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UNITED STATES INTERNATIONAL DEVELOPMENT OFFICE
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

file 311
0432

July 28, 1983

INFORMATION MEMORANDUM FOR THE ASSISTANT ADMINISTRATOR, BUREAU FOR ASIA

THRU: DAA/ASIA, Eugene Staples

FROM: ASIA/PD, G. R. van Raalt

SUBJECT: Pakistan - Fauji Fertilizer Project Completion Report

The enclosed report summarizes the history of the Fauji Fertilizer Project in the Punjab, Pakistan, and provides a status report upon the occasion of official completion of this AID-assisted activity.

Fauji was conceived in the mid-1970s as a part of USAID's vigorous fertilizer promotion program in Pakistan. The 569,000 metric ton annual production capacity of this natural gas-based plant was designed to meet Pakistan's nitrogenous (urea) fertilizer requirements into the 1980s together with other fertilizer plants already in place. This objective has been achieved with start-up of the Fauji plant. The impressive \$285 million facility, now on-stream since June 1982, includes a 1725 ton per day ammonia/urea plant, a 52 kilometer gas pipeline, a 36 megawatt power plant, and a new township for 600 direct employees with houses, school, hospital and other amenities. AID's loan of \$40.2 million (final amount disbursed) was part of a \$202 million equivalent multi-donor lending package dominated in roughly equal shares by IDA, the German KFW, and AID.

The initial year of production has gone smoothly, with 564,000 tons of urea produced and 80 percent of this sold through Fauji's new, extensive marketing system.

An important ancillary benefit of the Fauji Project to Pakistan is the foreign exchange savings arising out of domestic substitution for \$62 million worth of annual urea imports. Thus, the foreign exchange costs of the project can be recovered in approximately three years of operation.

No project of this magnitude is without problems, however. The major U.S. equity investor, AGRICO, withdrew from the project as the world fertilizer market softened in the late 1970s in the face of heavy OPEC urea production. The project was substantially delayed by the general contractor's unfamiliarity with the lenders' procurement rules. The economic rate of return, now projected at only 9.6 percent over a ten-year operating life, has been substantially lowered from the 1978 estimate of 23 percent due to global fertilizer production over-capacity. Labor costs skyrocketed in the face of devaluation, and lender coordination, especially in the early stages, was too loose.

The project appears to be an overall success, playing an important supporting role in reaching Pakistan's agricultural production goals. We have also learned a few lessons:

- AID should soberly assess the comparative economic advantage of any import substitution project. Could the trend in world urea prices have been more accurately predicted at the time the project was launched?
- AID must put in sufficient effort to facilitate contracting and procurement, especially when multiple lenders are involved. A project of this magnitude is not without staffing implications.

Attachment:
Project Completion Report

391-0432

File -
Faaji Fertilizer



AMMONIA UREA COMPLEX
GOTH MACHHI
PAKISTAN

PROJECT COMPLETION REPORT

**FAUJI FERTILIZER COMPANY LTD.
FINANCE**

FAUJI FERTILIZER COMPANY LIMITED

Major General (Retd) Rao Farman Ali Khan
Chairman & Managing Director

Harley Street
RAWALPINDI Pakistan

Mr. G.R. Van Raalte
Director Asia PD
Room 3318 N.S.
Agency for International Development,
Department of State,
Washington D.C. 20523
U.S.A.

Ref: F.250
July 5, 1983

Dear Sir,

FFC Project Completion Report

As you are aware FFC has successfully completed its ammonia-urea project with the assistance of the Government of Pakistan, foreign and national lenders, equity partners, consultants and contractors.

Because of the complexities involved in the setting up of such a large scale plant we did go through periods of difficulties and as a consequence some project delays did occur. However, it is gratifying that the plant as finally completed incorporates the latest and well proven technologies.

FFC has now prepared its project completion report which identifies the various stages of the project preparation and implementation, and contributions of the various participants.

FFC wishes to express its appreciation to the Government of Pakistan, the lenders, financial institutions and equity partners, consultants and contractors who have contributed in the joint efforts in constructing a viable, modern plant capable of producing 569,000 M.tons of prilled urea *annually* which will go a long way in meeting Pakistan's agricultural input needs and save valuable foreign exchange.

A copy of the report is enclosed for your information.

Yours faithfully,

Farman

MANAGING DIRECTOR

Attachment: a/s



FAUJI FERTILIZER COMPANY LIMITED

AMMONIA UREA COMPLEX
GOTH MACHHI
PAKISTAN

PROJECT COMPLETION REPORT

Has, ^{Pak.} urea self - sufficient been achieved?
What are Hussein's views?
What role did AMIC play as "operating company"??



FFC AMMONIA UREA COMPLEX

PROJECT COMPLETION REPORT

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KEY DATA

	Appraisal Plan 1978	Actual/Current (1982)
Financing (US\$ Million)		
Debt	190.4	202.3
Equity	81.6	82.2
Total	272.0	284.5
Costs : (US\$ Million)		
Foreign currency	163.6	174.7
Local currency	108.4	128.8
Loans		
Effective dates	June 1978	December 1978 to Sept 1981
Closure dates	June 1982	June 1982 to March 1983
Project		
Commencement	May, 1978	June 12, 1978
Mechanical completion	September, 1980	December, 1981
Commissioning	February, 1981	May, 1982
Commercial production	July, 1981.	June, 1982
Project completion	October, 1981	September, 1982
Final acceptance of plant	June, 1981	March, 1983
Project Scope		
Ammonia unit (TPD)	1,000	1,000
Urea unit (TPD)	1,725	1,725

Financial rate of return after tax (%)	13.6	14.0
Economic rate of return (%)	22.7	9.6

Why??
discrepancy
9

OTHER DATA

First Proposal 1975

Government sanction December 1977

Negotiation 1977/1978

Engineering/Construction Agreements:

Execution May 1978

Effective date June 1978

Loan Agreements

	<u>IDA</u>	<u>US.AID</u>	<u>KFW</u>	<u>KFAED</u>	<u>DND</u>	<u>ISC</u>	<u>LC</u>
Effective dates	December 1978	January 1979	January 1979	Sept 1981	Jan 1981	June 1978	Jan 1979
Closing dates	June 1982	March 1983	Dec 1982	Dec 1982	Mar 1983	-	-

Borrower For IDA, AID, KFW, KFAED and DND - GOP
For ISC and LC - FFC

Executing agency FFC

Fiscal year of borrower (GOP) July - June

Fiscal year of user (FFC) January-December

Country exchange rates

	<u>US\$ 1</u>	<u>DM 1</u>	<u>D.Kr</u>	<u>Kt-Din</u>
Appraisal date (June 1978)	Rs.9.90	4.16	1.77	36.35
Project implementation Period (June 1978 to Sept 1982)	Rs.10.03	5.07	1.24	39.02
Project completion date (Sept 1982)	Rs.12.47	4.97	1.42	42.89

Lenders project reviews

<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
November	February	March	April	February	March
	March	June	November	June	
	June	October		November	
	October	December			

ABBREVIATIONS AND ACRONYMS

FAUJI	Fauji Foundation
FFC	Fauji Fertilizer Company Limited
GOP	Government of Pakistan
HT A/S	Haldor Topsoe A/S
IFU	Industrialisation Fund for Developing Countries
IDA	International Development Association
USAID	United States Agency for International Development
KFW	Kreditanstalt für Wiederaufbau
KFAED	Kuwait Fund for Arab Economic Development
DND	Danida
ISC	Italian suppliers credit
LC	Local Consortium of financial institutions and banks
ICP	Investment Corporation of Pakistan
NIT	National Investment Trust
PIDC	Pakistan Industrial Development Corporation
SP	Snamprogetti S.p.A,
AQ	Aquater S.p.A
JCE	James Chemical Engineering Inc.
ANIC	Anic S.p.A,
MSCF	Thousand standard cubic feet
BTU	British thermal unit
MT	Metric tons
FROR	Financial rate of return
EROR	Economic rate of return
ICB	International competitive bidding
TPD	Metric tons per day
TPY	Metric tons per year
AGRICO	Agrico Chemicals Corporation
FAFCO	Fauji Agrico Fertilizer Company
NFC	National Fertilizer Corporation
EXXON	Exxon Chemical Pakistan Limited
EBASCO	Ebasco Services Inc

INTRODUCTION

This report describes the background, scope, implementation and objectives of the FFC ammonia - urea project at Goth Machhi, District Rahim Yar Khan, Pakistan.

The project, in its present form, was sponsored jointly by FAUJI and HT A/S, as sanctioned by GOP in December 1977.

Project engineering and construction agreements became effective on June 12, 1978, mechanical completion was achieved in December 1981, and the plant was commissioned by May 1982.

Commercial production of FFC 'Sona' urea commenced on June 14, 1982.

PROJECT IDENTIFICATION, PRE-APPRAISAL AND APPRAISAL

1.1 Project scope origin and evolution

The project owned by FFC consists of a new natural gas-based 1725 TPD urea plant including an intermediate 1000 TPD ammonia plant, a 52 kilometers pipeline to transport gas from the Mari gas field, all related infrastructures and facilities, and a housing colony.

The original project was prepared by FAUJI-AGRICO in 1975, and financing for the project had been agreed by US.AID, IBRD and KFW during 1975-76. The overall parameters had been defined and basic agreements negotiated to follow up the GOP sanction of April 1975. Project activities were commenced with the signing of the FAUJI-AGRICO agreement in early 1977. However in May of 1977 AGRICO withdrew from the project. This necessitated restructuring of the project and its financing. The restructured project was appraised and approved by the GOP and lenders in 1977/78.

1.2 Project feasibility preparation

The project feasibility was originally prepared jointly by FAUJI and AGRICO in 1975 and updated in 1976. The 1976 feasibility envisaged an estimated outlay of US\$.260 million with an overall ceiling of US\$.272 million to cater for contingencies.

The feasibility was revised in 1977-78 to incorporate the project structural changes resulting from replacement of AGRICO's equity and technical know-how by (HT) A/S, IFU and ANIC. However at that time it was not considered advisable to recast the cost estimates as this would have undoubtedly resulted in delay in commencement of the re-structured project.

Helder T. Pires

1.3 Lenders role in project preparation, negotiation and loan effectiveness

The lenders had appraised the project in 1975 and 1976 (US.AID had sanctioned its loan in April 1975 and IBRD/KFW had committed their funds in 1977). However the re-structured project was reviewed and lender feasibilities prepared in 1978.

The principal lenders agreed to the GOP request for financing the re-structured project by extending loans to the GOP upto US\$.135 million equivalent in 1977/78. The IBRD commitment to FAFCO was therefore taken over by IDA as a development credit to GOP.

Lenders stipulations for ensuring efficient project implementation and operation, were agreed to by the project - sponsors, GOP and FFC. These were embodied in the basic agreements and were designed to assist FFC in developing an efficient fertilizer distribution network, generating adequate funds for meeting debt-servicing needs of the Company and for providing a guaranteed return to shareholders at specified operating efficiencies during the first ten years of operation. An agreement was also executed to ensure adequate and timely supplies of natural gas from the Mari gas field.

All conditions precedent set by lenders were fulfilled by the GOP and FFC and the principal loans became effective during the last quarter of 1978 and first quarter of 1979.

1.4 Project description and objectives

The FFC ammonia urea complex has been constructed on 557 acres of freehold land acquired by the Company in Goth Machhi, district Rahim Yar Khan, Punjab. The site is on the main national railway line and adjacent to the national highway almost equi-distant between Lahore and Karachi. The plant is near the Mari gas field and the two existing urea plants of EXXON at Dharki and NFC (Pak Saudi) at Mirpur Mathelo, both in the province of Sind. The plant includes facilities for storage of 5000 MT ammonia and 55,000 MT of bulk urea,

a 36 Megawatt power generating plant, liner plant, chemicals and spares storage, workshop, laboratory, and urea bagging, loading and road-rail despatch platforms and facilities. FFC township consists of various categories of housing units, hospital, schools, commercial centre, recreational facilities and a temporary air-strip for light aircraft.

big
infra
facilities

The plant utilises modern, commercially tested technologies, HT A/S ammonia process and SP urea process.

The project was designed to eliminate Pakistan's expenditure on imports of nitrogenous fertilizer by increasing local annual capacity by 570,000 MT (262,000 nutrient tons), and to accelerate consumption of fertilizers in the country to achieve the overall objective of increased agricultural output.

FX
savings -
see
also
page 24

PROJECT IMPLEMENTATION AND MANAGEMENT

2.1 Project scope

The project scope as formulated in 1977/78 and narrated in the preceding section on project description, has remained basically unchanged. Minor modifications, agreed to by the lenders, comprise of the change from steam-power to gas turbine power plant and purchase rather than hire of a substantial portion of construction equipment and tools.

2.2 Project management system

Project implementation was managed by the project group with assistance from the technical advisors (JCE) mainly in the areas of contractors' performance in design, engineering and procurement of goods and services and installation work at the plant site.

In late 1979, in view of the project delay, an expediting task force was instituted, headed by the Senior Technical Advisor from JCE who was designated as FFC Deputy Managing Director with the responsibility of effectively co-ordinating the engineering and construction contractors activities at Milan and Goth Machhi.

Project implementation progress was monitored through monthly project reviews and progress reports which identified the critical areas and action requirements. The project management team is described in Annexure 8.4.8.

2.3 Use and performance of consultants and advisors

Besides SP and HT A/S, who provided assistance in the urea and ammonia processes, FFC also obtained assistance from ANIC in training and plant operation areas and from JCE as the technical advisors to the Managing Director.

The company also retained the services of Delson & Gordon, Orr Dignam & Co and A.F. Ferguson & Co as its legal and fiscal advisors.

Expatriate consultant services utilisation is summarised below :

	<u>Personnel</u>	<u>Man Months</u>
HT A/S	9	238
ANIC	46	772
JCE	21	248
D&G	2	13
Vendor specialists	86	258
		<hr/>
		1,529
		=====

2.4 Use and performance of engineering, construction contractors & suppliers

Snamprogetti was engaged as the general contractor with the overall responsibility of handing over to the owner (FFC) the complete ammonia-urea plant designed, engineered, and constructed, using the latest proven technologies; and commissioned and tested at guaranteed prices for equipment, materials, and construction within the project completion period of 33 months from the effective date of the engineering agreement.

Gen'l Contractor's procurement record poor.

While the general contractor's performance in design and engineering was technically good, in procurement it was not satisfactory and resulted in delays. The contractor failed to pay sufficient attention to project cost and time scheduling but handed over a well constructed, modern and efficient plant.

2.5 Implementation schedule

The contracted project implementation schedule called for mechanical completion within 28 months and plant commissioning and start up by 33 months of the effective date of the engineering agreement.

As the engineering agreement became effective on June 12, 1978 the plant should have been completed and handed over to FFC on March 12, 1981. However during the initial kick-off meeting the general contractor indicated that the 33-month schedule was not achievable but that a 37-month schedule was more realistic. The contractor made no real effort to work to the 33-month schedule. Later on, the contractor revised even the 37-month schedule to 42.5 months. The plant was eventually mechanically completed in December 1981, and commissioned and tested by June 1982, stretching the overall schedule to 48.5 months.

Although the necessary monitoring and supervision systems were used to control the overall activities, the 33-month schedule could not be followed due to certain factors such as, inadequate initial preparation and planning for procurement, slow and in certain cases, inadequate responses from vendors leading to slippages in ordering and, delays in delivery of certain major and time critical equipment.

Other major factors contributing to the time over-run was the contractor's limited exposure to multi-lender ICB procurement and its unfamiliarity of working within a fixed fee and guaranteed equipment price contract.

2.6. Procurement

Procurement of goods and services, both off-shore and on-shore, was effected on the basis of competitive bidding.

