OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

Distr.
RESTRICTED

UNIDO/TCD.23
11 September 1970

ENGLISH

UNITED NATIONS INDUSTRIAL
DEVELOPMENT ORGANIZATION

01611

REPORT ON MISSION TO THE UNITED ARAB REPUBLIC

UAR - 631 - F (SIS)

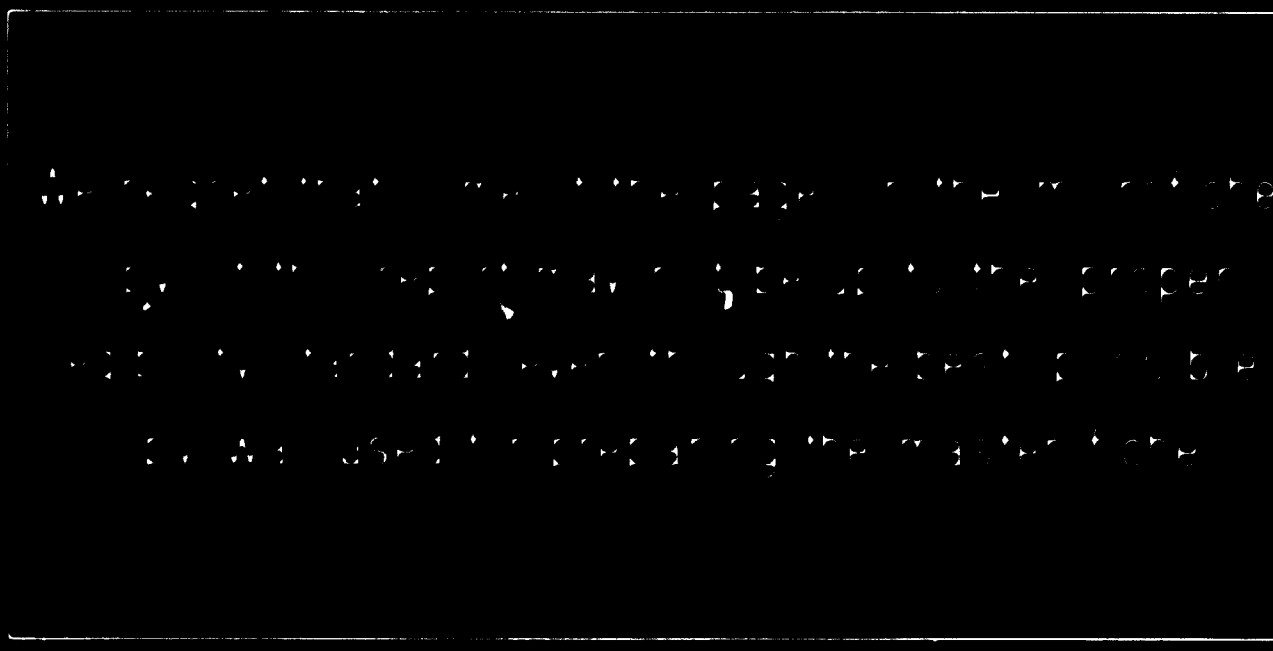
CONTRACT ENGINEERING SERVICES TO THE GENERAL ORGANIZATION
FOR INDUSTRIALIZATION

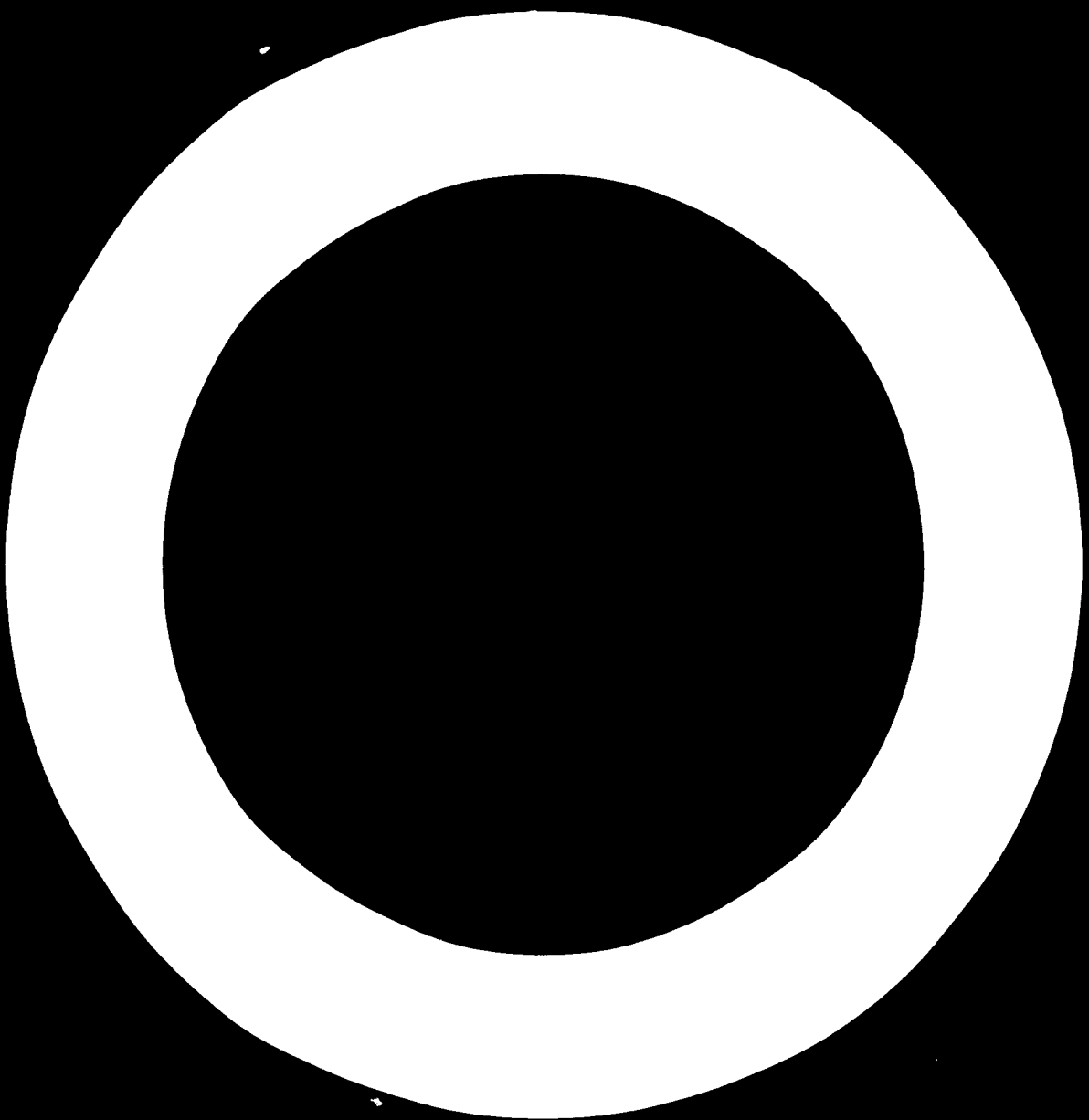
20 July to 14 August 1970

Dr. Julian R. [illegible]

This report has not been cleared with the Resident Representative in UAR or with UNIDO and they do not necessarily share the views expressed herein.

id.70-4948





I. BACKGROUND TO THE PROJECT

It is the intention of the Government of the United Arab Republic - Egypt - to have an Ammonia/Urea Fertilizer Complex built at Talkha in the Nile Delta. This site has also been chosen for the erection of the extensions to the Suez Fertilizer Factory - these should normally have been erected at Suez, but, due to the hostilities, the Suez plant is non-operational. The erection of these extensions is presently underway.

The raw material for the Fertilizer Complex at Talkha will be natural gas from Abou Madi, 40 km. from the factory site. A pipeline, which is outside the scope of the present mission, will bring the gas to the Battery Limits of the Factory.

Both the Suez Extensions and the new plant, hereinafter referred to as the Talkha Factory, are Public Sector projects.

A very preliminary Bid Specification was prepared by the General Organization for Industrialization (GOI) and sent to various potential contractors. Some of these expressed their interest and some submitted order-of-magnitude prices. Not all of these contractors were suitably qualified to carry out a contract of this type and magnitude.

II. THE SCOPE AND NATURE OF THE MISSION

The duties, as defined in the Job description (Attachment 1 to this report) were:

"The expert will be attached to the Egyptian General Industrialization Organization and will be expected to:

prepare the detailed contracts for an ammonia/urea complex including all its technical, commercial and legal aspects".

In fact, the work carried out within the framework of the mission was:

to advise on the most appropriate capacities for the production units, taking into account such factors as projected local consumptions and export possibilities;

to prepare, in collaboration with engineers of CCI, detailed technical specifications for the Talkha Factory. These specifications will be included in the "Invitation to Tender" for this Factory (Attachment 2 of this report),

to prepare the General Conditions to be included in the "Invitation to Tender" (Parts I and II of Attachment 2 to this report). These conditions were prepared largely by modification and revision of existing General Conditions.

to advise on which contractors should be invited to tender for the Factory (Attachment 3 to this report)

to advise on what points should be taken into account in comparing tenders received and the best way of carrying the project through the various stages of implementation (Attachments 4 and 5 to this report).

Unfortunately, it was not possible to visit the plant site but a site plan was made available. This is at present being prepared for inclusion in the "Invitation to Tender".

Outside of the immediate scope and context of the mission, advice was also requested on possible uses of 50 tons/day of chlorine available from a caustic soda plant in Alexandria and presently being dumped in the sea. This will form the subject of a separate report.

III. PRODUCTION AND CONSUMPTION OF NITROGENEOUS FERTILIZERS IN THE UAR

A. Production

1. Existing:

i) Egyptian Chemical Industries 'Kima' at Aswan

Ammonia production 130,000 tons/annum
This is converted to Calcium Ammonium Nitrate (CAN) at 26 % N although, shortly, this will be changed to 31½ N Ammonium Nitrate.

N (Nitrogen) production equivalent 112,000 tons/annum

ii) Société el Nasr des Engrais et Produits Chimiques at Suez.

This factory is temporarily shut down.

Normal Ammonia production	85,000 tons/annum
This is converted to Ammonium sulphate and CAN	
N production equivalent	70,000 tons/annum

iii) El Naer Coke and Heavy Chemical Company at Helwan.

Normal Ammonia production	52,000 tons/annum
This is converted to CAN	
N production equivalent	42,000 tons/annum

2. Under construction:

Extensions to Société el Nasr - Suez. Being erected at Talkha in the Nile Delta.

Rated ammonia production	130,000 tons/annum
This will be converted to CAN	
Rated N production equivalent	107,000 tons/annum.

3. Projected:

Ammonia/urea fertiliser complex at Talkha. Capacity to be established; see under item C of this chapter.

B. Consumptions

It is extremely difficult to obtain reliable figures for the projected consumptions of Nitrogeneous Fertilisers in the UAR. Annual increases in consumptions projected for the period 1970 to 1980 range from 5 % (figure given by OOI) to 7 % (ECA "Etude sur l'Evolution des Engrais Chimiques en Afrique du Nord", Addis Ababa, Dec. 1968) and even 8,5 % (report of the First Seminar of Experts on Fertilisers and Petrochemicals in Arab Countries - Kuwait, Institute for Economic and Social Planning in the Middle East - 15 to 18 May 1967).

Let us take 5 % as the lower and 7 % as the upper limits. Further, let us assume that the consumption in 1965 was 285,00 tons/annum. The consumptions of N in 1970, 1975 and 1980 would then be:

	1970	1975	1980
5 % growth	363,000	465,000	593,000
7 % growth	402,000	565,000	791,000.

Productions, excluding the new Talkha Factory and assuming that El Nasr at Suez and the Suez Extensions at Talkha are running normally, by 1975 will total 331,000 tons N/annum. This means that, without the new Talkha plant the shortfalls will be:

	1975	1980
5 % growth	134,000	262,000
7 % growth	234,000	460,000

C. Suggested capacity of Talkha Factory

As it would not be wise to build a factory at Talkha for export - it is sited too far from the nearest deep sea port - the main consideration must be the consumption in the country. The excess can of course be exported at whatever price the world market will bear at that time, thus earning much needed foreign currency, but it must be recognised that export of urea is a cyclical and risky business.

In order to be economic, the plant must have a capacity of at least 600 tons/day of ammonia and should not be larger than 1,000 ton/day. Within this range, the technology, using centrifugal compressors, is well established. Basing productions on 8,000 hours/annum, the outputs of these two factories in Nitrogen equivalent would be:

NH_3 plant capacity	N production
Tons/day	Tons/annum
600	162,000
1,000	268,000

It would seem, therefore, that a 1000 ton/day ammonia plant with all the ammonia being converted to urea, would be the 'best' size of plant to instal This will satisfy the country's requirements until somewhere between 1975 and 1980 For economic assessment purposes, it has been decided to ask bidders also to submit an offer based on the production of 500 tons/day of ammonia, all converted to urea See part III of attachment 2 to this report.

