

**FERTILISER PRODUCTION  
IN INDIA**  
(AS ON 1.10.1977)

**The Fertiliser Association of India  
Near Jawaharlal Nehru University  
New Delhi-110 057**

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## PREFACE

The year 1906 marked the beginning of fertiliser production in the country with superphosphate using animal bones as the raw material. As a source of N, ammonium sulphate was the first product domestically produced in 30s as a by-product from steel plants. Since then, Indian fertiliser scene has been continually expanding embracing a whole range of fertiliser technology, using a wide spectrum of feedstock and producing a vast array of products. Today, fertiliser industry occupies a pivotal position in the country and India ranks among the major fertiliser producers in the world. For nitrogenous fertilisers we are the fourth largest producer.

2. There has been a rapid growth in both consumption and production of fertiliser in India over the past two decades. We are, however, not yet producing enough fertiliser within the country to meet our requirements and we continue to depend upon imports for nearly 30 per cent of our consumption. This is despite the very sharp increase in production during the last 2-3 years. A large programme of expansion of capacity has already been taken up and plans are being firmed up for further expansion.

3. For producing nitrogenous fertilisers, we are using a whole range of feedstock—lignite, coal, coke oven gas, electrolysis of water, natural gas and associated gas, naphtha and fuel oil. A number of plants based on coal and fuel oil are at different stages of construction and will be commissioned over the next few months.

4. The discovery of oil and natural gas (free and associated) in Bombay High and Basscin structures (off west coast) and natural gas in Assam will have a tremendous impact on the type of feedstock to be used in the country in the next generation of plants. Though oil was struck off-shore Bombay in 1974, the current year has special significance as firm estimates of availability of associated and free gas are now available. Their use pattern is in the process of being finalised. Fertiliser Industry is likely to get top priority in the allocation of gas as feedstock for nitrogenous fertilisers. Capacity of nearly 6,000 tonnes per day ammonia based on this gas has been planned in West India, apart from conversion of Units I, II & V of FCI's Complex at Trombay from naphtha to gas.

5. It will thus be seen that we are passing through dynamic times in the history of fertiliser production in India. Situation is changing rapidly. No wonder any reference material tends to get out of date quickly.

6. The primary purpose of this booklet "Fertiliser Production in India" has been to provide a handy source of latest reference material about the essential aspects of fertiliser production in the country to administrators, planners, managers and entrepreneurs concerned with fertiliser. The current issue puts together the cardinal points of fertiliser production in India as on 1st October, 1977.

7. Readers may remember that the last issue of this publication was brought out in December 1976. That we have had to update it so soon thereafter is indicative of the dynamic nature of the Indian fertiliser scene. Moreover, the fact that we have had to bring out its fourth edition in as many years leads us to believe that this Booklet is serving a useful purpose. This is a matter of

satisfaction to us also. We hope that our readers will continue to find the new edition equally useful. Suggestions for improving it further will be most welcome.

8. It will be of interest to mention that as of date 29 nitrogenous and complex and 33 phosphatic fertiliser factories are in operation with an installed capacity totalling 3 million tonnes of N and 1,198 thousand tonnes of  $P_2O_5$ .

9. By the end of 1978 the position is anticipated to be as shown below:

	<i>Capacity ( 000 tonnes/annum)</i>	
	<i>N</i>	<i>P<sub>2</sub>O<sub>5</sub></i>
1. Capacity existing as on 1-10-77	3,069	1,198
2. Fresh capacity likely to be added by 31-3-78		
(i) FCI, Nangal (Expn.)	152	—
(ii) FCI, Trombay (IV)	75	75
(iii) NFL, Bhatinda	235	—
3. Total estimated capacity as on 31-3-78	3,531	1,273
4. Further capacity planned for commissioning by 31-12-1978		
(i) FCI, Ramagundam	228	—
(ii) FCI, Talcher	228	—
(iii) FCI, Sindri (M)	129	—
(iv) NFL, Panipat	235	—
(v) Kothari (Madras), Ennore	5	—
5. Total estimated capacity as on 31-12-1978	4,356	1,273

*A Few Words About the Presentation of Data:*

10. A map showing the location of fertiliser factories (as on 1-10-77) is given on the next page to indicate the geographical coverage of the country by the fertiliser industry.

11. For easy reference, factories/projects are listed in an alphabetical order.

12. Actual factory production, both materialwise and nutrientwise, for the year 1976-77 (April-March) is also provided in the relevant tables.

13. Financial outlays on NP/NPK fertiliser factories/projects (even when listed under  $P_2O_5$  capacity — Table II) have been mentioned in Table I (N) against appropriate factories/projects.

14. "Date of commissioning" refers to the date of commencement of commercial production of the project. In the case of "expansion", this refers to the date of trial run.

15. Notes and abbreviations appearing in the Booklet are explained on page 62. An index to processors/licensees/contractors is appended to highlight their contribution to the Indian fertiliser industry.

New Delhi  
November 15, 1977

SATYA NAND  
Executive Director  
The Fertiliser Association of India

18.	Gujarat State Fertilizers Co.	Baroda	AS, Urea, DAP, ASP	
19.	Indian Farmers Fertiliser Cooperative	Kandla	NPK	
20.	Indian Farmers Fertiliser Cooperative	Kalol	Urea	
21.	Paushak	Baroda	SSP	
<b>Karnataka</b>				
22.	Chamundi Chemicals & Fertilisers	Munirabad	SSP	
23.	Gammon Fer-Chems	Belagula	SSP	
24.	Mangalore Chemicals & Fertilizers	Mangalore	Urea	
<b>Kerala</b>				
25.	Fertilisers & Chemicals, Travancore	Alwaye	AS, APS, ACI, SSP	
26.	Fertilisers & Chemicals, Travancore	Ambalamedu	Urea, NPK	
<b>Madhya Pradesh</b>				
27.	Dharamsi Morarji Chemical Co.	Kumhari	SSP	
28.	Steel Authority of India	Bhilai	AS	
<b>Maharashtra</b>				
29.	Bharat Fertiliser Industries	Bombay	SSP	
30.	Dharamsi Morarji Chemical Co.	Amharnath	SSP, TSP	
31.	Fertilizer Corpn. of India	Trombay	Urea, Nitrophosphate, APSN	Urea Nitrophosphate
32.	Maharashtra Agro Industries Development Corpn.			
33.	Western Chemical Industries	Panvel	SSP	
34.	National Fertilizers	Bombay	SSP	Urea
<b>Uttar Pradesh</b>				
65.	Indian Farmers Fertiliser Cooperative	Phulpur		Urea
<b>West Bengal</b>				
66.	Fertilizer Corpn. of India	Haldia	Nitrophosphate	Urea
<b>APPROVED IN PRINCIPAL</b>				
<b>Andhra Pradesh</b>				
67.	Nagarjuna Fertilisers	Kakinada		Urea, NPK
<b>Assam</b>				
68.	Fertilizer Corpn. of India	Namrup		Yet to be decided
<b>Gujarat</b>				
69.	Indian Farmers Fertiliser Cooperative	Ahmedabad		Urea
<b>Karnataka</b>				
70.	Karnataka State Industrial Development Corpn.	Mangalore		H <sub>3</sub> PO <sub>4</sub>
<b>Madhya Pradesh</b>				
71.	Fertilizer Corpn. of India	Korba		Urea
<b>Maharashtra*</b>				
72.	Fertiliser Corpn. of India (Plant No. I&II)	Uran		Urea
73.	Maharashtra Cooperative Fertilisers & Chemicals	Thana		ACI
<b>Orissa</b>				
74.	Fertilizer Corpn. of India	Paradiep		NPK

\*Location and product pattern of one project in North of Bombay is under consideration.

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**CAPACITY, RAW MATERIALS, PROCESSES  
AND COLLABORATORS OF**

**NITROGENOUS FERTILISER PROJECTS**

**(AS ON 1.10.1977)**

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## I. NITROGENOUS

Name of factory	Sector	Nutrient			End-Products			Principal raw material/ Feedstock
		Capacity, tpy [NH <sub>3</sub> , tpd]	Production 1976-77 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy [Urea, tpd]	Production 1976-77 (tonnes)	
<b>A. FACTORIES IN</b>								
1. Bokaro Steel Bokaro (Bihar)	Public	7,480	4,095	151	AS	36,300	19,879	Coke-oven gas (COG); sulphuric acid
2. Coromandel Fertilisers Visakhapatnam (Andhra Pradesh)	Private	83 000 [357]	62,896	76	Urea 28-28-0 20-20-0 14-35-14	Nil 251 000 NA 95,500	30 202,127 — 44,901	Naphtha; phosphate rock; sulphur
3. EID-Parry (India), Ennore (Tamil Nadu)	Private	16,000 [66]	8,494	53	APS 16-20-0 } 18-9-0 } AS	51,480 38,610	36,714 9,748 4,201	Naphtha; phosphate rock; sulphur
4. Fertilisers and Chemicals, Travancore, Alwaye (Kerala)	Public	82,600 [355]	42,320 + 988* <u>43,308</u>	53	AS APS 20-20-0 } 16-20-0 } ACI	198,000 181,000 24,750	115,575 32,977 65,024 6,050	Naphtha; phosphate rock; sulphur
5. Fertilisers and Chemicals, Travancore Ambalamedu a) Cochin Phase I	Public	152,000 [600]	76,150	50	Urea	330,000 [1,000]	156,543	Naphtha

\*Manufactured at the plant for non-agricultural purposes.



## FERTILISERS

Process/Licensees, etc.	Engineering/Contractors, etc.	Remarks	Financial outlay of the project & (FE) (Rs. million)	Date of commissioning
<b>PRODUCTION (N) (AS ON 1.10.1977)</b>				
Neutralisation of ammonia.		AS is produced as a by-product. With more coke-oven batteries commissioned on 29.3.77, the capacity of N has gone up from 2,720 to 7,480 tonnes.	NA	Oct. 1972 1st Expn. — Nov. 1973 IInd Expn. — March 1977
ICI/Kellogg for steam reformer and NH <sub>3</sub> ; Dorr-Oliver for phosphoric acid; Chemico for sulphuric acid; Wellman Lord for UAP & NPK, TVA (modified).	Lumus; Kellogg; Dorr-Oliver; Simon Carves; Wellman Lord; Chemico; Vulcan Laval.	Before expansion, major portion of urea manufactured was utilised for processing UAP 28-28-0 and 14-35-14 (from November 1971). A small quantity of urea (16,500 tpy) was available for direct sale. After expansion (3,000 tpy N) entire urea is being used in manufacturing UAP and NPKs, as shown.	575 (244)	Urea—Dec. 1967 UAP/NPK — February 1968 Expn.—UAP/NPK —April 1976
Shell gasification of naphtha; Simon Carves for sulphuric acid.	Simon Carves; Dorr-Oliver for APS; Mitsubishi Shoji Kaisha for AS.	Factory was installed to manufacture APS 16-20-0. During January 1968, the plant was expanded to produce AS using by-product gypsum.	84 (39)	APS—March 1963 AS (Expansion) —January 1968
Texaco gasification of naphtha; ICI for synthesis; Texaco/Selas/ICI for reformer; Monsanto and Chemico for Sulphuric acid; Prayon/Dorr - Oliver for phosphoric acid; ICI/FACT for AS; Linde for Oxygen; Dorr-Oliver for NP; Krebs for ammonium chloride (ACI).	Singmaster and Breyer; Simon Carves; Power Gas Corporation; Hitachi; Dorr-Oliver; FEDO; Chemico; EIC.	The original plant was for AS production based on wood gasification. ACI produced at the factory is meant for agricultural purposes since April 1976. Stage-I expansion was for doubling N capacity by electrolysis of water, production of H <sub>2</sub> PO <sub>4</sub> and APS 16-20-0. Stage II was replacement of wood-based NH <sub>3</sub> plant by Texaco process using naphtha. Stage III expansion was the installation of 300 tpd of AS based on FACT know-how for conversion of by-product gypsum. Stage IV expansion was 120 tpd steam reforming of naphtha, NH <sub>3</sub> plant and 150 tpd 20-20-0 grade APS plant.	50 30 20 120 56 <hr/> 276 (100)	Original — June 1947 Stage I—Dec. 1960 Stage II—Nov. 1962 Stage III—Nov. 1967 Stage IV—Sept 1971
Steam reforming of naphtha; ICI/PGC for reformer; Vetro-coke for CO <sub>2</sub> removal; Montedison for ammonia and urea.	P&D of FCI; FEDO; Montedison; Power Gas Corpn.	In Phase I, 1,000 tpd urea is manufactured. Phase II for NP/NPK fertilisers commissioned in December 1976. Process design by PGC for both Phase I and Phase II.	630 (162)	July 1973

For Notes see page 62.

(Continued)

## I. NITROGENOUS

Name of factory	Sector	Nutrient			End-Products			Principal raw material/ Feedstock
		Capacity, tpy [NH <sub>3</sub> , tpd]	Production 1976-77 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy [Urea, tpd]	Production 1976-77 (tonnes)	

## A. FACTORIES IN

5. Fertilisers and Chemicals, Travancore Ambalamedu (Concluded)								
b) Cochin Phase II (Kerala)		40,000 [External supply]	2,142	21	NP/ NPKs 17-17-17 28-28-0 18-46-0	485,000	7,650	Bought out NH <sub>3</sub> ; phosphate rock; sulphur
6. Fertilizer Corporation of India	Public							
a) Unit : Barauni (Bihar)		152,000 [600]	22,287	23	Urea	330,000 [1,000]	48,451	Naphtha
b) Unit : Durgapur (West Bengal)	"	152,000 [600]	46,010 + 295*	30	Urea	330,000 [1,000]	100,021	Naphtha
			46,305					
c) Unit : Gorakhpur (Uttar Pradesh)	"	131,000 [550]	95,161	73	Urea	284,920 [950]	206,873	Naphtha
d) Unit : Namrup (Assam)	"	197,000 [800]	92,683 + 996*	48	AS Urea	100,000 385,000	90,446 160,978	Natural gas; sulphur
			93,679					
e) Unit : Nangal (Punjab)	"	80,000 [307]	80,019 + 1,053*	101	CAN (25% N)	320,000	320,078	Power for electrolytic H <sub>2</sub> ; limestone
			81,072					

\*Manufactured at the plant for non-agricultural purposes.

