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DP/ID/SER.A/217
2 November 1979
English

09345

ASSISTANCE IN PROJECT AND BID EVALUATION
FOR A MATCH FACTORY

SI/AFG/78/802

AFGHANISTAN

Technical Report: Evaluation of bids for a match factory ^{1/}

Prepared for the Government of the Democratic Republic of Afghanistan
by the United Nations Industrial Development Organization
executing Agency for the United Nations Development Programme

Based on the work of Erik Hedborg,
expert in the production of matches

United Nations Industrial Development Organization
Vienna

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id.79-8777

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Explanatory Notes

The following exchange rates have been used throughout this report:

US\$ 1 = Afg 43.00

US\$ 1 = DM. 1.814

US\$ 1 = Sw.Cr. 4.36

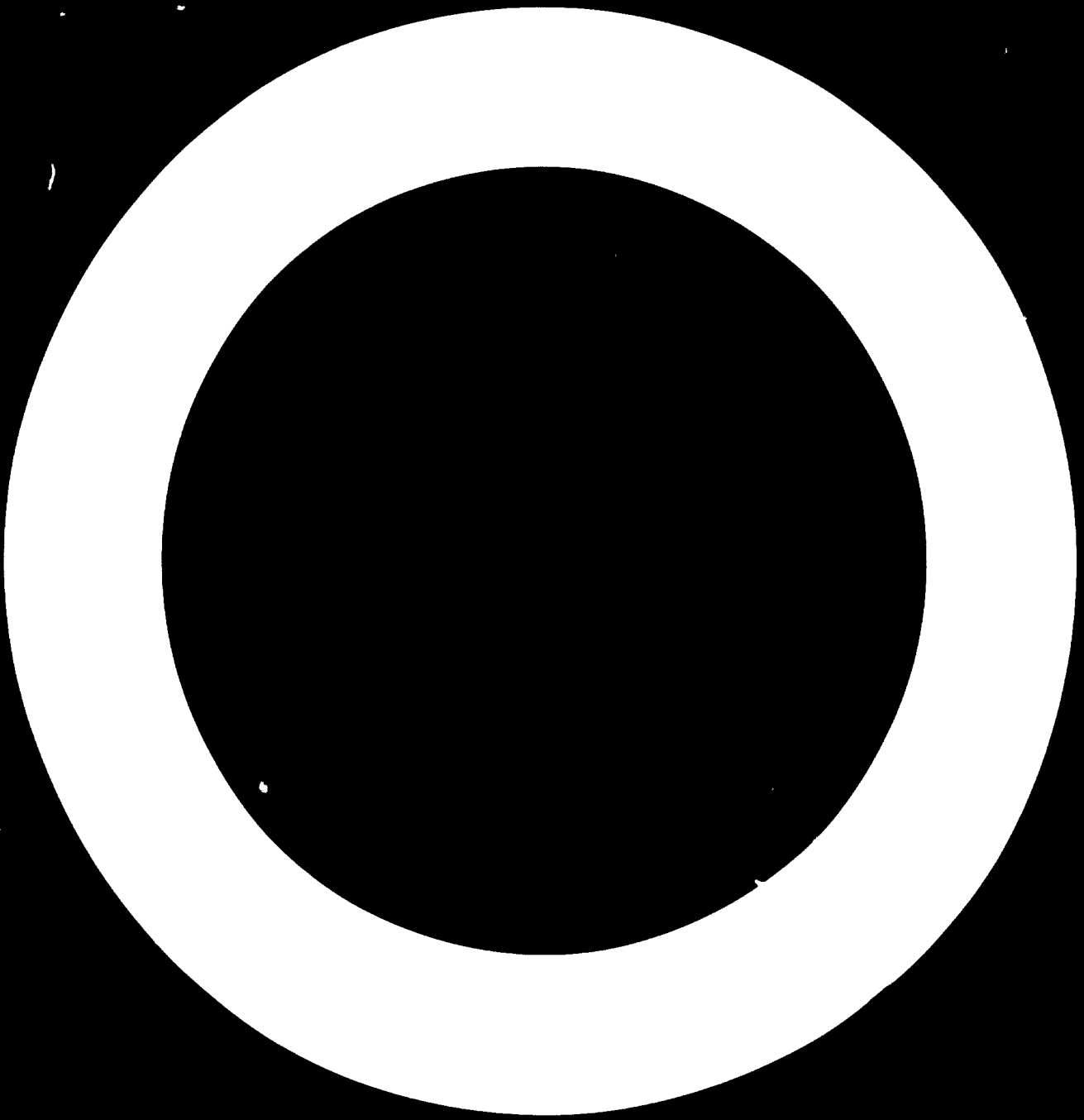
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Abstract

In response to a request by the Government of Afghanistan to the United Nations Development Programme (UNDP) and the United Nations Industrial Development Organization (UNIDO), the services of an expert in the production of matches were provided from 7 April 1979 to 20 April 1979 and from 14 September 1979 to 25 October 1979. The purpose of the first mission was to appraise a project for a match factory and assist the Government in preparing the call for tenders. During the second mission the expert evaluated the bids received.

This report covers the second mission and evaluates the four offers received and recommends requesting a further submission of bids on a more comparable basis.

It having become clear that the existing wood resources of the country are not suitable for match production, the expert recommended to obtain further offers from the four accepted bids for a smaller plant producing from imported raw materials. He also recommended that a study group of technicians be established at the Project office of the Department of Industry and that this group visits match factories to get acquainted with the machine and quality requirements.

