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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
(UNIDO)

**ASSISTANCE TO OMARZAY STEEL
MILLS COMPANY
AFGHANISTAN**

UNIDO Contract No. 90/207
Project No. SI/AFG/90/801
Activity Code: J 13208

FINAL REPORT

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1. SUMMARY, CONCLUSION AND RECOMMENDATION

The mission and subsequent work were directed at assisting Omarzay Steel Mill Company on the best way of setting up the Mini- Steel Plant and of providing a wider range of domestically produced steel products.

The implementation of the assistance has been carried out in two stages. Firstly the consultants visited Afghanistan for 7 weeks in February and March 1991. With the help of staff from Mr. Omarzay's office they evaluated offers submitted directly to Mr. Omarzay by VVO Tyazhpromexport - Moscow and by the firm of Danieli - Italy, further they updated the Feasibility Study, Project No. SI/AFG/85/801/11-01/31.8.C. and Tender Document prepared by Asia Engineerings Consultancy Ltd. The consultants have also undertaken investigations into the key areas of demand for steel products, availability of steel scrap (military hardware) and energy, and requirements of the Mini-Steel Plant in terms of site and infrastructure.

At the end of this visit a number of follow up interviews were conducted by consultants and UN/UNIDO/UNDP representatives in Kabul with relevant Government Departments concerning energy supply, infrastructure and location of the plant.

The second stage proceeded with respect to Terms of Reference in Europe. The list of duties in connection with the assistance was discussed in detail at UNIDO in Vienna and within Afghanistan at the start of the mission. The recommendations and conclusions are structured around these duties, but the report takes into account some wider aspects of steel product requirements encompassing need to house refugees and displaced persons.

Currently there is no direct involvement by the Government of Afghanistan in steel making project and it is incentive of the Omarzay Steel Mill Company to do so. The assistance provided by UNIDO to this company revealed an urgent need for steel produce and confirmed the viability of steel plant processing scrap. The amount of the plant capacity is consistent with consultants forecast of energy supply, infrastructure possibilities and of products demand.

Based on findings in Afghanistan the consultants prepared and distributed the "Invitation for Bidders". In close cooperation with UNIDO officials the offers received were evaluated.

R e c o m m e n d a t i o n

The consultants conclude that, of three offers available, China MCC offer is the most suitable.

Its principal advantages may be envisaged as follows:

- it fully complies with "Invitation for Bidders" on "Turn-key" basis,
- proposed simple and easy to operate steelmaking and rolling facilities are seen as promising new development for use in a country with no metallurgical tradition,
- capital investment is restricted to manageable proportions.

I t i s r e c o m m e n d e d

therefore for the Omarzay Steel Mill Company to enter into contract agreement with the China Metallurgical Construction Corporation, 46 Dongsi Xidajie, Beijing, China in order to proceed with MSP development and to consider the technical suggestions of the consultants presented during negotiations with MCC representatives in order to improve the design and related investment and production costs of the Mini Steel Plant. (For more detail evaluation and reasons see chapter 2.2.2 and Annex No. 6).

2. IMPLEMENTATION OF THE ASSISTANCE

The implementation of the Assistance has been carried out in two stages. First stage has proceeded in Afghanistan with respect to Terms of Reference (Annex 1), summary being presented in Interim Report, "Invitation for Bidders" included (Annex 2). Following the UNIDO approval the "Invitation for Bidders" has been distributed with respect to agreement made by Omarzay Steel Mill representatives to 14 possible suppliers in 1991, June the 6th. The submission of offers was requested within three months, i.e. at the end of August 1991. (List of proposed potential supplier see Annex 3).

The continuation of Assistance proceeded in Europe as its second stage. It had to be modified according to the complicated situation in Afghanistan which affected the response of bidders and caused delay in submission of offers. Nevertheless, the detailed technical negotiations took place with the firms of ABB, Škodaexport, Euroinvest in HP Metalconsult, Prague and with the representative of VVO Tyazhpromexport at the Trade Mission of Russian Federation in Prague.

The firm of ABB was interested in offer submission, but on a later stage withdraw its proposal. The same does apply to the firms of Euroinvest, Škodaexport, ASEA, Clecim, Davy Mc Kee and others. Only two offers were submitted, i.e. by the firm of Danieli and by the firm of VVO Tyazhpromexport Moscow. Limited response to "Invitation for Bidders", the contractor assumed, was mainly due to still unsettled conditions in Afghanistan and apprehensions. Ten years of conflict resulted in widespread destruction and there is, however, still a dearth of accurate and reliable information. Unstable political situation and Mr. Omarzay's credit requirements may also have been the reason. Afghan economy was in a state of flux, leading to uncertainty about the future.

In spite of much effort being spent on thorough formulation and clear wording of technical requirements, the offers obtained did not comply with the "Invitation for Bidders" fully.

2.1 EVALUATION OF OFFERS OBTAINED IN RESPONSE TO "INVITATION FOR BIDDERS" - THE FIRST STAGE

2.1.1 Offer submitted by VVO Tyazhpromexport Moscow (forwarded at the end of September 1991)

This offer has been handed over under the terms of "Technical Offer". The standard of the offer was poor, there were differences and contradictions among textual part and drawings attached. Some numerical mistakes were astonishing and causing embarrassment. Proposed rolling mill for required purposes was entirely unacceptable. The representatives of VVO Tyazhpromexport were asked for some explanations in due course. They were also asked to complete the offer as required by "Invitation for Bidders". There was no response and the offer could not have been considered for further use as such, remaining unfinished, its quality of elaboration being poor and with no interest for completion by the bidder.

2.1.2 Offer submitted by the firm of Danieli (forwarded in mid-December 1991)

The technical level and depth of elaboration of individual parts was unbalanced and varied substantially. There was no general lay-out of the proposed Mini-Steel Plant showing location of main and auxiliary buildings, transformer station, maintenance shop, oxygen plant, boiler house, water treatment plant, storage etc. Engineering services, roads, administration and social building and fencing were not included. Required important data indicating specific materials and energy consumption in steel shop and rolling mill were omitted. The price given as investment cost, i.e. 33,283.000 DM, did not cover the erection of the metallurgical plant as a whole and the offer did not enable to negotiate the contract terms in full.

In these circumstances, the UNIDO recommended support for the offer submitted by the firm of Danieli (see Annex 4). The consultants were asked to start direct technical negotiations aimed at completion of this only offer so that it would correspond with requests of "Invitation for Bidders".

Technical discussions took place in Buttrio - Italy at the Danieli premises and in the presence of Mr. Omarzay during 8th - 10th of February 1992. The representatives of the firm of Danieli agreed to review the offer and to provide for all information and data requested (see Annex 5).

On the 12th of February 1992, Mr. Omarzay and the consultants visited UNIDO Headquarters in Vienna. On this occasion UNIDO representatives informed Mr. Omarzay about the possibilities of project financing, by means of Special Industrial Services (SIS) fund of UNDP, United Nations Industrial Development Fund (UNIDF) and Trust Funds in particular.

The important role of the latter has been explained to Mr. Omarzay, with the objective of providing independent professional services and of helping both clients and construction companies alike. In this connection representatives of UNIDO Trust Fund Project Section also suggested that an effort was to be made in obtaining further and competitive offers. It has been decided therefore to send the "Invitation for Bidders" to the firms of:

- China Metallurgical Construction Corporation - Beijing
- Metallurgical Projects Consulting Design and General Supply Company, Katowice - Poland

These firms were asked to respond with their offers by the end of April 1992. In the meantime and as a result of Omarzay Steel Mill Company initiative another offer was submitted by the firm of Graham Group Sydney - Australia. At this stage Polish company of "Metallurgical Projects Consulting Design and General Supply" cancelled its participation on Mini-Steel Plant bidding procedure which has been reduced to 3 offers officially recognized by UNIDO Metallurgical Industries Branch as follows:

1. Danieli and Co., Officine Macchaniche S.p.A., Via Nazionale 41, Buttrio (Ud.) - Italy;
2. China Metallurgical Construction Corporation, 46 Dongsì Xidajie, Beijing - China;
3. Graham Group (Eng's) Ltd., 127-153 Rookwood Road, Sydney - Australia.

The above mentioned participants have submitted their offers in response to "Invitation for Bidders" and final evaluation of them was set up to proceed at UNIDO, Vienna in the first half of May 1992.

Due to the conditions in Afghanistan which prevented Mr. Omarzay from travelling out of Kabul, the evaluation was postponed to the end of May 1992. For this meeting the consultants prepared clear arrangement of significant information and data in tables showing different attitude of individual respondents in solving the technical and financial part of the offers.

Technical discussions concerning each offer were carried out by UNIDO official and consultants and in the presence of Mr. Omarzay with the representatives of the company involved, separately. Many queries were explained, nevertheless, some questions still remained unanswered. In order to provide for thorough comparison and evaluation of the offers the representatives of the companies were asked to answer the information requested in mid-June 1992.

It was assumed after this meeting that conditions were ready for consultants to approach the preparation of Draft Final Report and to give an account of their activities leading to recommendation of Mini-Steel Plant supplier.

2.2 EVALUATION OF OFFERS OBTAINED IN RESPONSE TO "INVITATION FOR BIDDERS" - THE SECOND STAGE

2.2.1 Offer submitted by the firm of Danieli

Main data:

* Fixed capital investment costs	not indicated
* Plant machinery and equipment (F.O.B. North Italian Port of Venice)	US \$ 38,166.138
* Erection	not indicated
* Structures and civil works	not indicated
* Technical assistance and training of personnel	US \$ 2,452.853
* Spare parts and consumables for two years of operation	US \$ 2,811.778
* Total installed capacity	15,3 MW
* Total weight of machinery and equipment (steel melting shop and rolling mill only)	1510 tons
* Total number of personnel	268 persons
* Land required	52.100 m ²
* Offer validity	10th July, 1992

For further details see Annex No. 6 - Table showing comparison of offers.

This offer is prepared elaborately in the technical part providing for complete specification of machinery and equipment. Main technologies and auxiliaries are designed well, the locations of individual shops keep the optimum production and material flow. Power distribution and engineering services in general are very efficient. Proposed general lay-out is well conceived, it incorporates all required buildings and enables further extension of Mini-Steel Plant as a whole.

The technological equipment offered maintains the present world standard in metallurgy, but requires highly skilled professionals to operate. This applies not only to steel melting and rolling mill equipment, but also to maintenance, adjustment and setting up operations. These activities need to be done in a reliable manner, otherwise the plant can not perform well. Automatic control systems are proposed in steel melting shop and rolling mill.

The offer of the 4,56 MW Diesel generator is worth noting. This generator may be used in parallel connection with mains supply and could prove to be of a great significance in case of black-outs and (also) because of installed capacity in Afghanistan being known as "soft".

Laboratory proposal provides for quantummeter in the chemical part. This shows interest in designing the plant on a very high standard. Within the auxiliaries and maintenance the offer provides for a repair shop of vehicles and transport facilities.

The commercial part of the offer does not indicate the cost to cover machinery and equipment assembly as well as a building part of the plant.

The cost of machinery and equipment are given F.O.B. North Italian Port of Venice.

Training of personnel is proposed by one item and covers:

- * supervision of erection,
- * supervision of start up and commissioning
- * training of Omarzay Steel Mills Company personnel; and as a separate item:
- * post commissioning assistance.

There is no tradition in metallurgy in Afghanistan and proposed machinery is of a high technical standard. It is highly unlikely that training programme suggested, i.e. 30 man/months, could provide for proper education in all branches of the Mini-Steel Plant. Post commissioning assistance is offered in the range of 6 man/months (one mechanical supervisor - one month, one melting shop supervisor - one month, one rolling mill supervisor - two months, one electronic supervisor - two months). Both, training of personnel and post commissioning assistance should be extended (post commissioning assistance to one year at least). The price of US \$ 243.213 for the post commissioning assistance is too high and can not be considered adequate.

Proposed main plant characteristics:

- Steel melting shop

- Liquid steel production	27.800 TPY
- Yield of liquid steel	95 %
- Billet production	26.400 TPY
- Steel scrap consumption	31.230 TPY
- Average heat weight	13 t
- Average tap-to-tap time	160 min
- Number of heats per day	9
- Weight of machinery and equipment	480 t
- Number of personnel	96 persons
- Shifts number per day	3

Basic technology:

- one electric arc furnace AC 13 t with 8 MVA (615 kVA/t) furnace transformer,
- one 1 strand continuous casting machine, radial type, to cast 80 x 80 mm - 130 x 130 mm billets.

Considering proper material and energy supply together with maintenance and professional control, the steel production may increase twice with minimal investment only (ladle furnace).

Further time and production capacity reserves are presented by CCM, casting 13 t heat in 44 min whilst 120 x 120 mm billets by 2,7 m/min speed are made. The structure of this CCM enables a second strand to be added.

- Rolling mill

- Rolled material production	25.000 TPY
- Yield of metal	95%
- Billet consumption	26.400 TPY
- Production mix: as per "Invitation for Bidders"	
- Weight of machinery and equipment	1.030 t
- Number of personnel	37 persons
- Shifts number per day	1

Basic technology:

- one pusher type reheating furnace 30 t/hour
- one roughing mill with one three high roll stands 450,
- one intermediate finishing mill with
 - * two horizontal - 2-high rolling units 430,
 - * six horizontal - 2-high rolling units 320,
 - * two vertical - 2-high Jolly rolling stands 320
 (to be installed on the baseplates of the horizontal stands when and where the roll pass design needs a vertical stand).

