

FERTILISER PRODUCTION IN INDIA

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INTRODUCTION

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 30's as a by-product from steel plants. Since then, Indian fertiliser scene has been continually expanding embracing the latest fertiliser technology and using a wide spectrum of feedstock.

Fertiliser Production in India, attempts to put together cardinal points of the Indian Fertiliser Industry tracing its development through stages and recording the situation as on 1st December 1975. It will be of interest to mention that as of date 27 nitrogenous and complex and 33 phosphatic fertiliser factories are in operation with installed capacity totalling 2,625 thousand tonnes N and 878 thousand tonnes P_2O_5 . Contributors to the present capacity in the past two years were FACT, Cochin (Phase I); ZACL, Goa; FCI, Durgapur; IFFCO, Kandla; SCI, Kota (Expn.); SPIC, Tuticorin; Coromandel, Vizag (Expn.); HCL, Khetri and MCFL, Mangalore.

By the end of the first quarter of 1976-77 (April-June), the position is anticipated to be as shown below :-

	<i>Capacity ('000 tonnes/annum)</i>	
	<u>N</u>	<u>P_2O_5</u>
1. Capacity existing as on 1.12.1975	2,625	878
2. Fresh capacity anticipated to be added by 31.3.1976		
i. FCI, Gorakhpur (Expn.)	51	—
3. Total capacity anticipated as on 31.3.1976	<u>2,676</u>	<u>878</u>
4. Further capacity anticipated to be added by 30.6.1976		
i. FCI, Barauni	152	—
ii. FCI, Namrup (Expn.)	152	—
iii. FCI, Sindri (Rational.)	—	156
5. Total capacity anticipated as on 30.6.1976	<u>2,980</u>	<u>1,034</u>

Presentation

A map showing the location of fertiliser factories is given on next page to indicate the span of geographical coverage by the fertiliser industry.

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

Actual factory production, both materialwise and nutrientwise, for the year 1974-75 (Apr.-Mar.) is also provided.

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

“Date of commissioning” refers to the date of commencement of commercial production of the project.

Notes and abbreviations appearing in the booklet are given at the end of the first two chapters on N and P_2O_5 capacity.

An index to processors/licensors/contractors is appended to present a glimpse of their contribution to the Indian fertiliser industry.

**CAPACITY, RAW MATERIALS, PROCESSES
AND COLLABORATORS OF
NITROGENOUS FERTILISERS**
(AS ON 1. 12. 1975)

I. PRODUCTION OF NITROGENOUS

Name of factory	Sector	Nutrient			End-Product			Principal raw material/ feedstock
		Capacity t. p. y.	Production 1974-75 (tonnes)	% capa- city utilisa- tion	Product	Capacity t. p. y.	Production 1974-75 (tonnes)	
A. FACTORIES IN								
1. Bokaro Steel, Bokaro (Bihar)	Public	2,720	2,604	96%	AS	13,200	12,650	Coke-oven gas (COG); sul- phuric acid
2. Coromandel Fertilisers, Visakhapatnam (A. P.)	Private	83,000 (345)	46,629	58%	Urea UAP (28-28-0) (20-20-0) (14-35-14)	Nil 250,000 — 96,500	9,648 136,576 Nil 28,221	Naphtha; phos- phate rock; sulphur
3. E. I. D.—Parry, Ennore (Tamil Nadu)	Private	16,000 (66)	9,984	62%	APS (16-20-0) AS	51,480 38,610	51,512 8,465	Naphtha; phos- phate rock; sulphur
4. Fertilisers and Chemicals Travancore, Alwaye (Kerala)	Public	82,000 (355)	34,902	43%	AS APS (20-20-0) (16-20-0) A. Cl.	198,000 171,500 — 24,750	93,315 23,804 68,232 NA	Naphtha; phos- phate rock; sulphur
5. Fertilisers and Chemicals Travancore, Ambelamedu (Kerala) [Cochin Phase I]	Public	152,000 (600)	39,703	26%	Urea	330,000	86,312	Naphtha
6. Fertilizer Corporation of India (a) Unit : Durgapur (West Bengal)	Public	152,000 (600)	14,581	10%	Urea	330,000	31,639	Naphtha

FERTILISERS (AS ON 1.12.1975) (Continued)

Process/Licences, etc.	Engineering/Contractors, etc.	Remarks	Financial outlay of the project & (FE) (Rs. million)	Date of commissioning
PRODUCTION (N)				
Neutralisation of ammonia		AS is produced as a by-product. With more coke-oven batteries under construction, the production of AS would go up.	NA	Oct. 1972 Expn. —November 1973
ICI/Kellogg for steam reformer and NH ₃ ; 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 t. p. y.) was available for direct sale. After expansion, (3,000 t. p. y. N) entire urea is being used in manufacturing UAP and NPKs, as shown.	575 (244)	Urea—December 1967 UAP/NPK—February 1968 Expansion—UAP/NPK—Oct. 1975
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 by 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 mostly for non-agricultural purposes. 1-stage expansion was for doubling N capacity by electrolysis of water, production of H ₃ PO ₄ and APS (16-20-0). Stage II was replacement of wood-based NH ₃ plant by Texaco process using naphtha. Stage III expansion was the installation of 300 t. p. d. of AS based on FACT know-how for conversion of by-product gypsum. Stage IV expansion was 120 t. p. d. steam reforming of naphtha, NH ₃ plant and 150 t. p. d. (20-20-0) grade APS plant.	50 30 20 120 56 ----- 276 (100)	Original—June 1947 I Stage—December 1960 II Stage—November 1962 III Stage—November 1965 IV Stage—September 1971
Steam reforming of naphtha; ICI/PGC for reformer; Vetro-coke for CO ₂ removal; Montedison for ammonia and urea.	P & D of FCI; FEDO; Montedison; Power Gas Corporation.	In phase I, 1000 tpd urea is manufactured. Phase II for NP/NPK fertilisers is under implementation (vide page 16)	630 (162)	July 1973
ICI/PGC for steam reforming; Vetro-coke for CO ₂ 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 13-10-1973. Permitted to install their own captive power plant.	599 (225)	October 1973

(Continued)

I. PRODUCTION OF NITROGENOUS

Name of factory	Sector	Nutrient			End-Product			Principal raw material/ feedstock
		Capacity t. p. y.	Production 1974-75 (tonnes)	% capa- city utilisa- tion	Product	Capacity t. p. y.	Production 1974-75 (tonnes)	
A. FACTORIES IN								
6. Fertiliser Corporation of India								
(b) Unit : Gorakhpur (UP)		80,000 (350)	72,772	91%	Urea	173,920	158,200	Naphtha
(c) Unit : Namrup (Assam)		45,000 (200)	39,915	89%	AS Urea	100,000 55,000	69,325 55,271	Natural gas; sulphur
(d) Unit : Nangal (Punjab)		80,000 (307)	40,342	50%	CAN (25% N) Heavy water	320,000 14.11	161,356 NA	Power for electrolytic H ₂ ; limestone
(e) Unit : Sindri (Bihar)		90,000 (463)	51,116	57%	AS ASN Urea	320,000 50,000 18,000	195,622 26,721 7,232	Coke; Coke- oven gas; na- phtha; gypsum; pyrites
(f) Unit : Trombay (Maharashtra)		81,000 (350)	58,261	72%	Urea Nitrophosphate (20-20-0) (15-15-15) Methanol	99,000 180,000 — 30,000	58,012 Nil 210,501 NA	Naphtha; re- finery gas; pho- sphate rock; potash

FERTILISERS (AS ON 1.12.1975) (Continued)

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

Shell gasification; Chemico for ammonia; Mitsui for urea.	P & D; Toyo Engineering Corporation.	Expansion programme (debottlenecking) is under implementation (vide page 16). Permitted to install their own captive power plant.	349 (143)	January 1969
Steam reforming of natural gas; Selas for reformer, ammonia; urea; Chemiebau for sulphuric acid.	Chemico; P & D of FCI.	Expansion programme is under implementation (vide page 16)	243 (64)	January 1969
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 Co.; Linde; Pintsch Bamag.	Grade of CAN changed from 20.5% N to 25% N from 20.8.67. Under the 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 18).	312 (143)	February 1961
Power Gas Corporation 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 Corporation; 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 ₂ SO ₄ plant (400 tonnes/day) was commissioned in 1971-72. "Sindri Rationalisation Scheme" (vide page 44) will yield by-product gypsum which will replace natural gypsum. "Rationalisation Scheme" and "Modernisation Scheme" (vide page 18) will augment capacity and are under implementation.	537 (N. A.)	AS—November 1951 ASN & Urea —October 1959
Shell gasification; Chemico for ammonia and urea; Girdler for reformer; Topsoe synthesis for methanol; PEC process modified by FCI for nitrophosphate.	P & D; Chemico; C & I.	Under the 1st USAID loan, nitrophosphate grade was changed from (16-13-0) to (20-20-0) with effect from 20th July, 1967. Present production is of "Suphala" of grade (15-15-15) since 1970-71. Under the 2nd USAID loan, methanol plant was constructed (October 1966). Added a 100 tpd H ₂ PO ₄ plant in June 1975. Also implementing expansion programmes viz., Trombay (debottle) (vide page 20), Trombay IV (vide page 20) & Trombay V (vide page 24). FCI, Trombay, has been permitted to install its own captive power plant.	456 (215)	Urea—October 1965 Nitrophosphate— November 1965

(Continued)

I. PRODUCTION OF NITROGENOUS

Name of factory	Sector	Nutrient			End-Product		
		Capacity t.p.y.	Production 1974-75 (tonnes)	% capacity utilisation	Product	Capacity t.p.y.	Production 1974-75 (tonnes)

