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BIC TAIFER
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PROJECT

SABIC TAIFER FERTILIZER PROJECT

A JOINT VENTURE BY

SAUDI BASIC INDUSTRIES CORPORATION

AND

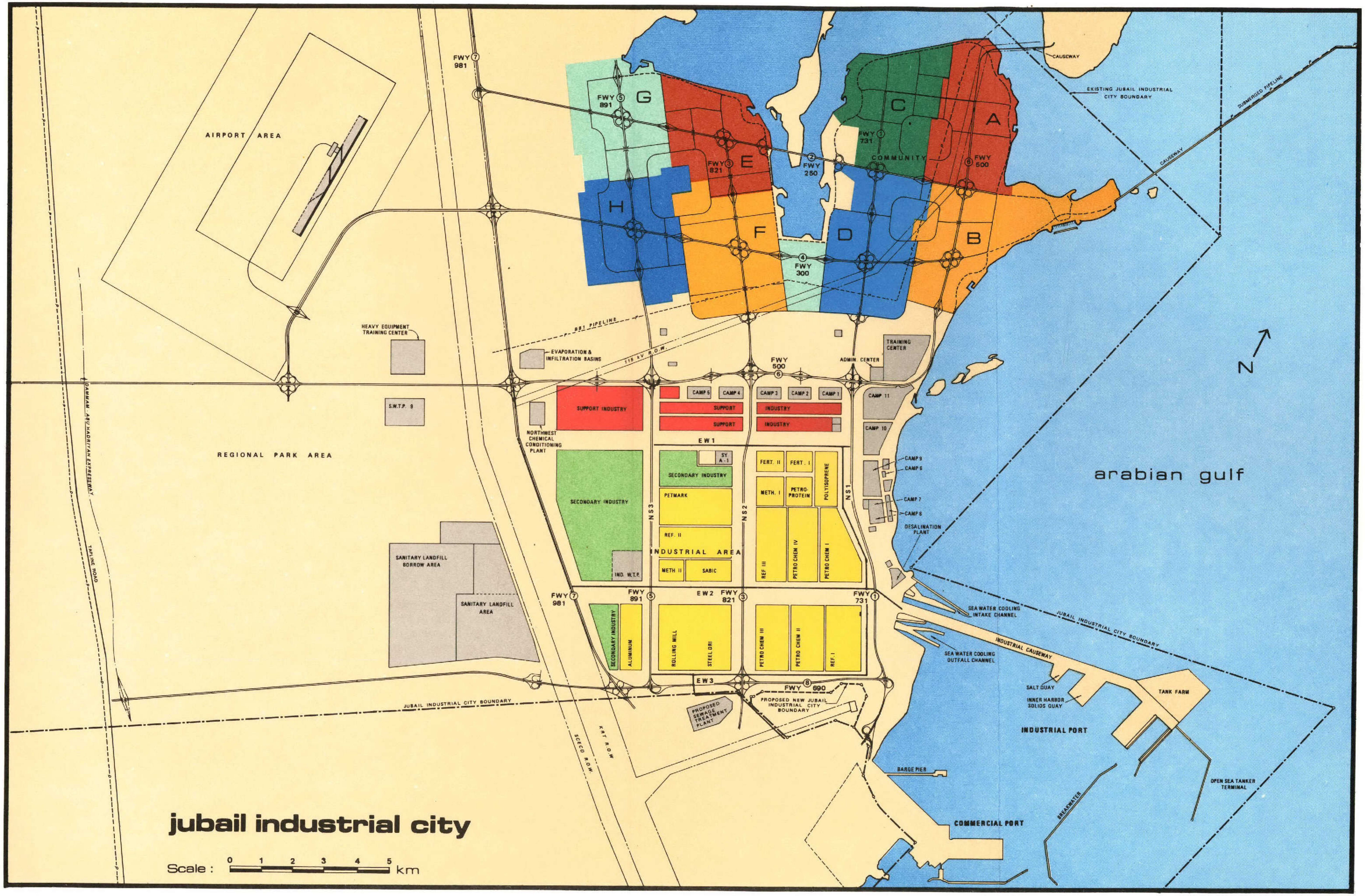
TAIWAN FERTILIZER COMPANY

ASIBILITY
STUDY

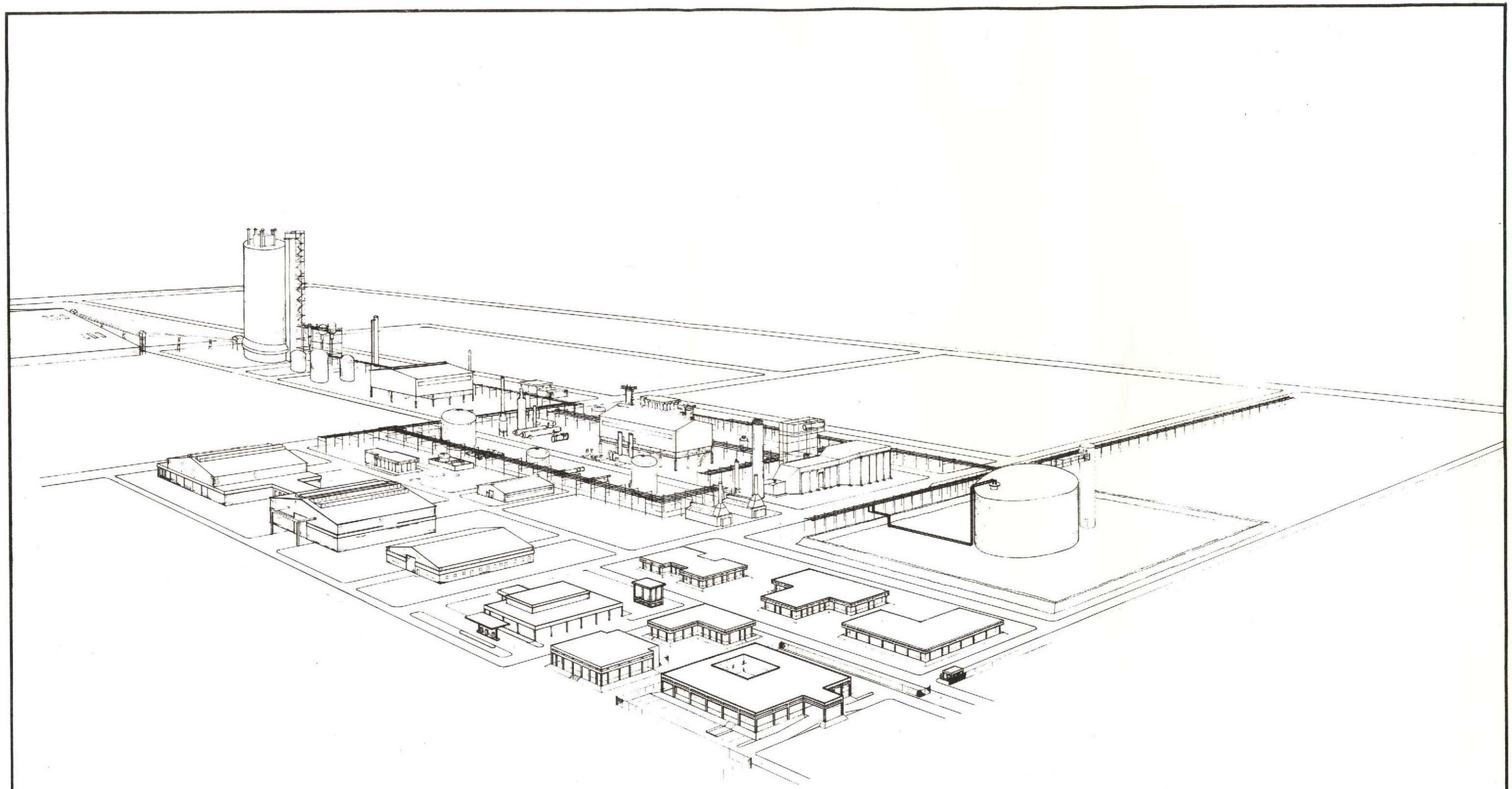
OLUME I

FEASIBILITY STUDY
VOLUME I
EXECUTIVE SUMMARY


JUBAIL INDUSTRIAL COMPLEX 1978



jubail industrial city
Scale : 0 1 2 3 4 5 km
arabian gulf
N
AIRPORT AREA
REGIONAL PARK AREA
HEAVY EQUIPMENT TRAINING CENTER
S.W.T.P. 9
EVAPORATION & INFILTRATION BASINS
981 PIPELINE
115 kV R.O.W.
NORTHWEST CHEMICAL CONDITIONING PLANT
SANITARY LANDFILL BORROW AREA
SANITARY LANDFILL AREA
PROPOSED SEWAGE TREATMENT PLANT
PROPOSED NEW JUBAIL INDUSTRIAL CITY BOUNDARY
JUBAIL INDUSTRIAL CITY BOUNDARY
EXISTING JUBAIL INDUSTRIAL CITY BOUNDARY
CAUSEWAY
SUBMERGED PIPELINE
DAMMAM - ABU HADRIYAH EXPRESSWAY
TAPLINE ROAD
SCECO R.O.W.
KAT R.O.W.
FWY 7 981
FWY 5 891
FWY 3 821
FWY 2 250
FWY 1 731
FWY 6 500
FWY 4 300
FWY 8 690
A
B
C
D
E
F
G
H
COMMUNITY
TRAINING CENTER
ADMIN CENTER
SUPPORT INDUSTRY
SUPPORT
INDUSTRY
CAMP 1
CAMP 2
CAMP 3
CAMP 4
CAMP 5
CAMP 6
CAMP 7
CAMP 8
CAMP 9
CAMP 10
CAMP 11
EW 1
EW 2
EW 3
NS 1
NS 2
NS 3
SECONDARY INDUSTRY
SY A-1
PETMARK
REF. II
METH II
SABIC
IND. W.T.P.
FERT. II
FERT. I
METH. I
PETRO-PROTEIN
POLYISOPRENE
REF. III
PETRO CHEM IV
PETRO CHEM I
INDUSTRIAL AREA
ALUMINUM
ROLLING MILL
STEEL DRI
PETRO CHEM III
PETRO CHEM II
REF. I
DESALINATION PLANT
SEA WATER COOLING INTAKE CHANNEL
SEA WATER COOLING OUTFALL CHANNEL
INDUSTRIAL CAUSEWAY
SALT QUAY
INNER HARBOR SOLIDS QUAY
TANK FARM
INDUSTRIAL PORT
OPEN SEA TANKER TERMINAL
BARGE PIER
BREAKWATER
COMMERCIAL PORT



SABIC TAIFER FERTILIZER

PERSPECTIVE VIEW TO SOUTHWEST

DRAWN BY: V. CHRISTIE 10-11-79

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SABIC-TAIFER FERTILIZER PROJECT

FEASIBILITY STUDY

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I. CONCLUSIONS AND RECOMMENDATIONS

SECTION I

CONCLUSIONS AND RECOMMENDATIONS

A. OPERATIONAL ASPECTS:

A-1. TECHNOLOGY:

The technology utilized for this Project is very well proven, as there are a considerable number of ammonia and urea plants designed according to the selected Kellogg & Stamicarbon processes which are running successfully in different parts of the world.

A-2. PROJECT EXECUTION:

The Company will be capable of executing the Project as it will benefit from the resources available to both Partners and the selected Plant designer. TFC has the benefit of the execution experience of a similar project in the recent past, while SABIC will make available to the Company the results of the experiences of Saudi Arabian Fertilizer Co. (SAFCO) and other similar plants in the Arabian Gulf in avoiding relevant design and execution problems.

