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FROM: The President

INDIA - FERTILIZER INDUSTRY PROJECT (Credit 598-IN)

PROPOSED AMENDMENT OF CREDIT AGREEMENT *

1. The purpose of this memorandum is to recommend that the Development Credit Agreement between India and IDA for a Fertilizer Industry Project be amended so as to revise the list of subprojects to be financed.

Background

2. The salient features of the Credit are as follows:

- Total Original Project Cost : US\$238.7 million
- IDA Credit : US\$105.0 million
- Date of Credit Agreement : December 31, 1975
- Date of Effectiveness : March 1, 1976
- Amount Disbursed (2/8/78) : US\$11.5 million
- Closing Date : June 30, 1980

3. The major objective of the project was to improve the utilization of India's installed fertilizer production capacity. Through 19 subprojects to be implemented by nine different companies in the public, private and joint sectors, the project aimed at removing technical limitations on output, improving pollution control, increasing the production of industrial chemicals and producing petroleum feedstock for the fertilizer industry. The individual subprojects were subject to review by the Government and, in some cases, by the Industrial Development Bank of India. The Credit of US\$105 million was designed to cover the direct foreign exchange costs, the costs of locally produced equipment procured through international competitive bidding, and the foreign exchange cost of technical assistance, license fees and design engineering. The Credit also included funds to help finance studies of relevance to the fertilizer sector.

Distribution:

- Executive Directors and Alternates
- Senior Vice President, Operations
- President's Council
- Vice Presidents, IFC
- Directors and Department Heads, Bank and IFC

*Questions on this document may be referred to Mrs. A. Hamilton (ext. 73456).

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4. All covenants and reporting requirements included in the legal documents are being met, although the studies undertaken under the project are taking 15-18 months longer to be completed than was estimated at the time of negotiations. The Government has recently announced a new fertilizer pricing policy, which is designed to ensure a reasonable return, at efficient use of capacity, to fertilizer plants without increasing the price to the farmer.

5. From its inception, this credit has met with delays in obtaining the necessary formal investment decisions and approvals. It was recognized at the time of appraisal (mid-1975) that the complete Governmental approvals required for the implementation of the various subprojects were not available in all cases, but no difficulties were expected in view of the substantial benefits then expected to be realized, rapidly and at low cost, from the project and the fact that the subprojects had been agreed to with the technical authorities concerned prior to and during negotiations. In fact, however, the individual subprojects were considered for formal approval in a routine manner under the same detailed procedures that govern larger investments, and their approvals were often delayed and in some cases rejected. Of the 19 subprojects, two -- a steam generation unit at Trombay and a pollution control scheme at Zuari Agro Chemicals -- have been completed, and eleven are under implementation. These have been delayed for periods ranging from 7 to 26 months. The 13 subprojects completed or under implementation, together with the studies now underway, were estimated to cost a total of US\$157.9 million and to use US\$82.6 million of the Credit proceeds. Annex 1 to this memorandum indicates the status of the subprojects originally proposed.

6. The Government has informed us that the remaining six subprojects, for which US\$22.4 million of the Credit proceeds were expected to be used, will not be implemented at the present time for a variety of reasons. These are discussed in detail in Annex 2 and may be summarized as follows: (a) Three of the subprojects were aimed at improving the financial returns of fertilizer manufacturing by converting waste hydrofluosilicic acid to marketable cryolite and aluminum fluoride. This would have involved imported equipment and technologies. However, local processes for fluoride recovery have since been developed by a private company and, as things stand now, it would be financially and technically advantageous to postpone an investment decision until the local technology has been proven on a commercial scale. (b) After detailed review of the available technology, it was decided not to proceed with installation of an ammonia process computer for one subprojects since this would not help operations significantly. (c) With the availability of natural gas from Bombay High as fertilizer feedstock and the decision to build a large refinery at Mathura, expansion of capacity at the Hindustan Petroleum Corporation refinery at Trombay has become unnecessary. (d) Cash flow problems and uncertainty about the availability of ammonia have led to deferral of construction of the proposed soda ash plant by the Southern Petrochemical Industries Corporation.