Semicontinuous rolling mill of a modern concept using 1481 hours production time has the production capability of 25.000 TPY and covers full range of required produce, during one shift and by average 17 t/hour efficiency. This production capacity may increase with no investment cost by introducing two and three shift operation or by installing two new intermediate stands, up to 120.000 TPY. The rolling mill lay-out allows for wire rod rolling mill to be supplemented and to produce ϕ 5,5 - 12 mm rod coils for future demand.

Conclusion

1. The offer submitted by Danieli complies with "Invitation for Bidders" in general, with the exception of the following:
 - machinery assembly cost,
 - price to cover building structures,
 - scrap processing plant machinery and equipment (one cutter is offered only).
2. Proposed technology being of a very high technical standard requires sophisticated computer system to operate. This system needs to be controlled by a small number of highly skilled professionals.
3. Advantages of the offer:
 - proposed technology secures a high quality of product,
 - only small number of personnel and workmen will be employed,
 - high productivity and efficiency will be achieved,
 - maximal flexibility to meet various market demands is provided.

Disadvantages of the offer:

 - high investment cost,
 - high production cost,
 - well trained workmen and highly skilled professionals will have to be employed,
 - some machinery and equipment will not be fully utilized.
4. The input of electricity from the mains is too high (50 % above the limit) and is supplemented by means of a very costly generator.
5. Training of personnel is not adequate.
6. Post commissioning assistance covers short period of time and is too costly.

The company of Danieli has a world wide reputation in metallurgy and is well known as a supplier of machinery as well as of plants as a whole and on "Turn- key" basis. The references comprising all countries engaged in metallurgical industry are very large.

2.2.2 Offer submitted by firm of MCC, Beijing, China (revised edition from July 1992)

Main data:

* Fixed capital investment	US \$ 24.994.000
* Plant machinery and equipment (F.O.B. China Port)	US \$ 8.700.000
* Erection	US \$ 2.182.400
* Structures and civil works	US \$ 7.630.300
* Technical assistance	US \$ 500.000
* Training of personnel	US \$ 150.000

* Spare parts and consumables for two years of operation (F.O.B. China Port)	US \$ 2.680.000
* Total capacity installed	9,264 MW
* Total weight of machinery and equipment (steel melting shop and rolling mill only)	1.650 t
* Total number of personnel	497 persons
* Land required	110.000 m ²
* Offer validity	September 30th, 1992

For further details see Annex No. 6 - Table showing comparison of offers.

The MCC offer provides for the Mini-Steel Plant supply on "Turn-key" basis and complies with "Invitation for Bidders", except for water treatment plant supply, auxiliaries description and full technical assistance. The elaboration is only medium, due to lack of time perhaps, and the offer presents a number of inaccuracies. The MCC followed the recommendations required after UNIDO meeting and several items in its revised offer were included, e.g. a bridge across the river Kabul, approach road, building part (according to Chinese conditions), machinery and equipment assembly, personnel training and technical assistance. Nevertheless, the revised general lay-out still requires a large area and the proposed location of main shops and auxiliaries should be modified.

Proposed main plant characteristics:

- Steel melting shop	
- Liquid steel production	25.550 TPY
- Yield of liquid steel	93 %
- Billet production	22.830 TPY
- Steel scrap consumption	26.270 TPY
- Average heat weight	10,05 t
- Average tap-to-tap time	165 min
- Number of heats per day	9
- Weight of machinery and equipment	700 t
- Number of personnel	216 persons
- Shifts number per day	3

Basic technology:

- one electric arc furnace AC 10 t with a 5.500 kVA furnace transformer,
- one full bow-type continuous casting machine with 1 strand (with provision for an additional strand at a later date).

The required amount of liquid steel is made within the 274 working days, with 26 days remaining for maintenance and future production increase. The production increase may also be achieved by means of ladle furnace installation, or by using the second furnace. The capacity of proposed continuous casting machine is sufficient. Second strand may be added, if necessary.

The following specific consumption seem to be too high:

- power: 590 + 60 kWh/t
- electrodes: 7 kg/t
- heating oil: 21,3 kg/t
- slag builders: 65 kg/t
- refractories: 34,3 kg/t

The above figures have a direct and significant influence on production costs.

- Rolling mill	
- Rolled material production	21.000 TPY
- Yield of metal	92 %
- Billet consumption	22.830 TPY
- Production mix	
- round bars (diameter)	12 to 32 mm
- equal angles	30/3 to 50/6 mm
- channels	50 mm
- flats	60/8 to 100/20mm
- Weight of machinery and equipment	600 t
Number of personnel	103 persons
- Shifts number per day	1

Basic technology:

- one pusher type reheat furnace - rated capacity 15 t/hour,
- one roughing mill with two 3-high stands 430,
- one open light section mill with five 3-high stands 300.

In choosing the technology for newly established plant, the MCC offer differs from the other two offers. A simple and easy to operate rolling facilities are seen as promising new development for use in a country with no metallurgical tradition. Open train type of mill, with roughing 3-high stands and finishing 5 stands mill can be considered as an optimum solution according to Afghan conditions. Proposed repeaters for bar rolling, horizontal and vertical feeding rollers and transfer device for U and L sections ease the strain of workmen. Disadvantage of this type of mill may be seen in lower metal yield (92%), against continuous rolling (95%). Number of workmen is higher.

Production increase may be achieved by employing second, even the third shift.

The mill lay-out allows for wire rod rolling mill to be added and to produce 5,5 mm - 12 mm wire rod coils.

Conclusion

1. Technical part of the offer is prepared in compliance with the Feasibility Study for the Establishment of a Mini-Steel Plant at Pul-i-Charki - Kabul, dated 1985.
2. Possibilities of existing infrastructure are respected.
3. Proposed China made technological equipment is of a good technical standard, simple and can be considered reliable, with no automatic control systems, nor highly skilled professionals needed.
4. Adequate number of personnel will be employed; training of Afghan personnel is to be provided in Chinese plants of a similar nature at a reasonable cost.
5. Power consumption keeps within the 10 MW limit, given by the Afghan Ministry of Energy to avoid steelwork imposing voltage fluctuation on other consumers.
6. Capital investment proposal is favourable.
7. General lay-out allows further extension.

8. Offered technical assistance covers plant erection period, testing and trial production at an acceptable cost.
9. Proposed consumption of power, electrodes, heating oil, slag builders and refractories is too high.
10. The general lay-out of the Mini-Steel Plant occupies a site far too large for a metallurgical development of a suggested capacity. The location of scrap yard, slag bay, power station and of some auxiliaries should be reviewed.
11. The supply of a very important water treatment plant is not included, in spite of its investment cost being mentioned under item 1.1.6, page 3.
12. The offer does not provide for technical assistance after the start of production.

Recommendation

In the consultant's opinion, the MCC offer in general is the most suitable proposal for conditions in Afghanistan and may be well considered as future basis of a newly established industrial branch in this country. The support for MCC offer is also based on the assumption of company's experience in steel plants construction projects and their implementation throughout China and South-East Asia in conditions similar to Afghanistan. As the development is to be constructed by the private sector, it is important to restrict the capital investment to manageable proportions. The latter point is significant.

Proposed China made technological machinery and equipment may be considered to be of a good technical standard, simple, reliable, with no automatic control system anticipated.

On the basis of a careful evaluation of all three offers, the consultants recommend the Omarzay Steel Mill Company to enter into contract agreement with MCC Company Beijing concerning the erection of the Mini- Steel Plant at Pul-i-Charki, Kabul.

2.2.3 Offer submitted by the firm of Graham Group

Main data:

* Fixed capital investment cost	US \$ 55,493.747
* Plant machinery and equipment (C.I.F. Kabul)	US \$ 28,336.691
* Erection	US \$ 3,221.873
* Structures and civil works	US \$ 19,038.778
* Technical assistance	US \$ 1,510.936
* Training of personnel	US \$ 905.469
* Spare parts and consumables for two years of operation (C.I.F. Kabul)	US \$ 2,480.000
* Total installed capacity, approx.	10 MW
* Total weight of machinery and equipment (entire plant construction and erection materials and equipment included)	4.150 tons
* Total number of personnel	150 persons
* Land required	21.290 m ²
* Offer validity	30th July 1992

For further details see Annex No. 6 - Table showing comparison of offers.

This offer is not facilitating an easy survey, individual parts being unbalanced and with a number of numerical inaccuracies. Cables and cabling, shears and cooling bed calculations absolutely unimportant at this project stage are described in detail whilst significant data and basic information concerning auxiliaries are missing.

Proposed general lay-out is compact and efficient, but drawing No. 10-1992 submitted on 14th April 1992 has no relation to the textual part of the offer.

As a result of the meeting at UNIDO on 25th May 1992 the bidder changed the EAF from 5 to 10 t size. This substantial alteration will affect the steel plant structure, cranes, auxiliaries and made the original offer prepared for the bidder by CLECIM invalid.

Proposed basic technologies, EAF DC, CCM and rolling mill, are of a very high technical standard. The reliability of such equipment in Afghan conditions is doubtful. According to references, the firm of CLECIM supplied up to the present time one EAF-DC 62/75t in 1985, one EAF-DC 100/120 t in 1990 only. Further three furnaces are envisaged to be supplied in 1993, one of these is to be EAF-DC 10t for Graham Group Comp. The company of Graham Group built and operates for approx. one year the only micro/metallurgical plant of the proposed type.

The very high level of proposed automatic control systems to operate the machinery and equipment of melting shop and rolling mill requires, due to space limitation, a special and by Graham Group Comp. patented software design. This applies to tension control system in rolling mill in particular. Highly skilled and especially trained professionals will have to be employed to operate these systems.

Automation control level of production processes is well reflected in total personnel number and in workman number - total personnel number proportion. Respective values are 150 persons and 55,3%. (In Danieli's offer 208 persons and 81%, in MCC offer 497 persons and 85%).

Technical assistance offered is not adequate. It suggested three months only for the Omarzay's Comp. staff to receive the necessary training and there were no personnel number nor professionals envisaged.

Proposed main plant characteristics:

- Steel melting shop	
- Liquid steel production	22.556 TPY
- Yield of liquid steel	98 %
- Billet production	22.105 TPY
- Steel scrap consumption	25.200 TPY
- Average heat weight	8 t
- Average tap-to-tap time	110 min
- Number of heats per day	13
- Weight of machinery and equipment	not indicated
- Number of personnel	54 persons
- Shifts number per day	3

Basic technology:

- one electric arc furnace DC 10 t with 9530 kVA furnace transformer,
- one "Bow Type" continuous casting machine with 1 strand (provision for an additional strand at a later date).

Required amount of liquid steel in a year time is to be achieved within 250 days, 50 days to be utilized for maintenance or production increase.

Claimed advantages of proposed EAF-DC are as follows:

- low back effect on electrical network,
- lower electrode consumption,
- lower electrical energy consumption,
- lower background noise level,
- less harmful and detrimental polluting agents,

following are the disadvantages:

- higher investment cost,
- complicated bottom electrode with a special cooling system,
- intricate electrical equipment,
- higher requirements on electrode quality.

The above mentioned advantages and disadvantages represent a proportion which is still to be established. It is assumed that DC-EAF will be developed and in theory the installation of these furnaces could be expected in the future, however slow it may appear to be at present among countries with metallurgical tradition. This type of furnace cannot be recommended for Afghanistan at the present time.

Liquid steel production can be raised by increasing working hours and by shortening of tap-to- tap time. For evaluation purposes, a melting shop lay- out should have been included to consider ladle furnace or second EAF placement.

The CONCAST type of continuous casting machine is well chosen, it casts 8 t heat into 120 x 120 mm billets within 24 min and provides a good production reserve. The structure of this CCM enables a second strand to be added.

- Rolling mill

- Rolled material production	21.000 TPY
- Yield of metal	95 %
- Billet consumption	22.105 TPY
- Production mix:	
- round bars (diameter)	20 - 30 mm
- equal angles	20 - 50 mm
- channels	20/12-40/20 mm
- flats	20/4-50/20 mm
- Weight of machinery and equipment	not indicated
- Number of personnel	27 persons
- Shifts number per day	1

Basic technology:

- one pusher type reheating furnace, average output 25 t/hour,
- one split type rolling train, average output 25t/hour.

Proposed mill with a great number of stands, direct current drive, has a very complicated control system and high level of automation. The mill deliberately limits the speed down to 3,25 m/sec at the exit section and this would require improper low entry speed of 0,027 m/sec into the first stand when ϕ 12 mm bars would be rolled. Proposed mill can not be considered suitable for Afghan conditions.

As for the specific heat consumption data to preheat the billets, the indicated figure of 0,00002 GJ, 0,0006 kg of fuel oil per one ton respectively is an apparent mistake.

Production can be raised 3 times up to 63.000 t/year by employing three shifts with no additional costs. Further production improvement may be achieved by increasing the rolling speed. The bidder gives a guarantee that wire rod mill can be installed with no bay extension.

Conclusion

1. The offer submitted by the firm of Graham Group complies with "Invitation for Bidders".
2. The standard of elaboration is low.
3. The offer does not include a valid general lay-out drawing nor the drawings showing melting shop and rolling mill offered.
4. Auxiliaries are included in the offer, specification of machinery, equipment and purpose of proposed shops is not given.
5. Training of personnel is not clear.
6. Technical assistance after the production start is not adequate.
7. Additional change of the EAF size made a part of the offer submitted by the firm of CLECIM invalid. Certain doubts remain in connection with other machinery and equipment left with no change as for specification and price.
8. Advantages of the offer:
 - high productivity,
 - the lay-out of the plant requires a very small site,
 - number of personnel, professionals and workmen alike is low.
9. Disadvantages of the offer:
 - high investment costs,
 - it is necessary to employ highly skilled professionals to operate all machinery and equipment,
 - the utilisation of some of the machinery and equipment will be low,
 - production costs are high.