For imported goods and services financed by IDA and KFW ICB procurement procedures were adopted, after consultations with these agencies. For goods and services financed by USAID limited source country procurement procedures were adopted. All these procedures ensured that bids were invited from all pre-qualified vendors, evaluated technically and economically and then purchase orders placed in such a manner as to ensure pari-passu utilisation of all sources of funding. Off-shore procurement was controlled by the FFC project group with the technical assistance of JCE, from the general contractor's central offices at Milan, Italy and its US procurement sub-contractor (EBASCO) at New York.

In the initial stages procurement was delayed due to the non-familiarity of the general contractor with lenders' procedures and reluctance of the general contractor to take purchase actions until the foreign currency loan funds became available despite FFC having arranged adequate bridge funds.

One of the benefits of ICB procurement was to enable FFC to build up its own reference list of international vendors. However, there were considerable delays resulting from these procedures which did affect the project implementation schedule as even where actions and decisions were taken promptly, the minimum time for high value orders completion was nothing less than 90-120 days.

2.7 Fertilizer distribution (seeding) programme

In order to build up the capability for marketing full production from its plant, FFC undertook a marketing development programme. This (seeding) programme commenced in the spring of 1979 and continued upto Dec 1982. During this time the Company built up its marketing and distribution organisation to cater for fertilizer sales from zero level to 650,000 TPY. This was achieved by evaluating and enlisting 1487 distributors throughout the country, and establishing fertilizer storage points at selected locations to ensure adequate and timely availability of over 100,000 MT of fertilizers in the consumption areas.

*Created
Sector
Distributors
Rep't etc*

During the programme FFC conducted numerous training courses for its marketing officers which concentrated not only on the distribution and selling functions but also recognized the importance of extension services and demonstration plots, soil testing, and informal discussion groups and meetings with the farmers to propogate the use and benefits of agricultural inputs.

By the end of the seeding programme the marketing staff comprised of 113 personnel in the field with 76 at the marketing head office and controlling offices in the regions.

The objectives of the seeding programme were satisfactorily achieved in that during the first six and a half months of FFC plant operation from June to Dec 82 the company marketed 267,000 MT of its 'Sona' brand urea as well as 110 000 MT of purchased fertilizers, thus achieving an overall efficiency of 103% of plan.

★ FFC marketing performance during the first commercial operating year, counting from June 14, 1982 through June 13, 1983 was also very satisfactory; during this period the Company sold 444,000 MT of its own product besides turning-over 160,000 MT of purchased fertilizers.

2.8 Costs, financing and disbursements

The appraisal project cost estimate envisaged capital outlay of US \$ 272 million (including over-run contingency of US\$ 11.7 million) whereas the project was completed with a total expenditure of US\$ 303.5 million . The cost variances are detailed in Annexure 8.2.

Major causes and factors leading to the cost over-runs, besides working on the basis of the 1975/76 cost estimates, were:

- extension of project implementation schedule from 33 months to 48.5 months
- change in power generation plant
- unanticipated escalation in costs relating to:
 - Government departmental works - railways, canals
 - equipment and materials
 - services and construction labour
 - construction tools and materials
 - transportation

Various measures were considered and actions taken from time to time in order to control cost over-runs. In order to minimise funds outlay the Company managed to obtain concessional rates of bank charges on its letters of credit; obtained insurance cover for the project including general contractors' liability from Pakistani insurers having adequate reinsurance arrangements, at the most economic rates; and effectively placed temporary project funds at profitable bank rates. By these measures the savings and generation of additional resources amounted to over US\$ 7 million.

The appraisal financing plan catered for sources aggregating to US\$.272 million. Financing utilized for completion of the project aggregated to US\$.284.5 million; differential of project cost of US\$. 19 million was provided by deferred debt servicing charges on loans from GOP and deferred disbursements of certain costs. The project funding sources are tabulated in Annexure 8.3

The only additional financing required by the Company was provided by the KFAED. Despite the cost over runs, the total funding needs were controlled within the total package lined-up in 1978.

Drawdown of funds was administered by the Company on the basis of quarterly/semi-annual funds forecasts, prepared by incorporating the engineering and construction physical progress and forecasts and revised PERT charts.

Aggregate disbursements during project implementation totalled US\$.277 million, as compared to the forecast of US\$.259 million. The initial disbursement of funds was slower than forecast due to principal lender funds not becoming available until the 6th to 7th project months.

9
Disbursements through lenders were generally effected smoothly. There were certain occasions where FFC was required to and did pre-finance certain goods and services from equity funds for which it subsequently obtained reimbursements. Only minor procedural problems experienced during the initial and final stages of the project were under US.AID financing which resulted in US vendors expressing concern over delays in payments.

One other factor for delayed disbursement to certain vendors was their inadequate experience of working within the lenders and SP documentation and verification procedures for obtaining payments through their bankers.

OPERATING PERFORMANCE

3.1 Commissioning and start-up

Pre-commissioning of sections of utilities started in August 1981, however start-up and commissioning activities commenced after the plant was mechanically completed in December 1981, and were completed by end April 1982. The first urea was produced on May 1 and commercial operation declared on June 14 1982. Commissioning was therefore achieved within the scheduled time of five months, but since mechanical completion had slipped by 15 months, the accumulated delay resulted in the plant coming on stream 15 months after the original scheduled date of March 1981.

The major problems though temporary, encountered during commissioning and start-up were in the following areas :

Utilities:

- Delayed passivation of cooling water system
- Gas turbine commissioning delays
- Delayed commissioning of auxiliary boiler
- Replacement of exchanger in inert gas generation
- HP BFW Pump turbine vibration, rotors repairs
- Cooling tower fan blades failure
- Instrument air compressor -suction filter modification

Ammonia unit :

- Catalysts bulk density variances and delayed delivery
- Primary reformer ID fan start up delay
- Synthesis gas compressor tripping and high vibration
- Ammonia compressor high vibration, first stage low compression ratio
- Air compressor, anti-surge control system problems

Urea unit:

- K 101 leakage on final discharge line
- T 102 damage
- Block valves failure

Start-up and commissioning activities were performed jointly by the general contractor, ANIC and FFC personnel, with assistance from vendor specialists and HT A/S personnel.

The general contractor had undertaken guarantees for raw material and utilities consumption and costs, ammonia, urea production quantities and urea quality. As the plant did not meet the product quality guarantees, during the performance tests, for moisture and biurate the contractor agreed to pay liquidated damages to FFC.

The guarantee for cost of equipment and materials was met but the guarantees for construction cost and 33-month plant completion were not fulfilled.

3.2 Manpower development

At inception of the project, the sponsors had provided qualified and experienced personnel to form the nucleus of the project management team i.e. the Project, Site and Marketing Managers from HT A/S and the Asstt. Managing Director, Manager Finance and Asstt Project Manager from FAUJI. This group was assisted by other personnel provided under the agreements with HT A/S, JCE and ANIC.

In 1979 FFC commenced its own staff hiring, training and development programmes.

These programmes, prepared in consultation between the project sponsors and ANIC (operating company), concentrated on clearly identified selection criteria and training schedules

with the aim of achieving full manning in a phased manner consonant with FFC's project progress and needs. The basic objectives of these programmes were to :

- Achieve optimum balance between experienced and fresh inductees.
- Build up overhire margin of approx 30% for operating personnel, to cater for anticipated attrition.
- Provide adequate incentives to staff to develop and stay with the company through well specified career development plans at competitive compensation levels.
- Provide exposure to its staff in project development, plant start-up and commissioning.
- Provide oportunities for development of skills and know-how through off-shore training in related fields by deployment at engineering contractors offices, vendors' workshops, at FFC plant site and ANIC plants in Italy and through participation in management courses for middle and higher management levels.
- Provide on the job training at FFC plant backed up with reorientation at the FFC training centre, established at Goth Machhi.

Through these programmes FFC managed to attract qualified personnel to meet its entire needs for its operations, marketing, finance and administrative functions.

The sum total of FFC's personnel hiring and training during the period 1978 through June 1983 can be assessed from the following tabulation:

Manpower deployment as of:	<u>Dec</u> <u>1978</u>	<u>Dec</u> <u>1979</u>	<u>Dec</u> <u>1980</u>	<u>Dec</u> <u>1981</u>	<u>Dec</u> <u>1982</u>	<u>June</u> <u>1983</u>	<u>Trained**</u>
Seeding/Marketing	13	20	55	72	110	115	105
Finance	15	40	52	62	74	79	24
Project/Operation	12	29	62	331	550	513*	475
Administration	<u>67</u>	<u>141</u>	<u>190</u>	<u>247</u>	<u>309</u>	<u>316</u>	<u>37</u>
	<u>107</u>	<u>230</u>	<u>359</u>	<u>712</u>	<u>1043</u>	<u>1023</u>	<u>641</u>
Trained***	-	5	75	233	490	641	

*Including 93 apprentice engineers and trainee technicians and operators.

**Through participation in external and in-house training programmes and management courses.

3.3 FIC organisation

The company organisation charts placed at Annexure 8.4 show some adjustments in the originally proposed patterns resulting from realignment of functions and relationships with actual needs, contractual obligations and locations of company offices and facilities.

During project implementation and initial operation of the plant the required management and information systems were developed. These included :

- Manpower induction, training and development programmes
- Integrated cost and financial accounting systems
- Revenue and capital expenditure forecasting, planning and evaluation systems
- Inventory control system
- Plant operation and maintenance procedures

3.4 Production and Capacity

The tabulation of monthly production and turnover together with trading turnover during the seeding programme are placed at Annexure 8.8.

There have been no serious problems encountered since the plant commenced commercial operation. The plant has operated smoothly except for certain problems in the synthesis gas compressor and ammonia compressor. | *

The plant's satisfactory performance is demonstrated by it having achieved 99 per cent production efficiency during the first 12 months of commercial operation ended June 13, 1983.

Operating forecasts for the ensuing 9 years are tabulated in Annexure 8.9.

3.5 Marketing

As a result of its seeding programme the company has built up an adequate network of distributors, handling capacity through its field storage points, and fully trained field force capable of marketing its entire production of urea along with purchased fertilizers throughout the country.

The marketing performance during the first 12 months of commercial operations from June 14, 1982 to June 13, 1983 was 100% of plan. Despite production from the Goth Machhi plant being much higher than planned (planned 526,000 MT, actual 564,000 MT) 80% of total production was marketed. During this period FFC managed to capture 30% of the share of the nitrogenous fertilizer market. | *

During the first six months of 1983 FFC's share of the market was 32%, slightly more than its production participation in the country.

FINANCIAL PERFORMANCE

4.1 Financial rate of return (FROR)

For determining the project FROR, the project cost has been taken at US\$.303 million (Rs.equivalent 3,027 million) in 1982 terms.

The cost and benefits streams are shown in Annexure 8.12. On the basis that the initial equity investment will be fully recovered by 1992 (by the end of first 10 years of operation) the discounted yield would be 22.7% on common stock and 12.5% on preferred shares.

4.2 Financial results

At the end of the first commercial operating period of 6.5 months, i.e. from June 14, 1982 to December 31, 1982 the company's financial position was :

<u>Capital</u>	<u>Rs Million</u>	<u>%</u>
Equity, including retained earnings	966.85	33 ^{77.3}
Debt	1,962.68	67 ^{157.0}
Total	2,929.53	100 ^{134.3}

Operating results :

Gross revenue	1,266.80	100
Operating margin	447.51	35
Net income available for appropriation	184.79	15

These results compared very favourably with those forecast in the project feasibility for the first year.

Company's financial data for the period since its incorporation on May 8, 1978 to December 1982 is summarised below :

	December 31				
	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
	(Rs million)				
Sales revenue	-	104	279	275	1,267
Net income(before taxes and interest)	-	(1)	9	(1)	582
Net income (after taxes)	-	(1)	3	(4)	187
Interest and financial charges	-	-	1	4	114
Depreciation and amortisation	-	-	-	1	172
Current assets	14	179	352	369	1,109
Total assets	101	704	2,005	3,052	3,876
Current liabilities	87	73	172	224	690
Long term debt	6	332	1,285	2,016	1,963
Equity	8	300	548	812	967
Ratios :					
Current	0.2	2.5	2.0	1.6	1.6
Debt: Equity	57:43	53:47	70:30	71:29	67:33
Debt service coverage	-	-	-	-	8

4.3 Financial covenants

The project agreements obligate the company to ensure operations within stipulated ratios, namely a current ratio at project completion and thereafter of 1.5; a debt : equity ratio of 70:30 and debt service coverage of 1.4.

The actual ratios achieved by the Company on the project completion dates as defined by lenders and GOP and at the closure of its first financial year with plant operation were :

	<u>At project completion</u>		<u>At</u>
	<u>June 13,</u>	<u>Sept 27,</u>	<u>December 31,</u>
	<u>1982</u>	<u>1982</u>	<u>1982</u>
Current	0.6	1.2	1.6
Debt-equity	72:28	71:29	67:33

Financial projections for the ensuing 10 years of operation also indicate that the company will be able to operate well within the stipulated ratios.

ECONOMIC PERFORMANCE

5.1 Economic rate of return

The FFC plant has been installed for urea import substitution; prices of natural gas and fertilizers for consumers being controlled by the GOP.

Current international urea prices show considerable deviation from the economic urea prices forecast in the 1978 feasibility; the urea price forecast for 1982 was US\$ 189 MT, and US\$ 230 for 1985 and onwards, whereas the current price is US\$ 130 MT.

major cause of lower EROR !! (that "Saudi effect")

For the purpose of EROR calculations, economic prices for urea have been taken at US\$ 160 MT-1982, US\$ 130 MT for 1983 and US\$ 150 MT thereafter. Cost of natural gas for the FFC plant has been taken at twice the price level fixed by the GOP in 1982.

Assuming a 10 year operating life for the project, the EROR for the FFC plant works out to 9.6% compared to the before tax FROR of 20.7%.

5.2 Transfer of technology

The FFC plant was the third large scale fertilizer project in Pakistan, the others being the NFC Pak-Saudi and Pak-Arab plants at Mirpur Mathelo and Multan.

During project implementation and initial operations of the plant FFC personnel have had considerable exposure of working alongside the general and construction contractors' personnel, and have gained further experience as a result of deployment at the vendors' workshops and ANIC plants at Revenna and Manfradonia, Italy.

FFC marketing personnel also had the benefit of initial technical guidance and exposure to marketing know how from HT A/S personnel.

5.3 Foreign exchange savings and earnings

Foreign exchange savings arising out of substitution of urea imports are estimated annually at US\$ 62 million. Thus the foreign exchange costs of the project would be recovered in approximately 3 years of operation.

5.4 Environmental effects

The plant as designed and constructed, ensures conformance with standards of pollution control and environmental safeguards specified by the GOP and lenders, and hence there has been no detrimental impact on the local environment.

The vigorous efforts in horticultural activities undertaken by FFC in the township and adjoining areas have considerably improved the local environment.

5.5 Other benefits

Certain major benefits arising out of the FFC project, not reflected in the financial or economic analyses in this report, may be summarised as follows :

- creation of employment opportunities for over 600 persons in one of the less developed areas of the country.
- generation of operating revenue for public utilities, irrigation, telecommunication departments.
- creation of employment and generation of substantial income for contract~~ed~~ labour and rail-road transporters.
- provision of medical and education facilities to local residents in addition to Company employees.
- assistance in government development programmes through contributions by way of corporate taxes, worker levies and differential interest gains.

LENDERS' ROLE

6.1 Overall performance and relationship with borrower and user

The GOP requested the lenders for assistance in 1975/1977 for financing part of the FFC ammonia urea project cost. USAID sanction for the FAUJI - AGRICO project was accorded in April 1975. Subsequent to AGRICO's withdrawal from the project USAID agreed to extend its sanction for US\$.40 million loan to the GOP for the restructured project sponsored by FAUJI - HT A/S. The lender appraisal was conducted by IDA in 1978 and IDA/KFW approval for financing to the extent of US\$.55 million and D.M.95 million was accorded in 1978.

During project implementation regular project reviews, normally at intervals of 4 to 6 months were carried out by lender missions. In total 15 lenders reviews were conducted upto March 1983.