A. FACTORIES IN

1. Gujarat State Fertilizers Co., Baroda (Gujarat)	Private	216,000 (950)	171,043	79%	Technical grade urea (46.5% N) Urea AS DAP (18-46-0)	3,300 364,000 148,000 108,000	285,889 132,964 67,464	Associated/natural gas; naphtha; phosphate rock; sulphur.
8. Hindustan Steel	Public							
(a) Unit : Bhilai (Madhya Pradesh)		6,720	5,857	84%	AS	32,600	28,639	Coke-oven gas; Sulphuric acid.
(b) Unit : Durgapur (West Bengal)		4,370	2,437	61%	AS	21,200	11,863	—do—
(c) Unit : Rourkela (Orissa)		5,770	2,465	41%	AS	28,200	11,952	—do—
(d) Unit : Rourkela (Orissa) (Fertiliser plant)		120,000	61,278	51%	CAN (25% N)	480,000	245,107	Coke-oven gas; naphtha; limestone
9. Indian Explosives, Panki (Uttar Pradesh)	Private	200,000 (830)	192,533	96%	Urea	450,000	418,552	Naphtha

FERTILISERS (AS ON 1.12.1975) (Continued)

Process/Licences, etc.	Engineering/ Contractors, etc.	Remarks	Financial outlay of the project & FE (Rs. million)	Date of commissioning
PRODUCTION (N) (Continued)				
ICI/PGC as well as ICI/H&G for reformer; Casale for NH ₃ ; Vetrocoke for CO ₂ removal; Mitsui Toatsu for urea; Chemico for sulphuric acid and DAP; Nissan for H ₃ PO ₄ ; ICI for AS Inventa for know-how of caprolactum plant.	Toyo Engineering Coron, 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 (20-4-0). 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 ₃ , Urea, AS, DAP, H ₂ SO ₄ and H ₃ PO ₄ were installed. In Phase II, capacities of NH ₃ and urea plants were enhanced. In phase III, caprolactum facility with a capacity of 20,000 tpy and 84,000 tpy co-product AS was developed for which the contract was awarded in Feb. 1969. Caprolactum plant was commissioned on 5th August 1974. Proposal for new ammonia and urea plants at Baroda has been approved in principle (vide page 24).	630 (320)	Phase I—May 1967
			337 (92)	Phase II—June 1969
			350 (NA)	Phase III—August 1974
Neutralisation of NH ₃ .	—	AS is a by-product from the coke-oven plant.	N. A.	December 1959
—do—	—	—do—	N. A.	April 1960
—do—	Koppers GmbH	—do—	N. A.	March 1967
Linde for gasification of COG; Otto for naphtha reforming; Uhde for NH ₃ ; P & D for nitric acid and CAN.	Bamag-Uhde; Otto; Linde; Stamicarbon; P & D of FCI	Low production due to shortage of COG. Expansion of the plant using naphtha reformer (Rs. 36 million) erected by W. Otto & Co. was commissioned in 1969 to augment supply of hydrogen. Switched over to the production of CAN of grade 25% N from December 1968 in place of grade 20.5% N produced earlier.	230 (N. A.)	December 1962 Expansion—August 1969
ICI for steam reforming and NH ₃ ; 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.	610 (210)	December 1969

(Continued)

I. PRODUCTION OF NITROGENOUS

Name of factory	Sector	Nutrient			End-Product			Principal raw material/ feedstock
		Capacity t. p. y.	Production 1974-75 (tonnes)	% capacity utilisation	Product	Capacity t. p. y.	Production 1974-75 (tonnes)	
A. FACTORIES IN								
10. Indian Farmers Fertiliser Cooperative, Kandla and Kalol (Gujarat)	Cooperative	215,000 (910)	11,820	31%	Urea	392,000	18,403	Natural gas; phosphoric acid; potash
					NPK fertilisers			
					(10-26-26)	92,800	14,375	
					(12-32-16)	92,800	15,971	
(14-36-12)	189,900	—						
11. Indian Iron & Steel Co. Burnpur-Kulti (West Bengal)	Private	4,740	1,241	25%	AS	23,000	6,026	COG; H ₂ SO ₄
12. Madras Fertilisers, Manali (Tamil Nadu)	Public	164,000 (750)	83,296	51%	Urea	210,000	87,387	Naphtha; H ₃ PO ₄ ; potash
					NPK fertilisers	360,000		
					(17-17-17)	90,600	226,418	
					(14-28-14)	72,500	33,673	
					(28-28-0)	54,500	—	
					(18-36-0)	54,400	—	
(24-12-12)	54,400	—						
(11-22-22)	36,300	—						

FERTILISERS (AS ON 1.12.1975) (Continued)

Process/Licences, etc.	Engineering/ Contractors, etc.	Remarks	Financial outlay of the project & FE (Rs. million)	Date of commissioning
PRODUCTION (N) (Continued)				
M. W. Kellogg for steam reforming and NH ₃ ; Dorr-Oliver for NPK; Stamicarbon for urea.	M. W. Kellogg & Co, H & G.; Dorr-Oliver.	NH ₃ and urea are manufactured at Kalol and NPK fertilisers at Kandla presently with imported H ₃ PO ₄ . Part of H ₃ PO ₄ is being replaced by MAP. Introduced new grades (24-24-0), (17-17-17) and (22-22-11) in place of (12-32-16) from April 1975. 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 U. K. against U. K./India Mixed Project Loan. It is proposed to have their own H ₃ PO ₄ plant with capacity 120,000 tpy of P ₂ O ₅ (Rs. 380 million). A fresh proposal for production of ammonia and urea at Phulpur is under implementation (vide page 24).	920 (250)	NH ₃ —Kalol—November 1974 NPK ferts.—Kandla—November 1974 Urea—Kalol —January 1975
		AS is the by-product from coke-oven gas.	N. A.	1947
Chemico for steam reforming and urea; Catacarb for CO ₂ ; Topsoe for NH ₃ ; Dorr-Oliver for NPK fertilisers.	Chemico; Dorr-Oliver.	Capacity of the plant is 190,000 tonnes. At present, the capacity is 164,000 tonnes for urea and 2 streams of NPK fertilisers. Some NH ₃ is being sold for other purposes. When third stream of NPK goes into production by mid 1976, it would consume the entire spare NH ₃ . Production is only of grades (17-17-17) and (14-28-14). Introduced a new grade (24-24-0) in September 1975. Presently, H ₃ PO ₄ is imported to manufacture NPK fertilisers. For "debottlenecking" programme, see page 20.	641 (249)	October 1971

(Continued)

1. PRODUCTION OF NITROGENOUS

Name of factory	Sector	Nutrient			End-Product			Principal raw material/ feedstock
		Capacity t.p.y.	Production 1974-75 (tonnes)	% Capacity utilisa- tion	Product	Capacity t.p.y.	Production 1974-75 (tonnes)	
A. FACTORIES IN								
13. Mangalore Chemicals & Fertilisers, Mangalore (Karnataka)	Private	160,000 (660)	—	—	Urea	340,000	—	Naphtha
14. New Central Jute Mills Co., Varanasi (Uttar Pradesh)	Private	10,000	2,540	25%	A. Cl.	40,000	10,164	Coke; Com- mon salt
15. Neyveli Lignite Corpo- ration, Neyveli (Tamil Nadu)	Public	70,000 (285)	17,403	25%	Urea	154,000	37,832	Lignite
16. Shriram Chemical Industries, Kota (Rajasthan)	Private	152,000 (600)	85,786	69%	Urea	330,000	186,491	Naphtha
17. Southern Petrochemical Industries Corporation, Tuticorin (Tamil Nadu)	Private	258,000 (1,100)	—	—	Urea DAP NPK fertilisers (10-26-26) (15-15-15) Heavy water	512,000 28,000 — 128,000 32,000 72	— — — — — —	Naphtha; phosphate rock; sulphur

FERTILISERS (AS ON 1.12.1975) (Continued)

Process/Licences. etc.	Engineering/ Contractors, etc.	Remarks	Financial outlay of the project & (FE) (Rs. million)	Date of commissioning
PRODUCTION (N) (Continued)				
ICI/H&G for steam reforming; ICI for NH ₃ ; Stamicarbon for urea.	H&G.	Terms of collaboration with U. K. were finalised in December 1971 under which (O. D. A 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 Coop. 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)	Nov /Dec. 1975
Modified Solvay process.	Pintsch Bamag; Uhde.	Equal quantity of soda ash is produced as co-product.	45 (N. A.)	November 1959
Winkler gasification process; Vetrocoke for CO ₂ removal; Bamag for NH ₃ ; Linde for oxygen; Montedison for urea.	Ansaldo, Pintsch-Bamag; Linde; Montedison.	Plans are under consideration for installation of fuel oil gasification to replace lignite. Complete switch-over is contemplated by 1978-79.	344 (180)	March 1966
Topsoe for steam reformer, NH ₃ and urea.	Mitsubishi; Chiyoda	The original project (110,000 tpy N/240,000 tpy urea) was financed from suppliers' 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 26).	357 (N. A.)	February 1969 Expansion— December 1974
ICI/PGC for steam reforming; Mitsui-Toatsu for urea and DAP; TVA process for NPK fertilisers; Nissan process for H ₂ SO ₄ and H ₃ PO ₄ .	Vetrocoke for CO ₂ removal; ICI for NH ₃ ; PGC; TEC; Hitachi Zosen	Implementation of the project commenced in February 1972. U. K. and Yen credit arranged for foreign exchange requirement. Foreign exchange for NH ₃ plant was arranged against UK/India Mixed Project Loan. Urea and DAP plants by TEC (Rs. 150 million), NH ₃ plant by ICI - PGC (Rs. 130 million). Inclusion of heavy water plant (Rs. 230 million) has enabled SPIC to increase the capacity of NH ₃ plant from 1,000 to 1,100 tpd. NP/NPK plants are expected to be commissioned in December 1975.	897 (278)	Urea—June 1975 NP/NPK—Dec. 1975