According to references, Graham Group Comp. supplied one small metallurgical plant only, which may be regarded equivalent to the plant proposed. The GGC operates this plant for approximately one year. The firm of CLECIM has recently supplied only two furnaces of DC type. The firm of CONCAST is a world leading CCM supplier.

3. RECOMMENDATION

The consultants conclude that, of three offers available, China MCC offer is the most suitable.

Its principal advantages may be envisaged as follows:

- it fully complies with "Invitation for Bidders" on "Turn-key" basis,
- proposed simple and easy to operate steelmaking and rolling facilities are seen as promising new development for use in a country with no metallurgical tradition,
- capital investment is restricted to manageable proportions.

I t i s r e c o m m e n d e d

therefore for the Omarzay Steel Mill Company, to enter into contract agreement with the China Metallurgical Construction Corporation, 46 Dongsu Xidajie, Beijing, China in order to proceed with MSP development and to consider the technical suggestions of the consultants presented during negotiations with MCC representatives in order to improve the design and related investment and production costs of the Mini Steel Plant.(For more detailed evaluation and reasons see Chapter 2.2.2 and Annex No. 6).

FINAL REPORT

ANNEX 1

Terms of Reference
(Extract)

ANNEX 1

TERMS OF REFERENCE (EXTRACT)

The mission has been undertaken and subsequent work carried out under provision of project No. SI/AFG/90/801 "Assistance to Omarzay Steel Mills Company" and with respect to Government of the Republic of Afghanistan request of September 1989.

The Omarzay Steel Mills Company has been charged with the erection of a Mini-Steel Plant based on scrap melting and as a 10% private sector investment. The aim of the project was to assist the newly established Omarzay Steel Comp. in the process of setting up a steel plant and rolling mill at Pul-i-Charki, Kabul. The technical assistance covered four stages:

1. STAGE ONE

The work to be carried out under the first mission in the field:

- 1.1 Assist Omarzay Steel Mills Comp. to survey the condition of infrastructures, such as electricity, water, building, foundation for machine, road etc., essential for the Mini- Steel Plant to be established, and prepare:
 - the arrangement programme to be completed by the counterpart before the installation of equipment,
 - the list of infrastructure guaranteed for the equipment supplier(s) as a precondition for the bid.
- 1.2 Assist the company in the preparation of specification of machinery and equipment for a complete Mini-Steel Plant, in view of the new data obtained under the work 1.1 above.
- 1.3 Assist the company in the finalization of the tender document, already prepared by the counterpart, and draft contract for the supply of the machinery and equipment.
- 1.4 Provide a list of reliable potential suppliers (dealers), contractors for the supply of the machinery and equipment on a turn-key basis.
- 1.5 An interim report will be prepared and will be handed over to the national counterpart through UNIDO.

2. STAGE TWO

The work to be carried out under the second mission in the field:

Based upon the above tender document ("Invitation for Bidders") the counterpart will request the offer from potential suppliers. After the offers are collected, the team leader of the contractor will visit the site as second mission and will carry out the following three activities:

- 2.2 Evaluate the received offers for their financial and technical soundness.
- 2.3 Then select the most suitable one or two suppliers, which will be visited by a company representative and the team leader for the detailed negotiation under third mission.

- 2.4 Based upon the cost estimation obtained under the work 2.3 above, update the completed feasibility study.

3. **STAGE THREE**

The work to be carried out under the third mission:

- 3.1 Accompany a company representative to the most likely suppliers for detailed negotiations.
- 3.2 In consultation with the counterpart prepare recommendation for the best offers.

4. **STAGE FOUR**

Based upon conclusion agreed upon with the national counterpart, the contractor will prepare the final report which contains the results of this contract, i.e.:

- updated technical specifications for a complete Mini-Steel Plant including melting furnace, continuous caster and steel rolling mills for bars, angles and strips,
- contents and format of the tender document and draft supply contract,
- list of reliable suppliers and
- selection of most competitive offers.

FINAL REPORT

ANNEX 2

Invitation of Bidders

- 1.2 - **Time statement** for machinery and labor productivity to be proposed according to the figures as follows:
- working days per 1 year = 300
 - working hours per 1 week = 46
 - three shift operation during 24 hours in steel plant
 - one shift operation during 24 hours in rolling mill
- 1.3 - Due to present balance of payments second-hand equipment may be considered, providing the working and production reliability would be guaranteed.
- 1.4 - All measurements and weights will be stated in the metric system.
- 1.5 - The general Lay-out of the MSP proposed must allow for appropriate extension up to double the size of the original one, and to provide for future production changes as well.
- 1.6 - **Definitions and interpretations**
Throughout the invitation for bidders words and expression shall have the meanings hereby assigned to them, except where the context requires otherwise:
- 1.6.1 - "Client" means OMARZAY COMPANY LTD
- 1.6.2 - "Offerer" ("Bidder") means person or persons, firm or Company whose offer has been posted off upon Invitation for Bidders to the client
- 1.6.3 - "General contractor" means person or persons, firm or Company whose offer, has been accepted by the Client, who is the only responsible to him for the whole Work.
- 1.6.4 - "Subsupplier" means any person (other than the General contractor), named in the offer for any part of the Work
- 1.6.5 - "Work" means all MSP and Technical Assistance and Services to be provided by the General contractor
- 1.6.6 - "Technical Assistance" means the provision of personnel assigned by the General contractor to assist at Site, for the purpose of supervising the erection, testing, setting up the operation and commissioning of the MSP, training of the Client's personnel incl.
- 1.6.7 - MSP means Ministeel Plant
- 1.6.8 - EAF means Electric Arc Furnace
- 1.6.9 - CCM means Continuous Casting Machine

2 TECHNOLOGY DESCRIPTION

- 2.1 - Scrap processing
- 2.2 - Steel scrap melting and liquid steel refining in EAF
- 2.3 - Liquid steel casting suitable for consequent rolling process
- 2.4 - Rolling and final treatment of rolled material

2.1 Steel scrap processing plant

maxim. size of a single piece - 750 mm
maxim. weight a single piece - 250 kg

Main operational stages envisaged:

- visual inspection and sorting of non-ferrous scrap
- manual cutting of large pieces
- pressing of bales
- mechanical cutting

Mechanically and manually operated scrap processing is to be located within the scrap store keeping one-way production line up to the steel plant.

The processing scrap area should consist of a 12,5 t covered crane runway and the store to provide for 30 days of steel making. It is necessary to bear in mind that a scrap storage to provide for 90 days of steel making will have to be secured during winter time. The weighbridge at non-processed scrap reception approx. 30 t. Non-processed scrap after delivery should be stored separately as follows:

- scrap collected from industries
- scrap of domestic origin

2.2 Steel scrap melting and liquid steel refining

The production of liquid steel per year must relate to required production of 21.000 t/year of rolled material.

One Electric Arc Furnace (EAF) will be used for steel scrap melting, input voltage 20 kV. Electrical power capacity being limited, it is required to compare technically as well as economically the use of Direct and Alternating Current to feed the EAF.

To reduce the electricity input in early stage of scrap melting oxyfuel burners should be proposed. To accelerate the metallurgical reaction oxygen is to be blasted through the EAF door.

The EAF will be supplied with a fume cleaning equipment attached to its roof. Cooling to be secured by a thorough recirculation system with only a necessary amount of additional water required. The drying of scrap in charging buckets must be envisaged during the winter period.

Tapped steel will be poured into the crane operated ladle.

3 AUXILIARY AND MAINTENANCE

3.1 Electricity supply

The main supply line to switch house of MSP will be of 20 kV, max. input being 10 MW. Main network figures:

- cos (power factor) 0,95
- frequency 48-51 Hz
- envisaged voltage in switchboard systems of MSP 6 kV, 380/220 V

In case of electricity stoppage an independent power supply source is to be proposed to secure cooling of furnaces and cranes operation.

3.2 Water supply

100 % circulation cooling systems are required, comprising EAF, future CCM, preheating furnace, rolling equipment and scale scavenging.

According to representatives of Ministry for Water and Irrigation, a well will be drilled at the erection site providing enough water to cover the losses of the cooling systems as well as to supply auxiliaries.

In case of emergency an independent source of water supply for cooling EAF and heating furnace will have to be included in the offer.

3.3 Fuel Oil Supply System

The main fuel oil requirement will be in rolling mill preheating furnace and in steel plant for drying and preheating of ladles.

The fuel oil storage should last for approx. 1,5 month.

Fuel oil specification:

Caloric value	- 9.800 Cal/kg
Specific gravity	- 0,92
Flash point	- 60 C°
Pour point	- 28 C°
Kinetic viscosity in centistokes at	50 C° - 80
Max water content by volume	- 1 %
Ash percent by weight max.	- 0,1
Sulphur by weight max	- 3,5
Sediment percent by weight	- 0,25
Acidity inorganic	- Nil.

Location and dimensions of main storage tanks, daily store, pipe-line to mill and steel plant, consumption measuring instrument inclusive should be specified in the offer.

3.4 Compressed Air System

Regular and reliable compressed air supply is required. The offer should present an optimal solution as for compressed air production, pipe-line network, and consumption measuring equipment. Compressed air may be supplied to other auxiliaries.

3.5 Oxygen Supply

The major oxygen requirement will be for lancing at EAF. The other use of oxygen is steel skull cutting and miscellaneous jobs. The offer should comprise an optimal oxygen production method to achieve required purity, also transport means and consumption measuring equipment. Consideration should be given to install pressure vessel filling equipment as well as the production of a small amount of nitrogen needed for blasting in to the liquid steel ladle.

Sale of oxygen in pressure vessels outside the MSP may also be considered.

3.6 Maintenance

There will be a common workshop designed and divided into individual sections as well as shops attached to steel plant and rolling mill to provide for preventive inspection, routine maintenance, roll machining, spare machine parts making and preparatory work of main aggregates and appropriate storage area included.

In order to perform all operations needed, the common workshop will be equipped with the following machinery:

- general purpose lathes, min 4 pcs
- centre lathes - 2 pcs
- roll turning lathes - 2 pcs
- screw-cutting lathe - 1 pc
- shaping machine - 2 pcs
- planing machine - 1 pc
- grinders - 4 pcs
- power hacksaw machines - 2 pcs
- pedestal and bench drilling machines - 4 pcs
- universal milling machine - 3 pcs
- portable drills - 4 pcs
- welding machines - 5 pcs
- gas cutting sets - 10 units

whilst the small workshops attached to steel plant and rolling mill will be supplied with only necessary machine-tools like bench and portable drilling machines, disk sanders, gas cutting sets and welding machines.

3.7 Laboratory

The laboratory will be equipped with all necessary implements servicing the whole MSP, thus providing for:

- complete chemical analysis of steel during production process

- determination of macro-micro-structure of semiproducts as well as of final products - testing the mechanical properties of the rolled products i.e. tensile strength, elongation, yield point, contraction etc.
- entry control of materials coming in

3.8 General Store

General store is to be well organised with appropriate means to store and handle materials required for EAF, CCM and all different associated equipment. For materials handling and manipulation, belt conveyers and high lift trucks will be used. An approach road for truck and mobile crane movement should be provided to facilitate loading and unloading of materials.

The minimal storage required (in working days):

FeMn	- 90
FeSi	- 90
Iron ore	- 90
Al	- 30
Lime stone	- 30
Burnt lime	- 30
Fluorite	- 30
Breeze	- 90
Graphite Electrodes	- 90
Refractories	- 90

The separate store of technical gas - 30 days.

4 GENERAL CONDITIONS FOR SUBMISSION OF THE OFFER

- 4.1 The offer in original and based upon the above Invitation for Bidders will be posted off before the 31st of July 1991 12:00 o'clock of local time to the address as follows:

OMARZAY COMPANY LTD.
 Latif Market
 P.O.Box : 359
 Kabul
 Afghanistan
 Cable: OMARZAY KABUL
 Telex: 327 OMARZAY AF.
 Tel.: 24051, 22079, 23954

One of the copies is to be forwarded at the same time to the address as follows:

HUTNI PROJEKT - METALCONSULT PRAHA
 Opletalova 37
 110 00 Praha 1
 Czechoslovakia
 for attention of Mr. Jaroslav Odvody and Mr. Jan Zikmund
 Telex: 121 440
 Telefax: 26 95 59
 Telefon: 22 31 51, 22 08 51

- 4.2 The validity of the offer is considered 5 month since the acceptance therein
- 4.3 The offerer must guarantee the start of MSP operation within 24 month after the contract has been signed. Schedule of activities envisaged is to be submitted starting with project preparatory stage up to continuous operation and covered by means of the handover record
- 4.4 Prices specified in the offer will be in US\$, DDU Kabul according to Incoterms 1990 and to be fix prices, divided with respect to mains and auxiliaries as follows:
- Engineering
 - Delivery of machinery
 - Assembly
 - Spare parts to cover 2 years of service
 - Technical assistance and services
- 4.5 The offer and all other relevant documentation, drawings and information will be in the English language.
- 4.6 The offerer, considered to be the only responsible partner to the client and general contractor as well, will list potential subsuppliers and partners, furthermore it is required to state which machinery will be supplied by the offerer and what activities are likely to be done by cooperative organisations.
- 4.7 The scope of machinery assembly and also work done under offerer's supervision by local subcontractors will be clearly stated and specified in the offer.
- 4.8 Machinery parameters and material qualities guaranteed will be specified in the offer
- 4.9 Reference related to MSP list of plants and machinery erected, will be enclosed. The name of client, scope of supply and deliveries, author in charge of the project, site of erection etc. should be included in the offer.

