars)
125 kWh per ton @ LD .006 (Allow 10% bypass)	.750
(Allow 825 kcal/kg clinker)	
Fuel oil, 85.83 litres @ LD .012 per litre	1.030
Auxiliaries	.050
53 operators and 90 maintenance staff (excluding quarry and packhouse)	
LD .97 per hour x 8 hours x 53 divided by 3 200 tons =	.129
LD 1.46 per hour x 8 hours x 90 divided by 3 200 tons =	.329
Labour benefits @ 18%	.082

Balls and liners .5 kg per to LD .32 per kg	.165
Bricks @ LD .3 per ton	.300
5% gypsum addition @ LD 2.8 per ton delivered (50,000 t/a)	.140
8% iron ore @ LD 9.22 per ton (12,400 t/a)	.115
Blasting powder, 1 kg per 9 tons (cost including primer)	.095
Blasting labour	.015
Maintenance parts and supplies (Allow LD 1.525 per ton)	1.525
Operation of quarry equipment LD 1 672 x 6 divided by 22 400 tons per week	.448
Direct cost of cement	5.173
Fixed costs	.828
Total cost per ton to silo	6.001
(rounded down)	6.000

Summary of production costs

(thousands of Libyan dinars)

	Per annum for first two years	Per annum after 2nd year
Electric power	800	800
Fuel oil	1 405	1 405
Labour	1 290	1 290
Operating supplies	395 a/	795
Maintenance parts	900 a/	1 525
Taxes, fees, water, misc.	185	185
	4 975	6 000

	1st year	2nd year	After 2nd year
Paper bags	705	800	752

a/ Reduced to allow for material supplied under construction contract, i.e., spare parts for two years

Breakdown of production costs per annum

(thousands of Libyan dinars)

Electric power:	
Production @ LD .75 per ton	750
Facilities @ LD .05 per ton	50
	800

Fuel oil:	
No. 6. @ 825 kcal with 10% bypass	1 030
No. 2 for heaters	50
No. 2 for vehicles	275
Gasoline for vehicles	50
	1 405
Labour:	
117 operators @ LD .97 per hour	285
110 maintenance men @ LD 1.46 per hour	405
45 staff and supervisors @ LD 2.9 per hour	315
Labour benefits (insurance, vacation)	185
Special technicians	100
	1 290
Operating supplies:	
Balls and liners	165
Bricks	300
Gypsum	50
Iron ore	25
Blasting powder with primers	105
Facilities (shops, laboratories, office)	100
Miscellaneous (lubrication)	50
	795
Maintenance parts and supplies:	
Quarry and mobile equipment	900
Plant	500
Facilities (shops, laboratories, office)	125
	1 525
Taxes, fees, water charges:	
Allow	185
Paper bags (sacks):	
Allow 20 per ton @ LD .047 = LD .94 per ton	752
(1st year @ 750 000 tons x LD 0.94 = LD 705 000)	
(2nd year @ 850 000 tons x LD 0.94 = LD 799 000)	

I. Forecast of annual production, sales and market distribution
(thousands of tons)

Year	Production	Southern region sales [a/]	Available for export	Inventory
1/2 start-up	200	125	-	75
1	750	500	250	75
2	900	600	300	75
3	1 000	700	300	75
4	1 000	800	200	75
5	1 000	900	100	75
6	1 000	1 000	-	75
7	1 000	1 000	-	75

8	1 000	1 000	-	75
9	1 000	1 000	-	75
10	1 000	1 000	-	75

a/ Primaily the population centers of:
(i) Hun, Sawknah, Waddan.
(ii) Brak, Sabhah, Awbari.
See also the figure on the following page.

J. Comments on the documents prepared by the firm of consultants

At the meeting in London in September 1981 between the three Libyan committee members, including the co-ordinator, and the consultants' representatives, there was detailed discussion of the most suitable process technology and equipment and the factors affecting the production of cement in this project. The aim was to reach the most appropriate specifications for the tender documents in accordance with the requirements of the contract signed with the Secretariat of Heavy Industry. The Southern Region Cement Project committee had also requested the co-ordinator to evaluate the project study and the feasibility study submitted by the consultants and the co-ordinator's comments are given here so that they can be discussed with the consultants' representatives at the next meeting in Tripoli at the beginning of 1982.

The project study

According to the contract, the project study should provide detailed studies of the following:

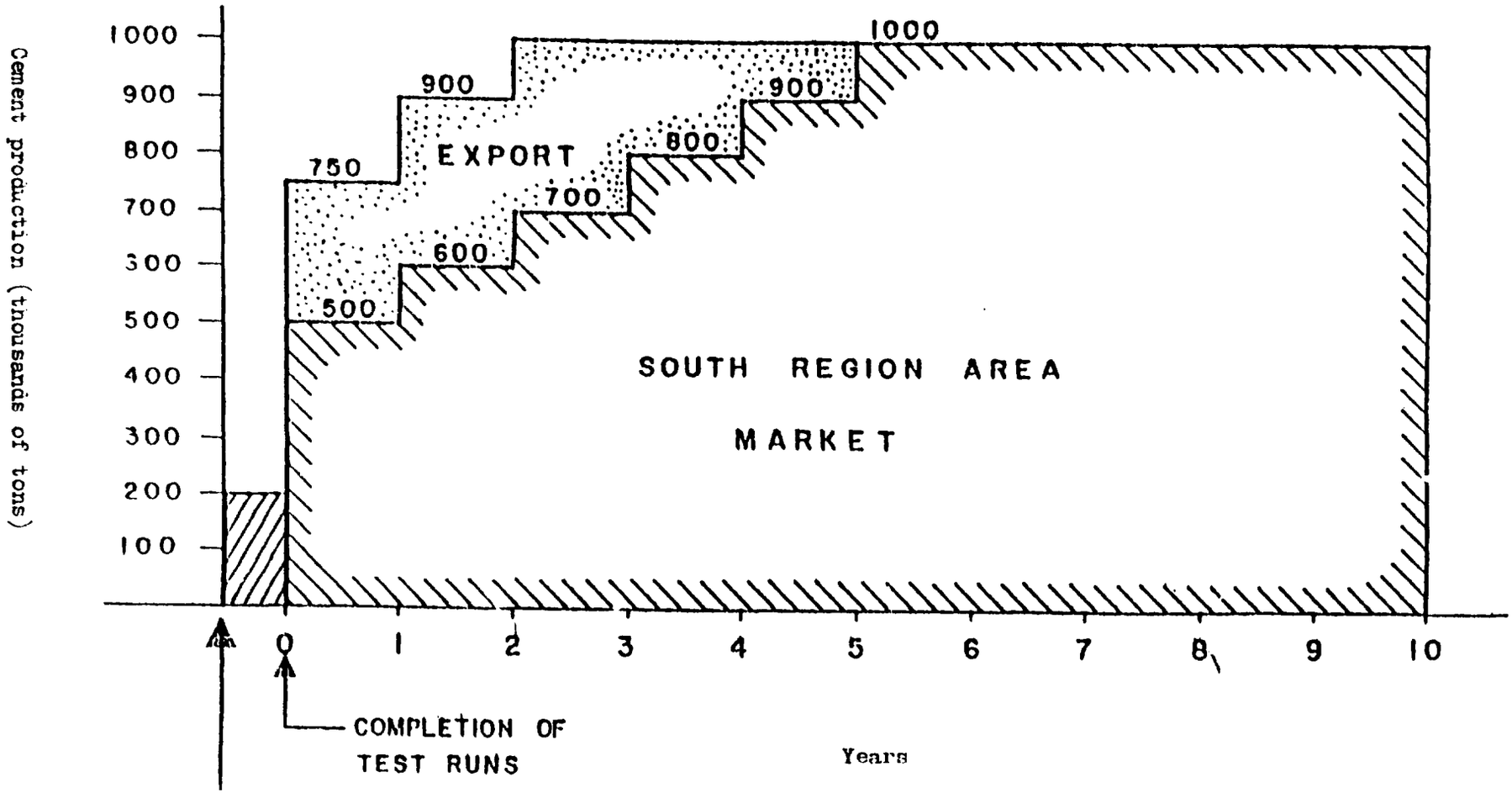
(a) Process design including;
  (i) Mode of quarry opening, types of mining equipment required, mode of quarry operations for all the raw materials along with detailed maps of the quarry opening,
  (ii) Transport of raw materials from the quarries;

(b) Plant location, design and layout.

In general, it should be pointed out that the average cost of extracting the raw materials amounts to about 10% of the net production cost of cement, depending on many factors such as the nature of the geological deposits, the cost of preparation and homogenization, drying and burning, the method chosen for extracting the materials and associated activities This means that each deposit has to be tackled in its own particular way. Quarrying and raw-material handling have to be suitably adapted to the project design. An important factor is the proper adjustment of the individual operations to one another and the interrelated effects on operating costs arising from the blasting or ripping technique employed, the loading and transport of the material and quarry preparation.

In section 2-1 dealing with quarry opening, the project study gives the density of limestone as 2.12 and of marl as 2.28. The co-ordinator thinks that the density of limestone is more than that of marl.

Forecast of annual production sales and market distribution



Quarry development and opening is not treated according to the contract as there are no detailed maps showing plans for the most efficient exploitation based on the exploration studies carried out by Polservice. Accordingly, this point ought to be covered and detailed maps on an appropriate scale provided to show the opening of the limestone and marl quarries and indicating how further exploitation of these quarries will proceed. Special attention should be paid to studying the comparative advantages of using face shovels or wheel-mounted loaders, stationary crushers at the plant site or portable crushers to be installed in the quarries, heavy-duty lorries or belt conveyors. The study ought also to specify all the types of mining equipment and their capacities. The comparison between equipment which might be selected will be dealt with in an economic study to evaluate the output and the final costing of raw-material production.

The co-ordinator believes that the choice of how to transport the raw materials to the plant site (either by using heavy trucks to the crusher at the plant site or by using belt-conveyor installation to transport crushed raw materials) can be left up to the tenderer. It is well known that belt-conveyor installations provide a more rational solution to raw-material transport. They achieve an effectiveness of about 98% of operating time. They are also least affected by technical troubles. Their operation and maintenance are economical in terms of wages. Continuous material handling is the most advantageous method if the handling equipment can be brought up close to the quarry work-face in connection with a mobile crusher.

It was stated in the project study (2-4) that the marl appears to be fairly soft and friable and that, while preparing the quarry-opening benches, it should be easy to determine if it can be sucessfully mined by ripping with a bulldozer rather than by blasting. In the co-ordinator's opinion, ripping in exploiting marl will succeed perfectly. From the committee's point of view, ripping of marl is to be recommended as being more economical. In recent years there has been a continued development and improvement of the equipment and the ripping teeth, the design of the pushing and pulling devices of the machines employed, the shape of the blade and the teeth. Thus the scope for applying the ripping method in exploiting hard rocks, and certainly rocks harder than marl, is steadily increasing.

In exploiting limestone, it is more questionable whether the ripping method or blasting is preferable. The co-ordinator agrees with the consultants that, while preparing the limestone quarry-opening benches, it should be easy to determine if the limestone can be successfully mined by ripping with a bulldozer or by blasting.

It was stated in the project study (2-4) that the selection of the down-hole type drill is to be recommended as they seem to be the best type for the 7 inch (17.8 cm) holes needed in the harder limestone. For depths of less than 3.5 metres, the holes should be made with the 3 inch (7.6 cm) air-track drill. The co-ordinator thinks that a careful choice of the most advantageous blasting installation is essential. The down-hole type drill with 7 inch holes is not recommended by the committee which would prefer to use holes of a smaller diameter, or both sizes, to leave open the possibility of using gelatine blasting in the future.

It was stated that primary blasting should be done with pre-mixed ammonium nitrate set off by electric caps in booster detonators (2-6). The co-ordinator agrees and also recommends using ammonium nitrate and diesel oil explosives as this kind of explosive has come into widespread use throughout the world, not only because it is much more advantageous in cost but also because it can be supplied to the remote Al Jufrah area in bulk more easily and safely than gelatine. It was also stated that, in general, all holes

should be drilled vertically as angle holes are difficult to control and align. The co-ordinator thinks that, if large burdens and wide spacing are allowed in the blasting operation, there is a great tendency for rock masses to remain standing on the quarry floor. To disloge these in secondary operations is expensive (in terms of labour costs) and possibly dangerous. To overcome this problem, ripping or horizontal boreholes at floor level have been used sucessfully in conjunction with vertical holes. By applying this method, it is possible to increase the lateral spacing and distance from the vertical holes to the quarry face. This can be tried during early exploitation of the limestone quarry.