## FERTILISERS (Continued)

Process/Licensees etc.	Engineering/Contractors, etc.	Remarks	Financial outlay of the project & (FE) (Rs. million)	Date of commissioning
<b>PRODUCTION (N) (Continued)</b>				
Chemiebau for H <sub>2</sub> T <sub>4</sub> ; DPG/Wellman Lord for NP/NPKs; Prayon for H <sub>2</sub> PO <sub>4</sub> ; Power Gas Corpn. for process design.	FEDO; Chemiebau; Prayon; Davy Power Gas.	500,000 tonnes of liquid ammonia would be imported over a period of 7 years. World Bank (IDA) credit of \$20 million to meet the FE cost of the H <sub>2</sub> SO <sub>4</sub> (1,000 tpd), H <sub>2</sub> PO <sub>4</sub> (350 tpd) and NP/NPKs (1,600 tpd) plants has been provided. Implementation of the project commenced in June 1974. Started manufacturing DAP from May 1977.	540 (180)	Dec. 1976 (trial run)
Selas for steam reformer; Vetrocoke for CO <sub>2</sub> removal; Montedison for NH <sub>3</sub> and urea.	P&D of FCI; Montedison.	Plant is similar to that at Durgapur and Cochin. Imported equipment obtained against suppliers' credit.	688 (182)	Nov. 1976
ICI/PGC for steam reforming; Vetrocoke for CO <sub>2</sub> removal; Montedison for ammonia and urea.	P&D of FCI; FEDO; Montedison; Power Gas Corporation	The plant having steam driven centrifugal compressor was commissioned on 13.10.73. Permitted to install their own captive power plant.	599 (225)	Oct. 1974
Shell gasification; Chemico for ammonia; TEC for expansion of ammonia plant; Mitsui Toatsu for urea.	P & D; Toyo Engineering Corporation.	World Bank (IDA) assistance of \$10 million was provided to meet the foreign exchange cost of the expansion project (51,000 N tpy). Permitted to install its own captive power plant (45 MW). It is proposed to manufacture NP/NPK fertilisers in Phase II under consideration.	529 (218)	Jan. 1969 Expn.—Dec. 1975
Steam reforming of natural gas; Selas for reformer, ammonia; urea; Montedison for expn. of NH <sub>3</sub> and urea plants. Vetrocoke for CO <sub>2</sub> removal.	Chemico; P&D; Montedison.	Technimont provided the supplier's credit for expansion (152,000 N tpy) FCI has been entrusted with another proposal to install 600 tpd NH <sub>3</sub> plant based on natural gas from OIL and ONGC oil fields [vide page 28].	920 (315)	Jan. 1969 Expn.—April 1976
De Nora for electrolysis of water; Grand Paroisse for ammonia; Bamag for nitric acid; St. Gobain for CAN; Linde for heavy water.	P&D; St. Gobain; De Nora; English Electric; Linde; Pintsch Bamag.	Grade of CAN changed from 20.5% N to 25% N from 20.8.67. Under expansion scheme, under implementation, 900 tpd ammonia will be produced using fuel oil, 300 tonnes will be used by the existing plant and the balance for expansion to produce urea [vide page 20].	312 (143)	April—1961 Heavy Water—August 1962

(Continued)

## I. NITROGENOUS

Name of factory	Sector	Nutrient			End-Products			Principal raw material/ Feedstock
		Capacity, tpy [NH <sub>3</sub> , tpd]	Production 1976-77 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy [Urea, tpd]	Production 1976-77 (tonnes)	
<b>A. FACTORIES IN</b>								
6. Fertilizer Corporation of India (Concluded)								
(f) Unit : Sindri (Bihar)	Public	90,000 [463]	21,971 +12,200*	38	AS ASN Urea	320,000 50,000 18,000	103,325 1,959 384	Coke; Coke-oven gas; naphtha; gypsum; pyrites
			<u>34,171</u>					
(g) Unit : Trombay (Maharashtra)		113,000 [350]	90,118 +10,600*	96	Urea Nitro-phosphate 20-20-0 15-15-15 APSN 20-20-0 Methanol	129,000 270,000 30,000	98,069 58,981 182,420 29,236 N.A.	Naphtha; refinery gas; phosphate rock; potash; sulphur; imported NH <sub>3</sub> (for additional capacity arising from debottlenecking)

\*Manufactured at the plant for non-agricultural purposes.

## FERTILISERS (Continued)

Process/Licensees, etc.	Engineering/ Contractors, etc.	Remarks	Financial outlay of the project & (FE) (Rs. million)	Date of commissioning
<b>PRODUCTION (N) (Continued)</b>				
Power Gas Corpn. for gasification; Selas; ICI for naphtha reformer; Chemico for ammonia; Simon Carves for sulphuric acid; ICI for AS; Montedison for gas reformation, ammonia, urea and ASN.	P&D; Power Gas Corpn; Chemico; Montedison; Hitachi; Simon Carves.	Ammonia is produced using coke which is supplemented by coke-oven gas and then naphtha. Naphtha gasification unit was set up (Rs. 11.2 million) to bring the plant upto capacity. Pyrites based H <sub>2</sub> SO <sub>4</sub> plant (400 tonnes/day) was commissioned in 1971-72. "Sindri Rationalisation Scheme" [vide page 46] will yield by-product gypsum which will replace natural gypsum. "Rationalisation Scheme" was commissioned in September 1977 [vide page 46]. "Modernisation Scheme" [vide page 22] which is under implementation will augment capacity further. Production of ASN (permanently) and urea (temporarily) stopped since August 1976. See Sindri (M) [vide page 22].	537 (NA)	AS—Nov. 1951  ASN & Urea— Oct. 1959
Shell gasification; Chemico for ammonia and urea; Girdler for reformer; Topsoe synthesis for methanol; PEC process modified by FCI for nitrophosphate. Nissan—Phos. acid. Dihydrate/demihydrate.	P&D; Selas; Chemico; C & I.	Under the First USAID loan, nitrophosphate grade was changed from 16-13-0 to 20-20-0 with effect from July 20, 1967. Started production of "Suphala" of grade 15-15-15 since 1970.71. Also started production of "Suphala" 20-20-0 and APSN grade 20-20-0 from November 1975. Under the second USAID loan methanol plant was constructed (November 1966). Added a 100 tpd H <sub>3</sub> PO <sub>4</sub> plant in June 1975. Also implementing expansion programmes viz. Trombay IV [vide page 24] and Trombay V [vide page 24]. FCI, Trombay has been permitted to instal its own captive power plant (18 MW). Import of NH <sub>3</sub> for debottlenecking (32,000 N tpy) will be discontinued as soon as Trombay V goes on stream. A proposal to instal a total capacity of 2,700 tpd NH <sub>3</sub> near Uran based on associated gas from Bombay High/Bassein has been approved in principle and the preparation of the project report has been entrusted to FCI [vide page 30]. Feedstock for Trombay I, II & V will be changed to natural gas when the latter is available from Bombay High/Bassein by 1980-81	456 (223)	Urea—Oct. 1965 Nitrophosphate— Nov. 1965 Debottlenecking— July—1976 Methanol— Nov. 1966 Switch over— 1980-81

(Continued)

## I. NITROGENOUS

Name of factory	Sector	Nutrient			End-Products			Principal raw material/ Feedstock
		Capacity, tpy [NH <sub>3</sub> , tpd]	Production 1976-77 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy [Urea, tpd]	Production 1976-77 (tonnes)	

## A. FACTORIES IN

7. Gujarat State Fertilizers Co Baroda (Gujarat)	Private	216,000 [500+450]†	155,961	72	Technical grade urea 46.5% N	3,300	NA	Associated/natural gas; naphtha; phosphate rock; sulphur
					Urea	364,000	240,170	
					AS	148,000	163,140	
					DAP	108,000	65,847	
					18-46-0			
					ASP			
					19.5-19.5-0		123	
8. Indian Explosives Panki (Uttar Pradesh)	Private	200,000 [830]	187,545	94	Urea	450,000 [1,364]	407,707	Naphtha

## FERTILISERS (Continued)

Process/Licensees, etc.	Engineering/Contractors, etc.	Remarks	Financial outlay of the project & (FE) (Rs. million)	Date of commissioning
<b>PRODUCTION (N) (Continued)</b>				
ICI/PGC as well as ICI/H&G for reformer; Casale for NH <sub>3</sub> ; Vetrocoke for CO <sub>2</sub> removal; Mitsui Toatsu for urea; Chemico for sulphuric acid and DAP; Nissan for H <sub>3</sub> PO <sub>4</sub> ; ICI for AS; Inventa for know-how of caprolactum plant.	Toyo Engineering Corpn. for Phase I; Hitachi for Phase II; Hitachi Zosen. EIL for detailed engineering of the caprolactum plant while the supply of imported equipment entrusted to Technip.	Switched over to the production of DAP of grade 18-46-0 from grade 20-48-0 since January 26, 1969. Introduced a new fertiliser ammonium sulphate phosphate (ASP) of grade 19.5-19.5-0 in April 1975. In Phase I, plants for NH <sub>3</sub> , Urea, AS, DAP, H <sub>2</sub> SO <sub>4</sub> , H <sub>3</sub> PO <sub>4</sub> were installed. In Phase II, capacities of NH <sub>3</sub> and urea plants were enhanced. In Phase III, caprolactum facility with a capacity of 20,000 tpy and 80,000 tpy co-product AS was developed for which the contract was awarded in February 1969. Caprolactum plant was commissioned on August 5, 1974. Proposal for new ammonia and urea plants at Chavaj is under implementation [vide page 24].	630 (320)	Phase I—May 1967
			337 (92)	Phase II—June 1969
			350 (NA)	Phase III—Aug. 1974
		[†Stream III of GSFC of 100 tpd of ammonia is not included, which is meant for heavy water plant of BARC]		
ICI for steam reforming and NH <sub>3</sub> ; Mitsui Toatsu for Urea.	ICI; TEC.	The company is a sister concern of ICI (India) Ltd. International Finance Corporation (of the World Bank), besides others, has provided funds to meet the foreign exchange cost. It is a two-stream plant of 100 thousand tpy N each. A proposal for 3rd stream of 100 thousand tonnes of N/annum has been approved in principle and is expected to be commissioned by 1980-81.	610 (210)	Dec. 1969 Expn. 1980-81

(Continued)

## I. NITROGENOUS

Name of factory	Sector	Nutrient			End-Products			Principal raw material/ Feedstock
		Capacity, tpy [NH <sub>3</sub> , tpd]	Production 1976-77 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy [Urea, tpd]	Production 1976-77 (tonnes)	
<b>A. FACTORIES IN</b>								
9. Indian Farmers Fertiliser Cooperative Kandla and Kalol (Gujarat)	Cooperative	215,000 [910]	160,074	81	Urea	392,000	271,482	Natural gas; phosphoric acid; potash
			+14,449*		10-26-26	92,800	54,875	
					12-32-16	92,800	247,540	
					14-36-12	189,900	—	
					22-22-11	N.A.	—	
					24-24-0	N.A.	—	
		174,523						
10. Indian Iron & Steel Co. Burnpur-Kulti (West Bengal)	Public	4,740	1,395	29	AS	23,000	6,770	COG; H <sub>2</sub> SO <sub>4</sub>
11. Madras Fertilizers Manali (Tamil Nadu)	Public	176,000 [750]	129,531	77	Urea	210,000	173,535	Naphtha; H <sub>3</sub> PO <sub>4</sub> ; potash
			+ 751*		17-17-17	90,600	261,936	
					14-28-14	72,500	5,028	
					28-28-0	54,500	—	
					18-36-0	54,400	—	
					24-12-12	54,400	—	
					11-22-22	36,300	—	
					24-24-0	N.A.	5,005	
	18-46-0	N.A.	18,169					
		130,282						

\*Manufactured at the plant for non-agricultural purposes.



## FERTILISERS (Continued)

Process/Licensees, etc.	Engineering/Contractors, etc.	Remarks	Financial outlay of the project & (FE) (Rs. million)	Date of commissioning
<b>PRODUCTION (N) (Continued)</b>				
M. W. Kellogg for steam reforming and NH <sub>3</sub> ; Dorr-Oliver for NPK; Stamicarbon for urea.	M W. Kellogg & Co; H&G; Dorr-Oliver.	NH <sub>3</sub> and urea are manufactured at Kalol and NPK fertilisers at Kandla presently with imported H <sub>3</sub> PO <sub>4</sub> . Part of H <sub>3</sub> PO <sub>4</sub> is being replaced by MAP. A "debottlenecking" programme costing Rs. 40 million has been taken up to augment production of NPKs and would be completed in about a year. Rs. 90.40 million as equity by State Cooperatives of U.P., Punjab, Haryana, Rajasthan, Maharashtra, Gujarat, M.P., Karnataka, Andhra Pradesh and Tamil Nadu and Rs. 180 million as equity by the G.O.I. Balance Rs. 650 million given as loan, out of which foreign exchange requirement of Rs. 250 million met through Rs. 112 million loan from the USAID and another Rs. 138 million loan from the UK/INDIA Mixed Project Loan. It is proposed to have their own H <sub>3</sub> PO <sub>4</sub> plant with capacity 120,000 tpy of P <sub>2</sub> O <sub>5</sub> (Rs. 380 million) expected to be ready in 1981-82. A fresh proposal for production of ammonia and urea at Phulpur is under implementation [vide page 24]. IFFCO has been entrusted with the preparation of project report for a plant of size 1,350 tpd NH <sub>3</sub> north of Bombay based on natural gas from Bassein [vide page 30].	920 (270)	NH <sub>3</sub> Kalol—Nov. 1974 NPKs Kandla—Nov. 1974  Urea Kalol—Jan. 1975
—	—	AS is a by-product from coke-oven plant.	N. A.	1947
Chemico for steam reforming and urea; Catacarb for CO <sub>2</sub> ; Topsoe for NH <sub>3</sub> ; Dorr-Oliver for NPKs.	Chemico; Dorr-Oliver.	Capacity of the plant is 190,000 tonnes out of which 164,000 tonnes is accounted for by urea and two streams of NPK fertilisers. Third stream of NPK commissioned in October 1976 (12,000 tpy N) would consume the entire spare NH <sub>3</sub> . Presently, H <sub>3</sub> PO <sub>4</sub> is imported to manufacture NPK fertilisers. Started manufacturing DAP from January 1977.	750 (260)	October 1971  III Stream— October 1976

(Continued)

## I. NITROGENOUS

Name of factory	Sector	Nutrient			End-Products			Principal raw material/ Feedstock
		Capacity, tpy [NH <sub>3</sub> , tpd]	Production 1976-77 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy [Urea, tpd]	Production 1976-77 (tonnes)	
A. FACTORIES IN								
12. Mangalore Chemicals & Fertilizers Mangalore (Karnataka)	Private	160,000 [660]	49,695	32	Urea	340,000 [1,000]	108,032	Naphtha
13. New Central Jute Mills Co Varanasi (Uttar Pradesh)	Private	10,000 [40]	2,870	29	ACI	40,000	11,479	Coke; Common salt
14. Neyveli Lignite Corporation Neyveli (Tamil Nadu)	Public	70,000 [285]	43,875 + 44* <u>43,919</u>	63	Urea	154,000 [450]	95,381	Lignite
15. Shriram Chemical Industries Kota (Rajasthan)	Private	152,000 [600]	119,032	78	Urea	330,000 [1,000]	258,766	Naphtha

\*Manufactured at the plant for non-agricultural purposes.