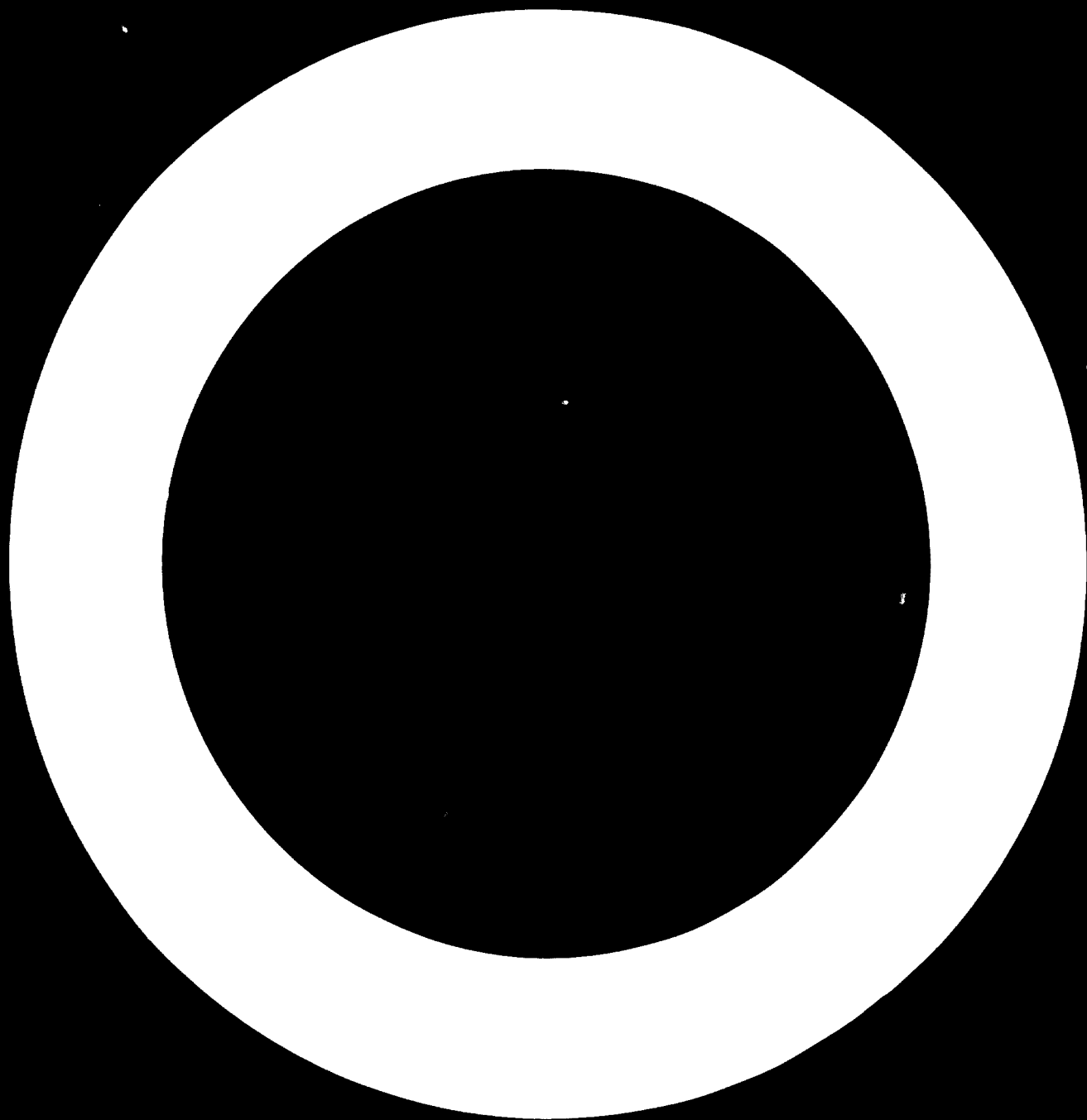


C O N T E N T S

	<u>Page</u>
Introduction	7
1. Findings and Conclusions	8
2. Recommendations	10
3. Technical considerations	11
4. Evaluation of bids received	13

Tables

I	Comparison of offers for a match factory opened on 22 September 1979	19
II	Capital tied up and production costs derived from offers of 22 September 1979	22
III	Capital tied up and cost of production in the theoretical case of Swedish machines and German raw material	25



INTRODUCTION

The Government of Afghanistan requested assistance from the United Nations Development Programme (UNDP) and the United Nations Industrial Development Organization (UNIDO) for the evaluation of a study for the production of matches in the country prepared by the Japan Consulting Institute. The proposed annual capacity of the factory is 300 million boxes (of 50 sticks per box). This capacity would not only meet the demands for matches of the country, but would also make possible exports to neighbouring countries.

The services of a match production expert, Mr. Erik G. Hedborg, were provided by UNIDO. During the expert's first assignment (from 7 to 20 April 1979) he evaluated the project and drafted the documents and technical specifications for the call for tenders and assistance was provided in issuing it.

During the second mission (from 14 September to 25 October 1979) the expert evaluated the four bids received. This report only covers the second mission.