IV. CONCLUSIONS

The "Invitation to Tender" for the Talkha Factory should be based on a daily ammonia production of 1000 tons. As an alternative, the price of a complex based 500 tons/day of ammonia should be requested In both cases the entire production of ammonia is to be converted to urea

As insufficient carbon dioxide will be available from the synthesis gas washing for this purpose, the deficit will be made up from the Suez Extensions being erected on the adjacent site.

Of the urea produced, 10 000 tons per annum will be in the form of Technical Grade Crystals; the remainder will be Fertilizer Grade Prills.

As it is intended to produce Methanol and Melamine in the UAR in the future, it would be advisable to consider producing these in the Talkha Factory and it has, therefore, been decided to request bidders for the Fertilizer Complex to indicate separately the prices for battery limits plants to produce 15 000 tons/annum of Methanol and 5 000 tons/annum of melamine on the same site. These indicative prices will enable the GOI to decide whether or not to ask for detailed offers and firm prices for these plants.

In the General Conditions of the "Invitation to Tender" there is a clause concerning the deposit by the successful bidder of 10% of the Contract Price as a guarantee of good execution of the contract. The GOI has the right to draw upon this sum up to its totality if the GOI decides that the Contractor is in debt to the GOI. Although this may be a Standard Clause in the UAR, it is the writer's view that this will have the effect of increasing the contract price by 10% and some other form of safeguard to the GOI should be sought which will not, at the same time, have this inflationary effect on the price.

V. RECOMMENDATIONS

Approximately six months after the issuing, to suitably qualified bidders, of the "Invitation to Tender" for the Talkha Factory, the detailed Tenders should be received by the GOI. It is at this point that the real work will commence.

Although the GOI has a number of highly qualified engineers, they are limited in number and, for a venture of this magnitude and complexity, they would not be able to cope alone with all the tasks involved in the implementation of this Complex. It is, therefore, recommended that the GOI avails itself of the services of a suitable consultant team to act as an extension of its own facilities.

Ideally, this team of specialists would all belong to one organization with the requisite back-up facilities. This organization would be either a consulting or, preferably, a contracting company which is not itself bidding for the Talkha Factory and which is not involved in "Fertilizer Contracting". In this way the GOI would have the advantage of a contractor's staff of process, mechanical, electrical, structural, civil, instrument, project, planning materials-handling, erection and commissioning engineers; expediters; inspectors; cost control and purchasing specialists, etc. It is very unlikely that many consulting organizations would have all these specialists on their own staffs.

The use of a team of individual specialists is definitely not recommended as the task of coordinating their efforts and providing "Head Office" back-up service would fall on the GOI and, in addition, it would take quite some time before the specialists knew one another well enough to perform as a team.

It is also inadvisable to request this sort of assistance from a producing fertilizer company, especially as it is intended to export the excess production in the beginning, perhaps at "Distress Prices". In the writer's experience, this procedure usually leads to an expensive, inefficient plan: After all, it is not reasonable to expect a producer to create competition for itself.

The Consultant Contractor (CC) would carry out the following main tasks:

1. Comparison of Tenders

This includes the detailed inspection of tenders received by the GOI: The CC, in collaboration with the GOI, will examine tenders in minute detail

to see whether they meet the Tender Specifications and whether they are complete. A detailed comparison, from a technical point of view, will be carried out between tenders (from qualified bidders) and the tenders will be put on to a comparable basis. After discussions with bidders and the modification and completion of their bids where required, the CC will recommend to the GOI which tender or tenders are the most attractive from a technical point of view. It is recommendation will take into account such things as experience, process design, equipment proposed, consumption and production guarantees, cost of operation, etc. A Discounted Cash Flow calculation will also be carried out at this stage.

When the successful bidder (or bidders) has been selected, a Contract Engineer and a Legal Adviser from the CC's staff will help the GOI in drawing up a suitable contract. A Financial Expert could assist in negotiating of the best credit facilities and terms of repayment. This is another field in which a contractor is likely to be superior in performance to a straight Consultant and, certainly, to a team of individuals. Contractors are themselves constantly exploring financing and credit possibilities and are more likely to be able to help the GOI in this matter than is a consultant who very rarely needs to find long-term credit facilities for their type of work.

ii. Execution of Engineering Design

Subsequent to the signature of the contract, the CC would be responsible, on behalf of the GOI for inspection and approval of all contractors documents such as:

Process Flow Sheets and Heat and Matter Balances
Engineering Flow Sheets and Piping and Instrumentation Drawings
Plot Plans, General Arrangement Drawings etc.
Piping and other Standards;
Data Sheets for all Heat Exchangers, Pumps, Furnaces, Compressors and other major items of Equipment;
Vessel Sketches and Vessel Calculation Sheets;
Piping Stress Calculation Sheets;
Purchase Requisitions;
Planning Schedules - either Bar Line, Critical Path or other;
Civil Engineering Calculation Sheets and Execution Drawings;
Contractors Erection Staff Estimates
etc.

The CC would inspect and approve the scale models of the factory; these models would, after construction, serve as training aids for the factory operatives.

iii. Inspection and Expediting

The CC would represent the GOI in the inspection and shop testing materials prior to shipment. He would also see that equipment is delivered in the correct sequence and at the right time - in accordance with the planning schedule.

iv. Field Erection

The CC would, together with the GOI and the Contractor, draw up schedules for site preparation, civil engineering work (to be carried out by a nominated sub-contractor of the GOI), and field erection. He would act as the GOI's representative and would maintain a presence during the entire erection period. The field erection will be carried out by the GOI but under the supervision of the Contractor.

v Choice and training of personnel

The CC would assist the GOI in the choice of suitable operating and maintenance personnel for the factory and would, together with the GOI and the contractor, draw up a programme for training of this personnel both in the UAR and abroad. The CC would ensure that the Operating and Maintenance Manuals prepared or supplied by the Contractor were adequate and comprehensive.

vi. Commissioning

The CC would represent the GOI during the Commissioning period and would ensure that this was properly done. In particular such things as adequate cleaning out of piping and vessels, proper catalyst filling and reduction, pre start-up mechanical testing, running in of pumps and compressors, etc. would be carefully observed and, if necessary, enforced. The CC would also assure himself that the GOI personnel was adequately associated with all stages of commissioning and start-up and that GOI maintenance men were properly

per[illegible] the [illegible] [illegible] drawings and [illegible]

VIII. Post Runs

The [illegible] would be present [illegible] per[illegible] and [illegible] and would report to the [illegible] whether [illegible] with the contract terms and whether [illegible] factory, had or had not met the guarantee and performance requirements.

Extent [illegible] Work

Assuming that the contract [illegible] the [illegible] contractor (either a single contractor [illegible] or the [illegible] of a general contractor) and that the [illegible] place on one continent [illegible] expected [illegible] the [illegible] months spent by the [illegible] would be as [illegible]

I.	[illegible]
II.	[illegible]
III.	8
IV.	18
V.	6
VI.	1[illegible]
VII.	[illegible]
	[illegible]44

This is based on a [illegible] months period between the inspection [illegible] tenders and the commissioning. These figures are somewhat tentative and would have to be firmed up when the overall project schedule is more definite. Also, if the contracts for various units are placed with different contractors, the [illegible] may wish to confide the overall coordination to the [illegible]. In this case, the figures given above would be materially altered.

The scope of the outlined consulting contractor services falls well within the UNIDO programme of technical assistance to developing countries in their industrialization effort. UNIDO would provide the foreign currency component of the costs involved with local currency costs being borne by GOI. Alternatively, GOI may wish to place this technical assistance contract directly with the CC itself.

The following companies are among those which the writer considers capable of acting as consultant contractor for a project of this size, type and complexity. This list is not exclusive and the companies are listed in alphabetical order only:

A.M.O.	Czechoslovakia (if not tendering for the project)
Fertilizer Corporation of India	New Delhi, India (if not tendering for the project)
IMA Industrie progetti	Zagreb, Yugoslavia
Institut Français du Petrole	France
Kellogg International Corporation	United Kingdom
S.	Italy
Snam Progetti (if not tendering for the project)	Italy
Stone & Webster	USA
Weir Pumps, Ltd.	United Kingdom.

7. ACKNOWLEDGEMENTS

The writer wishes to express his appreciation to: Dr. M.A. Shaaban, Chairman of the General Egyptian Organization for Chemical Industries; Mr. Ibrahim Sharkawy, Head of the Central Administration for Industrial Planning and Technical Research of the General Organization for Industrialization; Dr. Eng. M. Ismail Abd Elfattah, Director of the Chemical Department of the GOI; Eng. Farouk Abdelhady and Mr. Ibrahim Armouche; Mrs. Amal Roshdy Helal; and other engineers and personnel of the GOI for their friendly co-operation and assistance, without which this mission could not have been carried out successfully.

Attachment 1

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

1 October 1969

Request from the Government of the United Arab Republic for Special Industrial Services

JOB DESCRIPTION

UAR-69-F (SIS)

Post Title:	Contract Engineer for Fertiliser Industry (ammonia/urea)
Duration:	Four weeks
Date required:	As soon as possible
Duty Station:	Cairo with travel within the country
Duties:	The expert will be attached to the Egyptian General Industrialisation Organisation and will be expected to: prepare the detailed contracts for an ammonia/urea complex including all its technical commercial and legal aspects.
Qualifications:	A professional engineer with experience in the engineering and contracting field in particular the ammonia/urea sector.
Language:	English; French and Arabic desirable

Attachment 2

Part I

Instructions to Tenderers

Article 1.

OBJECT OF TENDER:

Tenderers are invited by the General Organisation for Industrialization of the United Arab Republic 6 Khalil Agha Street Garden City Cairo for the supply and supervision of erection start-up and taking over tests for a complete Ammonia/Urea Fertiliser Complex at Talkha in the Nile Delta based on Natural Gas.

Article 2.

Study of Tender Documents

1. Tenderer is required to obtain all information as he may require to enable him to submit his Tender. No claims whatsoever will be entertained arising out of failure to study local conditions specifications drawings or documents etc.

2. The Tender together with the Schedules referred to hereinafter should be presented in a straight forward, clear concise manner free from stipulation. Should the Tenderer find any discrepancies in or omissions from Tender Documents, or should he be in any doubt whatsoever as to their meanings, he should, not later than thirty days prior to the date of submission of his tender, notify the Organisation and obtain a ruling thereon before tendering. The fact that any tenderer has asked for any such ruling shall not render the Organisation liable to communicate such ruling to any other tenderer who has not applied for the same as aforesaid.

3. All documents comprising the Tender Documents shall be fully completed without interlineation or erasure and no unauthorised alteration shall be made to the Tender Documents. Any such alteration may result in the rejection of the respective tender.

Article 3.

Submission form and validity of tender

1. The tender should be submitted fully completed in Parts I II and III together with the Schedules referred to hereinafter. (One bound copy of the Tender Documents i.e. Parts I II + III is for the Tenderer's retension and records).

Only those Tenders received in writing on the Form of Tender attached as Annex No. I to this Part I together with the provisional guarantee deposit the offer for credit facilities, and the Schedules referred to hereinafter, by the time and date specified hereunder will be considered. All copies of Drawings should be returned unmarked.

With this Tender the Tenderer shall submit all engineering and technical details necessary to enable the organisation to evaluate his Tender.

2. The Tender Documents shall be either sent to the Organisation's address under sealed double cover by registered post or handed over to the organisation against stamped receipt stating the date and hour of handing over. The inner envelope must bear the following inscription:

"Tender for an Ammonia/Urea Fertiliser
Factory at Talikan. U.A.T."

3. Tenders will be received up to 12 o'clock noon on the and tenderers should ensure that their Tenders are despatched in such time as to allow ample margin for the receipt of same before the elapse of the fixed date.

4. Incomplete vague or conditional Tenders or Tenders delivered later than the time and date prescribed above will not be considered

Each page of the Tender Documents (i.e. Part I II and III) shall be initialled by the Tenderer before submission.

5. Tenders shall be irrevocably valid from the date of dispatch and shall remain so for a period not less than 100 days counted from the day following the latest date fixed above for receiving tenders.

Article 4.

Period and schedules for the execution of plant

The Tenderer will submit all the information and documents requested under "General" of Part III of the present document.

Article 5.

Tender Price

The Tender Price is to be submitted as requested under Appendix IV. of part III. The prices must be written without erasures in figures and words. In case of contradiction between figures and words words alone shall rule.

Article 6

Credit Facilities

Tenderer shall in his Tender offer to provide credit facilities for the tender price and shall stipulate the terms and conditions for these credit facilities. Long period for deferred payments and low rate of interest shall have preference.

Article 7

Provisional Guarantee Deposit

1. Tenderers must submit together with their tenders a bank L/G in favour of the Organisation for a sum equal to 2 % (two per cent) of the total value of the Tender as a provisional guarantee deposit. In case of alternative Tenders the provisional guarantee deposit shall be calculated on the basis of the highest priced alternative. The said letter of guarantee shall be issued in the form attached as Annex No. V to this Part I endorsed by a state-owned bank in the U.A.E. and valid for the same period of validity of the Tender.

2. The Tenders of those Tenderers who do not furnish a provisional guarantee deposit as specified will not be considered.