## FERTILISERS (Continued)

Process/Licensees, etc.	Engineering/ Contractors, etc.	Remarks	Financial outlay of the project & (FE) (Rs. million)	Date of commissioning	
<b>PRODUCTION (N) (Continued)</b>					
ICI/H&G for steam reforming; ICI for NH <sub>3</sub> ; Stamicarbon for Urea.	H & G	Terms of collaboration with UK were finalised in December 1971 under which ODA of U.K. is giving Rs. 198 million foreign exchange loan. Project was taken up for implementation in October 1972. Sponsors are Karnataka State Industrial Investment and Development Corporation; State cooperative Marketing Federation, State Agro-Industries Corporation and Rallis India, Bombay. Project was more or less on a turn-key basis. Most of the work was taken up by Humphreys & Glasgow.	676 (230)	March 1976	
Modified process.	Solvay	Pintsch Bamag; Uhde.	Equal quantity of soda ash is produced as co-product.	45 (N.A.)	Nov. 1959
Winkler gasification process; Vetrocoke for CO <sub>2</sub> removal; Bamag for NH <sub>3</sub> ; Linde for oxygen; Montedison for urea.	Ansaldo; Pintsch Bamag; Linde; Montedison.	FCI will install, on a turn-key basis plants for fuel oil gasification to replace lignite. Complete switch-over is contemplated by 1978-79. Investment would be Rs. 140 million out of which World Bank would provide \$11 million under IDA. Process know-how of Shell Research Ltd. and Benfield Corpn. is being used.	344 (180)	March 1966 Switch over— 1978/79	
Topsoe for steam reformer and NH <sub>3</sub> and Stamicarbon for urea.	Mitsubishi; Chiyoda.	The original project (110,000 tpy urea) was financed from supplier's credit and other sources (Rs. 270 million). Expansion under Phase I (42,000 tpy N 92,000 tpy urea) was completed in December 1974 and was financed from Yen credit (Rs. 87 million). A proposal for a new ammonia/urea Plant at Kota under Phase II has been approved in principle [vide page 32].	357 (N.A.)	Feb. 1969 Expn — Dec. 1974	

(Continued)

## I. NITROGENOUS

Name of factory	Sector	Nutrient			End-Products			Principal raw material/ Feedstock
		Capacity, tpy [NH <sub>3</sub> , tpd]	Production 1976-77 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy [Urea, tpd]	Production 1976-77 (tonnes)	
<b>A. FACTORIES IN</b>								
16. Southern Petrochemical Industries Corporation Tuticorin (Tamil Nadu)	Private	258,000 [1,100]	149,048	58	Urea	512,000	320,816	Naphtha; phosphate rock; sulphur
					DAP	28,000	—	
					10-26-26	128,000	—	
					15-15-15	32,000	—	
					28-28-0	N.A.	5,256	
Heavy Water	72	NA						
17. Steel Authority of India	Public							
(a) Unit : Bhilai (Madhya Pradesh)		6,720	7,496	112	AS	32,600	36,389	Coke-oven gas; sulphuric acid
(b) Unit : Durgapur (West Bengal)		4,370	3,044	70	AS	21,200	14,778	-do-
(c) Unit : Rourkela (Orissa)		5,770	3,322	58	AS	28,200	16,127	Coke-oven gas; sulphuric acid
(d) Unit : Rourkela (Orissa) (Fertiliser Plant)		120,000	79,514 + 5,709*	66	CAN (25% N)	480,000	318,057	Coke-oven gas; naphtha limestone
			<u>85,223</u>					

\*Manufactured at the plant for non-agricultural purposes.

## FERTILISERS (Continued)

Process/Licensees, etc.	Engineering/Contractors, etc.	Remarks	Financial outlay of the project & (FE) (Rs. million)	Date of commissioning
<b>PRODUCTION (N) (Continued)</b>				
ICI/PGC for steam reforming; Vetrocoke for CO <sub>2</sub> removal; Mitsui - Toatsu for urea and DAP; TVA process for NPK fertilisers; Nissan process for H <sub>2</sub> SO <sub>4</sub> and H <sub>3</sub> PO <sub>4</sub> .	PGC for NH <sub>3</sub> ; and TEC; Hitachi Zosen for Urea.	Implementation of the project commenced in February 1972 U.K. and Yen credit arranged for foreign exchange requirement. Foreign Exchange for NH <sub>3</sub> plant was arranged against UK India Mixed Project Loan. Urea and DAP plants by TEC (Rs. 150 million). NH <sub>3</sub> plant by ICI/PGC (Rs. 130 million). Inclusion of heavy water plant (Rs. 230 million) has enabled SPIC to increase the capacity of NH <sub>3</sub> plant from 1,000 to 1,100 tpd. NP/NPK plants started in November 1976. Production of DAP started in April 1977.	897 (278)	Urea—June, 1975 NP/NPK—Nov. 1976
Neutralisation of NH <sub>3</sub> .	—	AS is a by-product from coke-oven plant. Expansion to 53,400 tpy AS is expected by June, 1983.	NA	Dec. 1959 Expn—June, 1983
—do—	—	AS is a by-product from coke-oven plant.	NA	April 1960
—do—	Koppers GmbH.	—do—	NA	March 1967
Linde for gasification of COG; Otto for naphtha reforming; Uhde for NH <sub>3</sub> ; P&D for nitric acid and CAN.	Pintsch Bamag — Uhde; Otto; Linde; Stamicarbon; P & D of FCI.	As shortage of COG was inhibiting production, a naphtha reformer (erected by W. Otto & Co) was commissioned in 1969 at a cost of Rs. 36 million. Switched over to the production of grade 25% N from December 1968 in place of grade 20.5% N produced earlier. Second naphtha reformer is under erection to reduce dependence on COG. After completion, capacity based on COG will be reduced from 70,000 to 21,000 tpy N.	230 (NA)	Dec. 1962 Expn—Aug 1969 Second Naphtha reformer—1978-79

(Continued)

## I. NITROGENOUS

Name of factory	Sector	Nutrient			End-Products			Principal raw material/ Feedstock		
		Capacity, tpy [NH <sub>3</sub> , tpd]	Production 1976-77 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy [Urea, tpd]	Production 1976-77 (tonnes)			
<b>A. FACTORIES IN</b>										
18. Tata Iron and Steel Co. Jamshedpur (Bihar)	Private	4,760	3,276	69	AS	23,100	15,903	COG; H <sub>2</sub> SO <sub>4</sub>		
19. Zuari Agro-Chemicals, San Coale (Goa)	Private	170,000 [660]	121,054	71	Urea	340,000	218,975	Naphtha; H <sub>3</sub> PO <sub>4</sub> ; potash		
					UAP					
					28-28-0				150,000	3,000
					DAP					
18-46-0	61,422									
NPK										
19-19-19										

	Capacity	Production
<b>Public</b>	<b>1,584,080</b>	<b>874,769</b>
<b>Private</b>	<b>1,269,760</b>	<b>859,871</b>
<b>Cooperative</b>	<b>215,000</b>	<b>174,523</b>
<b>A. GRAND TOTAL</b>	<b>3,068,840</b>	<b>1,909,163* (47,085)</b>
	<b>Capacity utilisation</b>	<b>65%</b>

\*This figure includes 47,085 tonnes of N for non-agricultural purposes.

## FERTILISERS (Continued)

Process/Licensees, etc.	Engineering/ Contractors, etc.	Remarks	Financial outlay of the project & (FE) (Rs. million)	Date of commissioning
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## PRODUCTION (N) (Concluded)

		AS is a by-product	NA	1933
ICI/PGC for steam reformer; vetrocok for CO <sub>2</sub> removal; TEC for NH <sub>3</sub> and NPK; Mitsui Toatsu for urea	ICI/PGC; TEC; Mitsui Toatsu	Plant was erected on a turnkey basis by TEC. Trial runs for NPK fertilisers based on imported H <sub>3</sub> PO <sub>4</sub> were carried out during March 1975. Change-over from Vetrocoke to Benfield is completed. International Finance Corporation (World Bank) provided funds besides USA to meet foreign exchange cost. Started manufacturing DAP from March 1977. Also planning to expand NP/NPKs.	566 (262)	Urea—May 1973 NPKs—March 1975

	<b>Public</b>	<b>6,811</b>
	<b>Private</b>	<b>5,127</b>
<b>A. TOTAL (Financial Outlay)</b>	<b>Coop.</b>	<b>920</b>
	<b>Total</b>	<b>12,858</b>

(Continued)

## I. NITROGENOUS

Name of factory	Sector	Nutrient	End-Products	
		Capacity, tpy [NH <sub>3</sub> , tpd]	Product	Capacity, tpy [Urea, tpd]

## B. PROJECTS UNDER

1. Fertilizer Corporation of India	Public			
(a) <i>Unit : Haldia</i> (West Bengal)		152,000 [600]	Urea	167,400
			Nitro-phosphate 20-20-0	375,000
			Soda ash	60,000
			Methanol	41,250
(b) <i>Unit : Nangal</i> (Punjab)				
Expansion plan		152,000	Urea	330,000
Total after expansion		232,000 [900]		[1,000]
(c) <i>Unit : Ramagundam</i> (Andhra Pradesh)		228,000 [900]	Urea	495,000 [1,500]

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For Notes please see page 62.



## FERTILISERS (Continued)

Principal raw material/ Feedstock	Process/ Licensees, etc.	Engineering/ Contractors, etc.	Remarks	Financial outlay of the project & (FE) (Rs. million)	Date of commis- sioning
<b>IMPLEMENTATION (N) (AS ON 1 10.1977)</b>					
Fuel oil; phosph- ate rock; sulphur	Shell gasifica- tion; Lurgi for gas purification; Montedison for NH <sub>3</sub> and urea; Stamicarbon for NPK; FCI for H <sub>2</sub> SO <sub>4</sub> ; Nissan for H <sub>3</sub> PO <sub>4</sub> ; To- psoe for meth- anol; CLE for soda ash.	P&D; Lurgi; Mon- tedison; Stemi- carbon; Heurtey Nissan; Polimex- CLE; Topsoe.	Licence was issued in December 1971. Implementation of the project commenced in Septem- ber 1972. Licence agreements for process know-how and con- tracts for design & supply of equipment/machinery have since been concluded.	2240 (420)	Jan. 1979
Fuel oil	Shell gasifica- tion; Lurgi for gas purification; Topsoe for NH <sub>3</sub> ; Montedison for urea.	P&D; Montedison; Uhde; Lurgi; To- psoe.	Implementation of the project commenced in March 1973. After expansion, the entire capacity of NH <sub>3</sub> would be based on fuel oil. Out of 900 tpd NH <sub>3</sub> 600 tonnes will be used for urea production and the balance 300 tonnes for CAN production in the existing plant [vide page 6]. The electrolyser and NH <sub>3</sub> plant in the existing unit would be gradually replaced. FE com- ponent through IDA of the World Bank.	1210 (550)	Dec. 1977
Coal	Koppers for gasification; Lurgi for gas purification; Montedison for NH <sub>3</sub> and urea.	P&D; Montedison Koppers; Lurgi.	FCI signed contract with Techno Export of Czechoslovakia in January 1971 for the supply of equipment and machinery for air separation and nitrogen wash units. Other imported equip- ment is from West Germany and Italy. Licence was issued in February 1971. Implementation of the project started in July 1971. Out of 3,000 tonnes/day coal requirement, 1700 tonnes would be for gasification and produc- tion of NH <sub>3</sub> and the balance for steam generation.	1660 (460)	June. 1978

(Continued)

## I. NITROGENOUS

Name of factory	Sector	Nutrient	End-Products	
		Capacity, tpy [NH <sub>3</sub> tpd]	Product	Capacity, tpy [Urea, tpd]

## B. PROJECTS UNDER

1. Fertilizer Corpn.  
of India (Continued)      Public

(d) *Unit : Sindri*  
(Bihar)  
(Modernisation)

Expansion plan  
Total after expansion

129,000  
219,000  
[900]

Urea

280,000  
[1,000]  
(after expansion)

(e) *Unit : Talcher*  
(Orissa)

228,000  
[900]

Urea

495,000  
[1,500]

## FERTILISERS (Continued)

Principal raw material/ Feedstock	Process/ Licensees, etc.	Engineering/ Contractors, etc.	Remarks	Financial outlay of the project & (FE) (Rs. million)	Date of commis- sioning
<b>IMPLEMENTATION (N) (Continued)</b>					
Fuel oil.	Shell gasification Lurgi for gas purification; Topsoe for NH <sub>3</sub> synthesis; Montedison for urea.	Uhde; Lurgi; Montedison P&D	Application was made in May 1971. Implementation of the project was taken up in October 1974. After "Modernisation" revised total capacity would be as under: AS—320,000 tpy. Urea—330,000 tpy. Out of 900 tpd NH <sub>3</sub> , 600 would be used to manufacture urea and the balance 300 tpd for making AS in the existing plant. There would be no production of ASN after expansion and capacity of urea would be increased as shown. As soon as Sindri (M) is commissioned, the existing semi-water gas plant, gas reforming plant and NH <sub>3</sub> [vide page 8] would be closed down. However, power plant and AS plant would be retained and renovated at a cost of Rs. 100 million to manufacture 320,000 AS tpy. ØIDA of the World Bank has provided an additional \$91 million both for Sindri (Modernisation) and Sindri (Rationalisation), [vide page 46].	1520 (810) Ø	Oct. 1978
Coal.	Koppers for gasification; Lurgi for gas purification; Montedison for NH <sub>3</sub> and urea.	P&D; Montedison; Koppers; Lurgi.	FCI signed contract with Techno Export of Czechoslovakia in January 1971 for the supply of equipment and machinery for air separation and nitrogen wash units. Other imported equipment is from West Germany and Italy. Implementation of the project was taken up in July 1971.	1660 (460)	April 1978

(Continued)