The selection of the designer/construction management contractor (Pullman Kellogg and its Saudi affiliate Bakhsh-Pullman Kellogg) was based both on its world-wide extensive experience with similar plants and its recent experience in project/construction

management of a sizable industrial project in the Kingdom.

A-3. PLANT OPERATIONS:

The manning of the plant with the required experienced manpower (473 persons) will be facilitated by the large force of experienced manpower which is available within Taiwan Fertilizer Co. (TFC). TFC has undertaken to supply the Company with around one third of the total manpower which will cover most of the needed technically skilled positions.

The training and development of the Saudi manpower should be no problem taking into consideration the training facilities available within TFC, SAFCO and the Plant designer.

B. PRODUCT MARKETING ASPECTS:

B-1. SUPPLY/DEMAND SITUATION:

This Project is expected to be started up at a time of tightening urea markets which represent a real need for such projects.

It should be noted that all available demand projections by different experienced sources indicate that there will be a need for hundreds of new similar

plants in the coming two decades (British Sulphur forecast a need for 300 new plants between 1985 and 1998 while the UNIDO projections forecast a need for 450 new plants between 1985 and 2000). The Kingdom of Saudi Arabia represents one of the most ideal locations for a number of these needed plants as fuel/feed stocks and financing are available, which are the most critical two factors in the establishment of these plants at present; while its geographical location gives it a considerable freight advantage due to its nearness to the major importing markets.

B-2. MARKETING SITUATION:

There should in general be no problems with the marketing of the Product, as indicated by the demand position described in the preceeding paragraph (B-1).

TFC's guarantee to Offtake 60% of the Product is a further assurance of successful marketing. The marketing of the remaining 40% Product does not pose any special problems as the Partners can help the Company with their available resources (including SAFCO's marketing experience).

B-3. PRICING SITUATION:

The projected prices are encouraging as they are expected to give adequate return to the Project. It should be noted here that this Study was based on a conservative pricing assumption based on the lower of the prices indicated by British Sulphur for the first half of the Project life and the World Bank data for the second half of the Project life respectively, but that didn't decrease the Project's profitability to an unattractive level as a whole.

C. FINANCIAL ASPECTS:

C-1. FINANCIAL ASSESSMENT:

Adequate assessment was made of all the cost items to be incurred during the execution of the Project based on a detailed "Definitive Cost Estimate" prepared by the Plant designer (Pullman Kellogg). The risk of over-runs of the capital was minimized to an acceptable level by allowing a contingency related to the degree of uncertainty in the cost of each item.

C-2. FINANCING MEANS:

The equity financing (53.6 MM US.$) of the Project which is 30% of the total capital requirements (357.3 MM US.$) is within the available resources

to each of SABIC and TFC. 60% of the total capital requirements (214.4 MM US.$) will be secured with a loan from the Saudi Public Investment Fund (P.I.F.). No problem can be foreseen in securing the remaining required 10% (35.7 MM US. $) as commercial bank loan.

C-3. FINANCIAL VIABILITY:

The Project is financially viable to both of the Partners as it will produce an internal rate of return (according to the "Base Case" projections) to each of SABIC and TFC of 17.3% and 16.2% respectively. The difference is because TFC is liable to pay an income tax after 10 operation years tax-holiday while SABIC is exempted from it.

C-4. FINANCIAL SENSITIVITY:

The Project's profitability is moderatly sensitive to capital cost increase, construction delay and production capacity build-up, while it is highly sensitive to production rate and Product sales prices. The production projection which is built into the "Base Case" is considered adequate as it is lower than the production rates achieved by TFC its similar plants in Taiwan, while the prices projections is highly conservative in comparasion to the price trend at present. However even in

the unlikely case of 10% drop in either of production rates or the Product sales prices the internal rate of return remain higher than 12.5% and 11.5% for each of SABIC and TFC respectively.

It should be noted that in case of using prices projections based on World Bank data the rate of return of SABIC & TFC rises to 19.9% and 18.9% respectively.

C-5. ECONOMIC ASPECTS OF THE PROJECT:

The Project's internal rate of return to Saudi Arabia is indicated to be higher than 10%; this highlights the economic viability of the Project to the Kingdom as a financial investment. The Project will have a number of other advantages which are not indicated by this financial indicator as it will upgrade the value of natural gas and will contribute the broadening of the Saudi industrial sector.

D. RECOMMENDATIONS:

It is our recommendations to both of the Partners to proceed with this Project and establish a Joint Venture Co. to execute it, as our detailed study indicated that this Project is viable in all of its technical, financial

and marketing aspects to each Partner and to the Kingdom of Saudi Arabia.

The needed equity capital for the Company is 360 MM SR (53.6 MM US. $) while total capital investment is 1200 MM SR (357.3 MM US. $), of which 1080 MM SR (321.7 MM US. $) is to cover the capital investment and the balance 120 MM SR (35.6 MM US.$) is to cover the working capital.

II. PLANT OUTLINE

SECTION II

PLANT OUTLINE

A. INTRODUCTION:

The proposed fertilizer plant is to be established in Al-Jubail on the Arabian Gulf coast in the Eastern Province of the Kingdom of Saudi Arabia (Fig. I).

The plant will be integrated as part of the Al-Jubail Industrial Complex (Fig. II), and will produce 500,000 MTY of urea which will be exported through the Al-Jubail Industrial Port in bulk or in bagged form.

The feedstock of the plant will be natural gas produced in association with crude oil production.

A brief description is given of the main components of the plant in the following sections:

B. AMMONIA PLANT: (Fig. III)

A 1,000 MTD ammonia unit will be established based on natural gas as fuel and feedstock. The plant will utilize centrifugal compressors based on the modern concepts of utilizing the waste process heat for the generation of steam for driving turbines.

Pullman Kellogg's ammonia process will be used which is the most widely used ammonia process in the world. The main features of the process (Fig. III) are the thorough purification of natural gas from sulphur compounds, followed by

steam reforming of the natural gas resulting in the generation of a hydrogen - rich synthesis gas. Air is than mixed with the synthesis gas in order to add the required quantity of nitrogen. Following this a second-stage reforming is carried out and the carbon oxides are then removed by a series of reactors and an absorption unit based on the advanced UCAR Amine Guard Process. The final synthesis gas which contains mainly hydrogen and nitrogen is compressed to high pressure and passed into a special reactor to form ammonia. The ammonia product is separated by refrigeration and sent to the urea plant or stored in a special 20,000 MT storage tank.

The separated carbon dioxide is sent to the urea plant for use as a feedstock in urea processing or vented to the atmosphere.

C. UREA UNIT: (Fig. IV)

A urea unit of 1,600 MTD capacity will be established based on the Stamicarbon Carbon dioxide Stripping Process, which is one of the most advanced proven-technologies for urea processing in the world.

Manufacture of urea utilizes ammonia and carbon dioxide produced in the ammonia plant; the main processing steps (Fig. IV) are the reaction of ammonia and carbon dioxide at high pressure then the removal of most of the reacted

ammonia at the same pressure by stripping with the carbon dioxide feed. After that the pressure is reduced and the unreacted ammonia and carbon dioxide are recycled, while the urea solution is concentrated by the removal of water. The finishing of the urea is done by prilling, which consists of showering the molten urea from the top of a high concrete tower called the prilling tower while an upward current of air is induced by fans. The result is the solidification of urea drops into small prills (i.e. small spheres) which are of good handling characteristics. The urea prills are sent to the storage by conveyors.

D. STORAGE AND BAGGING UNIT:

As the application of fertilizer urea is seasonal to a certain extent, a urea bulk storage of 100,000 MT capacity will be established at the plant site, while a bagging plant of 300 MT/Hr capacity will be established at the Al-Jubail Industrial Port adjacent to another 20,000 MT bulk storage. The urea product will be transported by rail cars in bulk from the plant site to the storage at port, while the loading of urea into ships, whether in bulk or after bagging will be by utilizing automatic loading machines.

E. OFFSITES AND UTILITIES: (Fig. V)

The plant will be self sufficient in generating all the required utilities except those which are to be provided by

the Royal Commission (i.e. potable water, sea cooling water and electric power). Adequate storage tanks will be provided for the utilities, chemicals and operating supplies.

F. GENERAL FACILITIES:

The Plant will be provided with all general facilities needed for the Company purposes, including a medical center, cafeteria, training center, workshop ... etc., in addition to the required office buildings for the different departments of the Company.

G. INFRASTRUCTURE:

The Plant will benefit from the general services which will be available at the Al-Jubail Industrial Complex including:

- Accommodation facilities
- Roads
- Telecommunications
- Sewage and Wastes disposal
- Health services
- Security services

These services and many others will be available in Al-Jubail which facilitates the construction of the Plant and its subsequent operation.

FIG. I

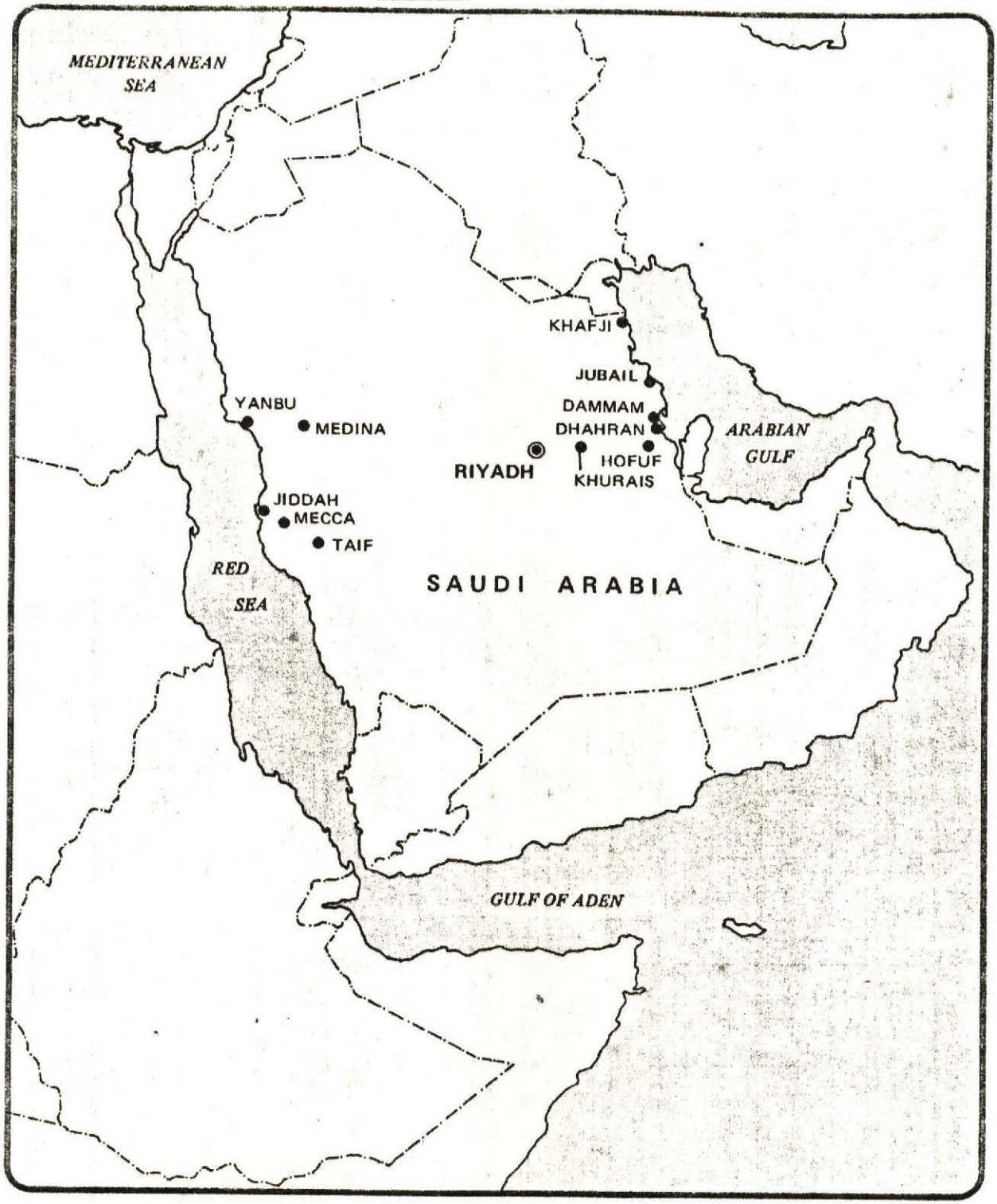

MEDITERRANEAN SEA
KHAFJI
JUBAIL
YANBU
MEDINA
DAMMAM
DHAHRAN
ARABIAN GULF
RIYADH
HOFUF
KHURAIS
JIDDAH
MECCA
TAIF
RED SEA
SAUDI ARABIA
GULF OF ADEN

