

**FERTILISER PRODUCTION
IN INDIA**
(AS ON 1.9.1980)

**The Fertiliser Association of India
Near Jawaharlal Nehru University
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P R E F A C E

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.

There has been 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 35-40 per cent of our consumption. This is despite the very sharp increase in production and capacity during the last 3-4 years. A large programme of expansion of capacity has already been taken up and plans are being firmed up for further expansion.

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. The first fuel oil based plant (Nangal Expansion) was commissioned in April 1978 and the two coal-based plants (Talcher and Ramagundam) are in the process of being commissioned.

The discovery of oil and natural gas (free and associated) in Bombay High and Bassein structures (off west coast) in 1974 and natural gas in Assam has had a tremendous impact on the type of feedstock to be used in the country in the next generation of plants. The use pattern of these petroleum reserves has been more or less delineated and fertiliser industry is receiving 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 and V of RCFL's complex at Trombay from naphtha to gas. Likewise, to meet the deficit of phosphates, sizeable share of P_2O_5 will come through single superphosphate besides complexes.

Fresh findings of oil and free associated gas in June 1980 in the Godavari basin and in Andaman & Nicobar Islands have opened new vistas for further creating fertiliser capacity based on petroleum derived feedstock.

It will thus be seen that we are passing through exciting 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.

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 September 1980.

Readers may remember that the fourth edition of this publication was brought out in December 1977. That we have had to update it frequently is indicative of the dynamic nature of the Indian fertiliser scene. Moreover, the fact that we have had to bring out its fifth 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.

It will be of interest to mention that as on 1.9.1980, 29 nitrogenous and complex fertiliser plants, 6 by-product ammonium sulphate plants, 3 TSP plants and 40 single superphosphate plants are in operation with an installed capacity totalling 4,586 thousand tonnes of N and 1,333 thousand tonnes of P_2O_5 . This is likely to go up further by early 1982 to about 5,300 and 1,600 thousand tonnes of N & P_2O_5 respectively.

A few words about the presentation of data

A map showing the location of fertiliser factories (as on 1.9.1980) is given on the next page to indicate the geographical coverage of the country by the fertiliser industry.

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

Actual production for each plant in operation both materialwise and nutrientwise, for the last year of normal operation i.e. 1978-79 (April-March) is also provided in the relevant tables.

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.

“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.

Notes and abbreviations appearing in the booklet are explained on page 80. An index to processors/licensees/contractors is appended to highlight their contribution to the Indian fertiliser industry.

New Delhi
October 24, 1980

SATYA NAND
Executive Director
The Fertiliser Association of India

**CAPACITY, RAW MATERIALS, PROCESSES
AND COLLABORATORS OF
NITROGENOUS FERTILISER PROJECTS**

(AS ON 1.9.1980)

I. NITROGENOUS

Name of factory	Sector	Nutrient			End-Products			Principal raw material/ Feedstock
		Capacity, tpy [NH ₃ , tpd]	Production 1978-79 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy [Urea, tpd]	Production 1978-79 (tonnes)	
A. FACTORIES IN								
1. Bokaro Steel, Bokaro (Bihar)	Public	7,480	4,614	62	AS	36,300	22,398	Coke-oven gas (COG); sulphuric acid.
2. Coromandel Fertilisers, Visakhapatnam (Andhra Pradesh)	Private	84,000 [357]	67,017	80	Urea 28-28-0 14-35-14	Nil 251,000 96,500	Nil 234,295 10,102	Naphtha; phosphate rock; sulphur.
3. EID-Parry (India), Ennore (Tamil Nadu)	Private	16,000 [66]	8,095	51	APS 16-20-0 AS	51,480 38,610	50,592 —	Naphtha; phosphate rock; sulphur.

FERTILISERS

Process Licensees, etc.	Engineering Contractors, etc.	Remarks	Financial outlay of the project & (FE) (Rs. million)	Date of commissioning
PRODUCTION (N) (AS ON 1.9.1980)				
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 — Mar. 1977
ICI Kellogg for steam reformation and NH ₃ ; Dorr-Oliver for phosphoric acid; Chemico for sulphuric acid; Wellman Lord for UAP & NPK, TVA (modified).	Lamus: 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. A small quantity of urea (16,500 tpy) was available for direct sale. After expansion (3,000 tpy N) entire urea is being used to manufacture UAP and NPKs. They are installing their own captive power plant of 5 MW.	575 (244)	Urea — Dec. 1967 UAP/NPK — Feb. 68 Expn — Apr. 76 UAP/NPK
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 which is now discontinued. Production of APS is being phased out. Its production is likely to be abandoned in 1981-82 when the unit will change over to the production of methanol and STPP. In Phase I STPP plant would be commissioned. Thereby, production of APS might be reduced. In Phase II, methanol plant would be commissioned.	157 (39)	APS — March 1963 AS (Expn) — Jan. 1968

(Continued)

I. NITROGENOUS

Name of factory	Sector	Nutrient			End-Products			Principal raw material/ Feedstock
		Capacity, tpy [NH ₃ , tpd]	Production 1978-79 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy [Urea, tpd]	Production 1978-79 (tonnes)	
A. FACTORIES IN								
4. Fertilisers and Chemicals, Travancore, Alwaye (Kerala)	Public	82,000 [355]	49,691	62	AS	198,000	137,505	Naphtha; phosphate rock; sulphur; common salt
			+1,378*		APS			
			51,069		20-20-0	49,000	42,673	
					16-20-0	132,000	69,334	
				ACI	24,750	6,953		

5. Fertilisers and Chemicals Travancore, Ambalamedu	Public							
a) Cochin Phase I (Kerala)		152,000 [600]	85,659	56	Urea	330,000 [1,000]	186,216	Naphtha.

*Manufactured at the plant for non-agricultural purposes.

FERTILISERS (Continued)

Process Licensees, etc.	Engineering Contractors, etc.	Remarks	Financial outlay of the project & (FEB) (Rs. million)	Date of commissioning
PRODUCTION (N) (AS ON 1.9.1980) (Continued)				
Texaco gasification of naphtha; ICI for ammonia 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 separation; 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 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 tpd of AS based on FACT know-how for conversion of by-product gypsum. By the time Stage III was completed, the installed capacity reached a level of 92,000 tpy N and 36,200 tpy P ₂ O ₅ (235,000 tpy AS; 181,000 tpy APS; 25,000 tpy ACI). In 1971-72, this was revised to 82,000 tpy N and 36,200 tpy P ₂ O ₅ . Stage IV expansion was 120 tpd steam reforming of naphtha, NH ₃ plant and 150 tpd 20-20-0 grade APS plant. Old APS (16-20-0) plant of 100 tpd was scrapped in 1977. A proposal to set up caprolactum facility with 50,000 tpy capacity at a cost of Rs. 1520 million is under active consideration of the G.O.I. This would provide 200,000 tpy AS as co-product.	50 30 20 120 56 --- 276 (100) ---	Original — June 47 Stage I — Dec. 60 Stage II — Nov. 62 Stage III — Nov. 67 Stage IV — Sept. 71
Steam reforming of naphtha; ICI PGC for reformer; Vetrocoke for CO ₂ removal; Montedison for ammonia and urea.	F (PD) IL; FEDO; Montedison; Power Gas Corpn.	In Phase I, a capacity for 1,000 tpd urea was set up. Phase II for NP; NPK fertilisers commissioned in December 1976.	673 (162)	July 1973

(Continued)

I. NITROGENOUS

Name of factory	Sector	Nutrient			End-Products			Principal raw material/ Feedstock
		Capacity, tpy [NH ₃ , tpd]	Production 1978-79 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy [Urea, tpd]	Production 1978-79 (tonnes)	
A. FACTORIES IN								
5. Fertilisers and Chemicals Travancore, Ambalamedu (Concluded)	Public							
b) Cochin Phase II (Kerala)		40,000 [External supply]	25,747	64	NP/ NPKs 17-17-17 } 28-28-0 } 18-46-0 }	485,000 —	2975 48,815 64,295	Bought out NH ₃ ; phosphate rock; sulphur.
6. Fertilizer Corporation of India	Public							
a) Unit: Gorakhpur (Uttar Pradesh)		131,000 [550]	88,414	67	Urea	284,920 [950]	192,206	Naphtha.
b) Unit: Ramagundam (Andhra Pradesh)		228,000 [900]	—	—	Urea	495,000 [1,500]	—	Coal.

FERTILISERS (Continued)

Process Licensees, etc.	Engineering Contractors, etc.	Remarks	Financial outlay of the project & (FE) (Rs. million)	Date of commissioning
Chemiebau for H ₂ SO ₄ ; DPG; Well- man Lord for NP- NPKs; Prayon for H ₃ PO ₄ ; 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) provided a credit of \$ 20 million to meet the FE cost of plants to produce H ₂ SO ₄ (1,000 tpd), H ₃ PO ₄ (350 tpd) and NP/NPKs (600 tpd) implementation of the project commenced in June 1974 and completed by Dec. 1976. Started manufacturing DAP also from May 1977. Planning to enhance their P ₂ O ₅ capa- city by 64,000 tpy.	565 (180)	Dec. 1976
Shell gasification; Chemico for ammo- nia; TEC for expn. of ammonia plant; Mit- sui Toatsu for Urea.	F (PD) IL; Toyo Engg. Corpn.	World Bank (IDA) assistance of \$ 10 million was provided to meet the foreign exchange cost of the expan- sion project (51,000 N tpy). Captive power plant (25 MW) with the help of World Bank loan under construc- tion is expected to be commissioned in December 1980. Manufacture of NP/NPK fertilisers in Phase II is under consideration.	342 (143) 184 (87)	Original — Jan. 1969 Expn. — Dec. 1975
Koppers for gasifica- tion; Lurgi for gas purification; Mont- edison for NH ₃ and urea.	F (PD) IL; Mont- edison; Koppers; Lurgi.	Licence was issued in February 1971. Implementation of the project started in July 1971. Techno Export of Czechoslovakia have supplied equipment and machi- nery for air separation and nitrogen wash units. Other imported equip- ment are from West Germany and Italy. Out of 3,000 tonnes day coal require- ment 1700 tonnes would be for gasi- fication and production of NH ₃ and the balance for steam generation. It has 3 gasifiers each of capacity 300 tpd NH ₃ . Production of urea with external NH ₃ started in Sept. 1979. Produc- tion of NH ₃ in the plant started from January 1, 1980.	1825 (464)	Trial run — Sept. 79/ Aug. 80 Commercial Production — Oct/Nov. 80

(Continued)

I. NITROGENOUS

Name of factory	Sector	Nutrient			End-Products			Principal raw material/ Feedstock
		Capacity, tpy [NH ₃ , tpd]	Production 1978-79 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy [Urea, tpd]	Production 1978-79 (tonnes)	

A. FACTORIES IN

6. Fertilisers Corporation of India (Continued) c) Unit: Sindri (Bihar)	Public	219,000 [900]	—	—	AS Urea	320,000 330,000 [1,000]	—	Fuel oil; naphtha; gypsum; pyrites.
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I. NITROGENOUS

Name of factory	Sector	Nutrient			End-Products			Principal raw material/ Feedstock
		Capacity, tpy [NH ₃ , tpd]	Production 1978-79 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy [Urea, tpd]	Production 1978-79 (tonnes)	
A. FACTORIES IN								
6. Fertiliser Corp. of India (Concluded)	Public							
d) Unit: Talcher (Orissa)		228,000 [900]	—	—	Urea Heavy Water	495,000 [1,500]	—	Coal,
7. Gujarat State Fertilisers Co., Baroda (Gujarat)	Private	236,000 [500+450] †	165,174 +12,827* <u>178,001</u>	75	Technical grade Urea 46.5% N Urea AS DAP 18-46-0	3,300 364,000 [1,100] 148,000 108,000	NA 241,944 193,152 78,285	Associated/ natural gas; naphtha; phosphate rock; sulphur.

*Manufactured at the plant for non-agricultural purposes.