1. FINDINGS AND CONCLUSIONS:

A study of the offers opened on 22 September 1979 and of the actual economic situation in Afghanistan has revealed that:

- 1.1 Full scale match factories as requested in Ministry of Mines and Industries' bid invitation of April 1979 require a capital tied up of US\$ 10 to 15 million and more (table No. 1, line 6).
- 1.2 An investment in means of production of wooden sticks and wooden boxes would be unrealistic, because sufficient supply of good peeling poplar for the purpose is now lacking.
- 1.3 Production of matches in Afghanistan can be made on the basis of imported raw materials.
- 1.4 Production costs arising in plants as offered are higher than actual import prices for current types of matches (table No. 1, line 14).
- 1.5 According to preliminary calculations a minimum size plant, for limitation of employment of foreign exchange, can however theoretically be constituted with an approximate tied up capital of US\$ 2.63 million, comprising an employment of foreign exchange for machinery of US\$ 1.33 million (table No. 2, column 1, lines 1-5).
- 1.6 The combination of this equipment (1.5) and raw materials of lowest available cost does theoretically result in acceptable production costs, when utilized in two shifts and more (180 million boxes/year, table No. 3, line 17).

A very clever management with good previous training of at least six months in production and the utilization of maintenance facilities and social installations together with adjacent industries would then be needed.

- 1.7 Even so little or no profit arises from the project if sales prices are to be maintained at actual levels.
- 1.8 Added value arises from the employment of local manpower and management (table No. 1, line 17, tables Nos. 2 and 3, lines 12).
- 1.9 If and when Afghan poplar becomes available for making sticks (i.e. about 15 years after start of the afforestation project), an annual quantity of 4,200 m³ would be needed for 200 million boxes which at today's prices would represent a cost of US\$ 0.32 million and will increase added value by this amount.
- 1.10 Matches are actually imported at the following prices (excluding customs duties):

U.S.S.R.*	1052 US\$/ton	(One packet of 10 boxes of 50 sticks weighs 112.29 grams, thus one box costs Afg 0.5079 (at 43 Afs/\$))
India	889 US\$/ton	
Pakistan	326 US\$/ton	
Various	1,465 US\$/ton	
Others	333 US\$/ton	on barter

Wholesale and detail prices in Kabul are:

<u>Origin</u>	<u>Cost per box</u>		<u>Brand</u>
	<u>Wholesale</u>	<u>Retail</u>	
U.S.S.R.	0.89	1.--	Avion
China	0.68	0.75	Double Happy:S
India	0.60	0.75	
Bangladesh	0.65	0.75	
Czechoslovakia	0.80	1.--	Scissors
Germany (DDR)	0.80	1.--	Torch Brand

* This being the only easily controllable import, this value was taken as a representative one in the report.

2. RECOMMENDATIONS:

On the basis of the findings referred to in chapter 1 and in compliance with the technical requirements of chapter 3 it is suggested that:

- 2.1 New offers be requested from the companies admitted in the bidding procedure for a minimum equipment, utilized to the fullest extent possible with imported raw materials.
- 2.2 Raw material offers be renewed after revision of the relation of the qualities and prices.
- 2.3 A study be undertaken soonest for sharing of maintenance facilities and social equipment and services, adjacent to the proposed factory's site.
- 2.4 A work group of technicians be organized at the Project Office of the Department of Industry that shall study match making techniques and machinery, raw material qualities and prices. A study tour for this team to visit match factories soonest is recommended.
- 2.5 In the long term a poplar afforestation programme be co-ordinated with the match project for future obtention of real added value (see table No. 1, line 17).

3. TECHNICAL CONSIDERATIONS:

- 3.1 One match making machine of highest technology (WIMCO) produces 4.5 billion (10^9) matches per shift and year (270 days of 7 hours). The Afghan market is covered by one such machine operating 2.2 shifts of 7 hours or 1.9 shifts of 8 hours per day per annum.
- 3.2 One good outer box making machine operating at half speed supplies the necessary boxes in equal time from imported skillets.
- 3.3 One good inner box making machine also supplies the necessary inner boxes in equal time running at half speed.
- 3.4 Printing should be avoided in first stage of operation because it is complicated and expensive in terms of foreign exchange and capital tied up.
- 3.5 When no wooden splints and no wooden boxes are made no drying is requested, no boiler house will be needed while heating necessary for the match making machine can be obtained electrically, and a very considerable saving in cost for auxiliary equipment will be made (boiler house, pumps, steam, water, and air distribution networks).
- 3.6 Points 3.1 through 3.5 meet the requirement that capital tied up shall be small and constitute the optimum basic investment for a maximum production of 13.5 billion matches (270 million boxes) per annum (only the match making machine would run more than two shifts). (See Tables Nos. 2 and 3).
- 3.7 Raw materials for the above machinery are only eight i.e. splints, outer box skillets with printed label and striking surface, reels of cardboard for inner boxes, ready made powders for head composition, hide glue, chlorate of potash, glue for inner boxes and paraffin wax.

- 3.8 Filling of boxes and wrapping of 10 and 100 packets by hand gives the highest added value and gives the not small advantage that matches and boxes from eventual late shifts can be stocked and utilized during earlier shifts, thus avoiding to keep a large number of workers on late shifts.
- 3.9 The match- and box making machines having been reduced to only three items the maintenance workshop can be considerably reduced in order to lessen capital tied up. Facilities of surrounding maintenance units should be utilized at a maximum.
- 3.10 It should be studied if social services can be shared with adjacent industries. This also applies to transportation of people and goods.
- 3.11 As a consequence of 3.1 through 3.9 starting up can occur earlier than for a more complex factory and training will be quicker and more specific.
- 3.12 Buildings shall be foreseen on a level rectangular site of 140 x 360 m having access roads on both short sides. Long sides are essentially in north south direction (lots 81-92 and 58-64 at Pul-i-Charkhi).
- 3.13 Buildings shall be of modular conception and machines shall be placed in such a way that subsequent increases of production or mechanization thereof can be made without stopping of machinery already in use.
- 3.14 Administrative offices shall be part of main buildings and separated from production hall by glass partition to make visual inspection continuous and easy.
- 3.15 In view of the extremely favourable meteorological conditions of the proposed site and the suitable north southerly position of main building the utilization of sun-heating for all warm-water needs shall be reconsidered.