3. In the event of the acceptance of the Tender and after notification by the organisation the successful Tenderer will be required to sign the Contract and submit the final guarantee deposit referred to in Part II within 10 (ten) days of such notification. In case where the successful tenderer fails to submit the final guarantee deposit and sign the contract in the said ten days the provisional guarantee deposit will be forfeited by the organisation without any legal proceedings or proof of

damage and without prejudice to the right of the organisation to recover any direct damage exceeding the amount of the provisional guarantee deposit which may be suffered by such default. Other provisional guarantee deposits will be returned to the unsuccessful Tenderers when the adjudication is finally decided and to the successful Tenderer as soon as he will have submitted the final guarantee deposit.

Article 8

Information as to status of Tenderer

The Tender must be accompanied by duly authenticated copies of the documents defining the constitution of the Tenderer power of attorney and other relevant documents so as to show by what persons and in what manner contracts may be entered into by/or on behalf of the Tenderer. Signatures of the persons allowed to sign on behalf of the Tenderer must be written on the same authenticated extract of the constitution of power of attorney. The said documents must be legalised by the local authorities at their place of issue and endorsed by the U.A.R. competent Consulate abroad.

Article 9.

Previous experiment of Tenderer

Tenderers are requested to submit satisfactory evidence of their previous experience of tenderers and that they have recently executed plants similar to the plant forming the subject matter of this Tender including the site of such plants specifying the size and total value of the undertaking in each case and the date from which the plant has been in continuous operation. The above mentioned evidence must be included with the tender and shall be given due consideration in selecting the successful Tenderer.

Article 10

Alternative Tenders Details + eservations

Tenderer is at liberty to submit with the original tender alternative Tenders details and reservations that he may deem desirable and in the event of his doing so he must annex the added matter t the Tende Documents returned by him but such alternative tenders details and reservations will not be binding on the organisation unless they are approved in writing and incorporated in the contract

Where in special circumstances the Tenderer deems it advisable to provide for the nondisclosure of drawings and information of a confidential nature furnished with his Tender he should include in the covering letter a stipulation to this effect.

Article 11

Opening + acceptance of Tenders

1. Tenderers or their delegated representatives are entitled to attend when Tenders are being opened and to hear the prices read out of the various Tenders when opened.

2. The organisation is not bound to accept the lowest Tender or any other Tender and may cancel the adjudication partially or entirely without being liable to give any reasons whatsoever.

3. No Tenderer may consider himself successful unless and until he receives a written notice to this effect from the organisation.

ANNEX I.

FORM OF TENDER - CONTRACT

For a complete Ammonia Urea Fertilizer Complex at Talkha in the Nile Delta.

Adjudication of the day of 19...

I/we the undersigned of nationality residing or being established at and making declaration of residence in at (Street) No. (Town) at which latter address all notices and other communications relating to the Tender may be served validly on me/us: after having carefully perused and examined the conditions and specifications for the above mentioned contract as hereto annexed (comprising the general conditions of Tender, the general conditions of contract the specifications and the data schedule and the various documents drawings and plans attached or referred to) and having made myself/ourselves fully acquainted with the details of same hereby declare that thoroughly understanding the work to be done and basing my/our tender on these particulars I/we hereby offer and undertake to execute and carry out at my/our own risks and strictly in conformity with the said conditions and specifications (except where I/we have definitely and specifically stated otherwise in my/our Tender) and the drawings plans calculations and designs submitted by me/us with the Tender and approved by the organisation and within the period stated hereunder the work therein comprised, and I/we hereby agree to accept as my/our remuneration for such work (including therein all such incidental matters as may under the above mentioned documents be required to be done by me/us and for which no payments expressly and specifically provided in any of the said conditions) the total sum of:

Egyptian Pounds (£) the details of which are shown in the schedule of prices hereto annexed the total sum arrived at by adding together the several detailed prices for these items or supplies in respect of which my/our offer may be

accepted and I/we hereby agree to complete and hand over the said work to the organisation in manner and under the conditions provided in the said conditions and specifications within a period of days from the date of the receipt by me/us of the written order to commence work.

I/we hereby undertake to make the guarantee deposits within ten days of the receipt by me/us of the official notification of the acceptance of my/our Tender.

I/we hereby give the guarantees and undertake the indemnities expressed or implied in or by said conditions and specifications.

SIGNATURE

ANNEX II.

PRICE REVISION

Should any change occur in the cost of the relevant materials and/or wages during the period of execution of the contract the agreed prices shall be subject to revision on the basis of the following formula:

$$Pl = \frac{Po}{100} \left(a + b \frac{Ml}{M0} + c \frac{Sl}{S0} \right)$$

where:

Pl = final price for invoicing

P0 = initial price of goods as stipulated in the contract and as prevailing at the date of (1)

Ml = mean (2) of the prices (or price indices) for (type of materials concerned)..... ....
over the period ..... (3)

M0 = prices (or price indices) for the same materials as the date stipulated above for Po.

Sl = mean (2) of the wages (including social charges) or relevant indices (4) in respect of.....
(specify categories of labour and social charges) over the period ..... (3)

S0 = wages (including social charges) or relevant indices (4) in respect of the same categories at the date stipulated above for Po.

a, b, c represent the contractually agreed percentage of the individual elements of the initial price, which add up to 100.

(a + b + c = 100)

a = fixed proportion = ...

b = percentage proportion of materials = ...

c = percentage proportion of wages (including social charges) = ...

Where necessary b (and if need be c) can be broken down into as many partial percentages (b1 b2 b3 . . . . . as there are variables taken into account (b1 + b2 . . . . . + bn = b).

DOCUMENTATION

For the purpose of determining the values of materials and wages the parties agree to use the following documents as sources of reference:

1. Materials: Prices . . . . . (type of materials) (or price indices)
Published by:
Under the headings

2. Wages: Wages (including related social charges) (or relevant indices)
Published by:
Under the headings (5)

Rules for applying the clause:

In the case of partial deliveries which are invoiced separately the final price shall be calculated separately for each such delivery.

Period of application of the clause:

The revision clause shall cover the delivery period fixed in the contract together with any extension thereof granted under clause 20.2 but shall in no case apply after the date on which the work is completed.

Tolerances

Prices shall not be revised unless the application of the formula produces a plus or minus variation of..... (6)

Saving Clause

If the parties wish the revision formula to be adjusted or replaced by more accurate method of calculation when the plus or minus variation exceeds a certain percentage they shall expressly so agree.

---

1) It is recommended that the parties should as far as possible adopt as the initial price the price prevailing at the date of the contract and not at an earlier date. This is normally the contract price less cost of packing, transport and insurance.

2) Arithmetical or weighted

3) Specify the datum period which may be defined as part or the whole of the delivery period

4) If legal social charges are covered by the index they need not be taken into account again.

5) Indices relating specifically to the engineering and electrical industries should be used as far as possible.

6) State the percentage plus or minus variation which must be exceeded before the formula is applied

[illegible]

To be completed by parties to the contract

A)	Maximum amount recoverable on termination by contractor for failure to take [illegible] make payment	Open for agreement by parties
B)	Rate of interest on overdue payments	Open for agreement by parties
C)	Period of delay in payment authorising termination by contractor	Two [illegible] months [illegible] date of payment falling due
D)	Percentage to be deducted for each week's delay	Open for agreement by parties
E)	Maximum percentage which the deductions above may not exceed	Open for agreement by parties
F)	Maximum postponement of taking over tests by contractor	Open for agreement by parties
G)	Maximum postponement of taking over tests by contractor	6 (six) months
H)	Guarantee period for original works and parts replaced or renewed	1[illegible] months from putting into operation
I)	Maximum indemnities for personal injury or damage	Open for agreement by parties

ANNEX II.

FORM OF LETTER OF GUARANTEE FOR THE
PROVISIONAL GUARANTEE DEPOSIT

To The General Organisation for Industrialisation
6 Khalil Aghe Street
Garden City Cairo U A .

Dear Sirs

With reference to the Tender of Messrs:

in connection with the adjudication of Ammonia/Urea Fertiliser Complex at Talkha U A.

We hereby undertake to hold at your disposal as provisional Guarantee Deposit free of interest and payable in cash on your first demand and notwithstanding any contestation by the tenderer or any third party the sum of:

Consequently any claim in respect thereof should be made to us by the at the latest.

This Letter of Guarantee is valid until the Tender is finally decided upon and in the event of all or part of the tender being accepted until such time as the Tenderer shall provide such final guarantee deposit as may be required by you but it will in any case expire on the

Should we receive no claim from you by that date our liability will cease ipso facto and the present letter of guarantee will definitely become null and void.

Please return to us this Letter of Guarantee on expiry date for cancellation

Part II

General Conditions

Article 1

Enforcement of Contract

The contract shall be subject to the approval of the competent authorities in U.A.M. Organisation shall notify contractor of such approval by cable and confirmed by a registered letter within a time to be agreed upon. The contract shall come into force from the date of such notification.

Article 2

Delivery of Plant

The plant shall be delivered FOB according to the International rules for the interpretation of trade terms (Incoterms) of the International Chamber of Commerce in force at the date of the formation of contract. It shall be brand new of modern type incorporating the latest design features taking into account local conditions.

Article 3

Packing, Marking and Shipping

1. The deliveries to be supplied under the contract shall be suitable and seaworthy packed and protected to prevent damage thereto of deterioration thereof during transport. The marking of packages shall be as follows:

Port of shipping	.....
Port of destination	.....
Consignor	.....
Consignee	.....
Name of plant	.....
Contract no.	.....
Gross weight	.....
Net weight	.....
Package no.	.....

The contractor may add such other numbers, words, references, etc. as he may require. Each package shall contain a copy of its packing list enumerating the parts contained therein.

2. Shipment of deliveries shall be effected through the competent organization for maritime transport in the U.A.R., or with its consent. The organisation shall, immediately after signing the contract, notify the contractor with the name of the said organisation and the contractor shall immediately contact them in order to arrange for shipping.

Shipment of deliveries shall not be made in ships touching Israeli ports.

The contractor shall, however, give the organisation 45 (fortyfive) days prior notice of his readiness to ship each partial consignment. Such notice shall include all required details.

In case the organisation, due to its fault, fails to provide shipping space or give its consent to the contractor to carry out shipping within 50 (fifty) days from the contractor's or any other warehouse in the port of shipping. In such a case, the contractor shall insure the period of storage. The warehouse receipt and insurance policy shall replace the bill of lading for the said consignment. The cost of storage and insurance shall be at the organisation's expense.

Article 4

Terms of Payment

The tenderer shall give details of the best terms of payment he is able to offer.

Article 5

Taxes, Duties and Bank Charges

All taxes, duties and bank charges which may be incurred in the territory of the U.A.R. on payments due to the contractor or to his personnel as well as custom duties on the deliveries

to be supplied under the contract shall be paid and borne by the organisation. Those incurred outside the territory of the U.A.R. shall be paid and borne by the contractor.

Article 6

Final Guarantee Deposit

1. The contractor shall submit to the organisation, within 10 (ten) days from the date of the organisation's notice to the effect that his tender has been accepted. A bank letter of guarantee in the same currency of the tender equal to ten per cent (10%) of the total contract price as a final guarantee deposit.

This letter of guarantee will be held by the organization on the conditions and subject to the stipulations herein contained, as a pecuniary guarantee for the due execution and proper performance of the contract and the recovery pro tanto of any penalties or damages or other sums for which the contractor may become liable to the organisation under the contract. It shall be valid until the fulfilment by the contractor of all his obligations and guarantees under the contract.

The organisation may, at any time, on giving prior notice to the contractor, deduct from the amount of this letter of guarantee any sums for which the contractor may become liable to the organisation under the contract and which are not promptly paid by him. The organisation shall be entitled on its first demand to the immediate payment by the bank up to the full amount of the letter of guarantee notwithstanding any contestation by the contractor or any third party. The form of this letter of guarantee is attached as Annex II to this part II.

2. The organisation, however, shall pay back to the contractor the deducted amount in the same currency as it has been deducted, if the contractor refers the matters to arbitration and the arbitration committee has decided that the claim on which the deduction was based is unjustified and that the deducted amount has to be refunded to the contractor.

3. The above mentioned letter of guarantee shall not in any way be construed as a limitation of the contractor's responsibility for his obligations and guarantees under the contract, and shall not in any way prevent the organisation from claiming indemnification for damages suffered which exceeds the value of the said letter of guarantee.

Article 7
Patent Rights

Contractor shall indemnify, protect, and save harmless the organisation from and against all claims, damages, expenses or other proceedings, growing out of or resulting from the infringement of any patent, trade-mark, copyright, or other similar industrial property right or on account of any uncopyrighted composition, secret process or unpatented invention, article, or appliance manufactures or used by the contractor in the performance of this contract or subject to use by organisation.

Organisation shall notify contractor immediately when claim is made and then contractor shall be at liberty, if he so desires, with the assistance of organisation, if required, but at contractor's expense, to conduct all negotiations for the settlement of the same or any litigation that may arise therefrom and provided that no such machine, equipment and tooling shall be used for the purpose or in any manner other than that for which they have been supplied by contractor and specified under the contract.