FERTILISERS (Continued)

Process Licensees, etc.	Engineering Contractors, etc.	Remarks	Financial outlay of the project & (F.E) (Rs. million)	Date of commissioning
PRODUCTION (N) (AS ON 1.9.80) (Continued)				
Koppers for gasification; Lurgi for gas purification; Montedison for NH ₃ and urea.	F(PD) IL; Montedison; Koppers; Lurgi.	Implementation of the project was taken up in July 1971. Techno Export of Czechoslovakia have supplied equipment and machinery for air separation and nitrogen wash units. Other imported equipments are from West Germany and Italy. It has 3 gasifiers each of capacity 300 tpd NH ₃ .	2000 (470)	Trial run — Sept. '79/ Aug. 80 Commercial Production — Oct/Nov. 80
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 knowhow of caprolactum plant.	Toyo Engineering Corpn. for Phase I; Hitachi for Phase II; Hitachi Zosen for Phase III; 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. In phase I, plants for NH ₃ , Urea, AS, DAP, H ₂ SO ₄ , H ₃ PO ₄ were installed with a total capacity of 96,000 tpy N. In Phase II, capacities of NH ₃ and urea plants were enhanced by 264,000 tpy urea (120,000 tpy N). 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. It has now 3 ammonia plants. Two are based on natural gas and the third on naphtha which is being converted to gas based at a cost of Rs. 354 million. Proposal for expansion of caprolactum facility to 41,000 tpy (160,000 tpy AS) is under consideration of the Government of India. It has already taken in hand the debottlenecking programme and an expansion programme is under consideration. †[Stream III of GSFC of 100 tpd of ammonia is not included, which is meant for heavy water plant of BARC.]	630 (320) 337 (92) 350 (NA)	Phase I — May. 1967 Phase II — June '69 Phase III — Aug. '74

(Continued)

I. NITROGENOUS

Name of factory	Sector	Nutrient			End-Products			Principal raw material/ Feedstock
		Capacity, tpy [NH ₃ , tpd]	Production 1978-79 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy [Urea, tpd]	Production 1978-79 (tonnes)	
A. FACTORIES IN								
8. Hindustan Fertilizer Corpn., a) Unit: Barauni (Bihar)	Public	152,000 [600]	53,224 + 25* <u>53,249</u>	35	Urea	330,000 [1,000]	115,704	Naphtha.
b) Unit: Durgapur (West Bengal)		152,000 [600]	37,812	25	Urea	330,000 [1,000]	82,200	Naphtha.
c) Unit: Namrup (Assam)		197,000 [800]	114,169 + 520* <u>114,689</u>	58	AS Urea	100,000 385,000 [1,165]	72,983 215,511	Natural gas; sulphur.
9. Indian Explosives, Panki (Uttar Pradesh)	Private	207,000 [830]	185,347 + 1,727* <u>187,074</u>	90	Urea	450,000 [1,364]	402,928	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
PRODUCTION (N) (AS ON 1.9.1980) (Continued)				
Selas for steam reformer; Vetrocoke for CO ₂ removal; Montedison for ammonia and urea.	F(PD) IL; Montedison.	Plant is similar to that at Durgapur and Cochin. Imported equipment obtained against Italian credit through suppliers. Planning to have their own captive power plant of 16 MW.	923 (240)	Nov. 1976
ICI PGC for steam reformer; Vetrocoke for CO ₂ removal; Montedison for ammonia and urea.	F(PD) IL; FEDO; Montedison; Power Gas Corpn.	The plant having steam driven centrifugal compressor was commissioned on 13.10.1973. Installing their own captive power plant (15 MW) with the help of World Bank loan. Expected to be commissioned in December 1980.	1022 (363)	Oct. 1974
Steam reforming of natural gas; Selas for reformer, ammonia and urea; Montedison for expansion of ammonia and urea plants; Vetrocoke for CO ₂ removal.	Chemico; F(PD) IL; Montedison.	Technimont provided the supplier's credit for expansion (152,000 tpy N). It is proposed to instal another stream of 600 tpd ammonia and urea based on natural gas (vide page 34). It is planning to instal its own captive power plant.	243 (64) 749 (242)	Original -- Jan. 1969 Expn. -- Apr. 1976
ICI for stream reforming and NH ₃ ; Mitsui Toatsu for urea.	ICI; TEC.	The company is a sister concern of ICI (India) Ltd. International Finance Corpn. (of the World Bank) besides others, provided funds to meet the foreign exchange cost. It is a two-stream plant of 100 thousand tpy N each. The proposal for 3rd stream of 100 thousand tonnes of N/annum is under implementation and is expected to be commissioned by mid 1981 (vide page 28). It is proposing to have its own captive power plant of 10 MW.	757 (210)	Dec. 1969 Expn. 1981-82

(Continued)

I. NITROGENOUS

Name of factory	Sector	Nutrient			End-Products			Principal raw material/ Feedstock
		Capacity, tpy [NH ₃ , tpd]	Production 1978-79 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy [Urea, tpd]	Production 1978-79 (tonnes)	

A. FACTORIES IN

10. Indian Farmers Fertiliser Cooperative Unit: a) Kandla & Kalol (Gujarat)	Cooperative	215,000 [910]	231,794	110	Urea	392,000	360,460	Natural gas; phosphoric acid, potash.
			+4,716*		10-26-26	[1,200]	78,600	
			236,510		12-32-16	92,800	484,360	
					14-36-12	189,900	—	
b) Unit: Phulpur (Uttar Pradesh)		228,000 [900]	—	—	Urea	495,000 [1,500]	—	Naphtha.
11. Kothari (Madras) Ennore (Tamil Nadu)	Private	5,000 [External supply]	—	—	Ammonium chloride	20,000	—	Ammonia and common salt.

*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
PRODUCTION (N) (AS ON 1.9.80) (Continued)				
M.W. Kellogg for steam reforming and NH ₃ ; Stamicarbon for urea; Dorr-Oliver for NPK.	M.W. Kellogg & Co.; H&G Dorr-Oliver.	Cooperatives of most states in the country hold equity shares in the company. Foreign exchange requirement of Rs. 250 million met through Rs. 112 million loan from the US AID and another Rs. 138 million loan from the UK INDIA Mixed Project Loan. NH ₃ and urea are manufactured at Kalol & NPK fertilisers at Kandla presently with imported H ₃ PO ₄ and NH ₃ from Kalol. "Debottle necking" programme costing Rs. 40 million has augmented production of NPKs. In the long term it is the intention to have their own H ₃ PO ₄ plant with a capacity of 120,000 tpy of P ₂ O ₅ (Rs. 380 million) but no firm date has yet been set. Presently, H ₃ PO ₄ manufactured at HZL, Debari (vide page 54) is replacing a part of their import requirement for H ₃ PO ₄ . IFFCO has floated a new company KRIBHCO which has been entrusted with the setting up of a ammonia/urea plant at Hazira near Surat (Gujarat) based on natural gas from Bassein. (vide page 30)	976 (270)	NH ₃ Kalol — Nov. 74 NPKs Kandla — Nov. 74 Urea Kalol — Jan. 75
Kellogg for Snamprogetti urea.	NH ₃ ; Kellogg; Snamprogetti.	Construction started in 1976. Pre-commissioning tests started in August 1979. IBRD have financed the entire FE component upto \$ 110 million. Balance Rs. 696 million through shares by Cooperatives, GOI & IFFCO's retained profits.	1700 (980)	Trial run — August 1979/August 1980 Commercial Production — Oct. 1980
		Industrial licence issued in May 1976. NH ₃ from external source. Production of caustic soda commenced in February 1979 & that of A.Cl in May 1979.	N.A.	A.Cl — May 1979

(Continued)

I. NITROGENOUS

Name of factory	Sector	Nutrient			End-Products			Principal raw material/ Feedstock
		Capacity, tpy [NH ₃ , tpd]	Production 1978-79 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy [Urea, tpd]	Production 1978-79 (tonnes)	
A. FACTORIES IN								
12. Madras Fertilisers, Manali (Tamil Nadu)	Public	176,000 [750]	162,026	92	Urea	210,000	144,837	Naphtha; H ₃ PO ₄ ; potash.
			+ 452*		17-17-17	90,600	469,244	
			-----		14-28-14	72,500	42,143	
			162,478		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.	27,964	
-----	18-46-0	N.A.	16,769					
13. Mangalore Chemicals & Fertilisers, Mangalore (Karnataka)	Private	156,000 [660]	121,136	78	Urea	340,000 [1,000]	263,339	Naphtha.
			-----		-----	-----		
14. National Fertilisers a) Unit: Bhatinda (Punjab)	Public	235,000 [900]	—	—	Urea	511,500 [1,550]	—	Fuel oil.
			-----		-----	-----		

*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)	Daofte commissioning
PRODUCTION (N) (AS ON 1.9.1980) (Continued)				
Chemico for steam reforming and urea; Catacarb for CO ₂ ; Topsoe for NH ₃ ; Dorr-Oliver for NPKs.	Chemico; Oliver.	Dorr- Capacity of the plant is 190,000 tonnes of N out of which 164,000 tonnes N is used up to produce urea and two streams of NPK fertilisers. Third stream of NPK was commissioned in October 1976 (12,000 tpy N). Presently, H ₃ PO ₄ to manufacture NPK fertilisers is imported.	750 (260) 110 (NA)	Oct. 1971 III stream — Oct. 1976
ICI, H&G for steam reforming; ICI for NH ₃ ; Stamicarbon for urea.	H & G.	Terms of collaboration with UK were finalised in December 1971 under which ODA of UK has given 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 Corpn. and Rallis India, Bombay. In phase I, they have a plan to increase the capacity of N by 25,000 tpy by April 1984. Work is expected to start in July 1981. Under Phase II, P ₂ O ₅ capacity to the extent of 64,000 tpy is proposed to be created. (vide page 72) Installation of a captive power plant is under consideration.	749 (230)	March 1976
Partial oxidation of fuel oil by Shell gasification process; Lurgi for gas purification; Topsoe for NH ₃ synthesis; Mitsui Toatsu total recycle process for urea.	Toyo Engg. Corpn. (TEC) for basic process design; EIL licensees for detailed engg. For construction, complementary engineering and procurement.	Veba Chemie were consultants to both Bhatinda and Panipat projects. Bhatinda project was taken up for implementation in September 1974 when contracts of TEC and EIL became operative. Export-Import Bank of Japan provided a part of the foreign exchange to the extent of 11 million Yen. In addition, IBRD gave a loan of \$ 170 million to be shared jointly by Bhatinda, Panipat, GNVFC Bharuch (new plant) and Kakinada projects to meet the FE cost.	1877 (650)	Trial run — May 1979 Commercial Production — October 1979

(Continued)

I. NITROGENOUS

Name of factory	Sector	Nutrient			End-Products			Principal raw material/ Feedstock
		Capacity, tpy [NH ₃ , tpd]	Production 1978-79 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy [Urea, tpd]	Production 1978-79 (tonnes)	
A. FACTORIES IN								
14. National Fertilisers (Concluded)	Public							
b) <i>Unit: Nangal</i> (Punjab)		232,000 [900]	127,364 +1,263*	55	CAN (25% N)	320,000 [1,000]	282,505	Power for electrolytic H ₂ ; limestone; fuel oil.
			128,627		Urea	330,000 [1,000]	123,343	
c) <i>Unit: Panipat</i> (Haryana)		235,000 [900]	—	—	Urea Flaked sulphur	511,500 [1,550] 20 tpd	—	Fuel oil.
15. New Central Jute Mills Co., Varanasi (Uttar Pradesh)	Private	10,000 [40]	2,729	27	A;Cl	40,000	10,917	Coke; Common salt.
16. Neyveli Lignite Corp., Neyveli (Tamil Nadu)	Public	70,000 [285]	37,934	54	Urea	154,000 [450]	82,465	Fuel oil.

*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
PRODUCTION (N) (AS ON 1.9.1980) (Continued)				
De Nora for electro- lysis of water; Grand Paroisse for ammonia; Bamag for nitric acid; St. Gobain for CAN; Linde for heavy water.	St. Gobain, De Nora; English Elec- tric; Linde; Pintsch Bamag.	Original plant (80,000 tpy N) com- missioned in April 1961 required 164 MW of power. Grade of CAN changed to 25% N from 20.8.67.	Original 345 (140)	Original April 1961 Heavy Water — Aug. 1962
Partial oxidation of fuel oil by Shell gasi- fication process; Lurgi for gas purification; Topsoe for NH ₃ ; Montedison for urea.	F (PD) IL; Mont- edison; Uhde; Lurgi; Topsoe.	Expansion project (152,000 tpy N) was commenced in March 1973 under which new ammonia (900 tpd) and urea (1000 tpd) plants based on fuel oil were commissioned in January 1978. Power consumption of the entire plant has now come down to 36 MW. Production of entire am- monia is now based on fuel oil, out of which 300 tpd NH ₃ is used for manufacturing CAN (25% N) in the original plant and the balance (600 tpd NH ₃) for urea in the new plant.	Expn. — 1337 (510)	Expn. — April 1978
		The electrolyser in the original NH ₃ plant (307 tpd) may be gradually scrapped.		
		FE component for the expansion project was met through IDA of the World Bank.		
Same as for NFL Bhatinda.	Same as for NFL Bhatinda.	Same as for NFL Bhatinda. Construction started in March 1975.	1820 (550)	Trial run — Jan. 1979 Commercial Production Oct. 1979
Modified Solvay pro- cess	Pintsch Uhde.	Bamag; Equal quantity of soda ash is pro- duced as co-product.	45 (N.A.)	Nov. 1959
Winkler gasification process; Vetrocoke for CO ₂ removal; Bamag for NH ₃ ; Linde for oxygen; Montedison for urea; Shell gasifi- cation of fueloil; Ben- field for CO ₂ removal.	Ansaldo; Pintsch Bamag; Linde; Montedison; F(PD); IL.	Plant was originally based on lignite. From August 1979 it has switched over to fuel oil as a feedstock to re- place lignite. F(PD) IL has installed on a turn-key basis plant for fuel oil gasification. Investment was Rs. 170 million out of which World Bank provided Rs. 60 million under IDA.	404 (180) 170 (60)	March 1966 Switch over — August 1979

(Continued)

Public	165,000 [350]	110,724 +12,327*	75	Urea	99,000 [300]	98,253	Natural refinery gas; phosphate rock; potash; sulphur; diammonium phosphate; imported NH ₃ (for additional capacity arising out of debottlenecking and Trombay IV).
		<u>123,051</u>		Nitro-phosphate	555,000	4,279	
				20-20-0		265,630	
				15-15-15			
				APSN 20-20-0		124,139	
				Methanol	30,000	N.A.	

vate	152,000 [600]	115,333	76	Urea	330,000 [1,000]	250,723	Naphtha.
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t for non-agricultural purposes.