4. EVALUATION OF BIDS RECEIVED:

The opening date of the bids was extended from 15 to 22 September 1979. On the latter date the following four bids were opened:

- UNION MATEX (Federal Republic of Germany)
- ANSIMON S.R.L. (Italy)
- TECHNOIMPEX (Hungary)
- WIMCO Ltd. (India)

Some two or three weeks after that date the Japanese offer was received, which was therefore not taken into consideration. The detailed analysis of these four bids is given hereunder.

A. Offer made by:

UNION MATEX (EUROPEAN TEXTILE MACHINERY UNION)
POSTFACH 6169, D - 6231 SCHWALBACH
FEDERAL REPUBLIC OF GERMANY
(Project No. 301/2001-17)

The offer was accompanied by the Afghan representative of the above company Mr. H. Naseri of Kabul and consisted of 4 copies each in a large file and some samples of matches and printed skillets for outer and inner boxes.

An adequate bond had been deposited at the time of the submission of the offer.

The offer is reasonably detailed and numerous layout drawings are included.

The following statements can be made:

- The machinery offered is mainly manufactured by Czerveny-Hering of Nürnberg, FRG, a well known, reputable company who has sold very numerous plants and machinery in many countries all over the world. Machines are brand new and of good average technology.

- No offer for wooden boxes is made.
- Factory take over is scheduled at the end of the 23rd month after the order is placed.
- Union Matex, the bidder, have assured the function of contractor and representative of the manufacturer.
- In difformity to the requests of Ministry of Mines and Industries' bid invitation of April 1979 raw materials are explicitly excluded from the offer (paragraph VI, Exclusions from scope of supply).
- Cost of production calculations were not produced, only one scheme showing how to make calculations is provided (paragraph X, calculation of production costs).
- Quality control of raw material is explicitly left to the responsibility of the buyers (paragraph VII obligations of the client points 6 and 19).
- There is no complete list of the quality requirements of raw materials.
- The framework of an adequate and attractive production hall and offices is comprised in the offer. The building shall however be completed locally.
- Training proposed appears to be insufficient for Afghan circumstances.
- Technical specifications and pamphlets appear sufficient for an experienced match technician.
- The deliveries of maintenance work shop and test laboratory are not specified.
- The offer is of prime interest despite the above shortcomings.

A more complete technical discussion and comparison with other offers will be made further on in this report.

B. Offer made by:

ANSIMON S.R.L.
Consultants and Exporters
Italy

The offer that was accompanied by Mr. Fahim (Kabul), the Afghan representative of that company was issued in three copies of a price list and one set of pamphlets showing the machines offered. It cannot, however, be compared to the other offers received because:

- a- It is made FOB Italian port and not CIF site in Kabul.
- b- It is incomplete in numerous ways.

Thus, among others, the following requested details were totally missing:

- Name of manufacturers of the different machines.
- Reference lists of actual users of similar or identical machines.
- Offer of workshop and test laboratory.
- Offer of raw materials and quality specifications of same.
- Manning schemes.
- Cost of production calculations.
- A training, administration and assistance proposition.
- A list of consumption materials and spare parts.
- Drawing of machine groups and layout of factory.
- Offer of boiler house and power station.
- Offer of steam, water and compressed air distribution systems.
- Lighting in and outside factory buildings and offices.
- Social services.

For the above reasons it was proposed by the expert that the offer be disregarded.

(A bond of US\$ 50.000 had been deposited before submission of offer).

C. Offer made by:

TECHNO IMPEX
P.O.Box 183
BUDAPEST 62
HUNGARY

(Offer No. 102-49-9-1971)

The offer was submitted by Miss Eva Sáakai and consisted of four copies containing each a machine specification prices for all machinery, equipment and buildings offered, pamphlets, drawings and a simplified calculation of production costs and profitability.

An adequate deposit of a bidding bond had been made at the time of the submission of the offer.

Upon examination, it can be stated that:

- No offer of raw materials is included nor is there a quality specification for raw materials.

- The machinery offered is of unknown origin and the pamphlets give no indication of hourly outputs, weight and size or running speeds.

- Take over is scheduled at end of October 1982.

- The reference lists from CHEMIMAS included are updated until 1975 and make no mention of match factories supplied or installed. Only reference made to matches is that of an unnamed factory in Budapest.

- The 10-year historiographic pamphlet of CHEMIMAS (1967-77) gives no account of match factories installed or pertaining to future developments in the planning stage.

- There is no cost calculation or profitability calculation for alternative "B", that is part of the offer, and that is not established in conformity to the instructions given in the Ministry of Mines and Industries' bid invitation of April 1979 paragraph 12.01 through 12.09.

- Total cost of alternative "A" is US\$ 7,885,700 (Afs. 350 million) buildings partly comprised.

- Total cost of alternative "B" is not clearly specified but would be roughly US\$ 1,000,000 higher than alternative "A".