Article 8
Arbitration

1. Any dispute or difference arising out of or in connexion with the contract, and which could not be settled amicably between the parties, shall be finally settled under the rules of conciliation and arbitration of the International Chamber of Commerce in Paris by an arbitration committee of three arbitrators

appointed in accordance with the said rules.

2. The arbitration committee shall meet at any place to be agreed upon by the parties; failing such an agreement the meetings shall be held in Paris.

3. In case the parties do not determine by mutual agreement the law to be applied to the substance of dispute or difference, then the arbitration committee shall apply the law with which the contract has the most real connection as shown by the objective facts of the case. In both cases, the arbitration committee shall take into consideration the terms of the contract and the trade usages.

4. The arbitral award shall be final and subject to no appeal and shall deal with the question of the costs of arbitration and shall direct who is to pay costs and all matters relating thereto or in what manner the costs are to be divided between the parties.

Article 9

Languages, Metric System

English shall be the language to be used in all correspondence as well as flow sheets, catalogues, labels on equipment, instructions, pamphlets, drawings and any other data or document to be given.

The metric system is to be used for all weights and measures in connection with the execution of the contract. (See 1.2.2 Part III).

Article 10

Transfer of Contract

Organisation may transfer all its rights and obligations derived from the contract to any firm or company entrusted for the execution of the contract in U.A.R., provided that the organization shall remain jointly responsible with that firm or company for the fulfilment of all financial obligations related to payments due according to the contract.

Article 11

Guarantees of Deliveries

1. The contractor guarantees and warrants that the deliveries shall be in strict conformity with the contract and of first class workmanship, and that under normal operating conditions as site according to the contractor's written instructions, they shall show no defects due to faulty design, materials and/or workmanship for a period of twelve (12) months from the date of commissioning of the plant.

The contractor also guarantees that the deliveries shall be brand new incorporating the latest design features and that no second hand or repaired parts shall be delivered.

2. The contractor is obliged to repair and replace the deliveries or any part thereof which may show any defects during the guarantee period for reasons within his responsibility.

On the organization's written notification, the contractor shall carry out the required repairs and replacements, at his expense, in the shortest possible time to be fixed in the organisation's notification. In default, the organisation shall carry out the required repairs and/or replacements at the contractor's expense and risk.

3. The guarantee period for both the repaired parts and the corresponding section/s of the plant which are out of operation, as a result of repair or replacement shall be extended by a period equal to the period during which they have been out of operation.

The replaced or renewed parts shall have a new guarantee period of 12 (twelve) months from the date of their commissioning after being replaced or renewed at site.

4. The guarantee stipulated under this Article does not cover normal wear and tear as well as improper handling, storage and/or operation carried out by the organisation contrary to the contractor's written instructions.

5. The replaced parts hall be returned to the contractor on his request and expense, provided that the contractor shall so request not later than 2 (two) months from the date of replacement.

6. After the expiration of the guarantee period/s as specified under this Article and fulfilment by the contractor of his obligations related thereto, the organisation shall issue to the contractor a final taking-over certificate to that effect.

Article 12

Limitation of Damages

1. Where either party is liable in damages to the other these shall not exceed the damage which the party in default could reasonably have foreseen at the time of the formation of the contract.

2. The party who sets up a breach of the contract shall be under a duty to take all necessary measures to mitigate the loss which has occurred provided that he can do so without unreasonable inconvenience or cost. Should he

fail to do so, the party guilty of the breach may claim a reduction in the damages.

Article 13

Publicity

The contractor shall treat all matters in connection with the contract as strictly confidential and shall not publish or cause to be published any information on technical or any other aspects of the plant without the prior written approval of the organisation.

Article 14

Cancellation

1. The contractor shall be responsible in all respects for the fulfilment of his contractual obligations.

2. Without prejudice to Articles 8 and 15 concerning arbitration and force majeure and to any other remedy available, the organisation shall be entitled to cancel this contract in whole or in part in case the contractor commits a serious breach there of which is not remedied within 30 (thirty) days of receipt of a written notice from the organisation specifying the breach or fails to fulfil any of his essential obligations within a maximum period of 6 (six) months from its due date.

3. The above mentioned cancellation under para above shall take place by a registered letter to be sent to the contractor's address without further formalities or any other proceedings.

Article 15

Force Majeure

1. Force majeure are contingencies caused by neither of the parties and which are unforeseeable at the time of concluding the contract, uncontrollable and which render the further performance of the contractual obligations impossible as for instance, acts of God, acts of war, acts of governments, blockades and revolutions.

2. Neither party shall be deemed to be in default of its contractual obligations whilst performance thereof is prevented by Force Majeure and the time limits laid down in the contract for the performance of such obligations shall accordingly be extended by a period equal to that during which the Force Majeure contingencies operated.

3. Upon the occurrence of any such contingencies the party suffering therefrom shall immediately give the other party notice in writing of the cause of delay. Such notice shall be confirmed by an official evidence.

4. In case the force majeure contingencies last continuously for at least six (6) months both parties shall agree on the necessary arrangements for the implementation or termination of the contract as the case may be, taking into consideration their mutual interests.

5. No indemnity shall be claimed by either party in case of force majeure.

Part II

Annex I

"General conditions for the supply and erection of plant and machinery for import and export, No 574 of UN Economic Commission for Europe Geneva, March 1957.

Articles 23 and 26 deleted.

Annex II

Letter of guarantee for the due execution and proper performance of contract

To: .....

Dear Sirs,

With reference to the contract concluded on between: The General Organization for Industrialisation, 6, Khalil Agha Street, Garden City, Cairo, U.A.R. and Messrs.

hereinafter referred to as "The Contractor", for a complete ammonia/urea fertiliser factory, for the total contract price of:

We hereby irrevocably and unconditionally guarantee the Contractor upto the sum of 10% of the total Contract price, i.e. for the due execution and proper performance of the Contract, and

We undertake to pay to you on your first demand in writing to us any amount you may claim up to and not exceeding this sum, notwithstanding any contestation of the Contractor or any other party.

This letter of guarantee shall be valid until the fulfilment of the Contractor's obligations and guarantees under the Contract, i.e. until:

In case the Contractor's guarantees are extended according to the Contract, the validity period shall automatically be extended accordingly for the amount of 10% of the price of deliveries for which the Contractor's guarantees have been extended.

Should we receive no claim from you upto the date of expiry

of this letter of guarantee our liability will become null and void.

Please return to us this letter of guarantee as soon as its validity expires.

B A N K

Annex III

For Rendering Technical Services

Clause I

1. The Contractor shall render technical services for supervision of erection, conducting start-up, and taking over tests of the plant. For this purpose the Contractor shall depute to the plant site in the U.A.R. his specialists in number, categories, qualifications, and periods of service to be mutually agreed upon and included in the Contract.

2. The Contractor shall be responsible for the correctness of the information, instructions and directions given by his specialists and for the correctness of the work carried out under their supervision.

3. The Contractor's specialists shall be highly qualified and experienced in their jobs. They shall carry out the required services in accordance with the best international standards, taking into consideration the local conditions at the plant site.

4. For the purpose of carrying out efficiently their jobs, the Contractor's specialists shall be acquainted with either the English or French language to the extent enabling smooth cooperation with the U.A.R. personnel at the plant site.

During their activity in the U.A.R. the Contractor's specialists, each in his respective speciality, shall transmit their skill and knowledge to the U.A.R. personnel at the plant site.

5. Three months before starting the services of the Contractor's specialists in the U.A.R., the Contractor shall provide the Organization with the names, personal data and qualifications of the recommended specialists for approval.

Annex II — Remuneration and Expenses

1. For the services of the Contractor's specialists, the organization shall pay to the Contractor remuneration at the following rates and allowances:

	Rate	Allowance	
for graduated engineer	per day	L.E.	per day
for technician	per day	L.E.	per day

The remuneration shall be paid starting from the date of departure of the specialist from the international airport in his home country until the date of his leaving the U.A.R. upon termination of his services, with the understanding that stop-over is not permitted during the air trip.

2. The normal working time at the plant site is 42 (forty two) hours per week, in case overtime work is required, only the technicians shall be entitled to overtime charges at the following rates:

For overtime work carried out on working days:

a) between 8 - 22 H 125 % of the hourly rate

b) between 22 - 8 H 150 % of the hourly rate.

For overtime work carried out on holidays:

a) between 8 - 22 H 150 % of the hourly rate

b) between 22 - 8 H 200 % of the hourly rate.

Working days are six days per week.

3. The organisation shall provide, at its expense tourist class air tickets for the Contractor's specialists from the international airport to Cairo and back. In case of necessity vouchers covering excess personal baggage within the maximum of 20 (twenty) kgs for the specialist, as well as tools and devices necessary for carrying out the specialist's job shall be provided by the organisation at its expense.

4. In case of illness of any of the Contractor's specialists during his service in the U.A.R., the specialist shall be financially treated in accordance with the conditions to be mutually agreed upon and included in the Contract.

5. In case the period of service of any specialist is extended for reasons pertaining to the Contractor's responsibility, the Contractor shall bear the specialist's remuneration and expenses for the period of extension.

Clause III — Facilities Provided by the Organisation

The organisation shall provide the Contractor's specialists with the following facilities in the U.A.R.:

a) Working facilities at the plant site;

b) Transport facilities for official business;

c) Appropriate furnished lodging;

d) Medical attendance, including hospitalisation if necessary in accordance with the laws and regulations prevailing in the U.A.R.

PART III.

1 1 General

It is the intention of the United Arab Republic to build an Ammonia Urea Fertilizer Factory at Talkha in the Nile Delta. Qualified engineering contractors are being invited to submit Tenders for the entire factory or parts thereof. Bids from Tenderers who have not the necessary experience will not be considered.

As it is intended at a later date to instal a unit for the production of methanol (about 15,000 tons/annum) and a unit for the production of melamine (about 5000 tons/annum) the Tenderer must allow for these units in preparing his plot plans and in sizing the main H T transformers and switchgear water treatment units cooling towers cooling water line etc. Blank flanges should be installed at appropriate points to allow for tie ins to utility and raw material lines. The units will be independent of but adjacent to the ammonia and urea plants respectively.

The organization would like to have an indication of the prices of these two units and Tenderers are invited to submit preliminary proposals for the supply of these units. Prices should be completely separate and unlinked to the prices for the Ammonia Urea Factory.

1 1 1 Capacity of the Factory

a) The ammonia plant will produce 800 metric tons per day of liquid anhydrous ammonia which will all be converted to Urea. Of this urea 10,000 tons/year will be technical grade crystals and the remainder will be uncoated prilled agricultural grade urea.

b) As an alternature the Tenderer will indicate the increase in price if the ammonia plant capacity is increased to 1000 metric tons/day all converted to urea.

c)

c) The normal on stream time of the factory will be 8000 hours/annum.

1.2.1 Information and Documents to be provided by Tenderer

Tenderer will supply as part of his bid:

a) A complete description of all processes selected with reasons for any deviations from the present specification.

b) A detailed equipment list with a list of all installed and non-installed spare equipment.

c) Process flow sheets of all units indicating temperatures and pressures and also a material balance showing compositions and quantities at various points in the circuit.

d) Utility flow sheets giving quantities, temperatures and pressures and an overall block utility balance of the factory.

e) Piping and instrument diagrams of process and utility units. If these are not given, a detailed instrument schedule must be provided. In particular, all safety circuits must be illustrated.

f) An overall plot plan of the site and individual arrangement drawings for the different units.

g) One line diagram giving the electricity supply and distribution system of the factory.

h) Data sheets giving such information as: Materials of construction; design and operating temperatures and pressures; capacity of equipment; principal dimensions; corrosion allowance; operating speed; heat transfer rates and surface areas; power consumption; efficiency; space velocity; etc.

i) A planning schedule - either a bar line or critical path network - for the execution of the contract. Any assumption made in drawing up this document should be clearly indicated.

j) The Tenderers terms on the training of local personnel

both in the UAR and abroad for the erection, operation and maintenance of the plant. The Tenderers estimates of man power requirements for the various units.

k) The tenderers ideas on the training of UAR personnel for local and export marketing of the excess products of the plant.

l) Tenderer's piping, instrumentation, electrical and other standards.

m) Tenderer should give a reference list of all similar plants he has built recently. Unqualified Tenderers will not be considered.

1.2.2 Scope of work to be carried out by Contractor

The scope of work includes:

1. Provision or obtention of the required licences, know-how, etc. for the design, erection and operation of the plants.
2. Detailed design and engineering of the factory. The scope of supply is outlined in the present specifications.
3. Procurement - including purchasing, inspection, expediting and testing - of all machinery and equipment required for the complete factory. The units to be delivered are outlined in the specification.

   Delivery is to be understood as FOB port of shipment as per "Incoterms" 1953.

   Shipping and insurance of the equipment is the responsibility of the oarganisation.
4. Preparation of detailed civil engineering plans for all foundation, civil engineering and building works. The execution of these works will be the responsibility of the organization under the supervision of the Contractor (see under 1.5).

   The organisation will furnish maps, surveys, soil test and metereologial data, water analysis all year round, and the building standards and codes as far as required for plant design.