FERTILISERS (Continued)

Process Licensees, etc.	Engineering/ Contractors, etc.	Remarks	Financial outlay of the project & (FE) (Rs. million)	Date of commissioning
PRODUCTION (N) (AS ON 1.9.80) (Continued)				
Shell gasification; Chemico for ammonia & urea; Girdler for reformer; Topsoe synthesis for methanol; PEC process modified by F(PD) IL for nitrophosphate. Nissan dihydrate demihydrate for phosphoric acid; Uhde for nitrophosphate; DPG for HNO ₃ ; DSM for process design.	F(PD) IL; Sela; Chemico; C&I Stamicarbon; Pintsch Bamag; Uhde.	Originally in 1965-66, the plant had a capacity of 90,000 tpy N and 45,000 tpy P ₂ O ₅ (urea 99,000 tpy and nitrophosphate 270,000 tpy). In 1969-70, the capacity was revised to 81,000 tpy N and 36,000 tpy P ₂ O ₅ (Urea 99,000 tpy and nitrophosphate 180,000 tpy). Under the First USAID loan, nitrophosphate grade was changed from 16-13-0 to 20-20-0 in 1967. Started production of "Suphala" of grade 15-15-15 in 1970-71, "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 ₂ PO ₄ plant in June 1975. Implementation of Trombay IV for 75,000 tpy N (375,000 tpy nitrophosphate) was taken up in June 1974 based on external supply of NH ₃ . HNO ₃ plant under Trombay IV (750 tpd) was commissioned in April 1978. Import of NH ₃ for debottlenecking (32,000 tpy N) as well as for Trombay IV will be discontinued as soon as Trombay V goes on stream (Vide Page 32). RCFL Trombay has installed its own captive power plant (18 MW) which was commissioned in March 1979. RCFL has taken up installation of a new project with a total capacity of 2,700 tpd NH ₃ near Thal Vaishet based on associated gas from Bombay High Bassein.	456 (215) 763 (300)	Urea — Oct 65 Nitrophosphate — November 1965. Debottlenecking — July 1976 Methanol — Nov. 1966. Trombay IV — July 1978. Switch over to Natural gas — 1979.
Topsoe for steam reformation and NH ₃ ; Stamicarbon for urea.	Mitsubishi; yoda.	Chi- The original project (110,000 tpy N) was financed from suppliers credits and other sources (Rs. 270 million). Expansion under Phase I (42,000 tpy N and 92,000 tpy urea) was financed from Yen credit (Rs. 87 million).	440 (NA)	Feb. 1969 Dec. 1974 Expn. —

(Continued)

I. NITROGENOUS

Name of factory	Sector	Nutrient			End-Products			Principal raw material/ Feedstock
		Capacity, tpy [NH ₃ , tpd]	Production 1978-79 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy [Urea, tpd]	Production 1978-79 (tonnes)	
A. FACTORIES IN								
19. Southern Petrochemical Industries Corporation, Tuticorin (Tamil Nadu)	Private	258,000 [1,100]	144,194	56	Urea	512,000 [1,550]	286,216	Naphtha; phosphate rock; sulphur.
					DAP	28,000	69,641	
					10-26-26	128,000	—	
					15-15-15	32,000	—	
					28-28-0	NA	—	
					Heavy Water	72	NA	
20. Steel Authority of India	Public							
a) Unit: Bilai (Madhya Pradesh)		6,720	7,316	109	AS	32,600	35,515	Coke oven gas; Sulphuric acid.
b) (Indian Iron & Steel Co) Unit: Burnpur-Kulti (West Bengal)		4,740	1,504	32	AS	23,000	7,301	COG; H ₂ SO ₄ .
c) Unit: Durgapur (West Bengal)		4,370	2,418	55	AS	21,200	10,736	-do-
d) Unit: Rourkela (Orissa)		5,770	3,210	55	AS	28,200	15,541	Coke oven gas; Sulphuric acid.
e) Unit: Rourkela (Orissa) (Fertiliser Plant)		120,000 [450]	69,072 +11,679*	67	CAN (25% N)	480,000	276,286	Coke oven gas; Naphtha; Limestone.
			80,751					

*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
PRODUCTION (N) (AS ON 1.9.1980) (Continued)				
ICI/PGC for steam reforming; Vetrocoke for CO ₂ removal. Mitsui Toatsu for urea and DAP; TVA process for NPKs, Nissan process for H ₂ SO ₄ and H ₂ PO ₄ .	PGC for NH ₃ ; TEC for DAP; Hitachi Zosen for urea.	Implementation of the project commenced in February 1972. UK & Yen credit arranged for foreign exchange requirement. Foreign exchange for NH ₃ plant was arranged against UK/INDIA Mixed Project Loan and for 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. Planning to expand NP,NPK capacity (vide page 74)	1051 (278)	Urea — June 1975 NP/NPK — Nov. 1976 Heavy Water — July 1978
Neutralisation of NH ₃	—	AS is a by-product from coke oven plant. Originally, it had a capacity of 16,300 tpy AS which was enhanced to 32,600 tpy in December 1959. II Expansion to 53,400 tpy AS is expected by June 1983.	NA	Original — 1955 Ist Expn. — Dec. 1959 IInd Expn. — June 1983
-do-	—	AS is a by-product from coke oven plant.	NA	1947
-do-	—	-do-	NA	April 1960
-do-	Koppers; GmbH.	-do-	NA	March 1967
Linde for gasification of COG; Otto for Naphtha reforming; Uhde for NH ₃ ; F(PD) IL for nitric acid and CAN.	Pintsch Bamag; Uhde; Otto; Linde; Stamicarbon; F(PD) IL.	Originally based on C.O.G. 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. IInd naphtha reformer was erected to reduce dependence on COG. After completion, capacity based on COG has been reduced from 70,000 to 21,000 tpy N.	275 (NA)	Dec. 1962 Expn. — Aug. 1969 IInd Naphtha reformer — 1978-79

(Continued)

I. NITROGENOUS

Name of factory	Sector	Nutrient			End-Products			Principal raw material/ Feedstock	
		Capacity, tpy [NH ₃ , tpd]	Production 1978-79 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy [Urea, tpd]	Production 1978-79 (tonnes)		
A. FACTORIES IN									
21. Tata Iron & Steel Co., Jamshedpur (Bihar)	Private	4,760	2,583	54	AS	23,100	12,541	COG; H ₂ SO ₄ .	
22. Zuari Agro Chemicals, San Coale (Goa)	Private	171,000 [660]	148,638	87	Urea UAP 28-28-0 DAP 18-46-0 NPK 19-19-19 14-35-14	340,000 150,000	259,820 55,138 66,503 7,910	Naphtha; H ₃ PO ₄ ; Potash.	
		Capacity			Production				
		Public	2,843,080	(62%)	1,008,541			(45%)	
TOTAL (tonnes)		Private	1,299,760	(28%)	974,860			(44%)	
		Cooperative	443,000	(10%)	236,510			(11%)	
		Capacity				4,585,840			
A. GRAND TOTAL (tonnes)		Production				2,219,911@			(46914)
		Capacity utilisation				71%			

() = Percentage share to total capacity/production

@ The figure includes 46,914 tonnes of N meant 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) (AS ON 1.9.1980) (Concluded)

Neutralisation of NH ₃ .	—	AS is a by-product from coke oven plant.	NA	1933
ICI PGC for steam reformation; Vetrocoke for CO ₂ removal; TEC for NH ₃ and NPK; Mitsui Toatsu for urea.	ICI PGC; Mitsui Toatsu.	TEC Plant was erected on a turnkey basis by TEC. Trial runs for NPK fertilisers based on imported H ₃ PO ₄ were carried out during March 1975. Changed over from Vetrocoke to Benfield for CO ₂ removal. International Finance Corporation (World Bank) provided funds besides USA to meet the foreign exchange cost. Also planning to double the NP/NPKs capacity (vide page 74) Debottlenecking programme for NH ₃ plant is already in progress.	595 (262)	Urea — May 1973 NPKs — March 1975

A. TOTAL (Finance outlay) (Rs. million)	Public	19,436 (70%)
	Private	5,686 (20%)
	Cooperative	2,676 (10%)
	Total	27,798

(Continued)

I. NITROGENOUS

Name of factory	Sector	Nutrient	End-Products		Principal raw material/ Feedstock
		Capacity, tpy [NH ₃ , tpd]	Product	Capacity, tpy [Urea, tpd]	
B. PROJECTS UNDER					
1. Gujarat Narmada Valley Fertilizers Co. Bharuch (Gujarat)	Private	273,000 [1,350]	Urea	594,000 [1,800]	Fuel oil.
2. Hindustan Fertilizer Corporation, Unit: Haldia (West Bengal)	Public	152,000 [600]	Urea Nitrophosphate 20-20-0 Soda Ash Methanol	167,400 375,000 60,000 41,250	Fuel oil; phosphate rock; sulphur.
3. Indian Explosives, Panki (Uttar Pradesh)	Private Total after Expansion	100,000 [415] 307,000 [1,245]	Urea Urea	225,000 [682] 675,000 [2,046]	Naphtha.
4. Indian Farmers Fertiliser Cooperative Unit: Kandla (Gujarat)	Coop. Total after Expansion	50,000 [External supply] 265,000 [910]	NP/NPKs NP/NPKs	500,000 1000,000	Imported NH ₃ and Phos. acid.

FERTILISERS (Continued)

Process/ Licensees, etc.	Engineering/ Contractors, etc.	Remarks	Financial outlay of the project & (FE) (Rs. million)	Date of commissioning
IMPLEMENTATION (N) (AS ON 1.9.1980)				
Texaco for gasification; Rectisol process for sulphur removal and CO ₂ recovery; Topsoe for NH ₃ synthesis; Snamprogetti for urea.	GSFC; Linde; Snamprogetti; Topsoe.	GSFC and Gujarat Government are the promoters. Industrial licence was issued in March 1977. NH ₃ capacity will be 1,350 tpd out of which 950 tpd would be used to manufacture 1600 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, Bharuch to meet part of its foreign exchange cost. IDBI is financing rupee term loan of Rs. 600 million and underwriting Rs. 120 million equity share. The company GNVFC has approached the Government of India for expansion of capacity based on natural gas from Bombay High. Feasibility report is under preparation.	2,750 (830)	September 1981
Shell gasification; Lurgi for gas purification; Montedison for NH ₃ and urea; Stamicarbon for NPK; F (PD) IL for H ₂ SO ₄ ; Nissan for H ₃ PO ₄ ; Topsoe for methanol; CLE for soda ash.	F (PD) IL; Lurgi; Montedison; Stamicarbon; Heurtey; Nissan; Polimex; Topsoe; CLE.	Licence was issued in December 1971. Implementation of the project commenced in September 1972. Power requirement is 25 MW. Planning to have their own captive power plant.	2,600 (430)	March/ April 1981
TEC for NH ₃ ; Power Gas Corpn. for urea.	Humphreys & Glasgow for NH ₃ ; Power Gas Corpn. for urea.	Licence for expansion was issued in February 1979.	820 (NA)	July 1981
	Construction by Hindustan Dorr-Oliver; Siemens.	Expansion programme would enhance the capacity of NP/NPKs by 4 lakh to 5 lakh tonnes/annum at a cost of Rs. 230 million.	230 (40)	July 1981

(Continued)

I. NITROGENOUS

Name of factory	Sector	Nutrient	End-Products		Principal raw material/ Feedstock
		Capacity, tpy [NH ₃ , tpd]	Product	Capacity, tpy [Urea, tpd]	

B. PROJECTS UNDER

5. Krishak Bharatiya Coop., (2 plants) Unit: Hazira (Gujarat)	Coop.	345,000×2 [1,350×2]	Urea	3×495,000 [3×1,500]	Associated gas from Bombay High.
6. Rashtriya Chemicals & Fertilisers, a) Unit: Thal Vaishet (Maharashtra) (2 plants)	Public	345,000×2 [1,350×2]	Urea	3×495,000 [3×1500]	Associated gas from Bombay High.

FERTILISERS (Continued)

Process Licensees, etc.	Engineering Contractors, etc.	Remarks	Financial outlay of the project & (FE) (Rs. million)	Date of commissioning
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IMPLEMENTATION (N) (AS ON 1.9.1980) (Continued)

Pullman Kellogg for NH ₃ ; Snamprogetti for urea.	Pullman Kellogg; Snamprogetti; F (PD) IL.	Four fertiliser plants identical in capacity of 1350 tpd ammonia and based on natural associated gas from Bombay High were mooted in early 1977 -- two, South of Bombay and the other two, North of Bombay. The two plants South of Bombay are being implemented by RCFL, Bombay, at Thal Vaishet and the other two plants North of Bombay, by KRIBHCO at Hazira (Gujarat) (vide page 30). Hazira plant will consist of 2 × 1350 tpd ammonia and 3 × 1500 tpd urea. The entire project cost would be Rs. 7000 million with World Bank providing assistance of 8150 million. In addition, Japan would provide Rs. 800 million and UK Rs. 700 million to meet the foreign exchange component of Rs. 2700 million. KRIBHCO would finance to the extent of Rs. 1000 million and balance would be obtained through public financing institutions. KRIBHCO expect to commence work on the project by January 1981.	7000 (2700)	Plant I -- Jan. 1985 Plant II -- July 1985
Haldor Topsoe for NH ₃ ; Snamprogetti for urea.	Haldor Topsoe; F (PD) IL; Snamprogetti.	Basic details are the same as given in "Remarks" column of KRIBHCO Hazira (vide page 30). Thal Vaishet plant will consist of two 1350 tpd ammonia plants each and three 1500 tpd urea plants each. Entire project is expected to be completed in about 4 years i.e. October 1984. Total cost of the project at Thal Vaishet is expected to be Rs. 6500 million out of which foreign exchange component would be ₹ 250 million to be provided by the World Bank. In addition, U.K. would give a grant of Rs. 950 million for the purchase of captive power plant to be installed at Thal Vaishet.	6500 (2950)	I Plant -- Oct. 1984 II Plant -- Apr. 1985

(Continued)

I. NITROGENOUS

Name of factory	Sector	Nutrient	End-Products		Principal raw material/ Feedstock
		Capacity, tpy [NH ₃ , tpd]	Product	Capacity, tpy [Urea, tpd]	