Proposed Modifications

7. The Government of India has requested that the Project Description (Schedule 2 to Development Credit Agreement) be revised to substitute for those subprojects which are now not to be carried out other subprojects which are consistent with the objectives of the Credit and which can be expected to be completed on a schedule compatible with the current Credit Closing Date. The proposed subprojects and their cost estimates are discussed in Annex 3. As with the subprojects included originally, the proposed Credit allocation would cover the cost of equipment contracts awarded following Bank procurement guidelines. It is estimated that about one-quarter of these contracts would be won by Indian suppliers. The proceeds of the Credit would be reallocated as indicated in the following table; US\$5.4 million would remain unallocated to meet physical and price contingencies.

<u>Company/Plant</u>	<u>Purpose of New Subprojects</u>	<u>Total Estimated Cost</u> (US\$ million)	<u>Proposed Credit Allocation</u> (US\$ million)
<u>New Subprojects:</u>			
FCI: Trombay	(a) Changeover of Trombay I and II to natural gas	4.5	2.7
	(b) Phosphoric acid plant debottlenecking	1.0	0.8
Barauni and Namrup Expansion	Plant modifications	1.1	0.7
Nangal	Ammonia Storage	2.0	0.3
Gorakhpur	Ammonia Storage	0.5	0.5
IFFCO: Kalol	Ammonia/urea plant debottlenecking	16.0	9.5
Madras Fertilizers, Ltd.	Ammonia plant debottlenecking	0.5	0.5
Coromandel Fertilizers, Ltd.	Purge gas recovery	4.0	2.0
Subtotal		29.6	17.0
<u>Ongoing Subprojects (appraisal estimate):</u>		157.9	82.6
Physical and price contingencies		--	5.6
TOTAL		<u>187.5</u>	<u>105.0</u>

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Proposed Modifications

Justification

8. The proposed subprojects would (a) release about 140,000 TPY of naphtha for other fertilizer units by changing over Trombay I and II plants to Bombay High gas, and (b) improve fertilizer production from the debottlenecked plants. It is estimated that the incremental output from the new subprojects would add about 75,000 TPY of nutrients to India's fertilizer production. Since the subprojects all take advantage of existing infrastructure and complementary equipment, the capital cost per nutrient ton of incremental fertilizer output is US\$336 compared to US\$1,100 for a new plant in India. As discussed in detail in Annex 3, they all have economic rates of return exceeding 25%.

Recommendation

9. I recommend that the Executive Directors approve the amendment to the Development Credit Agreement described above. The proposed amendment would become effective upon an exchange of letters between the Borrower and the Association.

10. In the absence of objection (which should be communicated to the Vice President and Secretary or Deputy Secretary) by the close of business on March 16, 1978, this recommendation will be deemed approved.

Robert S. McNamara
President

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INDIA - FERTILIZER INDUSTRY CREDIT

Original Subprojects Included in Credit

Company	Subproject	Appraisal Estimates ^{1/}	
		Total Cost	Credit Allocation
		(US\$ Million)	
Public Sector			
Fertilizer Corporation of India	Boiler/Power Set at Gorakhpur	23.5	10.8
	Boiler/Power Set at Durgapur	20.7	8.7
	Boiler at Trombay	12.9	8.5 Completed
	Ammonia Tankwagons and Storage	20.5	9.1
	Pollution Control and Testing Equipment	1.4	1.4
Neyveli Lignite Corp.	Neyveli Feedstock Conversion	19.5	12.0
Hindustan Steel Corp.	Rourkela Feedstock Conversion	26.1	15.5
Public Sector Subtotal		124.6	66.0
Joint Sector			
Gujarat State Fertilizer Corp. (GSFC)	Purge Gas Recovery	11.3	5.3
	Fluorine Recovery	2.7	1.2 Not taken up
	Phosphoric Acid Plant Debottlenecking	6.6	2.5
Hindustan Petroleum Corp. (HPCL)	Refinery Debottlenecking	25.9	4.0 Not taken up
Madras Fertilizers Ltd. (MFL)	Urea Debottlenecking	1.2	0.8
	Ammonia Process Control Unit	0.5	0.2 Not taken up