(Continued)

I. PRODUCTION OF NITROGENOUS

Name of factory	Sector	Nutrient			End-Product			Principal raw material/ feedstock
		Capacity t. p. y.	Production 1974-75 (tonnes)	% capacity utilisation	Product	Capacity t. p. y.	Production 1974-75 (tonnes)	
A. FACTORIES IN								
18. Tata Iron and Steel Co., Jamshedpur (Bihar)	Private	4,760	2,596	52%	AS	23,100	12,622	COG; H ₂ SO ₄
19. Zuari Agro-Chemicals, San Coale (Goa)	Private	170,000 (660)	135,078	86%	Urea NP/NPK fertilisers UAP (28-28-0) DAP (18-46-0) NPK (18-18-18)	340,000 150,000	293,446 325	Naphtha; H ₃ PO ₄ ; Potash
		Public	1,135,580					
TOTAL (Capacity)		Private	1,274,500					
		Cooperative	215,000					
		Capacity	2,625,080					
A. GRAND TOTAL		Production	1,186,182					
		Capacity utilisation	60%					

FERTILISERS (AS ON 1.12.1975) (Continued)

Process Licences, etc.	Engineering/ Contractors, etc.	Remarks	Financial outlay of the project & (F.E.) (Rs. million)	Date of commissioning
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PRODUCTION (N) (Concluded)

		AS is a by-product.	N. A.	1939
ICI/PGC for steam reformer; Vetrocoke for CO ₂ removal; TEC for NH ₃ and NPK; Mitsui for urea.	ICI/PGC; TEC; Mitsui	Plant was erected on a turn-key basis by TEC. Trial runs for NPK fertilisers based on imported H ₃ PO ₄ 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.	566 (262)	Urea – May 1973 NPK – March 1975

(Continued)

I. PRODUCTION OF NITROGENOUS

Name of factory	Sector	Nutrient	End-Product	
		Capacity t.p.y.	Product	Capacity t.p.y.

B. PROJECTS UNDER

1. Fertilisers and Chemicals Travancore, Ambalamedu (Kerala) [Cochin Phase II] Expansion Plan: (Total after expansion:	Public	40,000 192,000 (600)	NP/NPK fertilisers: (17-17-17) (28-28-0) Cryolite	485,000 7,500
2. Fertilizer Corporation of India	Public			
a. Unit : Barauni (Bihar)		152,000 (600)	Urea	330,000
b. Unit : Gorakhpur (U. P.) Expansion Plan: (Total after expansion:		51,000 131,000 (550)	Urea	111,000
c. Unit : Haldia (West Bengal)		152,000 (600)	Urea Nitro-phosphate (20-20-0) Soda ash Methanol	167,400 375,000 60,000 41,250
d. Unit : Namrup (Assam) Expansion Plan: (Total after expansion:		152,000 197,000 (800)	Urea	330,000

FERTILISERS (AS ON 1.12.1975) (Continued)

Principal raw material/ Feedstock	Process/ Licences etc.	Engineering/ Contractors etc.	Remarks	Financial outlay of the project & FE (Rs. million)	Date of Commis- sioning
Imported NH ₃ : phosphate rock; sulphur	Chemiebau for H ₂ SO ₄ ; DPG/ Wellman Lord for NP/NPK fertilisers; Prayon for H ₃ PO ₄	FEDO; Chemi- ebau; Prayon; Davy Power Gas	To begin with, 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 ₂ SO ₄ (1000 t.p.d.), H ₃ PO ₄ (350 t.p.d.) and NP/NPK (1700 t.p.d.) fertiliser plants would be made available. Implementation of the project commenced in June 1974.	450 (140)	Dec. 1976
Naphtha	Selas for steam reformer; Vet- rocok for CO ₂ removal; Montedison for NH ₃ and urea.	P & D; Montedison	Implementation of the project commenced in March 1968. Plant is similar to that at Durgapur and Cochin. Im- ported equipment was obtained against Italian suppliers credit.	688 (182)	April 1976
Naphtha	Shell gasifica- tion; TEC for NH ₃ ; Mitsui Toatsu for urea	P & D; TEC	Implementation of the expan- sion project commenced in June 1972. World Bank (IDA) assistance of \$10 million would meet the foreign exchange cost. The capacity is being in- creased through debottleneck- ing.	180 (75)	Dec. 1975
Fuel oil; phos- phate rock; sulphur	Shell gasifica- tion; Lurgi for gas puri- fication; Mon- tedison for NH ₃ and urea; Stamicarbon for NPK; FCI for H ₂ SO ₄ ; Nissan for H ₃ PO ₄ ; Topsoe for methanol; CLE for soda ash	P & D; Lurgi; Montedison; Stamicarbon; Heurtey; Nis- san; Polimax; Topsoe.	Licence was issued in December 1971. Implementation of the project commenced in Sep- tember 1972. Licence agree- ments for process know-how and contracts for design & supply of equipment/machinery have since been concluded	1872 (400)	Dec. 1977
Natural gas	Selas for steam reformer; Vet- rocok for CO ₂ removal; Montedison for NH ₃ and urea	P & D; Montedison	Implementation of the project commenced in March 1968. Plant is similar to that at Durgapur and Cochin. Im- ported equipment was obtain- ed against Italian suppliers' credit.	586 (150)	April 1976

(Continued)

I. PRODUCTION OF NITROGENOUS

Name of factory	Sector	Nutrient	End-Product	
		Capacity t.p.y.	Product	Capacity t.p.y.

2. Fertilizer Corpn. of India (Continued) B. PROJECTS UNDER

e. Unit : Nangal (Punjab) Expansion plan (Total after expansion:		152,000 232,000 (907)	Urea	330,000
f. Unit : Ramagundam (A. P.)		228,000 (900)	Urea	495,000
g. Unit : Sindri (Bihar) [Modernisation] Expansion Plan: (Total after expansion:		129,000 219,000 (900)	Urea	280,000

FERTILISERS (AS ON 1.12.1975) (Continued)

Principal raw material/ feedstock	Process/ Licences etc.	Engineering/ Contractors, etc.,	Remarks	Financial outlay of the project & (FE) (Rs. million)	Date of commissioning
IMPLEMENTATION (N) (Continued)					
Fuel Oil	Shell gasification; Lurgi for gas purification; Topsoe for NH ₃ ; Montedison for urea.	P & D; Montedison; Uhde; Lurgi; Topsoe.	Implementation of the project commenced in March 1973. After expansion, the entire capacity of NH ₃ would be based on fuel oil. Out of 900 t. p. d. NH ₃ , 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 ₃ plant in the existing unit would be gradually replaced. FE component through IDA of the World Bank.	1038 (392)	Feb. 1977
Coal	Koppers for gasification; Lurgi for gas purification; Montedison for NH ₃ 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. Licence was issued in February 1971. Implementation of the project started in July 1971. Out of 3000 tonnes/day coal requirement, 1700 tonnes would be for gasification and production of NH ₃ and the balance for steam generation.	1373 (400)	July 1977
Fuel Oil	Shell gasification; Lurgi for gas purification; Topsoe for NH ₃ 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 t. p. y. Urea : 330,000 t. p. y. There would be no production of ASN after expansion and capacity of urea would be increased as shown. φ IDA of the World Bank has provided an additional \$91 million both for Sindri (Modernisation) and Sindri (Rationalisation), (vide page 44).	1194 (235)φ	Dec. 1978

(Continued)

I. PRODUCTION OF NITROGENOUS

Name of factory	Sector	Nutrient	End-Product	
		Capacity t. p. y.	Product	Capacity t. p. y.
B. PROJECTS UNDER				
2. Fertilizer Corporation of India (Concluded)				
h. Unit : Talcher (Orissa)		228,000 (900)	Urea	495,000
i. Unit : Trombay (Maharashtra) [Debottlenecking] Expansion Plan: (Total after expansion:		32,000 113,000 (350)	Urea Nitro-phosphate (20-20-0)	30,000 90,000
j. Unit : Trombay IV (Maharashtra) Expansion Plan: (Total after expansion:		75,000 188,000 (350)	Nitro-phosphate (20-20-0)	375,000
3. Madras Fertilizers Manali (Tamil Nadu) [Debottlenecking] Expansion Plan: (Total after expansion:	Public	12,000 176,000 (750)	NPK Ferts. of various grades	
4. National Fertilisers a. Unit : Bhatinda (Punjab)	Public	235,000 (900)	Urea	511,500

FERTILISERS (AS ON 1.12.1975) (Continued)

Principal raw material/ feedstock	Process/ Licences etc.	Engineering/ Contractors, etc.,	Remarks	Financial outlay of the project & (FE) (Rs. million)	Date of commissioning
Coal.	Koppers for gasification; Lurgi for gas purification; Montedison for NH ₃ 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.	1427 (400)	Feb. 1977
Imported NH ₃ ; phosphate rock; sulphur.		P & D; Sela	Project work is being done departmentally by the P & D of FCI. Import of NH ₃ would be discontinued as soon as Trombay V goes on stream in Dec. 1974 (see page 24)	N.A (58)	Oct. 1976
Imported NH ₃ ; phosphate rock; sulphur.	Uhde for nitrophosphate; DPG for HNO ₃ .	P & D; Stamicarbon; Uhde; Bamag.	Licence was issued in June 1971. Implementation was taken up in June 1974. Project would be based on bought out/imported NH ₃ for 2-3 years and thereafter, from Trombay V. (See page 24) (See Trombay "debottlenecking"). World Bank would provide Rs. 248 million as FE through IDA both for Trombay "debottle." and Trombay IV.	440 (190)	June (1977)
Naphtha; phosphoric acid; potash.		Being done departmentally	A third stream of NPK plant is being added in the debottlenecking	110 (10)	June 1976
Fuel oil.	Partial oxidation of fuel oil by Shell gasification; Lurgi for gas purification; Topsoe for NH ₃ 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.	Project 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, Baroda (new plant) and Kakinada projects to meet the FE cost.	1384 (532)	Oct. 1977

(Continued)

I. PRODUCTION OF NITROGENOUS

Name of factory	Sector	Nutrient	End-Product	
		Capacity t.p.y.	Product	Capacity t.p.y.