B. PROJECTS UNDER

6. Rashtraiya Chemicals & Fertilisers, (Concluded)	Public				
b) <i>Unit: Trombay V</i> (Maharashtra)		152,000 [900]	Urea	330,000 [1,000]	Naphtha or natural gas.
	Total after Expansion	317,000 [1,250]	Urea	429,000 [1,300]	
			Nitrophosphate 20-20-0 15-15-15	555,000	

B. TOTAL (Capacity) (tonnes)	Public	994,000
	Private	373,000
	Cooperative	740,000
	Total	2,107,000

FERTILISERS (Continued)

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

Topsoe for reformation and NH ₃ synthesis; Snamprogetti for urea.	F (PD) IL; Snamprogetti; Topsoe.	Construction started in 1977. 50 per cent of NH ₃ (450 tpd) capacity when commissioned would be used to replace imported NH ₃ at Trombay IV (vide page 22). Balance NH ₃ would be used to manufacture urea at the plant (i.e. 778 urea tpd for Trombay V and balance 222 urea tpd as NH ₃ for Trombay IV). The ammonia plant is designed to use naphtha or natural gas. To start with naphtha will be used but will be replaced later by natural gas available from Bombay High/Bassein.	1700 (435)	July 1981 Switch over — 1981-82
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B. TOTAL (Financial Outlay)	Public	10,800
(Rs. million)	Private	3,570
	Cooperative	7,230
	Total	21,600

(Continued)

I. NITROGENOUS

Name of factory	Sector	Nutrient	End-Products		Principal raw material/ Feedstock
		Capacity, tpy [NH ₃ , tpd]	Product	Capacity, tpy [Urea, tpd]	
C. PROJECTS APPROVED IN					
1. Bihar Caustic & Chemicals, Unit : Palamau (Bihar)	Private	6,500 [External sources]	Ammonium Chloride	26,000	Ammonia; Common salt.
2. Deepak Fertiliser & Products, Unit : Talaja (Maharashtra)	Private	66,000 [273]	N.A.	N.A.	Associated gas from Bombay High.
3. Fertilizer Corporation of India, Unit : Korba (Madhya Pradesh)	Public	228,000 [900]	Urea	495,000 [1,500]	Coal.
4. Hindustan Fertilizer Corporation, Unit : Namrup (Assam)	Public	152,000 [600]	Urea	330,000 [1,000]	Associated gas from OIL and ONGC oil fields.
	Total after Expansion	349,000 [1,400]	AS Urea	100,000 715,000 [2,170]	

FERTILISERS (Continued)

Process/ Licensees, etc.	Engineering/ Contractors, etc.	Remarks	Financial outlay of the project & (FE) (Rs. million)	Date of commissioning
PRINCIPLE (N) (AS ON 1.9.80) (Continued)				
		Letter of intent has been issued. Would be using Chlorine from their main caustic soda plant. Ammonia from external sources.	10 (NA)	1982-83
Gasification by Selas; Steam reforming; CO ₂ removal by UCAR — MEA & NH ₃ synthesis by Topsoc.		Letter of intent issued.	120 (N.A.)	July 1982
Koppers for gasification Lurgi for gas purification; Montedison for NH ₃ and urea.	F (PD) IL; 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. Though civil work had started as far back as December 1971 and Rs. 220 million already spent on the project, work has been rephased. Once the results of Ramagundam and Talcher are known, the implementation of Korba project may be hastened up.	1500 (400) (Under revision)	April 1986
Haldor Topsoc; Benfield Corpn.	F (PD) IL.	0.5 mm ³ pd of associated gas is anticipated to be made available to the project from ONGC & OIL oil fields. Capacity of ammonia plant may be increased from 600 to 900 tpd depending upon the quantum of gas available. The project is currently being processed for final investment approval. Land has been acquired. The plant has been permitted to have its own captive power plant.	1724 (600)	November 1983

(Continued)

I. NITROGENOUS

Name of factory	Sector	Nutrient	End-Products		Principal raw material/ Feedstock
		Capacity, tpy [NH ₃ , tpd]	Product	Capacity, tpy [Urea, tpd]	

C. PROJECTS APPROVED IN

5. Nagarjuna Fertilisers & Chemicals, Kakinada (A.P.)	Private	228,000 [900]	Urea NPKs	437,000 450,000	Fuel oil; phosphate rock; sulphur.
6. Paradeep Project, Paradeep (Orissa)	Public	120,000 [450]	NP/NPKs 18-46-0 19-19-19 14-28-14		Imported NH ₃ ; phosphate rock; sulphur.
7. Polymer Corporation, (Gujarat)	Private	2,100 [External supply]	Ammonium sulphate	10,000	Ammonia and sulphuric acid
C. TOTAL (Capacity) (tonnes)	Public	500,900	GRAND TOTAL(Capacity) (A + B + C) (tonnes)	Public	4,337,080
	Private	302,600		Private	1,975,360
	Cooperative	—		Cooperative	1,183,000
	TOTAL	802,600		Total	7,495,440

FERTILISERS (Continued)

Process/ Licensees, etc.	Engineering/ Contractors, etc.	Remarks	Financial outlay of the project & (F.E.) (Rs. million)	Date of commissioning	
PRINCIPLE (N) AS ON 1.9.1980 (Concluded)					
Texaco partial oxidation for ammonia; Stamicarbon for urea.	Haldor Topsoe; Foster Wheeler (UK); EIL.	Letter of intent was issued in January 1974 and industrial licence in July 1978 to its original co-promoter Shaw Wallace & Co., Madras alongwith the A.P. Government. In the project, it was proposed to manufacture urea in Phase I and NPKs in Phase II. IBRD had earmarked a loan of \$ 170 million to be shared jointly by Bhatinda, Panipat, Kakinada and GNVFC Bharuch to meet a part of the foreign exchange cost. Birlas have replaced Shaw Wallace & Co. as co-promoters. Negotiations are currently in progress with International Finance Corporation (of the World Bank) and Topsoe (Denmark) for equity participation to the extent of Rs. 60 million. This would raise the total financial outlay from Rs. 2500 million (with f.f.e. component Rs. 700 million) to Rs. 4000 million. The share capital of Nagarjuna Fertilisers would be Rs. 800 million and of promoters Rs. 400 million out of which Rs. 240 million would be from Zuari & their associates and balance Rs. 160 million from the State Government of A.P. Initially, P ₂ O ₅ component would be based on imported H ₃ PO ₄ . Under the revised plan also, urea would be taken up in Phase I and NPKs in Phase II. MFL, Madras have prepared a feasibility report for this project. Details and financial tie-ups are being worked out. Project is anticipated to be completed in two phases each of 60,000 tpy N capacity. P ₂ O ₅ component would be initially based on imported H ₃ PO ₄ . Letter of intent has been issued. 2.1 Would be using waste effluent from their main plant. Ammonia from external sources. (N.A.)	4000 (1000)	Phase I — 1984-85 Phase II — 1986-87 Phase I — January 1984 Phase II — January 1986	
C. Total (Financial Outlay) (Rs. million)	Public Private Cooperative Total	3,224 4,132 — 7,356	Grand Total (Financial Outlay) (A+B+C) (Rs. million)	Public Private Cooperative Total	33,460 13,388 9,906 56,754

(Continued)

I. NITROGENOUS

Name of factory	Sector	Nutrient	End-Products		Principal raw material/ Feedstock
		Capacity, tpy [NH ₃ , tpd]	Product	Capacity, tpy [Urea, tpd]	
C. PROJECTS APPROVED IN					
5. Nagarjuna Fertilisers & Chemicals, Kakinada (A.P.)	Private	228,000 [900]	Urea NPKs	437,000 450,000	Fuel oil; phosphate rock; sulphur.
6. Paradeep Project, Paradeep (Orissa)	Public	120,000 [450]	NP/NPKs 18-46-0 19-19-19 14-28-14		Imported NH ₃ ; phosphate rock; sulphur.
7. Polymer Corporation, (Gujarat)	Private	2,100 [External supply]	Ammonium sulphate	10,000	Ammonia and sulphuric acid
C. TOTAL (Capacity) (tonnes)	Public	500,000	GRAND TOTAL(Capacity) (A + B + C) (tonnes)	Public	4,337,080
	Private	302,600		Private	1,975,360
	Cooperative	—		Cooperative	1,183,000
	TOTAL	802,600		Total	7,495,440

I. NITROGENOUS

Name of factory	Sector	Nutrient	End-Products		Principal raw material/ Feedstock
		Capacity, tpy [NH ₃ , tpd]	Product	Capacity, tpy [Urea, tpd]	

D. PROJECTS UNDER

1. Projects based on Bombay High —					
(i) V Plant		345,000			Associated gas from Bombay High
(ii) VI Plant		345,000			
(iii) VII Plant		345,000			
(iv) VIII Plant		345,000			
(v) IX Plant		345,000			
(vi) X Plant		345,000			
2. West Coast NP/NPK Project		50,000		NP/NPKs	

D. TOTAL (Capacity) (tonnes) 2,120,000

GRAND TOTAL (Capacity) (A + B + C + D) (tonnes)

Public 4,337,030

Private 1,975,360

Cooperative 1,183,000

Total 9,615,440 ∅

FERTILISERS (Concluded)

Process/ Licensees, etc.	Engineering/ Contractors, etc.	Remarks	Financial outlay of the project & (FE) (Rs. million)	Date of commissioning
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CONSIDERATION (N) (AS ON 1.9.80)

		First two plants are being erected at Thal Vaishet (Maharashtra) and the second set of two plants at Hazira (Gujarat). (vide page 30)		1985-86
		On account of adequate and assured supply of associated/natural gas from West Coast, possibilities of putting up additional six plants based on this feedstock are under consideration. Position on end-product pattern, financial outlay and the sectoral allocation would be clear in the near future. Possible locations are one each in M.P. and Rajasthan and the remaining four in U.P./ Punjab/Haryana.		1986-87 1987-88 1988-89 1988-89 1989-90
		It is planned to manufacture NP/ NPK fertilisers at a location to be selected on the West Coast. Might be taken up alongwith 6 projects proposed to be based on Bombay High.		1984-85

Grand Total (Financial Outlay)	Public	33,460
(A+B+C)	Private	13,388
(Rs. million)	Cooperative	9,906
	Total	56,754

Ø Includes projects listed in category 'D'.

In addition, 5 NP/NPKs projects — 3 of 50,000 tpy N each to be commissioned in 1986-87, 1987-88 and 1988-89) and 2 of 120,000 tpy N each (to be commissioned in 1986-87 and (1988-89) — and 1 project of 343,000 tpy N based on surplus naphtha (to be commissioned in 1986-87) totalling to 733,000 tpy N — are under consideration of the Government of India to fill the gap between domestic production and demand of N. Connecting details are being worked out. It is likely that some of these projects might be taken up for implementation alongwith 6 projects proposed to be based on Bombay High.

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

PHOSPHATIC FERTILISER PROJECTS

(AS ON 1.9.1980)

II. PHOSPHATIC

Name of factory	Sector	Nutrient			End-Products		
		Capacity, tpy [P ₂ O ₅ , tpd]	Production 1978-79 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy	Production 1978-79 (tonnes)

I. COMPLEXES

A. FACTORIES IN

1. Coromandel Fertilisers, Visakhapatnam (Andhra Pradesh)	Private	104,000 [350]	69,139	66	UAP 28-28-0 14-35-14	251,000 96,500	234,295 10,102
2. EID-Parry (India), Ennore (Tamil Nadu)	Private	10,300 [32]	10,118	98	APS 16-20-0	51,480	50,592
3. Fertilisers and Chemicals Travancore, Alwaye (Kerala)	Public	36,200 [25 + 100]	22,401	62	APS 20-20-0 16-20-0	49,000 132,000	42,673 69,334
4. Fertilisers and Chemicals Travancore, Ambalamedu (Cochin-Phase II) (Kerala)	Public	114,000 [360]	43,750	38	NP/NPKs 17-17-17 } 28-28-0 } 18-46-0 }	485,000 —	2,975 48,815 64,295

FERTILISERS

Principal raw material/Feedstock	Process Licensees, etc.	Engineering/ Contractors, etc.	Remarks	Date of commissioning
PRODUCTION (P₂O₅) (AS ON 1.9.1980)				
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.	In 1976, P ₂ O ₅ capacity was expanded by 31,000 tpy. After expansion the grade of 14-35-14 was added to its range of products.	Feb. 1968 Expn. — April 1976.
Naphtha; phosphate rock; sulphur.	Prayon process for phosphoric acid; Simon Carves for sulphuric acid.	Simon Carves; Dorr-Oliver for APS.	Planning to abandon production of APS in 1981-82 when the unit will change over to the production of methanol and STPP.	March 1963.
Naphtha; phosphate rock; sulphur.	Monsanto and Chemico for sulphuric acid; Prayon/Dorr-Oliver for phosphoric acid; Dorr-Oliver for APS.	Singmaster and Breyer; Simon Carves; Power Gas Corpn; 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. (First plant to manufacture complex fertilisers in the country). For Stages II and III see page 6) The IV stage expansion comprised 120 tpd steam reforming NH ₃ plant and 150 tpd 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 — I Stage — Dec. 1960 IV Stage — Sept. 1971 H ₃ PO ₄ plant— March 1972.
Bought out NH ₃ ; Phosphate rock; sulphur.	Chemiebau for H ₂ SO ₄ ; UPG/Wellman Lord for NP/NPKs; Prayon for H ₃ PO ₄ ; Power Gas Corpn. for process design.	FEDO; Chemiebau; Prayon; Davy Power Gas.	World Bank (IDA) credit of \$ 20 million met the FE cost of the H ₂ SO ₄ , (1000 tpd), H ₃ PO ₄ (360 tpd) and NP/NPKs (1600 tpd) plants. Implementation of the project commenced in June 1974 500,000 tonnes of liquid ammonia would be imported over a period of 7 years.	Dec. 1976