5 WORK FINANCING

The financing of the MSP, building work excluded, is envisaged by credit given to the OMARZAY COMPANY LTD.

The offerer shall propose the amount of credit and conditions to be fulfilled.

6 FURTHER CONDITIONS

- 6.1 The client's obligation is to accept or to refrain from the offer. In doing so shall not be binding on either party.
- 6.2 The offerer's obligation is to enter upon the contract with the client in case of acceptance of the offer and prior the expiration of its validity term.
- 6.3 The information about the building site are brief only. The offerer should provide for further and more detailed information himself.

- 6.4 The client shall not accept application concerning offered price changes with regard to false, not precise or not fully specified data in Invitation for Bidders.
- 6.5 The offerer is not obliged to alterations as for the list of organizations cooperating and included in the offer, unless the client indicates otherwise.
- 6.6 The offerer shall forward a legal testimony with regard to law of the country involved thus covering the authorization of the firm's personnel to negotiate the offer submitted
- 6.7 The offerer is aware that in case on the offer acceptance the contract will have to provide for items as follows:
- contractor's accident insurance at the building site
 - obligations and duties accrued from building operations at the site
 - ensurance of patent clearance in connection with deliveries and services offered
 - offerer's obligations with regard to local resources of manpower, working capacities and services which are to be fully utilized
 - respect for local law and common regulations, of religious nature in particular
 - residence of offerer's representative in Kabul, official dealing place
- 7 The Invitation for Bidders was worked out by OMARZAY COMPANY LTD in cooperation with the Consultant firm of Hutní projekt METALCONSULT Prague

ANNEX 1

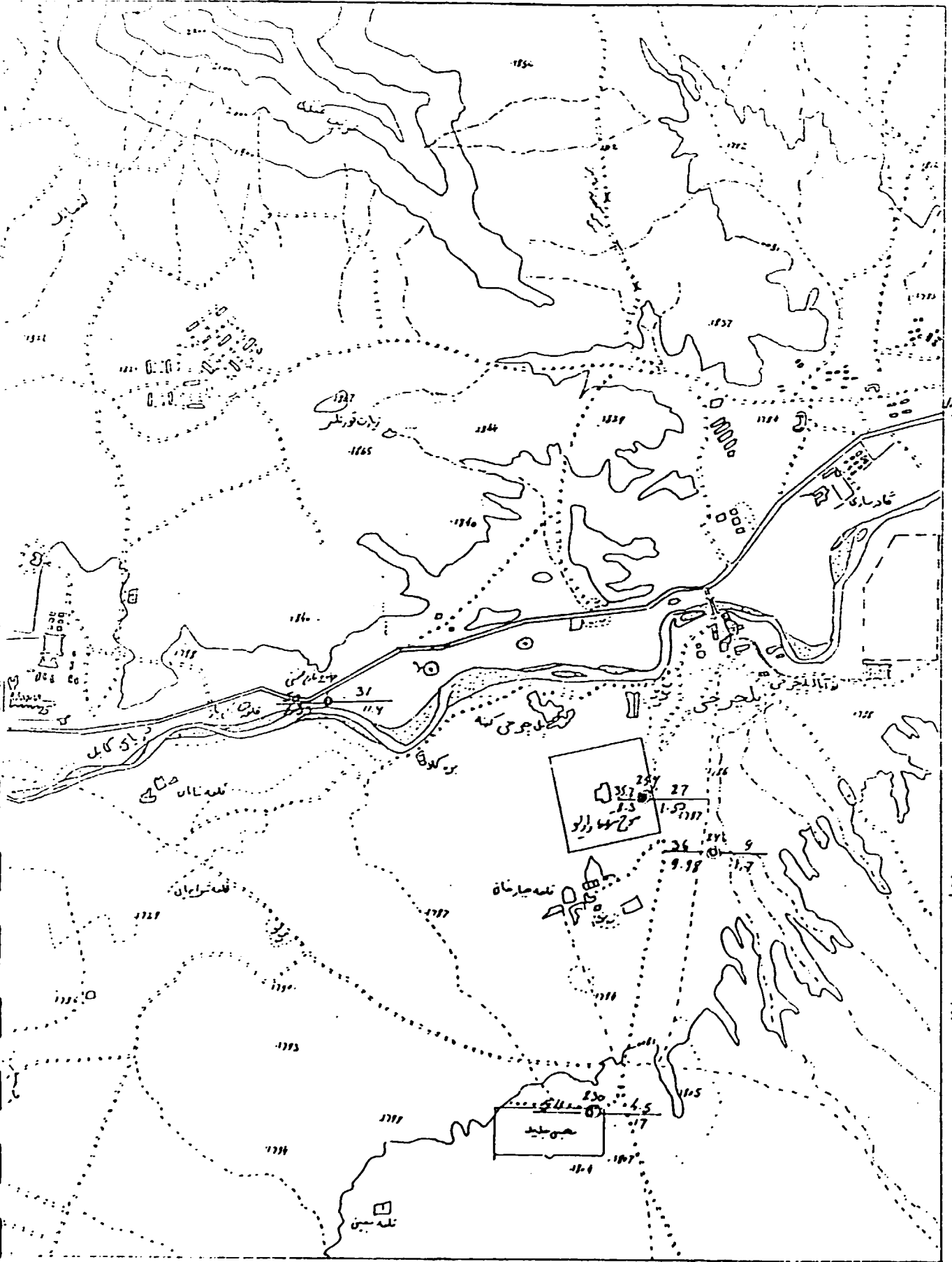
1.1 General MSP Lay-out

Plant lay-out must allow for easy, smooth and uninterrupted flow of molten steel, billets and rolled products with minimum handling of different auxiliary and utility units.

The area allotted for the MSP, scrap processing included, is located within the Pul-i-Charki industrial zone of Kabul. There is a net-work of roads around it and the main highway to Jalalabad passes by. The site for setting up the MSP is the farthest one, (distance to city centre 20 km) because of ecological reasons. The locality is named Tangi Pul-i-Charki and will have to be surveyed up to Pul-i-Charki bridge. There is one access road and existing electricity over head line on the other side of the river. The water supply will be provided on the site and can also be secured from the river Kabul prior to appropriate treatment. The site itself is large enough to meet the requirements for further extension not only of the MSP but of the envisaged metallurgical base as a whole. It covers 60.000 m² as shown on map enclosed and may be enlarged up to 500.000 m² down the river Kabul. There are dwelling areas in the vicinity, some abandoned, but many occupied by villagers living in single stores homes built in earth, bricks, stone and timber. All homes have enclosed outdoor space for storage or drying of crops and the stabling of animals.

Site map see page 2

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1.2 Organization of the work

Submission of the optimum plan and scheduling of activities aimed at MSP erection on Turn-Key basis is required, this comprising:

land preparation, ground work, engineering services, mains network, road construction, MSP and auxiliary buildings erection, equipment, machinery and materials delivery and assembly. Supervision and testing procedure should also be specified in the offer. However it is to be clearly understood and with respect to negotiations taking place in Kabul with Mr. Omarzay, the president of Omarzay Steel Mills Comp., that out of these activities, land preparation, ground work, MSP and auxiliary buildings erection, road construction and laying down of mains will be done by Afghanistan counterparts. The "Turn-Key basis" term means the delivery, assembly of machinery, supervision and testing procedure (see page 1).

1.3 Climatological data and figures

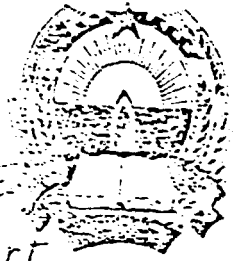
Kabul Meteorological Authority issued the data and figures obtained during the last 10 years as follows:

- Mean temperatures in C°, max. and min. temperatures in C° (1981-1990)
- Relative humidity in %
- soil surface temperature, and in the depth of 8 cm
- pressure in mb, max. and min.
- number of days with sand and dust storms
- wind speed

Meteorological Authority

ریاست هواشناسی

Climatological Director



Station Name: Kukul Air Port

اسم ایستیشن

Years	Jan	Feb.	MAR.	APR.	May	Jun	Jul	Aug.	Sep.	OCT	Nov.	Dec.	Yearly
Mean Temperature in C°													
1981	-3.3	-0.8	7.9	14.4	18.3	22.5	25.1	24.5	19.9	12.5	6.8	2.2	12.5
82	0.7	-3.5	3.8	14.5	17.9	23.2	25.4	24.8	19.2	13.7	6.7	-0.8	12.1
83	-1.3	1.9	3.4	11.4	18.8	23.0	25.5	25.2	21.2	13.5	7.0	-0.8	12.6
84	-1.9	-0.7	9.7	13.3	20.2	25.1	25.9	25.9	19.9	13.5	7.5	0.9	13.3
85	-2.2	4.0	10.3	14.6	18.8	23.9	26.9	25.0	21.0	13.5	7.3	2.0	13.8
86	0.0	2.0	5.8	13.9	18.0	21.2	24.1	23.8	20.7	15.3	7.7	1.4	12.9
87	2.1	4.6	8.6	14.5	17.6	22.3	25.3	25.7	21.9	14.2	8.9	3.6	14.1
88	1.4	2.7	6.6	15.7	20.5	24.9	27.4	24.4	21.3	14.1	8.8	3.3	14.2
89	-2.9	-1.4	6.4	11.7	17.2	22.5	24.2	24.9	23.7	22.3	7.5	3.3	12.9
90	0.3	1.5	7.3	12.3	21.1	24.5	26.5	25.4	22.2	14.1	8.5	1.1	13.7
Mean	-0.7	1.0	7.0	13.7	18.8	23.3	25.8	24.9	20.8	14.0	7.6	1.6	13.2
Mean MAX. Temp. in C°													
81	2.2	4.5	13.2	20.8	25.2	29.4	32.1	31.3	28.1	20.5	15.8	8.8	19.3
82	6.6	1.5	8.4	21.4	24.5	29.6	32.2	32.1	26.7	20.7	12.4	3.9	18.3
83	3.4	7.5	8.3	16.7	25.2	29.4	32.0	32.9	29.7	22.1	18.1	7.1	18.7
84	4.2	4.4	15.6	20.0	27.4	32.2	32.2	33.1	27.3	22.0	14.7	7.0	20.0
85	3.1	10.2	15.9	20.8	25.4	30.5	34.0	32.3	29.1	21.6	15.5	8.9	20.7
86	6.8	7.6	13.6	20.3	24.2	30.2	33.0	30.9	28.0	23.9	15.0	6.5	19.7
87	10.0	10.8	13.5	20.8	24.5	29.1	31.4	33.0	29.8	21.5	13.5	13.0	21.3
88	6.3	8.0	11.5	21.8	27.7	31.6	34.3	31.3	29.7	22.2	17.9	9.4	21.0
89	+2.9	+3.4	11.4	18.4	23.5	28.9	31.0	31.1	28.5	23.9	14.8	9.0	19.7
90	4.7	5.6	13.8	18.0	28.3	31.6	33.6	32.8	30.4	22.7	17.2	7.6	20.6
Mean	5.0	6.4	12.3	19.9	25.6	30.3	32.6	32.1	27.7	22.1	16.0	8.1	19.8
Mean MIN. Temp. in C°													
81	-7.6	-6.1	2.9	7.1	10.4	13.1	15.8	14.8	9.6	4.2	-1.4	-3.0	5.1
82	-4.2	-8.2	-0.5	6.7	10.3	13.6	15.7	15.9	10.1	6.3	1.7	-4.5	5.2
83	-5.2	-2.8	-1.1	6.0	10.9	13.4	16.6	17.2	12.5	4.6	-0.4	-4.5	5.6
84	-7.1	-5.2	3.8	7.1	11.8	15.7	18.4	18.8	11.4	4.5	0.8	-3.8	6.9
85	-6.3	-1.6	3.2	8.4	10.6	14.5	18.1	16.8	11.3	5.2	-0.4	-3.8	6.3
86	-5.3	-3.0	0.9	6.6	10.5	14.3	16.7	15.6	11.4	6.2	0.8	-2.7	6.0
87	-4.1	-1.2	4.1	7.2	10.0	13.5	16.9	16.6	12.3	6.6	0.5	-3.5	6.6
88	-2.8	-2.0	1.5	8.6	11.5	15.9	19.4	16.5	12.1	5.4	0.1	-1.6	6.9
89	-7.2	-5.6	1.9	4.2	9.0	14.2	16.3	15.6	11.2	5.9	0.8	-0.8	4.5
90	-3.4	-2.3	1.4	6.3	11.0	14.1	17.3	17.2	13.2	5.4	0.8	-3.8	6.4
Mean	-5.3	-3.8	1.8	6.8	10.6	14.3	17.2	16.5	11.5	5.4	0.2	-3.2	6.0