4. National Fertiliser (Concl.)
 b. Unit : Panipat
 (Haryana)

235,000
 (900)

B. PROJECTS UNDER
 Urea 511,500
 Flaked sulphur 20. t.p.d

TOTAL (Capacity)

Public : 1,873,000

Private : —

Cooperative : —

B. GRAND TOTAL

Capacity 1,873,000

FERTILISERS (AS ON 1.12.1975) (Continued)

Principal raw material/ Feedstock	Process/ Licences etc.	Engineering/ Contractors etc.	Remarks	Financial outlay of the project & FE (Rs. million)	Date of Commis- sioning
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IMPLEMENTATION (N) (Concluded)

Fuel Oil	Partial oxidation of fuel oil by Shell gasification; Lurgi for gas purification; Topsoe for NH ₃ 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.	Cabinet cleared the project in January 1973. Project has been taken up for implementation in April 1975 when contract of TEC and EIL became operative. Expected to be completed in 33 months. Export-Import Bank of Japan has provided a part of foreign exchange to the extent of 11 billion Yen. In addition, IBRD has advanced a loan of \$170 million to be shared jointly by Bhatinda, Panipat, Baroda (New Plant) and Kakinada projects to meet the FE cost completely.	1400 (580)	Feb. 1978
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(Continued)

I. PRODUCTION OF NITROGENOUS

Name of factory	Sector	Nutrient	End-Product	
		Capacity t.p.y.	Product	Capacity t.p.y.

C. PROJECTS APPROVED

1. Fertilizer Corporation of India a. <i>Unit : Korba</i> (Madhya Pradesh)	Public	228,000 (900)	Urea	495,000
b. <i>Unit : Paradeep</i> (Orissa)		345,000 (1,350)	NP/NPK fertilisers	
c. <i>Unit : Trombay V</i> (Maharashtra) Expansion Plan: (Total after expansion:		130,000 (900) 318,000 (1,250)	Urea	284,000
2. Gujarat State Fertilizers Co. Baroda (Gujarat) [New Plant]	Private	243,000 (1,350)	Urea	528,000
3. Indian Farmers Fertiliser Coop., Phulpur (U. P.)	Cooperative	228,000 (900)	Urea	495,000

FERTILISERS (AS ON 1.12.1975) (Continued)

Principal raw material/ Feedstock	Process/ Licences etc.	Engineering/ Contractors etc.	Remarks	Financial outlay of the project & FE (Rs. million)	Date of Commis- sioning
Coal	Koppers for gasification, Lurgi for gas purification; Montedison for NH ₃ and urea.	P & D; Montedison; Koppers; Lurgi.	It is the first coal-based project conceived in 1960. Progress has been rather slow due to non-availability of expertise in other parts of the world and, due to changing economics of use of diversified feedstocks. The project has since been rephased though civil work had started as far back as December 1971. Rephased project was taken up for imple- mentation in May 1974.	1500 (400)	December 1979
Fuel oil; phos- phate rock; sulphur		P & D.	Project work has been rephased.	3500 (1000)	December 1980
Naphtha or natural gas.		P & D.	The ammonia plant is designed to use naphtha or natural gas. 50 per cent of NH ₃ capacity (450 t. p. d.) when commis- sioned, would be used to re- place imported NH ₃ at Trom- bay (debottle) (see page 20) and Trombay IV (see page 20). Balance NH ₃ would be used to manufacture urea at the plant. Later, naphtha might be replaced by natural gas from Bombay High.	1114 (278)	December 1978
Fuel oil		GSFC	New NH ₃ capacity proposed is for 1350 t. p. d. out of which 950 t. p. d. would be used for urea manufacture and the balance for other purposes to be identified. IBRD has earmarked a loan of \$170 million to be shared jointly by Bhatinda, Panipat, Kakinada and Baroda (New plant) for foreign exchange.	2000 (750)	December 1978
Naphtha	Snamprogetti for urea.	Snamprogetti.	IBRD would finance the FE component through \$110 mil- lion. During Phase II, NPK fertilisers might be manufac- tured through H ₃ PO ₄ trans- ported from Kandla - its first unit in production since November 1974.	1655 (825)	December 1978

(Continued)

I. PRODUCTION OF NITROGENOUS

Name of the factory	Sector	Nutrient	End-Product	
		Capacity t.p.y.	Product	Capacity t.p.y.

C. PROJECTS APPROVED

4. Maharashtra Coop. Fertilisers and Chemicals, Thana (Maharashtra)	Cooperative	51,000 (200)	A.Cl Soda ash	66,000 66,000
5. Nagarjuna Fertilisers, Kakinada (A. P.)	Private	228,000 (900)	Urea NPK Ferts.	437,000 450,000
6. National Fertilisers Unit : Mathura (U. P.)	Public	235,000 (900)	Urea	511,500
7. Shriram Chemical Industries, Kota (Rajasthan) [Phase II] (Total after expansion:	Private	152,000 (600) 304,000 (1,200)	Urea	330,000
	Public :	938,000		
TOTAL (Capacity)	Private:	623,000		
	Coop. :	279,000		
C. GRAND TOTAL :	Capacity:	1,840,000		
	Public :	3,946,580		
GRAND TOTAL : (A+B+C)	Private:	1,897,500		
	Coop. :	494,000		
	Capacity:	6,338,080		

FERTILISERS (AS ON 1.12.1975) (Continued)

Principal raw material/ feedstock	Process/ Licences etc.	Engineering/ Contractors, etc.,	Remarks	Financial outlay of the project & (FE) (Rs. million)	Date of commissioning
IN PRINCIPLE (N) (Concluded)					
Naphtha, Common salt	Sahu Jain process.	Engineers India Ltd; Topsoe: FEDO.	Project is sponsored by Maharashtra State Cooperative Bank. Company signed a contract with Haldor Topsoe for technical collaboration. 65 tpd of NH ₃ is earmarked for ACI and the rest for direct application. NH ₃ plant (200 tpd) would cost Rs. 130 million.	440 (115)	July 1978
Fuel oil; phosphate rock; sulphur			It is proposed to manufacture urea in Phase I and NPK fertilisers in Phase II which may come up a year later. IBRD has earmarked a loan of \$170 million to be shared jointly by Bhatinda, Panipat, Kakinada and Baroda (new plant) to meet part of the foreign exchange cost.	2000 (700)	Phase I 1980 Phase II 1981
Naphtha from the proposed Mathura refinery.			Naphtha supply is related to the commissioning of Mathura refinery (6 million tonnes). Export-Import Bank of Japan would give 11 billion Yen to meet part of the foreign exchange cost. Balance is being tied up.	2000 (750)	December 1980
Fuel Oil			Phase I (expansion) was completed in December 1974 (42,000 t. p. y N). Under Phase II, a new NH ₃ and urea facility is under consideration to be developed at the existing location.	N. A.	June 1979

(Continued)

I. PRODUCTION OF NITROGENOUS

Name of factory	Sector	Nutrient	End-Product		Principal raw material/ feedstock
		Capacity t.p.y.	Product	Capacity t.p.y.	

D. PROJECT UNDER

1. J. K. Chemicals (Sarguja Dist) (M. P.)	Private	228,000 (900)	Urea Methanol	495,000 —	Coal
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TOTAL (Capacity) **Private : 228,000**

D. GRAND TOTAL **Capacity : 228,000**

Public : 3,946,580

GRAND TOTAL (A+B+C+D) **Private : 2,125,500**

Coop. : 494,000

Capacity: 6,566,080

FERTILISERS (AS ON 1.12.1975) (Concluded)

Process/Licences, etc.	Engineering/ Contractors, etc.	Remarks	Financial outlay of the project & (FE) (Rs. million)	Date of commissioning
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CONSIDERATION (N)

2000
(750)

CAPACITY, RAW MATERIALS, PROCESSES
AND COLLABORATORS OF
PHOSPHATIC FERTILISERS
(AS ON 1. 12. 1975)

II. PRODUCTION OF PHOSPHATIC

Name of factory	Sector	Nutrient			End-Product		
		Capacity t.p.y.	Production 1974-75 (tonnes)	% capacity utilisation	Product	Capacity t.p.y.	Production 1974-75 (tonnes)
A. FACTORIES IN							
I. Complexes							
1. Coromandel Fertilisers, Visakhapatnam (Andhra Pradesh)	Private	104,000	48,122	66%	UAP (28-28-0) (20-20-0) (14-35-14)	251,000 — 96,500	136,576 NIL 28,221
2. E.I.D.-Parry, Ennore (Tamil Nadu)	Private	10,300	10,303	100%	APS (16-20-0)	51,480	51,512
3. Fertilisers and Chemicals, Travancore, Alwaye (Kerala)	Public	36,200	18,406	51%	APS (20-20-0) (16-20-0)	171,500 —	23,804 68,232
4. Fertilizer Corporation of India a. Unit : Trombay (Maharashtra)	Public	36,000	31,583	88%	Nitrophosphate : (20-20-0) (15-15-15)	180,000 —	NIL 210,501
5. Gujarat State Fertilizers Co., Barada (Gujarat)	Private	50,000	31,033	62%	D.A.P. (18-46-0)	108,000	67,464