5. Planning and supervision of erection of the complete plant.

The work to be done by the Contractor for the supervision of erection includes the following:

a) Schedule of construction and equipment supply.

b) Checking of all work done by sub-contractors to assure conformity to drawing and specifications.

c) Checking of materials, quantities and labour used by sub-contractors.

d) Preparation of progress reports.

e) Maintenance of co-ordination and progress of construction.

f) Expediting.

g) Approval of payment by the organization to sub-contractors.

6. Starting up and conducting test runs to ensure the fulfilment of operation guarantees for the complete plant.

7. Training of local personnel both in the U.A.R. and abroad in all phases of erection, commissioning, operation and maintenance of the complete plants. The Contractor will supply all operating and maintenace manuals catalogues, brochures, etc. required for the plant. Contractor will also supply details of chemical analysis procedures for the entire factory.

The Contractor will establish plant maintenance procedure and shall instruct the maintenance personnel as to correct maintenance practice.

The Contractor will establish a lubrication programme and procedures for the proper lubrication of all machinery and will recommend the types and qualities of oils, greases and other lubricants to be stocked at the plant. All lubricatns will be furnished by the organization.

8. The making available to the organization of all developments and improvements to the process for 10 (ten) years from the signature of the contract.

9. Training of UAR nationals in the local and export marketing of products of the plant.
10. Technical assistance in the operation of the plant for a period of two years following the successful termination of the test-run.

N O T E

The following units of measurments are to be used:

Length:	Km (kilometre), m. (metre), cm. (centimetre)
Area:	Ha (hectare), m^2 (sq.metre), cm^2 (sq. centimetre)
Volume:	m^3 (cubic metre), l (litre)
Weight:	Ton (1,000 kg), kg (kilogram), gm. (gram)
Pressure:	Bars, millibars
Composition:	Wt.%, vol.%, PPM (parts per million)
Quantity:	Either weight, volume or kg. mols.
Electrical:	V. (Volts), A. (amps), W (Watts), kW (Kilowatt) MW (Megawatt), kWH (kilowatt hour).
Heat:	K.Cal. (Kilo Calories).

1.3.1 Site

The plant will be installed at Talkha in the middle of the Nile Delta. The proposed site is immediately adjacent to a calcium ammonia nitrate plant which is at present being constructed and is also adjacent to the electric power distribution station of Talkha. Railways and road communication with the site is good and a railway siding is being built for the CAN plant. The site is close to the Nile, from which raw water will be taken. A plan showing the site is in Appendix _____ of this document.

Natural gas from Abou Madi will be delivered at the battery limits of the plant.

1.3.2 Utilities

1.3.2.1 Water

Fresh water is available from the Nile. This water,

after suitable treatment, will be used for all purposes in the plant. An approximate analysis of the raw Nile water is given in Appendix II .

1.3.2.2 Cooling water

It is proposed to use a closed circuit cooling water system and cooling towers, pumps, etc. are to be included in the scope of supply. Data for calculation of the cooling tower is given in Appendix I .

1.3.2.3 Steam

All the steam requirements for the factory are expected to be met from waste heat recovery. If a separate boiler is required to facilitate start up, this should be included in the scope of supply. All necessary steam distribution, piping, valves, measuring instruments, etc. will be supplied by the Contractor. All condensate, excluding that from steam traps is to be recovered.

1.3.2.4 Electricity

Electricity is available from the grid through the Talkha power distribution station. The supply is at 66 kV, 3 phase, and with a power factor of 0.9.

A step down transformer station 66/[illegible] kV is to be quoted separately.

1.3.2.5 Fuel oil

Fuel oil is available if required and will have the following specifications:

Specific gravity at 15°C	0.960 - 0.970
Viscosity Redwood I at 37.8°C	10500 - 20000
Flash pt. Pensky Martens closed cup	65°C
Pour pt. max.	32°C
Carbon residue conradson	10 % (wt.)
Ash content max.	0.3 % (wt.)
Water content max.	1.0 % (vol.)
Sulphur content max.	3.3 % (wt.)
Sediment max.	0.25 % (wt.)
Vanadium	[illegible] ppm
Gross calorific value min.	10,000 kcal/kg.

1.4 **Raw material**

The raw material for the factory will be natural gas from Abou Madi. This will be supplied at battery limits at a pressure of 40 kg/cm^2 eff. The Contractor will supply all necessary pressure control equipment and a Flow Recorder Totaliser on the natural gas supply as well as all distribution piping within the factory.

The gas contains no H_2S and only traces of sulphur. Its preliminary analysis is as follows:

Compound	Vol. %
Methane	91.67
Ethane	4.85
Propane	1.36
Iso-butane	0.28
Normal butane	0.28
Iso pentane	0.07
N pentane	0.04
Hexane'	0.05
Heptane	0.02
Nitrogen	0.40
CO_2	0.98

1.5 **Building and civil engineering works**

All buildings, foundations and civil engineering works will be carried out by and at the cost of the Organisation but in accordance with the designs and under the supervision of the contractor.

The Contractor will furnish detailed drawings and specifications for all buildings and civil works to the Organisation who will call for bids for this work from qualified local Contractors. The Contractor will assist the Organisation in the analysis of these bids and in the preparation of a contract with the building and civil works Contractor (hereinafter referred to as the Sub-Contractor).

In the terms of this Contract between the organisation and the Sub-Contractor, it will be specified that

the Sub-Contractor is entirely responsible to and under the director of the Contractor for any and all the works performed by the Sub-Contractor.

The Contractor should quote a separate price for the Civil engineering design and supervision of execution. The organisation may choose to perform, itself, the design and supervision of building and civil engineering works. In this case, the fees for design and supervision of building and civil engineering works will be deleted. However, in that case, the Contractor will approve the building and civil engineering design and drawings prepared by the organisation.

1.6 Machinery and equipment

The scope of delivery will include all machinery, equipment, piping, instruments, catalysts, etc. required for the plant. The plant shall be of the most uptodate design allowing for economic and safe operation. Standby equipment will be installed wherever the Contractor considers this desirable and automatic safety cutouts will be incorporated to avoid accidental damage to equipment or personnel.

Local climatic conditions should be taken into account in the choice of electrical and other equipment, where applicable protection against corrosive atmospheres must be provided. Where copper instrument air lines are used in ammonia atmosphere for instance, these must be suitably protected.

1.7 Ammonia plant

1.7.1 Gas compression plant

1.7.1.1 Sulphur removal

Although the natural gas contains only traces of sulphur, it is expected that a guard sulphur removal system will be supplied. This may be either of the active carbon or oxide type but in view of the presence of higher hydro-

carbons either an aluminium oxide or iron oxide system is preferred. This should be large enough to allow at least one year's operation between replacement of oxide. Provision must be made for controlled oxidation of the oxide mass before opening the reactor to the atmosphere.

1.7.1.2 Gas reforming

The steam reforming of the natural gas should be carried out at the highest (economic) pressure possible. An adequate steam to carbon ratio should be maintained to allow the lowest possible outlet temperature from the heater. The space velocity through the catalyst and the radiant heat transfer rate should be conservatively calculated. These values, as well as such data as conversion bank heat transfer areas, materials, transfer rates; number, lenght, manner of supporting, layout, material, thickness of catalyst tubes; and all pertinent details, should be given by the tenderer.

The reforming furnace is to be designed for maximum recovery of waste heat. The boiler drums should be sized sufficiently large to allow easy and safe operation of the unit. At least, one of the boiler feed water pumps and boiler circulating pumps should be steam turbine driven with an automatic cut in the case of a power failure. Spare pumps must be provided for these services and the electrically driven pump should be, if possible, on the emergency electricity supply.

There is a preference for reforming heaters with two flue gas extraction fans. At least one of these and possibly both should be electrically driven at start-up but when sufficient steam is available should be steam turbine driven. There is also a preference for countercurrent flow of process and flue gases. However, downfired furnaces will not necessarily be excluded. Hot risers within the furnace are not favoured unless it can be shown that these will never overheat and fail at very low flow rates or in the case of gas or steam failure.

The reforming heater must be fitted with a very comprehensive safety system including alarms, automatic shutdowns, etc.

Method of catalyst removal and addition should be stated.

The tenderer should state whether the fuel oil specified under 1.3.2.5 could be used in the reforming heater. Purge gases from the ammonia synthesis loop will be burned in the reforming heater.

1.7.1.3 Transfer line

This line will either be of a suitable alloy or internally refractory lined. In the latter case, it must be ensured that the lining is so applied that hotspots do not develop. The lining will be of a low silica type. Adequate provision must be made for expansion of the line and suitable supports must be installed to avoid undue stresses.

1.7.1.4 Secondary reformer (Post combustion reactor)

Gas and air inlets must be so arranged as to avoid scouring of the lining but ensuring good mixing.

The lining of the reactor should be monolithic and be of the low silica type. It should be lined in such a way that no hotspots develop. Catalyst removal and addition should be easy operations.

The system for temperature control and the safety system should be extremely comprehensive.

1.7.1.5 CO conversion

The carbon monoxide should be converted to carbon dioxide by the shift reaction. This will be carried out in two stages using high and low temperature shift catalyst preferrably without intermediate carbon dioxide removal. All necessary precautions should be taken to avoid poisoning or degradation of the low temperature shift catalyst. Adequate provisions will be made for reduction

and start-up of this catalyst in accordance with recommendations of the manufacturer.

1.7.1.6 <u>Carbon dioxide removal</u>

The carbon dioxide will be removed by washing of the gas with a solvent. This may be mono ethanolamine, hot potassium carbonate, sulfinol or some other product of the Contractor's choice. If arsenic containing solution is used, adequate precautions must be taken to avoid pollution of ground water supplies.

In general, the materials of construction of this unit should be appropriate for the corrosion and erosion conditions existing, solution loadings in terms of CO_2 should not be excessive; reclaimers and/or filtration systems should be provided to keep the solution pure; heat exchange surfaces and towers should be conservatively dimensioned.

If the Contractor considers it economic, a power recovery system should be installed to recover power from the "rich" solution from the absorption tower.

Low grade waste heat in the gases from the second stage shift converter should be used for the regeneration of the wash solution.

The recovered carbon dioxide must be pure enough for use in the urea plant and should be available, if possible, cold and at a pressure above atmospheric pressure. This CO_2 will be mixed with CO_2 from the existing adjacent ammonia plant and compressed in the urea plant. No CO_2 storage be required. Provision must be made for venting some or all of the CO_2 to atmosphere through a vent stack when necessary.

1.7.1.7 <u>Carbon monoxide removal</u>

Methanation is the preferred method of removal of the residual CO and CO_2 in the gases after carbon dioxide removal. The methanated gases should be suitable, after compression, for ammonia synthesis.

[illegible] **[illegible]**

a) **Air**

The air for the plant [illegible] compressed in a single centrifugal machine [illegible] driven by either an electric motor or [illegible] steam turbine. [illegible] gas turbine is used [illegible] next from [illegible] the [illegible] boiler [illegible] the exhaust gases from [illegible] combustion air [illegible] A steam turbine [illegible] compressor [illegible] desired.

The compressor [illegible] efficient suction air [illegible] Provision should be made for putting [illegible] compressed air to atmosphere [illegible] Adequate silencing facilities should be provided [illegible] purpose.

During normal operation of the plant, instrument and service air will be provided from the discharge of the compressor and the capacity of the compressor should be calculated accordingly. A standby air compressor will provide compressed air when the main compressor is not running.

The system of capacity control of the compressor should be described in detail.

b) **Synthesis gas**

The synthesis gas from the methanation section will be compressed to the pressure required for ammonia synthesis in a single centrifugal compressor. This machine will be driven by a steam turbine. Only compressors which have been successfully used before for this service will be permitted. The recycle gas from the synthesis loop may be compressed in a separate casing of this machine or in a separate machine. Similarly, the refrigeration ammonia required in the synthesis plant may be compressed in a separate casing of this

machine although it is preferrable for a separate centrifugal machine to be provided.

The synthesis gas compressor will be provided with all necessary safety devices, anti-surge devices, capacity control system, etc. An emergency, steam driven, auxiliary oil pump must be provided as a spare to the normally operating pump.

All details of the compressor and driver shall be provided. The tenderer should state whether he intends to use a combined syn-gas/recycle gas or Syn-gas/recycle gas/refrigerant or other arrangement of compressors. Details must be given of all compressors and drivers. Reference of previous installations using the compressor types must be given.

1.7.1.9 Steam system

The steam generated (and superheated) in the waste heat boiler of the primary reformer and secondary reformer should be between 40 and 70 Bar (kg/m^2) although, if Tenderer's standard lies outside of this range, this should be quoted. If possible, the steam produced in the ammonia synthesis plant will be at the same pressure as the high pressure steam from the two waste heat boilers mentioned above.

If a waste heat boiler is installed between the high and low temperature shift stages, this may be for high or medium pressure steam production.

A certain amount of medium pressure and low pressure steam is required in the urea plant. All of this should be supplied by the ammonia plant (synthesis gas preparation and synthesis). The entire steam requirements of the factory must not be from waste heat recovery.