FIG. III

AMMONIA PROCESS

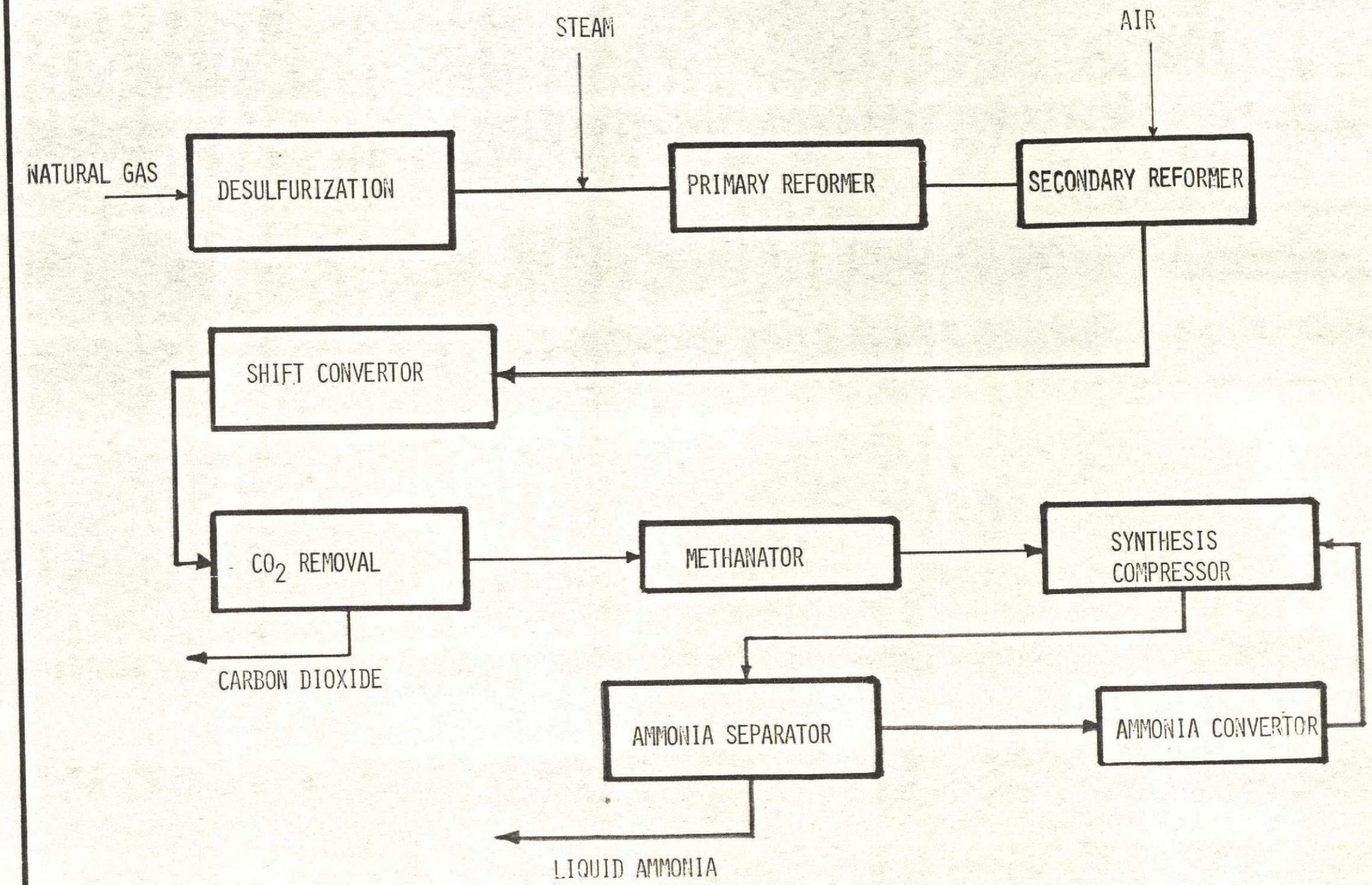


FIG. IV

UREA PROCESS

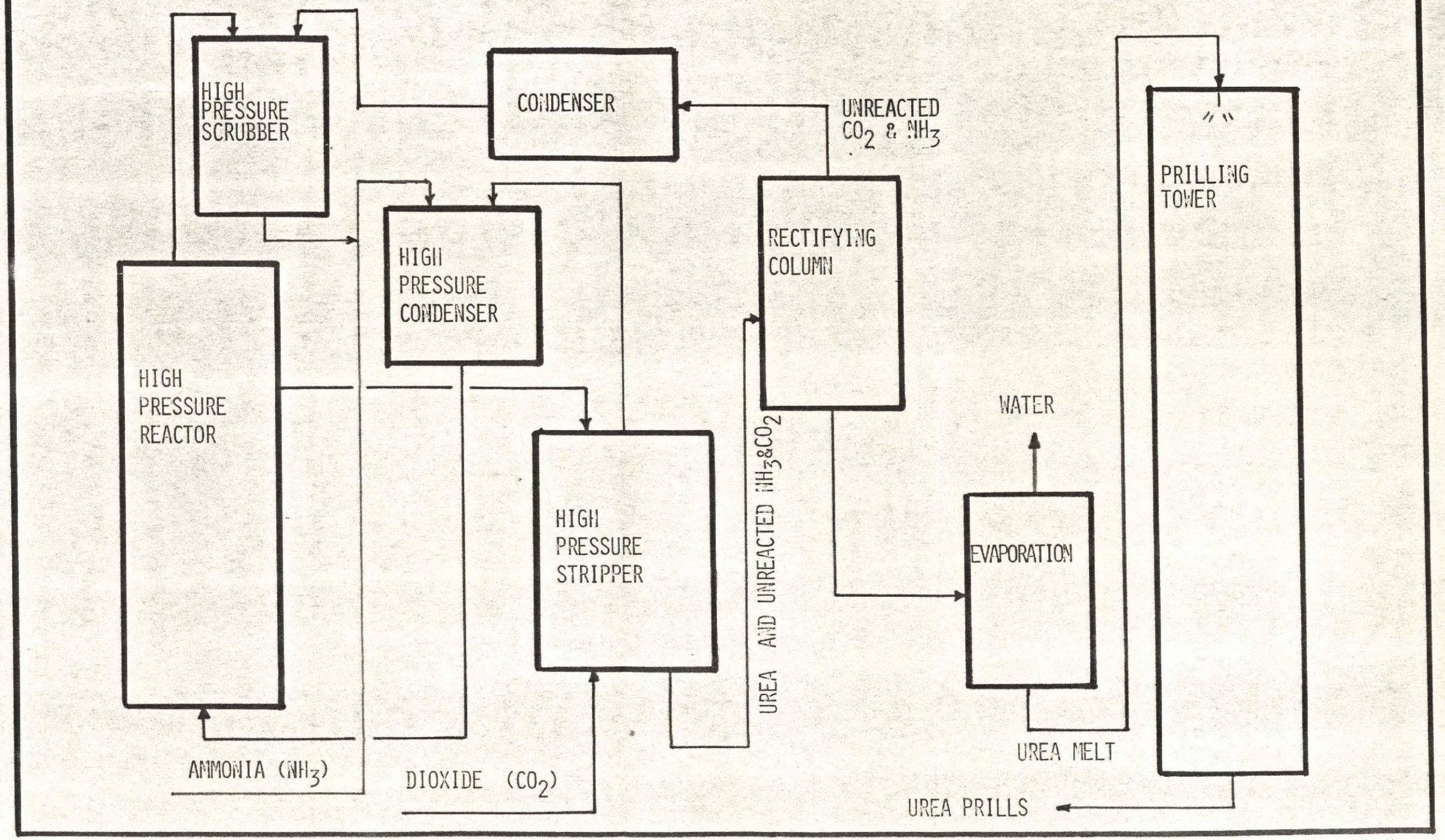
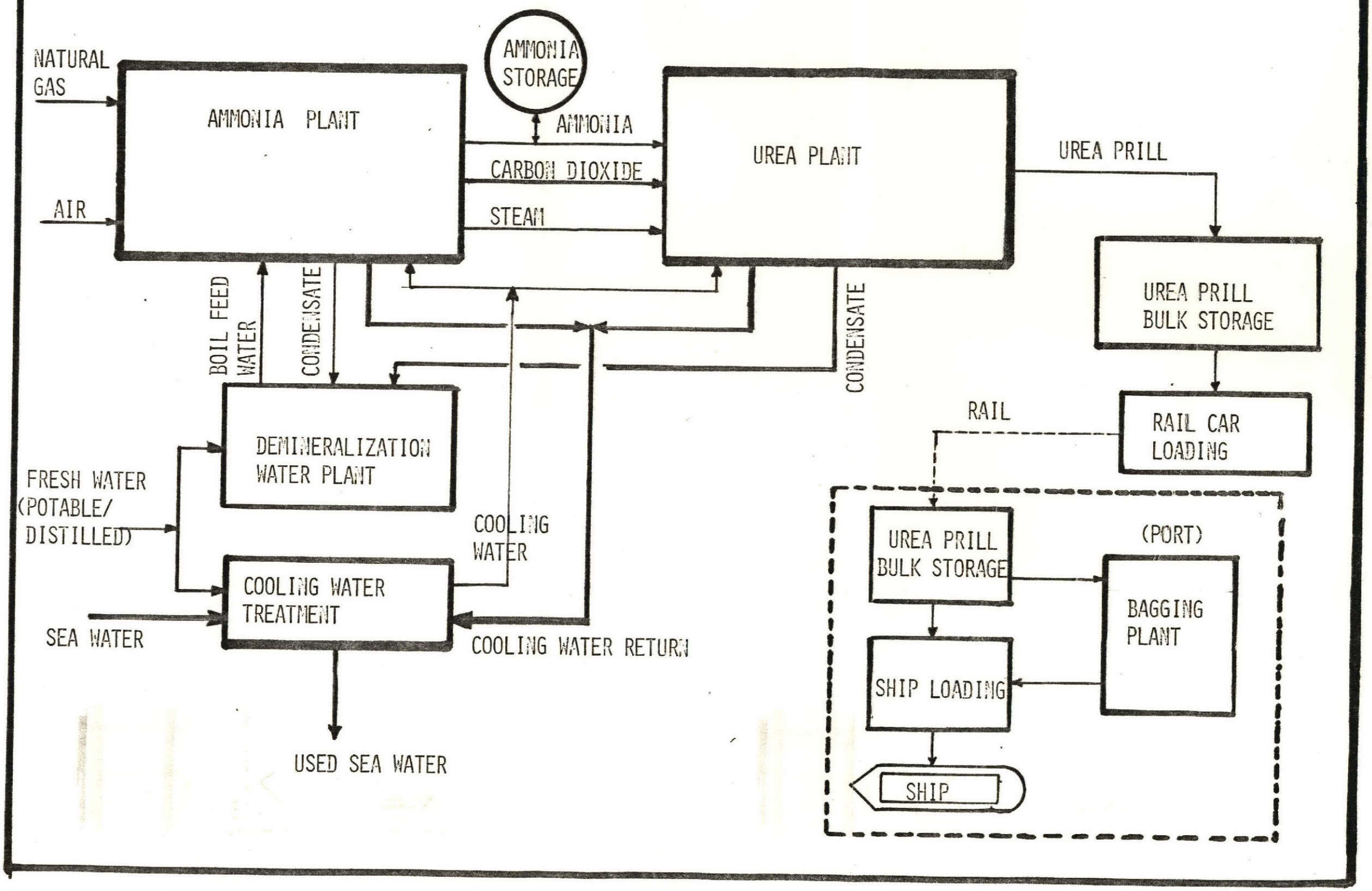


FIG. V

OFFSITES AND AUXILIARY FACILITIES



III. PROJECT EXECUTION OUTLINE

SECTION III

PROJECT EXECUTION OUTLINE

A. INTRODUCTION:

On January 6th 1979, the Saudi Basic Industries Corporation, Riyadh, the Kingdom of Saudi Arabia and Taiwan Fertilizer Company Ltd., Taipei, Taiwan, Republic of China signed an Interim Agreement to conduct a feasibility study for the establishment of an ammonia urea fertilizer complex in the Kingdom, and targeting on the establishment of a joint venture company to own and operate such fertilizer complex.