FERTILISERS (AS ON 1.12.1975)

Principal raw material/feedstock	Process/Licences, etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
PRODUCTION (P₂O₅)				
Naphtha; phosphate rock; sulphur; potash.	Dorr-Oliver for phosphoric acid; Chemico for sulphuric acid; Wellman Lord for UAP and NPK.	Lumus; Kellog; Dorr-Oliver; Simon Carves; Wellman Lord; Chemico; Vulcan.	After expansion (31,000 tpy P ₂ O ₅), NP fertilisers are in the form of UAP 28-28-0 and 14-35-14.	February 1968 Expn.— Oct. 1975
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 Brayar; Simon Carves; Power Gas Corporation; Hitachi; Dorr-Oliver; FEDO; Chemico; EIC.	1st stage expansion was for doubling N capacity by electrolysis of water, production of H ₃ PO ₄ and APS (16-20-0). In stage IV, expansion comprised 120 t.p.d. steam reforming NH ₃ plant and 150 t.p.d. (20-20-0) grade APS plant. Its phosphoric acid plant was commissioned in March 1972, though, the NH ₃ plant was ready by September 1971.	Original— June 1947 Ist Stage— Dec. 1960 IV Stage— Sep. 1971 H ₃ PO ₄ Plant— March 1972
Naphtha; refinery gas; phosphate rock; potash.	Nitrophosphate is by PEC process modified by FCI.	P & D; Chemico; C & I.	Under the 1st USAID loan, nitrophosphate grade was changed from (16-13-0) to (20-20-0) with effect from 20th July 1967. Present production is of "Suphala" of grade (15-15-15) since 1970-71 using DAP. With the commissioning of its own H ₃ PO ₄ plant, use of DAP will be dispensed with.	Nitrophos— Nov. 1965 H ₃ PO ₄ plant— June 1975
Associated/Natural gas; naphtha; phosphate rock; sulphur.	Chemico for sulphuric acid and DAP; Nissan for H ₃ PO ₄	Toyo Engineering Corporation 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 ₃ , urea, AS, DAP, H ₂ SO ₄ and H ₃ PO ₄ were installed. In phase II and III, NH ₃ and caprolactum capacities were developed.	Phase I— May 1967

II. PRODUCTION OF PHOSPHATIC

Name of factory	Sector	Nutrient			End-Product		
		Capacity t.p.y.	Production 1974-75 (tonnes)	% capacity utilisation	Product	Capacity t.p.y	Production 1974-75 (tonnes)

A. FACTORIES IN

6. Indian Farmers Fertiliser Coop., Kandla (Gujarat)	Cooperative	127,000	8,849	39%	NPK fertilizers		
					(10-26-26)	92,800	14,375
					(12-32-16)	92,800	15,971
					(14-36-12)	189,900	—
7. Madras Fertilizers, Manali (Tamil Nadu)	Public	85,000	47,811	56%	N.P.K. Fertilisers	360,000	
					(17-17-17)	90,600	226,418
					(14-28-14)	72,500	33,673
					(28-28-0)	54,500	—
					(18-36-0)	54,400	—
					(24-12-12)	54,400	—
					(11-22-22)	36,300	—
8. Southern Petrochemical Industries Corporation, Tuticorin (Tamil Nadu)	Private	51,000	—	—	DAP	28,000	—
					NPK fertilisers :		
					(10-26-26)	128,000	—
	(15-15-15)	32,000	—				
9. Zuari Agro Chemicals, San Coale (Goa)	Private	42,000	91	3%	NP/NPK fertilisers :	150,000	
					UAP		
					(28-28-0)		325
					DAP		
					(18-46-0)		—
NPK							
	(18-18-18)	—					

FERTILISERS (AS ON 1.12.1975) (Continued)

Principal raw material/feedstock	Process/Licences, etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
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PRODUCTION (P_2O_5) (Continued)

Natural gas; phosphoric acid; potash	Dorr-Oliver for NPK	M. W. Kellogg & Co; H & G; Dorr-Oliver	NPK fertilisers are manufactured at Kandla presently with imported H_3PO_4 . Introduced new grades (24-24-0), (17-17-17) and (22-22-11) in place of (12-32-16) from April 1975. MAP is being imported to replace a part of H_3PO_4 . It is proposed to have their own H_3PO_4 plant with capacity 120,000 t.p.y of which construction would start by the year end. (Rs. 380 million).	NH ₃ - Kalol - Nov. 1974 NPK - Kandla - Nov. 1974
Naphtha; H_3PO_4 ; potash	Dorr-Oliver for NPK	Chemico; Dorr-Oliver	Presently, 2 streams of NPK are operating when third stream goes into production by mid 1976; it would consume the spare NH ₃ capacity. Introduced a new grade (24-24-0) in September 1975. Presently, H_3PO_4 is imported to manufacture NPK fertilisers. (For "debottlenecking" programme, see page 46).	October 1971
Naphtha; phosphate rock; sulphur	Mitsui-Toatsu for urea and DAP; TVA process for NPK fertilisers; Nissan process for H_2SO_4 and H_3PO_4 .	PGC; TEC; Hitachi Zosen	The NH ₃ and urea plants were commissioned in June 1975. Their H_3PO_4 and NP/NPK plants are expected to be in operation by December 1975. DAP plant financed with suppliers' credit from TEC (Rs. 150 million).	December 1975
Naphtha; H_3PO_4 ; Potash	Mitsui-Toatsu for urea; TEC for NH ₃ and NPK; Based on imported H_3PO_4 .	ICI/PGC; TEC; Mitsui	NH ₃ and urea plants were commissioned in May 1973. Trial runs for NPK fertilisers based on imported H_3PO_4 were carried out during March 1975. International Finance Corporation (World Bank) provided funds besides USA. to meet foreign exchange cost.	March 1975

II. PRODUCTION OF PHOSPHATIC

Name of factory	Sector	Nutrient			End-Product		
		Capacity t.p.y.	Production 1974-75 (tonnes)	% capacity utilisation	Product	Capacity t.p.y.	Production 1974-75 (tonnes)
					A. FACTORIES IN		
II. Superphosphates							
10. Adarsh Chemicals and Fertilisers, Udhna (Gujarat)	Private	5,360	5,682	106%	SSP	33,530	35,510
11. Andhra Fertilizers Tadepalle (Andhra Pradesh)	Private	6,400	5,703	89%	SSP	40,000	35,646
12. Andhra Sugars, Tanuku (Andhra Pradesh)	Private	5,360	2,526	47%	SSP	33,530	15,789
13. Anil Starch Products Bhavnagar (Gujarat)	Private	5,360	2,141	40%	SSP	33,530	13,382
14. Anish Chemicals Ahmedabad (Gujarat)	Private	1,440	137	10%	SSP	9,000	856
15. Associated Industries (Assam) Chemical Unit of Chandrapur (Assam)	Public	5,360	70	2%	SSP	33,530	389
16. Bharat Fertiliser Industries, Bombay (Maharashtra)	Private	3,600	1,193	33%	SSP	22,500	7,457
17. Bihar State Superphosphate Factory, Sindri Institute (Bihar)	Public	3,760	1,607	43%	SSP	23,470	10,041
18. Chamundi Chemicals and Fertilisers, Munirabad (Karnataka)	Private	6,500	NIL	NIL	SSP	40,640	NIL
19. Coimbatore Pioneer Fertilisers, Coimbatore (Tamil Nadu)	Private	6,500	1,808	28%	SSP	40,640	11,299

FERTILISERS (AS ON 1.12.1975) (Continued)

Principal raw material/Feed stock	Process/Licences, etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
PRODUCTION (P₂O₅) (Continued)				
Phosphate rock; Sulphur	Acidulation of phosphate rock with H ₂ SO ₄ .		SSP is produced in powdered as well as granulated form.	October 1962
-do-	-do-			November 1960
-do-	-do-			March 1961
-do-	-do-		Shifted SSP plant from Ahmedabad to Bhavnagar in April 1964. They have H ₂ SO ₄ plants at both the places.	Original project —1947 At new site— April 1964
-do-	-do-			November 1972
-do-	-do-		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.	August 1963 Recommissioned —March 1975
Phosphate rock; Waste H ₂ SO ₄	-do-		Bulk of material is used in the granulation of fertiliser mixtures. H ₂ SO ₄ is purchased from the market.	April 1968
Phosphate rock; Sulphur	Acidulation of phosphate rock with H ₂ SO ₄		NPK granulation plant is being added.	May 1958
-do-	-do-		Closed since latter half of 1970-71	November 1963
-do-	-do-		Granulation plant was commissioned in April 1970 and SSP in powder or granulated form is produced.	February 1966

(Continued)