(Continued)

II. PHOSPHATIC

Name of factory	Sector	Nutrient			End-Products		
		Capacity, tpy [P ₂ O ₅ , tpd]	Production 1978-79 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy	Production 1978-79 (tonnes) e
A. FACTORIES IN							
5. Gujarat State Fertilizers Co., Baroda (Gujarat)	Private	50,000 [165]	36,011	72	DAP 18-46-0	108,000	78,285
6. Indian Farmers Fertiliser Coop., Kāndla (Gujarat)	Coop.	127,000 [External supply]	175,431	138	NPKs 10-26-26 12-32-16 14-36-12	92,800 92,800 189,900	78,600 484,360 —
7. Madras Fertilizers, Manali (Tamil Nadu)	Public	112,000 [External supply]	105,600	94	NPKs, 17-17-17 14-28-14 28-28-0 18-36-0 24-12-12 11-22-22 24-24-0 18-46-0	360,000 90,600 72,500 54,500 54,400 54,400 36,300 N.A. N.A.	— 469,244 42,143 — — — — 27,964 16,769

FERTILISERS

Principal raw material Feedstock	Process/Licensees, etc.	Engineering/ Contractors, etc.	Remarks	Date of commissioning
PRODUCTION (P₂O₅) (AS ON 1.9.1980) (Continued)				
Associated/ Natural gas; naphtha; phosphate rock; sulphur.	Chemico for sulphuric acid and DAP; Nissan for H ₃ PO ₄ .	Toyo Engineering Corpn. for Phase I; Hitachi for Phase II.	Switched over to production of DAP of grade 18-46-0 since January 1969. 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, additional NH ₃ and caprolactum capacities respectively were developed. It has already taken in hand the debottlenecking programme and an expansion programme is under consideration.	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 Kandla presently with imported H ₃ PO ₄ (see page 16). A 'debottlenecking' programme costing Rs. 40 million has been taken up to enhance production of NPKs upto 5 lakh tonnes per annum. It is the long term intention to have their own H ₃ PO ₄ plant with a capacity of 120,000 tpy, details of which have yet to be finalised. To meet a part of import requirement of H ₃ PO ₄ , entire production of H ₃ PO ₄ at HZL, Debari (vide page 54) is being procured. Under expansion programme, NP NPKs capacity would be doubled (vide page 72) at a cost of Rs. 230 million with FE of Rs. 40 million.	Kalol NH ₃ — Nov. 1974 Kandla NPKs — Nov. 1974
Naphtha; potash.	H ₃ PO ₄ ; Dorr-Oliver for NPKs.	Chemico; Dorr-Oliver.	Third stream of NPK commissioned in October 1976 (27,000 tpy P ₂ O ₅). Presently H ₃ PO ₄ is imported to manufacture NPK fertilisers.	Oct. 1971 IIIrd Stream — Oct. 1976

(Continued)

II. PHOSPHATIC

Name of factory	Sector	Nutrient			End-Products		
		Capacity, tpy [P ₂ O ₅ , tpd]	Production 1978-79 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy	Production 1978-79 (tonnes)
A. FACTORIES IN							
8. Rashtriya Chemicals & Fertilisers, Trombay (Maharashtra)	Public	120,000 [200]	65,528	65	Nitrophosphate 15-15-15 20-20-0 APSN 20-20-0	555,000	265,630 4,279 124,139
9. Southern Petrochemical Industries Corpn., Tuticorin (Tamil Nadu)	Private	51,000 [160]	32,035	63	DAP NPKs: 10-26-26 15-15-15 28-28-0	28,000 128,000 32,000 N.A.	69,641 — — —
10. Zuari Agro Chemicals, San Coale (Goa)	Private	42,000 [External supply]	30,842	73	UAP 28-28-0 DAP 18-46-0 NPK 19-19-19 14-35-14	150,000	55,138 — 66,503 7,910

FERTILISERS (Continued)

Principal raw material/Feedstock	Process, Licensees, etc.	Engineering/ Contractors, etc.	Remarks	Date of commissioning
PRODUCTION (P₂O₅) (AS ON 1.9.1980) (Continued)				
Natural refinery gas; phosphate rock; potash; sulphur; Imported NH ₃ (for additional capacity arising from debottlenecking and Trombay IV Expansion).	Nitrophosphate by PEC process modified by F(PD) IL; Nissan Dihydrate / Demihydrate for Phosphoric acid. Uhde for nitrophosphate; DPG for HNO ₃ ; DSM for process design.	F(PD) IL; Chemico; C&I; Selas; Uhde; Stamicarbon; Pintsch Bamag.	Originally in 1965-66 the plant was designed to manufacture 45,000 tpy P ₂ O ₅ . Started production of 'Suphala' of grade 15-15-15 in 1970-71 using DAP. With the commissioning of its own H ₃ PO ₄ 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 ₃ for debottlenecking (18,000 tpy P ₂ O ₅) and Trombay IV (75,000 tpy P ₂ O ₅) will be discontinued as soon as Trombay V goes on stream based on natural/ associated gas from Bombay High (vide page 32)	Nitrophosphate — Nov. 1965 H ₃ PO ₄ plant — June 1975 Debottlenecking — July 1976 Switched over to Natural Gas — 1979 Trombay IV — July 1978.
Naphtha; Phosphate rock; sulphur.	Mitsui-Toatsu for urea and DAP; TVA process for NPK fertilizers; Nissan process for H ₂ SO ₄ and H ₃ PO ₄ .	PGC; Zosen.	TEC/Hitachi DAP plant financed with suppliers credit from TEC (Rs. 150 million). Production of DAP started in April 1977. It has a plan to expand H ₃ PO ₄ plant at a cost of Rs. 150 million to improve operational efficiency of the plant and enhance the capacity of NP/NPKs (vide page 74).	NH ₃ & Urea — June 1975 NP/NPKs — Nov. 1976
Naphtha; potash.	H ₃ PO ₄ ; Mitsui-Toatsu for urea; TEC for NH ₃ and NPK. Based on imported H ₃ PO ₄ .	ICI; PGC; TEC; Mitsui.	International Finance Corporation (World Bank) provided funds besides US Steel to meet foreign exchange cost. Debottlenecking programme is in progress. It has a plan to double the capacity of NP, NPKs (vide page 74).	NH ₃ & Urea — May 1973 NP/NPKs — March 1975

(Continued)

II. PHOSPHATIC

Name of factory	Sector	Nutrient			End-Products		
		Capacity, tpy [P ₂ O ₅ , tpd]	Production 1978-79 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy	Production 1978-79 (tonnes)
A. FACTORIES IN							
II. SUPERPHOSPHATES							
11. Adarsh Chemicals and Fertilisers Udhna (Gujarat)	Private	11,200	9,316	83	SSP	70,000	58,224
12. Andhra Fertilisers Tadepalle (Andhra Pradesh)	Private	6,400	6,018	94	SSP	40,000	37,610
13. Andhra Sugars Tanuku (Andhra Pradesh)	Private	5,360	3,216	60	SSP	33,530	20,101
14. Anil Starch Products Bhavnagar (Gujarat)	Private	5,360	2,146	40	SSP	33,530	13,412
15. Anish Chemicals Ahmedabad (Gujarat)	Private	1,440	571	40	SSP	9,000	3,570
16. Associated Industries (Assam), Chemical Unit of, Chandrapur (Assam)	Public	5,360	1,122	21	SSP	33,530	7,014
17. Bharat Alums & Chemicals, Alwar (Rajasthan)	Private	10,560	—	—	SSP	66,000	—
18. Bharat Fertiliser Industries Bombay (Maharashtra)	Private	3,600	3,372	94	SSP	22,500	21,077
19. Bihar State Superphosphate Factory Sindri Institute (Bihar)	Public	3,760	1,489	40	SSP	23,470	9,308

FERTILISERS (Continued)

Principal raw material/Feedstock	Process/Licensees, etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
PRODUCTION (P₂O₅) (AS ON 1.9.1980) (Continued)				
Phosphate rock; sulphur.	Acidulation of phosphate rock with H ₂ SO ₄ .		SSP is produced in powdered as well as granulated form. Have been issued letter of intent in May 1979 to enhance capacity by 10,560 tpy P ₂ O ₅ by December 1980.	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 ₂ SO ₄ plants at both the places.	Original Project — 1947 At new site — April 1964
Phosphate rock; H ₂ SO ₄ from market.	-do-		Shifted plant from Vapi to Ahmedabad in February 1977.	Nov. 1972 At new site — Feb. 1977
Phosphate rock; sulphur.	Acidulation of phosphate rock with H ₂ SO ₄ .		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 ₂ O ₅ .	August 1963 Recommissioned — March 1975
Phosphate rock; sulphur.	-do-		Licence issued in May 1979. Total cost of the project Rs. 30 million. Already having their own acid plant which has been expanded to 33,000 tpy H ₂ SO ₄ .	Trial run — Jan. 1980 Commercial Production — Mar. 1980
Phosphate rock; waste H ₂ SO ₄ .	-do-		Bulk of the material is used in the granulation of fertilizer mixtures. H ₂ SO ₄ is purchased from the market.	April 1968
Phosphate rock; Sulphur.	-do-		NPK granulation plant is being added.	May 1958

(Continued)

II. PHOSPHATIC

Name of factory	Sector	Nutrient			End-Products		
		Capacity, tpy [P ₂ O ₅ , tpd]	Production 1978-79 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy	Production 1978-79 (tonnes)
A. FACTORIES IN							
20. Chamundi Chemicals and Fertilisers Munirabad (Karnataka)	Private	6,500	—	—	SSP	40,640	—
21. Coimbatore Pioneer Fertilisers Coimbatore (Tamil Nadu)	Private	6,500	3,477	53	SSP	40,640	21,729
22. D.C.M. Chemical Works Delhi (Delhi)	Private	23,040	19,061	83	SSP	144,000	119,130
23. Dharamsi Morarji Chemical Co.	Private						
(a) <i>Unit Ambernath</i> (Maharashtra)		23,420	24,353	104	SSP	146,320	152,209
(b) <i>Unit Ambernath</i> (Maharashtra)		12,150	688	5	TSP (46% P ₂ O ₅)	27,000	1,496
(c) <i>Unit Kumhari</i> (Madhya Pradesh)		15,200	15,261	100	SSP	95,000	95,383
24. E.I.D. — Parry (India) Ranipet (Tamil Nadu)	Private	6,400	6,373	100	SSP	40,000	39,830
25. Fertilisers and Chemicals Travancore Alwaye (Kerala)	Public	7,150	5,392	75	SSP	44,700	33,699

FERTILISERS (Continued)

Principal raw material/Feedstock	Process. Licensees, etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
PRODUCTION (P₂O₅) (AS ON 1.9.1980) (Concluded)				
Phosphate rock; Sulphur.	Acidulation of Phosphate rock with H ₂ SO ₄		Closed since later half of 1970-71.	Nov. 1963
-do-	-do-		Granulation plant was commissioned in April 1970 and SSP in powder and granulated form is produced.	Feb. 1966
-do-	-do-		Superphosphate from bone-meal till June 1948; thereafter, from rockphosphate. SSP is produced in powder and granulated form. Capacity of SSP is being expanded by 72,000 tpy. (vide page 68) at Bhatinda.	Original Project 1946 Expansion — April 1968
-do-	-do-		Licensed capacity was doubled on May 3, 1973.	Original Project 1924 Expansion — May 1973 January 1968
Phosphate rock; H ₃ PO ₄ . From Albright Morarji and Pandit.	Treating phosphate rock with H ₃ PO ₄ .			
Phosphate rock; Sulphur.	Acidulation of phosphate rock with H ₂ SO ₄ .		Licensed capacity was increased from 12,000 to 15,200 tpy P ₂ O ₅ in 1973. Also manufacturing granulated SSP. Expansion of SSP capacity by 66,000 tpy been taken up and is likely to be completed by 1980. (vide page 62)	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-			April 1948

(Continued)

II. PHOSPHATIC

Name of factory	Sector	Nutrient			End-Products		
		Capacity, tpy [P ₂ O ₅ , tpd]	Production 1978-79 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy	Production 1978-79 (tonnes)
A. FACTORIES IN							
26. Fertilizer Corpn. of India Unit-Sindri (Rationalisation) (Bihar)	Public	150,000 [360]	1,447	4	TSP (46% P ₂ O ₅)	340,000 (1,087)	3,146 (Trial run)
27. Gammon Fer-Chems Belagula (Karnataka)	Private	5,280	6,364	121	SSP	33,000	39,778
28. Girraj Fertilisers & Chemicals, Shikohabad (Uttar Pradesh)	Private	1,440	—	—	SSP	9,000	—
29. Hindustan Chemicals, Bhilwara (Rajasthan)	Private	800	—	—	SSP	5,000	—

FERTILISERS (Continued)