The contract signed between The Secretariat of Heavy Industry and the consultants states that the cost of each stage of the process with details of all specific inputs will be calculated so as to arrive at the total cost. The co-ordinator considers that the costing of each stage of the process, as shown in the project study carried out by the consultants, was given only as rough estimates using some hypothetical cost bases. It would be preferable to have a detailed semi-specific list of inputs to give a closer approximation to the total cost of the final products, taking into account the maintenance costs, spare parts, administrative expenses, duties, taxes, transportation etc.

It was stated in the project study (3-25) that an explosives store capable of storing 40 tons of explosives or one month's supply, whichever is greater, is to be provided. It must be taken into consideration that the plant site is far away from the capital, Tripoli, and that, since re-supplying from that distance would be difficult, it is preferable to construct the explosive stores to hold about 80 tons which would guarantee at least two months' supply of raw materials in compliance with the specifications requested.

The section on labour costs (8-5) gives the following rates:

Operators - LD 0.97 per hour or about LD 200 per month

Maintenance men - LD 1.46 per hour or about LD 280 per month

The co-ordinator considers that these rates are insufficient for this isolated area. The labour benefits are indicated as 13%. This is also insufficient. The costing must include all the services and social facilities which will need to be provided for the personnel serving in such a distant and isolated area.

The forecast of annual production, sales and market distribution given in the project study (8-7) showed that production will reach its maximum (100% capacity) in the third year and that, from the first to the fifth year, 250,000, 300,000, 300,000, 200,000 and 100,000 tons respectively would be surplus to local requirements and therefore available for export. The production costs given in the project study and based on such figures will not represent the actual cost of the project. It is preferable to take into consideration as a likely alternative that only 75% of production capacity will be reached in the third year and that full capacity will be reached only after five years. A costing based on this assumption would represent, to some extent, the real situation of the project for the first 10 years of production. The economic evaluation charts ought to clarify the break-even point. It is also clear that between 100,000 and 300,000 tons per year will be available for export. Accordingly, it would be very interesting for the consultants to submit a cement-marketing study especially of the Libyan Arab

Jamahiriya and the surrounding countries including Algeria, Cyprus, Egypt, Greece, Italy, Jordan, Syrian Arab Republic, Turkey and other Mediterranean countries, and of Chad, Niger, Nigeria, Sudan and other neighbouring African countries. This marketing study would help greatly in evaluating the cement-production situation of this project for the next 10 years. The prospects for exporting Libyan surplus cement should be good, taking into consideration the fact that the price of fuel oil or petrol will be very low in the Libyan Arab Jamahiriya, certainly for the next 10 years, in comparison with the Mediterranean countries. The relevant data should be available at CEMBUREAU (The European Cement Association) and it can be forecast for the next 10 years. Special attention should be paid to the cement-plant extensions and new cement-plant projects that are scheduled to be built during this period.

Concerning the operating hours per operating day shown in section 3-3 of the study, especially the effective hours of operating some of the equipment, the co-ordinator thinks that some of these effective hours are optimistic but the figures need not be changed as this can be overcome by increasing the shifts in some cases if necessary. The other main factor affecting this is the production factor of the kiln, especially at the beginning.

The co-ordinator has no comments on the other data given as these have been discussed and agreed upon at the committee meeting in London.

The feasibility study

It is regrettable that the feasibility study received turned out to be a collection of the separate reports previously submitted to the Secretariat of Heavy Industries. No new studies had been undertaken and added to satisfy the stipulations for data required as laid down in the contract and as discussed before in the meetings with the consultants' representatives. The only data that have been added in these collected reports are those costs, and these are very rough estimates.

Tender document III

The co-ordinator has the following remarks to make on points arising from tender document III:

(a) It would be preferable to install a bypass before the crushers, especially the marl crusher, to separate the undersize particles directly before entering the crusher through the sieve;

(b) The quarry equipment ought to be checked again by the consultants as the equipment is still not sufficient;

(c) Magnetic separators ought to be installed at different places in the crushers, raw and cement mills etc.;

(d) In any lubrication system, the oil ought to cool down the relevant parts of the gears and bearings. Measurements of the temperature of the lubricating oil and bearings, pressure, the down stream of the filter and the rate of oil flow ought to be carried out in two independent ways and, in case of failure of one of these two independent measurements, the machine affected

ought to be automatically stopped or switched off. This ought also to be the case if the oil temperature at entry into the gear boxes and bearings exceeds the uppermost temperature limit;

(e) It would be preferable to install day tanks for the heavy oil for the kilns;

(f) From the factory's point of view, the installation of classifying liner plates in the raw and cement mills is to be recommended;

(g) In the section on raw mills, the words "or gas" should be added to the end of the phrase "One complete set of heavy fuel oil....";

(h) Pneumatic cleaning devices or something similar ought to be installed in dusty departments or production sites to prevent dust accumulation;

(i) A suitable crane with a long boom and a tractor with trailer capable of carrying the heaviest part of the plant from place to place are necessary;

(j) The moisture content of the raw-mill output shall not be more than 0.5%;

(k) Special attention has to be paid to the design of the clay bins due to the high moisture content of the marl, especially in the winter;

(l) A portable sorting facility to classify the grinding media into the required sizes is necessary;

(m) The provision of standby compressors and blowers for blending and aereation is recommended. Water and oil separators ought also to be installed with each system. Air tanks fitted with intake filters to store and distribute compressed air to the different pieces of equipment ought also to be installed;

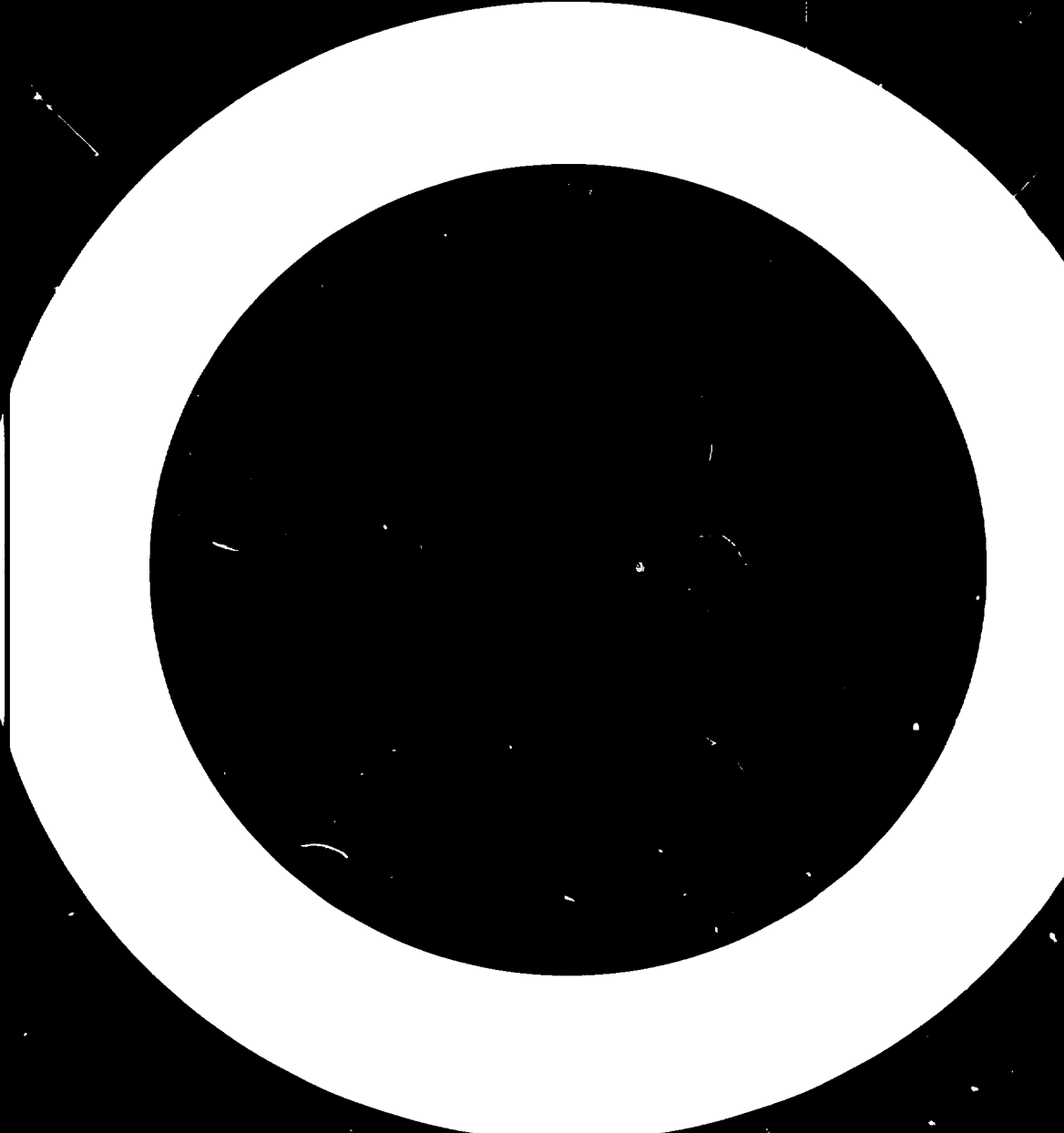
(n) The provision of special equipment to help in erecting fire bricks is recommended;

(o) The provision of two gas analysers, one for the kiln-exit gases and one for the preheater-exit gases to analyse O_2 and CO content, should be considered;

(p) The installation of a system to cool the kiln shell, especially the burning zone up to and including the drive gear, is recommended;

(q) The maximum allowable free lime content in the clinker is 1%;

(r) The drilling machines ought to include one mounted on a truck and capable of core drilling. This would be needed in the near future to carry out further investigations of raw material deposits with a view to assuring supplies for the next 50 years at least.



Annex I

STATISTICS OF PROJECT PERSONNEL FROM MAY 1978 TO 1 NOVEMBER 1981

A. Length of stay at the duty station

Length of stay	Group number														Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Less than 6 months															
Still assigned	–	–	–	–	–	–	–	–	–	–	2	6	9	11	28
Repatriated	4	–	–	–	–	–	–	–	–	–	–	1	–	–	5
Total	4	–	–	–	–	–	–	–	–	–	–	7	9	11	33
6-12 months															
Still assigned	–	–	–	–	–	–	–	–	6	4	–	–	–	–	10
Repatriated	6	8	1	1	1	1	–	3	–	–	–	–	–	–	21
Total	6	8	1	1	1	1	–	3	6	4	–	–	–	–	31
13-18 months															
Still assigned	–	–	–	–	–	–	14	6	–	–	–	–	–	–	20
Repatriated	5	4	2	6	7	5	5	–	–	–	–	–	–	–	34
Total	5	4	2	6	7	5	19	6	–	–	–	–	–	–	54
19-24 months															
Still assigned	–	–	5	2	6	–	–	–	–	–	–	–	1[a/]	–	16
Repatriated	2	3	1	1	–	–	–	–	–	–	–	–	–	–	7
Total	2	3	6	3	6	2	–	–	–	–	–	–	1	–	23

25-30 months															
Still assigned	–	–	–	–	–	–	–	–	–	1[b/]	–	–	–	–	1
Repatriated	3	1	–	–	–	–	–	–	1	–	–	–	–	–	5
Total	3	1	–	–	–	–	–	–	1	1	–	–	–	–	6
31-36 months															
Still assigned	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Repatriated	1	1	–	–	–	–	–	–	–	–	–	–	–	–	2
Total	1	1	–	–	–	–	–	–	–	–	–	–	–	–	2
More than 36 months															
Still assigned	2	3	–	–	–	–	–	–	–	–	–	–	–	–	5
Repatriated	2	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Total	4	3	–	–	–	–	–	–	–	–	–	–	–	–	7
Total in group	25	20	9	10	14	8	19	9	7	5	2	7	10	11	156

B. Specialists still at duty station according to their attendance periods

Length of stay (months)	Group number														Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Less than 6	-	-	-	-	-	-	-	-	-	-	2	6	9	11	28
6-12	-	-	-	-	-	-	-	-	6	4	-	-	-	-	10
13-18	-	-	-	-	-	-	14	6	-	-	-	-	-	-	20
19-24	-	-	5	2	6	2	-	-	-	-	-	-	1[a/]	-	16
25-30	-	-	-	-	-	-	-	-	-	1[b/]	-	-	-	-	1
31-36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
More than 36 months	2	3	-	-	-	-	-	-	-	-	-	-	-	-	5
Total	2	3	5	2	6	2	14	6	6	5	2	6	10	11	80

C. Repatriated specialists according to their attendance periods

Length of stay (months)	Group number														Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Less than 6	4	-	-	-	-	-	-	-	-	-	-	1	-	-	5
6-12	6	8	1	1	1	1	-	3	-	-	-	-	-	-	21
13-18	5	4	2	6	7	5	5	-	-	-	-	-	-	-	34
19-24	2	3	1	1	-	-	-	-	-	-	-	-	-	-	7
25-30	3	1	-	-	-	-	-	-	1	-	-	-	-	-	5
31-36	1	1	-	-	-	-	-	-	-	-	-	-	-	-	2
More than 36	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Total	23	17	4	8	8	6	5	3	1	-	-	1	-	-	76

a/ Reassigned from group 1.

b/ Reassigned from group 2.