- The equipment is foreseen to be delivered between the 10th and 26th month and factory take over at the end of the 36th month after the order is placed.

The offer appears to be issued by an industrial engineering agency particularly experienced in and devoted to chemical engineering in the field of plastics, paints and varnishes on the one hand and in the field of extraction and ore processing on the other hand, the main output of which seems to be heavy equipment like containers and tanks for liquids and powder, their transporting and handling equipment for example, more recent engineering appears to lay in the fields of canning, bagging, boxing and palletizing of powders, foodstuffs and fluids.

At first sight the offer does not seem to be of prime interest.

D. Offer Made by:

WIMCO Ltd.
BALLARD ESTATE
BOMBAY 400038
INDIA

The offer submitted by Mr. A. Nehru Expert Development Manager and Mr. K. L. Komar, Chief Engineer of Bombay, was given in four copies, each consisting of three voluminous files containing a very complete specification of 10 different alternatives all very completely specified with a large documentation and technical specifications and many drawings down to the smallest detail.

An adequate bond had been deposited in time.

The following can be stated upon first lecture:

- WIMCO, a subsidiary of the Swedish Match Group, acts on behalf of the Group as a contractor for that Group in respect of Ministry of Mines and Industries.

- The match making machines offered are brand new and manufactured by the Group's daughter company ARENCO of Kalmar, Sweden.

- Auxiliary equipment such as boilers, compressors, social services, etc. will be delivered from India by WIMCO.

- The raw materials offered are those employed in the Group's own match factories in numerous countries where they are being produced in close collaboration with the Group.

- Erection is foreseen to start at the end of the 14th month after the order is placed and production on the 18th month. A subsequent run-in and training period of 13 months will have the assistance of technicians of the Group from India and Sweden. A very complete training scheme has been offered and an administration and assistance contract is available after separate negotiations.

- WIMCO is willing to assist in plantation of poplars, particularly selected for match production based on separate negotiations.

The offer is of prime interest and a technical discussion and comparison to other offers has been made in this report.

Japanese offer:

It had been made known that a Japanese company was interested to submit an offer which could not be delivered until 22 September 1979. For this reason the bidding procedure had been postponed from 15 September, at 12:00 hours, until 22 September, at 10:00 hours.

On that day and that hour, Mr. Seito from Japan was on hand for participation in the bidding procedure, but could not produce his offer.

Bidding was then postponed until 14:00 hours of the same day but in spite of researches made Mr. Seito could not produce his bid documents.

On 23 September 1979 at noon there still was no offer submitted to the Ministry of Mines and Industries.

This offer finally reached the Ministry some two to three weeks later. However, since it was not submitted in due time the stipulation in the bid invitation (paragraph 1.12 ... "Delays in the post office shall not be accepted") precluded the acceptance of this bid.

TABLE I

COMPARISON OF OFFERS FOR A MATCH FACTORY OPENED ON 22 SEPTEMBER 1979

Item	UNIONMATEX		ANSI MON		TECHNO IMPEX		WINCO - SWEDISH MATCH CO.									
	A	B	A	B	A	B	1A	1B	1C	1D	1E	2A	2B	2C	2D	2E
	M i l l i o n U S \$ (e x c e p t l i n e 1 4)															
1. Total offer	9.59	8.08	5.74	7.89	8.86	8.55	6.70	11.19	10.31	9.75	4.81	3.89	7.11	5.28	6.39	
2. Minus management offer	--	--	--	0.57	0.57	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69
3. Plus local cost for buildings	1.00	1.00		1.00	1.00	1.90	1.90	1.90	1.90	1.90	0.95	0.95	1.90	1.90	0.95	
4. Plus raw material for one year	1.99	1.00		2.50	2.50	3.10	3.10	2.40	2.40	2.70	1.94	1.94	3.88	3.88	1.55	
5. Plus other working capital	1.80	0.90		1.80	1.80	1.80	1.80	1.80	1.80	1.80	0.90	0.90	1.80	1.80	0.90	
6. Total tied up capital	14.38	10.93		12.62	12.59	14.66	12.81	16.60	15.72	15.46	7.91	6.99	14.00	12.17	9.10	
7. Minus offered buildings	0.87	0.87		0.47	0.47	--	--	--	--	--	--	--	--	--	--	--
8. Minus local buildings	1.00	1.00		1.00	1.00	1.90	1.90	1.90	1.90	1.90	0.95	0.95	1.90	1.90	0.95	
9. Minus services, erection, etc.	2.43	2.43		1.55	1.66	0.68	0.62	0.73	0.71	0.71	0.43	0.41	0.59	0.59	0.56	0.58
10. Minus auxiliary equipment	1.52	1.52		0.95	0.95	0.87	0.87	1.03	1.03	1.03	0.81	0.81	0.86	0.86	0.86	0.87
11. Minus all working capital	3.80	5.16		4.39	4.28	4.90	4.90	4.20	4.20	4.50	2.84	2.84	5.68	5.68	2.45	
12. Total cost of match machines	4.76	3.26	5.74	4.26	5.23	6.31	4.52	8.74	7.88	7.32	2.88	1.98	4.97	3.17	4.25	
13. Total production costs per year	3.51	3.71		3.66	3.66	4.76	5.27	4.59	5.29	4.62	2.95	3.22	5.58	6.18	2.67	
14. Production cost per box Afs.	0.504	0.532		0.52	0.52	0.68	0.76	0.66	0.768	0.662	0.85	0.923	0.80	0.89	0.74	
15. Minus depreciation and interest	1.17	0.86		1.07	1.11	1.15	0.88	1.51	1.42	1.40	0.71	0.62	1.26	1.09	0.82	
16. Minus imported raw material	1.47	1.47		0.35	0.77	2.64	2.64	1.59	1.59	2.02	1.93	1.93	3.85	3.85	1.32	
17. Total value added in Afghanistan	0.87	1.18		2.24	1.77	0.97	1.75	1.49	2.28	1.20	0.31	0.67	0.47	1.24	0.53	
<u>Technical specifications</u>																
18. Number of sticks per box	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
19. Size of box	53x35x17	53x35x17	53x37x15	53x37x15	53x37x15	53x37x15	53x37x15	53x37x15	53x37x15	53x37x15	53x37x15	53x37x15	53x37x15	53x37x15	53x37x15	53x37x15
20. Outside boxes CB-cardboard	CB	CB	CB	W	CB	CB	CB	W	W	W	CB	CB	CB	CB	CB	CB
21. Inside boxes W=wooden	CB	CB	CB	W	CB	CB	CB	W	W	W	CB	CB	CB	CB	CB	CB
22. Splints P=purchased M=Made in Afghanistan	M	M	M	M	M	M	M	M	M	M	P	P	P	P	P	M
23. Filling MA=Manual, ME=Mechanical	ME	MA	ME	MA	ME	ME	MA	ME	ME	MA	ME	MA	ME	MA	ME	ME
24. Number employed	122	338	not indi- cated	940	292	386	1152	498	1272	457	205	588	349	1115	233	
25. Million boxes per year	300	150	287	300	300	300	300	300	300	300	150	150	300	300	150	
26. Added value in % of capital tied up	6.0	17.7	13	17.7	13	6.6	13.7	8.9	14.5	7.8	3.9	9.6	3.4	10.2	5.8	