The Interim Agreement arranged for the formation of an Executive Committee and a Project Team to carry out the feasibility study and to complete the preparation for the establishment of the Joint Venture Company.

The execution steps will be outlined below and will follow the Master Schedule (Fig. I) according to which the start-up of the plant will be mid 1982 if there are no delays in the approval of the Project; this feasibility study has however been based on end 1982 for start-up as a factor of conservatism.

B. INTERIM STUDY PERIOD:

The SABIC-TAIFER Fertilizer Project Team was organized on January 6th, 1979, to handle all project work needed till

the establishment of the Joint Venture Company; the following outline summarizes the main activities:-

B-1. TECHNICAL STUDY:

On March 3rd, 1979 the Project Team finished the preparation of complete definition of the Project and an invitation to bid for the following tasks; "Initial Engineering & Definitive Cost Estimate", Project Management, Engineering & Procurement" and "Construction Management, Start-Up & Training Services". This invitation to bid was sent to selected qualified engineering contractors on March 5th, 1979. The bid proposal packages were received from the selected engineering contractors on April 8, 1979. After evaluation of the bid proposals and a series of clarification and negotiations with the bidders, the contract for "Initial Engineering & Definitive Cost Estimate" was awarded to Pullman Kellogg on June 28, 1979, while an agreement was reached with the same firm (i.e. Kellogg) on the completion of the design, procurement and construction of the plant after the establishment of the Company.

The "Initial Engineering & Definitive Cost Estimate" is scheduled for completion with the Interim Study Stage. The "Definitive Cost Estimate" was prepared and submitted for use in this feasibility study. The activities of Kellogg during the preparation of the "Definitive

Cost Estimate" included the preparation of a Preliminary Design of the Plant with high degree of detail in order to ensure the high accuracy of the cost estimate; while for the next few months Kellogg will continue the refinement of the Preliminary Design and will obtain quotations for the critical long-delivery equipment in order to prepare for the execution of the Project when it is approved.

B-2. MARKET STUDY:

In order to obtain a reliable analysis of the forward urea market situation for use in the feasibility study, the contract for a market study was awarded to the British Sulphur Corpn. Ltd. (BS), London, England. The study of marketing arrangements for the Joint Venture Company was carried out by Taiwan Fertilizer Co. Ltd., There two studies are included as part of this feasibility study report.

B-3. FEASIBILITY STUDY REPORT:

The Project Team prepared this feasibility study report for the Project based on the Definitive Cost Estimate by Pullman Kellogg, Market Study Report by British Sulphur and Study of Marketing Arrangements by TFC. The financial analysis of the Project was prepared by the utilization of a Special Computer Program developed by SABIC and the World Bank and modified to suit this Project's specific requirements.

C. PRE-OPERATION PERIOD:

This stage will start with the approval of the Project and the signature of the agreements for the formation of the Joint Venture Company. The following outline summarizes the main activities to be handled during this period:-

C-1. ESTABLISHMENT OF JOINT VENTURE COMPANY:

As soon as approval to proceed with the Project is obtained, the Joint Venture Company will be established according to the relevant laws and regulations of the Kingdom. SABIC has undertaken to handle all the official procedures for the establighment of the Company. After the Company agreements are signed, the Board of Directors will be nominated by SABIC & TFC and the key Company's officers will be appointed; so the Company can proceed with its work.

C-2. PLANT DESIGN:

Pullman Kellogg will be awarded the contracts for the completion of the Plant Design, based on the Preliminary Design which was completed in the Interim Study Stage under the Company's supervision.

C-3. PROCUREMENT:

Pullman Kellogg will handle the procurement of all equipment and materials needed as approved by the Company.

360 × 10
= 3,600
1,500
400
5,500

C-4. CONSTRUCTION:

Construction contractors will be selected, and awarded the construction contracts under the supervision of the Company and the Saudi affiliate of Pullman Kellogg.

C-5. RECRUITMENT:

The Company will proceed with the recruitment plan which targets on the provision of capable manpower to run the Plant.

C-6. TRAINING:

The Company will proceed with its training plan which targets on training and qualifying the maximum possible number of Saudies to participate in the running of the Plant and the management of the Company.

C-7. START-UP:

The Company will proceed with Plant Start-Up after completion. Start-up advisors from Kellogg will be available during the Start-Up period.

D. OPERATION PERIOD:

The Company will enter this period after the completion of Start-Up of the Plant, and will proceed with its operation and marketing activities. The beginning of this period will mark the end of the Execution Phase of the Project.

ANNEX 3-5

KINGDOM OF SAUDI ARABIA

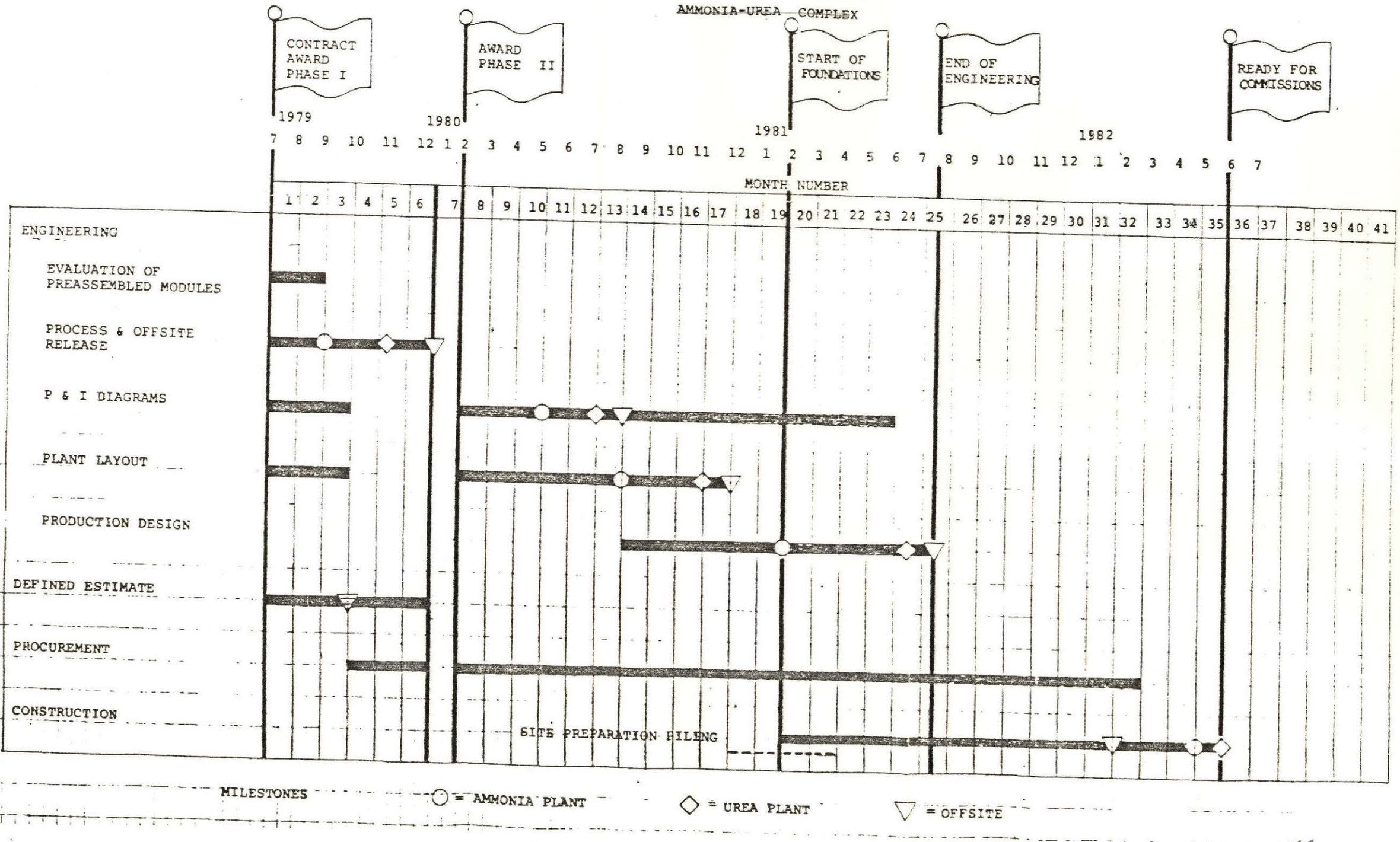
SABIC-TAIFER FERTILIZER PROJECT

PROJECT SCHEDULE -

MASTER SCHEDULE

AL-JUBAIL - SAUDI ARABIA

AMMONIA-UREA COMPLEX



Cost January 1980

WB-21172

SECTION IV

INVESTMENT AND OPERATING COST

A. INVESTMENT:

The total required investment needed for the Project is 357 MM US.$ (Table I) which will require equity financing of 107 MM US. $ (equivalent to 360 MM SR.).

The needed investment's calculations were based on a detailed definitive cost estimate prepared by the plant designer Pullman Kellogg, and based on a careful analysis for all the Pre-operation costs which are to be incurred by the Company during the execution of the projection and for the preparation of capable manpower to run the Plant successfully. The total investment covers as well the Company's requirement for the working capital adequately.

A-1. INTERIM PERIOD EXPENSES:

It was agreed by the Partners that all the expenses which were incurred or to be incurred by the Project Team and the Executive Committee before the formation of the Company are to be reimbursed by the Company to the Partners. These expenses are expected not to exceed 2.3 MM US.$).

A-2 PROJECT EXECUTION EXPENSES:

These expenses (Table II) are detailed as Engineering and Procurement, Materials and Equipment, Construction Management, Construction Costs, all-risk Construction Contractor Insurance, Contingency, Misc. Cost (Material

related includes freight and insurance), training equipment and aid, licence fee and engineering charges, office furniture, maintenance tools and equipment, Mobile Fire Fighting Equipment.