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Company	Subproject	Appraisal Estimates ^{1/}		
		Total Cost	Credit Allocation	
		(US\$ Million)		
Southern Petrochemical Industries Corp. (SPIC)	Fluorine Recovery	2.7	1.3	Not taken up
	Soda Ash Plant	43.5	12.7	Not taken up
Joint Sector Subtotal		94.4	28.0	
<u>Private Sector</u>				
Coromandel Fertilizers	Boiler/Power Set	3.0	1.0	
	Fluorine Recovery	5.5	3.0	Not taken up
Zuari Agro Chemicals	Ammonia Plant Debottlenecking	7.2	4.0	
	Urea Plant Pollution Control	3.0	2.0	Completed
Private Sector Subtotal		18.7	10.0	
<u>Technical Assistance</u>				
National Council of Applied Economic Research, Fertilizer Market Study		1.0	1.0	
RITES Fertilizer Transportation Study				
Staff College, Hyderabad, Fertilizer Storage Study				
TOTAL PROJECT COST		238.7	105.0	

^{1/} Includes contingencies. From page 21 and Annex 6-1 of the Appraisal Report.

INDIA - FERTILIZER INDUSTRY CREDITSubprojects Not Taken Up for Implementation

1. The following subprojects included for financing under the Fertilizer Industry Credit have not been taken up for implementation.

	<u>Total Cost</u>	<u>Credit Allocation</u>
	(US\$ millions)	
GSFC Fluorine recovery	2.7	1.2
HPCL Refinery debottlenecking	25.9	4.0
MFL Ammonia process control unit	0.5	0.2
SPIC Fluorine recovery	2.7	1.3
Soda ash plant	43.5	12.7
Coromandel Fluorine Recovery	<u>5.5</u>	<u>3.0</u>
Total	<u>80.8</u>	<u>22.4</u>

The following paragraphs summarize the reasons for not proceeding with the above subprojects.

2. Fluorine Recovery. Coromandel Fertilizers, GSFC and SPIC own and operate phosphoric acid plants based on acidulation of rock phosphate. The process produces fluorine containing gases which have to be treated to avoid atmospheric pollution. At present the gases are scrubbed with water to remove fluorine as hydrofluosilicic acid liquor which is neutralized before disposal. Three subprojects were originally proposed to process the hydrofluosilicic acid, after purification, to produce cryolite or aluminum fluoride. (Both these products are used in the production of aluminum.) The purpose of the schemes was, therefore, not to increase fertilizer production but to improve the value of the waste product. The subprojects had planned to use one of the internationally proven technologies. Dharamsi Morarji Chemical Company (DMCC), a fertilizer manufacturing company, has in the meanwhile developed technologies for the production of cryolite and aluminum fluoride. These technologies have already been tested in the laboratory and on a pilot scale and they are about to be proven on a commercial scale. They should soon be ready to be promoted widely. Thus, a reversal of the previous decision to proceed with imported technologies appears advantageous from the standpoint of the sponsors as well as the Government, particularly since the replacement subprojects now proposed would contribute to increased fertilizer production -- the central purpose of the project.

3. Refinery Debottlenecking. This subproject was to debottleneck the HPCL refinery in Bombay so that it would produce additional naphtha as feedstock for fertilizer production. The Government has since decided to build a large refinery in Mathura, mainly to supply the market in North West India. Furthermore, the development of the Bombay High offshore oil and gas field will now provide associated and nonassociated natural gas for use as fertilizer feedstock. The Bank is already appraising a large fertilizer complex at Mandwa based on Bombay High gas. In the changed circumstances, the Government does not at present plan to expand refining capacity in HPCL.