Meteorological Authority



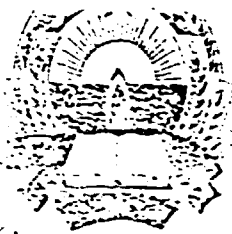
ریاست ہوا شناسی

Climatological Direction

Station Name: Kalesi Air Port

ایم اسٹیشن

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
H.B.S. MAX. TEMP. in C°													
1981	7.5/21	10.4/25	21.4/27	27.9/29	30.2/23	35.2/21	36.5/19	34.6/17	31.2/15	24.5/12	22.5/10	13.5/22	36.5/12
82	11.8/8	4.3/28	16.6/30	26.2/26	29.4/2	32.9/1	36.2/1	36.2/1	30.9/6	25.0/11	20.0/11	3.4/20	36.2/12
83	8.1/13	12.7/21	17.5/28	23.0/33	29.0/19	35.5/11	36.5/11	37.3/1	33.9/11	29.3/11	21.5/11	14.6/11	36.3/11
84	7.6/29	9.4/27	22.0/29	27.2/23	35.6/21	35.9/1	34.4/1	30.2/1	32.5/6	25.4/11	20.0/11	15.0/15	36.2/12
85	6.8/21	17.6/21	22.5/21	27.2/21	30.4/1	32.9/1	36.4/1	34.5/1	33.0/1	30.0/1	21.0/11	16.3/13	36.4/12
86	9.8/6	13.5/11	17.5/11	23.5/21	30.1/6	36.5/1	35.5/1	35.0/1	33.1/1	23.0/1	21.0/11	13.3/15	36.5/12
87	16.0/21	17.0/11	20.5/14	23.5/11	30.5/1	33.6/1	35.5/1	36.0/1	34.1/1	23.0/1	23.8/1	17.5/20	36.0/12
88	12.5/19	13.0/25	19.4/11	29.4/12	33.6/11	37.7/1	37.5/1	35.6/1	34.0/1	26.0/1	23.0/1	16.5/12	36.7/12
89	8.2/29	7.1/20	11.5/18	22.5/12	31.0/11	32.5/11	35.2/11	33.5/11	32.4/1	23.6/1	18.0/11	15.0/11	35.7/12
90	11.0/24	12.0/11	23.4/11	25.4/12	33.0/11	37.7/1	37.5/1	36.7/1	34.0/1	27.0/1	23.0/1	17.7/12	36.7/12
A.B.S.T	16.0/23	17.6/12	23.2/10	29.4/23	35.6/11	37.7/1	37.1/11	37.3/11	34.1/1	30.0/1	27.0/1	17.7/16	36.7/12
H.B.S. MIN. TEMP. in C°													
1981	15.6/7	13.0/6	11.4/2	0.6/15	7.5/1	7.4/1	12.7/6	10.4/3	4.9/29	1.0/21	7.7/20	5.5/13	13.0/16
82	11.5/23	15.0/11	8.0/11	12.4/15	3.5/15	9.9/1	13.5/13	8.7/10	2.9/13	9.9/10	3.3/12	3.3/15	15.0/11
83	12.3/11	7.0/10	10.0/3	2.2/14	4.6/2	8.2/3	12.5/11	13.5/11	7.4/12	1.4/12	-4.0/1	11.2/23	12.3/11
84	10.5/14	13.0/7	3.0/1	2.0/6	7.5/2	11.6/19	13.1/1	16.0/5	5.7/1	3.5/1	2.5/10	7.8/13	13.0/17
85	12.0/12	6.4/7	3.4/1	3.5/10	6.0/15	10.4/4	13.5/11	12.4/12	3.0/17	0.5/1	5.4/12	10.0/10	12.0/17
86	3.3/3	12.0/12	4.0/13	2.4/12	6.0/2	8.7/12	13.0/12	11.0/26	7.4/15	0.1/1	4.5/12	3.4/23	12.6/16
87	7.4/22	8.0/9	0.8/13	1.5/10	4.0/9	3.0/1	12.0/14	13.0/19	8.4/12	1.4/12	3.5/11	9.5/19	19.5/10
88	9.4/19	7.5/2	3.0/1	0.0/15	7.0/12	3.9/9	14.5/11	8.5/10	5.0/29	2.0/1	5.3/12	5.3/12	19.4/12
89	13.5/18	9.3/12	4.4/11	2.0/14	2.0/12	11.2/12	12.5/16	11.0/10	5.0/24	1.5/15	7.3/12	5.7/11	13.5/13
90	3.7/23	8.0/12	4.5/11	1.1/11	6.7/10	9.8/12	13.7/10	11.5/15	9.0/23	2.0/1	7.4/13	2.0/11	20.6/11
A.B.S.T	15.6/12	13.0/16	10.0/13	2.4/12	2.0/10	7.4/10	10.6/13	8.5/10	2.0/13	3.5/10	7.7/13	20.0/11	20.6/11
Mean Relative Humidity in %													
1981	72	73	63	55	53	41	32	29	32	41	38	70	50
82	65	73	75	56	55	42	50	52	44	52	69	73	59
83	71	67	69	68	51	33	30	41	37	42	43	49	52
84	49	56	57	55	42	32	43	51	40	41	60	64	49
85	72	53	47	55	41	32	36	40	35	43	46	54	46
86	50	60	60	46	42	36	33	45	42	43	55	68	48
87	59	61	75	56	55	39	37	30	29	34	31	36	52
88	58	56	59	49	37	35	41	44	41	45	45	60	48
89	61	60	61	51	57	51	57	38	48	46	39	71	53
90	77	71	60	66	49	45	37	50	49	52	46	68	56
Mean	63	63	58	48	39	40	40	40	40	47	63	61	51
			63	56	48	39				44	42		



Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
Mean Surface ordinary Temp. at 0300													
1978	-11.5	-7.4	1.7	15.2	26.0	27.7	27.7	24.8	16.1	5.2	-1.2	-5.9	15.2
79	-6.6	-4.0	1.5	13.3	16.1	26.2	28.1	23.1	15.2	0.3	-5.3	-4.9	9.2
80	-	-5.4	1.9	13.1	22.4	27.4	29.4	25.0	18.0	9.7	0.5	-5.7	11.1
81	-10.3	-3.8	2.4	10.2	18.1	25.5	26.2	21.9	16.3	7.5	-2.5	-3.8	8.8
82	-4.8	-10.2	-0.9	13.8	19.6	25.7	27.8	26.3	18.2	11.7	2.7	-6.3	10.5
83	-4.7	-1.0	-0.7	11.7	25.0	28.8	30.1	28.8	20.9	11.0	2.0	-3.1	10.4
84	-6.3	-	3.9	14.9	-	27.4	30.7	27.4	19.5	9.0	-1.1	-6.1	12.0
85	-	-	-	-	26.3	28.5	28.6	25.4	18.4	8.9	-1.1	-6.0	-
86	-7.9	-4.6	2.0	13.5	22.7	28.6	28.2	24.5	17.7	7.2	-0.6	-4.0	10.8
87	-5.4	-1.9	5.5	14.7	21.5	25.3	28.6	26.6	18.9	9.0	-1.5	-5.3	11.3
mean	-7.3	-5.8	1.9	13.4	22.0	27.5	28.9	25.4	18.1	8.6	0.3	-5.1	10.7
Mean Surface ordinary Temp. at 0700													
1978	3.5	4.5	19.4	34.9	51.6	61.2	59.8	61.4	55.3	44.1	20.9	19.7	36.4
79	15.6	19.4	26.0	39.5	39.6	53.9	60.6	54.4	52.2	41.8	29.8	11.7	37.2
80	-	3.1	14.1	22.4	48.2	57.8	59.9	57.0	50.5	38.6	24.2	19.3	32.1
81	0.7	3.6	19.8	38.3	42.8	55.5	59.5	57.2	52.6	38.7	30.4	17.0	37.7
82	14.6	0.3	8.5	33.4	38.3	49.6	54.2	52.7	48.5	36.2	19.7	2.8	29.9
83	3.3	15.3	14.5	27.2	45.5	53.6	57.4	53.5	51.7	40.5	23.7	10.4	33.5
84	5.4	-	20.7	31.8	-	60.2	60.6	59.9	48.4	40.3	30.6	17.3	37.6
85	-	-	-	-	55.9	57.2	63.1	57.6	54.8	40.3	30.6	17.3	-
86	15.9	12.9	19.5	38.0	44.0	57.5	62.4	54.4	52.1	44.0	27.2	9.3	36.5
87	18.8	22.1	14.5	35.8	46.5	52.1	57.6	57.9	53.3	38.3	38.0	22.3	38.1
mean	9.7	10.2	18.0	34.6	45.8	56.6	59.6	57.1	52.0	40.3	27.1	15.0	35.7
Mean depth Temp. at 2m, in the Open Sea													
1978	2.0	6.5	8.0	10.0	13.0	19.2	22.5	24.4	23.0	19.2	14.4	9.2	14.8
79	7.1	6.2	8.1	12.4	15.2	17.2	22.3	24.1	22.5	19.2	14.6	9.3	15.1
80	5.6	4.8	6.0	10.9	15.6	20.4	23.6	24.4	22.5	20.0	14.5	10.8	14.9
81	6.5	6.0	8.1	6.8	16.8	15.5	22.0	24.0	23.0	20.5	13.2	9.1	14.3
82	8.0	7.5	9.1	8.9	9.0	19.0	23.3	23.5	23.1	19.8	16.1	10.4	14.9
83	4.0	5.4	6.0	6.3	13.0	24.2	22.8	24.8	23.9	19.9	15.9	10.3	14.8
84	5.0	3.5	5.9	40.5	14.2	20.2	-	-	-	-	-	-	-
85	8.0	5.5	2.0	8.0	15.0	20.8	-	-	-	-	-	-	-
86	9.2	8.9	8.3	7.2	14.0	21.3	24.3	24.6	23.4	20.2	15.5	10.0	15.6
87	2.0	7.6	9.5	12.2	16.6	20.2	23.2	24.6	23.8	20.0	15.1	10.2	15.9
mean	6.6	6.2	7.6	9.4	14.3	20.1	23.1	24.3	23.2	19.9	15.0	10.0	15.0

Meteorological Authority



ریاست ہوا شناسی

Climatological Director

ایم ایس ایس

Station Name: Rawalpindi Air Port

Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
	Mean Pressure in mb												
1981	822.5	822.6	820.7	820.2	819.1	815.6	813.5	814.9	819.7	822.8	823.9	825.0	820.1
82	823.0	820.6	820.6	819.4	820.3	816.4	814.6	817.8	822.9	824.9	824.4		820.2
83	823.1	821.4	820.4	819.9	819.1	817.2	815.2	815.6	818.7	821.8	825.0	823.5	820.1
84	821.4	820.7	820.5	819.3	817.8	813.8	813.3	814.2	817.5	822.5	824.5	822.0	819.1
85	823.3	819.2	820.3	818.8	818.3	814.8	814.0	814.6	818.5	822.2	823.6	822.9	817.2
86	823.4	821.7	819.6	817.8	817.3	815.1	814.3	816.2	819.7	822.8	822.6	822.1	820.0
87	825.0	823.2	820.9	820.6	820.4	816.9	815.6	815.9	819.7	822.8	824.2	825.6	820.9
88	823.3	821.8	817.5	821.6	817.2	815.6	814.4	815.8	819.3	822.8	825.6	825.0	820.5
89	822.1	822.0	821.0	820.9	819.6	817.7	816.0	817.9	822.2	823.2	825.9	825.9	821.7
90	823.9	821.0	821.3	817.2	816.0	816.0	814.2	817.2	818.8	822.7	823.4	823.6	820.4
Mean	823.1	821.4	820.5	820.1	819.2	816.1	814.6	815.6	819.2	822.9	824.4	824.1	820.1

Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
	MAX. Pressure in mb												
1981	833 1/2	825 1/2	827 1/2	825 1/2	826 3/4	817 1/2	815 1/2	819 1/2	825 1/2	827 1/2	827 1/2	823 1/2	830 1/2
82	827 1/2	827 1/2	827 1/2	825 1/2	825 1/2	820 1/2	815 1/2	820 1/2	825 1/2	827 1/2	827 1/2	830 1/2	830 1/2
83	823 1/2	823 1/2	823 1/2	821 1/2	824 1/2	821 1/2	817 1/2	821 1/2	823 1/2	823 1/2	830 1/2	830 1/2	827 1/2
84	822 1/2	823 1/2	827 1/2	825 1/2	823 1/2	820 1/2	817 1/2	817 1/2	824 1/2	822 1/2	827 1/2	823 1/2	829 1/2
85	823 1/2	824 1/2	823 1/2	822 1/2	823 1/2	818 1/2	818 1/2	817 1/2	824 1/2	822 1/2	823 1/2	827 1/2	827 1/2
86	820 1/2	826 1/2	825 1/2	825 1/2	822 1/2	820 1/2	820 1/2	821 1/2	825 1/2	827 1/2	827 1/2	830 1/2	830 1/2
87	829 1/2	824 1/2	827 1/2	827 1/2	825 1/2	821 1/2	820 1/2	822 1/2	826 1/2	817 1/2	825 1/2	830 1/2	832 1/2
88	825 1/2	834 1/2	826 1/2	827 1/2	825 1/2	820 1/2	818 1/2	822 1/2	824 1/2	822 1/2	830 1/2	825 1/2	830 1/2
89	830 1/2	830 1/2	827 1/2	825 1/2	824 1/2	820 1/2	818 1/2	822 1/2	824 1/2	825 1/2	827 1/2	830 1/2	830 1/2
90	827 1/2	827 1/2	826 1/2	826 1/2	825 1/2	819 1/2	818 1/2	820 1/2	823 1/2	826 1/2	827 1/2	830 1/2	830 1/2
MAX. P	830.3	830.4	827.5	827.1	826.7	822.7	818.4	822.2	826.4	830.0	830.9	830.5	832.3

Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
	MIN. Pressure in mb												
1981	811 5/24	814 3/13	812 3/20	812 1/10	812 1/10	810 3/20	809 1/10	807 1/12	813 1/10	814 1/10	816 1/6	822 1/2	814 1/10
82	815 1/22	813 1/10	812 3/5	814 1/10	815 3/20	811 1/20	808 1/20	808 1/20	814 1/10	815 1/10	816 1/10	816 1/10	808 1/20
83	813 1/28	815 1/20	810 1/10	809 1/10	812 1/20	813 1/20	809 1/20	811 1/20	812 1/10	815 1/10	814 1/10	814 1/20	807 1/20
84	815 3/31	810 1/10	815 1/10	814 1/10	811 1/20	809 1/20	808 1/15	809 1/30	811 1/10	817 1/20	820 1/10	816 1/10	808 1/20
85	818 1/2	812 3/10	814 3/10	811 1/10	812 1/10	809 1/10	809 1/10	800 3/16	813 1/10	815 3/10	815 1/10	815 1/10	800 3/10
86	817 1/22	815 3/7	812 1/10	812 1/20	814 1/10	809 3/10	810 1/22	810 1/10	812 1/10	817 1/10	815 1/10	812 1/2	809 1/20
87	814 1/22	814 1/5	813 1/10	813 3/10	813 1/10	811 1/20	811 1/10	811 3/10	814 1/10	815 1/10	817 1/10	820 1/10	811 1/10
88	814 1/11	813 1/10	812 1/10	814 1/10	814 1/10	811 1/20	808 1/10	811 1/20	811 1/10	815 1/10	819 1/10	822 1/2	808 1/10
89	814 1/11	813 1/10	812 1/10	814 1/10	814 1/10	811 1/20	808 1/10	811 1/20	811 1/10	815 1/10	819 1/10	822 1/2	808 1/10
90	814 1/11	813 1/10	812 1/10	814 1/10	814 1/10	811 1/20	808 1/10	811 1/20	811 1/10	815 1/10	819 1/10	822 1/2	808 1/10

Meteorological Authority



ریاست ہوا شناسی

Climatological Department

اسم ایستیشن

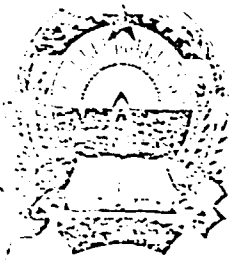
Station Name: Rawal Air Fort

Year	Jan	Feb	MAR	APR	MAY	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
	Total Monthly Precipitation in mm												
1981	85.0	101.0	60.6	42.9	30.5	0	5.5	0.4	0	10.6	2.1	35.1	360.7
82	82.1	75.2	59.0	0.9	27.6	0	0	0	0.6	13.3	49.3	23.0	252.6
83	14.3	29.5	54.1	43.9	12.7	0	0	0	0.3	0	0	3.5	256.3
84	13.1	10.4	63.0	50.0	6.3	10.8	4.9	0	0	0	23.9	32.9	225.3
85	27.4	12.0	13.8	52.2	17.3	0.2	0	0	0	21.1	0.6	2.3	157.4
86	0	21.3	119.7	25.7	20.1	0.7	4.3	3.1	1.1	0	26.9	17.7	254.1
87	0	9.6	123.0	21.2	41.6	0.7	0.6	0.0	0	13.7	0	14.8	235.9
88	47.0	23.4	135.7	25.5	1.8	12.5	0	12.3	0	0	0	55.2	313.5
89	30.6	51.1	114.0	40.6	7.3	6.6	28.5	0.3	9.7	0	6.0	41.0	335.2
90	46.2	53.0	34.7	75.3	9.0	0.0	0	20.9	0	1.1	3.0	53.6	313.6
mean	27.1	44.1	34.3	38.1	18.5	3.8	4.2	4.8	1.2	4.5	11.2	32.2	224.0
	MAX. Precipitation in decim. by 24 hours												
1981	18.9/10	23.7/14	7.7/4	23.7/10	10.9/5	0	3.4/23	0.4/15	0	1.0/2	2.7/2	17.3/2	25.7/2
82	5.1/29	14.1/24	15.1/3	0.7/15	12.6/28	0	0	0	0.7/2	6.3/9	10.6/14	6.9/4	15.1/8
83	5.9/14	5.5/14	23.4/7	13.9/7	6.9/3	0	0	0	0.3/30	0	0	3.9/19	55.4/2
84	6.9/12	5.7/1	23.5/2	2.3/1	3.2/11	10.8/3	4.3/23	0	0	0	12.3/2	11.7/29	23.7/2
85	14.5/12	6.3/12	11.1/1	15.0/7	7.5/2	0.7/2	0	0	0	0.4/24	0.0/16	8.9/20	15.8/12
86	0	13.2/2	23.5/2	5.5/13	24.7/1	0.7/1	2.5/22	0.4/10	1.1/5	0	2.3/24	3.9/20	24.7/11
87	0	3.6/21	27.2/2	10.8/1	13.5/20	4.1	0.7/2	0.0	0	13.3/10	0	3.0/29	27.2/5
88	15.5/20	9.4/19	14.3/6	10.7/12	1.0/8	10.3/2	0	10.1/15	0	0	0	10.0/20	43.0/6
89	14.3/10	10.9/5	25.9/15	27.2/10	3.2/10	5.1/13	17.7/24	0.3/20	7.7/29	0	2.6/9	12.9/20	27.2/10
90	16.3/13	7.0/10	11.4/20	18.0/10	4.7/1	0.5/25	0	23.4/1	0	0.9/4	2.3/2	26.7/21	26.7/10
MAX.	13.0	55.6	43.0	27.2	24.7	10.8	17.7	23.4	7.0	13.7	12.8	26.7	55.6
	No. of days with sand and dust storms												
1988	0	0	0	0	0	5	1	1	0	2	1	2	12
79	0	4	0	2	4	7	7	6	4	1	5	8	46
80	0	0	0	1	4	4	7	11	5	5	0	8	38
81	0	0	0	1	0	3	2	1	7	2	4	0	24
82	1	0	0	10	1	1	0	0	0	2	0	0	5
83	1	1	0	10	0	0	1	5	7	4	1	0	11
84	2	0	1	10	0	3	6	3	7	0	0	0	12
85	0	1	2	0	1	0	7	7	8	1	1	0	26
86	0	0	0	0	0	5	7	3	4	5	0	0	32
87	0	1	0	0	3	5	5	5	8	3	0	0	33
Total	4	7	3	4	13	33	43	36	48	26	12	18	242

Meteorological Authority

Climatological Observations

Station Name: Kabul Airport



ریاست هواشناسی

اسم ایستیشن

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly
MAX. Wind Speed (km/hr)													Direction
in m/sec													
1981	NW/10	W/10	NE/10	N/10	N/12	N/10	NW/10	NW/10	NW/10	NW/10	NW/10	NW/10	NW/10
1982	E/10	N/10	E/10	N/10	N/10	N/10	N/10	N/10	N/10	SW/10	E/10	NW/10	E/10
1983	N/10	S/10	N/10	N/10	N/10	N/10	N/10	E/10	N/10	N/10	N/10	S/10	N/10
1984	NW/10	N/10	E/10	NW/10	N/10	N/10	N/10	N/10	E/10	E/10	NW/10	NW/10	N/10
1985	NW/10	SW/10	NW/10	N/10	N/10	E/10	NE/10	N/10	N/10	N/10	N/10	E/10	NE/10
1986	E/10	N/10	N/10	N/10	W/10	N/10	NW/10	N/10	N/10	NW/10	N/10	SW/10	NW/10
1987	N/10	SW/10	NW/10	N/10	N/10	N/10	N/10	N/10	NE/10	N/10	N/10	NW/10	N/10
1988	E/10	S/10	SE/10	N/10	SW/10	NW/10	N/10	N/10	N/10	N/10	N/10	N/10	N/10
1989	SW/10	S/10	S/10	NW/10	N/10	N/10	N/10	N/10	N/10	N/10	N/10	N/10	N/10
1990	NE/10	E/10	S/10	N/10	NW/10	N/10	NW/10	N/10	N/10	SE/10	N/10	N/10	N/10
MAX	E/10	S/10	NE/10	N/10	N/10	N/10	N/10	N/10	N/10	NW/10	N/10	N/10	NW/10

1.4 Transport facilities

Transport of equipments and materials via USSR. Railway station and reloading site at HAIRATAN border crossing. From Hairatan down the country only roads with various type of surface (paved, tarmac, or with no surface) can be used. The quality of the roads is not known. The passing clearance of 5 tunnels and load bearing capacity of bridges are adequate for transport of 30 t of freight. The distance to Kabul Pul-i-Charki 450 km.

Transport via Pakistan

Border crossing at TURHKAN and from PESHARWAR by road transport available only. Road trucks have the capacity of 15-20 t and reloading at TURKHAN is a necessity on only 5 t trucks. Under present conditions the passage is controlled by antigovernment forces. Distance to Kabul 250 km.

Transport costs (data 1991)

Prices are indicative only, and can vary according to the weather, military activity and demand. Governmental companies charge 5,40 Afg/1t/1km Privat companies charge 200 up to 300 % more. The approximate cost of 1 t being transported by lorry from Pesharwar to Kabul is 5700 up to 6500 pakistani Rupies. There is number of governmental as well as privately owned transport companies in Kabul to provide for international transport with adequate capacities.

1.5 Information regarding machinery assembly and building erection

The truck-cranes, tractors, lorries hoists and other lifting devices are available in Kabul. To lease or hire a truck-crane costs per 1 day 25 000 Afg. (early 1991). The salary of a truck driver under present conditions is 5000 Afg + 24.000 Afg worth of coupons covering flour, rice, tea, sugar etc. per 1 month in government enterprise. Privat driver gets 30.000-40.000 Afg without the coupons for food.

Basic materials for MSP buildings erection are available in Kabul as well, thus comprising sand, cement, bricks, timber etc. Approximate costs (1990)

bricks from the Brick and Lime Kilns in Kabul -

	12000 Afg/1000 bricks
lime	15000 Afg/1 t
timber (/ 15x18 cm)	130000 Afg/1 m3
cement	1000-1500 Afg/50 kg

Workmen wages vary according to the season of the year, approximate wage per 1 month of unskilled labourer is 24.000 Afg., whilst a skilled workman gets 30-40.000 Afg.

Visa regulation

Tourist visa issued by Afghan authorities abroad are valid for 3 month. Afghan government issues visa to stay in the country for 2 years prior to application International UN personnel and their dependents arriving on a work related or normal entry visa, must register their passports with the Ministry of Foreign Affairs and apply for exit/re-entry and residence (stay) visas. This can be done trough the UNDP in Kabul and it is the responsibility of the UNDP staff member to keep the residence visas up to date. To be without a valid residence visa is considered an offence which can lead to the imposition of fines and other difficulties.

FINAL REPORT

ANNEX 3

Proposed potential suppliers

ANNEX 3

PROPOSED POTENTIAL SUPPLIERS

The distribution of the Invitation for Bidders was made early June 1991 to 14 firms well known with their supplies of technological equipment and production technology in the sphere of metallurgy and with construction of complete metallurgical plants, including the construction on the "Turn-key" basis, as follows:

- 1 - ASEA BROWN BOVERI AG. ABB
Industrie Gesellschaft m.b.H.
Pernerstorfergasse 94
A-1101 Vienna
- 2 - CLECIM (Ste)
Parc Saint-Christophe
Cergy-Pontoise Cedex
F 95864
France
- 3 - Danieli & C.S.p.A
Officine Maccaniche
P.O.Box 113
Via Nazionale 41
Buttrio, Udine
Italy
- 4 - Davy Mc Kee
Ashmore House
Stockton-on-Tees
Cleveland TS 18 3RE
England
- 5 - Ishikawajima-Harima Heavy Industries Co Ltd
Shin-Ohtemachi Bldg
2-1 Obtemachi 2-chome
Chiyods-ku
Tokyo, T100
Japan
- 6 - Italimpianti SpA
Piazza Picapietra 9
Genoa
I-16121
Italy
- 7 - KGYV - Metallurgical Engineering Corp.
P.O.Box 23
Budapest
H 1553
Hungary

- 8 - **Mitsubishi Heavy Industries Ltd**
5-1 Marunouchi 2-chome
Chiyoda-ku
Tokyo 100
Japan
- 9 - **Škodaexport**
Foreign Trade Corp.
Škoda Concern Plzeň
Václavské náměstí 56
113 32 Praha 1
Czechoslovakia
- 10 - **SMS Schloemann-Siemag AG**
P.O.Box 230229
Eduard-Schloemann Str. 4
Düsseldorf 1
D-4000
Bundes Republik Deutschland
- 11 - **Sumitomo Heavy Industries Ltd.**
1-1-3 Otemachi
Chiyoda-ku
Tokyo-100
Japan
- 12 - **Tyazhpromexport**
18/1 Ovchinnikovskaya Nab.
Moscow 113324
USSR
- 13 - **Euroinvest GmbH**
Opletalova 37
110 00 Praha 1
Czechoslovakia
- 14 - **Iron and Steel Works**
Ankara
Turkey

UNIDO-Trust Fund Project Section obtained early April 1992 two more offers from firms as follows:

- 15 - **China Metallurgical Construction Corporation**
46 Dongai Xidajic
Beijing
China
- 16 - **Metallurgical Projects Consulting Design
and General Supply Co**
19, Porcelanowa St.
40-246 Katowice
Poland