## I. NITROGENOUS

Name of factory	Sector	Nutrient	End-Products	
		Capacity, tpy NH <sub>3</sub> , tpd]	Product	Capacity, tpy [Urea, tpd]

## B. PROJECTS UNDER

1. Fertilizer Corporation of India (Concluded) (f) <i>Unit : Trombay IV</i> (Maharashtra)	Public	75,000 [External supply]	Nitro-phosphate 20-20-0	375,000
(g) <i>Unit : Trombay V</i> (Maharashtra) Total after expansion		130,000 [900] 318,000 [1,250]	Urea	284,000 [1,000]
2. Gujarat Narmada Valley Fertilizers Co Chavaj (Gujarat)	Private	273,000 [1,350]	Urea	594,000 [1,800]
3. Indian Farmers Fertiliser Coop Phulpur (Uttar Pradesh)	Cooperative	228,000 [900]	Urea	495,000 [1,500]

## FERTILISERS (Continued)

Principal raw material/ Feedstock	Process/ Licensees, etc.	Engineering/ Contractors, etc.	Remarks	Financial outlay of the project & (FE) (Rs. million)	Date of commis- sioning
<b>IMPLEMENTATION (N) (Continued)</b>					
Bought out NH <sub>3</sub> phosphate rock; sulphur.	Uhde for nitro- phosphate; DPG for HNO <sub>3</sub> ; DSM for process design	P&D; Stamicar- bon; Pintsch Bamag; Uhde.	Licence was issued in June 1971. Implementation was taken up in June 1974. Project is to be based on bought out NH <sub>3</sub> for 2-3 years and thereafter from Trombay V. (See below).	760 (300)	Jan. 1978 Switch over— 1980-81
Naphtha or natural gas.	Topsoe for re- formation and NH <sub>3</sub> synthesis; Snamprogetti for urea.	P&D; Snampro- getti; Topsoe.	The ammonia plant is designed to use naphtha or natural gas, 50 per cent of NH <sub>3</sub> (450 tpd) capacity when commissioned, would be used to replace import- ed NH <sub>3</sub> at Trombay IV (see above). Balance NH <sub>3</sub> would be used to manufacture urea at the plant (i.e. 778 urea tpd for Trom- bay V and balance 222 urea tpd as NH <sub>3</sub> for Trombay IV). Later, naphtha may be replaced by natural gas likely to be available from Bombay High/Bassein by 1980-81.	1,900 (550)	July 1980 Switch over— 1980-81
Fuel oil.	Texaco for gasi- fication; Rectisol process for sulphur removal and CO <sub>2</sub> recovery; Topsoe for NH <sub>3</sub> synthesis; snam- progetti for urea.	GSFC; Linde; Snamprogetti; Topsoe.	Industrial licence was issued in March 1977. New NH <sub>3</sub> capacity proposed is for 1,350 tpd out of which 950 tpd would be used to manufac- ture 1,600 tpd urea and the balance for other purposes yet to be identified. IBRD has earmarked a loan of \$170 million to be shared jointly by Bhatinda, Panipat, Kakinada and GNVFC Baroda (new plant) to meet part of its foreign ex- change cost. IDBI is financing rupee term of Rs. 600 million and underwrit- ing Rs. 120 million equity share.	2,750 (830)	April 1980
Naphtha.	Kellogg for NH <sub>3</sub> ; Snamprogetti for urea.	Kellogg; Snamprogetti.	IBRD are financing the FE component up to \$110 million. In Phase II, NPK fertilisers might be manufactured through H <sub>3</sub> PO <sub>4</sub> transported from Kandla.	1,700 (980)	June 1979

(Continued)

## I. NITROGENOUS

Name of factory	Sector	Nutrient	End-Products	
		Capacity, tpy [NH <sub>3</sub> , tpd]	Product	Capacity, tpy [Urea, tpd]

## B. PROJECTS UNDER

4. Kothari (Madras) Ennore (Tamil Nadu)	Private	5,000 [20]	ACI	20,000
5. National Fertilizers (a) <i>Unit : Bhatinda</i> (Punjab)	Public	235,000 [900]	Urea	511,500 [1,550]
(b) <i>Unit : Panipat</i> (Haryana)		235,000 [900]	Urea Flaked sulphur	511,500 [1,550] 20 tpd

	Public	1,564,000
B. TOTAL (Capacity)	Private	278,000
	Cooperative	228,000
	Total	2,070,000

## FERTILISERS (Continued)

Principal raw material/ Feedstock	Process/ Licensees, etc.	Engineering/ Contractors, etc.	Remarks	Financial outlay of the project & (FE) (Rs. million)	Date of commis- sioning
<b>IMPLEMENTATION (N) (Concluded)</b>					
Ammonia and common salt.			Industrial licence issued in May 1976. NH <sub>3</sub> from external sources.	NA	1978
Fuel oil.	Partial oxidation of fuel oil by Shell gasification; Lurgi for gas purification; Topsoe for NH <sub>3</sub> synthesis; Mitsui Toatsu total recycle process for urea.	Toyo Engg. Corpn for basic design process, Licences, detailed engineering etc. Engineers India Ltd for construction, complementary engineering and procurement.	Veba Chemie are consultants to both Bhatinda and Panipat projects. Projects has been taken up for implementation in Sept. 1974 when contracts of TEC and EIL became operative. Expected to be completed in 36 months. Export-Import Bank of Japan has provided a part of foreign exchange to the extent of 11 million Yen. In addition, IBRD has advanced a loan of \$170 million to be shared jointly by Bhatinda, Panipat, GNVFC Baroda (new plant) and Kakinada projects to meet the FE cost.	1735 (562)	Trial run — Dec. 1977  Commercial Production —March 1978.
Fuel oil.	Partial oxidation of fuel oil by Shell gasification; Lurgi for gas purification; Topsoe for NH <sub>3</sub> synthesis; Mitsui Toatsu total recycle process for urea.	—do—	—do—	1742 (520)	Trial run— April 1978  Commercial Production— July/Aug 1978
<b>B. TOTAL (Financial Outlay)</b>		<b>Public</b>	<b>14,427</b>		
		<b>Private</b>	<b>2,750</b>		
		<b>Cooperative</b>	<b>1,700</b>		
		<b>Total</b>	<b>18,877</b>		

(Continued)

## I. NITROGENOUS

Name of factory	Sector	Nutrient	End-Products	
		Capacity, tpy [NH <sub>3</sub> , tpd]	Product	Capacity, tpy [Urea, tpd]

## C. PROJECTS APPROVED

1. Fertilizer Corporation of India (a) <i>Unit : Korba</i> (Madhya Pradesh)	Public	228,000 [900]	Urea	495,000 [1,500]
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(b) *Unit : Paradeep*  
(Orissa)

345,000  
[1,350]

NP/  
NPKs

c) *Unit : Namrup*  
(Assam)

152,000  
[600]



**FERTILISERS (Continued)**

Principal raw material/ Feedstock	Process/ Licensees, etc.	Engineering/ Contractors, etc.	Remarks	Financial outlay of the project & (FE) (Rs. million)	Date of commis- sioning
<b>IN PRINCIPLE (N) (AS ON 1.10.1977)</b>					
Coal	Koppers for gasi- fication; Lurgi for gas purifica- tion; Montedison for NH <sub>3</sub> and Urea.	P & D; Montedison; Koppers; Lurgi.	It is the first coal-based project conceived in 1960. Progress has been rather slow for various reasons including constraints on funds and changing feedstock situation. Work has been rephased though civil work has started as far back as Decem- ber 1971.	1500 (400)	1983-84
Fuel Oil; Phosphate rock; sulphur.		P & D	Project work has been rephased.	3500 (1000)	1984-85
Associated gas from OIL and ONGC oil fields.		P & D	0.5 mm <sup>3</sup> pd of associated gas is anticipated to be made availa- ble to the project. Capacity of ammonia plant may be increased from 600 to 900 tpd depending upon quantum of gas availa- ble. [vide page 6]	2000 (600)	1982-83

(Continued)

## I. NITROGENOUS

Name of factory	Sector	Nutrient	End-Products	
		Capacity, tpy [NH <sub>3</sub> , tpd]	Product	Capacity, tpy Urea, tpd]

## C. PROJECTS APPROVED

(d) <i>Unit : Uran</i> (South of Bombay)— two plants (Maharashtra)	Public	345,000×2 [1,350×2 or 900×3]	Urea	500,000×2 or 600,000×2 [2×1800 or 3×1500]
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2. Indian Farmers Fertiliser Cooperative Ahmedabad (Gujarat)	Coopera- tive	345,000 [1,350]	Urea	500,000 to 600,000 [1,500 to 1,800]
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## FERTILISERS (Continued)

Principal raw material/ Feedstock	Process/ Licensees, etc.	Engineering/ Contractors, etc.	Remarks	Financial outlay of the project & (FE) (Rs. million)	Date of commis- sioning
<b>IN PRINCIPLE (N) (Continued)</b>					
Natural gas from Bombay High.		P & D and others.	<p>The equivalent of 3 x 1350 tpd NH<sub>3</sub> plants are proposed to be set up on the West Coast based on natural gas from Bombay High/Bassein.</p> <p>The size and therefore number of plants has yet to be decided. These could be 900/1350 tpd NH<sub>3</sub> capacity. Two plants will be located South of Bombay and the third one North of Bombay. FCI's plants will be located near Uran, the proposed shore terminal of the gas and oil pipelines from Bombay High. (IFFCO have been commissioned to prepare a project report for one of the plants North of Bombay).</p> <p>Exact locations of these plants have yet to be firmed up. Each plant will use a part of NH<sub>3</sub> to produce urea and the balance would be sent to Trombay, Cochin, etc. to replace imported ammonia or to meet shortfall of ammonia in other units.</p> <p>IDA (an affiliate of World Bank) and British Government are likely to finance the project. Both the plants near Uran are planned to be completed in 39 months from mid 1978 by which time details regarding credit, supply of technical know-how, land acquisition etc. are likely to be finalised.</p> <p>The requirement of gas of each plant at full capacity utilisation would be about 1.5 mm<sup>3</sup> pd.</p>	2,200— 2,300 each (750 each)	Both in 1982-83
Natural gas from Bassein, an off- shore structure South of Bombay High.			<p>(Remarks—Same as for Uran Plants).</p> <p>The plant is planned to be completed in 39 months from early 1979 by which time IFFCO's Phulpur plant [vide page 24.] would have been commissioned.</p>	2,200— 2,300 (750)	1982-83

(Continued)

## I. NITROGENOUS

Name of factory	Sector	Nutrient	End-Products	
		Capacity, tpy [NH <sub>3</sub> , tpd]	Product	Capacity, tpy [Urea, tpd]

## C. PROJECTS APPROVED

3. Maharashtra Coop. Fertilisers and Chemicals Tarapur (Maharashtra)	Cooperative	51,000 [200]	ACI Soda Ash	66,000 66,000
4. Nagarjuna Fertilisers Kakinada (Andhra Pradesh)	Private	228,000 [900]	Urea NPKs	437,000 450,000
5. Shriram Chemical Industries Kota (Rajasthan) (Phase II) Total after expansion	Private	152,000 [600] 304,000 [1,200]	Urea	330,000 [1,000] 660,000 [2,000]

	<b>Public</b>	<b>1,415,000</b>
<b>TOTAL CAPACITY</b>	<b>Private</b>	<b>380,000</b>
	<b>Coop.</b>	<b>396,000</b>
<b>C. Grand Total</b>	<b>Capacity :</b>	<b>2,191,000</b>

	<b>Public</b>	<b>4,563,080</b>
<b>GRAND TOTAL (Capacity)</b>	<b>Private</b>	<b>1,927,760</b>
<b>(A+B+C)</b>	<b>Coop.</b>	<b>839,000</b>
	<b>Total</b>	<b>7,329,840</b>

## FERTILISERS (Continued)

Principal raw material/ Feedstock	Process/ Licensees, etc.	Engineering/ Contractors, etc.	Remarks	Financial outlay of the project & (FE) (Rs. million)	Date of commis- sioning
<b>IN PRINCIPLE (N) (Concluded)</b>					
Naphtha; common salt.		Engineers India Ltd; Topsoe; FEDO.	Project is sponsored by Mahar- ashtra State Cooperative Bank. Company signed a contract with Haldor Topsoe for techni- cal collaboration. 65 tpd of NH <sub>3</sub> is earmarked for ACI and the rest for direct application. NH <sub>3</sub> plant (200 tpd) would cost Rs. 130 million. Industrial licence issued in December 1975.	440 (115)	Not yet finalised
Fuel oil; phosphate rock; sulphur.	Texaco partial oxidation for ammonia; Stami- carbon for urea.	Foster (UK).	Wheeler Letter of intent issued in January 1974. It is proposed to manufacture urea in Phase I. Production of NPK fertilisers in Phase II is yet indefinite. IBRD has earmarked a loan of \$170 million to be shared jointly by Bhatinda, Panipat, Kakinada and GNVFC Baroda (new plant) to meet part of the foreign exchange cost.	2000 (700)	Phase I 1982-83 Phase II yet to be- firmed up
Fuel oil.			Phase I (expansion) was com- pleted in December 1974 (42,000 tpy N) [vide page 14]. In Phase II, a new NH <sub>3</sub> and urea facility is under consideration to be developed at the existing loca- tion for which a letter of intent was issued in January 1974.	NA	1983-84
<b>C. TOTAL (Financial Outlay)</b>		<b>Public</b>	<b>11,400</b>		
		<b>Private</b>	<b>2,000</b>		
		<b>Coop.</b>	<b>2,640</b>		
		<b>Total</b>	<b>16,040</b>		
<b>GRAND TOTAL (Financial Outlay) (A+B+C)</b>		<b>Public</b>	<b>32,638</b>		
		<b>Private</b>	<b>9,877</b>		
		<b>Coop.</b>	<b>5,260</b>		
		<b>Total</b>	<b>47,775</b>		

(Continued)

## I. NITROGENOUS

Name of factory	Sector	Nutrient	End-Products	
		Capacity, tpy [NH <sub>3</sub> , tpd]	Product	Capacity, tpy [Urea, tpd]

## D. PROJECTS UNDER

1. Location-North of Bombay (Maharashtra)	Public	345,000 [1,350 or 900×2]
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	<b>Public</b>	<b>4,908,080</b>
	<b>Private</b>	<b>1,927,760</b>
	<b>Cooperative</b>	<b>839,000</b>
	<b>Total</b>	<b>7,674,840</b>
<b>GRAND TOTAL (Capacity)</b> <b>(A+B+C+D)</b>		

## FERTILISERS (Concluded)

Principal raw materials/ Feedstock	Process/ Licensees, etc.	Engineering/ Contractors, etc.	Remarks	Financial outlay of the project & (FE) (Rs. million)	Date of commis- sioning
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## CONSIDERATION (N) (AS ON 1.10.1977)

Natural gas from Bassein, an off-shore structure South of Bombay High.