II. PRODUCTION OF PHOSPHATIC

Name of factory	Sector	Nutrient			End-Product		
		Capacity t.p.y.	Production 1974-75 (tonnes)	% capacity utilisation	Product	Capacity t.p.y.	Production 1974-75 (tonnes)
A. FACTORIES IN							
20. D.C.M. Chemical Works, Delhi (Delhi)	Private	21,120	10,877	52%	SSP	132,000	67,980
21. Dharamsi Morarji Chemical Co.	Private						
(a) Unit : Ambernath (Maharashtra)		23,420	18,601	79%	SSP	146,320	116,256
b) Unit : Ambernath (Maharashtra)		12,150	1,164	10%	TSP (46% P ₂ O ₅)	27,000	2,531
(c) Unit : Kumhari (Madhya Pradesh)		15,200	13,548	89%	SSP	95,000	84,677
22. E.I.D.—Parry, Ranipet (Tamil Nadu)	Private	6,400	6,160	96%	SSP	40,000	38,503
23. Eastern Chemical Co. Bombay (Maharashtra)	Private	890	250	28%	SSP	5,590	1,562
24. Fertilisers and Chemicals Travancore, Alwaye (Kerala)	Public	7,150	3,749	52%	SSP	44,700	23,432
25. Hindustan Copper, Khetri (Rajasthan)	Public	90,000	—	—	TSP (46% P ₂ O ₅)	200,000	—

FERTILISERS (AS ON 1.12.1975) (Continued)

Principal raw material/Feed stock	Process/Licences, etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
PRODUCTION (P₂O₅) (Continued)				
Phosphate rock ; sulphur	Acidulation of phosphate rock with H ₂ SO ₄		Superphosphate from bone-meal till June 1948; thereafter, from rock-phosphate. 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 ₃ PO ₄ (from Albright Morarji and Pandit Ltd.)	Treating phosphate rock with H ₃ PO ₄ .			January 1968
Phosphate rock; sulphur	Acidulation of phosphate rock with H ₂ SO ₄		Licensed capacity was upgraded from 12,000 to 15,200 t.p.y. P ₂ O ₅ from May 3, 1973	Original project - Oct. 1961 Expansion - May 1973
-do-	-do-		This is the oldest fertiliser plant in the country. During the initial years, bone and H ₂ SO ₄ were used. However, phosphate rock and H ₂ SO ₄ are used since 1945.	1906
-do-	-do-		The plant is being shifted to the new industrial area.	
-do-	-do-		Besides SSP, FACT was the first plant to manufacture APS (16-20-0) in December 1960 (vide page 32)	April 1948
Phosphate rock ; by-product H ₂ SO ₄ from copper smelter at Khetri	Prayon process for H ₃ PO ₄	FEDO	FEDO was assigned construction job of H ₂ SO ₄ , H ₃ PO ₄ and TSP plants. TSP plant would cost Rs. 162 million and would start in early 1976. Arrangements finalised for FE component of Rs. 21 million. Single superphosphate is presently being manufactured.	November 1975

(Continued)

II. PRODUCTION OF PHOSPHATIC

Name of factory	Sector	Nutrient			End-Product		
		Capacity t.p.y.	Production 1974-75 (tonnes)	% capacity utilisation	Product	Capacity t.p.y.	Production 1974-75 (tonnes)
A. FACTORIES IN							
26. Hindustan Zinc Debari (Rajasthan)	Public	12,000	7,073	59%	SSP	75,000	44,208
27. Hyderabad Chemicals and Fertilisers, Maula Ali (Andhra Pradesh)	Public	6,700	2,045	31%	SSP	41,900	12,784
28. Jayshree Chemicals and Fertilizers, Khardah (West Bengal)	Private	9,180	7,625	83%	SSP	57,360	47,654
29. Kothari (Madras) Ltd. Ennore (Tamil Nadu)	Private	7,150	3,974	56%	SSP	44,700	24,840
30. Krishna Industrial Corporation Nidadavole (Andhra Pradesh)	Private	8,130	2,127	21%	SSP	50,800	13,296
31. Maharashtra Agro-Industries Development Corporation, Panvel (Maharashtra)	Public	7,200	855	12%	SSP	45,000	5,342
32. Mysore Chemicals & Fertilizers Belagula (Karnataka)	Public	5,360	Nil	Nil	SSP	33,530	Nil
33. Paushak Baroda (Gujarat)	Private	3,760	3,300	88%	SSP	23,470	20,626
34. Phosphate Co., Rishra (West Bengal)	Private	9,760	7,039	72%	SSP	61,000	43,993
35. Premier Fertilisers Cuddalore (Tamil Nadu)	Private	6,500	349	5%	SSP	40,640	2,180
36. Ralli Chemicals Magarwara (Uttar Pradesh)	Private	9,750	6,102	63%	SSP	60,960	38,141

FERTILISERS (AS ON 1.12.1975) (Continued)

Principal raw material/feedstock	Process/Licences, etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
PRODUCTION (P₂O₅) (Continued)				
Udaipur rock ; by-product H ₂ SO ₄ from zinc smelter.	Acidulation of phosphate rock with H ₂ SO ₄ .		Performance of the plant is related to the availability of H ₂ SO ₄ from the smelter at Debari. Implementing a programme to manufacture only H ₃ PO ₄ (vide page 46)	October 1967
Phosphate rock ; Sulphur	—do—		Plant was shifted from Bellampalli to Maula Ali in 1963.	Original project—1946 Shifted site—1963
—do—	—do—			December 1961
—do—	—do—			July 1962
—do—	—do—			April 1964
Phosphate rock and by-product H ₂ SO ₄	Acidulation of rock with H ₂ SO ₄	Larsen & Toubro, Bombay	SSP produced at the plant is meant mostly for its own granulation unit making mixtures.	March 1974
Phosphate rock ; Sulphur	—do—		Closed since November 1973	July 1941
—do—	—do—		Proposal to expand and renovate the existing plant is under implementation.	1951
—do—	—do—		Original plant—5,630 t.p.y. P ₂ O ₅ expansion—4,130 t.p.y. P ₂ O ₅ . SSP in powder and granulated form is produced.	Original project—1950 Expansion— December 1967
—do—	—do—		Plant was recommissioned in June 1974.	February 1963
—do—	—do—			September 1962

(Continued)

II. PRODUCTION OF PHOSPHATIC

Name of factory	Sector	Nutrient			End-Product		
		Capacity t.p.y.	Production 1974-75 (tonnes)	% capacity utilisation	Product	Capacity t.p.y.	Production 1974-75 (tonnes)

A. FACTORIES IN

37. Shaw Wallace and Co. Avadi (Tamil Nadu)	Private	12,180	12,292	101%	SSP	75,530	76,825
38. West India Chemicals Loni-Kalbhori (Maharashtra)	Private	5,360	4,396	82%	SSP	33,530	27,472
39. Western Chemical Industries, Bombay (Maharashtra)	Private	540	486	90%	SSP	3,350	3,036
III. Pelofos							
40. Orissa Fertilizers and Chemicals, Rourkela (Orissa)	Private	7,600	2,205	29%	Pelofos	45,000	12,252

	Public	294,730
TOTAL (Capacity) :	Private	456,910
	Cooperative	127,000
	Capacity	: 878,640
A. GRAND TOTAL :	Production	: 331,282
	Capacity utilisation	: 59%

FERTILISERS (AS ON 1.12.1975) (Continued)

Principal raw material/feedstock	Process/Licences, etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
PRODUCTION (P₂O₅) (Concluded)				
Phosphate rock ; Sulphur	Acidulation of rock with H ₂ SO ₄			April 1967
—do—	—do—		Original capacity at Mundhwa—1750 t.p.y. P ₂ O ₅ . Shifted plant to Loni-Kalbhori—5360 t.p.y. P ₂ O ₅ . Factory remained closed from June 1970 to July 1972 due to change in management.	Original—December 1950 Shifting site & reopening—June 1967
—do—	—do—			July 1948
Phosphate rock ; H ₂ SO ₄ ; 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 ₂ O ₅ and 5% w.s. P ₂ O ₅ . Financial outlay was Rs. 7.5 million with free foreign exchange—Rs. 1 million.	June 25, 1973

(Continued)

II. PRODUCTION OF PHOSPHATIC

Name of the factory	Sector	Nutrient	End-Product	
		Capacity t.p.y.	Product	Capacity t.p.y.

B. PROJECTS UNDER

1. Fertilisers and Chemicals Travancore, Ambelamedu (Kerala) (Cochin-Phase II) Expansion Plan : (Total after expansion :	Public	114,000 114,000	NP/NPK fertilisers (17-17-17) (28-28-0) Cryolite	485,000 7,500
2. Fertilizer Corporation of India, a. Unit : Haldia (West Bengal)	Public	75,000	Nitrophosphate (20-20-0) Methanol	375,000 41,250
b. Unit : Sindri (Bihar) (Rationalisation)		156,000	TSP	340,000
c. Unit : Trombay (Maharashtra) (Debottlenecking) Expansion plan : (Total after expansion		18,000 54,000	Nitrophosphate (20-20-0)	90,000

FERTILISER (AS ON 1.12.1975) (Continued)