1.7.1.10 Condensate and boiler feed water system

An efficient de-aerator will be provided for the de-aeration of all boiler feed water. There will be at least two boiler feed pumps one operating and one an automatically started spare. The boiler feed pump normally running will be

steam turbine driven and the spare, used for the start-up will be connected to both the normal and emergency electricity supplies. If possible, three pumps will be supplied two running and one spare.

Condensate from the synthesis gas will be used only for quenching of the gas. Separate pumps will be provided for this service and the same comments apply to these as to the boiler feed pumps. As a certain amount of ammonia is produced in the shift reactor, excess condensate must be demineralised before being used for boiler feed. This can be done either in the main water treatment plant or in a separate ion exchange vessel in the ammonia plant.

1.7.2. Ammonia synthesis section

The ammonia synthesis will be carried out in one stream at a pressure to be indicated by the Tenderer.

Preference will be given to a system giving long catalyst life, easy access for maintenance, easy removal and addition of catalyst and safe and easy operation.

The ammonia is to be produced as 100 per cent liquid and will be used for the production of urea. Atmospheric pressure ammonia storage will be used (see under 1.7.3).

Purge gases from the synthesis loop will be used as fuel in the primary reforming heater.

If steam is produced in the waste heat boiler this should, if possible, be at the same pressure as the high pressure steam produced in the synthesis gas section.

Automatic analysers should be provided to indicate the analysis of the make up gas, circulating gas and purge gas. A flow indicator-recorder-totaliser for the ammonia produced should be provided. This should be of the turbine type (Foss Hero or similar) and fitted with an efficient filter and sapphire bearings.

The ammonia produced should be of at least the following standard:

NH_3 wt %	99.5
Moisture	0.5 max
Oil	5 PPM max.

The conditions of temperature and pressure must be taken into account in the design of the storage but should not normally be above 40° or below 15 Bar pressure. Ammonia will go directly to the urea plant or to storage.

4.7.3 Ammonia storage

Storage will be supplied for seven days' production at full capacity. This will, for preference, be atmospheric pressure storage and will not be of the underground type. The storage tank will be accurately calibrated after completion so that the guarantee tests may be carried out by using this tank as a measure of production. Facilities will be provided for removing any oil which accumulates in the bottom of the tank.

At least two refrigeration compressors will be provided to liquefy any ammonia which evaporates. These will preferably be of the non-lubricated (Teflon or carbon piston ring) type.

4.7.4 Control

a) Instrumentation

The ammonia plant (Syn gas and synthesis section) will be supplied with instrumentation similar to that used in modern plants in Europe or the U.K. Attention will be given to safety, ease of operation and reduction in manual manpower requirements. Automatic analysers will be provided to monitor:

Methane in gas after primary reformer

Methane in gas after secondary reformer

CO exit first stage shift

CO exit second stage shift

CO_2 exit CO_2 removal

CH_4, CO, CO_2, O_2, H_2, N_2, Argon exit methanator

H_2, N_2, Argon, CH_4 in gas inlet ammonia synthesis

H_2, N_2, Argon, CH_4 in circulating gas to synthesis loop

H_2, N_2, Argon, CH_4 in purge gas from synthesis loop

Tenderers will indicate which instruments are local and which are panel mounted.

b) **Safety**

Where possible, safety valves will discharge into a vent stack. If the gas contains ammonia, it will in all cases, be discharged directly upwards and at a height above the highest operator platform..

c) **Noise**

All efforts should be made to reduce noise pollution to a minimum. Adequate silencing should be provided whenever applicable.

d) **Control room**

The control room will be fully air conditioned and slightly pressurised. All necessary controls, indicating and recording instruments, analysers, alarms etc. will be panel mounted. A mimic diagram will be used. (See Section 1.34 on Instruments).

1.1.9 **Catalysts**

All necessary catalysts will be supplied. These catalysts will be of the best quality and no catalyst will be accepted that has not already given satisfactory service elsewhere. BASF, CCI, Girdler, ICI, Topsoe or equal will be acceptable.

A spare charge of each catalyst is required and the price for this should be given separately.

1.4 **Urea plant**

1.4.1 **Introduction**

It is intended to convert all the ammonia into urea. The tenderer should quote for a two stream plant with, as an alternative, a one stream plant if the tenderer considers this feasible. Certain facilities such as prill tower, conveyors, [illegible] etc. can be common to both streams. The plant will produce 10,000 tons per annum of technical grade [illegible] [illegible] the remainder will be [illegible] [illegible]

cultural grade urea. Tenderer will indicate the price reduction for a plant producing agricultural grade urea with 0.8 % biuret content.

The specifications of the urea production should be at least:

	Fertiliser grade	Technical grade
Nitrogen content min. wt. %	46.1	46.4
Moisture content wt.%	0.3 max	0.3 max
Biuret wt. %	0.3 max	0.8 max
Free ammonia PPM	100-200 max	20 max
Iron content PPM	1 max	1 max
Ash PPM	10 -20	10-20
Granulometry	90% between 1-3mm	

As the CO_2 available from the ammonia plant will not be sufficient for the requirements of the urea plant it is intended to supplement this with CO_2 from the adjacent existing ammonia plant. This CO_2 comes from a Giammarco-Vetrocoke plant and can be assumed to be available at battery limits at atmospheric pressure. The blower and line required to bring the CO_2 to battery limits will be supplied by the Contractor but their price will be an extra and is not be included in the present offer.

The urea plant is to be of the most modern type of total recycle process such as the Stamicarbon stripping process, the Toyo Koatsu or Montedison stripping process, the D.H. Weatherly Inert gas recycle process or the Chemico process. No other process will be considered.

If feasible, centrifugal compressors for the CO_2 compression are preferred. Intercoolers and water separators should be installed in any event.

The Tenderer should indicate what materials of construction are to be used for the various parts of the plant. If the reactor is in stainless steel, how is this protected against corrosion? Is this system in infringement of any patents? Wherever it is deemed necessary standby equipment should be installed.

The scope of delivery includes a prilling section and conveyor system for the product to the storage. A totalizing weighing device will be incorporated in this conveyor. All conveyors will be fully enclosed and easily accessible for maintenance and inspection.

The tenderer must give a full description of all sections and principal items of equipment of the plant including his reasons for using certain systems.

1.8.2 Storage and bagging

The urea will be dispatched in bags of 50 kg each. It is intended to use the most modern bagging system possible and probably the automatic machine which manufactures its own bags from a continuous plastic "tube" and then fills and seals these bags, would be the most suitable. The Tenderer is to propose a suitable system. Neither PVC or polyethylene is at present manufactured in the U.A.R. but if the above mentioned method is to be used, it would be better for the organisation to import the raw plastic chip and produce the "tubes" locally. A machine to blow and roll the necessary "tubes" should be quoted separately as an extra.

The urea from production will either be stored in bulk or bagged directly. Bulk storage, air conditioned if the tenderer considers this necessary, for two weeks' production is required. Recovery equipment and conveyors to the bagging hoppers will be provided by the Contractor. The whole bagging and storage installation will be equipped by the Contractor.

The bagging installation will bag the entire production in 2 x 8 hour shifts. Bagged urea storage for two days' production will be sufficient. Sufficient conveyors and fork lift trucks for handling bagged urea will be included in the supply. All the urea will be dispatched by road or rail (see plot plan) and facilities must be included to convey the bags to the trucks or wagons.

Separate bagging facilities are required for the technical grade urea.

Tenderer shall give a full description of the storage, and bagging facilities hereto to supply.

1.8.3 General

a) Instrumentation

The entire urea plant will be adequately instrumented to allow for efficient and safe operation. Automatic cut-outs, alarms, etc. will be supplied where necessary. An ammonia inlet totalizer and urea production totalisers - for technical and fertiliser grade urea - are required.

b) Safety — see under ammonia plant

c) Noise — see under ammonia plant

d) Control room — see under ammonia plant

1.9 Laboratories

The scope of the delivery includes all the glassware, equipment and chemicals necessary for a laboratory capable of carrying out complete quality control of raw material and intermediate and final products. A vapour phase chromatograph is to be included in the supply. Tenderer will give a complete list of the equipment and chemicals to be supplied.

1.10 Workshops

It is intended to carry out all routine maintenance of mechanical and electrical equipment and instruments of the factory including balancing of centrifugal machines and turbines and the Tenderer is required to quote for the supply of all the machine and hand tools, equipment, etc. required for these workshops. A list of the scope of supply should be given in the Tender.

Most consumable supplies are available in the U.A.R. except for special electrodes for welding of alloy steels and non ferrous metals.

9.11 **Electrical system**

9.11.1 **Supply**

The factory will be supplied from the Talkha distribution station with power at 66 kV three phase, 50 cycles/sec. Two 100% feeders will be brought to the factory battery limits.

The Tenderer will quote for all electrical equipment of the factory including the H.T. switchgear for the incoming 66 kV (± 2 %) supply.

9.11.2 **Main substation**

The main substation will contain the incoming H.T. switchgear, the transformers for reducing the 66 kV to the medium tension to be used in the large motors in the factory and the circuit breakers for the out-going medium tension cables.

The rupturing capacity of the 66 kV switchgear will be 2,000 MVA and that of the medium tension switchgear 250 MVA.

The medium tension will either be 11 kV or 6 kV (to be decided by the Contractor), 11 kV is, however, preferred.

Two 100% transformers will be supplied for the 66/11 kV (or 66/6 kV) reduction service. Each feeder will be connected through a set of busbars to one transformer and there will be an automatic cross connection between the sets of bars in case of a failure in one feeder or one transformer. The medium tension output cables will be similarly connected to the transformers with automatic cross connection in case of failure of one transformer.

Minimum oil non-withdrawable type switchgear is preferred. The main transformers are to be oil filled outdoor type.

9.11.3 **Distribution substations**

It is preferred that the distribution substations should be fed with medium tension current through a ring main where this is feasible otherwise a single feeder cable per substation will be used. In the substations there will be the distribution switchboard for medium tension motors and the transformer or transformers for reducing the medium tension

to 440/ 2C volts. Transformers will be oil filled indoor type.

All substations will be slightly pressurised by a fan to exclude dust etc. But in hazardous areas all switchgear will be explosion proof.

7.11.4 General

Motors under .5 kW will be 220 V single phase.
Motors from 0.5 - 15 kW will be 440 V three phase.
Motors above 100 kW will be 11 kV (or 6kV) 3 phase.
Lighting and hand tools will be 220 V single phase.
Squirrel cage motors are preferred. These should be tropicalised and calculated for a maximum ambient temperature of 45°C. Switchgear should be tropicalised.

For motors under 15 kW direct on line starting is preferred. Above 15 kW Star Delta starters should be used.

All electrical equipment should conform to British German or American standards. Motors and starters shall be equipped with no-volt release.

Motors shall be of the totally enclosed dustproof fan cooled type and capable of delivering their full power without exceeding the temperature rise allowed by the standard specifications. Explosion or flame proof motors should be installed in hazardous areas.

All distribution boards shall be of the steel or iron clad dustproof type and each board shall include one circuit breaker for connection of the lighting supply. All fuses used throughout the plant shall be of high rupturing capacity, non deteriorating, cartridge type.

All switchgear will be of the minimum oil non-withdrawable type.

Cables will, wherever possible, be laid in easily accessible trenches and protected from accidental damage by concrete slab covers or some alternate means.

Transformers will be fitted with all standard protection devices.

A detailed one line diagram is to be provided by the

Tenderer as well as a detailed specification of equipment and cables supplied.

The Contractor is to ensure that the overall power factor in the factory is not below 0.8. If necessary, condensers should be installed to improve the power factor.

1.11.5 Emergency power supply

A diesel driven emergency generator to supply lighting and essential power requirements will be included in the scope of supply. The diesel will automatically start on failure of main supply. The Tenderer must give a full description of the manner of starting and the power output of this generator. The diesel is to be equipped with a day fuel tank and all necessary electrical and mechanical equipment.

1.12 Water system

1.12.1 Raw water intake

The raw water intake will be from the Nile adjacent to the water intake for the existing factory. All necessary strainers, pumps, valves, piping should be supplied. The Tenderer should state the number of pumps he will supply and the number of spare pumps which will be installed. A full specification of the equipment to be supplied must be given by the Tenderer.

1.12.2 Water treatment plant

The water treatment plant will produce all the necessary potable water, cooling water and boiler feed water by suitable treatment of the raw Nile water.

1.12.2.1 Clarification unit

The raw water will be suitably treated to remove as far as possible any suspended matter by flocculation (or other means) before being filtered. Either gravity or pressure filtration may be used. The installation will be designed for easy efficient operation and for automatic

or semi-automatic backwashing of the filters when this is necessary.

The tenderer will give a full description of the installation together with an estimate of the chemicals required for the clarification. If it is considered economic a recovery system for the flocculant should be proposed and its price given separately.

The filtered water will pass to a clarified water cistern before treatment for use as drinking water, cooling water and boiler feed water.

1.12.2.2 Drinking water

Clarified water should be sterilised by chlorination to render it potable. The treated water will be pumped to a water tower from which it will be distributed to points of use in the factory. The water tower will be of concrete construction.