(Remarks—Same as for Uran Plants).  
This is the second plant to be located North of Bombay (first plant by IFFCO at Ahmedabad). Technological, management and construction pattern are expected to be similar to that of FCI and IFFCO plants [vide page 30].

2,200—2300  
(750) 1983-84

	Public	34,838
	Private	9,877
	Cooperative	5,260
	Total	49,975
<b>GRAND TOTAL (Financial Outlay) (A+B+C+D)</b>		

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**CAPACITY, RAW MATERIALS, PROCESSES  
AND COLLABORATORS OF**

**PHOSPHATIC FERTILISER PROJECTS**

**(AS ON 1.10.1977)**

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## II. PHOSPHATIC

Name of factory	Sector	Nutrient			End-Products		
		Capacity, tpy [P <sub>2</sub> O <sub>5</sub> , tpd]	Production 1976-77 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy	Production 1976-77 (tonnes)
<b>A. FACTORIES IN</b>							
<b>I. COMPLEXES</b>							
1. Coromandel Fertilisers Visakhapatnam (Andhra Pradesh)	Private	104,000 [350]	72,311	70	UAP 28-28-0 20-20-0 14-35-14	251,000 N.A. 96,500	202,127 — 44,901
2. E.I.D.-Parry (India) Ennore (Tamil Nadu)	Private	10,300 [32]	8,220	80	APS 16-20-0 } 18-9-0 }	51,480	36,714 9,748
3. Fertilisers and Chemicals, Travancore Alwaye (Kerala)	Public	36,200 [25+100]	19,600	54	APS 20-20-0 } 16-20-0 }	181,000	32,977 65,024
4. Fertilisers and Chemicals, Travancore Ambalamedu (Cochin Phase II) (Kerala)	Public	114,000 [350]	2,142	21	NP/ NPKs: 17-17-17 } 28-28-0 } 18-46-0 }	485,000	— 7,650 —

For Notes see page 62.

## FERTILISERS

Principal raw material/Feedstock	Process/Licensees etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
<b>PRODUCTION (P<sub>2</sub>O<sub>5</sub>) (AS ON 1.10.1977)</b>				
Naphtha; phosphate rock; sulphur; potash.	Dorr-Oliver for phosphoric acid; Chemico for sulphuric acid; Wellman Lord for UAP and NPK.	Lumus; Kellogg; Dorr-Oliver; Simon Carves; Wellman Lord; Chemico; Vulcan.	After expansion (31,000 tpy P <sub>2</sub> O <sub>5</sub> ), NP fertilisers are in the form of UAP 28-28-0 and 14-35-14.	Feb. 1968 Expn. — Apl. 1976
Naphtha; phosphate rock; sulphur.	Prayon process for phosphoric acid; Simon Carves for sulphuric acid.	Simon Carves; Dorr-Oliver for APS.		March 1963
Naphtha; phosphate rock; sulphur.	Monsanto and Chemico for sulphuric acid; Prayon/Dorr-Oliver for phosphoric acid; Dorr-Oliver for NP.	Singmaster and Breyer; Simon Carves; Power Gas Corporation; Hitachi; Dorr-Oliver; FEDO; Chemico; EIC.	Ist Stage expansion was for doubling N capacity by electrolysis of water, production of H <sub>3</sub> PO <sub>4</sub> and APS 16-20-0. The IV Stage expansion comprised 120 tpd steam reforming NH <sub>3</sub> plant and 150 tpd 20-20-0 grade ASP plant. Its phosphoric acid plant was commissioned in March 1972, though the NH <sub>3</sub> plant was ready by September 1971.	Original— June 1947 I Stage— Dec. 1960 IV Stage— Sept. 1971 H <sub>3</sub> PO <sub>4</sub> Plant— March 1972
Imported NH <sub>3</sub> ; phosphate rock; sulphur.	Chemiebau for H <sub>2</sub> SO <sub>4</sub> ; DPG/Wellman Lord for NP/NPKs; Prayon for H <sub>3</sub> PO <sub>4</sub> ; Power Gas Corporation for process design.	FEDO; Chemiebau; Prayon; Davy Power Gas.	500,000 tonnes of liquid ammonia would be imported over a period of 7 years. World Bank (IDA) credit of \$ 20 million to meet the FE cost of the H <sub>2</sub> SO <sub>4</sub> (1,000 tpd), H <sub>3</sub> PO <sub>4</sub> (350 tpd) and NP/NPKs (1,600 tpd) plants has been provided. Implementation of the project commenced in June 1974. P <sub>2</sub> O <sub>5</sub> will be completely water soluble. Started manufacturing DAP from May 1977.	Dec. 1976 (trial run)

(Continued)

## II. PHOSPHATIC

Name of factory	Sector	Nutrient			End-Products			
		Capacity, tpy [P <sub>2</sub> O <sub>5</sub> , tpd]	Production 1976-77 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy	Production 1976-77 (tonnes)	
A. FACTORIES IN								
5. Fertilizer Corporation of India Trombay (Maharashtra)	Public	54,000 [100]	45,006	90	Nitro-phosphate:	270,000	58,981	
					20-20-0			182,420
					15-15-15			29,236
					APSN 20-20-0			
6. Gujarat State Fertilizers Co Baroda (Gujarat)	Private	50,000 [165]	30,314	61	DAP	108,000	65,847	
					18-46-0			
					ASP 19.5.-19.5-0			123
7. Indian Farmers Fertiliser Coop Kandla (Gujarat)	Cooperative	127,000 (External supply)	93,480	74	NPKs:	92,800	54,875	
					10-26-26			92,800
					12-32-16			189,900
					14-36-12			N.A.
					22-22-11			N.A.
24-24-0	—							

## FERTILISERS (Continued)

Principal raw material/Feedstock	Process/Licensees, etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
<b>PRODUCTION (P<sub>2</sub>O<sub>5</sub>) (Continued)</b>				
Naphtha; refinery gas; phosphate rock; potash; sulphur; imported NH <sub>3</sub> (for additional capacity arising from debottlenecking).	Nitrophosphate is by PEC process modified by FCI. Nissan Dihydrate/Demihydrate for phosphoric acid.	P & D; Chemico; C & I; Selas.	Under the 1st USAID loan, nitrophosphate grade was changed from 16-13-0 to 20-20-0 with effect from 20th July 1967. Started production of "Suphala" of grade 15-15-15 since 1970-71 using DAP. With the commissioning of its own H <sub>3</sub> PO <sub>4</sub> plant, use of DAP has been dispensed with. Also started production of "Suphala" 20-20-0 and APSN of grade 20-20-0 from November 1975. Import of NH <sub>3</sub> for debottlenecking (18,000 tpy P <sub>2</sub> O <sub>5</sub> ) will be discontinued as soon as Trombay V goes on stream which would be based on natural/associated gas from Bombay High by 1980-81.	Nitrophosphate—Nov. 1965 H <sub>3</sub> PO <sub>4</sub> plant—June 1975 Debottlenecking—July 1976 Switch over—1980-81
Associated / Natural gas; naphtha; phosphate rock; sulphur.	Chemico for sulphuric acid and DAP; Nissan for H <sub>3</sub> PO <sub>4</sub> .	Toyo Engineering Corpn. for Phase I; Hitachi for Phase II.	Switched over to production of DAP of grade 18-46-0 from grade 20-48-0 since January 26, 1969. Introduced a new grade 19.5-19.5-0 in April 1975. In Phase I, plants for NH <sub>3</sub> , urea, AS, DAP, H <sub>2</sub> SO <sub>4</sub> and H <sub>3</sub> PO <sub>4</sub> were installed. In Phase II and III additional NH <sub>3</sub> and caprolactum capacities respectively were developed.	Phase I—May 1967
Natural gas; phosphoric acid; potash.	Dorr-Oliver for NPK.	M.W. Kellogg; H&G; Dorr-Oliver.	NPK fertilisers are manufactured at Kanlola presently with imported H <sub>3</sub> PO <sub>4</sub> . [See page 56]. MAP is being imported to replace a part of H <sub>3</sub> PO <sub>4</sub> . A "debottlenecking" programme costing Rs. 40 million has been taken up to enhance production of NPKs. It is proposed to have their own H <sub>3</sub> PO <sub>4</sub> plant with a capacity 120,000 tpy, details of which have yet to be finalised. It is expected to be completed in 1981-82 (Rs. 380 million).	Kalol NH <sub>3</sub> —Nov. 1974 Kandla NPKs—Nov. 1974

(Continued)

## II. PHOSPHATIC

Name of factory	Sector	Nutrient			End-Products			
		Capacity, tpy [P <sub>2</sub> O <sub>5</sub> tpd]	Production 1976-77 (tonnes)	Capacity utilisation (per cent)	Product	Capacity tpy	Production 1976-77 (tonnes)	
<b>A. FACTORIES IN</b>								
8. Madras Fertilizers Manali (Tamil Nadu)	Public	112,000 [External supply]	55,496	56	NPKs:	360,000		
					17-17-17	90,600	261,936	
					14-28-14	72,500	5,028	
					28-28-0	54,500	—	
					18-36-0	54,400	—	
					24-12-12	54,400	—	
					11-22-22	36,300	—	
					24-24-0	N.A.	5,005	
9. Southern Petrochemical Industries Corporation Tuticorin (Tamil Nadu)	Private	51,000 [160]	1,472	7	18-46-0	N.A.	18,169	
					DAP	28,000	—	
					NPKs:			
					10-26-26	128,000	—	
					15-15-15	32,000	—	
					28-28-0	N.A.	5,256	
10. Zuari Agro Chemicals San Coale (Goa)	Private	42,000 [External supply]	21,166	50	UAP	150,000	28,985	
					28-28-0			3,000
					DAP			
					18-46-0			
					NPK			
19-19-19	61,422							
<b>II. SUPERPHOSPHATES</b>								
11. Adarsh Chemicals and Fertilisers Udhna (Gujarat)	Private	11,200	6,930	62	SSP	70,000	43,310	
12. Andhra Fertilisers Tadepalle (Andhra Pradesh)	Private	6,400	4,567	71	SSP	40,000	28,544	
13. Andhra Sugars Tanuku (Andhra Pradesh)	Private	5,360	1,870	35	SSP	33,530	11,689	
14. Anil Starch Products Bhavnagar (Gujarat)	Private	5,360	2,532	47	SSP	33,530	15,823	
15. Anish Chemicals Ahmedabad (Gujarat)	Private	1,440	74	5	SSP	9,000	464	

## FERTILISERS (Continued)

Principal raw material/Feedstock	Process/Licensees, etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
<b>PRODUCTION (P<sub>2</sub>O<sub>5</sub>) (Continued)</b>				
Naphtha; H <sub>3</sub> PO <sub>4</sub> ; potash.	Dorr-Oliver for NPKs.	Chemico; Dorr-Oliver.	Third stream of NPK commissioned in October 1976 (27,000 tpy P <sub>2</sub> O <sub>5</sub> ). Presently H <sub>3</sub> PO <sub>4</sub> is imported to manufacture NPK fertilisers. Started manufacturing DAP from January 1977.	Oct. 1971 III Stream— Oct. 1976
Naphtha; phosphate rock; sulphur.	Mitsui-Toatsu for urea and DAP; TVA process for NPK fertilisers; Nissan process for H <sub>2</sub> SO <sub>4</sub> and H <sub>3</sub> PO <sub>4</sub> .	PGC; TEC/ Hitachi Zosen.	The NH <sub>3</sub> and urea plants were commissioned in June 1975. NP/NPK plants went into production in November 1976. DAP plant financed with suppliers credit from TEC (Rs. 150 million). Production of DAP started in April 1977.	WP/NPKs— Nov. 1976
Naphtha; H <sub>3</sub> PO <sub>4</sub> ; potash.	Mitsui-Toatsu for urea; TEC for NH <sub>3</sub> and NPK. Based on imported H <sub>3</sub> PO <sub>4</sub> .	ICI/PGC; TEC; Mitsui	NH <sub>3</sub> and urea plants were commissioned in May 1973. Trial runs for NPK fertilisers based on imported H <sub>3</sub> PO <sub>4</sub> were carried out during March 1975. International Finance Corporation (World Bank) provided funds besides USA, to meet foreign exchange cost. Started manufacturing DAP from March 1977.	NP/NPKs— March 1975
Phosphate rock; sulphur.	Acidulation of Phosphate rock with H <sub>2</sub> SO <sub>4</sub> .		SSP is produced in powdered as well as granulated form.	Oct. 1962
-do-	-do-			Nov. 1960
-do-	-do-			March 1961
-do-	-do-		Shifted SSP plant from Ahmedabad to Bhavnagar in April 1964. They have H <sub>2</sub> SO <sub>4</sub> plants at both the places.	Original Project—1947
Phosphate rock; H <sub>2</sub> SO <sub>4</sub> from market.	-do-		Shifted plant from Vapi to Ahmedabad in February 1977.	At new site— April 1964 Nov. 1972 At new site— Feb. 1977

(Continued)

## II. PHOSPHATIC

Name of factory	Sector	Nutrient			End-Products		
		Capacity, tpy [P <sub>2</sub> O <sub>5</sub> , tpd]	Production 1976-77 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy	Production 1976-77 (tonnes)
A. FACTORIES IN							
16. Associated Industries (Assam) Chemical Unit of, Chandrapur (Assam)	Public	5,360	2,310	40	SSP	33,530	13,562
71. Bharat Fertiliser Industries Bombay (Maharashtra)	Private	3,600	259	11	SSP	22,500	1,618
18. Bihar State Superphosphate Factory Sindri Institute (Bihar)	Public	3,760	713	19	SSP	23,470	4,457
19. Chamundi Chemicals and Fertilisers Munirabad (Karnataka)	Private	6,500	—	—	SSP	40,640	—
20. Coimbatore Pioneer Fertilisers Coimbatore (Tamil Nadu)	Private	6,500	1,331	20	SSP	40,640	8,319
21. D.C.M. Chemical Works Delhi (Delhi)	Private	21,120	14,178	67	SSP	132,000	88,610
22. Dharamsi Morarji Chemical Co. (a) Unit: Ambarnath (Maharashtra)	Private	23,420	21,667	93	SSP	146,320	135,422
(b) Unit: Ambarnath (Maharashtra)		12,150	678	6	TSP (46% P <sub>2</sub> O <sub>5</sub> )	27,000	1,504