Omarzay Steel Mill Comp. submitted in mid-April 1992 an offer prepared by the firm of:

- 17 - **Graham Group (Eng's) Ltd**
127-153 Rookwood Road
Yagoon N.S.W. 2199
Australia

FINAL REPORT

ANNEX 4

Note to the file

NOTE TO THE FILE

ON THE VISIT OF MS. V. SPILCHALOVA (POLYTECHNA, PRAGUE) AND MESSRS.
J. ODVODY AND J. BIRMUND (METALCONSULT, PRAGUE)
TO UNIDO HEADQUARTERS ON 21-22 JAN. 1992
Place of venue: Mr. Grof's office (D1256)

The Interim Report No. 2 (Project SI/AFG/90/801) has been submitted to UNIDO and accepted with the following recommendations and remarks:

- The two consultants should continue negotiations with Danieli & C.S.P.A. as the only potential technically acceptable bidder of the mini-steel plant for Omarzay Company Afghanistan.
- It is recommended to visit Danieli together with Mr. Omarzay to discuss all technical, commercial and financial details of the offer.
- It is understood that due to the uncertain political and financial situation in Afghanistan no other companies were willing to offer directly to Messrs. Omarzay. It is, therefore, suggested to enter into a trust fund agreement with UNIDO by Mr. Omarzay's Company. It might enable to collect more offers from different companies, reduce the prices of equipment, provide adequate technical support and training before, during and after commissioning and start-up of the machinery. This question should be clarified with Mr. Omarzay by the consultants, separate from Danieli, and inform UNIDO afterwards accordingly.
- It is recommended to invite Mr. Omarzay and the consultants to UNIDO after the visit to Italy at Danieli's to continue negotiations on a possible trust fund arrangement or other follow-up of the project.
- It is deemed necessary to advise Mr. Omarzay to insist on having proper training and a long-term technical support of the operation of the plant (at least two years) by international experts and consultants.
- In the offer of Danieli the question of supervision should be discussed in details.
- The capacity of the arc furnace seems to be the bottleneck in the plant, so it has to be selected to enable achievement of the minimum 21,000 tpa capacity.
- The financial arrangement and general conditions of the contract including its legal aspects, terms of payment etc. should be very thoroughly discussed and clarified.

For POLYTECHNA:
For METALCONSULT:

For UNIDO: *[Signature]*
(IO/T/MET)

FINAL REPORT

ANNEX 5

Protocol Danieli

PROTOCOL CONCERNING OMARZAY STEEL MILL
KABUL - AFGHANISTAN - UNIDO PROJECT
N° SI/AFG/90/801 AC J 13208

CONTRACT N° 80/207/UK
ASSISTANCE TO OMARZAY STEEL MILL CORP.
IN THE REPUBLIC OF AFGHANISTAN

With respect to UNIDO Headquarters representative recommendation the consultants continued negotiations with Danieli's officials and together with Mr. Omarzay in Buttrio - Italy.

It has been agreed that offer N° 6677.001/91 will be revised to provide for all items as requested in "Invitation for Bidders", namely for the following one :

- The final commercial proposal should cover not only the main technologies (steel melt shop and rolling mill) but the mini steel plant as a whole on "Turn key" basis.

This commercial proposal should clearly indicate the price as discussed :

- Machinery and equipment FOB/CIF Karachi or Hairatan Russian border)
- Supervision to erection / start-up and commissioning for the complete plant with an option for the complete erection by Danieli.
- Building and construction work, bridge spanning 20 m. to be included (according to European standard)
- Spare parts for 2 years of running
- Training of personnel

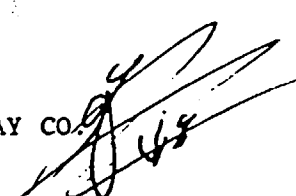
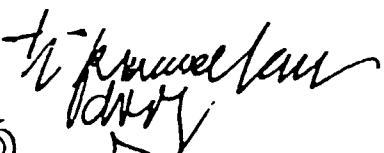



The revised offer as for the above mentioned items should be submitted during the second week of March. (3 copies are to be distributed to Mr. Omarzay and 1 copy to Metalconsult Praha).

The visit to Kabul by Danieli's officials should follow and it is envisaged to take place at the end of March 1992 and it is expected to be announced in advance to Mr. Omarzay's office in Kabul as well as in Dubai).

(N° Fax 531529 - Telex 46558 OMARZAY EM).

Prior the visit to Afghanistan, negotiations concerning the revised offer and briefing at UNIDO Headquarters will proceed between consultants and Danieli's officials to an approved date. According to Mr. Omarzay statements and with respect to Governement of Afghanistan interests in setting up the mini steel plant as soon as possible, the contract covering the plant supply as prepared by UNIDO Invitation for Bidders is envisaged to be signed without delay during March 1992 by Danieli's officials and Mr. Abdul Basir Omarzay President of Omarzay Steel Co.

10 FEB 1992

- Mr. B. Omarzay - OMARZAY CO. 
- Mr. J. Zikmund - METALCONSULT - UNIDO 
- Mr. F. Mulinaris - DANIELI & C. 
- Mr. P. Salvador - DANIELI & C. 
- Mr. P. Bianchi - DANIELI & C. 

FINAL REPORT

ANNEX 6

**Table showing comparison of offers
submitted in response to invitation for Bidders
UNIDO Project No SI/AFG/90/80**

ANNEX 6

**Table showing comparison of offers
submitted in response to invitation for Bidders
UNIDO Project No SI/AFG/90/80**

CRITERIA	DATA	OFFER No 1 Danieli	OFFER No 2 MCC China	OFFER No 3 Graham Group
1. Rolled material production	TPY	25 000	21 000	21 000
2. Liquid steel production	TPY	27 800	24 550	22 556
3. Scrap consumption	TPY	31 230	26 270	25 200
4. Fixed capital investment	USD	not indicated	24 994 000	55 493 747
• Machinery and equipment	USD	37 183 050 ¹⁾	8 700 000 ²⁾	28 336 691 ³⁾
• Erection	USD	not indicated	2 182 400 ⁴⁾	3 221 873
• Construction work	USD	not indicated	7 630 300 ⁴⁾	19 038 778
• Spare parts, tools and consumables for two years operation	USD	2 811 778 ¹⁾	2 680 000 ²⁾	2 480 000 ³⁾
5. Specific capital investment	USD/lt r.m.p.year	not indicated	1 190,2	2 642,5
6. Technical assistance:				
• Total cost	USD	2 452 853	500 000	1 510 936
• Volume	man-months	not indicated	250	not indicated
• Specific cost	USD/man-months	not indicated	2 000	not indicated
7. Training of personnel				
• Total cost	USD	See Item 6	150 000	905 469
• Volume	man-month	not indicated	100	not indicated
• Specific cost	USD/man-month	not indicated	1 500	not indicated
8. Total weight of machinery and equip.	t	1 510 ⁵⁾	1 650 ⁵⁾	4 150 ⁶⁾
9. Specific price of machinery and equip.	USD/kg	11,49 ⁵⁾	3,40 ⁵⁾	6,83 ⁶⁾
10. Total installed capacity	MW	15,4	9,264 ^{6a)}	10,6

1) F.O.B. North Italian Port (Venice)

2) F.O.B. China Port

3) C.I.F. Kabul

4) Estimated cost is based on construction conditions in China

5) Steel melting shop and rolling mill

6) Entire ministeel plant, incl. erection and construction materials and equipment

6a) Maximum power load

CRITERIA	DATA	OFFER No 1 Danieli	OFFER No 2 MCC China	OFFER No 3 Graham Group
11. Total number of personnel	pers.	268	497 ⁷⁾	150
• comprising: workers	pers.	217	421 ⁷⁾	83
12. Productivity	TPY/l pers.	93,3	42,2	140,0
13. Mechanization and automation level		high	normal	very high
14. Estimated steel structures	t	1 760	2 000	2 010 ⁸⁾
15. Estimated building materials	t	See note ^{8a)}	700 ⁹⁾	1 200 ⁸⁾
16. Total built-in area	m ²	33 830	26 742	21 290
17. Total roofed area	m ²	13 668	15 141	4 884
18. General lay-out land required	m ²	56 100	110 000	32 400
19. Lay-out concept		1	3	2
20. Delivery terms				
• Construction of bridge, road, MSP area	month	not indicated	not indicated	16
• Equipment and installation	month	not indicated	See note 10	24 ¹¹⁾
21. Delivery		F.O.B. Venice	F.O.B. China port	C.I.F. Kabul
22. Offer validity		07.10.1992	09.30.1992	07.30.1992

7) The number of personnel with future production operation improvements may be reduced substantially, in steel making shop in particular

8) For buildings, road and Kabul river bridge

8a) Concrete 17000 m³
Steel rebars 1400 t
Roofing 13800 m²
Cladding 8820 m²

9) Cement only

10) Steel making mechanical equipment 16 months
Light section mill 12 months
other 12 months after contract coming into effect

11) Cannot be carried out till the road, bridge and site preparation is completed

1. ELECTRIC STEEL MELTING SHOP

CRITERIA	DATA	OFFER No 1 Danieli	OFFER No 2 MCC China	OFFER No 3 Graham Group
1.1 Liquid steel production	TPY	27 800	24 550	22 556
1.2 Billet production	TPY	26 400	22 830	22 105
1.3 Yield of liquid steel	%	95	93	98
1.4 Built-up area	m ²	3 060	4 068	1 980
1.5 Specific liquid steel production	TPY/m ²	9,1	5,4	11,4
1.6 Specific billet production	TPY/m ²	8,6	5,2	11,2
1.7 Total manpower required (incl. CCM)	person	96	216	54
• comprising technicians and professionals	person	12	30	26
1.8 Productivity	TPY l.s./1 pers.	289,6	104,5	417,7
1.9 Furnace nominal capacity	t	A.C. 13	A.C. 10	D.C. 10
1.10 Average heat tapping weight	t	13	10,05	8
1.11 Max. heat tapping weight	t	15	12	10
1.12 Furnace transformer power	kVA	8 000	5 500	9 530
1.13 Specific furnace transformer power	kVA/t.l.s	615	550	953
1.14 Average heat tap-to-tap time	min.	160	165	110
1.15 Average specific furnace output	t.l.s./hour	4,88	3,85	4,36
1.16 Number of heats per 24 hours	pcs.	9	9	13
1.17 Actual operating time	hours/year	6 120	6 576	6 000
1.18 Oxy-fuel burner	pcs.	1	zero	zero
1.19 Method of oxygen use		consumable lance	consumable lance	consumable lance
1.20 Method of sec. metallurgy used		nitrogen into the ladle	argon into the ladle	nitrogen into the ladle
1.21 Scrap charging bucket	pcs.	3	4	4
• Bucket capacity	t	8	5	6
1.22 Scrap bucket transfer car	pcs.	1	1	2
- charging capacity	t	20	20	15
- weighing system		by load cells	electronic	by load cells ASEA

CRITERIA	DATA	OFFER No 1 Danieli	OFFER No 2 MCC China	OFFER No 3 Graham Group
1.23 Ladels in operation cycle	pcs	5	6	5
1.24 Hight of EAF operating platform above the bay floor level	m	± 0	+ 4,5	+ 4
1.25 Continuous casting machine	type	full bow	full bow	Low headroom bow caster Concast
1.26 Hight of CCM operating platform above the bay floor level	m	approx + 5	approx +4,5	+ 5
1.27 Billet section size ¹²⁾	mm/mm	120x120	120x120	120x120
1.28 Casting speed	m/min.	2,7	2,5 up to 2,8 ¹³⁾	3,0 up to 6,0 ¹³⁾
1.29 Number of strands	pcs.	1	1	1
1.30 Casting time for one heat	min.	44	35,6 up to 31,8 ¹³⁾	23 up to 61 ¹³⁾
1.31 Machine set-up time	min.	30	not indicated	max. 10
1.32 Tundish size, approx.	t	4,5	3,0	1,2 ¹⁴⁾
1.33 Tundishes in operating cycle	pcs.	3	2	5
1.34 Mold life-time	heats	200 up to 300	not indicated	280 up to 700
1.35 Total weight of machinery and equipment	t	480	665	not indicated
1.36 Price of 1 kg of machinery and equipment	USD/1 kg	11,52	3,71	not indicated
1.37 Consumption of raw materials, masses and energies:				
1.37.1 Steel scrap				
- specific consumption	kg/tt.s.	1 123,5	1 070	1 117,3
- annual consumption	t	31 230	26 270	25 200
1.37.2 Crude iron		zero	zero	zero
1.37.3 Iron ore				
- specific consumption	kg/tt.s.	zero	5,0	zero
- annual consumption	t	zero	123,0	zero

12) Possible range of billet section: Danieli - 80x80 up to 130x130 mm
MCC China - 90x80, 100x100 and 120x120 mm
Graham Group - 65x65 up to 130x130 mm

13) According to section size

14) With possibility to adopt Graham Group direct casting, tundisch free operation