The costs of engineering and procurement, training equipment and aids, licence fee and engineering charges are based on the firm quotation of Pullman Kellogg. The construction management, contingency, Misc. and the material and equipment costs estimate are prepared by Kellogg from Kellogg's in-house costs estimating experience and based on the initial engineering which was carried for the definitive cost estimate.

The cost of the construction of the plant was based on the expected expatriate labour sources availability, efficiency and cost as experienced in the Kingdom of Saudi Arabia; this estimate was supported by Kellogg's recent experience in the execution of a major contract in Ras Tunura Refinery which is near Al-Jubail.

The other costs are estimated according to the past experience from the similar plants.

A-3. PRE-OPERATION EXPENSES:

These expenses (TAble III) consist of manpower, overhead expenses, commissioning and start-up and miscellaneous.

The number of employees required during each stage of the development of Company Manpower has been estimated according to the past experience of TFC, SAFCO and the special requirements of this Project. The base salary and burden is estimated from SABIC's experience. The overhead expenses are estimated to cover the training expenses, out of Kingdom supervisory cost, local transportation expenses, recruiting and resettlement expenses, recreation and other services, Board of Directors' expenses, and land lease. The commissioning and start-up including vendors' advisers cost are as estimated by Pullman Kellogg. Adequate allowance was made for other miscellaneous cost items which are to be incurred in association with the Pr-operation expenses.

A-4. CONTINGENCY:

Adequate contingency of 10% is also provided to cover possible additional expenses due either to minor changes in the scope of the work, or due to a higher escalation rates in the equipment and construction costs than the escalation rate which are used as a basis for the estimate (3% for the balance of 1979, 8% for 1980 and 7% for 1981).

Also this item is to cover additional expenses a result of a variation of the working or site conditions than those taken as a basis for the estimate, or the costs which could be caused by a limited delay in the construction.

A-4. WORKING CAPITAL:

Adequate allowance of working cash was provided (22 MM US.$), this was based on covering the Company's cash requirements adequately until the Company start receiving its sales proceeds. This working cash is to be reduced in the following years to the equivalent of 3 months of labour's salary and burdens as the Company will accumulate adequate Product inventory and will have considerable receivable accounts by then.

The working capital covers adequately all the spare parts needsas were estimated by Kellogg and all the other requirements for chemicals,catalysts, bags and others (Table IV).

B. OPERATING COST:

Attached Table V details the main elements of the Operating Cost, while the basis of these calculations are outlined below. The costs of operating labor, supervisory labor, maintenance labor Administration and General was estimated based on past experience regarding the required number of employees to run the Company effectively and based on the expected salary and burden of each category of employees.

Other overheads are estimated from the past experience and the anticipated Company's requirement and to include adequate allocations for the continuous training and development programs of Saudies.

Operating materials are estimated from the data of lube oil consumption supplied by Kellogg and the experience of SAFCO for miscellaneous items.

Maintenance expenses include 3% of the total cost of equipment and material of the plant for maintenance material and 3% of the same for contract maintennance labor.

Utilities and materials costs are estimated from the unit consumption and unit cost of each item which are provided by Pullman Kellogg.

The cost of bags and shipping is estimated based on the experience of SAFCO.

The marketing cost is assumed to be 5% of the marketing sales revenue.

TABLE : I

TOTAL INVESTMENT COST ESTIMATION

(IN THOUSANDS OF US. $)

	1979	1980	1981	1982	TOTAL
INTERIM PERIOD EXPENSES	2,344.24				2,344.24
PRE-OPERATION EXPENSES		5,917.00	14,760.00	39,976.00	60,653.00
PROJECT EXECUTION EXPENSES		41,238.00	145,930.00	71,596.00	258,764.00
SUB-TOTAL:	2,344.24	47,155.00	160,690.00	111,572.00	321,761.24
WORKING CAPITAL				35,560.00	35,560.00
TOTAL	2,344.24	47,155.00	160,690.00	147,132.00	357,321.24

Interest During Constr. 10.35

367,671

+ Owners Contingency 23,525

344 146

TABLE : II

PROJECT EXECUTION EXPENSES

(IN THOUSANDS OF US. $)

	1980	1981	1982	Total
Engineering and Procurement	8,688.00	2,896.00	-	11,584.00
Materials and Equipment	26,876.50	64,503.00	16,125.90	107,505.40
Construction Management	-	4,304.00	1,026.00	5,330.00
Construction Costs	-	38,636.00	9,659.00	48,295.00
All Risk Construction Contractor Insurance (1%)		1,000.00	360.00	1,360.00
Contingency	-	-	29,486.00	29,486.00
Misc. Cost (Mtl. Related includes Freight and Insurance	-	18,434.40	4,608.60	23,043.00
Training Equipment & Aids	-	293.20		293.20
Licence Fee and Engineering Charges	1,724.39	197.56	221.00	2,142.95
Offices Furniture	200.00	400.00	400.00	1,000.00
Maintenance Tools & Equipment		2,000.00	3,000.00	5,000.00
Mobile Fire Fighting Equipment			200.00	200.00
TOTAL	37,488.89	132,664.16	65,086.50	235,239.55
Grand TOTAL (inclusive 10% Contingency)	41,238.00	145,930.00	71,596.00	258,764.00

TABLE - III

PRE-OPERATIONAL EXPENSES

(IN THOUSANDS OF US.$)

	1980	1981	1982	Total
Manpower	2163.3	7052.9	19,759.6	28,975.80
Overhead	2,316.40	4,128.83	7,269.51	13,714.74
Commissioning & Start-UP			3,257.00	3,257.00
Sub-Total	4,479.7	11,181.73	30,286.11	45,947.54
Miscellaneous and Others	895.94	2,236.35	6,057.22	9,189.51
TOTAL	5,375.64	13,418.08	36,343.33	55,137.05
GRAND TOTAL (inclusive 10% Contingency)	5,917.00	14,760.00	39,976.00	60,653.00

TABLE : IV

WORKING CAPITAL ESTIMATION

WORKING CAPITAL

(IN THOUSANDS OF U.S.$)

	1982	1983
CURRENT ASSETS		
Cash-Min Operational	22,000.00	3,567.56
Inventory		
Urea		5,600.46
Spare Parts	13,560.00	14,374.06
Total Inventory		19,974.52
Account Receivables (60 Days)		12,395.36
Total Current Assets		35,937.44
CURRENT LIABILITIES		
Materials Payables (45 Days)		589.88
Utilities Payables (45 Days)		1,307.44
Total Liabilities		1,897.32
WORKING CAPITAL	35,560.00	34,040.12

TABLE : V

OPERATING COST

(IN MILLION U.S. $)

YEAR PERIOD	1 1983	2 1984	3 1985	4 1986	5 1987	6 1988	7 1989	8 1990	9 1991	10 1992	11 1993
PRODUCTION COSTS											
FIXED COST											
LABOR EXPENSES											
OPERATING LABOR INCLUDING BURDEN	7.45	8.01	8.61	9.26	9.95	10.70	11.50	12.36	13.29	14.29	15.36
SUPERVISORY LABOR	3.90	4.19	4.50	4.84	5.21	5.60	6.02	6.47	6.95	7.47	8.03
MAINTENANCE LABOR	3.15	3.38	3.64	3.91	4.20	4.52	4.86	5.22	5.61	6.04	6.49
SUB TOTAL	14.50	15.59	16.75	18.01	19.36	20.81	22.37	24.05	25.86	27.80	29.88
PLANT OVERHEAD											
ADMINISTRATION AND GENERAL INCL. BURDEN	8.86	9.52	10.24	11.00	11.83	12.72	13.67	14.69	15.80	16.98	18.25
OTHER OVERHEAD EXPENSES	6.23	6.70	7.20	7.74	8.32	8.95	9.62	10.34	11.11	11.95	12.84
SUB TOTAL	15.09	16.22	17.44	18.75	20.15	21.66	23.29	25.03	26.91	28.93	31.10
OPERATING MATERIALS	0.28	0.29	0.31	0.33	0.35	0.37	0.39	0.42	0.44	0.47	0.50
MAINTENANCE EXPENSES	6.46	6.84	7.25	7.68	8.14	8.63	9.15	9.70	10.28	10.90	11.55
DEPRECIATION	22.14	22.19	22.22	22.24	22.32	22.38	22.46	22.54	22.65	22.78	22.95
TOTAL FIXED COST	58.46	61.11	63.97	67.03	70.33	73.86	77.66	81.75	86.14	90.88	95.98
VARIABLE COST											
UTILITIES											
FUEL NG	3.15	3.52	3.68	3.78	3.89	4.00	4.12	4.24	4.37	4.52	4.66
POWER	1.79	2.10	2.23	2.36	2.51	2.66	2.82	2.93	3.16	3.35	3.55
SEA WATER	4.82	5.80	6.15	6.52	6.91	7.32	7.76	8.23	8.72	9.24	9.80
FRESH WATER	0.74	0.87	0.93	0.98	1.04	1.10	1.17	1.24	1.31	1.39	1.48
INERT GAS											
MATERIALS											
PROCESS NG	2.93	3.34	3.43	3.62	3.62	3.72	3.83	3.95	4.07	4.20	4.34
CAT. & CHEM	1.60	1.70	1.80	1.91	2.02	2.14	2.27	2.41	2.55	2.70	2.87
TOTAL VARIABLE COST	15.14	17.43	18.21	19.07	19.99	20.94	21.96	23.04	24.19	25.41	26.70
TOTAL PRODUCTION COST	73.59	78.52	82.18	86.10	90.32	94.80	99.62	104.79	110.34	116.28	122.68
LESS INCREASE IN INVENTORY	5.60	4.30									
COST OF SALES	67.99	74.22	82.18	86.10	90.30	94.80	99.62	104.79	110.34	116.28	122.68
MARKETING	1.45	1.99	2.63	2.78	2.93	3.10	3.29	3.52	3.70	3.84	4.00
BAGS & SHIPING	9.23	11.12	12.47	13.22	14.01	14.85	15.75	16.69	17.69	18.75	19.88
TOTAL OPERATING COST	78.67	87.32	97.28	102.10	107.25	112.76	118.66	125.00	131.73	138.88	146.56

SECTION V

MARKETS AND EXPECTED PRICES

A. INTRODUCTION:

The marketing aspects of the planned production (i.e. 500,000 MTY of Urea) have a decisive influence on the success or failure of this Project; hence, these marketing aspects were given due consideration in the preparation of this study and an experienced consultancy firm (British Sulphur Corpn.) was contracted to conduct a detailed marketing study, including a field survey of most of the major potential markets for this Project.

The study which is included in Vol. XII is outlined in this section, in addition to the study on Marketing Arrangement and Strategy which was carried out by Taiwan Fertilizer Co. Also some additional valuable information on pricing aspects from the World Bank are outlined with the Project Team's analysis for the pricing situation.

B. UREA MARKET CHARACTERISTICS:

During the 1960's and 1970's urea has established itself as the leading growth product in the nitrogen fertilizer sector; between 1969/70 to 1976/77 consumption rose by a compound growth rate of 9.5% yearly; in the same period the non-fertilizer use of urea rose considerably, even though its rate of growth was lower than that of fertilizers (Table: I). Resulting from this difference in growth rate, the proportion of fertilizer urea grew to 87% of total urea production.

C. SUPPLY DEMAND SITUATION AND ITS FORECAST:

The soaring prices of urea in 1973/74 (see Fig. I) promoted many companies and countries to build urea plants in many parts of the world; this factor coupled with the adverse effect of high prices on demand, resulted in an over supply situation in recent years and depressed prices. This situation which prevailed since 1975 was improved considerably during the current year because the depressed price situation forced the closure of considerable production capacity in high energy cost regions like Japan or specific parts of the U.S., in addition to the effect of the demand increase due to the growth in urea use.