Annex II

SUMMARY OF PROJECT PERSONNEL SITUATION
(updated to November 1981)

Budget line	Post Title	Number required	At duty station	Expected repatriations	Required at present (groups 15+16)
11.06	Shift leader	4	4		
11.07	Control panel operator	4	4		
11.08	Miller	8	10		
11.09	Burner (cement kilns)	8	7		1
11.10	Mech. maint. foreman	2	1		
11.11	Mech. maint. fitter	7	9	3	
11.12	Compressor maint. mechanic	-	1		
11.14	Milling machine operator	1	-		
11.16	Maintenance electrician	7	5		
11.17	Instrumentation specialist	6	7		1
11.19	X-ray specialist	1	1		
11.20	Mechanical engineer	2	2		
11.21	Maintenance fitter	2	3		
11.22	Sheet metal fitter	6	5	1	4
11.23	Welder	3	2	1	1
11.24	Maint. elect. engineer	1	-		
11.25	Workshop fitter	2	2	1	
11.26	Instrumentation elect. engr.	1	1		
11.27	Elect. maint. foreman	1	-		
11.28	Instr. and contral foreman	1	1		
11.29	Shift electrician	8	2	1	
11.30	Instrumentation specialist	4	4		
11.31	Workshop and light electrician	5	2		1
11.32	High tension electrician	2	2	1	
11.33	Diesel mechanic	2	1		
11.34	Petrol engine mechanic	1	-		
11.35	Quarry equipment elect.	1	-		
11.38	Lime burner	4	4	1	2
11.39	Scraper operator	4	-		
Total		98	80	9	10

Annex III

SAMPLE MONTHLY REPORT FORMS

A. Annual leave, sick leave and work-injury time for the month of ,198-.

Serial No.	Name	Post title	Budget line	Duration of contract From	Duration of contract To	Annual Leave	Sick Leave	Work injury	Total Annual Leave	Total Sick Leave	Total Work injury	Remarks
1.	KAZIMERCZAK, Jan	Shift leader	11.06/B	31.05.78	27.08.82							
2.	BODZIOCH, Jan	Shift leader	11.06/E	06.08.80	05.08.82							
3.	TOPOLNICKI, Tedeusz	Shift leader	11.06/A	02.09.81	01.09.82							
4.	LUCHOWSKI, Wladyslaw	Shift leader	11.06/	28.10.81	27.10.82							
5.	JACHYMCZYK, Bogdan	Cont. Panel op.	11.07/A	25.09.80	23.09.82							
6.	KOSCIELNIK, Boleslaw	Cont. panel op.	11.07/B	31.05.78	26.08.82							
7.	PACUSZKA, Tadeusz	Cont. Panel op.	11.07/C	08.10.81	07.10.82							
8.	KRYMOWSKI, Jozef	Cont. panel op.	11.07/D	14.11.79	30.06.82							
9.	KURZEPA, Jan	Miller	11.08/A	13.03.80	12.03.82							
10.	STANCZAK, Jerzy	Miller	11.08/D	26.03.81	25.03.82							
11.	PALASZYNSKI, Jozef	Miller	11.08/E	06.08.80	08.08.82							
12.	GOSPODARCZYK, Amdrzej	Miller	11.08/F	20.08.80	28.11.82							
13.	SWITALA, Bernard	Miller	11.08/H	26.03.81	25.03.82							
14.	KONOPKA, Roman	Miller	11.08/I	16.11.79	31.07.82							
15.	SEDLAK, Marian	Miller	11.08/J	08.10.81	07.10.82							

B. Presence/non-presence and reasons for absence during the month of , 198-.

Serial No.	Name	Budget line	Date 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	Remarks
1.	KAZIMERCZAK, Jan	11.06/B		
2.	BODZIOCH, Han	11.0 /E		
3.	TOPOLNICKI, Tedusz	11.06/A		
4.	LUCHOWSKI, Wladyslaw	11.06/		
5.	JACHYMCZYK, Bogdan	11.07/A		
6.	KOSCIELNIK, Boleslaw	11.07/B		
7.	PACUSZKA, Tadeusz	11.07/C		
8.	KRYMOWSKI, Jozef	11.07/D		
9.	KURZEPA, Jan	11.08/A		
10.	STANCZAK, Jerzy	11.08/D		
11.	PALASZYNSKI, Jozef	11.08/E		
12.	GOSPODARCZYK, Andrzej	11.08/		
13.	SWITALA, Bernard	11.08/H		

Symbols to be used: X = Presence at duty station O = Absent on home leave F = Friday
I = Sick at duty station N = Absent for injury at work

Annex IV

SUMMARY OF LIST OF STANDBY CANDIDATES
(interviewed in March 1981)

Budget line	Post title	Number on list
11.06	Shift leader	2
11.07	Control panel operator	1
11.08	Raw or cement miller	6
11.09	Burner	2
11.11	Maintenance mechanic	15
11.14	Milling machine operator	3
11.16	Maintenance electrician	9
11.19	X-ray specialist	1
11.20	Mechanical engineer	6
11.21	Maintenance fitter	1
11.22	Sheet metal fitter	5
11.23	Welder	9
11.25	Fitter	8
11.29	Shift electrician	8
11.30	Instrumentation specialist	10
11.31	Workshop and light electrician	11
11.32	High-tension electrician	3
11.33	Diesel mechanic	7
11.34	Petrol engine mechanic	1
11.38	Lime burner	5
	Total	113

Annex V [a]

AIDE-MEMOIRE ON THE INTERREGIONAL CEMENT TECHNOLOGY FORUM

Organized by the United Nations Industrial Development Organization (UNIDO) in co-operation with the Libyan Authorities [b] concerned with the development of cement industry

to be held in the Socialist People's Libyan Arab Jamahiriya from 3 to 10 April 1982

Background and Purpose

1. Portland cement has played a major role in the development of industry, infrastructure, housing and modern agriculture and it will also in the future be indispensable for the continuing development of the developing countries.

2. Raw materials are with few exceptions practically available in all countries, but various developments have complicated the situation for both the established and the future producers. One such development is the inflation which makes it difficult to obtain loans for new factories when feasibility studies show that the selling price must be much higher from the new factory than from existing factories with which the new may have to compete.

3. Another problem is the increasing influence from environment protection groups and the selective quarrying of the past which is now limiting the exploitation in various ways. The factory and the quarry can no longer be allowed near to populated areas and the raw materials available are of increasingly inferior quality. Finally both costs and availability of fuel play an important role.

4. Most of the problems met by the cement industry in the past were solved with ideas based on technical resources. In order to counteract the influence of inflation, cement factories were built bigger and bigger, so the specific investment costs could be kept low. The up-scaling has now reached a balance point where other factors like transport capacity and market concentration determine the size of the plant and its machines.

5. The increasing pressure from environmental groups was responded to with efficient anti-pollution equipment and investments in changing the "scars from mining activities into acceptable landscapes. The increasing fuel costs have promoted a change from oil to coal firing and a focussing on the dry process technology with precalciners. The next 10 years will presumably concentrate on efficiency in order to make the most out of the accessible resources.

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a/ This annex has been reproduced without formal editing.

b/ Secretariat of Heavy Industries, Secretariat of Planning, Secretariat of Housing, Industrial Research Centre and Gar Yunis University of Libya.

6. Like cost accounting earlier helped to compare different solutions also energy accounting will be needed in the future. One way to save energy and costs is to make use of pozzolanic raw materials for the making of blended cement or special cement. This technique is not new, but it requires certain precautions for a safe application even in simple structures. When high performance specifications are required, it may often be found that only special types of pure portland cement can be accepted.

7. We are today in a situation for the cement industry where we have a solution to nearly all problems, because the know-how is available. The know-how may not be where it is needed and our problem is, therefore, to define the problem and find the one who has the solution and then to transfer the know-how and train the necessary personnel.

8. In a meeting like this we, "the organizers", can hardly find a large number of problems just to feed the discussion and we consequently prefer to come from the other side by inviting companies to present their ideas and tell us which problems they have solved and how they did it. This approach should not eliminate that individual participants bring along their problems and try to solve them during the meeting with the help of colleagues and delegates to the meeting.

9. The purpose of this Interregional Cement Technology Forum is the collection and dissemination of information regarding all technological aspects of the cement industry. Specifically we would like to find out where special experience is available and, if possible, have some case stories and examples of the application of special know-how and/or experience. Also every day problems are of interest and as an example of subjects of interest we should like to give the following incomplete list: reduction of investment costs, reduction of operating costs, production improvements, maintenance improvement, training problems, pollution problems, transport problems, climatic problems, geological problems etc.

Programme

10. In order to meet the objective of the Cement Technology Forum, UNIDO will invite equipment suppliers, consultants, research institutes and cement associations to delegate their specialists to meet with participants from the developing countries to discuss the future development of the cement industry, keeping in mind the technology available and considering the future problems for the cement industry.

11. We invite every delegate to present his company or institute and tell what it can offer and give examples of what it has accomplished in the cement industry and how they can contribute to an efficient development of the cement industry in the future. Participants from the developing countries will be invited to present a short paper describing the situation of the cement industry in their country today and describe plans and possibilities for its strengthening and development.

12. Attention should also be given to the human resource situation and the efforts made to train personnel for different duties in the cement industry.

13. UNIDO will in the preparatory phase of the meeting invite potential companies or institutes to indicate their interest in participating in the meeting at their own costs and to send to UNIDO a summary of what they propose to present to the Forum. UNIDO will then finally select the companies or institutes to participate and possibly ask some to emphasize special points of their presentation in order to avoid too much repetition of trival aspects of the cement technology. If time permits and sufficient interest exists, UNIDO will, with the host of the Forum, organize individual and private industrial promotion meetings between the participants from the developing countries and delegates from companies and institutes participating in the meeting.

14. During the time up to the meeting participants and delegates will receive information about the Forum in Notes for Participants which will be distributed when it is considered necessary.

Date and Place of the Forum

15. Interregional Cement Technology Forum will be held at the Benghazi Cement Training Centre, Benghazi, Libya, from 3 to 10 April 1982.

Organization of the Forum

16. The Forum will be served by a secretariat consisting of one official from the host country, one UNIDO official, one UNIDO editor, as well as a substantive officer. Chairperson(s), rapporteurs and group leaders will be selected between delegates and participants. UNIDO will further complete the secretariat with interpreters, typists and secretaries as may be required.

Lectures

17. Delegates and experts from companies and institutes will be invited to prepare papers partly of their own choice and partly in consultation with UNIDO.

18. The lecturers will be invited to present their paper(s) and are expected to be available for discussion of their paper and give a written summary to the rapporteur of the discussion held on his paper. The lecturers will also, if required, be available for individual and private industrial promotion meetings with participants from the developing countries.

Procedure

19. Under the guidance of the Forum officials or a chairperson selected from the participants, each subject will be presented by authors of meeting papers. The papers or summaries will be distributed to allow time for a careful examination of the subject matter.