4. Ammonia Process Control. Madras Fertilizer Ltd. has planned to install a process control computer in the ammonia plant. However, after further review, it is now felt that the installation will not help plant operations significantly and it has therefore been decided not to proceed with the subproject.

5. Soda Ash Plant. The ammonia required for the subproject was to be provided by SPIC from an ammonia plant which was under construction at the time of appraisal. Delays in project completion and difficulties in reaching full production levels have placed the company in a difficult cash flow position. After several modifications, the ammonia plant is now operating satisfactorily but may still not be able to spare adequate ammonia for the subproject. SPIC management does not, therefore, intend to proceed with the subproject.

2. Fertilizer Recovery. Governmental Fertilizer, SPIC and SPIC own and operate phosphate acid plants based on acidulation of rock phosphate. The process produces fumes containing gases which have to be treated to avoid atmospheric pollution. At present the gases are scrubbed with water to remove fumes as hydrochloric acid liquor which is neutralized before disposal. These subprojects were originally proposed to process the hydrochloric acid after purification to produce cryolite or aluminum fluoride. (Both these products are used in the production of aluminum.) The purpose of the scheme was, therefore, not to increase fertilizer production but to improve the value of the waste product. The subprojects had planned to use one of the internationally proven technologies. Unarmal Noraj Chemical Company (DMCC), a fertilizer manufacturing company, has the world's developed technologies for the production of cryolite and aluminum fluoride. These technologies have already been tested in the laboratory and on a pilot scale and they are about to be proven on a commercial scale. They should soon be ready to be proved widely. Thus, a reversal of the previous decision to proceed with imported technologies appears advantageous from the standpoint of the sponsor as well as the Government, particularly since the replacement subproject now proposed would contribute to increased fertilizer production -- the central purpose of the project.

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INDIA - FERTILIZER INDUSTRY CREDIT.Summary of Capital Costs and Proposed Credit Allocationsfor Substitute Subprojects

Company/Subproject	Estimated Capital Cost ^{1/} (US\$ millions)	Proposed Credit Allocation ^{2/}	Expected Completion Date
<u>Fertilizer Corporation of India (FCI)</u>			
Switchover of Trombay I and II to natural gas	4.5	2.7	July 1979
Trombay phosphoric acid debottlenecking	1.0	0.8	October 1979
Barauni/Namrup expansion plant modifications	1.1	0.7	July 1979
Nangal ammonia storage	2.0	0.3	October 1979
Gorakhpur ammonia storage	0.5	0.5	August 1979
FCI - Total	9.1	5.0	
<u>Indian Farmers Fertilizer Cooperative Ltd. (IFFCO)</u>			
Kalol debottlenecking project:			
Ammonia plant debottle- necking	6.2	4.1	December 1979
Purge gas recovery	6.5	3.5	December 1979
Oil fired boiler	3.3	1.9	October 1979
IFFCO - Total	16.0	9.5	
<u>Madras Fertilizers Ltd.</u>			
Ammonia plant debottlenecking	0.5	0.5	Mid-1979
<u>Coromandel Fertilizers Ltd.</u>			
Purge gas recovery	4.0	2.0	Early 1980
TOTAL	29.6	17.0	

^{1/} Includes contingencies.

^{2/} Proposed credit allocation includes foreign exchange cost of imported equipment and supplies, cost of local equipment procured following Bank procurement guidelines, and foreign technical services.

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Description and Analysis of Substitute Subprojects^{1/}Fertilizer Corporation of India (FCI) Subprojects

1. The Fertilizer Corporation of India (FCI) plans to implement the following five subprojects, which are designed to improve the overall economics of operation of the FCI plants (a) by increasing capacity utilization and (b) by changeover of feedstock in two plants from naphtha to natural gas.