In order to predict the supply of urea in the near future the Consultant (i.e. British Sulphur) assessed the supply expectations on the basis of past capacity utilization rates in existing units, making allowance for appropriate improvements. Also a survey was made of all the announced projects and assessment was made for the probability of their implementation. This assessment assumed that all projects for which a feasibility study is in progress will be implemented, which is a conservative assumption. Based on that it is expected that the total production capability for urea will rise from 21.6 million ton (ton N: is the nitrogen nutrient weight) to 34.0 million ton N in 1985/86.

This increase in use of urea fertilizer was common in all regions of the world but Asia had the biggest tonnage increment, even though other parts of the world had a higher rates of growth (Table II).

There has always been a cyclical movement of prices, resulting in excessively high prices at certain periods, which trigger a wave of new fertilizer projects whose establishment result consequently in an over supply situation and depressed prices. This in turn leads to the subsequent closure of plants or the cancellation of new project (Fig. I). The effect of these cycles on the market is expected to be reduced relatively in the future due to the broadening base of the industry.

Urea production is based on ammonia which is an energy intensive product (35 million Btu is needed for each ton of ammonia) which results in a strong link between urea production and the energy supply/demand and price situation. Currently some traditional exporters like Japan are being forced out of the market due to their dependence on a relatively expensive energy source (i.e. Naphtha). This link with the energy situation is expected to become stronger in the future and that regions which have access to relatively cheap energy will be dominant in the export markets in the future.

World demand for urea both for fertilizer and industrial end uses is projected to increase to 31.2 million ton N in 1985/86. Consumption of urea for fertilizer purposes will account for 28.0 million ton N of this total. Although the most rapid rates of growth will occur in Latin America and Africa, it is Asia which will constitute the largest growth market in absolute terms, accounting for over half of the increase in world total consumption during the period to 1985/86. These demand growth estimates are based essentially on an expected growth rate of 5% p.a. for total Nitrogen during the period to 1985/86; beyond that period the Consultant based the demand projection on a total Nitrogen Fertilizer growth rate of 3.6% p.a. for 1985 to 1990 and 3.5% during the period 1990 - 1998. These projections are more conservative than those of other agencies (e.g. UNIDO, FAO) but even though such low growth rates are assumed, the resulting growth in demand will require the construction of 300 new 1000 MTD ammonia plant (same size of the planned plant) between 1985 and 1998. By comparison the UNIDO projections require the construction of at least 450 new 1000 MTD ammonia plant between 1985 and 2000 to meet the demand.

In attached Table III the growth in urea production till 1985/86 is shown by region while Table IV shows the expected growth of demand till 1985/86. In Table V the Supply/Demand situation till 1985/86 is shown by region. It can be noted that even though an over supply situation will prevail till the end of that period, the expected over supply will diminish rapidly

after 1983/84 matching the start up of this project. In Table VI the regional Supply/Demand situation in 1990/91 is outlined.

In the 1990's, production facilities especially those oriented towards export markets, will become increasingly concentrated in the gas rich areas of the World. Such industries are already in the early stages of development at present, for example, in the Middle East, Mexico, Indonesia and the U.S.S.R. The productive lives of even the earliest facilities in these countries will span well into the 1990's.

In addition, large emergent export sectors may appear in countries where gas reserves are not currently exploited to any great extent.

There will also be a growing concentration of production facilities as the large consuming countries anxious to retain a high degree of self-sufficiency pursue expansion plans. China and India are obvious examples here, and will number amongst the largest producers in the World, along with the U.S.S.R. China's and India's desire to achieve these aims has already been exemplified by their willingness to proceed with coal based technologies for nitrogen production.

The introduction of coal technology on a large scale is in fact a very distinct possibility and will provide the only means for some countries to maintain at least some degree of self-sufficiency

in nitrogen fertilizer production in the very long term, but the required high capital expenditure and the pollution consideration will be constraints on the wide usage of coal based plants.

As to export markets, it would appear that many of the existing outlets will become self-sufficient. For example, those in the Indian Sub-continent, which should be able to develop their native gas reserves as funds become more readily available.

Markets will undoubtedly continue to expand in the many Central and South American outlets where there is little hope for indigenous urea production, whilst many of the presently very small markets in Africa may reach the take-off stage for nitrogen fertilizer consumption in the 1990's.

The Middle East and the U.S.S.R. will be the two regions producing the largest surpluses for export, the later already committed to export 1 million t.p.a. (product) of urea up to 1987 under the terms of the U.S.S.R. / Oxy deal.

D. UREA PRICES TREND:

As shown by Fig . I, urea prices moved cyclically with the supply situation with a high sensitivity; at the same time the continuous escalation of energy cost and general inflation pushed urea prices in a general upward trend.

The Consultant identified the main factors which affect the prices and assessed the effect of each of them. A detailed analysis was made of the freight situation which showed that the projected plant will have a substantial freight advantage which will be reflected in the expected F.O.B. prices.

The Consultant has compared the future production costs of this project and the major exporters (Table VII). It is clear that the low energy supply cost will be of increasing advantage as the energy cost rises throughout the World.

The Computer forecasts of future price trend indicate a fairly stable and relatively weak level in the early year of 1980's, with a substantial strengthening of the market developing as from 1983/84. In the interests of realistic project assessment the computer model is programmed to give a floor export price range. The following points should be made to put this floor price in context :-

a) Successful marketing will always enable a supplier to achieve higher than floor price.

b) Locational advantages will mean that a Saudi producer will be at the top end of the range.

From British Sulphur (B.S.) projections, the expected achievable prices in Al-Jubail were calculated, which are considered 5% higher than the applicable floor price in Al-Jubail (which is the high range of B.S. floor price projections). This 5% increment was added as the successful marketer will be able generally to get considerably higher than the floor price as indicated by B.S. in their definition of the floor price.

In Table VIII the World Bank projections for the period up to 1990 are shown; these projections are higher than B.S. projections but if they are extrapolated beyond 1990 they will become lower (Fig. II). As the World Bank projections are based on the prices needed to give a reasonable return on new investment, it seems that B.S. projections are quite conservative for the period until 1990. Beyond 1990 the straight line extrapolation of the World Bank data implys an escalation rate of about 3.5% which is much lower than what can be expected for an energy intensive product (urea) at an era of projected energy scarcity while the B.S. projected escalation rate for that period of 7.4% seems reasonable.

It would be noted however that the World Bank projections are for N.W. Europe which makes the corresponding projection for Al-Jubail considerably higher as the Arabian Gulf FOB

prices are considerably higher than Europe prices due to its nearness to the main importing markets which result in substantial freight cost savings, this factor was not taken considered in the selection of the prices basi of the "Base Case" of this feasibility study as a conservative measure.

As the project's feasibility is highly sensitive to the prices projection it was felt that there is a need to base this feasibility study on a very conservative pricing basis; accordingly the lower of either of the two following prices projections were taken for any specific year:

- The expected achievable prices based on B.S. projections.

- The prices projection based on the World Bank's data for N.W. Europe with out taking into consideration the freight advantage of this project.

Accordingly the prices projection of the "Base Case" were according to the expected achievable prices until 1990 then they followed the extrapolation of the World Bank data (Fig. II).

The agreement with TFC stipulated that the price of the 60% of the production - which TFC guaranteed to buy - will ~~not~~ be ~~less than~~ the international price or the total cost of production, which gives is ~~a~~ higher. This guarantee is a further assurance to the Project of getting ~~a~~ good revenue even in depressed years if there will be any.

Changed as per Rm talks Nov. 4

E. POTENTIAL MARKETS:

The Consultant made a very detailed assessment of potential markets supported by a field survey in a number of them; a brief is given below on the markets of the most importance to our Project:-

1) TAIWAN, R.O.C. :

Even though Taiwan is in a surplus position at present, the demand growth coupled with the phasing out of old capacity will result in an import need of about 150,000 to 200,000 MTY of urea by the mid 1980's.

2) TURKEY:

Demand for Urea in Turkey is expected to reach about 300,000 t.p.a. N by the mid-1980s rising to some 450,000 t.p.a. by 1990. Domestic capacity expansion will lag behind demand leaving a substantial import requirement through the entire project live.

3) EGYPT:

Unless new capacity expansions are announced in the near future, Egypt will once again become an importer of Urea by the mid-1980s. Demand is expected to reach 450,000 t.p.a. N by 1990, about 50,000 t.p.a. N more than present capacity is capable of producing.

4) SUDAN.

With 1990 demand estimated at some 300,000 t.p.a. N, Sudan is certain to remain a substantial importer of urea. However, if some of the more ambitious Arab-backed development programmes are implemented, demand could substantially exceed current estimates.

5) EAST AFRICA.

In the long-term East Africa can be expected to become an important market for Urea. Regional requirements by the mid-1980s are put at about 100,000 t.p.a. N with the likelihood of a number of countries rapidly increasing usage in the post-1990 period.

6) BANGLADESH.

Demand potential in Bangladesh remains enormous but is severely restricted by distributional problems and a chronoic shortage of funds. The import requirement is expected to grow during the medium-term, approaching 200,000 t.p.a. N by the mid-1980s. Even if the Chittagong project is realized by this time, import levels are not likely to decline much below 150,000 t.p.a. N.

7) INDIA.

Despite a rapid build-up of domestic production, India will remain a major importer of Urea through the medium-and

long-term. In the first half of the 1980s requirements are expected to be of the order of 0.8 - 1.2 million t.p.a. N. The scale of importation thereafter depends on gas availability and the speed of their projects implementation. Even if the most favourable prognosis of the development of the domestic industry is taken, it is unlikely that long-term import requirements will fall below 0.5 million t.p.a. N.

8) PAKISTAN

Demand for urea is expected to approach 1 million t.p.a. N by 1990, though this will be met in large part by a domestic industry due for a major phase of expansion in the early 1980s. These developments should see Pakistan self-sufficient in the early 1980s, though additional plant will be required to obviate the need for imports in the second half of the 1980s.

9) MALAYSIA.

Demand for urea is growing steadily in Malaysia and should be reaching 80,000 t.p.a. N by 1985. A large proportion of this material is likely to come from its ASEAN colleague, Indonesia. If Petronas' long-standing plans to build a plant reach fruition, the country will be transformed into a net exporter of urea, reaching balance again towards the end of the century.

10) PHILIPPINES.

It is anticipated that total demand for urea will be in the range 300,000 t.p.a. N by 1985. Of this requirement about half will be imported from Indonesia and the ASEAN plant at Aceh. In the long-term investment in a domestic plant seems probable if import requirements are to be kept down to a reasonable level.

F. MARKET ARRANGEMENT AND STRATEGY:

A due consideration was given to the marketing arrangement and strategy of the Project, the following outline summarizes the main aspects of this issue:-

F-1. ARRANGEMENT:

According to the agreement between SABIC and TFC, TFC shall take off 60% of the Product from the new Joint Venture Company. Upon completion of the Project, TFC will take appropriate actions to adjust its production of nitrogenous fertilizers including liquid ammonia, urea and ammonium sulfate, and any future shortage of nitrogenous fertilizers and liquid ammonia as well as industrial nitrogenous raw materials in Taiwan can be replaced with urea from Saudi Arabia. After the new plant is on stream the following portion of Offtake urea will be shipped to Taiwan

100,000 M/T	in the Ist year
100,000 to 150,000 M/T	in the 2nd year
150,000 to 200,000 M/T	in the 3rd year

The balance quantity of Offtake each year will be sold to international market.

At present the urea import countries are mostly developing countries or areas compactingly located in Asia, Africa and Central and South America. Considering the export areas of urea in future, TFC will still take South-East Asia in first priority and make its own adjustments, development and promotion depending on the changing situations of international fertilizer market.