## FERTILISERS (Continued)

Principal raw material/Feedstock	Process/Licensees, etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
<b>PRODUCTION (P<sub>2</sub>O<sub>5</sub>) (Continued)</b>				
Phosphate rock; sulphur.	Acidulation of phosphate rock with H <sub>2</sub> SO <sub>4</sub> .		Factory remained closed from 2-8-1971 to 21-3-75. Before closure, it was in the private sector Assam Industrial Development Corporation took over its management on 8th July 1974 and recommissioned it on 22-3-1975. Also manufacturing 18% W.S. P <sub>2</sub> O <sub>5</sub> .	August 1953 Recommissioned— March 1975
Phosphate rock; waste H <sub>2</sub> SO <sub>4</sub> .	-do-		Bulk of the material is used in the granulation of fertiliser mixtures. H <sub>2</sub> SO <sub>4</sub> is purchased from the market. Recommissioned after 16 months in August 1976.	April 1968
Phosphate rock; sulphur.	-do-		NPK granulation plant is being added.	May 1958
-do-	-do-		Closed since latter half of 1970-71.	Nov. 1963
-do-	-do-		Granulation plant was commissioned in April 1970 and SSP in powder or granulated form is produced.	Feb. 1966
Phosphate rock; sulphur.	-do-		Superphosphate from bonemeal till June 1948; thereafter, from rockphosphate. SSP is produced in powder or granulated form.	Original Project— 1946 Expansion— April 1968
-do-	-do-		Licensed capacity was doubled on May 3, 1973.	Original project— 1924 Expansion— May 1973
Phosphate rock; H <sub>3</sub> PO <sub>4</sub> (from Albright, Morarji and Pandit).	Treating phosphate rock with H <sub>3</sub> PO <sub>4</sub> .			January 1968

(Continued)



## II. PHOSPHATIC

Name of factory	Sector	Nutrient			End-Products		
		Capacity, tpy [P <sub>2</sub> O <sub>5</sub> tpd]	Production 1976-77 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy	Production 1976-77 (tonnes)
A. FACTORIES IN							
22. Dharamsi Moraji Chemical Co., (Concluded) (c) <i>Unit: Kumhari</i> (Madhya Pradesh)	Private	15,200	12,393	82	SSP	95,000	77,455
23. E.I.D.-Parry (India) Ranipet (Tamil Nadu)	Private	6,400	5,438	85	SSP	40,000	33,900
24. Fertilisers and Chemicals Travancore Alwaye (Kerala)	Public	7,150	3,732	52	SSP	44,700	23,324
25. Fertilizer Corporation of India (a) <i>Unit: Sindri</i> (Rationalisation) (Bihar)	Public	156,000 [360]	—	—	TSP (45% P <sub>2</sub> O <sub>5</sub> )	340,000	—

## FERTILISERS (Continued)

Principal raw material/Feedstock	Process/Licensees, etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
<b>PRODUCTION (P<sub>2</sub>O<sub>5</sub>) (Continued)</b>				
Phosphate rock; sulphur.	Acidulation of phosphate rock with H <sub>2</sub> SO <sub>4</sub> .		Licensed capacity was upgraded from 12,000 to 15,200 tpy P <sub>2</sub> O <sub>5</sub> from May 3, 1973. Also manufacturing granulated SSP.	Original project— Oct. 1961 Expansion— May 1973
Phosphate rock; sulphur,	Acidulation of phosphate rock with H <sub>2</sub> SO <sub>4</sub> .		This is the oldest fertiliser plant in the country. During the initial years, bone and H <sub>2</sub> SO <sub>4</sub> were used. However, phosphate rock and H <sub>2</sub> SO <sub>4</sub> are used since 1945.	1906
-do-	-do-		Besides SSP, FACT was the first plant to manufacture APS 16-20-0 in December 1960 [vide page 38].	April 1948
Pyrites; phosphate rock; sulphur.	Prayon process for H <sub>3</sub> PO <sub>4</sub> .	P&D; FEDO; Techno Export.	Implementation of the project commenced in February 1969, H <sub>2</sub> SO <sub>4</sub> (880 tpd) is produced from pyrites from Amjhore. Acid is used to acidulate phosphate rock to produce H <sub>3</sub> PO <sub>4</sub> (360 tpd) for the production of TSP. The by-product gypsum from H <sub>3</sub> PO <sub>4</sub> plant (acid 119,000 tpy) will replace the natural gypsum currently used for the production of AS. Total cost of the project is Rs. 1,870 million out of which FE would be Rs. 400 million. Pyrites crushing plant was commissioned in June 1975 and precommissioning tests of TSP plant commenced in August 1975. H <sub>2</sub> SO <sub>4</sub> and H <sub>3</sub> PO <sub>4</sub> plants commissioned in September 1977. IDA (of World Bank) has provided \$91 million both for Sindri (Modern) [vide page 24] and Sindri (Rationalisation.)	Sept. 1977

(Continued)

## II. PHOSPHATIC

Name of factory	Sector	Nutrient			End-Products		
		Capacity, tpy [P <sub>2</sub> O <sub>5</sub> , tpd]	Production 1976-77 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy	Production 1976-77 (tonnes)
<b>A. FACTORIES IN</b>							
26. Gammon Fer-Chems Belagula (Karnataka)	Private	5,280	0.5	Neg	SSP	33,000	3
27. Hindustan Copper Khetri (Rajasthan)	Public	90,000 [210]	4,358	10	SSP TSP (46% P <sub>2</sub> O <sub>5</sub> )	N.A. 200,000	26,279 340
28. Hindustan Zinc Debari (Rajasthan)	Public	12,000	5,463	46	SSP	75,000	34,146
29. Hyderabad Chemicals and Fertilisers Maula Ali (Andhra Pradesh)	Public	6,700	1,410	21	SSP	41,900	8,815
30. Jayshree Chemicals and Fertilizers Khardah (West Bengal)	Public	9,180	4,603	50	SSP	57,360	28,766
31. Kothari (Madras) Ennore (Tamil Nadu)	Private	7,150	1,365	19	SSP	44,700	8,530
32. Krishna Industrial Corporation Nidadavole (Andhra Pradesh)	Private	8,130	1,274	16	SSP	50,800	7,963
33. Maharashtra Agro-Industries Development Corporation, Panvel (Maharashtra)	Public	7,200	1,584	22	SSP	45,000	9,900
34. Paushak Baroda (Gujarat)	Private	3,760	2,338	62	SSP	23,470	14,610
35. Phosphate Co Rishra (West Bengal)	Private	9,760	4,433	45	SSP	61,000	27,705

## FERTILISERS (Continued)

Principal raw material/Feedstock	Process/Licensees, etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
<b>PRODUCTION (P<sub>2</sub>O<sub>5</sub>) (Continued)</b>				
Phosphate rock; sulphur.	Acidulation of phosphate rock with H <sub>2</sub> SO <sub>4</sub> .		SSP plant at Belagula has been recommissioned by Gammon Fer-Chems. of Bombay.	July 1976
Phosphate rock; by-product H <sub>2</sub> SO <sub>4</sub> from copper smelter at Khetri.	Prayon process for H <sub>3</sub> PO <sub>4</sub> .	FEDO	FEDO was assigned construction job of H <sub>2</sub> SO <sub>4</sub> , H <sub>3</sub> PO <sub>4</sub> and TSP plants. TSP plant cost Rs. 162 million with FE component of Rs. 21 million. The plant started in October 1976 with SSP and is gradually switching over to TSP as the market for TSP picks up.	Oct. 1976
Udaipur rock; by-product H <sub>2</sub> SO <sub>4</sub> from zinc smelter,	Acidulation of phosphate rock with H <sub>2</sub> SO <sub>4</sub> .		Performance of the plant is related to the availability of H <sub>2</sub> SO <sub>4</sub> from the smelter at Debari. Implementing a programme to manufacture only H <sub>3</sub> PO <sub>4</sub> [vide page 52].	Oct. 1967
Phosphate rock; sulphur.	-do-		Plant was shifted from Bellampalli to Maula Ali in 1963.	Original project—1946 Shifted site—1963
-do-	-do-		Also granulating SSP.	Dec. 1961
-do-	-do-			July 1962
-do-	-do-			April 1964
Phosphate rock and by-product H <sub>2</sub> SO <sub>4</sub> .	Acidulation of rock with H <sub>2</sub> SO <sub>4</sub> .	Larsen & Toubro, Bombay.	SSP produced at the plant is meant mostly for its own granulation unit making mixtures.	March 1974
-do-	-do-		Proposal to expand and renovate the existing plant is under implementation.	1951
-do-	-do-		Original plant—5,630 tpy P <sub>2</sub> O <sub>5</sub> . Expansion—4,130 tpy P <sub>2</sub> O <sub>5</sub> . SSP in powder and granulated form is produced.	Original project—1950 Expansion— Dec. 1967

(Continued)

## II. PHOSPHATIC

Name of factory	Sector	Nutrient			End-Products		
		Capacity, tpy [P <sub>2</sub> O <sub>5</sub> , tpd]	Production 1976-77 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy	Production 1976-77 (tonnes)
<b>A. FACTORIES IN</b>							
36. Premier Fertilisers Cuddalore (Tamil Nadu)	Private	6,500	—	—	SSP	40,640	—
37. Ralli Chemicals Magarwara (Uttar Pradesh)	Private	9,750	6,023	62	SSP	60,960	37,646
38. Shaw Wallace & Co Avadi (Tamil Nadu)	Private	12,180	9,133	76	SSP	75,530	57,079
39. West India Chemicals Loni-Kalbhor (Maharashtra)	Private	5,360	5,834	109	SSP	33,530	36,464
40. Western Chemical Industries Bombay (Maharashtra)	Private	540	286	53	SSP	3,350	1,789
<b>III. PELOFOS</b>							
41. Orissa Fertilizers and Chemicals Rourkela (Orissa)	Private	7,600	319	6	Pelofos	45,000	1,771
<b>TOTAL</b>	<b>Public</b>		<b>604,370</b>	<b>141,814</b>			
	<b>Private</b>		<b>467,140</b>	<b>241,008</b>			
	<b>Cooperative</b>		<b>127,000</b>	<b>93,480</b>			
<b>A. GRAND TOTAL</b>	<b>Capacity</b>		<b>1,198,510</b>				
	<b>Production</b>		<b>478,302</b>				
	<b>Capacity Utilisation</b>			<b>56%</b>			

## FERTILISERS (Continued)

Principal raw material/Feedstock	Process/Licensees, etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
<b>PRODUCTION (P<sub>2</sub>O<sub>5</sub>) (Concluded)</b>				
Phosphate rock and by-product H <sub>2</sub> SO <sub>4</sub>	Acidulation of rock with H <sub>2</sub> SO <sub>4</sub>		Plant was recommissioned in June 1974.	Feb. 1963
-do-	-do-			Sept. 1962
Phosphate rock; sulphur.	-do-			April 1967
Phosphate rock; sulphur.	-do-		Original capacity at Mundhwa - 1,730 tpy P <sub>2</sub> O <sub>5</sub> . Shifted plant to Loni-Kalbhor (3,630 tpy), - total 5,360 tpy P <sub>2</sub> O <sub>5</sub> . Factory remained closed from June 1970 to July 1972 due to change in management.	Original— Dec. 1950 Shift to a new site & recommissioned in June 1967
-do-	-do-			July 1948
Phosphate rock; H <sub>2</sub> SO <sub>4</sub> basic slag (from H. S. L., Rourkela).	Acidulation of rock and mixing it with basic slag.	Ing. Vladimir G. Logomerac & Yugoslav.	This is the first factory to produce a product containing 18% citrate soluble P <sub>2</sub> O <sub>5</sub> and 5% w.s. P <sub>2</sub> O <sub>5</sub> . Financial outlay was Rs. 7.5 million with free foreign exchange— Rs. 1 million.	June 1973

(Continued)

## II PHOSPHATIC

Name of factory	Sector	Nutrient	End-Products	
		Capacity, tpy [P <sub>2</sub> O <sub>5</sub> , tpd]	Product	Capacity, tpy
<b>B. PROJECTS UNDER</b>				
1. Fertilizer Corporation of India	Public			
(a) <i>Unit: Haldia</i> (West Bengal)		75,000 [100]	Nitrophosphate 20-20-0 Methanol	375,000  41,250
(b) <i>Unit: Trombay IV</i> (Maharashtra) Expansion plan		75,000 [100]	Nitrophosphate 20-20-0	 375,000
Total after expansion:		129,000 [200]		
2. Hindustan Zinc Debari (Rajasthan) Expansion plan	Public	26,000 [87]	Phosphoric acid	
Total after expansion		38,000 [87]		
<b>TOTAL (Capacity)</b>	<b>Public</b>		<b>176,000</b>	
	<b>Private</b>		—	
	<b>Cooperative</b>		—	
<b>B. GRAND TOTAL</b>	<b>Capacity</b>		<b>176,000</b>	

## FERTILISERS (Continued)

Principal raw material/Feedstock	Process/Licensees, etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
<b>IMPLEMENTATION (P<sub>2</sub>O<sub>5</sub>) (AS ON 1.10.1977)</b>				
Fuel oil; phosphate rock; sulphur.	FCI for H <sub>2</sub> SO <sub>4</sub> ; Nissan for H <sub>3</sub> PO <sub>4</sub> ; Stamicarbon for NPK; Topsoe for methanol.	P & D; Lurgi; Montedison; Stamicarbon; Heurtey; Nissan; Topsoe.	Implementation of the project commenced in September 1972. Licence agreement for process know-how and contracts for design & supply of equipment/machinery have since been concluded.	January 1979
Imported NH <sub>3</sub> ; phosphate rock; sulphur.	Uhde for nitrophosphate; DPG for HNO <sub>3</sub> ; DSM for process design.	P & D; Stamicarbon; Uhde; Bamag.	Implementation was taken up in June 1974. Project would be based on bought out/imported NH <sub>3</sub> for 2-3 years and thereafter, from Trombay V. [See page 24]. World Bank has provided Rs. 248 million as FE through IDA both for Trombay "debottle" and Trombay IV.	January 1978 Switch over— 1980-81
Phosphate rock; by-product H <sub>2</sub> SO <sub>4</sub> from zinc smelter at Debari.	Krebs process for H <sub>3</sub> PO <sub>4</sub> & Lurgi for H <sub>2</sub> SO <sub>4</sub> .	Krebs (India).	Licence was issued in Oct. 1972 originally for TSP. Project has been rephased to manufacture and market H <sub>3</sub> PO <sub>4</sub> only as an intermediate [See also page 48] to the fertiliser industry.	February 1978