During the initial stages of the project, lenders assisted the user (FFC) in one of its monthly meetings with the general contractor in Milan in November 1979 in order to point out the delays and actions in critical areas required to be undertaken by the general contractor. As a result of this joint meeting a project expediting task-force was instituted with the JCE's Senior Technical Advisor being appointed as FFC Deputy Managing Director with responsibility to ensure proper coordination of engineering and procurement efforts of the general contractor with construction activities at plant site.

6.2 Assistance in project preparation formulation and implementation

Lenders assisted in ensuring project financial viability through their requirement of execution of certain basic agreements amongst GOP, project sponsors and FFC, namely:

- Pricing and marketing principles agreement.
- Gas purchase and sale agreement.

- Investment/subscription agreements.
- Loan/credit agreements.
- Subsidiary financing agreements.
- Technical assistance/know-how agreements.

Execution and implementation of these agreements ensured that:

- Financing required was fully committed.
- FFC had access to adequate know-how and technical assistance and personnel to construct, commission and operate the plant.
- FFC obtained regular and adequate supplies of gas and other operating supplies.
- FFC investors were assured a guaranteed return on investment on agreed stipulated operating capacity levels.
- The company generated adequate resources to service its debts, and operated within adequate financial ratios.
- FFC acquired project goods and services on ICB standards.

CONCLUSIONS

7.1 Overall assessment

Lenders' appraisals indicated that the FFC project was one of the best managed projects in the developing countries despite the delays in project completion. Close attention was paid to cost control, start-up and commissioning, and initial plant operations.

Although the project experienced time and cost over-runs the very satisfactory production and marketing results achieved during the first 12 months of operation have to a considerable extent offset the adverse impacts.

During project implementation, start-up and operation of the plant FFC personnel became conversant with current international practices in design, engineering, procurement construction, and operation of a large urea plant. During this period through the various training programmes and exposure of its personnel to modern techniques, the company has developed an institutional image in the country and has already started providing assistance in technical and economic know-how fields to other fertilizer plants in the country.

7.2 Lessons for borrower, user and lenders for similar future projects

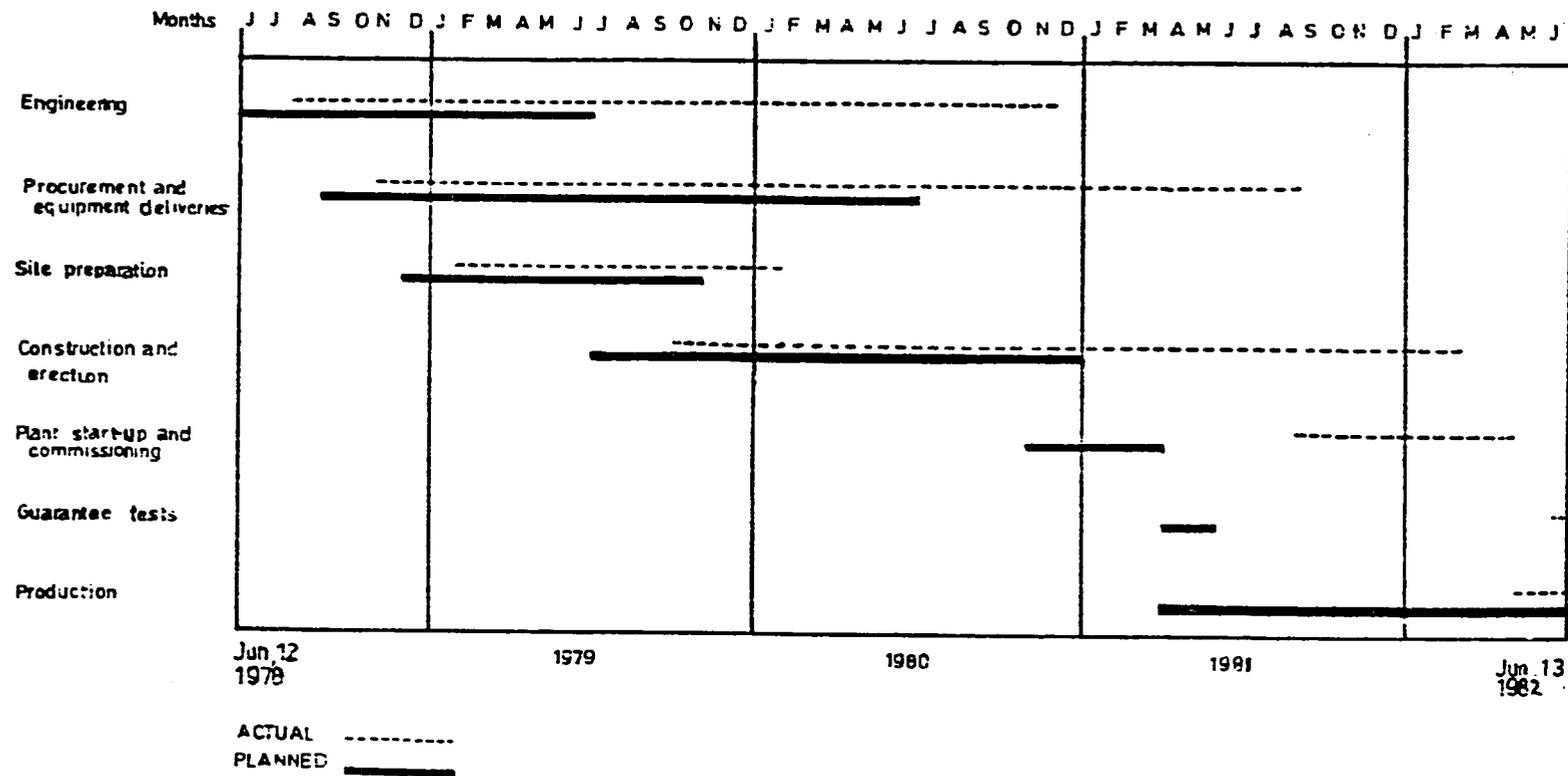
Major lessons learnt during FFC project implementation and initial plant operation are :

- A competent, fully - equipped project group must be established in the very early stages.
- Deployment of a lenders' representative with the project group, to expedite lender approvals, is necessary.

- Use of competent, established engineering and construction contractors of international repute is essential.
- Bonus/penalty contract clauses tied to implementation time and costs do not invariably help in providing incentives for within-time-and cost project completion, however lenders direct assistance in influencing the contractor proves more effective.
- Personnel training and exposure in planned areas is very essential in ensuring smooth plant start-up and operation.
- Marketing development programmes are essential in developing, recruiting and orientation of field marketing personnel, induction of whole-salers/retailers (distributors) and creating a corporate and brand image for product demand.
- Owner personnel placement at engineering/construction contractors premises is essential for adequate coordination and inter-action required for timely implementation.
- Multi-source financing procurement procedures can cause project procurement delays if not properly planned, coordinated and implemented.
- Free flow of information and constant feed-back at all levels and between groups, particularly the expatriate and owner's personnel is essential.

FAUJI FERTILIZER PROJECT
Project Implementation Schedule

ANNEXURE -81



FAUJI FERTILIZER COMPANY LIMITED

Capital Cost Summary

	<u>Appraisal Estimates</u>	<u>Actual/ Current</u>	<u>Variance</u>	<u>%</u>
	(US\$ Million)			
Land and site preparation	3.8	5.5	1.7	44.7
Buildings and structures	16.7	27.3	10.6	63.5
Equipment, materials and Spares	84.6	108.3	23.7	28.0
Freight insurance and handling	6.8	15.4	8.6	126.5
Erection, construction and supervision	23.6	44.1	20.5	86.9
Gas and water lines	6.5	7.0	0.5	7.7
Licences and engineering	15.8	18.0	2.2	13.9
Total plant cost	<u>157.8</u>	<u>225.6</u>	<u>67.8</u>	<u>43.0</u>
Township	12.0	13.5	1.5	12.5
Technical assistance	4.1	9.0	4.9	119.5
Training	0.8	0.6	(0.2)	(25.0)
Pre-establishment	3.4	1.6	(1.8)	(52.9)
Start up expenses	2.0	4.2	2.2	110.0
Stamp duties, & taxes	6.7	10.1	3.4	50.7
Admin and establishment	0.9	6.3	5.4	600.0
Base cost	<u>187.7</u>	<u>270.9*</u>	<u>83.2*</u>	<u>44.3*</u>
Physical contingencies (including provision for equipment overrun)	24.1	-	-	-
Price escalation	26.5	-	-	-
Total installed cost	<u>238.3</u>	<u>270.9</u>	<u>32.6</u>	<u>13.7</u>
Working capital	12.7	13.2	0.5	3.9
Interest during construction	21.0	32.6	11.6	55.2
	<u>272.0</u>	<u>316.7</u>	<u>44.7</u>	<u>16.4</u>

*including physical contingencies and price escalation.

CAPITAL COST

(US\$ '000')

	<u>Base Estimate</u>	<u>Actual</u>
<u>LAND AND SITE PREPARATION</u>		
Land acquisition	608	1,560
Development and preparation	2,230	1,714
Access allowance	1,000	2,266
	<hr/>	<hr/>
Sub-total	3,838	5,540
	<hr/>	<hr/>
<u>BUILDING AND STRUCTURE</u>		
Direct material	5,870	11,488
Steel structure	2,400	2,579
Piling	870	1,843
Labour	2,500	5,215
Construction Equipment	1,980	3,246
Consumable materials	820	**
Admin and servicing building	1,000	450
Other factory buildings	1,300	2,466
	<hr/>	<hr/>
Sub-total	16,740	27,287
	<hr/>	<hr/>
<u>EQUIPMENT, MATERIALS & SPARES</u>		
Furnaces	5,410	6,257
Exchangers	9,440	5,960
Convertors	2,890	2,912
Towers	1,100	2,548
Drums, tanks, filters and strainers	1,770	2,396
Pumps, compressors, blowers, diesel	9,180	12,867
Turbines, turbo generators	8,740	13,173
Boilers and special equipment	8,530	7,621
Material handling equipment	4,580	4,330
Vendors' service	880	2,734
	<hr/>	<hr/>
Sub-total	52,520	60,798
	<hr/>	<hr/>

Major increases

	<u>Base Estimate</u>	<u>Actual</u>
Piping	7,120	13,084
Electrical	3,560	4,865
Instruments	4,180	4,448
Insulation and paints	1,090	1,620
Catalyst and chemicals	2,013	3,651
Spare parts	4,600	8,314
	<hr/>	<hr/>
Sub-total	22,563	35,982
	<hr/>	<hr/>
Consumable materials	3,450	5,091
Catalyst - spare charge	2,540	472
Addl equipment & supplies	3,487	5,986
	<hr/>	<hr/>
Sub-total	9,477	11,549
	<hr/>	<hr/>
Total	84,560	108,329
	<hr/>	<hr/>

ERECTION, CONST. & SUPERVISION

Site management, construction and start-up supervision	6,752	6,952
Field expenses of supervision personnel	540	5,660
Labour	9,630	20,089
Construction equipment	4,220	6,919
Camp accommodation, field office and construction facilities	1,500	4,461
Contractors all risk insurance	910	*
	<hr/>	<hr/>
Sub-total	23,552	44,081
	<hr/>	<hr/>

*Included in Licence and Engineering Fee.

**Included in Consumables under Equipment, Materials and Spares.

DISBURSEMENT OF FUNDS

Annexure 8.3

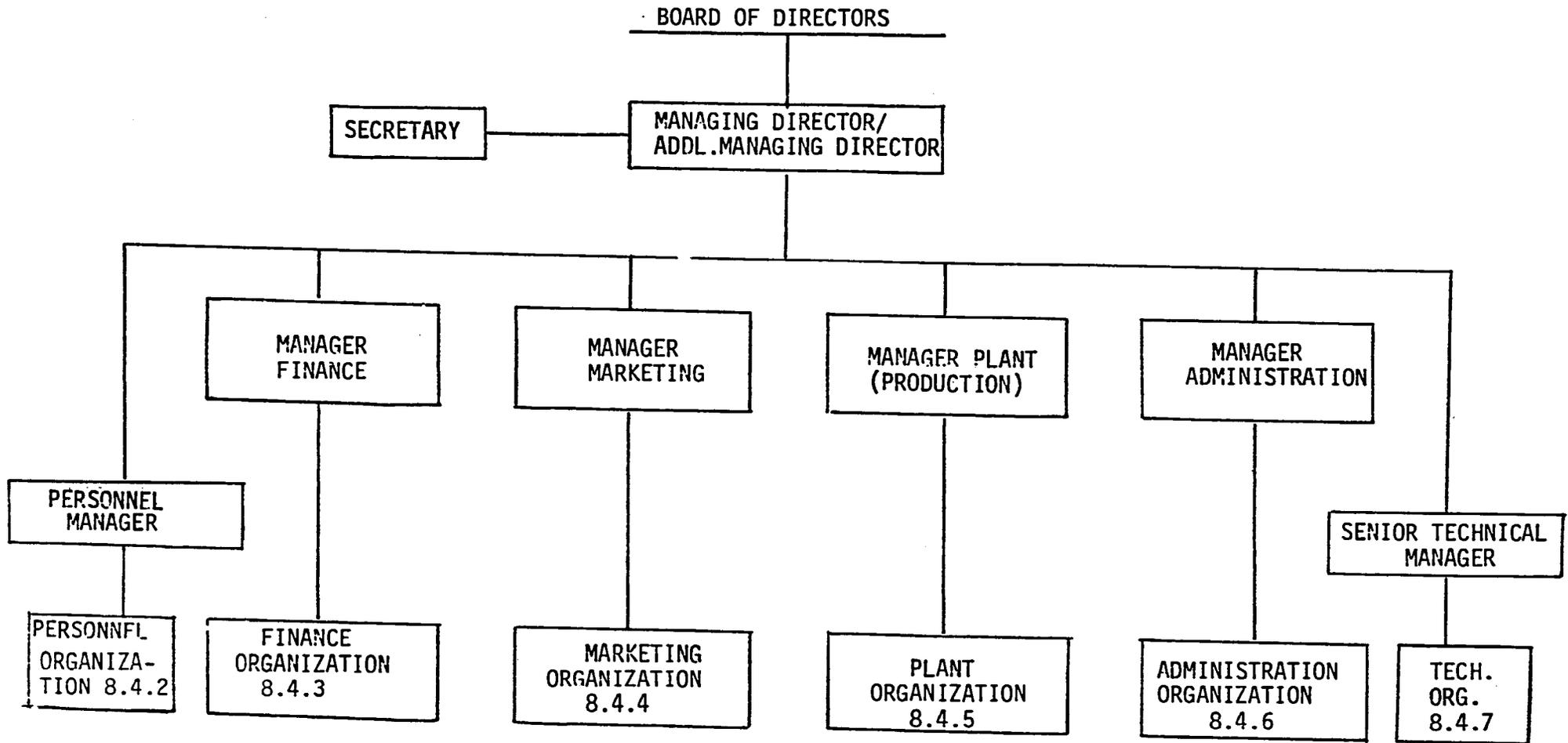
Year	Quarter	Debt sources								Equity sources			Total
		IDA	KFW	US.AID	DND	KFAED	ISC	LC	Total	Foreign	Local	Total	US\$ Million)
1978	III	-	-	0.2	-	-	-	-	0.2	-	-	-	0.2
	IV	0.4	-	-	-	-	-	-	0.4	0.1	-	0.1	0.5
1979	I	3.3	-	-	-	-	-	5.8	9.1	0.2	0.4	0.6	9.7
	II	1.3	0.6	1.0	-	-	2.0	3.6	8.5	2.8	0.3	3.1	11.6
	III	2.0	0.4	0.9	-	-	2.2	-	5.5	2.2	4.0	6.2	11.7
	IV	1.2	2.9	3.6	-	-	1.3	0.9	9.9	3.2	3.2	6.4	16.3
1980	I	7.0	3.0	7.0	-	-	2.2	5.7	24.9	1.5	6.6	8.1	33.0
	II	4.6	7.9	7.4	-	-	1.0	4.3	25.2	3.0	7.3	10.3	35.5
	III	5.2	9.9	5.3	-	-	0.3	2.6	23.3	2.3	5.8	8.1	31.4
	IV	5.9	6.1	5.2	-	-	-	3.7	20.9	1.2	1.7	2.9	23.8
1981	I	7.2	6.1	5.3	0.3	-	-	4.9	23.8	3.9	4.6	8.5	32.3
	II	7.1	3.9	2.0	1.0	-	-	6.6	20.6	-	4.7	4.7	25.3
	III	2.5	2.9	1.4	1.1	-	-	3.8	11.7	-	6.4	6.4	18.1
	IV	0.6	1.6	0.4	-	1.9	-	-	4.5	-	2.9	2.9	7.4
1982	I	0.1	2.8	0.1	0.4	-	-	-	3.4	-	9.6	9.6	13.0
	II	2.4	0.5	0.2	-	4.6	-	-	7.7	-	4.3	4.3	12.0
	III	0.8	0.2	-	0.4	-	-	-	1.4	-	-	-	1.4
	IV	-	-	0.1	0.1	-	-	-	0.2	-	-	-	0.2
				*0.1			*1.0		1.1				1.1
		51.6	48.8	40.2	3.3	6.5	10.0	41.9	202.3	20.4	61.8	82.2	284.5
		=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====