DISCUSSION OF TABLE NO. I:

I/1 The main purpose of the table is to allow a rapid comparison of the offers, one of which is extremely complete and specific to the smallest detail whereas others are succinct and in some cases lack the details requested in Ministry of Mines and Industries' invitation of bids.

I/2 Some figures therefore are arrived at by deduction or assumption as is for instance the case of some figures presented in an attempt to arrive at plausible production costs. (lines 13 and 14.)

I/3 An assessment of the total capital needed for projects based on the offers is made on line 6. Some offers comprise a management fee (line 2) and some do not. For the sake of comparison this fee is deducted before arriving at capital tied up. Likewise some offers comprise a metal structure for buildings and others do not. Line 3 therefore carries the additional local cost for the offers comprising building structures, and an assumed total cost for offers which do not comprise metal structures among the imported items.

Line 4, one year's supply of raw materials, is related to the yearly productions indicated for each alternative on line 25.

Line 5, other working capital, comprises cash and banks, stock of ready product prepaid expenses etc. at an assumed total value of 10-15% of total capital tied up.

Line 6, therefore, has no pretention of being an exact requirement of capital for the project, but is a rapid comparison of plausible needs for the various alternatives.

I/4 In order to establish the relationship between the cost of match making machines only (line 12) and total capital needed all other costs have been extracted in lines 7-11. Line 12 shows that the match making machinery employs between 26 and 50% of total capital tied up depending upon type of project and magnitude of production.

- I/5 An assessment of plausible value added is arrived at on line 17 by extraction from total cost of production of all items related to imported goods or services or capital costs. It will be seen that added value is high in columns where manual operations substitute mechanical ones (MA in line 23, more manpower is indicated in line 24). Where local forest resources were to be utilized the sign W for wooden boxes or M for manufactured wooden sticks is shown.
- I/6 It must be observed by the reader of the tables that all figures are based on the assumption that the plants are utilized at 100% of their production capability and that consequently a lesser utilization will result in less favourable financial results.
- I/7 It should also be noted that the apparently very favourable production cost reported in column A of the Technoimpex proposal line 14, derives from an obviously erroneous 0.35 for imported raw materials, which is only a fraction of the costs reported for other alternatives. Even the 0.77 under Technoimpex proposal "B" is only half the value given in columns "A" of Unionmatex or column "1A" of Wimco. A verification will have to be made later.
- I/8 The main conclusions drawn from this table are that capital tied up for factories as offered is very high (line 6), that cost of production is high and that value added in relation to capital tied up is low even in the rather theoretical case that the plants be utilized to their full capacity. (lines 25 and 26).

Table II

CAPITAL TIED UP AND PRODUCTION COSTS DERIVED FROM OFFERS OF 22 SEPTEMBER 1979
 SUPPOSING ONE MATCH MAKING MACHINE AND NECESSARY BOX MAKING MACHINERY ONLY.
 AUXILIARY EQUIPMENT REDUCED TO LOWEST POSSIBLE NEEDS AND SOCIAL BUILDINGS
 TO BE SHARED WITH ADJACENT ENTERPRISES.