(Continued)



## II. PHOSPHATIC

Name of factory	Sector	Nutrient	End-Products	
		Capacity, tpy [P <sub>2</sub> O <sub>5</sub> , tpd]	Product	Capacity, tpy

## C. PROJECTS APPROVED IN

1. Fertilizer Corporation of India (a) <i>Unit: Paradeed</i> (Orissa)	Public	300,000	NPKs	
2. Karnataka State Industrial Development Corporation Mangalore (Karnataka)	Public	150,000	Phosphoric acid	
3. Nagarjuna Fertilisers, Kakinada (Andhra Pradesh)	Private	82,000	NPKs	450,000

	<b>Public</b>	<b>450,000</b>
<b>Total (Capacity)</b>	<b>Private</b>	<b>82,000</b>
	<b>Cooperative</b>	<b>—</b>
<b>C. GRAND TOTAL</b>	<b>Capacity</b>	<b>532,000</b>

## FERTILISERS (Continued)

Principal raw material/Feedstock	Process/Licensees, etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
<b>PRINCIPLE (P<sub>2</sub>O<sub>5</sub>) (AS ON 1.10.1977)</b>				
Fuel oil; phosphate rock; sulphur.	P & D			1984-85
Phosphate rock; sulphur.			Fresh letter of intent issued. Project has been rephased. Phosphoric acid would be manufactured and marketed as such. (Capacity of H <sub>2</sub> SO <sub>4</sub> — 341,000 tpy).	
Fuel oil; phosphate rock; sulphur.	Texaco partial oxidation for NH <sub>3</sub> ; Stami-carbon for urea.	Foster Wheeler.	Letter of intent was issued in January 1974. It is proposed to manufacture NPK fertilisers in Phase II of the project. IBRD has earmarked a loan of \$170 million to be shared jointly by Bhatinda, Panipat, Kakinada and GNVFC, (Baroda) to meet part of the FE. The future of the project is yet uncertain.	Phase II—(yet to be firmed up)
	<b>GRAND TOTAL (Capacity) (A+B+C)</b>		<b>PUBLIC</b>	<b>1,230,370</b>
			<b>PRIVATE</b>	<b>549,140</b>
			<b>COOPERATIVE</b>	<b>127,000</b>
			<b>CAPACITY</b>	<b>1,906,510</b>

(Continued)

## II. PHOSPHATIC

Name of factory	Sector	Nutrient	End-Products	
		Capacity, tpy [P <sub>2</sub> O <sub>5</sub> , tpd]	Product	Capacity, tpy

## D. PROJECTS UNDER

1. Indian Farmers Fertiliser Cooperative Kandla (Gujarat)	Cooperative	127,000	Phosphoric acid	
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**Note :** Since sending the manuscript to the press, the following two projects have appeared on the

Project	P <sub>2</sub> O <sub>5</sub> Capacity, tpy	End Product pattern
1. DMCC/Madhya Pradesh Industrial Development Corporation	50,000	Monoammonium Phosphate
2. Haryana Industrial Development Corporation	25,000	Triple Superphosphate
	<u>75,000</u>	

The Grand Total (A+B+C) Capacity will therefore change from 1,906, 510 to 1,981, 510 tonnes.

**FERTILISERS (Concluded)**

Principle raw material/Feedstock	Process/Licensees, etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
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**CONSIDERATION (P<sub>2</sub>O<sub>5</sub>) (AS ON 1.10.1977)**Phosphate rock;  
sulphur

A joint venture project with Nauru using Nauru rock is under consideration [See page 40].

fertiliser scene.

Raw materials	Status	Date of Commissioning
Jhabua rock; Sulphur	Approved in Principle	1983-84
Udaipur rock; Sulphur	Under Consideration	—

**III. CAPACITY OF NITROGEN (N) ACCORDING TO SOURCES OF FEEDSTOCK  
(AS ON 1.10.1977)**

(Tonnes of nutrient N per annum)

Stage of production/ feedstock	Naphtha	Natural gas	Electric power	Coke/coke- oven gas	Lignite	Imported ammonia	Coal	Fuel oil	Total
I. Factories in production	2,140,000* (69.8)	513,000* (16.7)	80,000 (2.6)	193,840* (6.3)	70,000 (2.3)	72,000 (2.3)	— (—)	— (—)	3,068,840 (100.0)
II. Projects under implementation	358,000 (17.3)	— (—)	— (—)	— (—)	— (—)	80,000 (3.9)	456,000 (22.0)	1,176,000 (56.8)	2,070,000 (100.0)
III. Projects approved in principle	51,000 (2.3)	1,187,000 (54.2)	— (—)	— (—)	— (—)	— (—)	228,000 (10.4)	725,000 (33.1)	2,191,000 (100.0)
VI. Projects under consideration	— (—)	345,000 (100.0)	— (—)	— (—)	— (—)	— (—)	— (—)	— (—)	345,000 (100.0)
<b>TOTAL</b>	<b>2,549,000</b> <b>(33.2)</b>	<b>2,045,000</b> <b>(26.6)</b>	<b>80,000</b> <b>(1.0)</b>	<b>193,840</b> <b>(2.6)</b>	<b>70,000</b> <b>(0.9)</b>	<b>152,000</b> <b>(2.0)</b>	<b>684,000</b> <b>(8.9)</b>	<b>1,901,000</b> <b>(24.8)</b>	<b>7,674,840</b> <b>(100.0)</b>

Figures in brackets indicate the percentage contribution through a fertiliser feedstock to the total (horizontal).

\*In the case of

(i) FCI, Sindri (90,000 tpy N) it is assumed:  
60,000 tpy capacity on Coke;  
20,000 tpy capacity on COG;  
10,000 tpy capacity on Naphtha.

(ii) FCI, Trombay (113,000 tpy N) it is assumed:  
72,000 tpy capacity on Naphtha;  
9,000 tpy capacity on Refinery gas;  
32,000 tpy capacity on Imported ammonia.

(iii) SAIL, Rourkela (120,000 tpy N) it is assumed:  
50,000 tpy capacity on Naphtha;  
70,000 tpy capacity on COG.

(iv) GSFC, Baroda (216,000 tpy N) it is assumed:  
124,000 tpy capacity on Naphtha;  
92,000 tpy capacity on Natural gas

**IV. CAPACITY OF PHOSPHATIC FERTILISERS (P<sub>2</sub>O<sub>5</sub>) AND THE RAW MATERIALS  
(AS ON 1.10.1977)**

('000 tonnes of nutrient P<sub>2</sub>O<sub>5</sub> per annum)

Type of fertilisers	Raw materials						Total
	Sulphur	Pyrites	Smelter gases	By-product/waste sulphuric acid	Nitric acid	Imported phosphoric acid	
<b>I. FACTORIES IN PRODUCTION</b>							
i. SSP	208.0	—	12.0	12.2	—	—	232.2
ii. TSP	12.2	156.0**	90.0	—	—	—	258.2
iii. Pelofos	7.6	—	—	—	—	—	7.6
iv. NP/NPK fertilisers	365.5	—	—	—	54.0	281.0*	700.5
<b>I. Total</b>	<b>593.3</b>	<b>156.0</b>	<b>102.0</b>	<b>12.2</b>	<b>54.0</b>	<b>281.0</b>	<b>1,198.5</b>
	(49.5)	(13.0)	(8.5)	(1.0)	(4.5)	(23.5)	(100.0)
<b>II. PROJECTS UNDER IMPLEMENTATION</b>							
i. TSP	—	—	—	—	—	—	—
ii. NP/NPK fertilisers	—	—	—	—	150.0	—	150.0
iii. Others	—	—	26.0@	—	—	—	26.0
<b>II. Total</b>	<b>—</b>	<b>—</b>	<b>26.0</b>	<b>—</b>	<b>150.0</b>	<b>—</b>	<b>176.0</b>
	(—)	(—)	(14.8)	(—)	(85.2)	(—)	(100.0)
<b>III. PROJECTS APPROVED IN PRINCIPLE</b>							
i. NP/NPK fertilisers	382.0	—	—	—	—	—	382.0
ii. Others	150.0@	—	—	—	—	—	150.0
<b>III. Total</b>	<b>532.0</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>532.0</b>
	(100.0)	(—)	(—)	(—)	(—)	(—)	(100.0)
<b>Total (I+II+III)</b>							
SSP	208.0	—	12.0	12.0	—	—	232.2
TSP	12.0	156.0	90.0	—	—	—	258.2
Pelofos	7.6	—	—	—	—	—	7.6
NP/NPK fertilisers	747.5	—	—	—	204.0	281.0	1232.5
Others	150.0	—	26.0	—	—	—	176.0
<b>GRAND TOTAL (I+II+III)</b>	<b>1,125.3</b>	<b>156.0</b>	<b>128.0</b>	<b>12.2</b>	<b>204.0</b>	<b>281.0</b>	<b>1,906.5</b>
	(59.0)	(8.3)	(6.7)	(0.6)	(10.7)	(14.7)	(100.0)

\* One of the factories uses imported monoammonium phosphate occasionally. During the Sixth Plan it will have its own phosphoric acid plant.

\*\* It would use both pyrites and sulphur.

@ The phosphoric acid is planned to be marketed.

Note: 1. Rockphosphate is the basic raw material which is reacted with H<sub>2</sub>SO<sub>4</sub>, HNO<sub>3</sub> and H<sub>3</sub>PO<sub>4</sub> to release P<sub>2</sub>O<sub>5</sub> in the desired concentration. Factories based on imported H<sub>3</sub>PO<sub>4</sub> do not require either rock or sulphur as such to manufacture phosphatic fertilisers.

2. Figures in brackets indicate the percentage contribution through a fertiliser feedstock to the total (horizontal).

**V. SHARE OF FERTILISER CAPACITY UNDER VARIOUS STAGES OF  
IMPLEMENTATION—MATERIALWISE  
(AS ON 1.10.1977)**

(Tonnes of nutrient per annum)

Fertiliser	Nutrient	In production (I)	Under implementation (II)	Approved in principle (III)	Under consideration (IV)	Total (I+II+III+IV)
1. Ammonium sulphate	N	199,620 (6.5)	—	—	—	199,620 (2.6)
2. Ammonium sulphate nitrate	N	13,000 (0.4)	—	—	—	13,000 (0.2)
3. Calcium ammonium nitrate	N	200,000 (6.5)	—	—	—	200,000 (2.6)
4. Urea	N	2,216,760 (72.3)	1,915,200 (92.6)	1,423,000 (65.0)	345,000 (100.0)	5,899,960 (76.8)
5. Ammonium chloride	N	16,190 (0.5)	5,000 (0.2)	51,000 (2.3)	—	72,190 (0.9)
6. Superphosphate	P <sub>2</sub> O <sub>5</sub>	232,230 (19.4)	—	—	—	232,230 (12.2)
7. Triple superphosphate	P <sub>2</sub> O <sub>5</sub>	258,150 (21.5)	26,000@ (14.8)	150,000@ (28.2)	—	434,150 (22.8)
8. Pelofos	P <sub>2</sub> O <sub>5</sub>	7,600 (0.6)	—	—	—	7,600 (0.4)
9. Ammonium phosphate sulphate	N	42,540 (1.4)	—	—	—	42,540 (0.6)
	P <sub>2</sub> O <sub>5</sub>	44,600 (3.7)	—	—	—	44,600 (2.3)
10. Diammonium phosphate	N	24,480 (0.8)	—	—	—	24,480 (0.3)
	P <sub>2</sub> O <sub>5</sub>	62,560 (5.2)	—	—	—	62,560 (3.3)
11. Nitrophosphate	N	54,000 (1.8)	150,000 (7.2)	—	—	204,000 (2.7)
	P <sub>2</sub> O <sub>5</sub>	54,000 (4.5)	150,000 (85.2)	—	—	204,000 (10.7)
12. Urea ammonium phosphate	N	117,800 (3.8)	—	—	—	117,800 (1.5)
	P <sub>2</sub> O <sub>5</sub>	145,800 (12.2)	—	—	—	145,800 (7.6)
13. NP/NPK fertilisers	N	184,250 (6.0)	—	27,000 (1.2)	—	211,250 (2.8)
	P <sub>2</sub> O <sub>5</sub>	393,570 (32.8)	—	82,000 (15.4)	—	475,570 (24.9)
14. Urea and NP/NPK fertilisers*	N	—	—	690,000 (31.5)	—	690,000 (9.0)
	P <sub>2</sub> O <sub>5</sub>	—	—	300,000 (56.4)	—	300,000 (15.8)
<b>TOTAL</b>	N	<b>3,068,840</b> (100)	<b>2,070,000</b> (100)	<b>2,191,000</b> (100)	<b>345,000</b> (100)	<b>7,674,840</b> (100)
	P <sub>2</sub> O <sub>5</sub>	<b>1,198,510</b> (100)	<b>176,000</b> (100)	<b>532,000</b> (100)	—	<b>1,906,510</b> (100)

\* End-productwise capacity is not yet decided.

@ Phosphoric acid as P<sub>2</sub>O<sub>5</sub>.

Figures in brackets indicate the percentage share of the nutrient to the total nutrient (vertical).

**VI. SHARE OF FERTILISER CAPACITY UNDER VARIOUS STAGES OF  
IMPLEMENTATION—NUTRIENTWISE AND SECTORWISE  
(AS ON 1.10.1977)**

(Tonnes of nutrient per annum)

Category	N				P <sub>2</sub> O <sub>5</sub>			
	Public sector	Private sector	Cooper-ative sector	Total	Public sector	Private sector	Cooper-ative sector	Total
I. Factories in production	1,584,680 (51.6)	1,269,760 (41.4)	215,000 (7.0)	3,068,840 (100.0)	604,370 (50.4)	467,140 (39.0)	127,000 (10.6)	1,198,510 (100.0)
II. Projects under implementation	1,564,000 (75.6)	278,000 (13.4)	228,000 (11.0)	2,070,000 (100.0)	176,000 (100.0)	— (—)	— (—)	176,000 (100.0)
III. Projects approved in principle	1,415,000 (64.6)	380,000 (17.3)	396,000 (18.1)	2,191,000 (100.0)	450,000 (84.6)	82,000 (15.4)	— (—)	532,000 (100.0)
IV. Projects under consideration	345,000 (100.0)	— (—)	— (—)	345,000 (100.0)				
<b>TOTAL</b>	<b>4,908,080</b> <b>(64.0)</b>	<b>1,927,760</b> <b>(25.1)</b>	<b>839,000</b> <b>(10.9)</b>	<b>7,674,840</b> <b>(100.0)</b>	<b>1,230,370</b> <b>(64.5)</b>	<b>549,140</b> <b>(28.8)</b>	<b>127,000</b> <b>(6.7)</b>	<b>1,906,510</b> <b>(100.0)</b>

Figures in brackets indicate the percentage contribution through a particular sector to the total nutrient (horizontal).