<u>Unit</u>	<u>Subproject</u>	<u>Total Cost</u> (US\$ million)	<u>Proposed Credit Allocation</u>
Trombay	(a) Changeover of plants I and II to natural gas as feedstock	4.5	2.7
	(b) Debottlenecking of phosphoric acid plant	1.0	0.8
Barauni and Namrup Expansion	Plant modifications	1.1	0.7
Nangal	Ammonia storage	2.0	0.3
Gorakhpur	Ammonia storage	0.5	0.5
Total		9.1	5.0

Switchover of Trombay I and II to Natural Gas

2. The Trombay unit has in operation an ammonia plant and a methanol plant using naphtha as feedstock. The ammonia plant has an installed capacity of 350 TPD and is based on partial oxidation of naphtha in Shell gasifiers. The methanol plant has an installed capacity of 120 TPD and uses the naphtha steam reformation process. The two plants together require a total of about 150,000 TPY of naphtha, which is supplied from the adjacent Bombay refineries. The present proposal is to switch the feedstock from naphtha to Bombay High associated gas. This will have a significant impact on operating costs, since both the financial and the economic cost of natural gas is only about half that of naphtha. Moreover, since India is a net importer of naphtha, there will also be foreign exchange savings associated with the changeover.

^{1/} Details of the subprojects as furnished by the project sponsors are available in the Project files.

3. The proposed subproject includes necessary changes in the ammonia and methanol plants, natural gas compressors and in-plant gas distribution network. FCI has already engaged Shell and Kinetics Technology International (both of the Netherlands) to study and advise on the changes required in the plants. KTI will also coordinate the engineering of the changes. It is expected that the changeover project will be completed by September 1979.
4. The estimated cost of the changeover is about Rs 41 million (US\$4.55 million), of which about Rs 23.9 million (US\$2.66 million) represents equipment to be procured in accordance with IDA guidelines and is proposed for financing from the proceeds of the Credit.
5. The financial rate of return of this subproject is estimated at 33% and the economic rate of return at more than 100%.

Trombay Phosphoric Acid Plant Debottlenecking

6. The Trombay unit has a 100 TPD capacity phosphoric acid plant built and commissioned by FCI staff in 1975 based on the Nissan Hemihydrate process. The plant has faced difficulties during initial commissioning tests and has generally been operating at only about 50% of its capacity due to mechanical and rubberlining failures. FCI plans to debottleneck the plant in two phases. During the first phase, steps will be taken to improve the mechanical reliability and performance of the plant. During the second phase, the technology adopted for the plant will be improved with more recent Nissan process developments. Phase I of the project includes a standby acid concentration unit, an additional gypsum crystallizer, an additional premixer, a phosphoric acid storage tank, additional filter feed slurry pumps, replacement of gypsum slurry pumps and fluorine scrubber circulation pumps, and other minor modifications as required.
7. The cost of Phase I will be about Rs 8.8 million (US\$0.98 million), of which about Rs 7.4 million (US\$0.82 million) will be for imported equipment or for equipment procured locally after international competitive bidding. On completion of Phase I, scheduled for October 1979, phosphoric acid production is expected to increase by 3,200 tons of P₂O₅ per year due to improved plant availability, with an incremental annual cash generation of Rs 5.7 million (US\$0.63 million) as compared to the alternative of using diammonium phosphate in the manufacture of complex fertilizers. The project, therefore, has a financial pay-back period of about 1.5 years. Studies on Phase II will be carried out during the implementation period of Phase I. Phase II is not proposed for IDA financing under this project.

Barauni and Namrup Expansion Plant Modifications

8. FCI commissioned in 1976 two ammonia-urea complexes, one at Barauni and one at Namrup, each with installed capacity of 330,000 TPY of urea. The two projects were designed and engineered by the Planning and Development Division of FCI with process licenses from Tecnimont of Italy. Based on experience during initial operation, FCI plans to carry out certain modifications to stabilize plant

operations. The modifications at Barauni will cost about Rs 5.1 million (US\$0.6 million) of which about Rs 3.1 million (US\$0.33 million) is proposed for financing from the Credit proceeds. Modifications at Namrup will cost about Rs 4.8 million (US\$0.53 million) of which about Rs 3.0 million (US\$0.33 million) represents equipment to be procured following IDA guidelines and is proposed for financing from the Credit proceeds. The proposed modifications will increase urea production by about 33,000 tons per year.