20. The presentation will be followed by group discussions leading to the formulation of comments if any. The author will, in co-operation with group leaders and experts, draft a short report on the discussions including possible recommendations and conclusions. The rapporteurs' draft reports will

be typed and submitted to the editor. The editor subject by subject, follows the discussion, collects, analyses, edits and makes available for the last session of the Forum a draft report for presentation by the UNIDO official. Participants will as soon as they are selected for participation, draft and submit country monographs to UNIDO. They will, during the meeting participate in factory visits, examination of case studies, presentation of monographs, assignment work and group activities related to development work.

Documentation

21. All documents for the Forum will be prepared under the supervision of UNIDO and will include:

- Expert papers, to be presented by the authors;

- Background paper not formally presented but included in the discussions where appropriate;

- Country monographs not for distribution outside the Technology Forum;

- Selected development proposals not for distribution outside the Forum.

Participants

22. Selected developing countries in Africa, Asia, Far East, Latin America, Europe and Middle East will be invited to nominate two candidates for participation in the Interregional Forum. 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 the home country. They should further be development planners, decision makers and/or officials from industry, or officials expected to assume duties dimilar to the above.

23. Twenty participants will be selected by UNIDO, taking into account professional qualifications, level of experience and other relevant considerations. The programme is open both to male and female candidates.

24. Participants will, although nominated by their countries, attend the programme in their individual capacity and must agree to attend the whole programme according to the schedule prepared by UNIDO and the host authorities. They must comply with relevant rules and regulations laid down for the programme.

25. They are also expected to be fully informed about the development conditions in their respective countries and participate in the discussions, group activities and assignment work planned by the Secretariat of the meeting.

International Co-operation

26. Observers from developing countries and United Naions Organizations can be accepted in a limited number, provided that they cover their own expenses for participation.

Language Requirements

27. The Forum will be conducted in English with simultaneous interpretation from and to Arabic and French. All participants must have a good working knowledge in one of these languages.

Financial and Administrative Arrangements

28. Financial arrangements for participants from twenty developing countries selected by UNIDO will be in accordance with United Nations rules and regulations and will consist of:

(a) Round trip economy class air transportation between the airport of departure in the home country and Benghazi, Libya, and back home;

(b) During the participants' stay and travel in Libya with the Forum, board, lodging and travel will be covered by the host authorities and be reimbursed from the meeting budget up to the valid per diem rate for every participant. The rest, if any, will be paid as pocket money.

29. The participant's Government will be required to bear the following costs:

(a) All expenses in the home country incidental to travel abroad, including expenditures for passports, required medical examination, inoculations and other such miscellaneous items and internal travel to and from airport of departure in the home country;

(b) Salary and related allowances for the participants during the period of the Forum.

30. UNIDO will not assume responsibility for the following expenditures:

(a) Costs incurred by the participant with respect to any insurance, medical bills and hospitalization fees;

(b) Compensation in the event of death, disability or illness of the participant;

(c) Loss of or damage to personal property of the participant;

(d) Purchase of personal belongings and compensation for damage caused to them by climatic or other conditions.

Correspondence

All inquiries and mail concerning the Forum should be addressed to:

Officer in charge of the Interregional
Cement Technology Forum
Chemical Industries Branch
Division of Industrial Operations
UNIDO
P.O. Box 300
A-1400 Vienna
Tel: 2631 3899 or 2631 3881
Telex: 135612

List of participants invited

Lecturers. Research and development centres:

Centre d'Etudes et de Recherches de l'Industrie de Liants Hydrauliques (CERILH)
The European Cement Association (CEMBUREAU)

Cement unions:

Arab Union for Cement and Building Materials
Portland Cement Association
Verein Deutscher Zementwerke

Consultants:

Blue Circle Overseas Consultancy Division (United Kingdom)
Holderbank Management and Consulting (Switzerland)
Lafarge Conseils et Etudes (France)
Polservice (Poland)
Prospective Engineering Gestion (PEG), (Switzerland)

Cement equipment suppliers:

Beumer Maschinenfabrik (Federal Republic of Germany)
Fivecail Babcock (France)
F.L. Smidth and Co. (Denmark)
Haver and Boecker (Federal Republic of Germany)
KHD Humboldt Wedag AG (Federal Republic of Germany)
Krupp Polysius (Federal Republic of Germany)
Mitsubishi Heavy Industries (Japan)
Refratechnik (Federal Republic of Germany)

Participating countries

Africa: Algeria, Angola, Chad, Ethiopia, Mozambique, Niger, Sudan, Tunisia, Uganda, Upper Volta

Asia: China, Democratic Yemen, India, Iran, Kuwait, Malaysia, Pakistan, Philippines, Syrian Arab Republic, Thailand

Europe: Poland, Turkey

Latin America: Cuba, Nicaragua

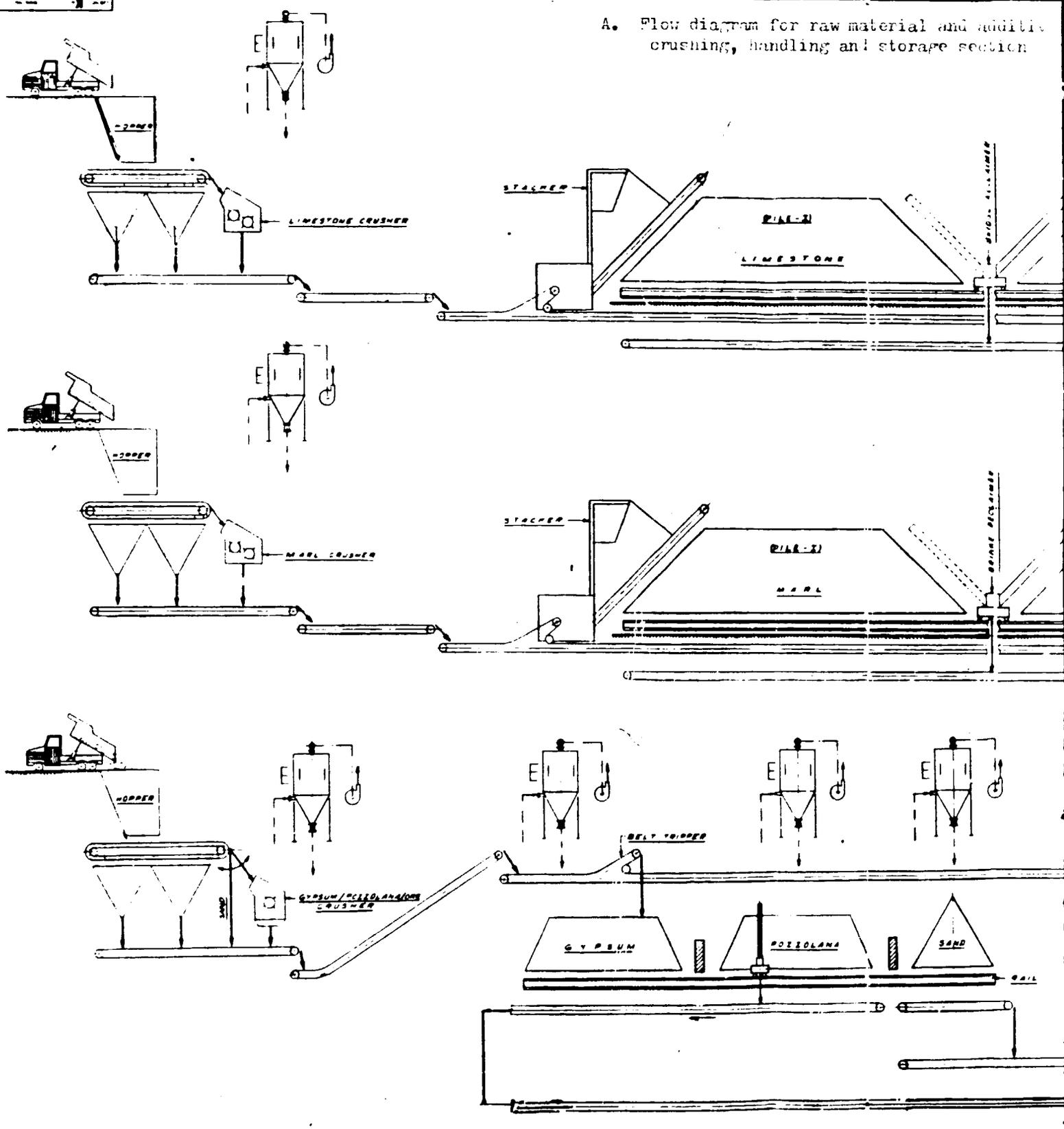
Invited organizations

Secretariat of Heavy Industry, Secretariat of Planning, Secretariat of Housing, the Industrial Research Centre, Gar Yunis University