Principal raw material/Feed stock	Process/Licences, etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
Imported NH ₃ ; phosphate rock ; sulphur	Chemiebau for H ₂ SO ₄ ; Prayon for H ₃ PO ₄ ; DPG/Wellman Lord for NP/NPK fertilisers	FEDO ; Chemiebau ; Prayon ; DPG	World Bank (IDA) credit of \$ 20 million to meet the FE cost of H ₂ SO ₄ (1000 tpd), H ₃ PO ₄ (350 tpd) and NP/NPK (1700 tpd) fertiliser plants would be made available. Implementation of the project commenced in June 1974.	December 1976
Fuel oil ; phosphate rock ; sulphur	FCl for H ₂ SO ₄ ; Nissan for H ₃ PO ₄ ; Stamicarbon for NPK ; Topsoe for methanol	P & D ; Lurgi ; Montedison ; Stamicarbon ; Heurtey ; Nissan ; Topsoe	Implementation of the project commenced in Sept. 1972. Licence agreement for process know-how and contracts for design & supply of equipment/machinery have since been concluded.	December 1977
Pyrites ; phosphate rock ; sulphur	Prayon process for H ₃ PO ₄	P & D ; FEDO ; Techno Export.	Implementation of the project commenced in February 1969. H ₂ SO ₄ (880 tpd) will be produced from pyrites from Amjhore. Acid will be used to acidulate phosphate rock to produce H ₃ PO ₄ for the production of TSP. The by-product gypsum from H ₃ PO ₄ plant will replace the natural gypsum currently used for the production of A.S. Total cost of the project is Rs. 1870 million out of which FE would be Rs. 400 million. Pyrites crushing plant was commissioned in June 1975 and pre-commissioning tests of TSP plant in August 1975. H ₂ SO ₄ and H ₃ PO ₄ plants are expected to be ready by early 1976. IDA (of World Bank) has provided \$ 91 million both for Sindri (Modern) (vide page 18) and Sindri (Rationalisation).	April 1976.
Imported NH ₃ ; Phosphate rock ; sulphur		P & D ; Selas	Project work is being done departmentally by the P & D of FCl. Import of NH ₃ for these would be discontinued as soon as Trombay V goes on stream in December 1978. (See page 24).	October 1976

(Continued)

II. PRODUCTION OF PHOSPHATIC

Name of the factory	Sector	Nutrient	End-Product	
		Capacity t.p.y.	Product	Capacity t.p.y.

B. PROJECTS UNDER

d. <i>Unit : Trombay IV</i> (Maharashtra) Expansion plan : (Total after expansion.		75,000 129,000)	Nitrophosphate (20-20-0)	375,000
3. Hindustan Zinc Debari (Rajasthan) Expansion plan : (Total after expansion :	Public	26,000 38,000)	Phosphoric acid	
4. Madras Fertilizers, Manali (Tamil Nadu) (Debottlenecking) Expansion plan : (Total after expansion :	Public	27,000 112,000)	NPK fertilisers of various grades	
	Public	: 491,000		
TOTAL (Capacity :	Private	: —		
	Cooperative	: —		
B. GRAND TOTAL :	Capacity	: 491,000		

FERTILISERS (AS ON 1.12.1975) (Continued)

Principal raw material/Feed stock	Process/Licences, etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
IMPLEMENTATION (P₂O₅) (Concluded)				
Imported NH ₃ ; Phosphate rock ; sulphur	Uhde for nitrophosphate ; DPG for NHO ₃	P & D ; Stamicarbon ; Uhde ; Bamag	Implementation was taken up in June 1974. Project would be based on bought out/imported NH ₃ for 2-3 years and thereafter, from Trombay V. (See page 24) World Bank would provide Rs. 248 million as FE through IDA both for Trombay "debottle" and Trombay IV.	June 1977
Phosphate rock by-product H ₂ SO ₄ from zinc smelter at Debari	Krebbs process for H ₃ PO ₄	Krebs (India)	Licence was issued in October 1972 originally for TSP. Project has been rephased to manufacture and market only H ₃ PO ₄ as an intermediate.	Early 1977
Naphtha ; phosphoric acid ; potash		Being done departmentally	A third stream of NPK plant is being added in the "debottle-necking." Cost of the project is anticipated at Rs. 110 million with FE component of Rs. 10 million.	June 1976

(Continued)

II. PRODUCTION OF PHOSPHATIC

Name of factory	Sector	Nutrient	End-Product	
		Capacity t.p.y.	Product	Capacity t.p.y.

C. PROJECTS APPROVED IN

1. Fertilizer Corporation of India <i>a. Unit : Paradeep (Orissa)</i>	Public	300,000	NPK fertilisers	
2. Karnataka State Industrial Development Corporation, Mangalore (Karnataka)	Public	125,000	Phosphoric acid	
3. Nagarjuna Fertilisers, Kakinada (Andhra Pradesh)	Private	82,000	NPK fertilisers	450,000

 Public : 425,000

 TOTAL (Capacity) Private : 82,000

 Cooperative : —

 C. GRAND TOTAL : Capacity : 507,000

 Public : 1,210,730

 GRAND TOTAL (A+B+C) Private : 538,910

 Cooperative : 127,000

 Capacity : 1,876,640

FERTILISERS (AS ON 1.12.1975) (Concluded)

Principal raw material/Feed stock	Process/Licences, etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
PRINCIPLE (P₂O₅)				
Fuel oil ; phosphate rock ; sulphur		P & D		December 1980
Phosphate rock ; sulphur			Project has been rephased. Phosphoric acid would be manufactured and marketed as such.	July, 1978
Fuel oil ; phosphate rock ; sulphur			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 Baroda (new plant) to meet part of the FE.	Phase II—1981

NOTES AND ABBREVIATIONS FOR TABLES I AND II

A. Abbreviations for Fertilisers/Fertiliser Raw Materials etc.

ACI	Ammonium chloride (25%N)
APS	Ammonium phosphate sulphate (16-20-0 & 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 ₃ PO ₄	Phosphoric acid
H ₂ SO ₄	Sulphuric acid
MAP	Mono ammonium phosphate
NH ₃	Ammonia
NP/NPK	NP/NPK complex fertilisers of various grades
SSP	Single superphosphate (16% P ₂ O ₅)
TSP	Triple superphosphate (46% P ₂ O ₅)
UAP	Urea ammonium phosphate (28-28-0)

B. Abbreviations for Financial Institutions

CIDA	Canadian International Development Agency
IBRD	International Bank for Reconstruction and Development (of the World Bank)
ICICI	Industrial Credit and 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

Expn.	Expansion
FE	Foreign exchange—shown in parenthesis under "Financial outlay of the project"
FCI	Fertilizer Corporation of India Ltd.
FACT	Fertilisers and Chemicals, Travancore Ltd.
HSL	Hindustan Steel Ltd.
GOI	Government of India
IOC	Indian Oil Corporation Limited
ONGC	Oil and Natural Gas Commission
PPCL	Pyrites, Phosphates and Chemicals Ltd.
tpy	tonnes per year
tpd	tonnes per day
NA	Not Available
()	Ammonia capacity per day.—shown under column "Capacity of nutrient t.p.y."

D. For the Listing of Abbreviations for Processors/Licensors/Contractors etc., refer to INDEX on page 55.

TABLE III : CAPACITY OF NITROGEN (N) ACCORDING TO SOURCES OF FEEDSTOCK
(As on 1. 12. 1975)

Stage of production/ feedstock	(tonnes of nutrient N per annum)								
	Naphtha	Natural gas	Electric power	Coke/ Coke oven gas	Lignite	Imported ammonia	Coal	Fuel oil	TOTAL
I. Factories in production	1,925,000* (73.3)	361,000* (13.8)	80,000 (3.0)	189,080* (7.2)	70,000 (2.7)	(—) (—)	— (—)	— (—)	2,625,080 (100.0)
II. Projects under implementation	215,000 (11.5)	152,000 (8.1)	— (—)	— (—)	— (—)	147,000 (7.8)	456,000 (24.4)	903,000 (48.2)	1,873,000 (100.0)
III. Projects approv- ed in principle	644,000 (35.0)	— (—)	— (—)	— (—)	— (—)	— (—)	228,000 (12.4)	968,000 (52.6)	1,840,000 (100.0)
IV. Projects under consideration	— (—)	— (—)	— (—)	— (—)	— (—)	— (—)	— (—)	228,000 (100.0)	228,000 (100.0)
TOTAL	2,784,000 (42.4)	513,000 (7.8)	80,000 (1.2)	189,080 (2.9)	70,000 (1.1)	147,000 (2.2)	684,000 (10.4)	2,099,000 (32.0)	6,566,080 (100.0)

* In the case of :

- (i) FCI, Sindri (90,000 t p y N) it is assumed 60,000 t p y capacity on Coke; 20,000 t p y capacity on COG; 10,000 t p y capacity on Naphtha
- (ii) FCI, Trombay (81,000 t p y N) it is assumed 72,000 t p y capacity on Naphtha; 9,000 t p y capacity on Refinery gas
- (iii) HSL, Rourkela (120,000 t p y N) it is assumed 50,000 t p y capacity on Naphtha; 70,000 t p y capacity on COG
- (iv) GSFC, Baroda (216,000 t p y N) it is assumed 124,000 t p y capacity on Naphtha; 92,000 t p y capacity on Natural gas

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

TABLE IV : SHARE OF FERTILISER CAPACITY UNDER VARIOUS STAGES OF IMPLEMENTATION—
MATERIALWISE (As on 1. 12. 1975)