*Committed

41

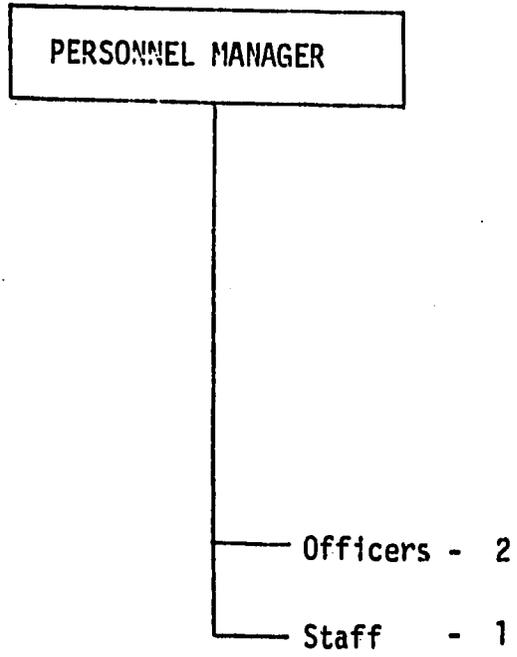
FFC ORGANIZATION

Annexure 8.4.1



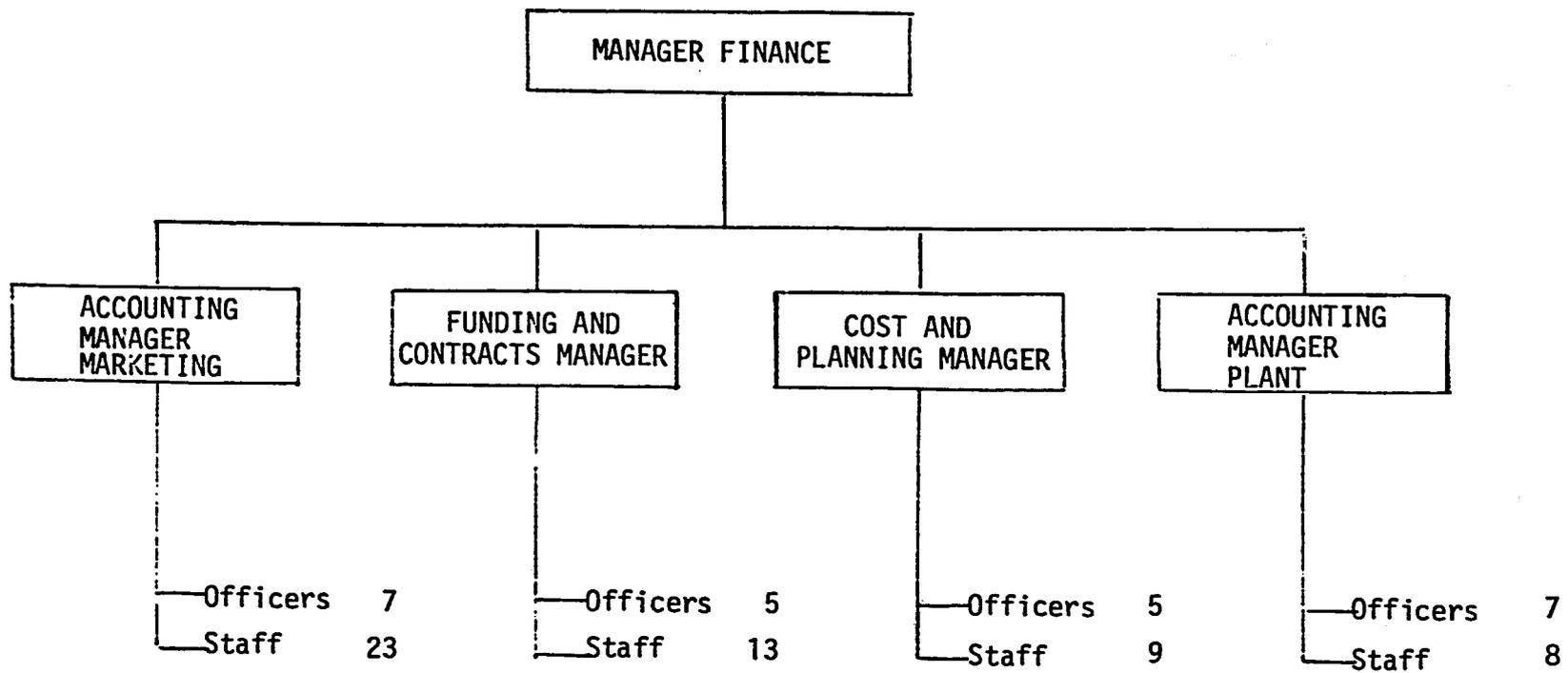
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Annexure 8.4.2



Admin support staff shown in Annexure 8.4.6

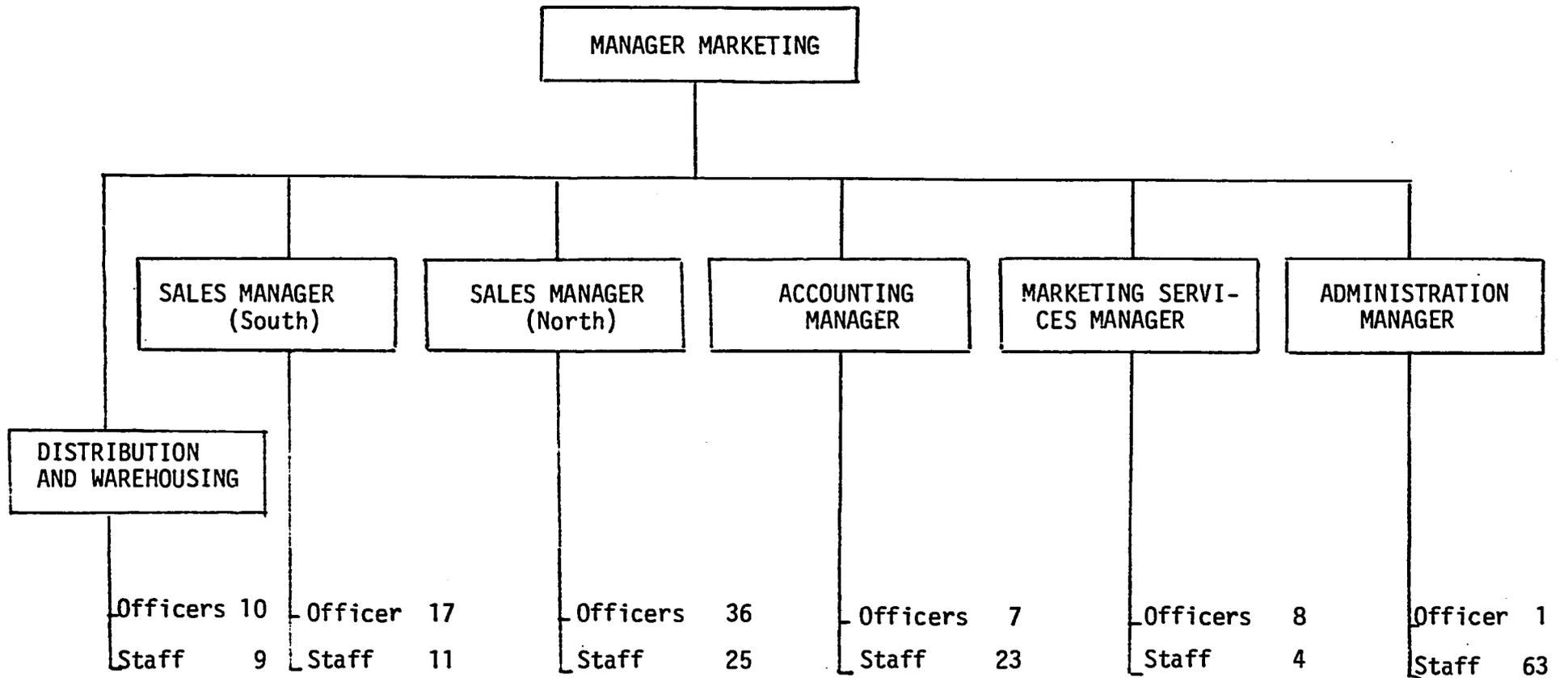
Annexure 8.4.3



Admin support staff shown in Annexure 8.4.6.

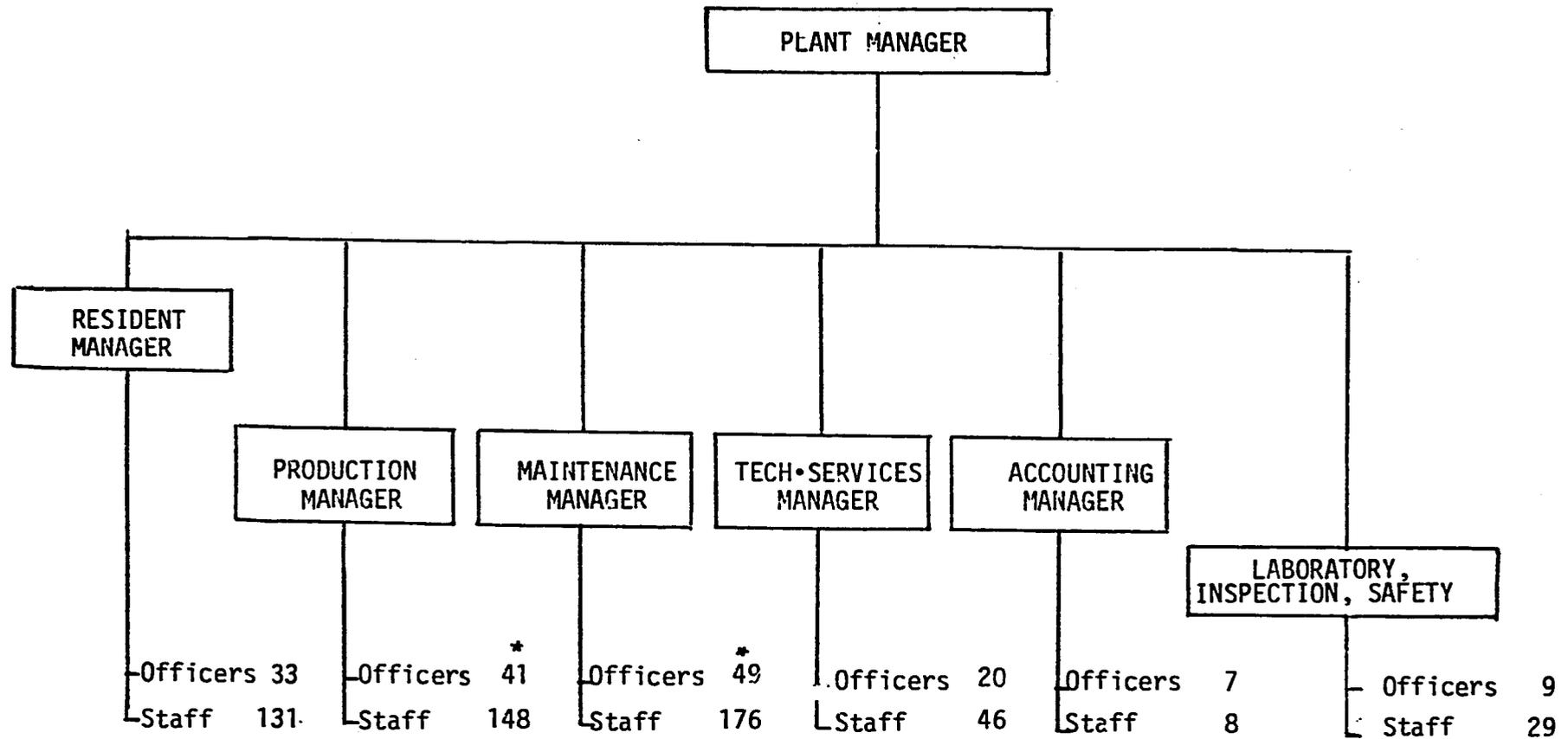
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Annexure 8.4.4



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Annexure 8.4.5

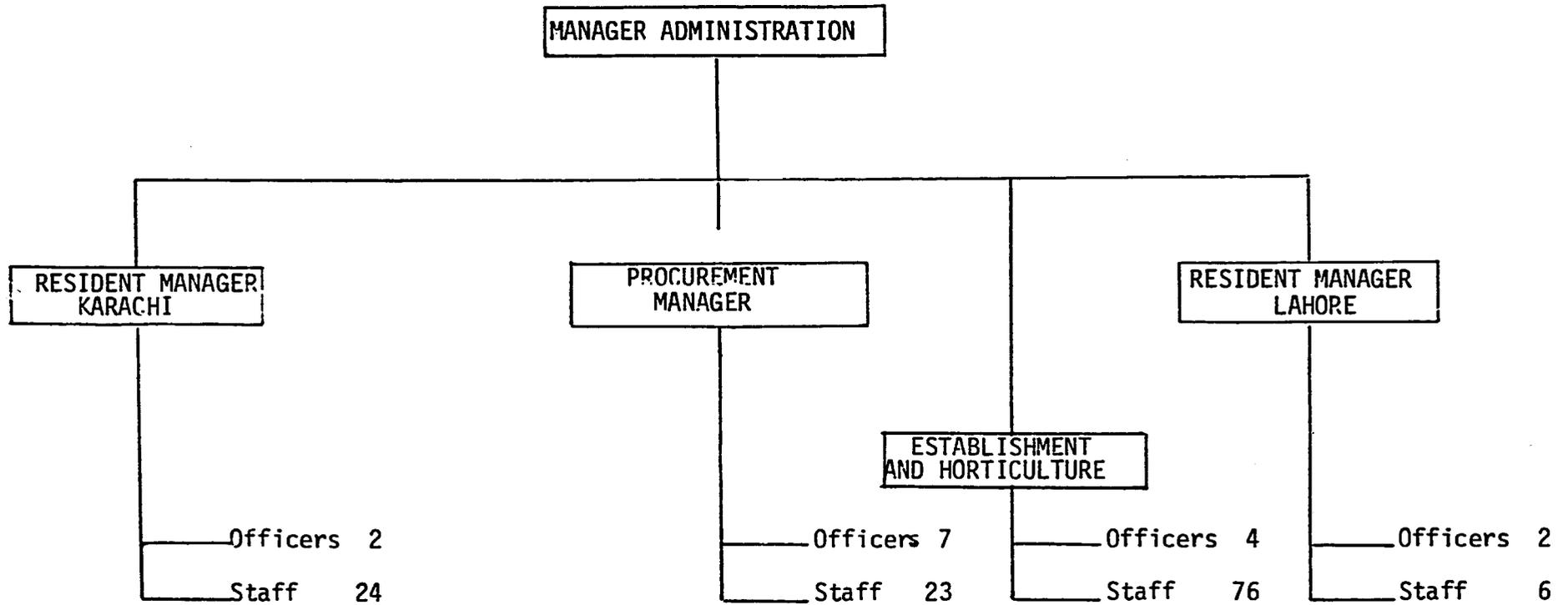


* In addition to the above, plant organization includes following expatriates:

- ANIC - 33
- HT A/S - 1

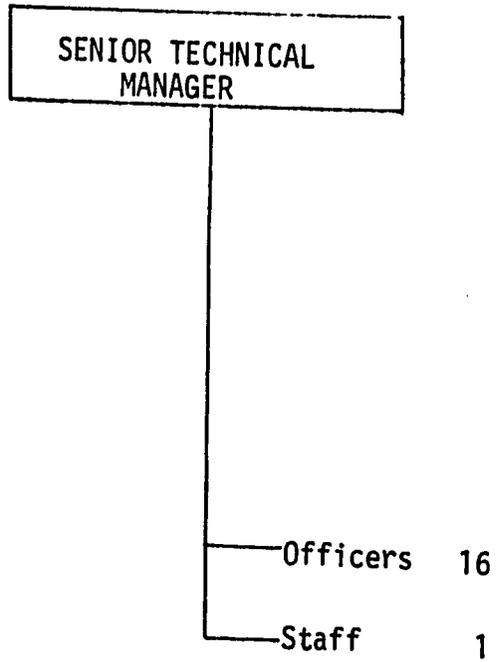
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Annexure 8.4.6



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Annexure 8.4.7



Admin support staff shown in Annexure 8.4.6.