Principal raw material/Feedstock	Process/Licensees, etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
PRODUCTION (P₂O₅) (AS ON 1.9.1980) (Continued)				
Pyrites; phosphate rock; sulphur.	Prayon process for H ₃ PO ₄ .	F (PD) IL; FEDO; Techno Export.	<p>Project was approved in 1967. Implementation of the project commenced in February 1969.</p> <p>H₂SO₄ (880 tpd) is produced from pyrites from Amjhore. Acid is used to acidulate phosphate rock to produce H₃PO₄ (360 tpd) for the production of TSP.</p> <p>Pyrites crushing plant was commissioned in June 1975 and precommissioning tests of TSP plant commenced in August 1975. H₂SO₄ plant commissioned in July 1976 and H₃PO₄ plant in September 1977. IDA (of World Bank) has provided \$ 91 million both for Sindri Modernisation (vide page 10) and Sindri Rationalisation. It is now proposed to change one stream of H₂SO₄ to use elemental sulphur whereas the other stream will be based on upgraded pyrites.</p> <p>By-product gypsum from H₃PO₄ plant (119,000 tpy) will replace natural gypsum currently used for the production of AS.</p> <p>Total cost of the project is Rs. 1,870 million out of which FE component is Rs 400 million.</p>	Sept. 1977 Recommissioned April 1979
Phosphate rock; sulphur.	Acidulation of phosphate rock with H ₂ SO ₄ .		SSP plant at Belagula which had been shut for many years was taken up by Gammon Fer-Chems of Bombay and recommissioned in July 1976.	Original — July 1941 Recommissioned — July 1976
Phosphate rock, purchased H ₂ SO ₄ from market.	Acidulation of phosphate rock with H ₂ SO ₄ .		Set up as a small scale Industrial Unit.	July 1979
-do-	-do-		-do-	July 1980

(Continued)

II. PHOSPHATIC

Name of factory	Sector	Nutrient			End-Products		
		Capacity, tpy [P ₂ O ₅ , tpd]	Production 1978-79 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy	Production 1978-79 (tonnes)
A. FACTORIES IN							
30. Hindustan Copper, Khetri, (Rajasthan)	Public	90,000 [210]	12,864	14	SSP TSP (46% P ₂ O ₅)	N.A. 200,000	37,240 15,012
31. Hindustan Fertiliser Industries, Madri, (Rajasthan)	Private	1,320	810	61	SSP	8,250	5,062
32. Hindustan Zinc Debari, Udaipur, (Rajasthan)	Public						
a) SSP Plant		12,000	5,089	42	SSP	75,000	31,806
b) H ₃ PO ₄ Plant		26,000 [87]	—	—	H ₃ PO ₄	—	—
33. Hyderabad Chemicals & Fertilisers, Maula Ali (Andhra Pradesh)	Public	6,700	2,465	37	SSP	41,900	15,405
34. Jayshree Chemicals & Fertilisers, Khardah (W. Bengal)	Private	9,180	8,554	93	SSP	57,360	53,463
35. J.K. Chemical Works, Pandesara (Gujarat)	Private	575	—	—	SSP	3,600	—

FERTILISERS (Continued)

Principal raw material/Feedstock	Process/Licensees, etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
PRODUCTION (P₂O₅) (AS ON 1.9.1980) (Continued)				
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 cost Rs. 162 million with FE component of Rs. 21 million. Total cost of the project is Rs. 230 million. The plant started in October 1976 with SSP and is gradually switching over to TSP as the production of TSP stabilises and the market for TSP picks up.	Oct. 1976
Phosphate rock; purchased H ₂ SO ₄ from HZL, Debari and from the market.	Acidulation of phosphate rock with H ₂ SO ₄ .		Set up as a Small Scale Industrial Unit. A similar SSP plant at Vizag (A.P.) is being set up.	Oct. 1977
Udaipur rock; by-product H ₂ SO ₄ from zinc smelter, Debari.	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.	Oct. 1967
-do-	Krebs process for H ₃ PO ₄ ; Lurgi for H ₂ SO ₄ .	Krebs (India).	Production of SSP is being gradually phased out and available H ₂ SO ₄ is being used to produce phosphoric acid which is being sold to IFFCO for their NPK plant at Kandla. [vide page 44]	H ₃ PO ₄ plant — Feb. 1979
Phosphate rock; sulphur.	Acidulation of phosphate rock with H ₂ SO ₄ .		Plant was shifted from Bellamapalli to Maula Ali in 1963.	Original Project — 1946 Shifted site — 1963
-do-	-do-		Also have a granulation unit. Upgraded capacity from 34,000 tpy to 57,360 tpy SSP in March 1973. Have a plan to further expand the capacity by 66,000 tpy SSP (vide page 70)	Original — Dec. 1961 Expn — Mar. 1973
Phosphate rock; purchased acid.	-do-		Set up as a Small Scale Industrial unit.	Oct. 1979

(Continued)

II. PHOSPHATIC

Name of factory	Sector	Nutrient			End-Products		
		Capacity, tpy [P ₂ O ₅ , tpd]	Production 1978-79 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy	Production 1978-79 (tonnes)
A. FACTORIES IN							
36. Khicha Industries, Udaipur (Rajasthan)	Private	575	—	—	SSP	3,600	—
37. Kothari (Madras), Ennore, (Tamil Nadu)	Private	7,150	5,503	77	SSP	44,700	34,394
38. Krishna Industrial Corporation, Nidadavole (Andhra Pradesh)	Private	8,130	3,159	39	SSP	50,800	19,746
39. Liberty Pesticides & Fertilisers a) Unit: Madri (Rajasthan)	Private	2,640	557	21	SSP	16,500	3,481
b) Visakhapatnam (Andhra Pradesh)		2,000	—	—	SSP	12,500	—
40. Madhuvan Chemicals & Fertilisers, Dabok (Rajasthan)	Private	4,220	N.A.	N.A.	SSP	26,400	N.A.
41. Maharana Khanij Udyog, Madri, (Rajasthan)	Private	800	—	—	SSP	5,000	—
42. Maharashtra Agro Industries Development Corporation, Panvel (Maharashtra)	Public	7,200	3,765	52	SSP	45,000	23,533
43. Noble Chemicals, Ghatkopar (Maharashtra)	Private	480	—	—	SSP	3,000	—

FERTILISERS (Continued)

Principal raw material/Feedstock	Process Licensees, etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
PRODUCTION (P ₂ O ₅) (AS ON 1.9.1980) (Continued)				
Phosphate rock; purchased acid	Acidulation of phosphate rock with H ₂ SO ₄		Set up as a small scale Industrial unit	June 1980
Phosphate rock; sulphur.	-do-			July 1962
-do-	-do-			April 1964
Phosphate rock; purchased H ₂ SO ₄ from HZL, Debari and from the market.	-do-		Set up as a Small Scale Industrial Unit. Expanded its capacity from 13,200 to 16,500 tpy SSP in Oct. 1978.	Original — Feb. 1977 Expn. — Oct. 1978
Phosphate rock; purchased H ₂ SO ₄ from HZL, Vizag and from the market.	-do-		Set up as a Small Scale Industrial Unit. Licensed and installed capacity 2000 tpy and 1000 tpy P ₂ O ₅ respectively.	Sept. 1979
Phosphate rock; purchased H ₂ SO ₄ from HZL, Debari and from the market.	-do-		Unit is set up with a capacity 80 tpd SSP mainly to supply SSP to its granulation plant for granulated mixtures. They have a plan for expansion of SSP capacity for which licence has been issued (vide page 64)	January 1977
Phosphate rock, purchased H ₂ SO ₄ from HZL, Debari and from the market.	-do-		Set up as a Small Scale Industrial Unit.	May 1979
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
-do-	-do-		Set up as a Small Scale Industrial Unit.	April 1980

(Continued)

II. PHOSPHATIC

Name of factory	Sector	Nutrient			End-Products		
		Capacity, tpy [P ₂ O ₅ , tpd]	Production 1978-79 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy	Production 1978-79 (tonnes)
A. FACTORIES IN							
44. Paushak Baroda, (Gujarat)	Private	5,360	4,631	86	SSP	33,530	28,943
45. Phosphate Co., Rishra (West Bengal)	Private	9,760	6,253	64	SSP	61,000	39,079
46. Premier Fertilisers, Cuddalore (Tamil Nadu)	Private	6,500	—	—	SSP	40,640	—
47. Rallis India Magarwara (Uttar Pradesh)	Private	9,750	8,104	83	SSP	60,960	50,650
48. Rama Krishi Rasayan (formerly West India Chemicals) Loni-Kalbhori, (Maharashtra)	Private	5,360	5,463	102	SSP	33,530	34,144
49. Shaw Wallace & Co., Avadi (Tamil Nadu)	Private	12,180	9,696	80	SSP	75,530	60,597
50. Viraj Chemicals, Nandesari (Gujarat)	Private	340	53	15	SSP	2,150	332
51. Western Chemical Industries, Bombay (Maharashtra)	Private	540	270	50	SSP	3,350	1,689

FERTILISERS (Continued)

Principal raw material/Feedstock	Process/Licensees, etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
PRODUCTION (P₂O₅) (AS ON 1.9.1980) (Continued)				
Phosphate rock; sulphur.	Acidulation of rock with H ₂ SO ₄		Proposal to expand and renovate and existing plant is under implementation.	1951
-do-	-do-		Original plant — 5,630 tpy P ₂ O ₅ Expansion — by 4,130 tpy P ₂ O ₅ in 1967. SSP in powder and granulated form is produced.	Original project — 1950 Expn — Dec. 1967
Phosphate rock; sulphur.	-do-		Plant was closed in May 1971 and recommissioned in June 1974. Again closed since August 1976.	Feb. 1963
-do-	-do-	Fisons (UK)	A proposal to expand SSP capacity by 66,000 tpy has been approved. (vide page 64)	Sept. 1962
-do-	-do-		Original capacity at Mundhwa — 1,730 tpy P ₂ O ₅ . Shifted plant to Loni-Kalbhori and added additional capacity of 3630 tpy to make a total of 5,360 tpy. Factory remained closed from June 1970 to July 1972 due to change in the management. There was a further change in the management in April May 1980.	Original — Dec. 1950 Shifted to a new site and recommissioned in June 1967.
-do-	-do-			April 1967
Phosphate rock; purchased sulphuric acid from market.	-do-		Set up as a Small Scale Industrial Unit.	October 1974
Phosphate rock sulphur.	-do-			July 1948

(Continued)

II. PHOSPHATIC

Name of factory	Sector	Nutrient			End-Products		
		Capacity, tpy [P ₂ O ₅ , tpd]	Production 1978-79 (tonnes)	Capacity utilisation (per cent)	Product	Capacity, tpy	Production 1978-79 (tonnes)

A. FACTORIES IN

III. PELOFOS

52. Orissa Fertilisers and Chemicals, Rourkela (Orissa)	Private	7,600	—	—	Pelofos	45,000	—
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IV. H₃PO₄

53. Hindustan Lever Haldia (West Bengal)	Private	19,500	—	—	STPP H ₃ PO ₄ H ₂ SO ₄	—	—
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		Capacity	P ₂ O ₅ Production
TOTAL (tonnes)	Public	690,370 (52%)	270,912 (35%)
	Private	515,910 (39%)	331,414 (43%)
	Cooperative	127,000 (9%)	175,431 (22%)

A. GRAND TOTAL (tonnes) Capacity 1,333,280

Production 777,757

Capacity Utilisation 71%

() = Percentage share to total capacity production

FERTILISERS (Continued)

Principal raw material: Feedstock	Process Licensees, etc.	Engineering/ Contractors, etc.	Remarks	Date of commissioning
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PRODUCTION (P₂O₅) (AS ON 1.9.1980) (Concluded)

Phosphate rock; H ₂ SO ₄ ; basic slag (from SAIL), (Rourkela).	Acidulation of rock and mixing it with basic slag.	Ing. Vladimir G. Logomerac & Yugoslav.	This is the first factory to manufacture a product containing 17% P ₂ O ₅ and 5% w.s. P ₂ O ₅ using basic slag. Financial outlay was Rs. 7.5 million with a free foreign exchange component of Rs. 1 million.	June 1973
Phosphate rock; sulphur.	Acidulation of rock with sulphuric acid.	H ₃ PO ₄ plant by Prayon (Belgium); STPP plant by Albright & Wilson (UK).	The project has been completed in two years to manufacture 30,000 tpy industrial phosphate — STPP (Sodium tripolyphosphate) at a cost of Rs. 220 million with Rs. 21 million foreign exchange component. It will additionally have 54,000 tpy H ₂ SO ₄ and 19,500 tpy H ₃ PO ₄ , 1 lakh tonnes of by-product gypsum for sale to other consumers.	October 1979

(Continued)

II. PHOSPHATIC

Name of factory	Sector	Nutrient	End-Products	
		Capacity, tpy [P ₂ O ₅ , tpd]	Product	Capacity, tpy
B. PROJECTS UNDER				
I. COMPLEXES				
1. Hindustan Fertilizer Corporation, Haldia (West Bengal)	Public	75,000 [100]	Nitrophosphate 20-20-0 Methanol	375,000 41,250
2. Indian Farmers Fertiliser Coop. Kandla (Gujarat)	Coop.	125,000 [External supply]	NP/NPKs	500,000
Total after Expansion		252,000 [External supply]	NP/NPKs	1000,000
II. SUPERPHOSPHATES				
3. Adarsh Chemicals & Fertilisers, Udhna (Gujarat)	Private	10,560	SSP	66,000
Total after expansion		21,760	SSP	136,000
4. Dharamsi Morarji Chemicals Co., Kumhari (M.P.)	Private	10,560	SSP	66,000
Total after expansion		25,760	SSP	161,000

FERTILISERS (Continued)

Principal raw material/Feedstock	Process/Licensees, etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
IMPLEMENTATION (P₂O₅) (AS ON 1.9.1980)				
Fuel oil; phosphate rock; sulphur.	F (PD) IL for H ₂ SO ₄ ; Nissan for H ₃ PO ₄ ; Stamicarbon for NPK; Topsoe for Methanol.	F (PD) IL; Lurgi; Montedison; Stamicarbon; Heurtey; Nissan; Topsoe.	Implementation of the project commenced in Sept. 1972. Erection of plant and machinery is expected to be completed by December 80/January 81.	March/April 1981
Imported NH ₃ and phosphoric acid.		Construction by Hindustan Dorr-Oliver; Siemens.	Expansion programme would enhance the capacity of NP/NPKs from 4 lakhs to 5 lakhs tonnes/annum at a cost of Rs. 230 million.	July 1981
Phosphate sulphur.	rock; Acidulation of phosphate rock with sulphuric acid.		Have been issued letter of intent in May 1979 for expansion of capacity by 33,000 tpy H ₂ SO ₄ and 66,000 tpy SSP. (See projects under 'A')	Dec. 1980
-do-	-do-		Have been issued letter of intent in May 1979 for expansion of capacity by 66,000 tpy SSP. Existing capacity of H ₂ SO ₄ will meet the requirement of acid. (See projects under 'A')	Dec. 1980