(tonnes of nutrient per annum)							
Fertiliser	Nutrient	In production (I)	Under implementation (II)	Approved in principle (III)	Total (I+II+III)	Under consideration (IV)	Total (I+II+III+IV)
1. Ammonium sulphate	N	194,860 (7.4)	— (—)	— (—)	194,860 (3.1)	— (—)	194,860 (3.0)
2. Ammonium sulphate nitrate	N	13,000 (0.5)	— (—)	— (—)	13,000 (0.2)	— (—)	13,000 (0.2)
3. Calcium ammonium nitrate	N	200,000 (7.6)	— (—)	— (—)	200,000 (3.2)	— (—)	200,000 (3.0)
4. Urea	N	1,847,960 (70.5)	1,653,000 (88.3)	1,417,000 (77.0)	4,917,960 (77.6)	228,000 (100.0)	5,145,960 (78.4)
5. Ammonium chloride	N	16,190 (0.6)	— (—)	51,000 (2.8)	67,190 (1.1)	— (—)	67,190 (1.0)
6. Superphosphate	P ₂ O ₅	227,360 (25.9)	— (—)	— (—)	227,360 (12.1)	— (—)	227,360 (12.1)
7. Triple superphosphate	P ₂ O ₅	102,150 (11.6)	156,000 +26,000 @ (37.1)	125,000@ (24.6)	409,150 (21.8)	— (—)	409,150 (21.8)
8. Pelofos	P ₂ O ₅	7,600 (0.9)	— (—)	— (—)	7,600 (0.4)	— (—)	7,600 (0.4)
9. Ammonium phosphate sulphate	N	42,540 (1.6)	— (—)	— (—)	42,540 (0.7)	— (—)	42,540 (0.6)
	P ₂ O ₅	44,600 (5.1)	— (—)	— (—)	44,600 (2.4)	— (—)	44,600 (2.4)
10. Diammonium phosphate	N	24,480 (0.9)	— (—)	— (—)	24,480 (0.4)	— (—)	24,480 (0.4)
	P ₂ O ₅	62,560 (7.1)	— (—)	— (—)	62,560 (3.3)	— (—)	62,560 (3.3)
11. Nitrophosphate	N	36,000 (1.4)	168,000 (9.0)	— (—)	204,000 (3.2)	— (—)	204,000 (3.1)
	P ₂ O ₅	36,000 (4.1)	168,000 (34.2)	— (—)	204,000 (10.9)	— (—)	204,000 (10.9)
12. Urea ammonium phosphate	N	117,800 (4.5)	— (—)	— (—)	117,800 (1.8)	— (—)	117,800 (1.8)
	P ₂ O ₅	145,800 (16.6)	— (—)	— (—)	145,800 (7.8)	— (—)	145,800 (7.8)
13. N. P. K. complex fertilisers	N	132,250 (5.0)	52,000 (2.7)	27,000 (1.5)	211,250 (3.3)	— (—)	211,250 (3.2)
	P ₂ O ₅	252,570 (28.7)	141,000 (28.7)	82,000 (16.2)	475,570 (25.3)	— (—)	475,570 (25.3)
14. Urea and N. P. K. complex fertilisers*	N	— (—)	— (—)	345,000 (18.7)	345,000 (5.4)	— (—)	345,000 (5.3)
	P ₂ O ₅	— (—)	— (—)	300,000 (59.2)	300,000 (16.0)	— (—)	300,000 (16.0)
TOTAL	N	2,625,080 (100%)	1,873,000 (100%)	1,840,000 (100%)	6,338,080 (100%)	228,000 (100%)	6,566,080 (100%)
	P ₂ O ₅	878,640 (100%)	491,000 (100%)	507,000 (100%)	1,876,640 (100%)	— (—)	1,876,640 (100%)

Note : Figure in bracket is the percentage share of the nutrient to the total (vertical) nutrient.

* end - productwise capacity is not yet decided; @ Phosphoric acid as P₂O₅.

**TABLE V : SHARE OF FERTILISER CAPACITY UNDER VARIOUS STAGES OF IMPLEMENTATION –
NUTRIENTWISE AND SECTORWISE
(As on 1. 12. 1975)**

Category	(tonnes of nutrient per annum)							
	N				P ₂ O ₅			
	Public sector	Private sector	Cooperative sector	Total	Public sector	Private sector	Cooperative sector	Total
I. Factories in production	1,135,580 (43.3)	1,274,500 (48.6)	215,000 (8.1)	2,625,080 (100.0)	294,730 (33.5)	456,910 (52.0)	127,000 (14.5)	878,640 (100.0)
II. Projects under implementation	1,873,000 (100.0)	— (—)	— (—)	1,873,000 (100.0)	491,000 (100.0)	— (—)	— (—)	491,000 (100.0)
III. Projects approved in principle	938,000 (51.0)	623,000 (33.8)	279,000 (15.2)	1,840,000 (100.0)	425,000 (83.8)	82,000 (16.2)	— (—)	507,000 (100.0)
• IV. Projects under consideration	— (—)	228,000 (100.0)	— (—)	228,000 (100.0)	— (—)	— (—)	— (—)	— (—)
TOTAL	3,946,580 (60.1)	2,125,500 (32.4)	494,000 (7.5)	6,566,080 (100.0)	1,210,730 (64.5)	538,910 (28.7)	127,000 (6.8)	1,876,640 (100.0)

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

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

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Participants*	Projects
	A
Ansaldo (Italy)	: NLC (Neyveli)
	B
Bamag (West Germany)	: FCI (Nangal); FCI (Trombay IV); HSL (Rourkela); NLC (Neyveli).
Benfield (USA)	: ZAFL (Goa).
Breyar (USA)	: FACT (Alwaye).
	C
Casale (USA)	: GSFC (Baroda).
Catacarb (USA)	: MFL (Manali).
Chemiebau (W 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).
C L E = Crensol Loire Entreprises (France)	: FCI (Haldia).
	D
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)	: HSL (Rourkela).
	E
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).
	F
FEDO = FACT Engineering and Design Organisation (India)	: FACT (Alwaye); FACT (Cochin I); FACT (Cochin II); FCI (Sindri - Rationalisation); HCL (Khetri); MCFC (Thana).
	G
Girdler (USA)	: FCI (Trombay).
Grand Paroisse (France)	: FCI (Nangal).

* As appearing in the text of the Booklet.

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

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Participants	Projects
P&D = Planning & Development (of FCI) Division of the Fertilizer Corporation of India Ltd.	P
PEC = Pottasse et Engrais Chimiques (France)	: FACT (Cochin); FCI (Barauni); FCI (Durgapur); FCI (Gorakhpur); FCI (Gorakhpur Expn.); FCI (Haldia); FCI (Korba); FCI (Namrup); FCI (Namrup Expn.); FCI (Nangal); FCI (Nangal 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); HSL (Rourkela).
PGC = Power Gas Corporation (UK)	: FCI (Trombay).
Pintsch Bamag (West Germany)	: FACT (Alwaye); FACT (Cochin); FCI (Durgapur); FCI (Sindri); GSFC (Baroda); SPIC (Tuticorin); ZACL (Goa).
Polimex (Poland)	: FCI (Nangal); NCJM (Varanasi); NLC (Neyveli).
Prayon (Belgium)	: FCI (Haldia).
St. Gobain (France)	: EID (Ennore); FACT (Alwaye); FACT (Cochin II); FCI (Sindri—Ration); HCL (Khetri).
Selas (USA)	S
Shell (UK)	: FCI (Nangal).
Simon Carves (UK)	: FACT (Alwaye); FCI (Barauni); FCI (Namrup Expn.); FCI (Sindri); FCI (Trombay—Debottle.).
Singmaster and Breyar (USA)	: EID (Ennore); FCI (Gorakhpur); FCI (Gorakhpur Expn.); FCI (Haldia); FCI (Nangal Expn.); FCI (Sindri—Modern.); FCI (Trombay); NFL (Bhatinda); NFL (Panipat).
Snam Progetti (Italy)	: CFL (Vizag); EID (Ennore); FACT (Alwaye); FCI (Sindri).
Solvay (Belgium)	: FACT (Alwaye).
Stamicarbon (Netherlands)	: IFFCO (Phulpur).
Technimont/Montedison (Italy)	: NCJM (Varanasi)
Technip (France)	: FCI (Haldia), FCI (Trombay IV); IFFCO (Kandla), MCFL (Mangalore).
Techno Export (Bulgaria)	T
Techno Export (Czechoslovakia)	: 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).
Texaco (USA)	: GSFC (Baroda).
Topsoe (Denmark)	: FCI (Sindri - Ration).
TEC = Toyo Engineering Corporation (Japan)	: FCI (Ramagundam); FCI (Talcher).
TVA = Tennessee Valley Authority (USA)	: FACT (Alwaye).
	: FCI (Haldia); FCI (Nangal Expn.); FCI (Sindri—Modern.); FCI (Trombay); MFL (Manali); MCFC (Thana); NFL (Bhatinda); NFL (Panipat); SCI (Kota).
	: FCI (Gorakhpur); FCI (Gorakhpur Expn.); GSFC (Baroda); IEL (Kanpur); NFL (Bhatinda); NFL (Panipat); SPIC (Tuticorin); ZACL (Goa).
	: SPIC (Tuticorin).

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Participants	Projects
	U
Uhde (West Germany)	: FCI (Sindri - Modern.); FCI (Trombay IV); HSL (Rourkela); NCJM (Varanasi).
	V
Vetrocoke (Italy)	: FACT (Cochin); FCI (Barauni); FCI (Durgapur); FCI (Namrup Expn.); GSFC (Baroda); NLC (Neyveli); ZACL (Goa).
Vulcan (USA)	: CFL (Vizag).
	W
Wellman Lord/DPG (USA)	: CFL (Vizag); FACT (Cochin II); FCI (Trombay IV).
Winkler (USA)	: NLC (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 Fertilizers Ltd.
FCI — Fertilizer Corporation of India Ltd.	NCJM — New Central Jute Mills Co. Ltd.
GSFC — Gujarat State Fertilizers Co. Ltd.	NFL — National Fertilizers Ltd.
HCL — Hindustan Copper Ltd.	NLC — Neyveli Lignite Corporation Ltd.
HSL — Hindustan Steel Ltd.	OFC — Orissa Fertilisers & Chemicals 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.	ZACL — Zuari Agro Chemicals Ltd.
KSIDC — Karnataka State Industrial Development Corporation Ltd.	