PROJECT TEAM

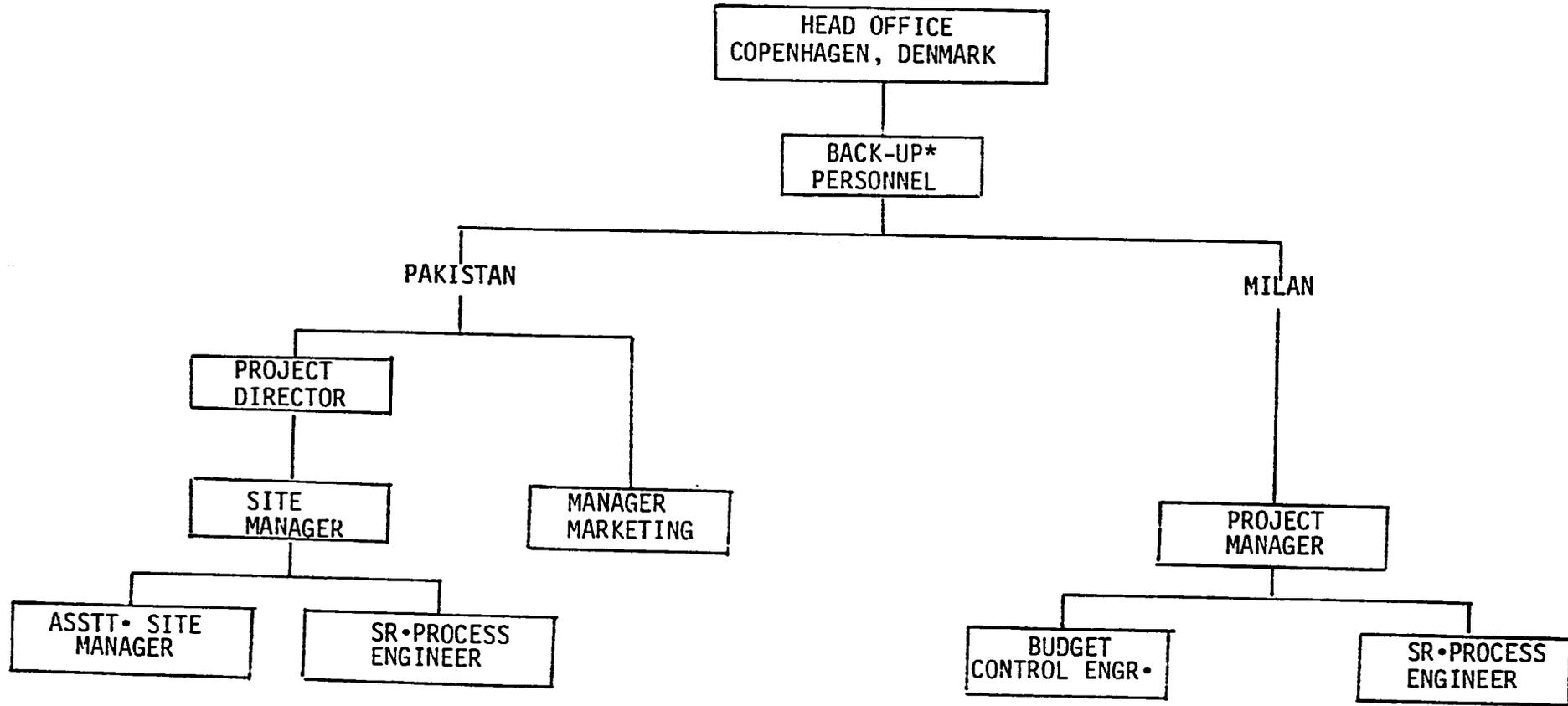
The project management team comprised of senior representatives of the sponsors and consultants in the following positions :

FAUJI	HT A/S
Chairman and Managing Director	Project Director
Additional Managing Director	Manager Marketing
Manager Finance	Project Manager
Asstt Project Manager	Site Manager
Chief Civil Engineer	Asstt Site Manager

JCE	ANIC
Deputy Managing Director/ Senior Technical Advisor	Plant Manager

HALDOR TOPSOE A/S

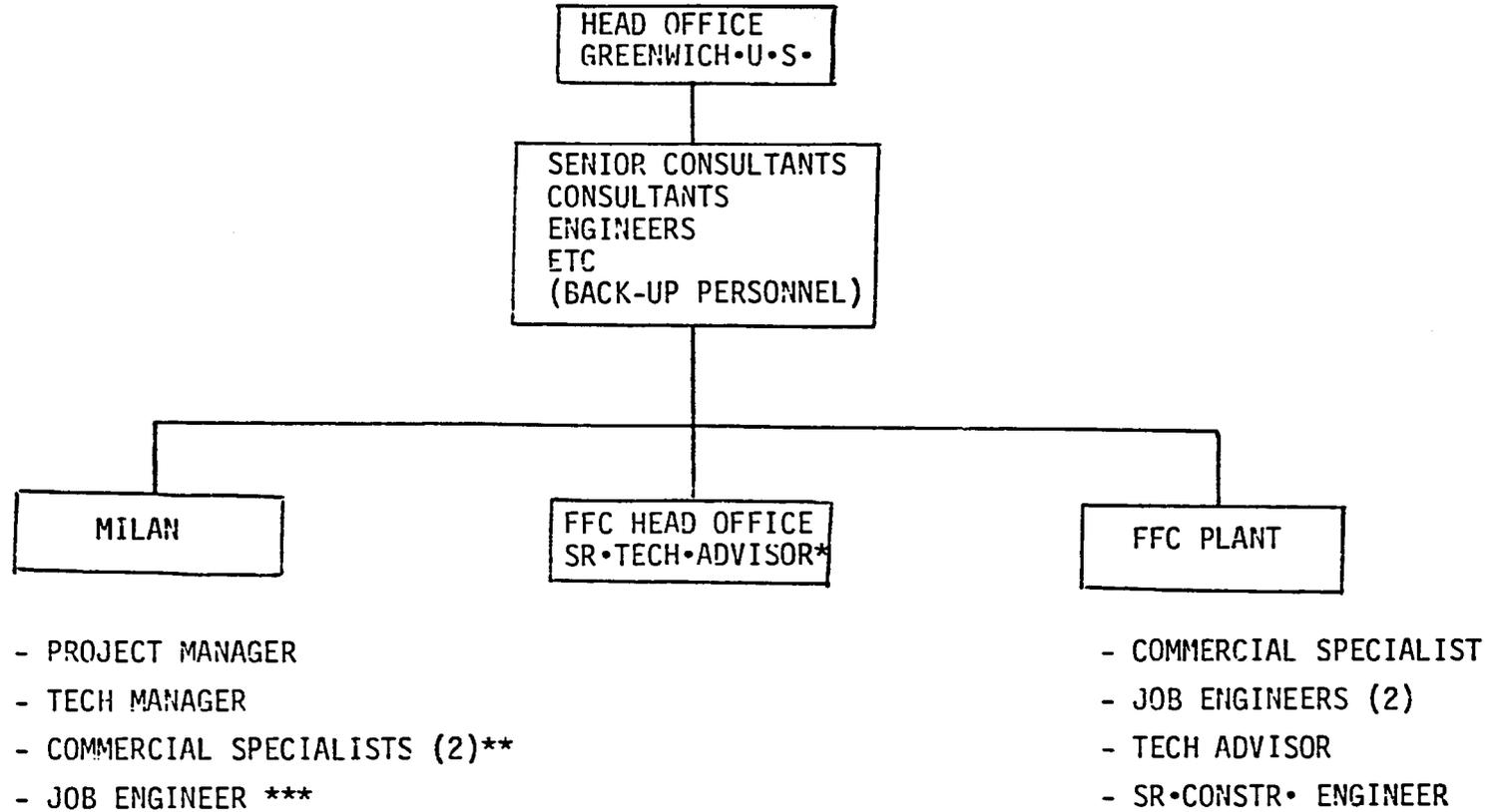
Annexure 8.5.1



* Technical assistance and know-how services from Home office -
under Technical Assistance and Know-How Agreements.

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JAMES CHEMICAL ENGINEERING INC. (JCE)



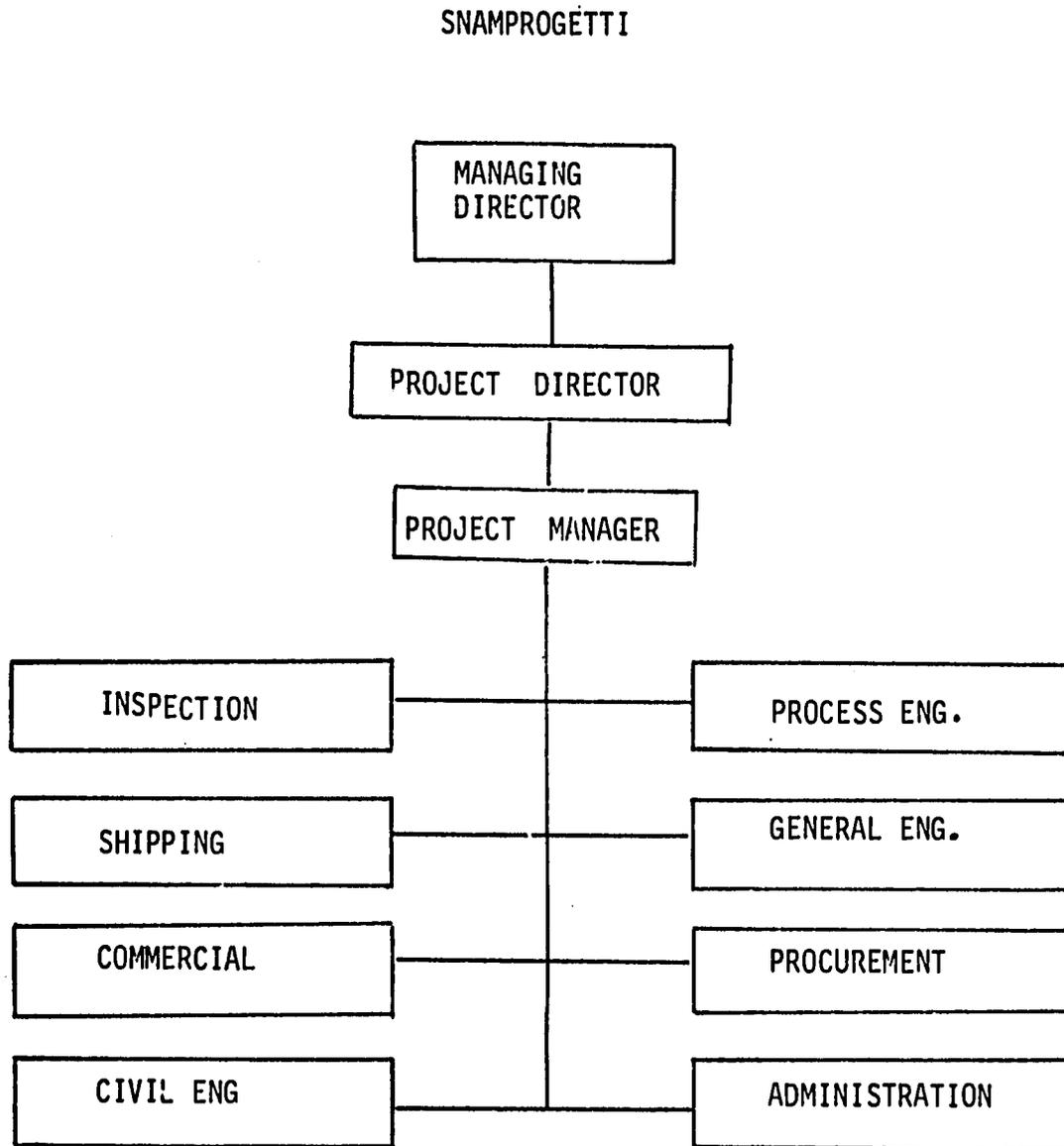
* Later, designation changed to DMD of FFC

** Later, one transferred to FFC Plant

*** Later, transferred to FFC Plant

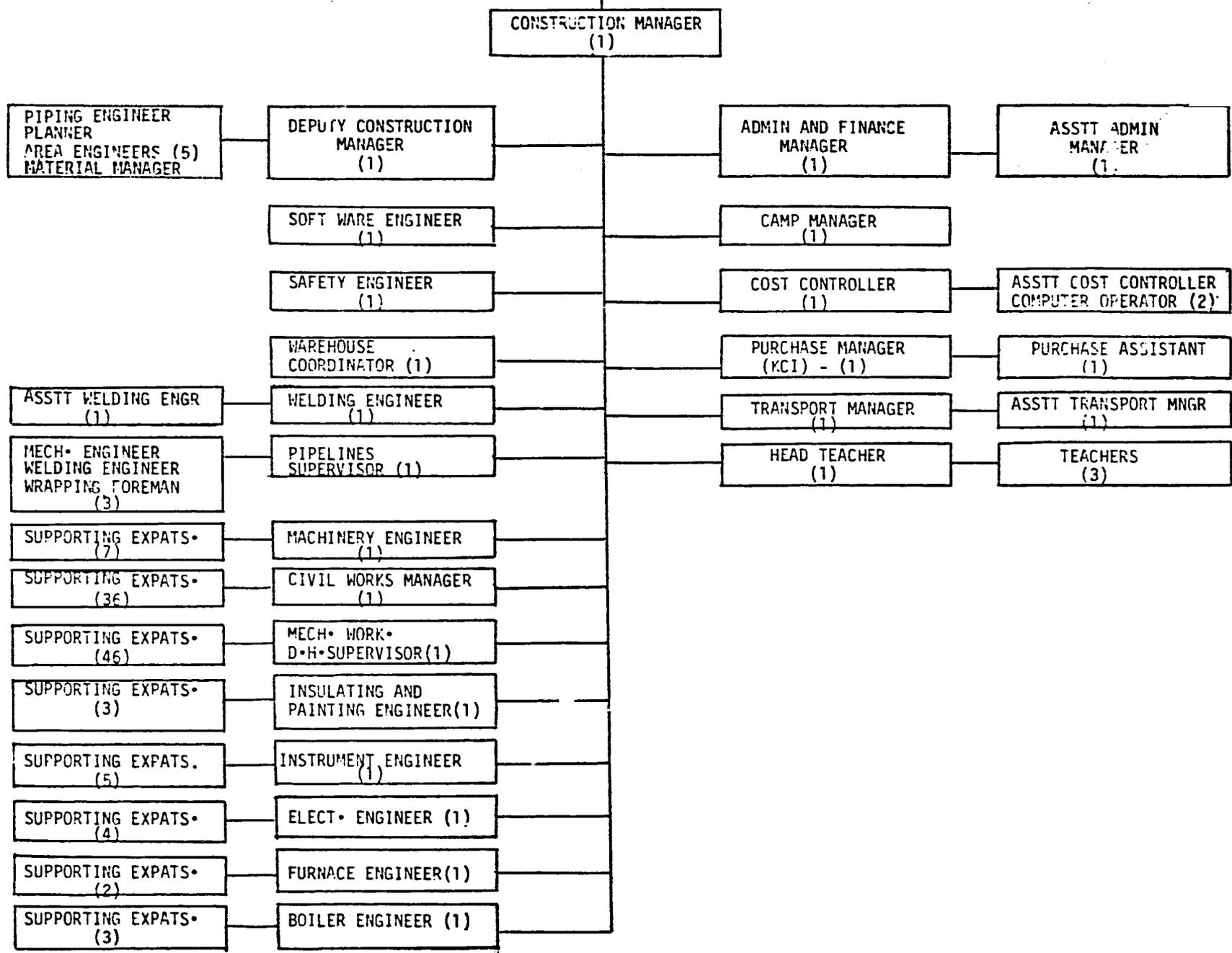
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Annexure 8.5.3