Item	WIMCO			UNIONMATEX				
	1 shift Million	2 shifts US\$	3 shifts US\$	4* (except	5 lines	6 17	7 and	8* 20)
Cost of equipment, raw materials, management, depreciations etc.								
1. Match making machine plus spare/wear parts	0.87	0.87	0.87	0.193	0.80	0.80	0.80	0.233
2. Inner box making machine plus spare/wear parts					0.20	0.20	0.30	0.038
3. Outer box making machine plus spare/wear parts	0.26	0.26	0.26	0.046	0.56	0.56	0.56	0.065
4. Composition making machines plus spare/wear parts	0.08	0.08	0.08	0.018	0.08	0.08	0.08	—
5. Auxiliary equipment	0.12	0.12	0.12	—	0.12	0.12	0.12	—
6. Buildings, locally built, sewers, etc.	0.60	0.60	0.60	—	0.60	0.60	0.60	—
7. Raw materials for three months	0.29	0.58	0.87	—	0.16	0.33	0.50	—
8. Stock of already made matches (2 months)	0.21	0.42	0.63	—	0.21	0.42	0.63	—
9. Cash and Banks and etc (app. 10% of tied up capital)	0.20	0.40	0.60	—	0.20	0.40	0.60	—
10. Total tied up capital	2.63	3.33	4.03	—	2.93	3.51	4.19	—
<u>Cost of matches made per year</u>								
11. Imported raw materials	1.16	2.32	3.48		0.61	1.23	1.84	
12. Manpower	0.19	0.38	0.57		0.14	0.29	0.43	
13. Depreciation (1+2+3+4+5 at 5% per year)	0.06	0.06	0.06		0.09	0.09	0.09	
14. Interest on capital tied up ($10 - \frac{1+2+3+4+5}{2} \times 0.09$)	0.18	0.24	0.30		0.18	0.24	0.29	
15. Management	0.07	0.07	0.07		0.07	0.07	0.07	
16. Total cost per year (million US\$)	1.66	3.07	4.48		1.09	1.92	2.72	
17. Cost in Afg/box ex factory	0.79	0.73	0.713		0.69	0.61	0.57	
18. Total production million boxes per year	90	180	270		68	136	204	
19. Total cost per year (million US\$/year) minus depreciation 7.5% per year per shift	1.69	3.19	4.69		1.135	2.10	3.045	
20. Cost in Afg per box ex factory (depreciation 7.5% per year per shift)	0.81	0.76	0.75		0.72	0.66	0.64	

* Columns 4 and 6 indicate Million US\$ per billion matches per annum per shifts (10⁹)

NOTES ON TABLE II:

Line 13:

Match making machinery and auxiliary equipment are depreciated at 5% per year for calculation purpose only. In a business proposition 7.5% per year per shift would be a more realistic rate. (see lines 19 and 20).

Line 14:

All capital tied up is calculated at 9% per year. Machines and auxiliary equipment are calculated at half initial value for averaging during depreciation cycle.

No provision for unforeseen costs has been made.

These figures are derived from Indian and West German offers. Other offers are insufficiently detailed to allow for a comparison of detailed costs and prices.

DISCUSSION OF TABLE NO. II:

- II/1 In view of the discouraging prospects appearing from table No. I (4.8) an attempt has been made to calculate cost of match making machinery, capital tied up and production costs in the case of minimum plants requiring a lower tied up capital which could be utilized to their full capacity in actual practice.
- II/2 One match making machine has been foreseen and the needed box making equipment as extracted from those offers which give sufficient details for the purpose.
- II/3 It having become apparent that no sufficient forest resources exist at present, all raw materials and splints are considered imported.
- II/4 The table shows that a total capital tied up as low as US\$ 2.63 million can be arrived at (line 10) and foreign exchange needed can be limited to US\$ 1.33 million (lines 1 - 5, column 1).
- II/5 Production levels (line 18) are those relative to each manufacturer's machinery in order to compare maximum utilization figures for each alternative.
- II/6 Columns 1, 2, 3 and 4 show lower cost of machinery than 5, 6, 7 and 8 but production costs are lower in columns 5, 6, and 7 than in 1, 2 and 3. This is due to lower costs for raw materials.
- II/7 However, all production costs indicated are too high for the market.

CAPITAL TIED UP AND COST OF PRODUCTION IN THE THEORETICAL CASE OF SWEDISH MACHINES^{1/} AND GERMAN RAW MATERIAL^{2/}

All figures in million US\$ per year (except for lines 17 and 20).

Item	Cost of equipment and raw materials	1 1 shift	2 2 shifts	3 3 shifts	Cost per billion sticks/year
1.	Match making machine and spare/wear parts	0.87	0.87	0.87	0.193
2.	Inner box making and spare/wear parts				
3.	Outer box making and spare/wear parts	0.26	0.26	0.26	0.046
4.	Composition making	0.08	0.08	0.08	0.018
5.	Auxiliary equipment	0.12	0.12	0.12	—
6.	Building, locally built, sewers, etc.	0.60	0.60	0.60	--
7.	Raw materials (3 months)	0.16	0.33	0.50	—
8.	Stocks of matches made (1 month)	0.20	0.40	0.60	--
9.	Cash and banks, etc.	0.20	0.40	0.60	--
10.	Total capital tied up	2.49	3.06	3.63	
11.	Imported raw materials	0.81	1.62	2.43	
12.	Manpower	0.19	0.38	0.57	
13.	Depreciations (Items 1 to 5 at 5% per year)	0.07	0.07	0.07	
14.	Interest on capital tied up (9% per year)	0.17	0.21	0.27	
15.	Management	0.07	0.07	0.07	
16.	Total cost per year	1.31	2.35	3.41	
17.	Cost Afg per box	0.63	0.56	0.54	
18.	Total production per year million boxes	90	180	270	
19.	Total cost per year (depreciation at 7.5% per shift per year)	1.345	2.49	3.655	
20.	Cost Afg/box (depreciation at 7.5% per shift per year)	0.64	0.59	0.58	

1/ Offered by WIMCO / Swedish Match Co., India

2/ Offered by WIMOMATEX / Garmeyer, Federal Republic of Germany

NOTES:

Line 13:

Match making machinery and auxiliary equipment are depreciated at 5% for the purpose of calculation only. In a business proposition 7.5% per year per shift would be more realistic rate (see lines 19 and 20.)