Annex VI

PROCESS FLOW SHEETS FOR FUELS AND MATERIALS IN THE SOUTHER

A. Flow diagram for raw material and additi
crushing, handling and storage section

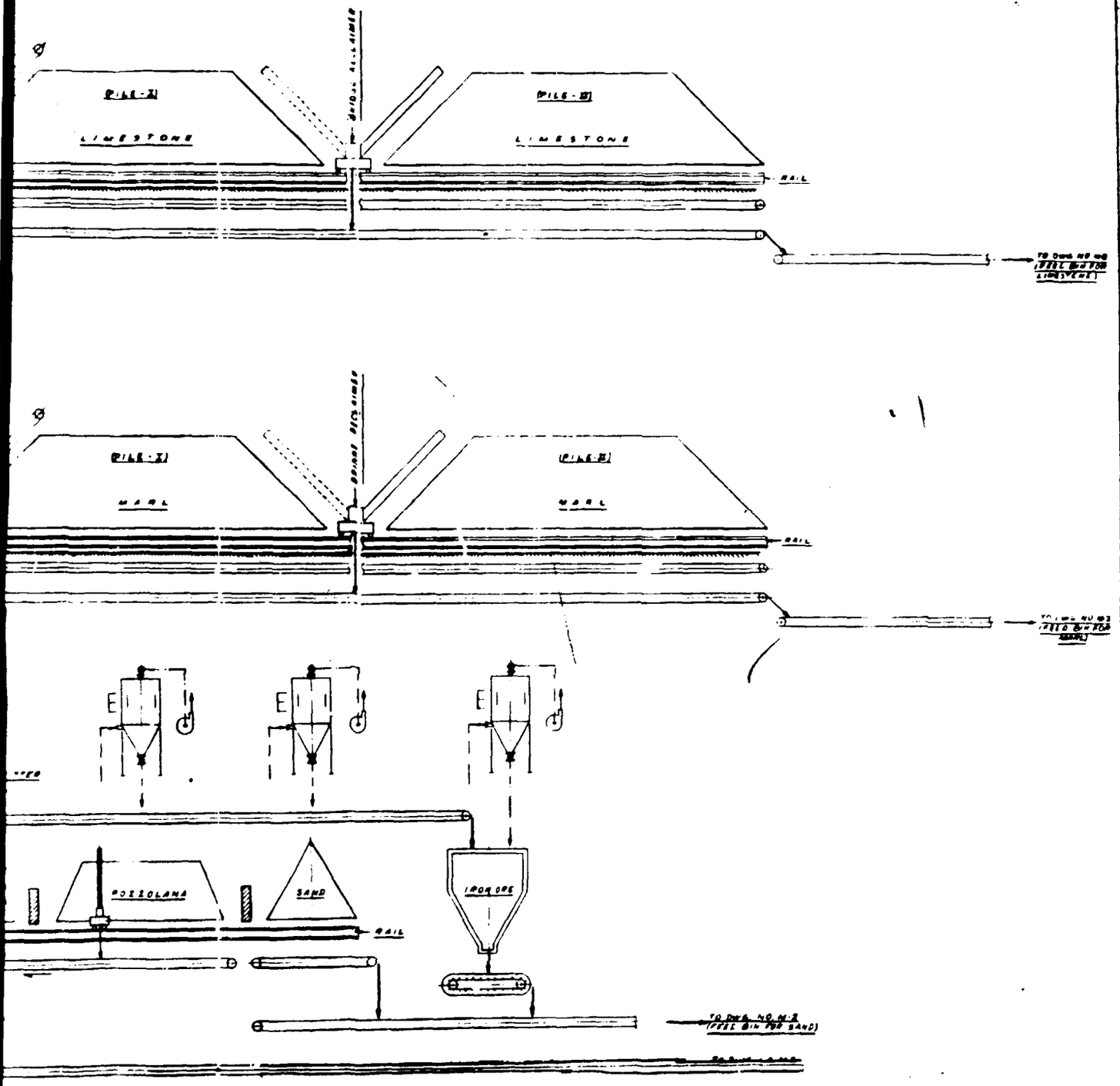


SECTION 1

Annex VI

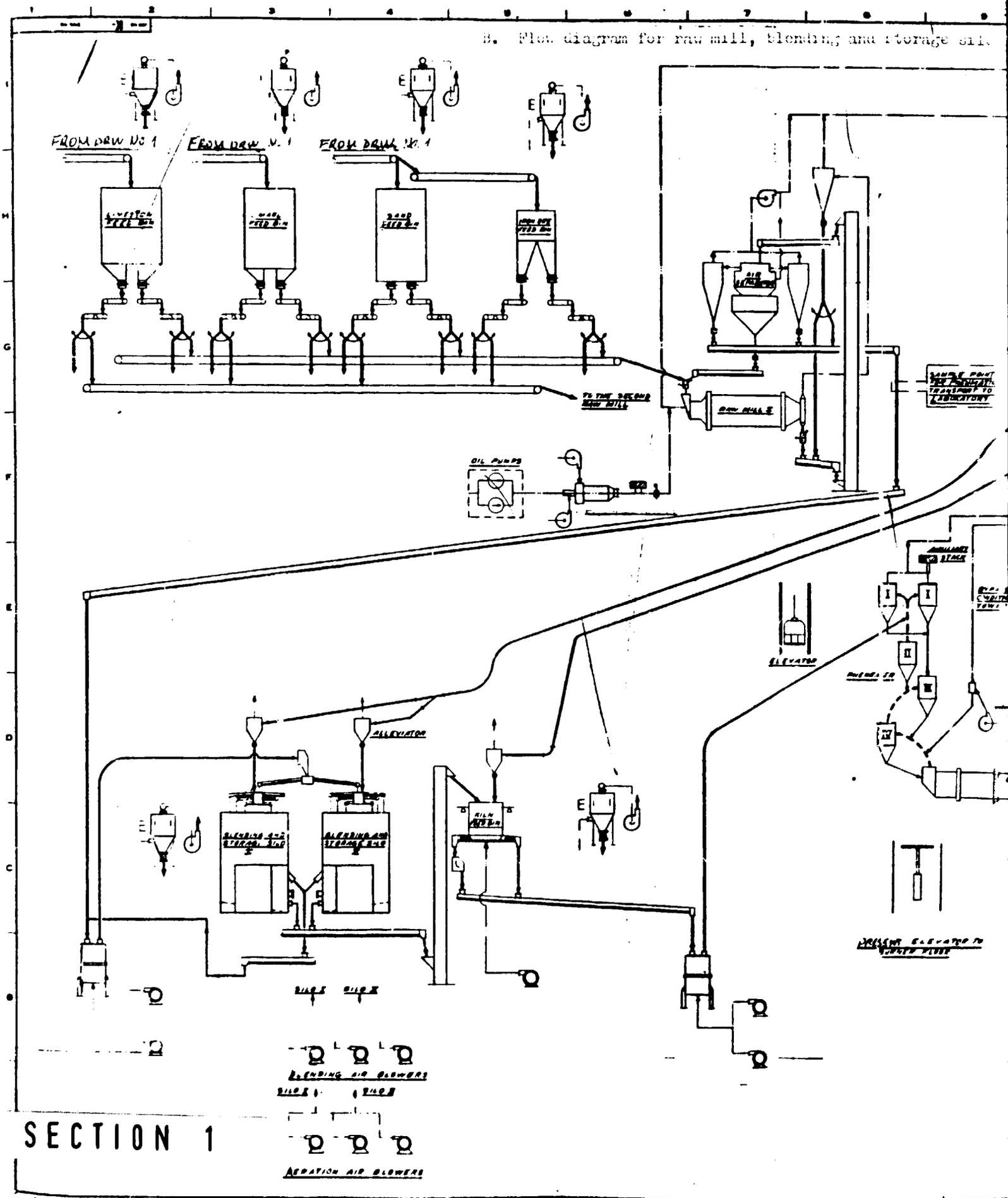
FUELS AND MATERIALS IN THE SOUTHERN CEMENT PLANT

Diagram for raw material and additive
mixing, handling and storage section



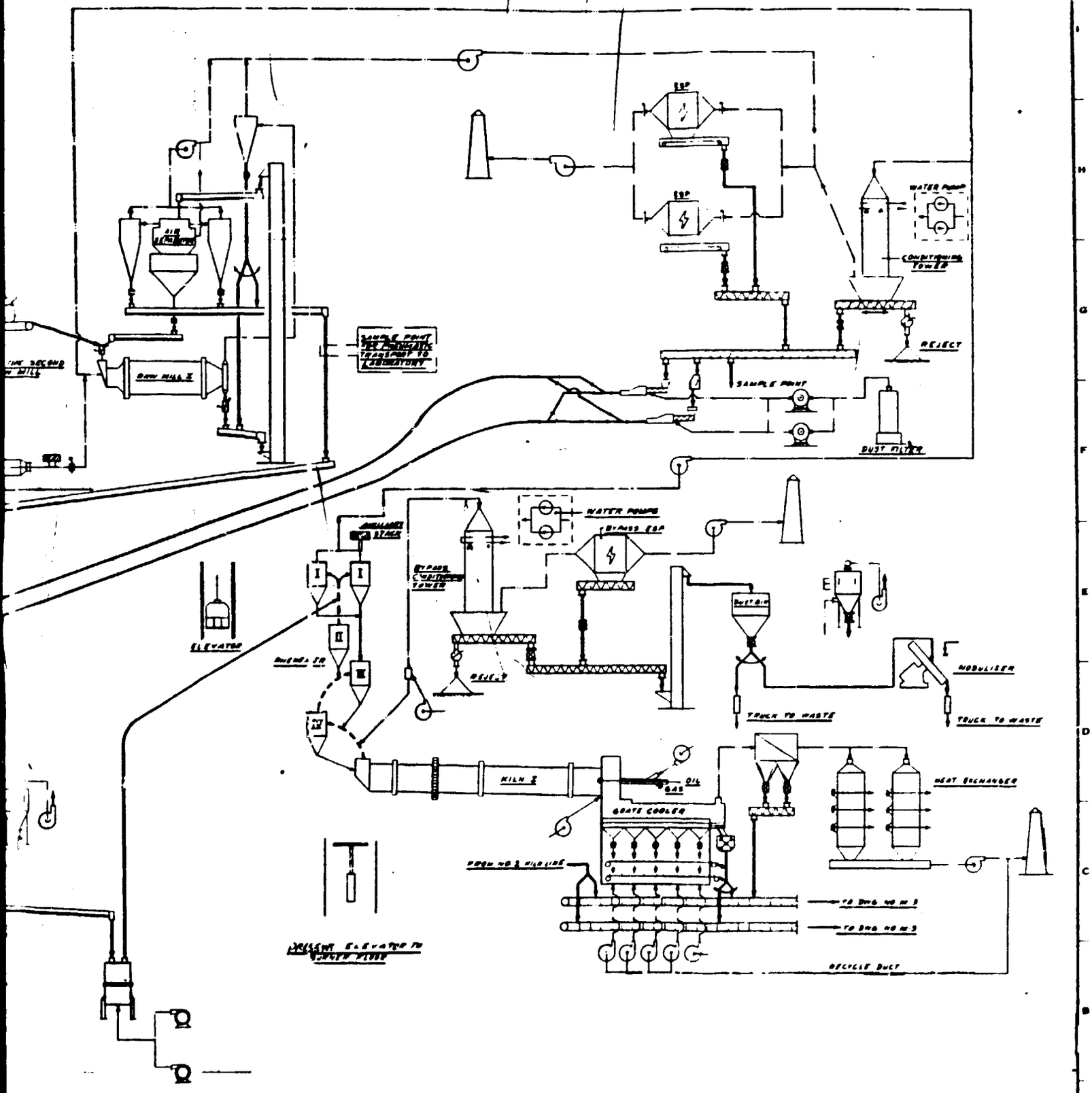
SECTION 2

B. Flow diagram for raw mill, blending and storage silo



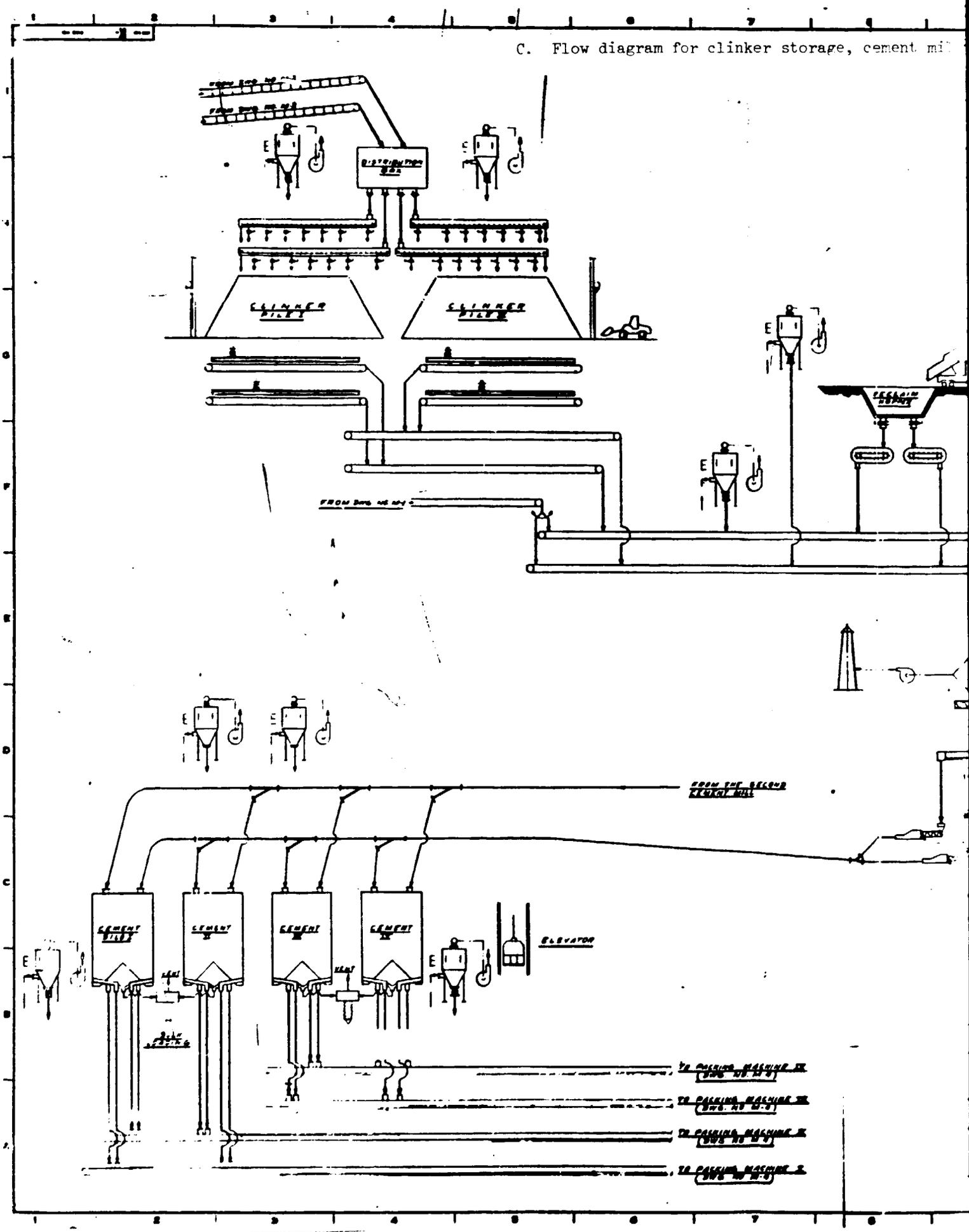
SECTION 1