(Continued)

II. PHOSPHATIC

Name of factory	Sector	Nutrient	End-Products	
		Capacity, tpy [P ₂ O ₅ , tpd]	Product	Capacity, tpy
B. PROJECTS UNDER				
5. Dharuhera Chemicals, Dharuhera (Haryana)	Private	10,560	SSP	66,000
6. Madhuvan Chemicals & Fertilisers Dabok, (Rajasthan)	Private	6,340	SSP	39,600
Total after expansion		10,560	SSP	66,000
7. Rallis India, Magarwara (U.P.)	Private	10,560	SSP	66,000
Total after expansion		20,310	SSP	126,960
8. Shivalik Fertilisers, Hoshiarpur (Punjab)	Private	10,560	SSP	66,000
TOTAL (Capacity) (tonnes)	Public	75,000		
	Private	59,040		
	Cooperative	125,000		
B. GRAND TOTAL (tonnes)	Capacity	259,140		

FERTILISERS (Continued)

Principal raw material Feedstock	Process/Licensees, etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
IMPLEMENTATION (P₂O₅) (AS ON 1.9.1980) (Concluded)				
Phosphate rock; sulphur	Acidulation of phosphate rock with sulphuric acid		License issued in May 1979. Plant will have its own H ₂ SO ₄ plant with capacity 30,000 tpy. Total cost of the project is estimated at Rs. 30 million.	Mar. 1981
-do-	-do-		Planning to expand SSP capacity by 120 tpd to bring the existing capacity of 80 tpd to 200 tpd. They would have their own H ₂ SO ₄ plant of 100 tpd (= 33,000 tpy). Letter of intent was issued in April 1979. (See projects under 'A')	Dec. 1981
Phosphate rock; sulphur	rock; -do-	-do-	Have been issued letter of intent in May 1979 for expansion of capacity by 33,000 tpy H ₂ SO ₄ and 66,000 tpy SSP. (See projects under 'A')	Dec. 1981
-do-	-do-	-do-	Letter of intent for SSP plant issued in October 1979. Already having a H ₂ SO ₄ plant with a capacity 16,500 tpy under Punjab Sulphur Products which is being enhanced to 33,000 tpy. Total cost of the project is estimated at Rs. 30-35 million.	Dec. 1980

(Continued)

II. PHOSPHATIC

Name of factory	Sector	Nutrient	End-Products	
		Capacity, tpy [P ₂ O ₅ , tpd]	Product	Capacity, tpy
I. COMPLEXES			B. PROJECTS APPROVED IN	
1. M.P. Agro Morarji Fertilisers, Jhabua (Madhya Pradesh)	Private	50,000 [165]	Mono- ammonium Phosphate	94,000
2. Nagarjuna Fertilisers & Chemicals, Kakinada (Andhra Pradesh)	Private	80,000	NPKs	450,000

FERTILISERS (Continued)

Principal raw material/Feedstock	Process Licensees, etc.	Engineering/ Contractors, etc.	Remarks	Date of commissioning
PRINCIPLE (P₂O₅) (AS ON 1.9.1980)				
Phosphate rock from Jhabua (M.P.); sulphur.			Letter of intent issued in April 1978. Besides, MAP, it, will manufacture 54,000 tpy H ₃ PO ₄ and 140,000 tpy H ₂ SO ₄ . Entire project would cost Rs. 180 million. Initially, it would be based on imported H ₃ PO ₄ .	1985-86
Fuel oil; phosphate rock; sulphur.	Texaco partial oxidation for NH ₃ ; Stamicarbon for urea.	Foster Wheeler (UK), Haldor Topsoe; EIL.	Letter of intent was issued in January 1974 and industrial licence in July 1978 to its original co-promoters Shaw Wallace & Co., Madras along with A.P. Government. It was proposed to manufacture NPK fertilisers in Phase II of the project. IBRD had earmarked a loan of ₹ 170 million to be shared jointly by Bhatinda, Panipat, Kakinada and GNVFC (Bharuch) to meet a part of the FE cost. Birlas replaced Shaw Wallace as copromoters. The company is currently having discussions with International Finance Corporation (of the World Bank) and Topsoe (Denmark) for equity participation to the extent of Rs. 60 million. This would raise the total financial outlay from Rs. 2500 million (with FE component Rs. 700 million) to Rs. 4000 million. The share capital of Nagarjuna Fertilisers would be Rs. 800 million, and of promoters, Rs. 400 million out of which, Rs. 240 million would be from Zuari and their associates and balance, Rs. 160 million from the State Government of Andhra Pradesh. Under the revised plan also, production of NPKs would be taken up in Phase II. Initially, P ₂ O ₅ capacity would be based on imported phosphoric acid.	Phase II — 1986-87

(Continued)

II. PHOSPHATIC

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

C. PROJECTS APPROVED IN

3. Paradeep Project, Paradeep (Orissa)	Public	300,000	NPKs 18-46-0 19-19-19 14-28-14	
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II. SUPERPHOSPHATES

4. Agricultural Sales Corpn., Patiala (Punjab)	Private	10,560	SSP	66,000
5. Dalmia Dairies, Mohindergarh (Haryana)	Private	10,560	SSP	66,000
6. DCM Chemical Works, Unit: Bhatinda (Punjab)	Private	11,520	SSP	72,000
Total after expansion		34,560	SSP	216,000
7. Haryana State Industrial Development Corporation, Panipat (Haryana)	Public	10,560	SSP	66,000
8. Industrial Supplies & Services, Udaipur (Rajasthan)	Private	10,560	SSP	66,000

FERTILISERS (Concluded)

Principal raw material/Feedstock	Process/Licensees, etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
PRINCIPLE (P₂O₅) (AS ON 1.9.1980) (Continued)				
Imported Phosphate sulphur.	NH ₃ ; rock;		MFL, Madras have prepared a feasibility report. Details and financial tie-ups are being worked out. Project is anticipated to be completed in two phases each of 150,000 tpy P ₂ O ₅ capacity. Ammonia & P ₂ O ₅ component would be initially imported the latter as H ₃ PO ₄ .	Phase I — 1983-84 Phase II — 1985-86
Phosphate sulphur.	rock; Acidulation of phosphate rock with H ₂ SO ₄ .		Letter of intent issued in May 1979. Plant will have its own H ₂ SO ₄ plant with a capacity 33,000 tpy. Total cost of the plant is estimated at Rs. 30 million.	1981-82
-do-	-do-		Letter of intent issued in May 1979. Plant will have its own H ₂ SO ₄ plant with a capacity 33,000 tpy. Total cost of the project is estimated at Rs. 30 million.	1981-82
-do-	-do-		The Company already has a licence for 216,000 tpy SSP out of which 144,000 tpy has been installed at Delhi. Balance 72,000 tpy is proposed to be installed at Bhatinda at a cost of Rs. 50 million. (See projects under 'A')	1982-83
Phosphate sulphur.	rock; Acidulation of phosphate rock with H ₂ SO ₄ .		Letter of intent issued in May 1979. Plant will have its own H ₂ SO ₄ plant with a capacity 33,000 tpy. Total cost of the project is estimated at Rs. 30 million.	1981-82
-do-	-do-		-do-	1981-82

(Continued)

II. PHOSPHATIC

Name of factory	Sector	Nutrient	End-Products	
		Capacity, tpy [P ₂ O ₅ , tpd]	Product	Capacity, tpy
C. PROJECTS APPROVED IN				
9. Jayshree Chemicals & Fertilisers, Khardah (W.B.)	Private	10,560	SSP	66,000
Total after expansion (See projects under 'A')		19,740	SSP	123,360
10. Modi Spinning & Weaving Mills, Bareilly (U.P.)	Private	10,560	SSP	66,000
11. Prem Chand Arya, Bulandshahr (U.P.)	Private	10,560	SSP	66,000
12. Punjab State Industrial Development Corpn., Hoshiarpur (Punjab)	Public	10,560	SSP	66,000
13. Varinder Agro Chemicals, Ludhiana (Punjab)	Private	10,560	SSP	66,000
TOTAL (Capacity) (tonnes)	Public	321,120		
	Private	215,440		
	Cooperative	—		
C. GRAND TOTAL	Capacity	536,560		

FERTILISERS (Continued)

Principal raw material/Feedstock	Process, Licensees, etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
PRINCIPLE (P ₂ O ₅) (AS ON 1.9.1980) (Concluded)				
Phosphate rock; sulphur	Acidulation of Phosphate rock with H ₂ SO ₄		Letter of intent issued in May 1979. Plant will have its own H ₂ SO ₄ plant with a capacity 33,000 tpy. Total cost of the project is estimated at Rs. 30 million.	1981-82
-do-	-do-		-do-	1981-82
-do-	-do-		-do-	1981-82
-do-	-do-		-do-	1981-82
-do-	-do-	Larsen & Toubro; DMCC, Bombay.	Letter of intent issued in March 1979. Plant will have its own H ₂ SO ₄ plant with a capacity 33,000 tpy. Total cost of the project is estimated at Rs. 30 million.	1981-82

(Continued)

II. PHOSPHATIC

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

D. PROJECTS UNDER

I. COMPLEXES

1. Fertilisers And Chemicals, Travancore, Ambalamedu (Cochin-Phase II) (Kerala) Total after expansion (See projects under 'A')	Public	64,000	NP/NPKs
2. Indian Farmers Fertiliser Cooperative, Kandla (Gujarat) Total after expansion	Coop.	127,000	Phosphoric acid
3. Mangalore Chemicals & Fertilisers, Mangalore, (Karnataka)	Private	64,000	NP/NPKs
4. Southern Petrochemical Industries Corpn. Tuticorin (Tamil Nadu) Total after expansion	Private	70,000	NP/NPKs
5. West Coast NP/NPK Project		125,000	NP/NPKs

FERTILISERS (Continued)

Principal raw material/Feedstock	Process/Licensecs, etc.	Engineering/Contractors, etc.	Remarks	Date of commissioning
CONSIDERATION (P ₂ O ₅) (AS ON 1.9.1980) (Continued)				
				1984-85
Phosphate sulphur.	rock;		It is proposed to replace the existing import requirement of H ₃ PO ₄ (127,000 tpy P ₂ O ₅) with production from their own H ₃ PO ₄ plant of same capacity (vide page 44)	1983-84
Phosphate sulphur.	rock;		In phase I, capacity of N would be increased by 2,500 tpy. In phase II, P ₂ O ₅ capacity to the extent of 64,000 tpy would be created (vide page 18).	Phase II — 1984-85
-do-			The company is of expand its P ₂ O ₅ capacity based on imported phosphoric acid. (vide page 46).	1983-84
			It is planned to manufacture NP/NPK fertilisers at a location to be selected on the west coast. Might be taken up alongwith 6 projects proposed to be based on Bombay High. (vide page 38).	1984-85

In addition, 5 NP/NPK projects — 3 of 125,000 tpy P₂O₅ each (to be commissioned in 1986-87, 1987-88 and 1988-89) and 2 of 300,000 tpy P₂O₅ each (to be commissioned in 1986-87 and 1988-89) — and SSP capacity of 50,000 tpy P₂O₅ based on pyrites (to be commissioned in 1985-86) totalling to 1,025,000 tpy P₂O₅ are under consideration of the Government of India to fill the gap between domestic production and demand of P₂O₅.

Both the 300,000 tpy P₂O₅ NP/NPK plants, one 125,000 tpy P₂O₅ NP/NPK plant (the one to be commissioned in 1988-89) and the SSP plant would be based on imported phosphoric acid in initial years of operation.

Connecting details are being worked out. It is likely that some of these projects might be taken up for implementation alongwith six projects planned to be based on Bombay High (vide page 38).