F-2. STRATEGY:

In order to maintain the normal production of the Project and to meet with the actual situations of the import countries, such as the quantities to be bought, price level and the urgency of the procurement, the Company will coordinate with TFC regarding the 60% Off-Take Product and cooperate with SABIC and TFC to decide delivery priorities and arrange shipment schedules according to the marketing plans. Of course, the marketing plans will be reviewed and revised in time depending on the changes of the international market.

There are many ways by which merchandise can be exported to the foreign market. The following ways can be used separately or combinedly depending on marketing strategy and the conditions of the individual market:-

(i) Directly sign long term contracts with import countries, guanranteeing supply quantity with prices to be negotiated each three or six months or on the basis of the average price of the urea at which the country has bought at the time of negotiation.

(ii) Directly participate in international tenders.

(iii) Directly negotiate with the import unit appointed by the import country.

(iv) Directly participate or authorize foreign firms to participate the international tenders in accordance with U.S. or other governmental regulations when urea is procured through tenders under U.S. aid or other aid.

TABLE : I

Breakdown of World Consumption of Urea 1969/70 - 1976/77

(000 tonnnes N)

	Total	Fertilizer Urea		Non-fertilizer
		Direct application	Other	end-uses
1969/70	7,569	5,658	752	1,158
1970/71	8,768	6,629	786	1,353
1971/72	9,848	7,407	904	1,538
1972/73	10,899	8,227	975	1,696
1973/74	11,147	8,256	1,027	1,865
1974/75	11,517	8,808	1,036	1,627
1975/76	12,605	9,949	983	1,674
1976/77	13,948	10,855	1,275	1,817

TABLE : II

Distribution of Urea Fertilizer Consumption by Region

('000 tonnes N)

	1969/70	1976/77	1976/77 % share
Total	6,411	12,131	100
West Europe	393	890	7.3
East Europe	1,477	2,811	23.2
Africa	158	398	3.3
North America	764	1,601	13.2
Latin America	295	671	5.5
Asia	3,281	5,692	46.9
Ocean	44	68	0.6

TABLE : III

Urea Production Forecast - By Region 1978/79 - 1985/86

(million tonnes N)

	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86
West Europe	2.47	2.73	2.78	2.89	2.92	2.99	3.05	3.10
East Europe	4.90	5.59	6.17	7.11	7.51	7.63	7.71	7.72
Africa	0.18	0.42	0.55	0.59	0.73	0.83	0.90	0.94
North America	2.46	2.49	2.69	2.82	2.92	3.23	3.43	3.65
Latin America	0.62	0.78	0.85	1.04	1.38	1.72	1.88	2.00
Asia	7.79	9.54	10.55	11.50	12.62	14.15	15.32	16.40
Oceania	0.07	0.07	0.07	0.10	0.11	0.13	0.14	0.15
TOTAL	18.49	21.62	23.66	26.05	28.19	30.68	32.43	33.96

TABLE : 1V

Urea Demand Forecast (All Uses) - By Region 1978/79 - 1985/86

(million tonnes N)

	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86
West Europe	1.76	1.90	2.07	2.24	2.41	2.59	2.76	2.94
East Europe	3.47	3.74	4.01	4.34	4.68	5.10	5.52	5.93
Africa	0.50	0.59	0.69	0.72	0.78	0.85	0.92	0.99
North America	2.52	2.72	2.90	3.09	3.27	3.45	3.64	3.80
Latin America	0.99	1.12	1.24	1.36	1.46	1.58	1.71	1.83
Asia	8.61	10.04	10.94	11.83	12.77	13.63	14.59	15.55
Oceania	0.09	0.10	0.10	0.11	0.12	0.12	0.13	0.14
TOTAL	17.94	20.21	21.95	23.69	25.49	27.32	29.27	31.18

TABLE : V

Urea Supply/Demand Balances - By Region 1978/79 - 1985/86*

(million tonnes N)

	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86
A. West Europe	0.59	0.70	0.58	0.51	0.37	0.26	0.14	0.01
B. East Europe	1.18	1.57	1.85	2.41	2.45	2.15	1.80	1.40
C. Africa	(0.33)	(0.19)	(0.17)	(0.16)	(0.09)	(0.06)	(0.07)	(0.10)
D. North America	(0.18)	(0.35)	(0.34)	(0.41)	(0.50)	(0.38)	(0.38)	(0.33)
E. Latin America	(0.40)	(0.38)	(0.43)	(0.37)	(0.15)	0.05	0.08	0.16
F. Asia	(1.20)	(0.97)	(0.92)	(0.91)	(0.78)	(0.19)	(0.03)	0.04
Oceania	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)	-	-	-
Surplus/Deficit	(0.36)	0.35	0.54	1.05	1.28	1.83	1.54	1.18

* Derived from (production minus losses at 5%) less (total consumption of fertilizer plus non-fertilizer urea).

TABLE : VI

Long-Term Urea Supply & Demand Projections - By Region 1990/91

(million tonnes N)

	DEMAND				
	Total	Fertilizer	Non-fertilizer	Supply	Surplus/ (deficit)
West Europe	3.7	2.3	1.4	2.5	(1.2)
East Europe	8.6	8.1	0.5	11.0	2.4
Africa	1.6	1.5	0.1	1.2	(0.4)
North America	4.9	3.6	1.3	3.6	(1.3)
Latin America	2.6	2.5	0.1	3.1	0.5
Asia	22.4	21.8	0.6	22.4	-
Oceania	0.2	0.2	-	0.2	-
TOTAL	44.0	40.0	4.0	44.0	

TABLE : VII

Constant or current $?

Future Production Costs Summary Table

($/tonne)

	1983	1988	1993	1998
Ammonia				
Sabic/Taifer	130.82	137.46	145.64	157.26
Pt Pupuk Srwidjaja (Indonesia)	72.14	77.50	83.80	92.26
Petrochemical Ind. Co. (Kuwait)	46.43	52.40	59.60	69.52
Libyan National Oil Co.	79.61	82.87	87.42	94.18
UKF (Holland)	109.26	156.42	225.26	326.69
Nam Hae (S. Korea)	301.14	415.30	581.73	826.41
Urea				
Sabic/Taifer	123.31	130.05	138.92	151.55
Pu Pupuk Srwidjaja	71.21	76.39	82.95	92.20
Petrochemical Ind. Co.	52.42	60.04	70.19	84.58
Libyan National Oil Co.	112.15	117.11	124.16	134.40
UKF	79.45	110.82	156.39	240.91
Nam Hae	244.42	316.63	424.30	582.06

TABLE : VIII

UREA PRICE PROJECTIONS

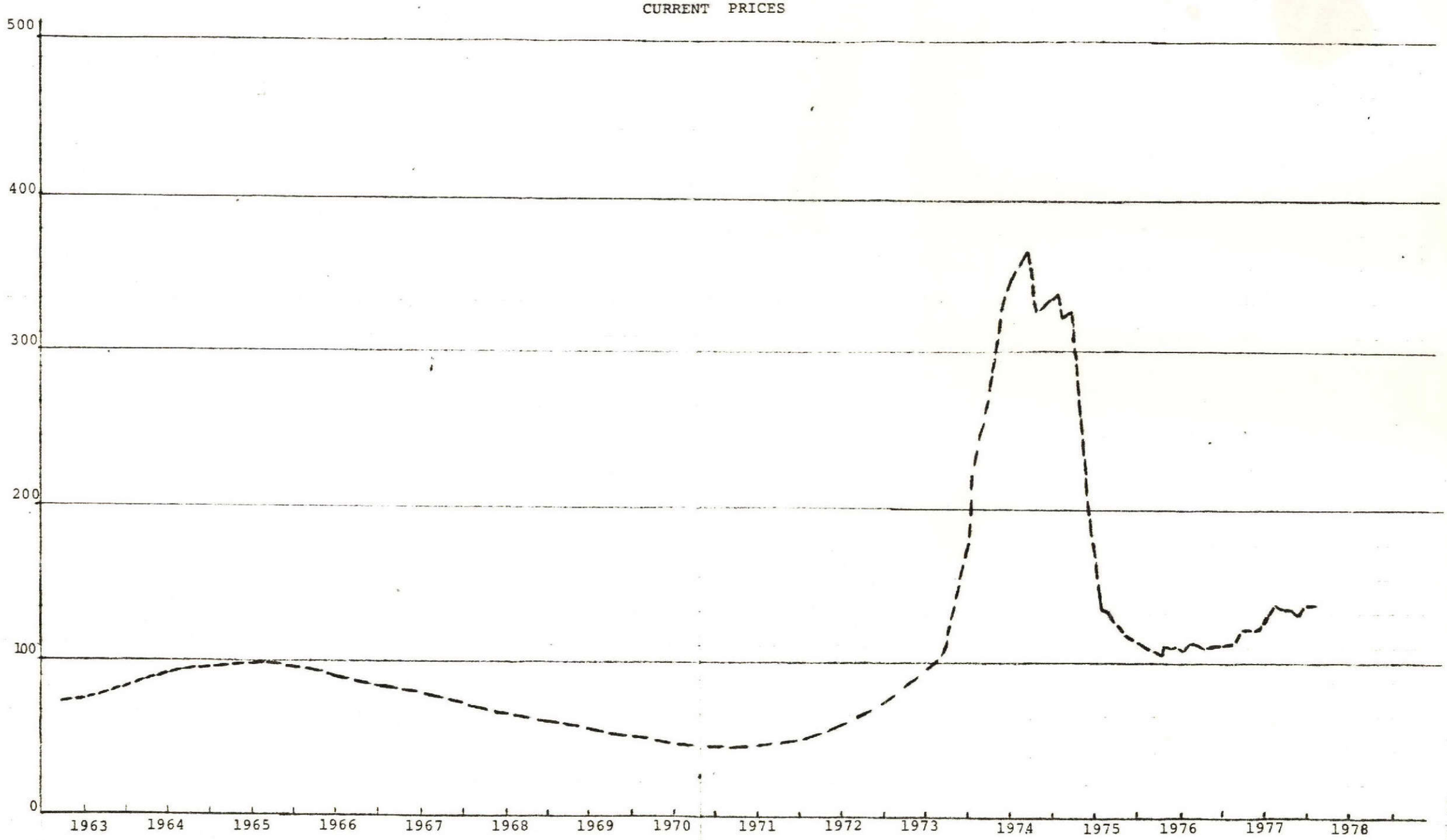
Year	Floor Price (U.S.$) FOB - Bagged.	Expected Achievable Prices (U.S. $) FOB Al-Jubail Bagged	World Bank Projections (U.S.$) FOB W. Europe Bagged
1982			187.6
1984	180 - 200	210	
1985	220 - 250	262.5	277.2
1990	306 - 335	352	354.1
1998	540 - 595	625	

FIG. I

EXPORT PRICE INDICATIONS FOR UREA BAGGED, F.O.B. W. EUROPE

(US $ PER TON OF PRODUCT)