1.12.2.3 Cooling water

The clarified water will be suitably dosed to adjust its pH if necessary, prevent algae growth and generally render it suitable for cooling water use before being pumped to the cooling tower basin. Chemical consumption should be stated in the Tender.

1.12.3.4 Boiler feed water

A complete demineralisation unit will be supplied to produce boiler feed water of the required quality for the waste heat boiler system of the factory. As the operating pressure of these boilers is high, the water must be treated to remove all cations, anions, silica and dissolved gases.

The Tenderer may propose either a classical ion exchange unit (one stream operating, one being regenerated) or a continuous de-ionisation unit of the ASAHI (or similar) type.

Sulphuric acid and caustic soda for regeneration are available in the U.A.R. Consumptions of chemicals must be stated.

A full description of the unit and specifications of the equipment must be given in the Tender.

The removal of the ammonia from the circulating condensate in the ammonia plant should be taken into account in the design of this unit.

1.13 Cooling water system

The cooling towers will be of concrete with treated wood or plastic internals. The Tenderer may, if he wishes quote for a natural draught tower but induced draught towers are preferred. A full description of the towers should be given. The fan blade pitch should be adjustable for maximum efficiency under different atmospheric conditions.

The cooling water circulating pumps must be adequately sized for the maximum factory load and sufficient standby capacity must be installed. Horizontal type pumps are preferred. Full specifications of these should be given by the Tenderer. The pumps should deliver at a sufficiently high pressure for the water, after passing through the heat exchange system, to return to the top of the cooling towers. The cooling water distribution and return piping should be in the form of a ring main. Isolation valves should be provided at the inlet to and outlet from each unit or section. Pitot tubes or some other similar type of flow meter should be provided for each unit. Thermowells should be provided in the cooling water outlet and inlet of each unit and the outlet from each exchanger so that the flow may be adjusted to the optimum level. The Tenderer must indicate what the maximum and optimum temperature rise across the heat exchange equipment should be.

1.14 Compressed air supply

Normally the compressed air required for instruments and service air purposes will be supplied from the secondary reformer air compressor. For start up and maintenance purposes, when the secondary reformer air compressor is shutdown, a

standby reciprocating, electrically driven, non lubricated air compressor will be supplied.

Air for instruments will be filtered to remove any traces of dust and then dried to a suitable dew point. A heatless dryer is preferred but other regenerable types of dryers are acceptable.

Service air will be taken off after the filter but upstream of the dryer.

The tenderer should give full specifications of the compressed air system.

1.15 <u>Inert gas unit</u>

A complete inert gas unit for purging, start-up catalyst reduction and oxidation services is to be supplied. Full specifications of this should be included in the tender.

1.16 <u>Air conditioning</u>

Only the ammonia and urea control rooms and the balance and chromatograph rooms of the laboratory are to be air conditioned for comfort.

If it is considered necessary, the urea bulk store will also be air conditioned.

All electrical substations will be maintained under a slight positive pressure to prevent entry of dust.

1.17 <u>Auxiliary services</u>

1.17.1 <u>Weigh bridge</u>

A weigh bridge for road trucks will be provided. This will have a capacity of 50 metric tons and will be of the dial indicating type. As an alternative, the extra price for ticket printout type of weigh bridge will be indicated. The weigh bridge should be robust and reliable - Avery or equivalent.

1.17.2 <u>Clock system</u>

A centralised clock system with one master clock and

[illegible] locks in [illegible] room, [illegible] will be provided [illegible] locks will be required.

Three [illegible] will be provided.

1.17 [illegible] system

A telephone switchboard [illegible] telephones [illegible] with 4 four [illegible] lines will be provided. Telephone sets will be provided [illegible] points within the factory [illegible] pump house and [illegible] will be [illegible] proof [illegible] will be provided [illegible] telephone set. The internal telephone system will be automatic [illegible] calls will be routed through the operator.

1.18 Safety system

1.18.1 Safety showers

Drenching and eye washing showers [illegible] will be installed at [illegible] points where [illegible] may be necessary. These shall be automatic operating, [illegible] when a person steps under a drenching shower or up to an eye wash shower, the water will start running. [illegible] number and location of showers proposed.

1.18.2 Alarm system

a) Fire alarm system

A fire alarm system shall be provided which will indicate in the fire house which alarm point has been pressed. Alarm points will be glass covered and provided with a small hammer, attached with a chain, to break the glass in case of need. The fire alarm will sound audibly all over the factory area and in the office and laboratory buildings.

b) General alarm

A general alarm [illegible], operated by the telephone operator will be provided. If, for any reason, this is to be

sounded, the telephone operator is informed and the alarm is operated.

[illegible] **Fire fighting system**

A fire main with hydrants and monitor points wherever required is to be provided. The main will normally be kept under cooling water pump pressure through a small diameter pipe fitted with a non return valve. When a hydrant or monitor is opened causing a drop in the main pressure, the electric fire pump will automatically start, boosting the main pressure to [illegible] hose or [illegible]. The fire pump will be [illegible] stopped after use. In case there is a power failure, a diesel driven standby fire pump will automatically start. Fire water will be taken from the cooling water pump.

The Contractor will provide details of the fire fighting system, including full specifications of the pumps.

In addition, fire extinguishers will be provided at all necessary points including transformer cisterns, control rooms. Where there is a danger of electrical fires, these should be of the dry powder or liquid CO_2 type.

Substations should be fitted with automatic alarms either temperature or smoke operated or both.

Automatic sprinkler systems should be installed in the control rooms, offices, warehouses and laboratories.

[illegible] **Safety equipment**

An adequate number of gas masks both self contained and compressed air types should be provided.

First aid equipment, including a resuscitator should be included in the supply.

1.19 **Sewage and effluent disposal**

All sanitary sewage is to be treated before discharge to the River. The chemical effluents will be neutralised before being discharged. If an arsenic containing solution is used for CO_2 removal on no account is any arsenic to be discharged to the river in any form whatsoever.

The effluent discharged to the river down stream of the intake for the existing and new factories will be at least of the following quality:

BOD	[illegible] PPM max
Suspended solids	40 PPM max
Heavy metals other than calcium, sodium, aluminium and iron	[illegible] PPM max
PH	[illegible].5 – 8

1.20 **Erection equipment, tools, and materials**

The Tenderer should state [illegible] erection equipment, tools, and materials he will be supplied. This will include such items as cranes, hoists, welding sets, welding rods, etc. At the time of contract award, it will be decided which of the items included are to be [illegible] and the price of these will be deducted from the contract price. The Tenderer should, therefore, provide a detailed list with individual prices, of the items included in the price for erection equipment.

1.21 **Spare parts**

The scope of delivery includes spare parts necessary for the [illegible] years' operation. The Tenderer should indicate what sum he has included in his price for spare parts. The successful Tenderer will be required to give a detailed list of the parts to be supplied with an itemised price list.

The spare parts will include all those recommended by suppliers of pumps, compressors, turbines, etc. and also a spare charge of all catalysts and spare tubes for the reforming heater.

1.22 **Plant layout**

All plants will be laid out for facility in operation and maintenance. Sufficient space will be allowed for re-

removal of equipment for inspection and maintenance and where cranes [illegible] not advisable an overhead beam will be provided to fit [illegible] hoist for facilitating removal of exchanger bundles, pumps etc.

In the compressor houses, overhead cranes of a capacity sufficient to lift the largest single piece of the compressors will be permanently installed.

All valves will be accessible from the ground or from operator platforms. Where this is not possible, chain operated valves must be provided.

Pipes running across walkways will be [illegible] the ground or at a height [illegible] obstruct passage. They will be either in covered pipe trench or above normal head height.

All instrument dials will be visible and thermowells will be accessible from ground level or operator platforms.

The units will be laid out in the most economic manner as regards [illegible] of materials etc.

[illegible] <u>Interconnecting (Yard) Piping</u>

All necessary interconnecting piping for steam, water, condensate, process fluids, etc. will be provided. These will be adequately sized and will be fitted with all necessary valves for shut off and control, measuring devices etc. Hot lines will be adequately insulated for heat conservation and/or personnel protection.

Where isolation valves are large and potentially difficult to operate, special valves must be provided to facilitate operation. This particularly applies to cooling water systems.

Cooling water piping will normally be buried and, where there is any danger of damage to this piping, such as at road crossings, special protection must be provided. For other piping, overhead pipe racks are preferred although ground level pipe racks or even pipe trenches are not excluded.

Adequate allowance for expansion and contraction of the piping should be made.

[illegible] **[illegible]**

All instruments will [illegible] reading and, where necessary, for proper [illegible] recorders will also be fitted. The [illegible] rate and, for certain [illegible] measurements [illegible] consumptions, [illegible] production, [illegible] consumption [illegible] and area production [illegible] will be provided.

[illegible] diagrams will be provided [illegible] one year's supply of instrument [illegible] English will be provided. Samples will be submitted for [illegible].

A detailed instrument list must be given by the Tenderer. [illegible] limits of accuracy of the instruments will be given in this list. The metric system will be used for all indicating and recording instruments.

Control and instrument panels shall be manufactured entirely of metal with all exposed surfaces suitably protected against corrosion. The framework shall be rigid and fitted for floor mounting including all holding down bolts. Direct access to the back of the panel shall be provided either from the side or rear, as necessary, and depending upon the size of the panel. It shall be totally enclosed without sharp corners and suitable for [illegible] mounting of all instruments. Where necessary, it shall be provided in sections to facilitate extension for further instruments in the future.

The layout and design of each and every panel shall be agreed by the organisation before commencement of manufacture and the finish determined to suit the conditions at site.

Provision shall be made for further instruments as required. The two name plates one in ARABIC and one in ENGLISH shall be fitted above and below each instrument respectively.

The arrangement for changing charts must be simple and direct. Locks are to be provided as necessary for protection of the instruments. All cabling, pipework and the like, shall be carried to and from the panel by means of floor channels or ducts suitably covered. If copper instrument

piping be used, it should suitably protected against [illegible] attack. For lay, measuring instruments, recorders and control equipment must be arranged to enable the organisation to check the performance of each part of the plant. It must also enable the organisation to make departmental costing.

In the schedule of prices quoted belonging to any section of the plant which is grouped with that section.

7.29 Indigenous supplies

The Contractor will quote for a complete plant as mentioned in this section. However, it is anticipated that a certain amount of equipment and material can be procured in the A.R.

The organisation will procure these materials and equipment in the A.R. in accordance with the detailed designs and specifications supplied by the Contractor. The contract price will be modified accordingly.

8. Guarantees

The Contractor will give to the organisation suitable guarantees covering the mechanical design and quality of the factory, the output of the factory, the consumption of certain utilities and raw materials and the quality of the various products.

8.1 Mechanical design

The Contractor will guarantee that the plants have been designed in line with accepted practice and that all equipment is suitable for the service to which it will be put. This includes suitability of materials, strengths capacities etc.

The Contractor will further guarantee equipment against any mechanical failure for one year from the date of the successful test-run of the plants. This guarantee

excludes, of course, such routine replacements as pump or valve gland packings.

In the case of any mechanical failure during this period the Contractor will at his sole cost repair or replace the defective equipment. A further guarantee period of one year will apply to the repaired or replaced equipment from the date of the repairs or replacement.

[illegible] **Output of the Factory**

The Contractor will guarantee that the factory will produce the design quantity of ammonia ([illegible] or [illegible] MT/D) and of technical grade urea ([illegible] mt/annum) and fertilizer grade urea (quantity to be stated by Tenderer). These guarantee figures will not be subject to any tolerances either for instrument errors or any other reason whatsoever.

The guarantee test run period will be for [illegible] continuous hours. The production of ammonia will be measured by use of the calibrated storage tank if the urea plant is not running at the same time or otherwise by the use of the ammonia production meter, the ammonia consumption meter for the urea plant, the calibrated storage tank (if all the ammonia is not used for urea production) and the urea production.

The urea production will be measured by weighing all the urea produced after bagging. If there is a discrepancy between this quantity and the totaliser on the product urea conveyor belt both for the total production over the 5 (five) days and the daily production, a value which is the average of the two measurements, will be used. As a check, the ammonia consumption will be used to calculate the urea production based on the guaranteed consumption of ammonia per ton of urea.

2.3 Utilities and raw materials

The Tenderer will indicate in his Tender the consumption and production of the following utilities and raw materials:

a) Water - make up and circulation flow

b) Gas - for process and fuel

c) Steam - of various pressures and at various production units

d) Electricity - consumption for the various production units

e) Catalysts

f) Chemicals

g) CO_2 consumption from the adjacent factory

The Contractor will guarantee the following consumptions and productions:

a) Gas - for process and fuel. This guarantee may be in terms of cubic meters or B.t.u.s. per hour or per day.

b) Electricity - overall consumption for the factory per hour or per day excluding lighting and ammonia storage refrigeration only.

c) Steam - the guarantee will be that sufficient steam will be produced for the needs of the factory.

d) Water - The guarantee will be, that sufficient water of the proper purity will be produced to allow full production of the plant.

e) Carbon dioxide from adjacent factory. - No penalty will be involved if the CO_2 requirement from the adjacent factory does not exceed the available CO_2. (This factory will produce 300 mt/day of ammonia by atmospheric pressure partial oxidation of naphtha or natural gas).