...ea for raw mill, blending and storage silos, kiln and cooler sections



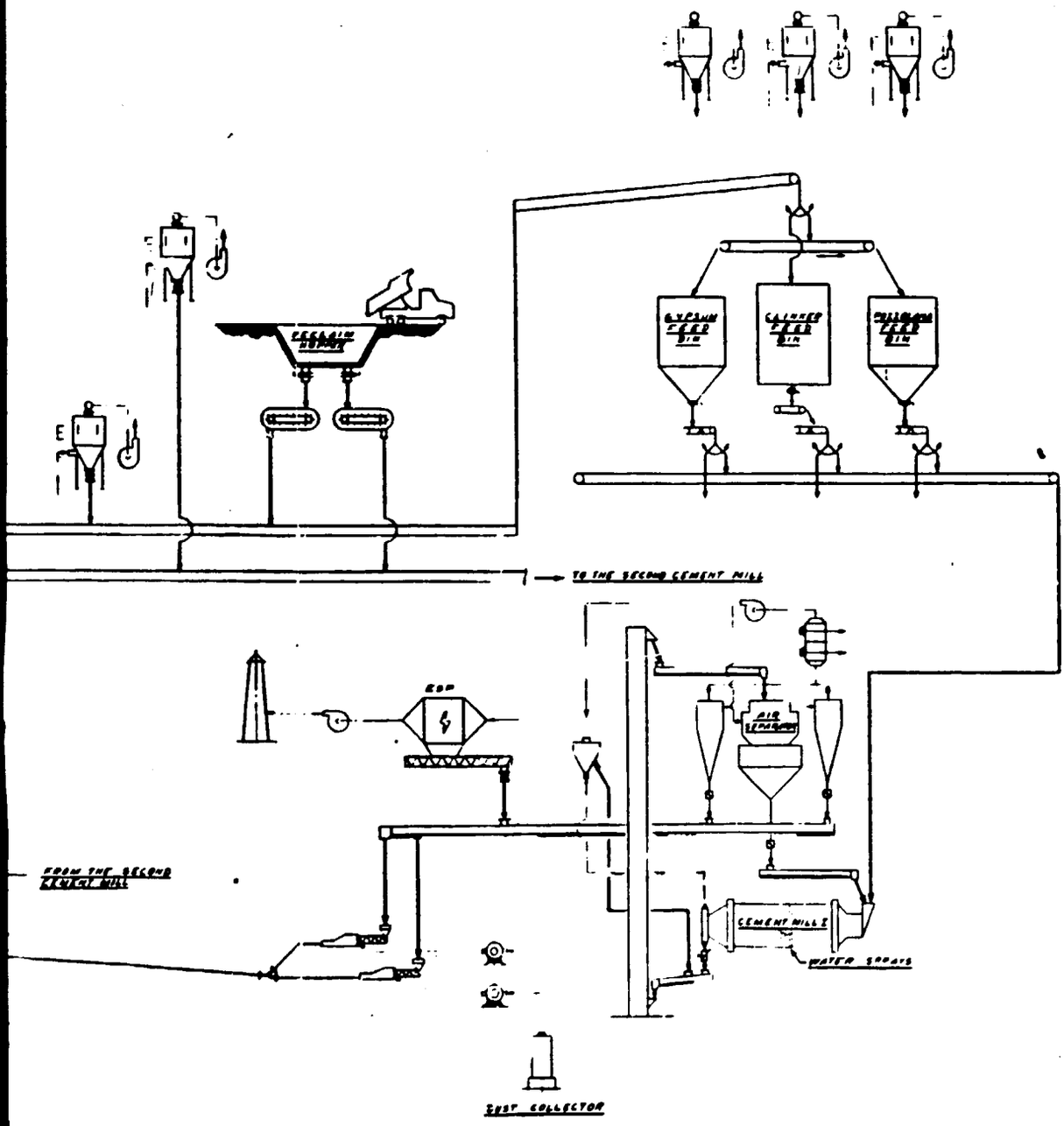
SECTION 2

C. Flow diagram for clinker storage, cement mi



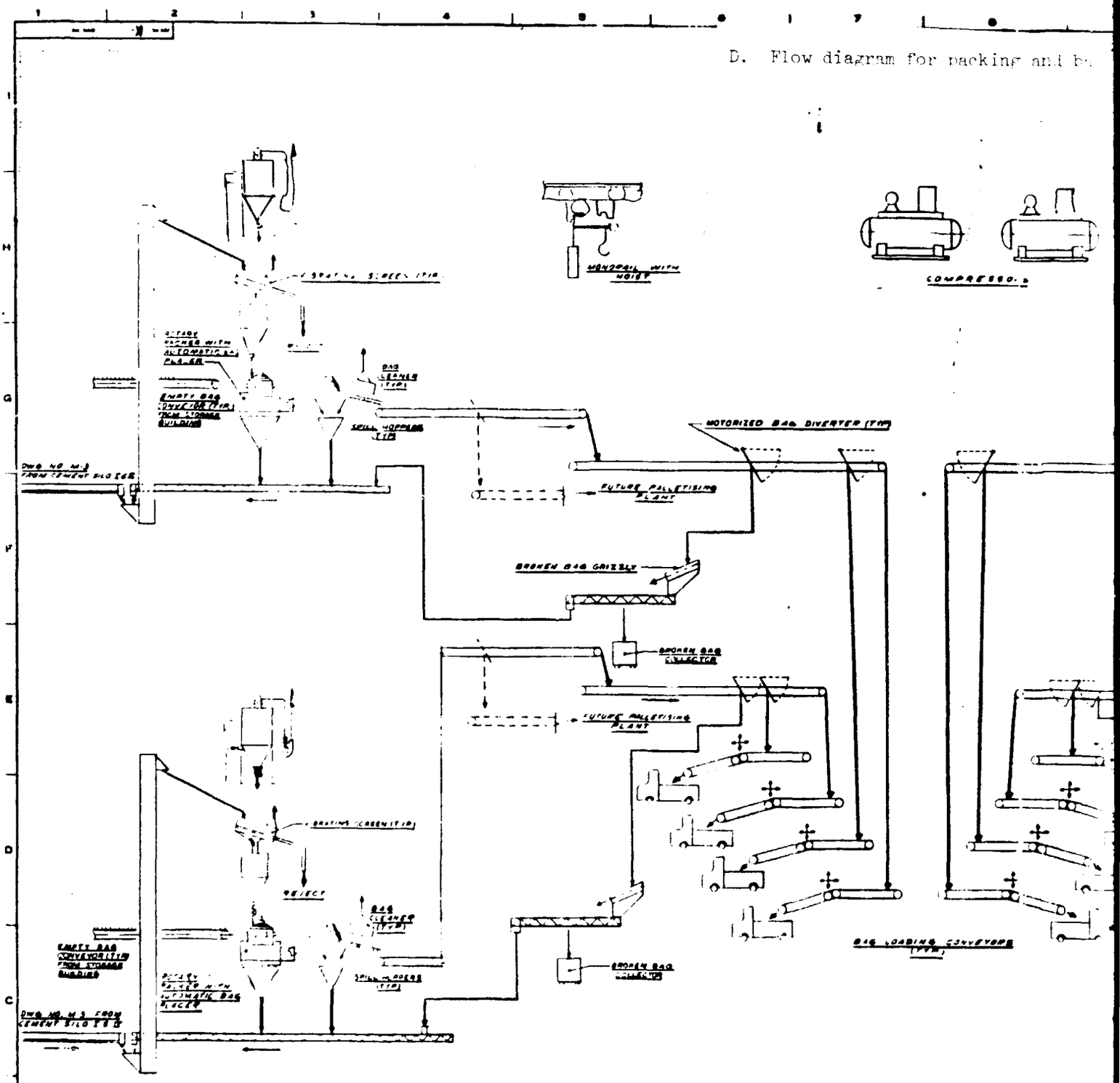
SECTION 1

For clinker storage, cement mill, cement silos sections



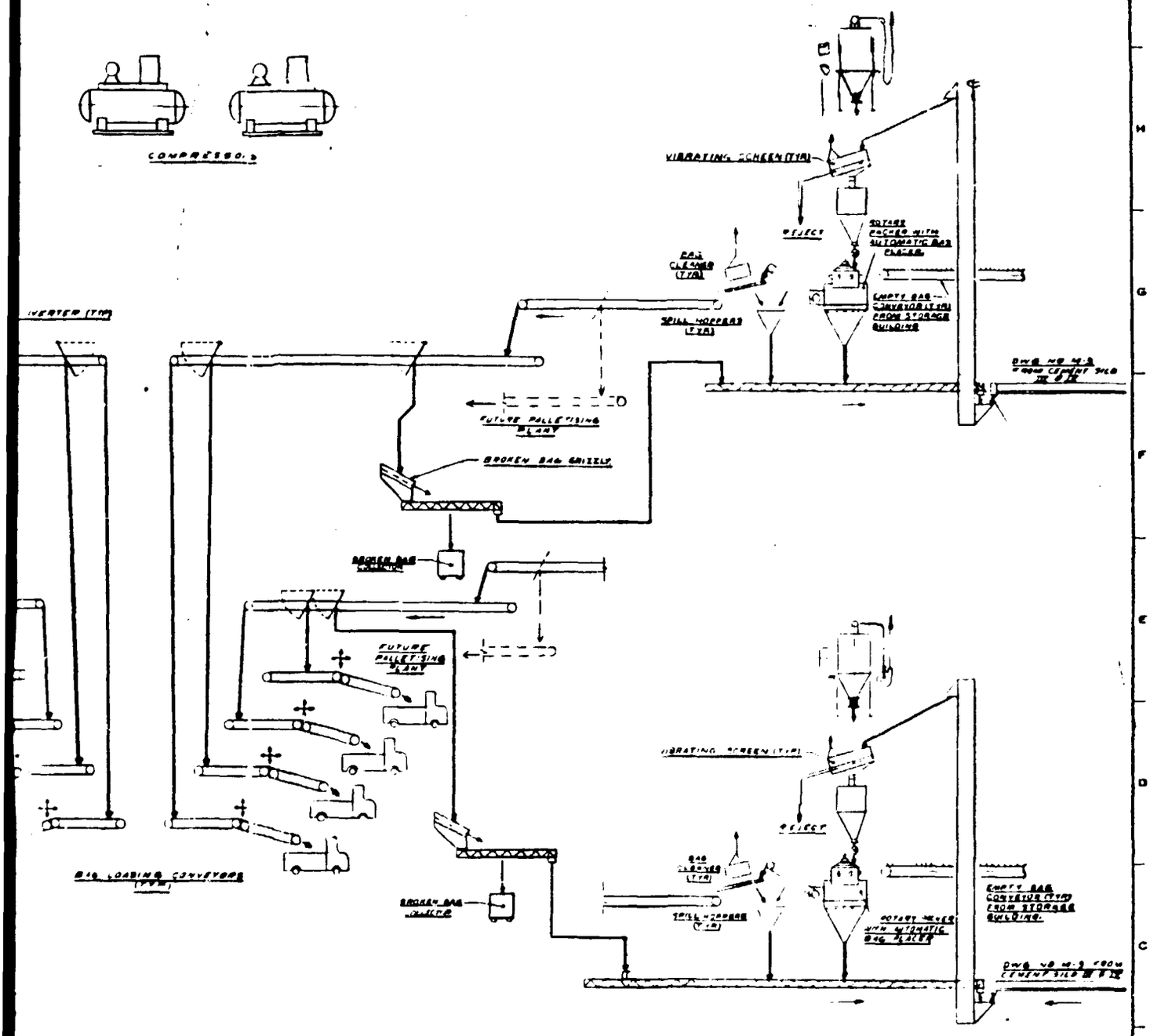
SECTION 2

D. Flow diagram for packing and b

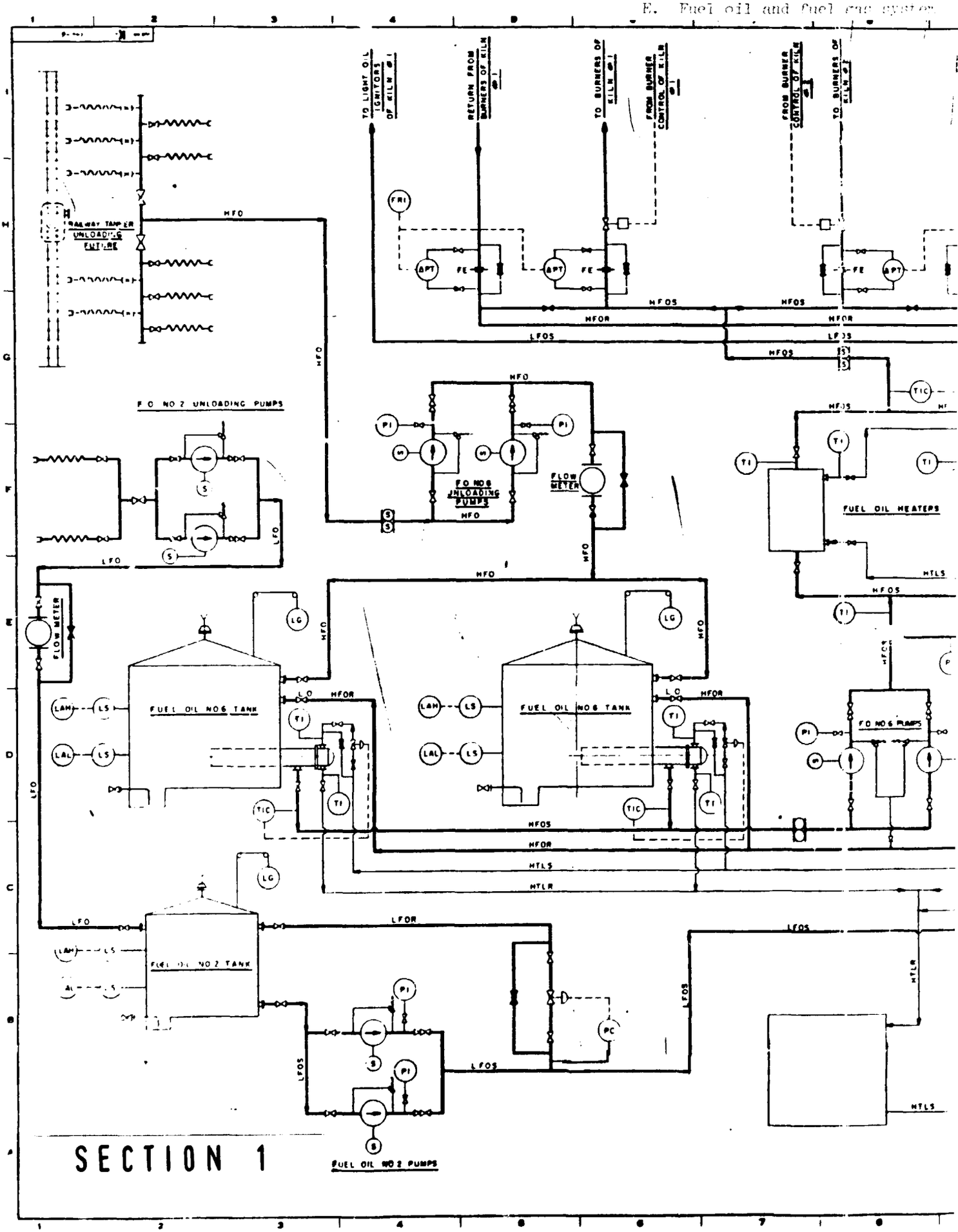


SECTION 1

diagram for packing and bag loading sections



SECTION 2


TO LIGHT OIL IGNITORS OF KILN #1
RETURN FROM BURNERS OF KILN #1
TO BURNERS OF KILN #1