Nangal Ammonia Storage

9. FCI is commissioning a fuel oil-based ammonia plant of 900 TPD capacity built with IDA assistance to provide the ammonia required by the urea and CAN plants at Nangal. It was planned that the existing ammonia plant of 300 TPD capacity, based on the electrolysis of water, be shut down to conserve power after the new plant went into operation. However, with the commissioning of the Setlej-Beas link, the flow of water into the Gobind Sagar lake will improve, and FCI expects to have 98 MW of power available for the foreseeable future. FCI plans to operate the existing ammonia plant at about 180 TPD production as long as surplus power continues to be available economically. About 60,000 TPD of ammonia will then be sold to industrial consumers or will be transported to other fertilizer plants in India. At present the Nangal plant has two horton spheres with a total storage capacity of 2,500 tons of ammonia. The implementation of the scheme for additional ammonia production based on surplus power will require an additional storage tank as part of FCI's overall plan for ammonia storage and distribution. The ammonia storage installation of 5,000 tons capacity is expected to cost about Rs 18.4 million (US\$2.04 million), of which Rs 2.9 million (US\$0.32 million) represents equipment procured in accordance with IDA guidelines and is proposed for financing out of the Credit.

Gorakhpur Ammonia Storage

10. The Gorakhpur plant, before expansion, had an ammonia capacity of 350 TPD against daily requirements of 330 tons for the production of 543 TPD of urea. With the above production plant capacities, ammonia storage provision of 850 tons was adequate. However, with the IDA-financed expansion in 1976 of the ammonia and urea capacities of 570 TPD and 950 TPD, respectively, the ammonia storage became inadequate to hold ammonia when urea production is reduced or interrupted. FCI, therefore, plans to install a 1,500 ton capacity horton sphere at a cost of Rs 4.5 million (US\$0.5 million). This equipment will be procured in accordance with IDA guidelines and is proposed for financing from the Credit proceeds. The additional ammonia capacity will help to increase urea production by about 5,000 tons per year.

Indian Farmers Fertilizer Cooperative Ltd. (IFFCO) Kalol Debottlenecking Project

11. IFFCO has at present two operating plants -- an ammonia/urea complex at Kalol and an NPK plant at Kandla. IFFCO is also implementing an ammonia/urea complex at Phulphur with Bank financing, and the company has been appraised by the Bank for the purpose. The ammonia plant at Kalol, with installed capacity of 910 TPD, was commissioned in November 1974. The urea plant, with installed capacity of 1,200 TPD, was commissioned in January 1975. IFFCO now proposes to debottleneck the ammonia plant to

increase its capacity to 1,000 TPD. Based on operating experience during the last two years, IFFCO expects to operate the urea plant at 110% of its capacity by ensuring reliable steam supply. The Kalol debottlenecking project is in three parts -- (i) ammonia plant debottlenecking, (ii) purge gas recovery and (iii) offsite package boiler.

12. Ammonia Plant Debottlenecking. The ammonia plant debottlenecking subproject includes an amine guard system for CO₂ removal, which will reduce corrosion and improve ammonia plant stream availability; a condensing turbine for the Boiler Feed Water (BFW) Pump; changes in the reformer heating and piping system; speeding up the air, synthesis gas and refrigeration compressors; additional ammonia cooling tower capacity; and other minor modifications. The total estimated cost of the ammonia plant debottlenecking is Rs 56.2 million (US\$6.24 million) of which about Rs 36.8 million (US\$4.1 million) represents equipment to be procured in accordance with IDA guidelines and is proposed for financing from the Credit proceeds.

13. Purge Gas Recovery. The make-up gas to the synthesis loop contains 1.3% methane and argon. These inerts build up in the loop and have to be purged to maintain loop pressure. At the loop's rated capacity, about 3,000 normal cubic meters (Nm³) per hour of gas containing about 61% hydrogen has to be purged. The purge gas is at present used as fuel in the reformer. IFFCO plans to install at Kalol a purge gas recovery system which will recover and recycle to the synthesis loop hydrogen-rich gas with some nitrogen. The system will increase ammonia production by about 50 TPD. The project is expected to cost Rs 58.20 million (US\$6.47 million), of which Rs 31.7 million (US\$3.5 million) represents equipment to be procured following IDA guidelines and is proposed for financing under the Credit.