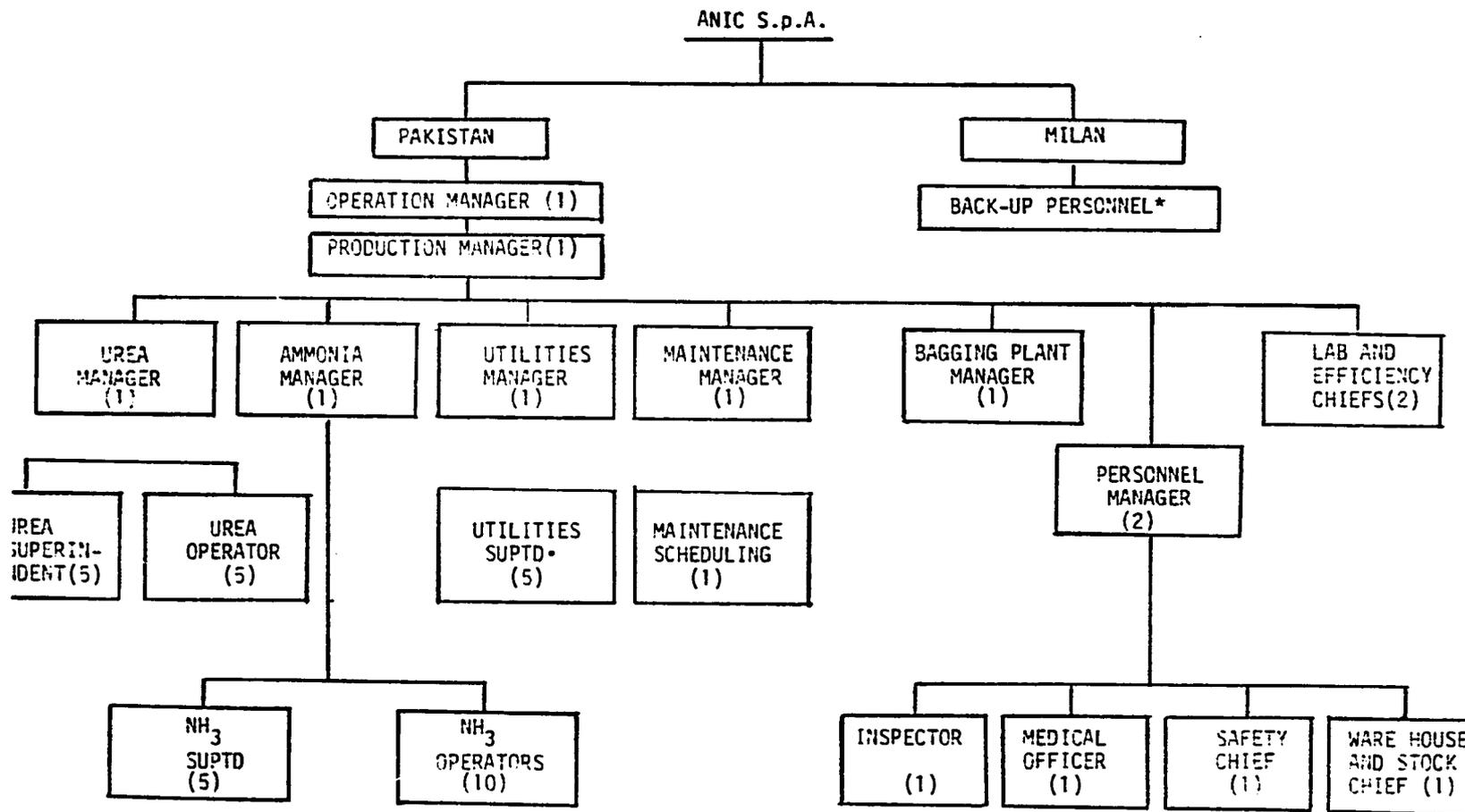
NOTE: No permanent expats, deployed in Pakistan.

AQUATER S.D.A.



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ORGANIZATION CHART



- Total Personnel Deployed : 46

* Technical assistance services from Home office, under Technical Services Agreement.

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Chronological history of significant events during project design, engineering, procurement, construction, plant commissioning and initial operation

<u>Year</u>	<u>Month</u>		<u>Event</u>
	<u>Calendar</u>	<u>Project</u>	
1977	Dec	-7	o Project sanction letter issued by GOP on December 17.
1978	May	-1	o FFC incorporated as a public limited company, in the private sector, under the Companies Act, on May 8.
			o Technical Advisor Services Agreement between FFC and JCE, signed on May 23.
			o Technical Assistance Agreement between FFC and HT A/S signed on May 24.
			o Know-How Agreement between FFC and HT A/S signed on May 24.
			o Participation and Shareholders' Agreements between FAUJI and HT A/S signed on May 24.
			o Engineering and Construction Agreements, and Amendment No. 1 (Italian Suppliers, Credit) between FFC, SP and Coming/(AQ) signed on May 27.
			o Technical Services Agreement between FFC and ANIC, signed on May 27.
			o Gas Purchase and Sale Agreement, between FFC and Esso Eastern Inc, signed on May 31.
	June	1	o Down payment (5%) letter of credit in favour of Snamprogetti established from bridge funds; Engineering and Construction Agreements became effective on June 12.

- 1978 June 1 o Initial (kick-off) meeting between FFC and SP on June 19.
- July 2 o Marketing and Pricing Principles Agreement between GOP and FFC, signed on July 5.
- o SP plant site and transportation surveys.
- o SP submits general layout plan for FFC plant.
- o SP submits proposed procurement procedures.
- o FFC/SP meeting with Ebasco (US procurement sub-contractor).
- August 3 o Investment Agreement between FFC and IFU, Denmark signed on August 31.
- Sept 4 o Development Credit, Fauji-Topsoe and Project Agreements between IDA/GOP, IDA/Fauji-HTAS-FFC and IDA/FFC signed on September 14.
- o Local Syndicate Loan (Debentures) Agreement between FFC and ICP/NIT and Pakistani nationalised banks, signed on September 19.
- o Subscription Agreements between FFC - ICP/NIT/ PIDC and Pakistani nationalised banks, signed on September 19.
- o FFC requests SP to provide revised plant steam balances.
- o FFC requests SP to revise its proposed vendors lists.
- October 5 o Amendment No 1 to the Project and Loan Agreement between USAID and FFC, for replacing IAFCO by FFC, signed on October 5.
- o Subscription Agreement between FFC and GOP signed on October 31.
- o First purchase memorandums (12), approved by FFC.

- 1978 November 6
- o Loan and Loan Utilization Agreements, between Federal Republic of Germany (KFW) and GOP/FFC signed on November 8 and 28.
 - o Danish government commitment to GOP for D.Kr. 25 million loan for FFC project confirmed on November 28.
 - o General plant layout, revision 3, submitted by SP.
 - o Anic submits preliminary plan for plant organisation, manning, recruitment and training programmes.
 - o Vendors lists approved by FFC.
 - o SP reports delay in engineering due to proposed changes in the power, water treatment and urea loading and shipping systems.
- December 7
- o IDA loan became effective on December 19.
 - o First technical bids received.
- 1979 January 8
- o KFW loan become effective on January 22.
 - o SP officially proposes revised 37 months project implementation schedule.
 - o Bid evaluation summary for urea reactor and carbonate separator approved by FFC.
 - o US.AID Loan became effective on January 8.
 - o Local Syndicate Loan became effective on January 10.
 - o FFC/SP meeting with US.AID to streamline procurement procedures and documentation.

- 1979 February 9
- o Purchase order for urea reactor placed on Mitsubishi.
 - o Procurement procedures and documents final edition for USAID, submitted by SP.
- March 10
- o Site topographical survey and soil survey for gas pipeline completed.
- April 11
- o FFC commences its Seeding Programme and starts trading in imported fertilizers in Sind, Punjab provinces.
- May 12
- o USAID approves FFC/JCE Technical Advisory Services Agreement.
- September 16
- o SP progress indicates project delay by further 6 months and construction delay of 2 months.
- October 17
- o Lenders/FFC meetings at Rawalpindi, Plant site and Milan with SP to emphasise need for immediate action in critical areas.
 - o SP presents revised 42.5 months project completion schedule.
- November 18
- o Expediting task-force set up to achieve project completion by identifying critical areas and actions required to review and streamline SP/AQ internal systems and workings, rescheduling of engineering and construction work to accommodate late equipment deliveries.
 - o FFC/ANIC meetings to plan and define plant operations, organization, local and expatriate manning, and FFC personnel training at Anic plants at Revenna and Manfredonia, Italy.



- 1980 March 22
- o One ship, transporting FF materials including slip forms for prilling tower, catches fire, some material damaged.
 - o Urea stripper fabrication reported delay, anticipated delivery delay of 5 months.
 - o SP/FFC meetings to resolve all change orders and claims. FFC agrees to compensate SP in the amount of US\$.700,000 for all change orders and waives the guaranteed price for construction.
- May 24
- o Urea reactor delivered at plant site.
- July 26
- o Ammonia convertor delivered at site.
 - o Short duration labour dispute at plant site
- September 28
- o Laying of gas pipeline commenced.
 - o Gas turbine generators from general electric delivered at site.
 - o Further delay indicated in delivery of process air compressor, ammonia compressor and syngas and CO-2 compressors.
 - o Under ground piping under process areas installed and tested.
- December 31
- o KFAED confirms its commitment to provide loan of Kt.Dn. 3 million.
- 1981 February 33
- o Work on modification of link canal commences.
 - o Gas pipeline installation completed.
- April 35
- o Lenders appraisal mission meeting with FFC/SP-AQ at plant site to emphasise need for expediting delivery of materials and effective coordination between action at Milan and activities at Goth Machhi.

- | | | | |
|------|-----------|-------|--|
| 1981 | May | 36 | <ul style="list-style-type: none">o Urea stripper installed.o Urea bulk storage warehouse completed. |
| | August | 39 | <ul style="list-style-type: none">o Pre-commissioning and testing of one gas turbine on diesel.o Gas pipeline commissioned. |
| | September | 40 | <ul style="list-style-type: none">o FFC personnel commences take over of operation and routine maintenance of completed units and sections of plant.o KFAED loan becomes effective on September 3. |
| | December | 43 | <ul style="list-style-type: none">o Both gas turbine generators fully operative.o Catalysts loading into ammonia unit.o Refractory complete and dried out.o FFC issues Plant Mechanical Completion certificate to AQ on December 25. |
| 1982 | January | 44 | <ul style="list-style-type: none">o Ammonia unit charged with catalysts. |
| | Feb/March | 45/46 | <ul style="list-style-type: none">o Primary reformer on stream at reduced load.o Waste heat boiler operative at full pressure.o Urea unit CO-2 compressor air tested.o Urea prilling system tested on purchased urea.o Chromate removal unit commissioned and operative. |
| | Apr/May | 46/47 | <ul style="list-style-type: none">o Ammonia synthesis unit operative at 70%.
urea bulk storage section operative.o First FFC urea produced on May 1, sold on May 24. |
| | June | 48 | <ul style="list-style-type: none">o FFC Plant inaugurated on June 6.o FFC Plant commences operation at 85% of designed capacity.o Contractor runs plant demonstration and performance tests. |

- | | | | |
|------|-------|----|--|
| 1982 | June | 48 | o Plant starts commercial production on June 14. |
| | Sept | 51 | o Plant completion achieved on September 27. |
| 1983 | March | 57 | o FFC issues Final Acceptance Certificate to SP. |

Annexure 8.7

SOURCES OF PROCUREMENT OF GOODS AND SERVICES

(US\$ Million)

<u>Country</u>	<u>IDA</u>	<u>KFW</u>	<u>USAID</u>	<u>Foreign Equity</u>	<u>Italian Loan</u>	<u>KFAED</u>	<u>DANIDA</u>	<u>LOCAL LOAN</u>	<u>LOCAL EQUITY</u>	<u>Total</u>	<u>Percentage</u>
ITALY	42.76	35.84	-	6.22	10.00	4.86	-	-	-	99.68	40.36
PAKISTAN	-	-	-	-	-	-	-	41.92	32.13	74.05	29.98
USA	1.53	0.45	40.10	2.50	-	0.31	-	-	-	44.89	18.17
WEST GERMANY	3.68	5.45	-	2.65	-	0.13	-	-	-	11.91	4.82
DENMARK	-	1.39	-	0.73	-	-	3.26	-	-	5.38	2.18
JAPAN	0.82	3.63	-	0.14	-	0.04	-	-	-	4.63	1.87
UK	2.22	0.70	-	0.27	-	0.65	-	-	-	3.84	1.55
FRANCE	0.49	0.59	-	0.02	-	0.28	-	-	-	1.38	0.56
SPAIN	-	0.44	-	0.01	-	0.01	-	-	-	0.46	0.19
HOLLAND	0.04	0.13	-	0.01	-	0.26	-	-	-	0.44	0.18
BELGIUM	0.04	0.01	-	0.12	-	-	-	-	-	0.17	0.07
AUSTRIA	-	0.12	-	0.01	-	-	-	-	-	0.13	0.05
SINGAPORE	-	-	-	0.02	-	-	-	-	-	0.02	0.01
SWITZERLAND	-	-	-	-	-	0.01	-	-	-	0.01	0.01
Total	51.58	48.75	40.10	12.70	10.00	6.55	3.26	41.92	32.13	246.99	100.00
Percentage	20.88	19.74	16.24	5.14	4.05	2.65	1.32	16.97	13.01	100.00	

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PRODUCTION, PURCHASE AND SALES OF FERTILIZER

Year	Quarter	Month	Purchase/Production		Sales	
			Other Products	FFC urea	Other Products	FFC urea
			M.tons	M.tons	M.tons	M.tons
1979	I		760	-	760	-
	II		26,023	-	23,713	-
	III		24,216	-	25,870	-
	IV		42,131	-	42,787	-
1980	I		33,481	-	25,526	-
	II		20,687	-	21,020	-
	III		38,786	-	29,414	-
	IV		103,362	-	97,355	-
1981	I		60,867	-	43,828	-
	II		25,513	-	16,815	-
	III		21,360	-	42,006	-
	IV		42,250	-	60,382	-
1982	I		10,532	-	20,109	-
		April	-	-	110	-
		May	-	11,262	-	10
		June	3,266	47,328	3,266	21,362
		July	11,609	19,849	6,065	40,181
		August	22,390	51,366	7,231	47,905
		September	28,092	48,748	13,298	17,309
		October	17,082	50,331	21,572	13,710
		November	15,888	51,628	37,770	32,376
		December	16,167	55,046	21,000	94,798
1983		January	6,837	55,556	5,001	80,563
		February	22,719	44,439	8,384	37,647
		March	3,483	27,993	9,885	13,093
		April	7,919	53,343	4,889	8,877
		May	5,618	56,097	11,250	22,842
			<u>611,038</u>	<u>572,986</u>	<u>599,306</u>	<u>430,673</u>
			=====	=====	=====	=====