Line 14:

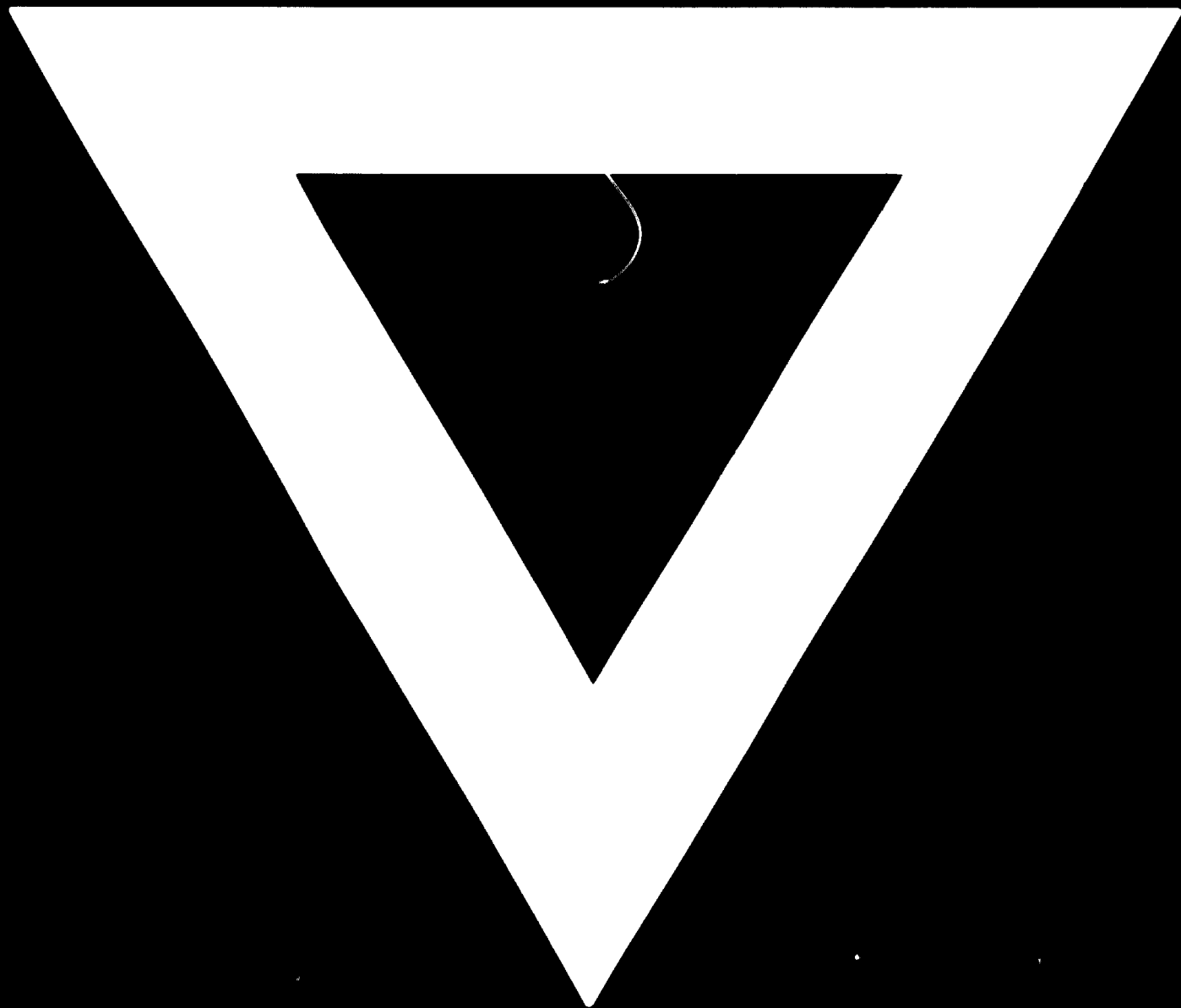
All tied up capital is calculated at 9% per year. Machines and auxiliary equipment are calculated at half their initial value for averaging during the depreciation cycle. No provision for unforeseen costs has been made.

DISCUSSION OF TABLE NO. III:

- III/1 From an analysis of table No. II it becomes apparent that the lowest production costs would arise from the combination of capital cost shown in columns 1, 2, 3, and 4 and raw material and manpower costs as shown in columns 5, 6 and 7.
- III/2 Table No. III has therefore been calculated on the theoretical assumption that the aforementioned combination of favourable circumstances be possible.
- III/3 Tied up capital then becomes slightly lower owing to the lower cost of raw materials carried in stock. Stocks of ready matches also become just slightly lower while carried at cost (line 10).
- III/4 Production costs, as expected, become lower and a theoretical production cost of Afg. 0.56 per box is achieved in two shifts operation with a coverage of 90% of the Afghan market. This cost was achieved in none of the alternatives of table No. II.
- III/5 The above results are estimated sufficiently interesting to encourage the recommendations made in chapter 2.



B-368



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