14. Offsite Package Boiler. IFFCO has two oil-fired boilers, each with 52 tons per hour capacity. Since the operation of the urea plant at its minimum operable level of 60% of its capacity requires 60 tons per hour of steam, IFFCO is required to shut down the urea plant if one of the boilers breaks down or is not available for other reasons. IFFCO, therefore, plans to install a standby boiler to improve the urea plant stream efficiency. With the standby boiler, urea production is expected to increase by about 30,000 tons per year. The installed cost of the boiler will be about Rs 29.60 million (US\$3.29 million) of which Rs 17.3 million (US\$1.9 million) represents equipment to be procured in accordance with IDA guidelines and is proposed for financing under the Credit.

15. The total cost of the Kalol debottlenecking project is summarized below:

	(Rs million)	(US\$ million) (equivalent)
Equipment & Spares	67.6	7.52
Duties	11.9	1.32
Licenses & Engineering	6.3	0.70
Construction	17.6	1.95
Base Cost	103.4	11.49
Physical Contingency	10.0	1.11
Price Escalation	18.2	2.02
Installed Cost	131.6	14.62
Interest during construction	12.5	1.39
Total	144.1	16.01

16. With the implementation of the overall project, IFFCO expects additional production of 65,000 tons per year or urea from January 1980. The financial and economic rates of return of the project are both estimated at 41%.

Madras Fertilizers Ltd. (MFL) Project

17. As part of the Fertilizer Industry Credit, MFL had planned to install a process control computer. The scheme has been abandoned after evaluation of similar computers in other plants. MFL's present plans to debottleneck the ammonia plant include:

- (a) Replacement of boiler feed water (BFW) preheater (US\$0.29 million)
- (b) Replacement of water cooler condenser
- (c) Installation of an inert gas generator (US\$0.45 million)

These three items will help to improve ammonia production and consequently urea and NPK production. IDA has declined to finance the BFW preheater as the equipment has already been procured, and the procurement has not followed the Bank procurement guidelines. The remaining US\$0.45 million worth of equipment will be procured in accordance with IDA guidelines and is proposed for financing under the Credit.

Coromandel Fertilizers Ltd. (CFL) Project

18. CFL plans to install a purge gas recovery unit to recover the hydrogen from the synthesis loop purge gas and recycle it for ammonia production. CFL has already obtained a letter of intent for the project and has engaged Kellogg to carry out a study. The project, which is expected to be completed in early 1980, is

estimated to cost Rs 35.88 million (US\$4.0 million) of which about Rs 18 million (US\$2.0 million) represents equipment to be procured in accordance with IDA guidelines and is proposed for financing under the Credit. Present estimates indicate that the project will help to increase ammonia capacity by about 5% and will have an economic rate of return of about 30%.

General

19. Financial and economic evaluations have been carried out for the larger subprojects. For other subprojects, which cover plant additions and replacements, the benefits are large compared to costs and a detailed analysis of rates of return has not been attempted. The proportion of the total cost of the substitute subprojects proposed for financing under the IDA Credit (US\$17.0 million out of a total estimated cost of US\$29.6 million or 57%) is substantially higher than that for the original subprojects which are not being implemented (US\$22.4 million out of total estimated cost of US\$80.8 million or 28%). This is because the substitute subprojects are all basically debottlenecking investments, the bulk of the cost of which represents equipment procured in accordance with IDA guidelines. These contracts, about 25% of which are expected to be won by Indian suppliers, are proposed to be financed from the proceeds of the Credit. By contrast, some of the subprojects originally proposed were diversification projects containing larger civil works, offsite construction and working capital components, which were not to be financed under the Credit.