FROM BURNER CONTROL OF KILN #1
FROM BURNER CONTROL OF KILN #2
TO BURNERS OF KILN #2
RAILWAY TANKER UNLOADING FIXTURE
F O NO 2 UNLOADING PUMPS
F O NO 6 UNLOADING PUMPS
FLOW METER
FUEL OIL HEATERS
FUEL OIL NO 6 TANK
FUEL OIL NO 6 TANK
FO NO 6 PUMPS
FUEL OIL NO 2 TANK
FUEL OIL NO 2 PUMPS
HFO
HFOS
HFOR
LFO
LFOS
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TI
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LG
LAH
LS
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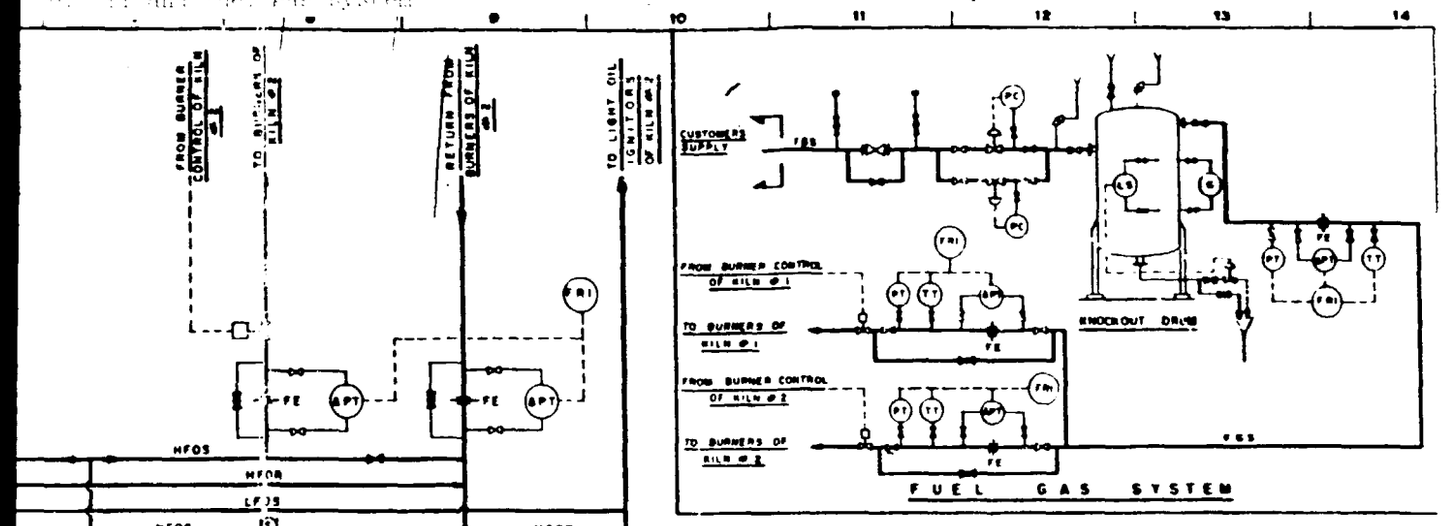
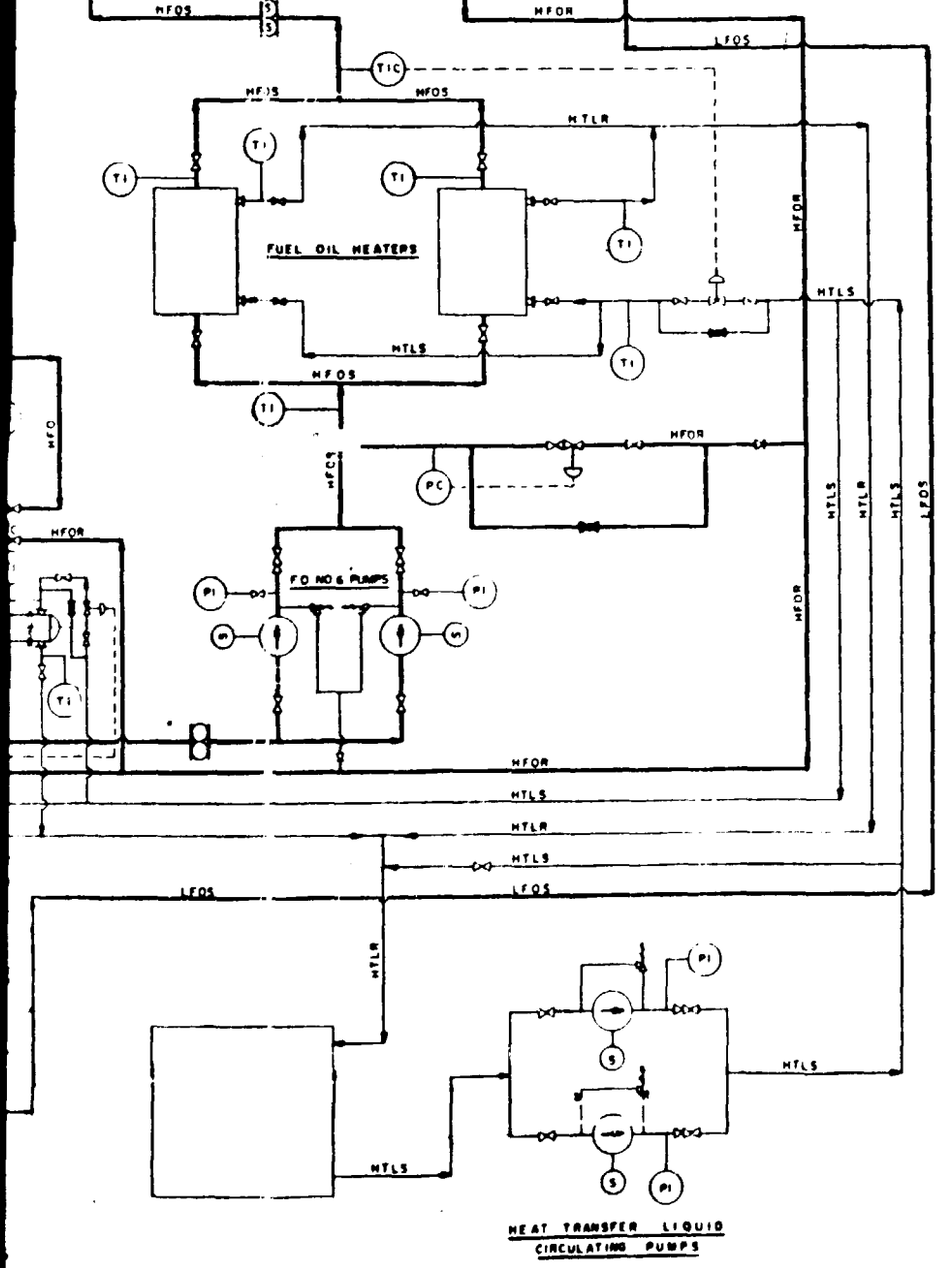
S