INCOME STATEMENTS

Accounting year	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
<u>Capacity utilization</u>	-	-	-	97	93	100	100	100	100	100	100	100	100	100
<u>Sales volume</u>														
FFC urea '000'M.tons	-	-	-	268	529	569	569	569	569	569	569	569	569	569
Purchased products (seeding programme)'000'M.tons	93	173	163	130	-	-	-	-	-	-	-	-	-	-
<u>Sales revenue</u>														
FFC urea	-	-	-	1010.4	1579.6	1444.7	1388.4	1362.2	1342.8	1323.5	1304.7	1286.5	1268.3	1250.7
Other (seeding programme) sub total	104.2	296.7	275.0	256.4	-	-	-	-	-	-	-	-	-	-
	104.2	296.7	275.0	1266.8	1579.6	1444.7	1388.4	1362.2	1342.8	1323.5	1304.7	1286.5	1268.3	1250.7
<u>Production cost/(cost of sales)</u>														
Variable	97.2	276.9	258.3	422.2	220.0	236.6	236.6	236.6	236.6	236.6	236.6	236.6	236.6	236.6
Fixed (net)	7.4	10.5	16.6	91.0	143.3	105.9	105.9	105.9	105.9	105.9	105.9	105.9	105.9	105.9
Depreciation	0.3	0.4	0.9	158.0	260.3	263.0	265.7	268.4	271.1	273.8	276.5	279.2	281.9	284.6
Amortisation (deferred costs and catalysts) sub total	-	-	-	13.9	25.6	25.7	16.2	10.1	10.1	10.1	10.1	10.1	10.1	10.1
	104.9	287.8	275.8	685.1	649.2	631.2	624.4	621.0	623.7	626.4	629.1	631.8	634.5	637.2
<u>Operating income/(deficit)</u>	(0.7)	8.9	(0.8)	581.7	930.4	813.5	764.0	741.2	719.1	697.1	675.6	654.7	633.8	613.5
Financial charges	0.1	1.3	3.6	114.0	197.9	183.6	168.0	148.7	129.5	110.3	91.4	73.1	54.8	36.5
<u>Income before tax and levies</u>	(0.8)	7.6	(4.4)	467.7	732.5	629.9	596.0	592.5	589.6	586.8	584.2	581.6	579.0	577.0
Workers' profit participation and welfare funds	-	-	-	24.7	51.3	44.1	41.7	41.5	41.3	41.1	40.9	40.7	40.5	40.4
Taxation sub total	-	4.6	-	256.0	374.7	322.2	304.9	303.1	301.6	300.1	298.8	297.5	296.2	295.1
	-	4.6	-	280.7	426.0	366.3	346.6	344.6	342.9	341.2	339.7	338.2	336.7	335.5
<u>Net income/(deficit)(Rs.in million)</u>	(0.8)	3.0	(4.4)	187.0	306.5	263.6	249.4	247.9	246.7	245.6	244.5	243.4	242.3	241.5

- NOTES : 1. Other products not shown after end of seeding programme.
 2. Capacity and sales volume for 1982 represent results from June 14 to December 31, including trial production.
 3. Figures for 1979 to 1982 actual.
 4. Figures for 1983 to 1992 projected.

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		STATEMENT OF FINANCIAL POSITION										ANNEXURE 8.10			
Accounting year		1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
ASSETS															
Current (Rs. in Million)															
Cash and bank balances		168.7	225.1	296.0	525.4	1046.4	1373.7	1121.4	1096.2	1018.4	988.9	966.8	940.4	850.2	841.1
Receivables		9.8	88.6	56.0	406.5	133.6	101.7	92.3	87.9	84.7	81.5	78.3	75.3	72.3	69.3
Inventories		-	37.9	16.3	177.0	158.0	155.4	154.2	153.6	154.1	154.6	155.1	155.5	155.9	156.4
sub total		178.5	351.6	368.9	1108.9	1338.0	1630.8	1367.9	1337.7	1257.2	1225.0	1200.2	1171.2	1078.4	1066.8
Long term															
Plant and facilities		99.4	525.7	1664.4	2705.6	2966.2	2996.2	3026.2	3116.2	3146.2	3176.2	3206.2	3236.2	3266.2	3356.2
Additions		426.3	1138.7	1041.2	260.6	30.0	30.0	90.0	30.0	30.0	30.0	30.0	30.0	90.0	30.0
		525.7	1664.4	2705.6	2966.2	2996.2	3026.2	3116.2	3146.2	3176.2	3206.2	3236.2	3266.2	3356.2	3386.2
Depreciation and amortisation		0.3	11.3	22.7	199.1	485.0	773.6	1055.5	1334.0	1615.2	1899.1	2185.7	2475.0	2767.0	3061.7
sub total		525.4	1653.1	2682.9	2767.1	2511.2	2252.6	2060.7	1812.2	1561.0	1307.1	1050.5	791.2	589.2	324.5
Total assets		703.9	2004.7	3051.8	3876.0	3849.2	3883.4	3428.6	3149.9	2818.2	2532.1	2250.7	1962.4	1667.6	1391.3
		=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
LIABILITIES AND EQUITY															
Current															
Payables		62.7	162.4	214.3	325.4	97.9	90.2	87.8	87.6	87.4	87.2	87.0	86.8	86.6	86.5
Current portion of long term loans:															
- local		-	-	-	20.7	43.2	43.2	40.9	40.9	40.9	40.9	40.9	40.9	40.9	21.6
- foreign		9.9	9.9	9.9	122.8	100.4	149.4	151.0	151.0	151.0	138.2	138.2	138.2	138.2	138.0
- deferred interest		-	-	-	221.5	-	195.4	12.5	-	-	-	-	-	-	-
sub total		72.6	172.3	224.2	690.4	241.5	478.2	292.2	279.5	279.3	266.3	266.1	265.9	265.7	246.1
Deferred taxation		-	-	-	256.0	630.7	787.7	727.4	654.1	515.0	421.6	320.1	211.6	96.7	-
Long term loans															
Local		102.2	263.4	415.0	394.3	351.1	307.9	267.0	226.1	185.2	144.3	103.4	62.5	21.6	-
Foreign		221.8	959.9	1421.5	1463.2	1362.8	1213.4	1062.4	911.4	760.4	622.2	484.0	345.8	207.6	69.6
Deferred interest		7.5	61.6	179.4	105.2	155.0	9.5	-	-	-	-	-	-	-	-
sub total		331.5	1284.9	2015.9	1962.7	1868.9	1530.8	1329.4	1137.5	945.6	766.5	587.4	408.3	229.2	69.6
Equity															
Common		300.6	545.4	664.0	664.0	664.0	664.0	664.0	664.0	664.0	664.0	664.0	664.0	664.0	664.0
Preferred		-	-	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0
Retained earnings		(0.8)	2.1	(2.3)	152.9	294.1	272.7	265.6	264.8	264.3	263.7	263.1	262.6	262.0	261.6
sub total		299.8	547.5	811.7	966.9	1108.1	1086.7	1079.6	1078.8	1078.3	1077.7	1077.1	1076.6	1076.0	1075.6
Total liabilities and equity		703.9	2004.7	3051.8	3876.0	3849.2	3883.4	3428.6	3149.9	2818.2	2532.1	2250.7	1962.4	1667.6	1391.3
		=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
CURRENT RATIO		2.5	2.0	1.6	1.6	5.5	3.4	4.7	4.8	4.5	4.6	4.5	4.4	4.1	4.3
DEBT EQUITY RATIO		53:47	70:30	71:29	67:33	63:37	58:42	55:45	51:49	47:53	42:58	35:65	27:73	18:82	6:94

**Debt servicing**

- repayment over 10 to 20 years including 4 to 6 years grace, in semi - annual equal instalments
- charges : local 11%
- : foreign 7-10%

Profit levies

- contributions to workers funds - 7% of pre-tax income
- taxation at 55% on corporate income

Dividends

- 16% cumulative dividend on preferred stock, currently.
- One-half of available income currently, remaining in succeeding year, on common stock, within the stipulated financial covenants.

Inventories

Stores and spares	2 to 4 months
Raw materials	2 months
Work in process	5 days
Finished goods	2 months

Receivables

Customers dues	2 months of 25% turnover
Price adjustment claims	2 months
Other accounts	2 months

Payables

1 month

Manufacturing Costs at full (90%) Capacity

	<u>Unit</u>	<u>Consumption per ton urea</u>	<u>Cost per ton urea</u> Rs.	<u>Cost</u> Rs. Million
Natural gas				
- feed stock	MSCF	19.88	87	44.6
- fuel	MSCF	26.20	110	56.3
Raw water	M3	12.0	1	0.6
Chemicals			21	10.7
Catalysts			20	10.1
Bagging materials			148	75.8
Plant operating supplies			17	8.6
Repair and maintenance			81	41.6
Royalty			13	6.6
Payroll			68	35.1
Admin and other overheads			76	38.9
			<hr/>	<hr/>
			642	328.9
			===	=====

1. Capacity based on 330 stream days per year.
2. Natural gas consumption, assuming 750 B TU/SCF.
3. Gas price taken at Rs.4.38 MSCF (US\$.0.34).
4. Catalysts cost - amortised over 3-6 years.



FINANCIAL RATE OF RETURN

	<u>Investment Costs</u>	<u>Operating Costs</u>	<u>Revenue</u>	<u>Taxes</u>
		(1982 Rupees Million)		
1978	121.6	-	-	-
1979	523.0	124.4	124.1	-
1980	1279.4	322.9	333.4	5.2
1981	1103.7	291.4	291.5	-
1982	372.6	537.9	1266.8	256.0
1983	30.0	414.6	1579.6	374.7
1984	30.0	386.6	1444.7	322.2
1985	90.0	384.2	1388.4	304.9
1986	30.0	384.0	1362.2	303.1
1987	30.0	383.8	1342.8	301.6
1988	30.0	383.6	1323.5	300.1
1989	30.0	383.4	1304.7	298.8
1990	30.0	383.2	1286.5	297.5
1991	90.0	383.0	1268.3	296.2
1992	30.0	382.9	1250.7	295.1
	(340.0)			

FROR - before taxes 20.7%

- after taxes 14.0%

Notes

1. 1982 Rupees derived by applying annual discount factor of 6%
2. Operating costs exclude depreciation, amortisation and financial charges but include worker's levies.
3. Project investment residual value is taken 10% of original investment and working capital.

PROJECT ECONOMIC COST

<u>Year</u>	<u>Capital cost</u>	<u>Taxes</u>	<u>Foreign equity</u>	<u>Economic cost</u>	<u>Economic cost</u>
		(absolute	Rupees	Million)	1982 Rs in million
1978	100.6	-	1.2	99.4	120.2
1979	439.1	1.5	82.9	354.7	422.4
1980	1138.7	12.9	78.8	1047.0	1176.4
1981	1041.2	24.6	39.0	977.6	1036.3
1982	372.6	26.6	-	346.0	346.0
1983	30.0	-	-	30.0	30.0
1984	30.0	-	-	30.0	30.0
1985	90.0	-	-	90.0	90.0
1986	30.0	-	-	30.0	30.0
1987	30.0	-	-	30.0	30.0
1988	30.0	-	-	30.0	30.0
1989	30.0	-	-	30.0	30.0
1990	30.0	-	-	30.0	30.0
1991	90.0	-	-	90.0	90.0
1992	30.0	-	-	30.0	30.0
	(351.2)	-	(201.9)	(149.3)	(149.3)

Notes

1. Economic cost in 1982 Rupees derived by discounting absolute numbers by an annual factor of 6%.
2. Project investment residual value taken at 10% of original investment plus working capital.

PROJECT ECONOMIC RATE OF RETURN

(1982 Rupees Million)

<u>Year</u>	<u>Economic Benefit</u>	<u>Economic Cost</u>		<u>Operating Cost</u>
		<u>Untied</u>	<u>Tied</u>	
1978	-	120.2	-	-
1979	-	422.4	3.0	-
1980	-	1,176.4	-	-
1981	-	1,036.3	-	-
1982	557.4	346.0	3.5	475.4
1983	894.0	30.0	38.9	506.1
1984	1,109.6	30.0	65.6	481.6
1985	1,109.6	90.0	50.6	488.9
1986	1,109.6	30.0	49.1	488.7
1987	1,109.6	30.0	48.9	488.5
1988	1,109.6	30.0	48.7	488.3
1989	1,109.6	30.0	48.5	488.1
1990	1,109.6	30.0	48.3	487.9
1991	1,109.6	90.0	48.1	487.7
1992	1,109.6	30.0	47.9	487.5
		(149.3)	135.2	

EROR - 9.6%

Notes

1. Tied capital costs comprise:

-Royalty:

- o Fixed royalty to HT A/S US\$.1.2 million, during first and second years of plant operation.
- o Royalty of US\$.1 per ton of urea produced and sold.

-Dividends to foreign common shareholders.

-Repatriation of foreign equity.

2. Operating cost excludes royalties (included in tied capital costs) but includes workers' levies.
3. The price of Mari gas to FFC is taken at twice the 1982 level.
4. Economic prices for bagged urea taken at US\$.160 FOB in 1982 and US\$.130 for 1983, US\$.150 thereafter.