The guarantees will not be subject to any tolerances whatever. The Contractor must state what guarantee figure he will accept and what tolerance for instrument errors etc. is included in this figure. If the consumption of

electricity or gas is exceeded, no penalty will be levied if the total cost of these based on a price of ______________ per kWh and ______________ per ton of natural gas does not exceed the total cost of the guaranteed quantities.

1.4. **Qualities of products**

The Contractor will guarantee that the quality of the products will at least be equal to those given in the present specification, namely:

a) Ammonia

NH_3	99.5 % wt. min.
Water	0.5 % wt. max.
Oil	5 PPM max.

b) **Fertilizer grade urea**

N_2	46.1 % wt. min
Biuret	0.9 % max (with [illegible] 0.8)
Moisture	0.3 % max.
Free ammonia	200 PPM max.
Iron	1 PPM max.
Ash	20 PPM max.
Granulometry	90 % between 1-4 mm

c) **Technical grade urea**

N_2	46.4 % wt. min;
Biuret	0.2 % wt. max.
Moisture	0.3 % wt. max.
Free ammonia	20 PPM max.
Iron	1 PPM max.
Ash	20 PPM max.

1.5 **Non-fulfilment of guarantees**

If the factory does not meet its guarantees concerning output, quality of products or consumptions, the organization will inform the Contractor of this in writing and the Contractor will have the opportunity of taking the necessary steps to rectify the defects of

the plant (at the contractor's expense) so that the guarantee is met. When these modifications or improvements have been carried out, a further 5 (five) day test-run will be performed. If the plant then still does not meet the guarantee, penalties will be imposed. These penalties will be fixed by mutual consent prior to the signing of the contract.

[illegible]

TABLE A.1

MONTH	[illegible] 1938-40 Pressure (mb.) Corrected to [illegible]	[illegible]							[illegible]		
		Max.	Min.	[illegible]					[illegible]		
				[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
January	1016.9	19.6	7.3	23.5	6	9.3	1[illegible]	[illegible]	[illegible]		[illegible]
February	1016.9	2[illegible].7	7.7	[illegible]	[illegible]	1[illegible].5	[illegible]	[illegible]		[illegible]	[illegible]
March	101[illegible].6	23.2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
April	101[illegible].2	27.[illegible]	12.[illegible]	[illegible]	[illegible]	[illegible]	2[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
May	101[illegible].6	[illegible].2	[illegible]	[illegible]	[illegible] 2	2[illegible]	[illegible]	2[illegible]	[illegible]	[illegible]	[illegible]
June	10[illegible].7	[illegible].7	[illegible]	[illegible]	[illegible]	2[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
August	10[illegible]7.9	[illegible].7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
September	10[illegible]1.9	[illegible].7	[illegible]	[illegible]	[illegible]	2[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
October	101[illegible]	[illegible]	17.6	[illegible]	[illegible]	22.[illegible]	[illegible]		[illegible]	[illegible]	[illegible]
November	101[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]
December	10[illegible]7.[illegible]	[illegible]	[illegible]					[illegible]		[illegible]	[illegible]

[illegible]

[illegible]

[illegible]

[illegible]	
[illegible]	
[illegible]	
[illegible]	-
[illegible]	-
[illegible]	-
[illegible]	-
[illegible]	
Total [illegible]	
[illegible]	
Permanent [illegible]	4
[illegible]	
[illegible]	-
[illegible]	
[illegible]	
[illegible]	-
[illegible]	
[illegible]	-
[illegible]	
[illegible]	-

[redacted]

[illegible]

III.1.4 [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

III.1.5 [illegible]

[illegible]

[illegible]

[illegible]

Mechanical engineers

[illegible]

[illegible]

III.1.6 [illegible]

[illegible]

Civil engineers

Chemists

Mechanical engineers

Electrical engineers

Foremen

Skilled fitters and mechanics

Semi-skilled fitters and mechanics

11.1.7 Local staff for plant operation and maintenance

	Engineers or Technologists	Skilled Labour	Semi-skilled Labour	Unskilled Labour
Gas preparation				
Ammonia synthesis				
Urea				
Laboratories				
Workshops and service rooms				
Emergency power unit				
Water treatment units				
Compressed air unit				
Auxiliary units				
Total.				
Administrative staff				
Clerical staff				

III.2.1 [redacted]

1. [redacted]
2. [redacted]
3. [redacted]
4. [redacted]
5. [redacted]
6. [redacted]
7. [redacted]
8. [redacted]
9. [redacted]
10. [redacted]
11. [redacted]
12. [redacted]
13. Auxilliary services
14. Fire fighting and safety equipment
15. Sewage and effluent disposal unit
16. Erection equipment, tools and materials
17. Spare parts
18. Instruments and measuring devices
19. Interconnecting (yard) piping

Total:

III.2.2 Total shipping weight (metric tons)

Maximum weight of single piece (.. tons)

Maximum dimensions of a single piece

Annex IV

[illegible]

[illegible] Currency [illegible]

. [illegible]

. [illegible]

. [illegible]

. [illegible]

. [illegible]

. [illegible]

. [illegible]

. [illegible]

. [illegible]

. [illegible]

. [illegible] unit

. Water [illegible] and treatment units

. Compressed air unit

13. Inert gas unit

14. Air conditioning and ventilation equipment

15. Auxiliary services

16. Fire fighting and safety equipment

17. Sewage and effluent disposal unit

18. Erection equipment, tools and materials

19. Spare parts for three years

20. Instruments and measuring devices

21. Interconnecting (yard) piping

TOTAL F.O.B. CASH PRICE:

22. Supervision of civil engineering construction

23. [illegible]

24. [illegible]

25. [illegible]

6. [illegible]

7. [illegible]

28. [illegible]

-4-

ompan ... ta ... tie ... pe

... ipe etr ... r er

L ...

... tie ... pe e, wer ... r

... ia. ... ntinental is primarily

... r ... tractor ... ene ... Contractor.

... E

... est tie up with ... ster ... eeler ... Technip.

... L ... ... ,

Suggest tie up with a General Contractor.

...

Suggest tie up, as in Bulgaria with Humphreys and Glasgow and Koppee-Rust - or with other companies.

HUMPHREYS AND GLASGOW ... U.K.

Suggest tie up with General Contractor.

KELLOGG ... U.K.

Suggest tie up with Urea Contractor or General Contractor.

L U R G I ... GERMANY

Suggest tie up with UHDE, Continental or Koppee-Rust for Urea.

[illegible] (page 4)

[illegible] [illegible]

Suggest [illegible] with [illegible]

Perhaps also [illegible]

[illegible] [illegible]

Suggest tie [illegible] with [illegible]

[illegible] contractor.

[illegible] [illegible] [illegible] general [illegible]

[illegible] [illegible] [illegible] general contractor.

[illegible] [illegible]

Suggest tie [illegible] with general [illegible]

[illegible] [illegible]

[illegible] [illegible]

Suggest tie up with Ruhr[illegible], [illegible]

[illegible]ower [illegible] for ammonia.

D[illegible] [illegible] [illegible]

Suggest [illegible] through Neth[illegible] [illegible],

[illegible]heinschel[illegible]e-Veka[illegible]f.

[illegible]

[illegible]

[illegible] the [illegible] received for [illegible]

[illegible]

[illegible] the offers complete [illegible] all the units and services requested included. In the case of a partial offer for 1 unit, is the offer for the unit complete? If the offer is not complete, what is missing?

4) Tabulate the [illegible] list the various items and the prices put by the Tenderer against these. Compare also the total price of the offer and the price of each item.

5) Compare the consumption figures and production figures. Work out a unit cost of production and compare them. Take manpower figures into account.

6) A detailed comparison of scope of supply of equipment should be carried out and the offers put onto a comparable basis of price.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

) assuming [illegible] acceptable [illegible] the comparison [illegible] total [illegible] good [illegible] the best [illegible].

) consider such factors [illegible] available [illegible] financing. This [illegible] be [illegible] recalculating total costs for [illegible]. [C]ustoms duties should be neglected [illegible] but freight costs must be taken [illegible] c.i.f. rather than f.o.b. costs t[o] be [illegible].

- - -

[C]airo, July 3[illegible]th, 1[illegible]7[illegible].

ebm.

[redacted]

[illegible]

[illegible]

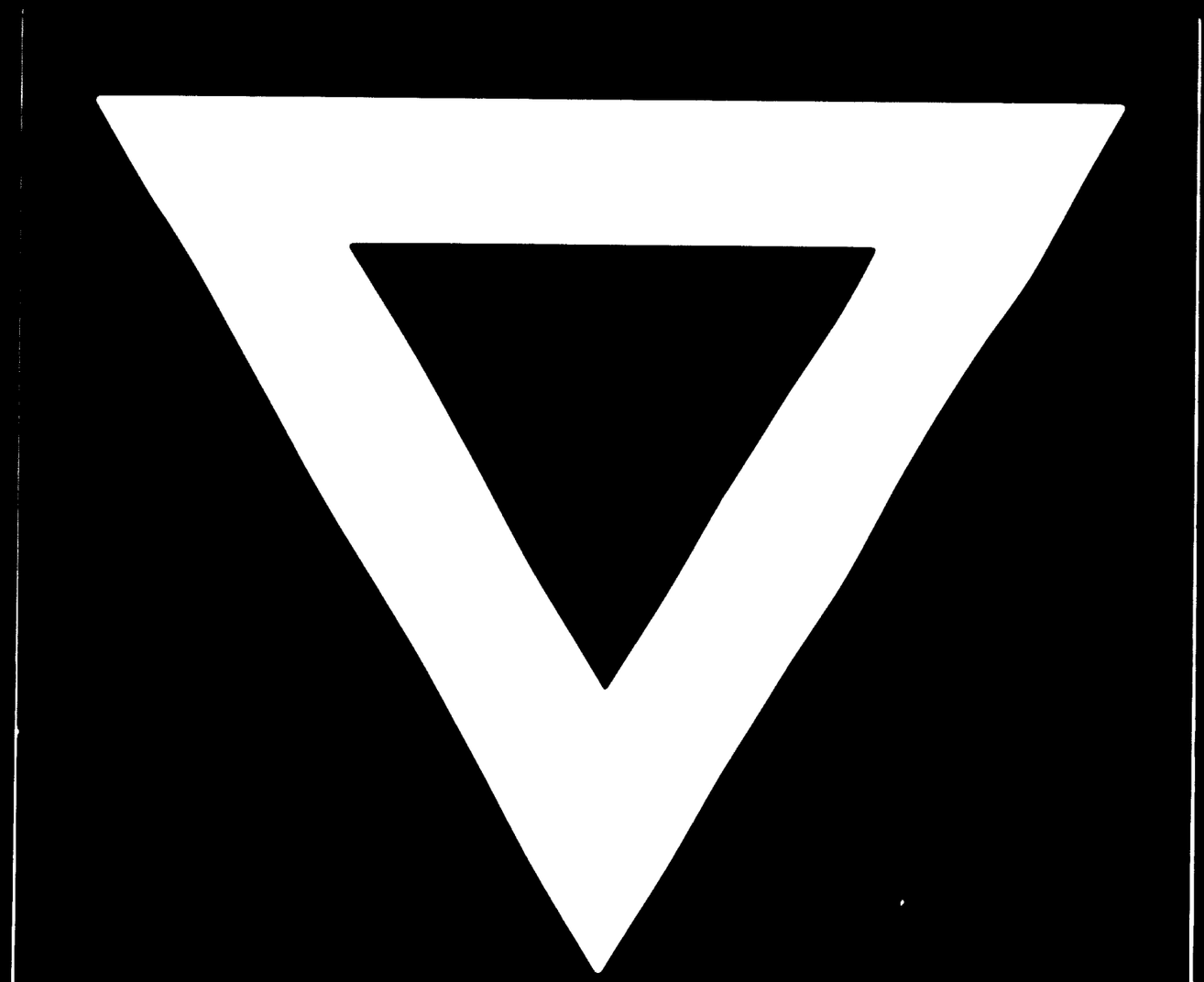
[illegible]

[illegible] should not himself be [illegible] otherwise, it would be [illegible] successful Bidder/s and there would [illegible] free interchange of information which is necessary.

The General, or overall, Contracting Companies could fill this role well but some of them, such as [illegible], [illegible], and [illegible]OGLTTI will be excluded as they will, no doubt, be bidding themselves – as leaders of consortia. The two remaining (there may be others of which I am not aware) are JOHN LAING CONSTRUCTION LTD and GEORGE WIMPEY both of London. These have both considerable experience of overseas work, including in the Middle East; both are multi million pound organizations

[illegible]

[illegible] experience. [illegible] perhaps have acted as drafting room [illegible] engineering services as Sub-contractors to main contractors on large projects but are not capable or qualified to bid in their own right for these projects. They may even have built small ammonia plants quite successfully but have never built a centrifugal compressor type plant before. I do not think that it is wise for the organization to serve for these companies to gain this first experience at your expense.



76.02.06