SECTION 1

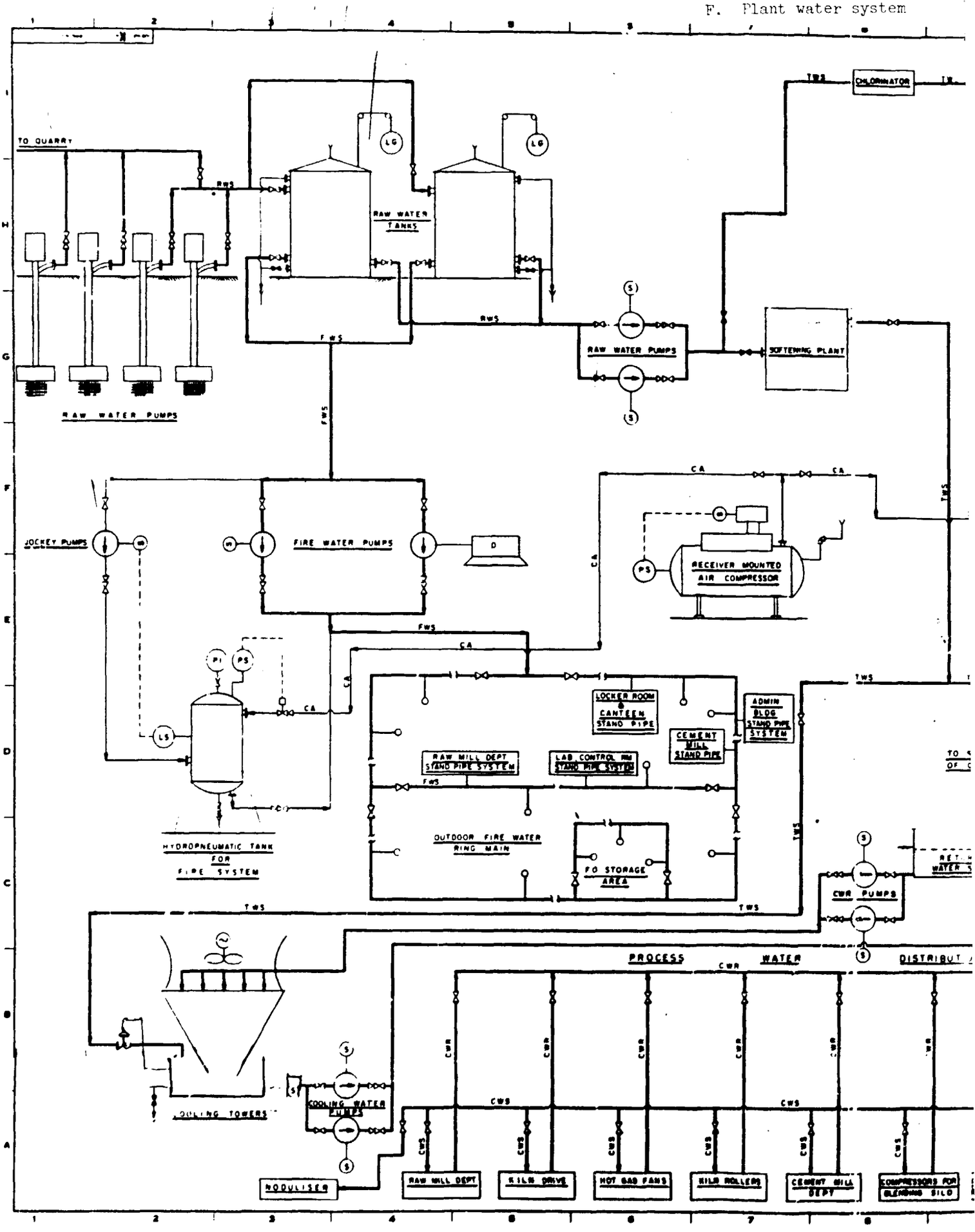




HEAT TRANSFER LIQUID CIRCULATING PUMPS

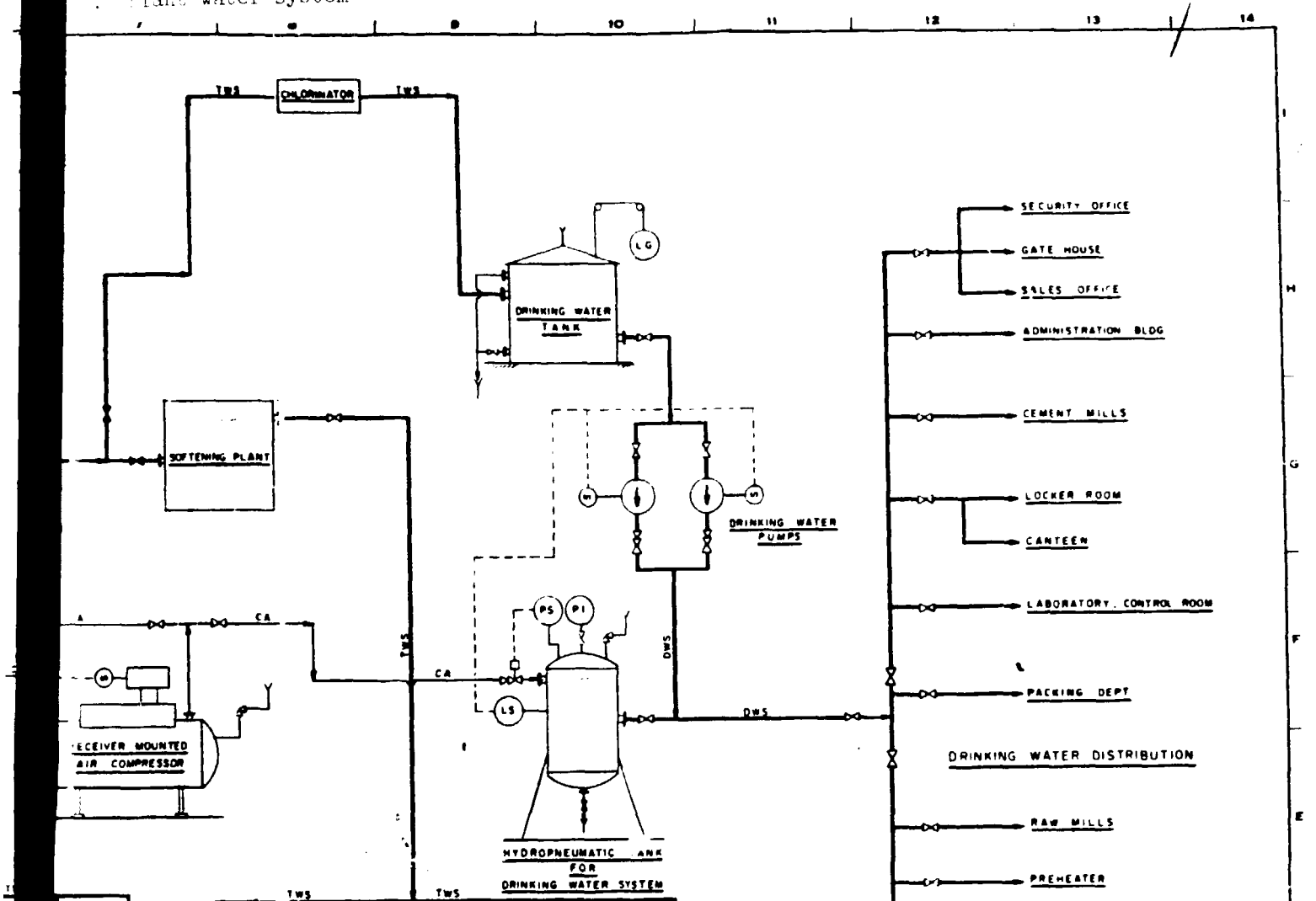
SECTION 2

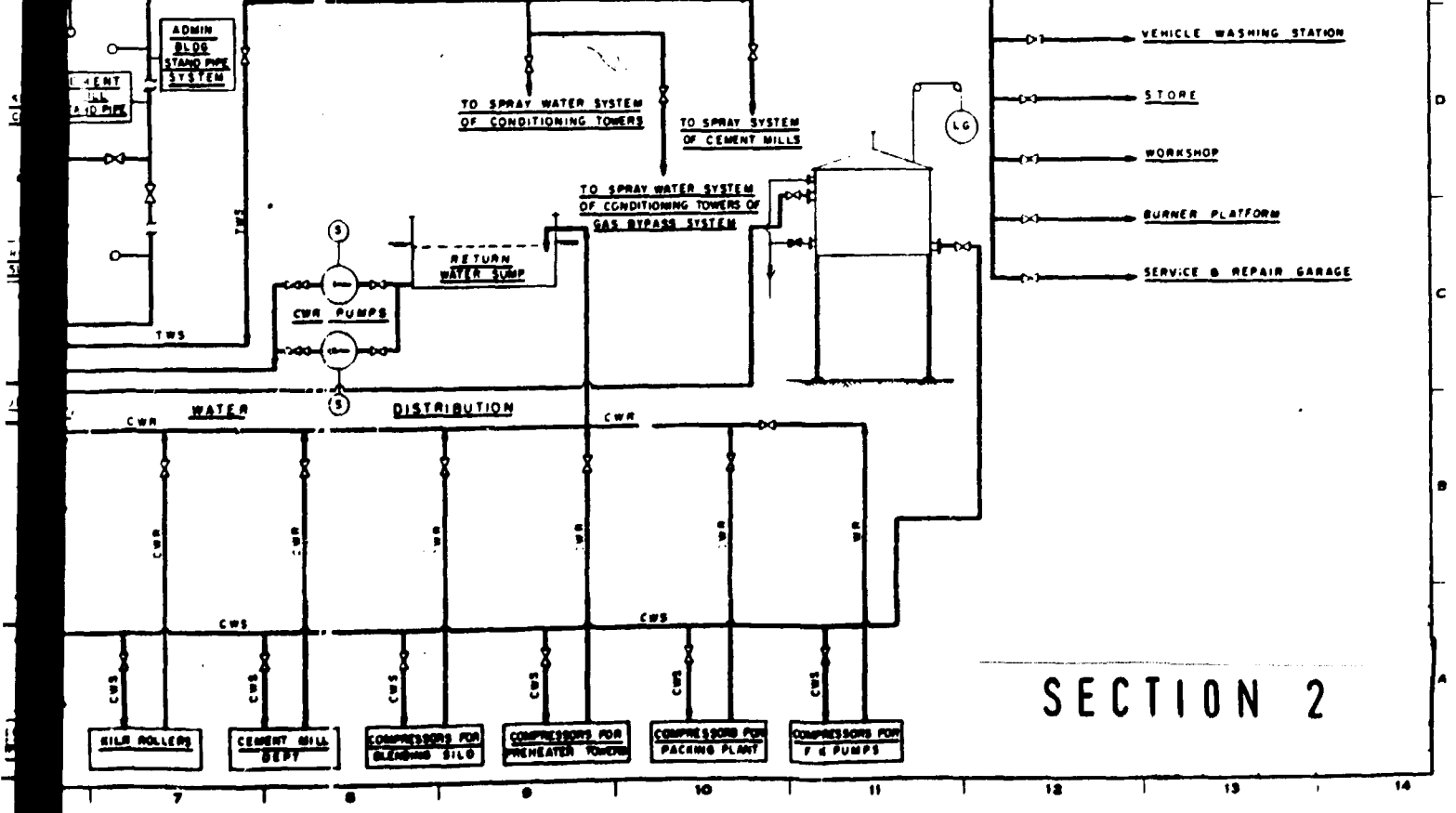
F. Plant water system



SECTION 1

Plant water system




ADMIN BLDG STAND PIPE SYSTEM
TO SPRAY WATER SYSTEM OF CONDITIONING TOWERS
TO SPRAY SYSTEM OF CEMENT MILLS
TO SPRAY WATER SYSTEM OF CONDITIONING TOWERS OF GAS BYPASS SYSTEM
VEHICLE WASHING STATION
STORE
WORKSHOP
BURNER PLATFORM
SERVICE & REPAIR GARAGE
RETURN WATER SUMP
CWR PUMPS
TWS
WATER DISTRIBUTION
CWR
CWS
SILO ROLLERS
CEMENT MILL DEPT
COMPRESSORS FOR BLENDING SILO
COMPRESSORS FOR PREHEATER TOWERS
COMPRESSORS FOR PACKING PLANT
COMPRESSORS FOR P & PUMPS
LG
7
8
9
10
11
12
13
14
A
B
C
D

SECTION 2

Annex VII

REPORTS ISSUED UNDER THE PROJECT TF/LIB/75/002

UNIDO/IOD.37 24 May 1976	Report on the first part (February to April 1976) of a year's mission by a building-materials adviser to the cement industry in Benghazi Aly Afify
UNIDO/IOD.174 11 July 1977	Report on the second part (November 1976 to August 1977) of a year's mission by a building-materials adviser to the cement industry in Benghazi Aly Afify
UNIDO/IOD.264 1 August 1978	Planning a system of mechanical maintenance Alfred Madsen
UNIDO/IOD.345 16 March 1979	Preventive maintenance planning in the mechanical maintenance service Mehmet A. Basman
UNIDO/IOD.354 15 August 1979	Assistance in instrument maintenance Boguslaw J. Walczenko
UNIDO/IOD.361 12 December 1979	Report of the project co-ordinator for the period up to October 1979 A.M. Afify
UNIDO/IOD.383 16 September 1980	Assistance to the electrical engineering staff in organizing and carrying out electrical maintenance Boguslaw J. Walczenko
UNIDO/IO.437 16 January 1981	Report on a one-month mission (from 11 November 1980) to review and evaluate the progress of the project A.M. Afify
UNIDO/IO.475 13 March 1981	Instrument maintenance systems at the Benghazi complex: final summary Boguslaw J. Walczenko
UNIDO/IO.472 6 July 1981	Report of a one-month mission (from 19 May 1981) to review and evaluate the progress of the project A.M. Afify
UNIDO/IO/R.7 30 July 1981	Raw materials deposits at Wadi Ash Shati and Al Jufrah Abd El Rahim Marei

UNIDO/IO/R.14 17 December 1981	Preliminary study for long-term technical advice A.M. Afify
UNIDO/IO/R.33 28 October 1981	Progress of the project from 10 May 1980 to 31 July 1981 A.R. Marei
UNIDO/IO/R.17 2 November 1981	Feasibility of producing sulphate-resisting cement A.R. Marei
UNIDO/IO/R.29 26 March 1982	Replacing cylpebs by grinding balls in Benghazi I and Hawari cement mills A.R. Marei
UNIDO/IO/R.34 26 March 1982	Progress of the project from 1 August 1981 to 31 December 1981 A.R. Marei
UNIDO/IO/R.42* 26 March 1982	Formation of cement lumps and accretion in cement silos A.R. Marei
UNIDO/IO/R.53 26 March 1982	New gypsum deposits A.R. Marei

*Forthcoming