CRITERIA	DATA	OFFER No 1 Danieli	OFFER No 2 MCC China	OFFER No 3 Graham Group
1.37.4 Ferrous additions				
- specific consumption	kg/t l.s.	18,0	20,0	18,2
- annual consumption	t	500	481	455 ¹⁵⁾ (410)
1.37.5 Slag builders				
- specific consumption	kg/t l.s.	36,1	65,0	25,0
- annual consumption	t	1 000	1 560	625 ¹⁵⁾ (564)
1.37.6 Refractory material [incl. CCM]				
- specific consumption	kg/t l.s.	14,8	34,0	15,0
- annual consumption	t	415	835	375 ¹⁹⁾ (338)
1.37.7 Electrode				
- specific consumption	kg/t l.s.	4,5	7,0	3,2 ¹⁶⁾
- annual consumption	kWh	125	170	80 ¹⁵⁾ (72)
1.37.8 Technological electrical energy				
- specific consumption	kWh/t l.s.	550	590	450
- annual consumption	kWh	15 290 000	14 183 600	11 250 000 ¹⁵⁾ (10 150 200)
1.37.9 Other electrical energy [incl. CCM]				
- specific consumption	kWh/t l.s.	14,5	60	50
- annual consumption	kWh	403 100	1 473 000	1 250 000 ¹⁵⁾ (1 127 800)
1.37.10 Total annual el. energy consumption				
	kWh	15 693 100	15 656 600	12 500 000 ¹⁵⁾ (11 278 000)
1.37.11 Oxygen				
- specific consumption	m ³ /t l.s.	34	28	20
- annual consumption	m ³	945 200	673 120	500000 ¹⁵⁾ (451120)
1.37.12 Fuel oil [incl. CCM]				
- specific consumption	kg/t l.s.	13,0	21,3	3,0
	GJ/t l.s.	0,49	0,80	0,11
- annual consumption	t	361	523	75 ¹⁵⁾ (68)
	GJ	13 622	19 640	2 750 (2 481)

15) Correspond to 25.000 t of liquid steel, data in parenthesis correspond to 22.556 t of liquid steel

16) Valid for by Graham Group selected electrode supplier and quality only

CRITERIA	DATA	OFFER No 1 Danieli	OFFER No 2 MCC China	OFFER No 3 Graham Group
1.37.13 EAF cooling water quantity				
- in circulation	m ³ /hour	350	200	195 ¹⁶⁾ 30 ¹⁷⁾
- make up water	m ³ /hour	60	30	20
1.37.14 CCM cooling water:				
- water quantity in circulation	m ³ /hour	150	170	not indicated
1.37.15 Compressed air [incl. CCM]				
- specific consumption	Nm ³ /lt l.s.	245,8	5,0	not indicated
- annual consumption	Nm ³ x 10 ³	6 833	123	not indicated
1.37.16 Inert gas				
- type		nitrogen	argon	nitrogen
- specific consumption	Nm ³ /lt l.s.	0,04	0,015	not indicated
- annual consumption	Nm ³	1 112	368	not indicated
1.38 Lifting and material handling equipment				
1.38.1 Scrap bay crane				
- quantity	pcs.	2	1	-
- lifting capacity	t	12,5	10	-
- crane runway span	m	16,75	16,7	-
- crane rail high	m	11	not indicated	-
1.38.2 Furnace bay - charging crane				
- quantity	pcs.	1	1	1
- main lifting capacity	t	17	20	20
- auxiliary lifting capacity	t	5	5	6
- crane runway span	m	16,75	19	18,5
- crane rail high	m	13,5	not indicated	11,0

17) Deionized water [indicated for EAF DC 5 t]

18) Without transformer, reactor and rectifier cooling circuit (this data was given for 5 t EAF DC)

CRITERIA	DATA	OFFER No 1 Danieli	OFFER No 2 MCC China	OFFER No. 3 Graham Group
1.38.3 Casting bay - ladle crane				
- quantity	pcs.	1	1	1
- main lifting capacity	t	35	30	20
- auxiliary lifting capacity	t	10	5	6
- crane runway span	m	16,75	19	18,5
- crane rail hight	m	13,5	not indicated	11,0
1.38.4 Billet stockyard crane				
- quantity	pcs.	1	1	1
- lifting capacity	t	15,5	10	12
- crane runway span	m	16,75		18,5
- crane rail hight	m	8,0	not indicated	11,0
1.38.5 Charging manipulator				
- lifting capacity	t	2,0	not indicated	4,0

2 LIGHT SECTION ROLLING MILL

CRITERIA	DATA	OFFER No 1 Danieli	OFFER No 2 MCC China	OFFER No 3 Graham Group	
2.1	Rolled material production	TPY	25 000	21 000	21 000
2.2	Yield of metal	%	95	92	95
2.3	Billet consumption	TPY	26 400	22 830	22 105
2.4	Billet length	mm	2 000 (4 000)	1 400	3 000
2.5	Billet weight	kg	225 (450)	135	340
2.6	Production mix				
	- round bars (diameter)	mm	12 to 32	12 to 32	12 to 32
	- equal angles	mm	20 to 50	30/3 to 50/6	20 to 50
	- channels	mm	30/15 to 40/20	50	20/12 to 40/20
	- flats	mm	25/5 to 150/20	60/8 to 100/20	20/4 to 50/20
2.7	Built-in area	m ²	6 840	7 812	1 890
2.8	Specific rolled material production	t r.m./m ² .year	3,65	3,64	11,1
2.9	Total manpower required	person	37	103	27
	• comprising technicians and professionals	person	2	7	9
2.10	Labour productivity	t r.m./y.pers.	676	204	778
2.11	Shift number per day	pcs.	1	1	1
2.12	Running hours	hour/year	1 481	2 100	not indicated
2.13	Theoretical annual mill capacity in three shift operation	t	120 000	63 000	63 000
2.14	Reheating furnace - type		pusher type	pusher type	pusher type
	- dimensions, length/width	m/m	15 x 5	20 x 3,3	3,25 x 9,5
	- furnace capacity	t/hour	30	15 ¹⁹⁾	25
2.15	Rolling train type		semicontinuous type	open type	split type
2.16	Average train capacity	t/hour	17,0	10	25

19) on 100 mm square, 1,4 m long billets

CRITERA	DATA	OFFER No 1 Danieli	OFFER No 2 MCC China	OFFER No 3 Graham Group
2.17 Roughing train		3-high	3-high	3-high
- number of stands	pcs.	1	2	1
- roll diameter	mm	490	430	508
2.18 Finishing train		2-high rolling units	3-high	2-high
- number of stands	pcs.	hor. hor. vert. 2 + 6 + (2)	5	8+4
- roll diameter	mm	430-320-(320)	300	350 + 280
- exit rolling velocity	m/s	3 to 7,5	not indicated	3,26 to 8,0
2.19 Total installed capacity	kW	4 250	2 461	4 000
2.20 Total weight of machinery and equipment	t	1 030	600	not indicated
2.21 Price of 1 kg of machinery and equipment	USD/1 kg	11,47	5,00	-
2.22 Material, masses and energy consumption				
2.22.1 Billet reheating - fuel oil				
- specific consumption	kg/lt r.m. GJ/lt r.m.	50 1,88	40 1,51	0,0006 ²⁰⁾ 0,0000211
- annual consumption	t GJ	1 250 47 112	840 31 660	0,0117 ²⁰⁾ 0,4431
2.22.2 Rolls				
- specific consumption	kg/t r.m.	0,25	0,5 to 2,5 ²¹⁾	See note 22)
- annual consumption	t	6,25	10,5 to 52,5 ²¹⁾	not indicated
2.22.3 Refractory material				
- specific consumption	kg/t r.m.	not indicated	1,0	not indicated
- annual consumption	t	not indicated	21,0	not indicated

20) deficient data

21) 0,5 kg/t for round bars
10,5 t/r

22) three sets of roll per stand - depend on production mix

CRITERIA	DATA	OFFER No 1 Danieli	OFFER No 2 MCC China	OFFER No 3 Graham Group
2.22.4 Electrical energy				
- specific consumption	kWh/t r.m.	250	70	not indicated
- annual consumption	kWh x 10 ³	6 250	1 470	not indicated
2.22.5 Cooling water				
- in circulation	m ³ /hour	150	150	not indicated
- mill scale splashing water	m ³ /hour	200	not indicated	not indicated
- make-up water	m ³ /hour	35	16	not indicated
2.23 Material handling				
- overhead travelling crane	pcs.	2	3	not indicated
- lifting capacity	t	18 10	5	not indicated
- crane runway span	m	16,75	15,0	not indicated
- crane rail height	m	8,0	6,0	not indicated

MAINTENANCE WORKSHOP

CRITERIA	DATA	OFFER No 1 Danieli	OFFER No 2 MCC China	OFFER No 3 Graham Group
Built-in area	m ²	1.080 ²³⁾	1.900 ²³⁾	400
Installed machine tools number	pcs	5 + 2 ²⁴⁾	24	45
Total installed capacity	kW	350 + 60 ²⁴⁾	not indicated	500
Total personnel number	pers.	32 + 3 ²⁴⁾	24	24

23) Incl. roll-turning shop

24) Vehicles repair shop

WATER TREATMENT PLANT

CRITERIA	DATA	OFFER No 1 Danieli	OFFER No 2 MCC China	OFFER No 3 Graham Group
Built-in area	m ²	1.100 + 49 ²⁵⁾	471	150
Installed pumps	pcs.	12 groups	See note ²⁷⁾	12
Pumps in operation	pcs.	1 for each group		6
Total installed capacity	kW	1.400		150
Total indirect cooling water quantity	m ³ /hour	720 ²⁶⁾		not indicated
Total direct colling water quantity	m ³ /hour	230		not indicated
Total make-up water	m ³ /hour	110		not indicated

25) water reservoir 40 m³ for power black-out situation

26) without 280 m³/hour for diesel generator

27) included in investment estimation, but excluded from equipment supply

COMPRESSED AIR PLANT

CRITERIA	DATA	OFFER No 1 Danieli	OFFER No 2 MCC China	OFFER No 3 Graham Group
Built-in area	m ²	80	200	25
Compressors installed	pcs.	3	2	1
Compressor in operation	pcs.	2	1	1
Compressed air output	Nm ³ /hour	1.100	1.200	not indicated
Total installed electrical capacity	kW	170	not indicated	100

OXYGEN PLANT

CRITERIA	DATA	OFFER No 1 Danieli	OFFER No 2 MCC China	OFFER No 3 Graham Group
Separating apparatus capacity	Nm ³ /hour	250	150	See note ²⁸⁾
Chemical oxygen purity	%	99,5	99,5	
Specific electric consumption	kWh/1Nm ³ O ₂	not indicated	2,0	
Plant area	m ²	900	600	
Nitrogen production	Nm ³ /hour	10	zero	
Nitrogen purity	%	99,0	-	
Total installed electrical capacity	kW	580	not indicated	

²⁸⁾ Data about oxygen producing equipment are not indicated at all

SCRAP HANDLING AND TREATMENT

CRITERIA	DATA	OFFER No 1 Danieli	OFFER No 2 MCC China	OFFER No 3 Graham Group
Untreated scrap unloading				
- crane type		Wheeled mobile	OT	not indicated
- number of cranes	pcs.	1	2	not indicated
- lifting capacity	t	55	10	not indicated
Press-shear	pcs.	zero	1	1
Baler	pcs.	zero	1	1
Cutting torch	pcs.	1	10	8

STORAGES

CRITERIA	DATA	OFFER No 1 Danieli	OFFER No 2 MCC China	OFFER No 3 Graham Group
Scrap yard (capacity for 90 working days)				
- quantity of scrap	t	11 830	9 145	12 000
- scrap yard area	m ²	4 950	4 800	6 000
- specific load	t/m ²	2,4	1,9	2,0
Ferro-alloys (capacity for 90 working days)				
- quantity of ferro-alloys	t	190	163	120 ²⁹⁾ (170)
- store area	m ²	240	See note ³⁰⁾	600
Non-metallic additives (capacity for 30 working days)				
- quantity of additives	t	128	176	250 ²⁹⁾ (78)
- store area	m ²	See note ³⁰⁾	See note ³⁰⁾	1 250
Refractory material (capacity 90 working days)				
- quantity of refractories	t	not indicated	205	1 300
- store area	m ²	See note ³⁰⁾	See note ³⁰⁾	2 000
Graphite electrodes (capacity for 90 working days)				
- quantity of electrodes	t	47	57	30
- store area	m ²	See note ³⁰⁾	See note ³⁰⁾	120
Spare parts				
- spare parts quantity	t	See note ³¹⁾	approx. 230	120
- store area	m ²	See note ³⁰⁾	See note ³⁰⁾	500
Fuel oil (capacity for approx. 1,5 month)				
- fuel oil quantity	t	200	153	8,5 ³²⁾
- store area	m ²	375	435	16
- installed electrical capacity	kW	130	not indicated	not indicated
Indirect material				
- store area	m ²	468 ³³⁾	not indicated	960

29) deficient data, realistic data in parenthesis

30) not indicated separately, included in general store

31) weight of spare parts is not indicated

32) unrealistic data

33) incl. oil and greases store

STAND-BY POWER STATION

CRITERIA	DATA	OFFER No 1 Danieli	OFFER No 2 MCC China	OFFER No 3 Graham Group
Generator capacity	kW	4 560	500	350 ³⁰⁾

30) kVA

LABORATORY

CRITERIA	DATA	OFFER No 1 Danieli	OFFER No 2 MCC China	OFFER No 3 Graham Group
Built-up area	m ²	340	730	25
Total personnel number	pers.	23	23	7
Installed electrical capacity	kW	140	not indicated	not indicated

PLANT FENCE AND GATEHOUSE

CRITERIA	DATA	OFFER No 1 Danieli	OFFER No 2 MCC China	OFFER No 3 Graham Group
Total fence length	m	1 010	1 470	720
Gatehouse built-up area	m ²	100	40	not indicated