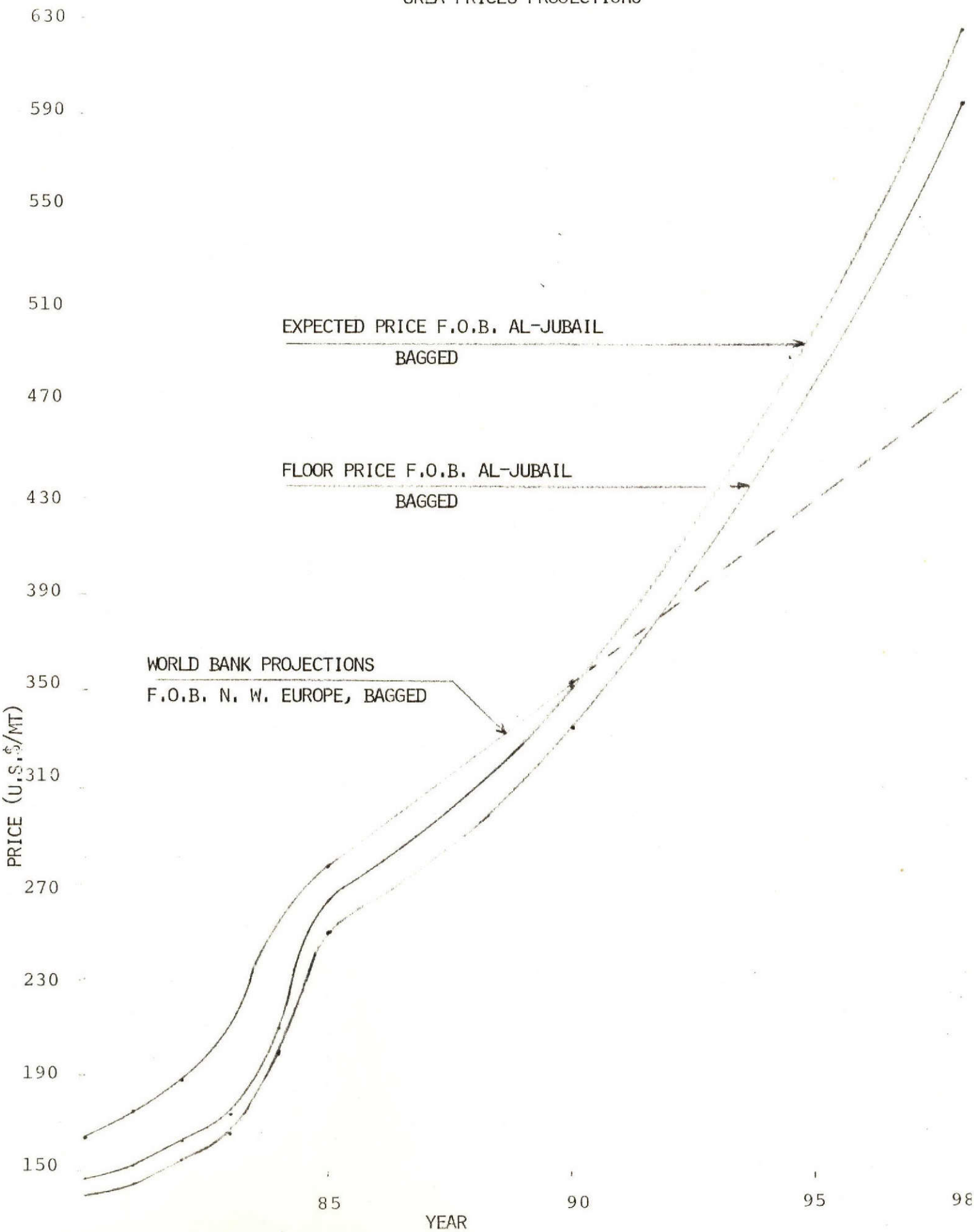
CURRENT PRICES



World Bank-17859

FIG. II

UREA PRICES PROJECTIONS



VI. PROFITABILITY ANALYSIS

SECTION VI

PROFITABILITY ANALYSIS

A. Total Capital Cost of the Project has been estimated at U.S. $ 367.67 million as summarized below:

Fixed Capital Cost	$	332.11	Million
Working Capital	$	35.56	"
Total Capital Cost	$	367.67	"

The above cost includes interest during construction amounting to U.S. $ 10.35 million on long/medium term loans proposed to be contracted from Public Investment Fund (PIF) Ministry of Finance, Kingdom of Saudi Arabia and the commercial banking system. According to SABIC guidelines, interest during construction is to be added to the principal amount of loan and repaid as part of normal instalments of principal according to repayment schedule of each loan. The resultant total Capital Cost of the Project, (excluding interest during construction) required to be cash financed from various debt and equity sources is estimated at $ 357.32 million as follows:-

Fixed Capital Cost	$ 321.76	million
Working Capital	$ 35.56	million
Total Capital Cost	$ 357.32	million

B. The above Capital Cost is proposed to be financed from the various sources as follows according to SABIC guidelines:-

Sources of Finance		Amount (million $)	Percentage
Debt	PIF	$ 214.40	60%
	Commercial Loan	$ 35.73	10%
	Total Debt	$ 250.13	70%
Equity :	Shareholders Capital	$ 107.19	30%
	Total Sources	$ 357.32	100%

The above financing arrangement inclusive of interest during construction will appear as follows:

Sources of Finance		Amt. (million $)	Percentage
Debt :	PIF	$ 222.96	60.6
	Commercial Loan	$ 37.52	10.2
	Total Debt.	$ 260.48	70.8
Equity:	Shareholders Capital	$ 107.19	29.2
	Total Sources	$ 367.67	100.00

The resultant debt/equity ratio of 70.80 : 29.2 is considered sound in view of soft terms of PIF loan i.e. low interest cost, 15 years of repayment including five years of grace after start-up, adequate cash flows and satisfactory debt service coverage demonstrated by the Project operations.

C. The Project's production facilities are expected to be completed and trial runs to be carried out by year end 1982. Accordingly it is expected to commence commercial production in early 1983 at partial capacity (90%) and achieve full production and sales level in the third year (1985) of commercial production. Although with TFC's expertise it is considered technically possible to achieve full capacity operations much earlier, in view of several constraints a slower build-up of operations has been assumed.

See Sensitivity Analysis

D. Based on various assumptions outlined in the feasibility study, the Project's operations at 90% of capacity in the first year show a loss of $ 13.5 million. Thereafter, with increase in capacity operations and unit price of urea, attainment of experience and improvement in overall efficiency, the Project demonstrates profitable operations throughout its life. It is able to service its debt

obligations conveniently and also maintain adequate liquidity as demonstrated by satisfactory Current and Quick Ratios. The Project is able to pay dividends from 3rd year of operations and throughout subsequent years. It is also able to prepay its indebtedness.

E. The following internal financial rates of return will accrue to the principle entities associated with its establishment:

SABIC	17.29%
T.F.C.	16.17%
Kingdom of Saudi Arabia	10.11%

The above return is considered satisfactory.

F. Sensitivity analysis of the"Base Case" results shows that moderate changes in investment costs construction delays upto one year, slower build up of production and sales volume do not significantly influence the I.R.R. Decrease in production volume and market price as well as increase in operating costs do have a discernible impact on the rate of return. However in the event of any one of these factors taking place to the assumed extent, the rate of return, although is reduced, yet does not decline to unattractive level for any party.

A table containing impact of changes in various parameters and their impact on "Base Case" results is attached herewith.

G. In view of the foregoing considerations, the Project is considered financially sound and commercially profitably.

SENSIVITY ANALYSIS

INTERNAL RATE OF RETURNS

	VARIATIONS	SABIC %		TFC %		KINGDOM %	
1.	Base Case IRR	Change (±)	17.3	Change (±)	16.2	Change (+)	10.1
2.	Increase in Capital Cost (+ 10%)	- 1.7	15.6	- 1.7	14.6	- 0.9	9.2
3.	Decrease in Capital Cost (- 10%)	+ 1.6	18.9	+ 1.6	17.8	+ 1.2	11.3
4.	Construction delay (one year)	- 1.7	15.6	- 1.5	14.7	- 1.1	9.0
5.	Decreased Production (- 10%)	- 4.1	13.2	- 4.2	12.0	- 2.2	7.9
6.	Slower Production Build-up)*	- 0.5	16.8	- 0.5	15.7	- 0.2	9.9
7.	Decrease in Market Prices (- 10%)	- 5.7	11.6	- 5.7	10.5	- 2.9	7.2
8.	World Bank Prices**	+ 2.6	19.9	+ 2.7	18.9	+ 1.8	11.9
9.	Increase in Operating Cost (+ 10%)	- 2.8	14.5	- 2.8	13.4	- 1.4	8.7

* First year 400 MMTONS; second year 450 MMTONS, thrid year 500 MMTONS.

? 80% 90% 100%

** See Section

for table on World Bank prices.

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SECTION VII

MANPOWER DEVELOPMENT AND TRAINING

As the development of capable manpower to operate and manage the plant is of great importance to the success of this project, and as the development of qualified and capable Saudi manpower to participate effectively in the operation and management of the Company was one of the principal aims planned by the Partners; a general manning and training plan was prepared to achieve these desired targets.

It is appreciated that the development of an entirely Saudi manned operation of this plant is going to take number of years, since there are different levels of skills and experiences needed by the various operational functions; accordingly, it is planned to make use of expatriate manpower during the Pre-operation period and the early years of operation. At the same time an active, training and development programme will be instituted to train and develop capable and qualified Saudies to replace the expatriates.

In attached Fig. I, the Organization Chart of the Company is shown with details of the number of employees needed in each section. In attached Table I a break-down is given of the number of employees according to their functions. In Table II the projected use of Saudies and expatriate and the development of their numbers

during the years of operation are shown. It can be noted that a considerable numbers of Saudies and expatriates will be needed; the supply of the Saudi manpower will come mainly from the educational and training institutes, while the expatriate to be recruited will have considerable experience in similar needed numbers.

In attached Table III the planned number of trainees is given for the Pre-operation and Operations Periods. It can be noted that training will continue even after the Saudi manpower becomes predominant, because the training needs will continue due to manpower attrition. The training and development of the Saudi manpower for this project will target on utilizing on-job training to the maximum possible extent, at the same time the facilities of Taiwan Fertilizer Co., Saudi Arabian Fertilizer Co. (SAFCO) and the plant designer (i.e. Kellogg) will be utilized. Taiwan Fertilizer Co. submitted attached Table IV which represents the minimum number of trainees TFC undertook to train in its facilities.

For the recruitment of expatriates the Company will be able to count on the help of Taiwan Fertilizer Co. as the latter undertook to supply the Company with the needed experienced manpower. Attached Table V represents the minimum numbers which Taiwan Fertilizer Co. undertook to supply.

TABLE III

SAUDI TRAINEES REQUIREMENT

CATEGORY	PRE OPERATION PERIOD				OPERATION PERIOD
	1980	1981	1982	TOTAL	YEARLY REQUIREMENT
College Graduates	15	15	15	45	
Secondary/ Intermediate Schools Graduates	10	30	50	90	
TOTAL	25	45	65	135	

TABLE IV

TRAINING PLANS AND PROGRAMS

TIME / CATEGORY	1980	1981	1982	TOTAL
ENGINEERS	10	5	5	20
CRAFTSMEN	-	15	10	25
OPERATORS	-	10	40	50
OTHER STAFFS	5	-	-	5
TOTAL	15	30	55	100

NOTE: THE COMPANY SHALL NOTICE TFC THE EXPECTED TRAINING CATEGORY AND THE DETAILED TRAINING SCHEDULE THREE (3) MONTHS BEFORE THE TRAINING DATE.

TABLE V

MINIMUM MANPOWER TO BE PROVIDED BY TFC

TIME	1980	1981	1982	TOTAL
CATEGORY				
SENIOR STAFFS & MANAGERS	4	2	2	8
SUPERINTENDENTS, SUPERVISORS & ENGINEERS	10	15	20	45
CRAFTSMEN & OPERATORS		30	70	100
ADMINISTRATIVE STAFFS	6	8	8	22
TOTAL	20	55	100	175

NOTE: THE COMPANY SHALL NOTICE TFC THE REQUIRED PERSONNEL, ITS NUMBERS AND CATEGORIES THREE (3) MONTHS BEFORE THE EMPLOYMENT DATE.