FOREIGN EXCHANGE SAVINGS
(US\$ Million)

	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>
I Inflow																
Equity	0.1	8.4	8.0	3.9	-											
Loans	<u>0.6</u>	<u>21.8</u>	<u>74.5</u>	<u>46.6</u>	<u>4.2</u>											
Sub total	0.7	30.2	82.5	50.5	4.2											
II Outflow																
Capital expenditure	0.6	24.9	81.3	52.3	15.6											
Operating and recurrent capital expenditure (Note 1)	-	-	-	-	7.4	8.6	5.6	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Debt servicing (Note 2)	-	0.3	3.2	3.7	4.0	3.9	3.8	3.8	4.1	4.1	4.3	8.3	7.3	7.3	7.2	7.1
Foreign dividends and royalties	-	-	-	-	0.3	3.0	5.0	3.9	3.8	3.8	3.8	3.8	3.7	3.7	3.7	-
Repatriation of capital	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.4	-
Sub total	0.6	25.2	84.5	56.0	27.3	15.5	14.4	12.7	12.9	12.9	13.1	17.1	16.0	16.0	26.3	12.1
III Foreign exchange surplus/(deficit)	0.1	5.0	(2.0)	(5.5)	(23.1)	(15.5)	(14.4)	(12.7)	(12.9)	(12.9)	(13.1)	(17.1)	(16.0)	(16.0)	(26.3)	(12.1)
IV Foreign exchange saving/earnings from turnover (Note 3)	-	-	-	-	42.9	68.8	85.4	85.4	85.4	85.4	85.4	85.4	85.4	85.4	85.4	85.4
V Incremental foreign exchange surplus/(deficit)	0.1	5.0	(2.0)	(5.5)	19.8	53.3	71.0	72.7	72.5	72.5	72.3	68.3	69.4	69.4	59.1	73.3

Notes:

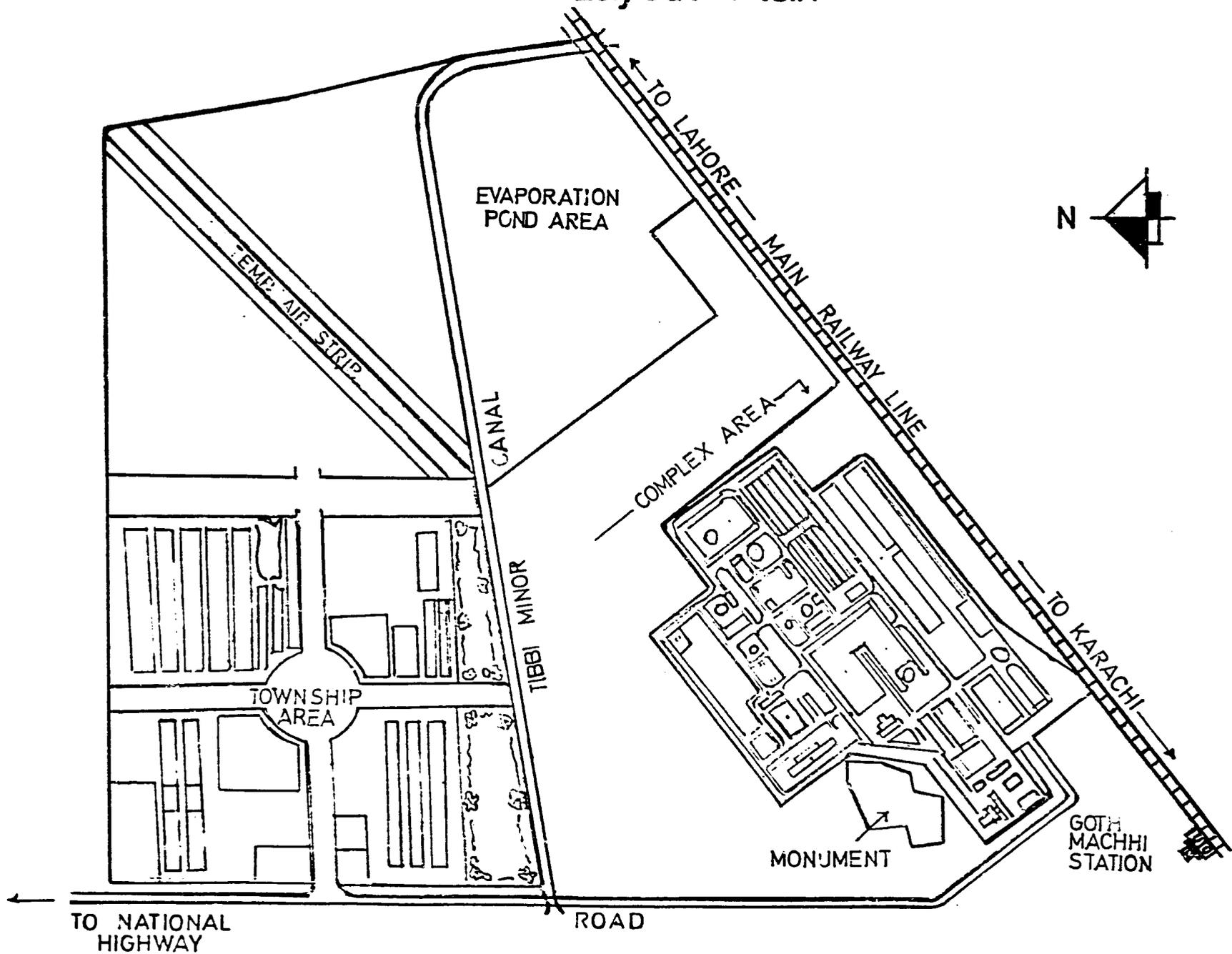
1. Operating and recurrent capital expenditure comprises imported supplies spares and equipment, and operating company personnel costs.
2. This reflects foreign exchange outflow for GOP loans and Italian Suppliers Credit.
3. Area prices used for foreign exchange earning calculation - 1982 US\$ 160 MT, 1983 US\$ 130 and US\$ 150 thereafter.

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FFC AMMONIA UREA COMPLEX Layout Plan

Chart 9.1

(65)

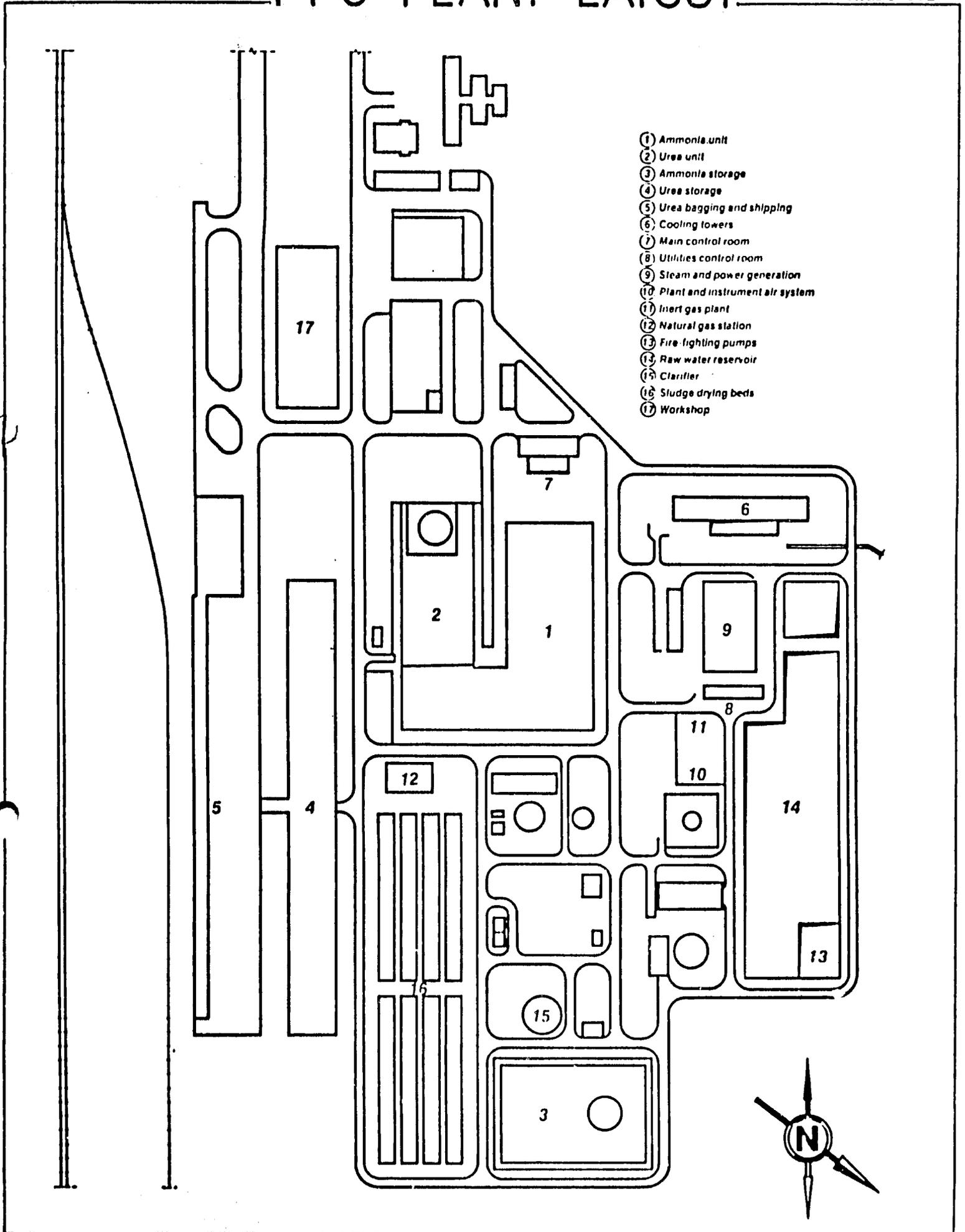


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FFC PLANT LAYOUT

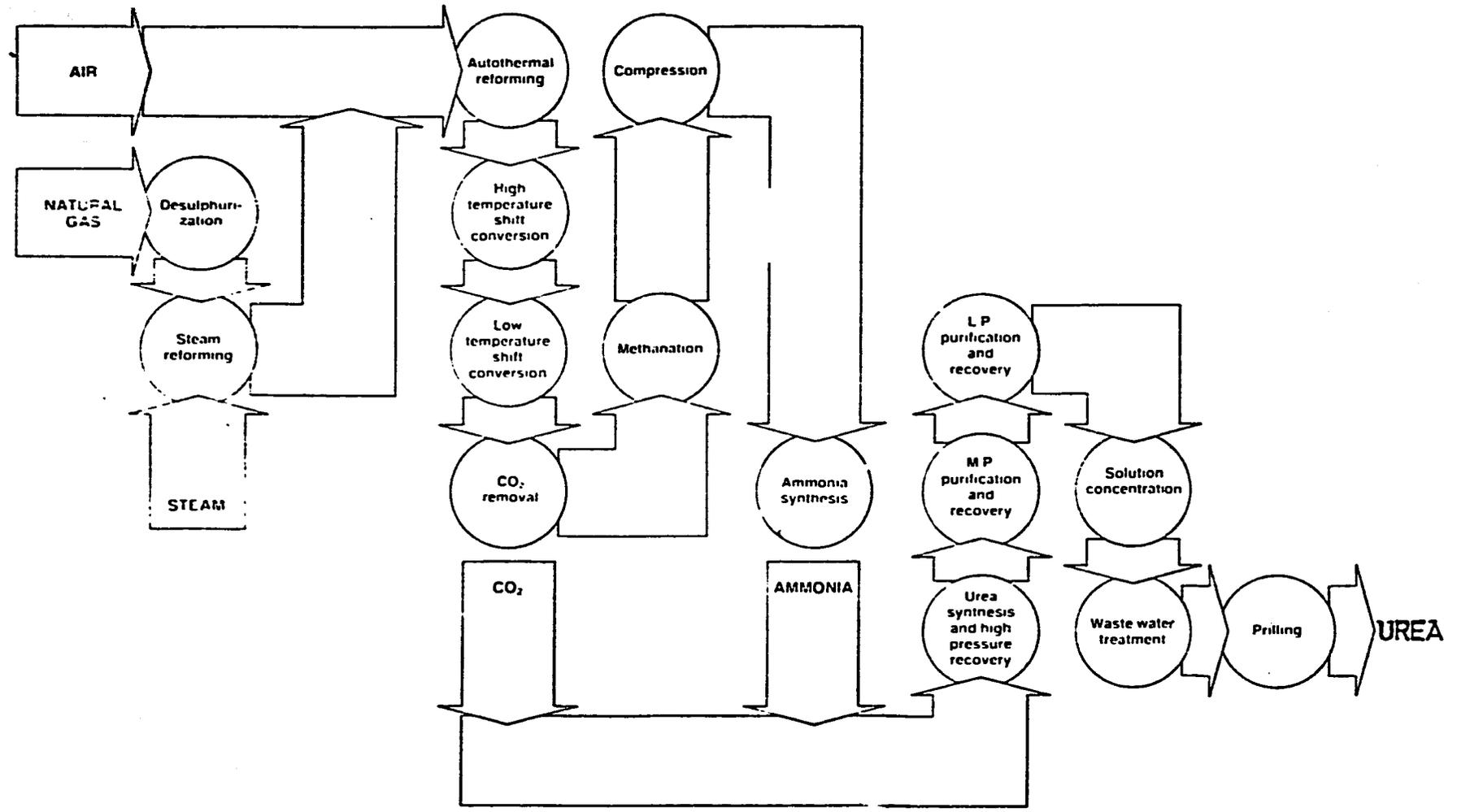
Chart 9.2

- ① Ammonia unit
- ② Urea unit
- ③ Ammonia storage
- ④ Urea storage
- ⑤ Urea bagging and shipping
- ⑥ Cooling towers
- ⑦ Main control room
- ⑧ Utilities control room
- ⑨ Steam and power generation
- ⑩ Plant and instrument air system
- ⑪ Inert gas plant
- ⑫ Natural gas station
- ⑬ Fire fighting pumps
- ⑭ Raw water reservoir
- ⑮ Clarifier
- ⑯ Sludge drying beds
- ⑰ Workshop



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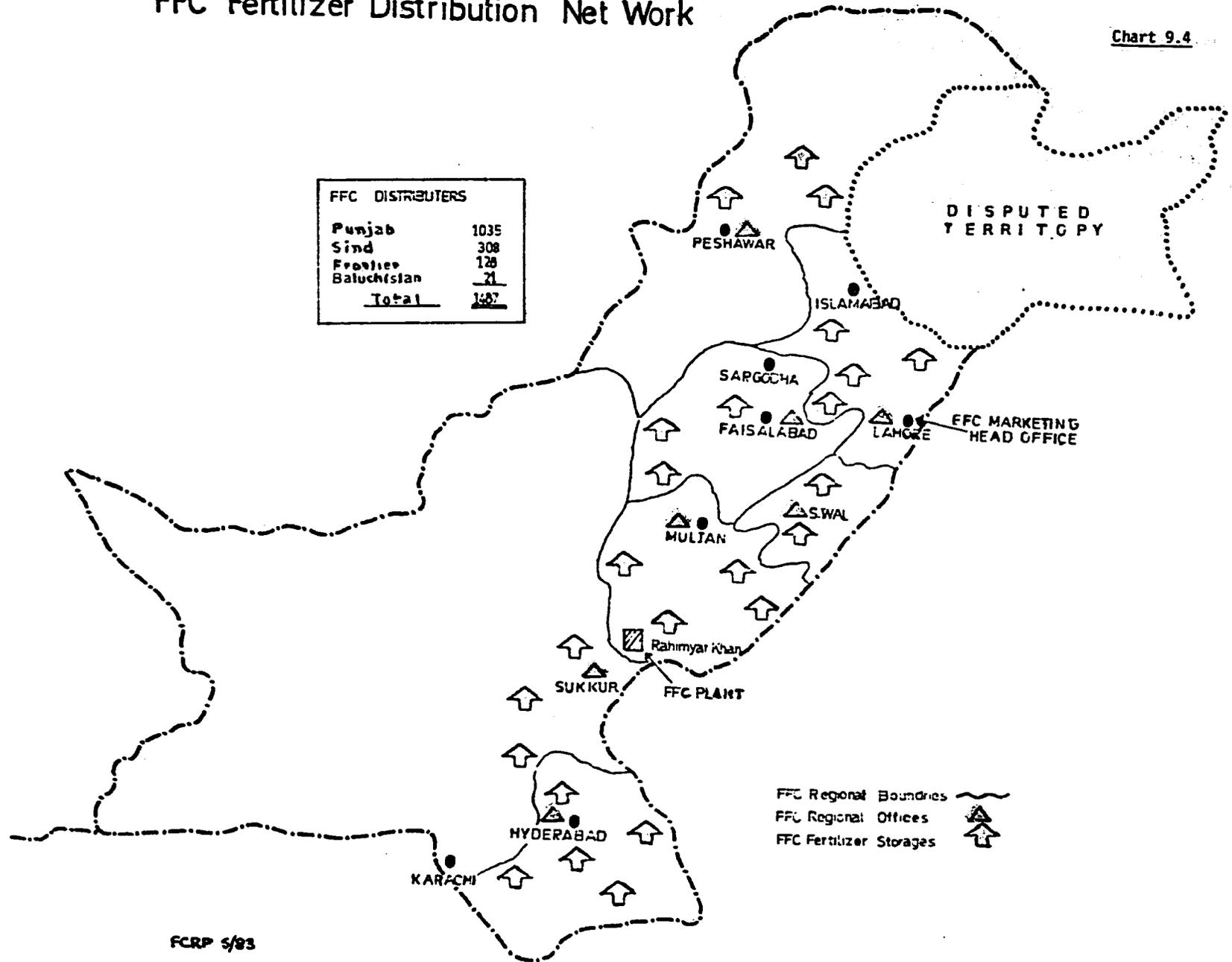
AMMONIA AND UREA PROCESSES



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FFC Fertilizer Distribution Net Work

Chart 9.4



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