## NOTES AND ABBREVIATIONS FOR TABLES

**A. Abbreviations for Fertilisers/Fertiliser Raw Materials etc.**

ACI	Ammonium chloride (25%N)
APS	Ammonium phosphate sulphate (16-20-0 & 20-20-0)
APSN	Ammonium phosphate sulphate nitrate (20-20-0)
AS	Ammonium sulphate (20.6%N)
ASN	Ammonium sulphate nitrate (26%N)
ASP	Ammonium sulphate phosphate (19.5-19.5-0)
CAN	Calcium ammonium nitrate (25% N)
COG	Coke oven gas
DAP	Diammonium phosphate (18-46-0)
H <sub>3</sub> PO <sub>4</sub>	Phosphoric acid
H <sub>2</sub> SO <sub>4</sub>	Sulphuric acid
MAP	Monoammonium phosphate
NH <sub>3</sub>	Ammonia
NP/NPKs	NP/NPK complex fertilisers of various grades
SSP	Single superphosphate (16%P <sub>2</sub> O <sub>5</sub> )
TSP	Triple superphosphate (46%P <sub>2</sub> O <sub>5</sub> )
UAP	Urea ammonium phosphate (28-28-0; 14-35-14)

**B. Abbreviations for Financial Institutions**

CIDA	Canadian International Development Agency
IBRD	International Bank for Reconstruction and Development
ICICI	Industrial Credit & Investment Corporation of India
IDA	International Development Association (an affiliate of World Bank)
IDBI	Industrial Development Bank of India

IFC	International Finance Corporation (of the World Bank)
IFCI	Industrial Finance Corporation of India
ODA	Overseas Development Administration (of U.K.)
USAID	United States Agency for International Development

**C. General Abbreviations**

BARC	Bhabha Atomic Research Centre
Expn.	Expansion
FE	Foreign exchange—shown in parenthesis under "Financial outlay of the project"
GOI	Government of India
IOC	Indian Oil Corporation Ltd.
OIL	Oil India Limited
ONGC	Oil and Natural Gas Commission
PPCL	Pyrites, phosphates and Chemicals Ltd.
tpy	tonnes per year
tpd	tonnes per day
N.A.	Not available
[ ]	(i) Ammonia capacity per day—shown under column "Nutrient Capacity tpy"—Table I (N).
	(ii) Urea capacity per day—shown under column "End—product capacity tpy"—Table I (N).
	(iii) Phosphoric acid capacity per day expressed as P <sub>2</sub> O <sub>5</sub> —shown under column "Nutrient Capacity tpy"—Table II (P <sub>2</sub> O <sub>5</sub> ).

*Note:* Actual production is for 1976-77 (April-March) and capacity situation is as on 1.10.1977. Therefore, capacity utilisation has been appropriately adjusted with dates on which new projects were commissioned during 1976-77.

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**INDEX TO**  
**PRINCIPAL PROCESSORS/LICENSEES/  
CONTRACTORS ENGAGED IN THE  
INDIAN FERTILISER INDUSTRY**

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Participants*	Projects
<b>A</b>	
Ansaldo (Italy)	: NLC (Neyveli)
<b>B</b>	
Bamag (West Germany) (See Pintsch Bamag)	
Benfield (USA)	: ZACL (Goa); NLC (Neyveli)
<b>C</b>	
Casale (Italy)	: GSFC (Baroda)
Catacarb (USA)	: MFL (Manali)
Cekop (Poland) (See Polimex—Cekop)	
Chemiebau (West Germany)	: FACT (Cochin II); FCI (Namrup)
C&I=Chemical & Industrial Corporation (USA)	: FCI (Trombay)
Chemico=Chemical Construction Corporation (USA)	: CFL (Vizag); FACT (Alwaye); FCI (Gorakhpur); FCI (Namrup); FCI (Sindri); FCI (Trombay); GSFC (Baroda); MFL (Manali).
Chiyoda (Japan)	: SCI (Kota)
CLE=Creusot Loire Enterprises (France)	: FCI (Haldia)
<b>D</b>	
DPG=(Davy Power Gas)/Wellman Lord (USA)	: CFL (Vizag); FACT (Cochin II); FCI (Trombay IV).
De Nora (Italy)	: FCI (Nangal).
Dorr-Oliver (USA)	: CFL (Vizag); EID (Ennore); FACT (Alwaye); IFFCO (Kandla); MFL (Manali).
DSM=Dutch State Mines (Holland) (See Stamicarbon)	
<b>E</b>	
EEC=English Electric Co. (UK)	: FCI (Nangal).
EIL=Engineers India Ltd.	: GSFC (Baroda); MCFC (Thana); NFL (Bhatinda); NFL (Panipat).
EIC=Engineering and Industrial Corporation (Luxemburg)	: FACT (Alwaye).
<b>F</b>	
FEDO=FACT Engineering and Design Organisation (India)	: FACT (Alwaye); FACT (Cochin I); FACT (Cochin II); FCI (Sindri-Rationalisation); HCL (Khetri); MCFC (Thana).
Foster Wheeler (UK)	: Nagarjuna (Kakinada).
<b>G</b>	
Girdler (USA)	: (FCI Trombay).
Grande Paroisse (France)	: FCI (Nangal).

\* As appearing in the text of the Booklet.

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Participants	Projects
<b>H</b>	
Heurtey (France)	: FCI (Haldia)
Hitachi Zosen Ltd. (Japan)	: FACT (Alwaye); FCI (Sindri); GSFC (Baroda); SPIC (Tuticorin).
H&G=Humphreys & Glasgow Ltd. (UK)	: GSFC (Baroda); IFFCO (Kandla); MCFL (Mangalore).
<b>I</b>	
ICI=Imperial Chemical Industries (UK)	: CFL (Vizag); FACT (Alwaye); FACT (Cochin); FCI (Durgapur); FCI (Sindri); GSFC (Baroda); IEL (Kanpur); MCFL (Mangalore); SPIC (Tuticorin); ZACL (Goa).
Inventa (Switzerland)	: GSFC (Baroda).
<b>K</b>	
KTI=Kinetics Technology International (Netherlands)	: FACT (Alwaye); FCI (Barauni); FCI (Namrup-Expn) FCI (Sindri); FCI (Trombay-Debottle.).
Kellogg (USA)	: CFL (Vizag); IFFCO (Kandla); IFFCO (Phulpur)
Koppers (West Germany)	: FCI (Korba); FCI (Ramagundam); FCI (Talcher); SAIL (Rourkela).
Krebs (France)	: FACT (Alwaye); HZL (Debari).
<b>L</b>	
Larsen & Toubro (India)	: MCFC (Thana)
Linde (West Germany)	: FACT (Alwaye); FCI (Nangal); SAIL (Rourkela); NLC (Neyveli); GNVFC (Chavaj).
Lummus (USA)	: CFL (Vizag).
Lurgi (West Germany)	: FCI (Haldia); FCI (Korba); FCI (Nangal-Expn.); FCI (Ramagundam); FCI (Sindri-Modern); FCI (Talcher); HZL (Debari); NFL (Bhatinda); NFL (Panipat).
<b>M</b>	
Mitsui-Toatsu (Japan)	: FCI (Gorakhpur); FCI (Gorakhpur Expn.); GSFC (Baroda); IEL (Kanpur); NFL (Bhatinda); NFL (Panipat); SPIC (Tuticorin); ZACL (Goa).
Mitsubishi Shoji Kaisha (Japan)	: EID (Ennore); SCI (Kota)
Monsanto (USA)	: FACT (Alwaye).
Montedison/Technimont (Italy) (See Technimont/Montedison)	
<b>N</b>	
Nissan (Japan)	: FCI (Haldia); FCI (Trombay); GSFC (Baroda); SPIC (Tuticorin).
Norsk Hydro (Norway)	: FACT (Cochin II).
<b>O</b>	
Otto (West Germany)	: SAIL (Rourkela)

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Participants	Projects
<b>P</b>	
P&D=Planning & Development Division (of FCI) of the Fertilizer Corpn. of India Ltd.	: FACT (Cochin); FCI (Barauni); FCI (Durgapur); FCI (Gorakhpur); FCI (Gorakhpur-Expn.); FCI (Haldia); FCI (Korba); FCI (Namrup); FCI (Namrup-Expn.); FCI (Nangal); FCI (Nagal-Expn.); FCI (Paradeep); FCI (Ramagundam); FCI (Sindri-Modern); FCI (Sindri); FCI (Sindri-Ration.); FCI (Talcher); FCI (Trombay); FCI (Trombay-Debottle.); FCI (Trombay IV); FCI (Trombay V); SAIL (Rourkela).
PEC =Potasse et Engrais Chimiques (France)	: FCI (Trombay).
PGC=Power Gas Corporation (UK)	: FACT (Alwaye); FACT (Cochin); FCI (Durgapur); FCI (Sindri); GSFC (Baroda); SPIC (Tuticorin); ZACL (Goa).
Pintsch Bamag (West Germany)	: FCI (Nangal); NCJM (Varanasi); NLC (Neyveli); FCI Trombay IV); SAIL (Rourkela).
Polimex — Cekop (Poland)	: FCI (Haldia).
Prayon (Belgium)	: EID (Ennore); FACT (Alwaye); FACT (Cochin II); FCI (Sindri-Ration.); HCL (Khetri).
<b>S</b>	
St. Gobain (France)	: FCI (Nangal).
Selas (USA)	: FACT (Alwaye); FCI (Barauni); FCI (Namrup-Expn.); FCI (Sindri); FCI (Trombay-Debottle.).
Shell (UK)	: EID (Ennore); FCI (Gorakhpur); FCI (Gorakhpur-Expn.); FCI (Haldia); FCI (Nangal-Expn.); FCI (Sindri-Modern.); FCI (Trombay); NFL (Bhatinda); NFL (Panipat); NLC (Neyveli).
Simon Carves (UK)	: CFL (Vizag); EID (Ennore); FACT (Alwaye); FCI (Sindri).
Singmaster and Breyer (USA)	: FACT (Alwaye).
Snamprogetti (Italy)	: IFFCO (Phulpur); FCI (Trombay V); GNVFC (Chavaj).
Solvay (Belgium)	: NCJM (Varanasi).
Stamicarbon (Netherlands) (DSM)	: FCI (Haldia); FCI (Trombay IV); IFFCO (Kandla); MCFL (Mangalore); SAIL (Rourkela); SCI (Kota) Nagarjuna (Kakinada).
<b>T</b>	
Technimont/Montedison (Italy)	: FACT (Cochin); FCI (Barauni); FCI (Durgapur); FCI (Haldia); FCI (Korba); FCI (Namrup-Expn.); FCI (Nangal-Expn.); FCI (Ramagundam); FCI (Sindri); FCI (Sindri-Modern.); FCI (Talcher); NLC (Neyveli).
Technip (France)	: GSFC (Baroda)
Techno Export (Bulgaria)	: FCI (Sindri-Ration).
Techno Export (Czechoslovakia)	: FCI (Ramagundam); FCI (Talcher)

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Participants	Projects
Texaco (USA)	: FACT (Alwaye); GNVFC (Chavaj); Nagarjuna (Kakinada).
Topsoe (Denmark)	: FCI (Haldia); FCI (Nangal-Expn.); FCI (Sindri- Modern.); FCI (Trombay V); GNVFC (Chavaj); MFL (Manali); MCFC (Thana); NFL (Bhatinda); NFL (Panipat); SCI (Kota).
TEC=Toyo Engineering Corporation (Japan)	: FCI (Gorakhpur); FCI (Gorakhpur-Expn.); GSFC (Barod); IEL (Kanpur); NFL (Bhatinda); NFL (Panipat); SPIC (Tuticorin); ZACL (Goa).
TVA=Tennessee Valley Authority (USA)	: SPIC (Tuticorin).
<b>U</b>	
Uhde (West Germany)	: FCI (Sindri-Modern.); FCI (Trombay IV); SAIL (Rourkela); NCJM (Varanasi).
<b>V</b>	
Veba Chemie (West Germany)	: NFL (Bhatinda); NFL (Panipat);
Vetrocoke (Italy)	: FACT (Cochin); FCI (Barauni); FCI (Durgapur); FCI (Namrup Expn.); GSFC (Baroda); NLC (Neyveli); ZACL (Goa).
Vulcan (USA)	: CFL (Vizag).
<b>W</b>	
Wellman Lord/DPG (USA) (See DPG/Wellman Lord)	
Winkler (USA)	: NLX (Neyveli)

## ABBREVIATIONS FOR FACTORIES/PROJECTS

BSL	— Bokaro Steel Ltd.	MAIDC	— Maharashtra Agro-Industries Development Corporation Ltd.
CFL	— Coromandel Fertilisers Ltd.	MCFC	— Maharashtra Cooperative Fertilisers and Chemicals Ltd.
DMCC	— Dharamsi Morarji Chemical Co. Ltd.	MCFL	— Mangalore Chemicals and Fertilisers Ltd.
FACT	— Fertilisers and Chemicals, Travancore Ltd.	MFL	— Madras Fertilisers Ltd.
FCI	— Fertilizer Corporation of India Ltd.	NCJM	— New Central Jute Mills Co. Ltd.
GNVFC	— Gujarat Narmada Valley Fertilisers Co. Ltd.	NFL	— National Fertilisers Ltd.
GSFC	— Gujarat State Fertilisers Co. Ltd.	NLC	— Neyveli Lignite Corporation Ltd.
HCL	— Hindustan Copper Ltd.	OFC	— Orissa Fertilisers & Chemicals Ltd.
HSL	— Hindustan Steel Ltd., Durgapur	SAIL	— Steel Authority of India Ltd.
HZL	— Hindustan Zinc Ltd.	SCI	— Shriram Chemical Industries.
IEL	— Indian Explosives Ltd.	SPIC	— Southern Petrochemical Industries Corporation Ltd.
IFFCO	— Indian Farmers Fertiliser Cooperative Ltd.	TISCO	— Tata Iron and Steel Co. Ltd.
IISCO	— Indian Iron and Steel Co. Ltd.	ZCAL	— Zuari Agro Chemicals Ltd.
KSIDC	— Karnataka State Industrial Development Corporation Ltd.		