(Continued)

II. PHOSPHATIC

Name of factory	Sector	Nutrient	End-Products	
		Capacity, tpy [P ₂ O ₅ , tpd]	Product	Capacity, tpy
D. PROJECTS UNDER				
6. Zuari Agro Chemicals, San Coale (Goa)	Private	42,000	NP/NPKs	150,000
Total after expansion		84,000	NP/NPKs	300,000
II. SUPERPHOSPHATES				
7. Haryana State Industrial Development Corpn. Panipat, (Haryana)	Public	25,300	Triple Superphosphate	55,000
8. Rajasthan Project, Udaipur/Chittorgarh (Rajasthan)	Public	200,000	Triple superphosphate	435,000
TOTAL (Capacity) (tonnes)	Public	289,300		
	Private	176,000		
	Cooprative	127,000		
D. GRAND TOTAL (tonnes)	Capacity	592,300		
		+125,000*		
		717,3000		

For notes see page 80

FERTILISERS (Concluded)

Principal raw material Feedstock	Process/Licensees, etc.	Engineering Contractors, etc.	Remarks	Date of commissioning
CONSIDERATION (P₂O₅) (AS ON 1.9.1980) (Concluded)				
Phosphate rock sulphur			Planning to double the capacity of P ₂ O ₅ through NP/NPKs (vide page) which is under active consideration of the G.O.I.	1983-84
Phosphate rock from Udaipur; sulphur.				1984-85
-do-			National Fertilisers, New Delhi have prepared a feasibility report. Initial production might be based on imported phosphoric acid.	1986-87
GRAND TOTAL (Capacity (A+B+C+D) (tonnes)		Public	1,375,790	
		Private	966,490	
		Cooperative	379,000	
		TOTAL	2,721,280	
			+125,000*	
			2,846,280	

West Cost NP/NPKs Project-Sector not known

**III. CAPACITY OF NITROGEN (N) ACCORDING TO SOURCES OF FEED STOCK
(AS ON 1.9.1980)**

(tonnes of nutrient N per annum)								
Stage of production/feedstock	Naphtha	Natural gas	Electric power	Coke/Cokeoven gas	Ammonia (external supply)	Coal	Fuel oil	Total
I. Factories in production	2,370,000* (51.7)	594,000* (13.0)	80,000@ (1.7)	64,840* (1.4)	120,000* (2.7)	456,000 (9.9)	901,000* (19.6)	4,585,840 (100.0)
II. Projects under implementation	100,000 (4.7)	1,532,000 (72.7)	— (—)	— (—)	50,000 (2.4)	— (—)	425,000 (20.2)	2,107,000 (100.0)
III. Projects approved in principle	— (—)	218,000 (27.2)	— (—)	— (—)	1,28,600 (16.0)	228,000 (28.4)	228,000 (28.4)	802,600 (100.0)
IV. Projects under consideration	— (—)	2,120,000 (100.0)	— (—)	— (—)	— (—)	— (—)	— (—)	2,120,000 (100.0)
TOTAL	2,470,000 (25.7)	4,464,000 (46.4)	80,000 (0.8)	64,840 (0.7)	298,600 (3.1)	684,000 (7.1)	1,554,000 (16.2)	9,615,440 (100.0)

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

* = In the case of

(i) FCI, Sindri (219,000 tpy N) it is assumed:
209,000 tpy capacity on Fuel oil.
10,000 tpy capacity on Naphtha.

(ii) SAIL, Rourkela (120,000 tpy N) it is assumed:
99,000 tpy capacity on Naphtha.
21,000 tpy capacity on COG.

@ = Only a part of the capacity is based on electrolysis.

(iii) RCFL, Trombay 165,000 tpy N) it is assumed:
81,000 tpy capacity on Natural gas
9,000 tpy capacity on Refinery gas
75,000 tpy on External supply of ammonia.
(iv) GSFC, Baroda (236,000 tpy N) it is assumed:
1,44,000 tpy capacity on Naphtha
92,000 tpy capacity on Natural gas

**IV. CAPACITY OF PHOSPHATE (P₂O₅) ACCORDING TO RAW MATERIALS
(AS ON 1.9.1980)**

('000 tonnes of nutrient P₂O₅ per annum)

Type of fertilisers	Raw materials						Total
	Sulphur	Pyrites	Smelter gases	By-product/waste sulphuric acid	Nitric acid	Phosphoric acid (External supply)	
I. FACTORIES IN PRODUCTION							
i. SSP	222.1+26.0@	—	12.0	27.4	—	—	287.5
ii. TSP	12.2	150.0**	90.0	—	—	—	252.2
iii. Pelofos	7.6	—	—	—	—	—	7.6
iv. NP/NPK fertilisers	365.5	—	—	—	120.0	281.0*	766.5
v. Others	19.5@	—	—	—	—	—	19.5
I. Total:	652.9 (49.0)	150.0 (11.2)	102.0 (7.6)	27.4 (2.1)	120.0 (9.0)	281.0 (21.1)	1,333.3 (100.0)
II. PROJECTS UNDER IMPLEMENTATION							
i. SSP	59.1	—	—	—	—	—	59.1
ii. NP/NPK Fertilisers	—	—	—	—	75.0	125.0	200.0
II. Total:	59.1 (22.8)	— (—)	— (—)	— (—)	75.0 (28.9)	125.0 (48.3)	259.1 (100.0)
III. PROJECTS APPROVED IN PRINCIPLE							
i. SSP	106.6	—	—	—	—	—	106.6
ii. NP/NPK fertilisers	380.0	—	—	—	—	—	380.0
iii. Others	50.0@	—	—	—	—	—	50.0
III. Total:	536.6 (100.0)	— (—)	— (—)	— (—)	— (—)	— (—)	536.6 (100.0)
IV. PROJECTS UNDER CONSIDERATION							
i. TSP	225.3+127.0@	—	—	—	—	—	352.3
ii. NP/NPK fertilisers	323.0	—	—	—	—	42.0	365.0
IV. Total:	675.3 (94.1)	— (—)	— (—)	— (—)	— (—)	42.0 (5.9)	717.3 (100.0)
(TOTAL I+II+III+IV)							
i. SSP	413.8	—	12.0	27.4	—	—	453.2
ii. TSP	364.5	150.0	90.0	—	—	—	604.5
iii. Pelofos	7.6	—	—	—	—	—	7.6
iv. NP,NPK fertilisers	1068.5	—	—	—	195.0	448.0	1711.5
v. Others	69.5	—	—	—	—	—	69.5
GRAND TOTAL	1923.9	150.0	102.0	2.74	195.0	448.0	2846.3
(I+II+III+IV)	(67.6)	(5.3)	(3.6)	(1.0)	(6.8)	(15.7)	(100.0)

* One of the factories uses imported mono ammonium phosphate occasionally. During the Sixth Plan period, it will have its own phosphatic acid plant.

** It would use both pyrites and sulphur.

@ Part of the phosphoric acid is planned to be marketed.

Note: 1. Rockphosphate is the basic raw material which is processed with H₂SO₄, HNO₃ and H₃PO₄ to release P₂O₅ in the desired concentration. Factories based on imported H₃PO₄ 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 STAGE OF
IMPLEMENTATION — MATERIALWISE
(AS ON 1.9.1980)**

(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 (4.4)	— (—)	2,100 (0.3)	— (—)	201,720 (2.1)
2. Calcium ammonium nitrate	N	200,000 (4.4)	— (—)	— (—)	— (—)	200,000 (2.1)
3. Urea	N	3,679,340 (80.2)	1,982,000 (94.1)	647,000 (80.6)	— (—)	6,308,340 (65.6)
4. Ammonium chloride	N	21,190 (0.5)	— (—)	6,500 (0.8)	— (—)	27,690 (0.3)
5. Single superphosphate	P ₂ O ₅	261,500 (19.6)	59,140 (22.8)	106,560 (19.9)	— (—)	427,200 (15.0)
6. Triple superphosphate	P ₂ O ₅	252,150+ 45,500@ (18.9)+ (3.4)	— (—)	50,000@ (9.3)	225,300+ 127,000@ (31.4)+ (17.7)	477,450+ 222,500@ (16.8)+ (7.8)
7. Pelofos	P ₂ O ₅	7,600 (0.6)	— (—)	— (—)	— (—)	7,600 (0.3)
8. Ammonium phosphate sulphate	N	39,160 (0.9)	— (—)	— (—)	— (—)	39,160 (0.4)
	P ₂ O ₅	46,500 (3.5)	— (—)	— (—)	— (—)	46,500 (1.6)
9. Diammonium phosphate	N	24,480 (0.5)	— (—)	— (—)	— (—)	24,480 (0.3)
	P ₂ O ₅	62,560 (4.7)	— (—)	— (—)	— (—)	62,560 (2.2)
10. Nitrophosphate	N	120,000 (2.6)	75,000 (3.5)	— (—)	— (—)	195,000 (2.0)
		120,000 (9.0)	75,000 (28.9)	— (—)	— (—)	195,000 (6.9)
11. Urea ammonium phosphate	N	117,800 (2.5)	— (—)	— (—)	— (—)	117,800 (1.2)
	P ₂ O ₅	145,800 (10.9)	— (—)	— (—)	— (—)	145,800 (5.1)
12. NP/NPK fertilisers	N	184,250 (4.0)	50,000 (2.4)	147,000 (18.3)	50,000 (2.4)	431,250 (4.5)
	P ₂ O ₅	391,670 (29.4)	125,000 (48.3)	380,000 (70.8)	365,000 (50.9)	1,261,670 (44.3)
13. Urea & NP/NPK fertilisers*	N	— (—)	— (—)	— (—)	2,070,000 (97.6)	2,070,000 (21.5)
	P ₂ O ₅	— (—)	— (—)	— (—)	— (—)	— (—)
TOTAL	N	4,535,840 (100.0)	2,107,000 (100.0)	1,02,600 (100.0)	2,120,000 (100.0)	9,615,440 (100.0)
	P ₂ O ₅	1,333,280 (100.0)	259,140 (100.0)	536,560 (100.0)	717,300 (100.0)	2,846,280 (100.0)

* End-productwise capacity is not yet decided.

@ Phosphoric acid as P₂O₅.

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

**VI. SHARE OF FERTILISER CAPACITY UNDER VARIOUS STAGES OF
IMPLEMENTATION NUTRIENTWISE AND SECTORWISE
(AS ON 1-9-1980)**

(tonnes of nutrient per annum)

Category	N				P ₂ O ₅			
	Public sector	Private sector	Coop. sector	Total	Public sector	Private sector	Coop. sector	Total
I. Factories in production	2,843,080 (62.0)	1,299,760 (28.3)	443,000 (9.7)	4,585,840 (100.0)	690,370 (51.8)	515,910 (38.7)	127,000 (9.5)	1,333,280 (100.0)
II. Projects under implementation	994,000 (47.2)	373,000 (17.7)	740,000 (35.1)	2,107,000 (100.0)	75,000 (23.9)	59,140 (22.8)	125,000 (48.3)	259,140 (100.0)
III. Projects approved in principle	500,000 (62.3)	302,600 (37.7)	— (—)	802,600 (100.0)	321,120 (59.8)	215,440 (40.2)	— (—)	536,560 (100.0)
IV. Projects under consideration				2,120,000* (100.0)	289,300 (40.3)	176,000 (24.5)	127,000 (17.7)	592,300 +125,000* (175)
								717,300 (100.0)
				7,495,440 +2,120,000* (22.1)				2,721,280 +125,000* (4.4)
TOTAL	4,337,080 (45.1)	1,975,360 (20.5)	1,183,000 (12.3)	9,615,440 (100.0)	1,375,790 (48.3)	966,490 (34.0)	379,000 (13.3)	2,846,280 (100.0)

*Sectorwise distribution pattern is not yet determined.

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)
HNO ₃	Nitric acid
H ₃ PO ₄	Phosphoric acid
H ₂ SO ₄	Sulphuric acid
MAP	Monoammonium phosphate
NH ₃	Ammonia
NP/NPKs	NP/NPK complex fertilisers of various grades
SSP	Single superphosphate (16% P ₂ O ₅)
STPP	Sodium Tripoly-Phosphate
TSP	Triple superphosphate (46% P ₂ O ₅)
UAP	Urea ammonium phosphate (28-28-0; 14-35-14)

B. Abbreviations for Financial Institutions

CIIDA	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
EIL	Engineers India Limited
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 ₂ O ₅ — shown under column "Nutrient Capacity tpy" — Table II (P ₂ O ₅).

Note: Actual production is for 1978-79 (April-March) and capacity situation is as on 1.9.1980. Therefore, capacity utilisation has been appropriately adjusted with dates on which new projects were commissioned during 1978-79.

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

INDEX

Participants*	Projects
A	
Ansaldo (Italy)	: NLC (Neyveli)
B	
Bamag (West Germany) (See Pitsch Bamag)	
Benfield (USA)	: ZACL (Goa) : NLC (Neyveli)
C	
Casale (Italy)	: GSFC (Baroda)
Catacarb (USA) (See Polimex - Cekop)	: MFL (Manali)
Chemiebau (West Germany)	: FACT (Cochin II); HFC (Namrup)
C&I - Chemical & Industrial Corporation (USA)	: RCFL (Trombay)
Chemico - Chemical Construction Corporation (USA)	: CFL Vizag; FACT (Alwaye); FCI (Gorakhpur); HFC (Namrup); FCI (Sindri); RCFL (Trombay); GSFC (Baroda); MFL (Manali).
Chiyoda (Japan)	: SFC (Kota)
CLE = Creusot Loire Enterprises (France)	: HFC (Haldia)
D	
DPG (Davy Power Gas) Wellman Lord (USA)	: CFL (Vizag); FACT (Cochin II); RCFL (Trombay IV)
De Nora (Italy)	: NFL (Nangal)
Dorr-Oliver (USA)	: CFL (Vizag); EID (Ennore); FACT (Alwaye); IFFCO (Kandla); MFL (Manali)
DSM - Dutch State Mines (Holland) (-- See Stamicarbon)	
E	
EEC - English Electric Co. (UK)	: NFL (Nangal)
EIL = Engineers India Ltd.	: GSFC (Baroda), NFL (Bhatinda); NFL (Panipat)
EIC - Engineering and Industrial Corporation (Luxemburg)	: FACT (Alwaye)
F	
FEDO = FACT Engineering & Design Organisation (India)	: FACT (Alwaye), FACT (Cochin-I); FACT (Cochin-II); FCI (Sindri-Rationalisation); HCL (Khetri)
F(PD)IL = Fertiliser (Planning & Development) India Ltd.	: FACT (Cochin), HFC (Barauni); HFC (Durgapur); FCI (Gorakhpur); FCI (Gorakhpur-Expan); HFC (Haldia); FCI (Korba); HFC (Namrup); HFC (Namrup-Expn.), NFL (Nangal); NFL (Nangal Expn.); Paradeep FCI (Ramagundam); FCI (Sindri-Modern); FCI (Sindri); FCI (Sindri-Ration); FCI (Talcher); RCFL (Trombay); RCFL (Trombay-Debottle); RCFL (Trombay IV); RCFL (Trombay V); SAIL (Rourkela) RCFL (Thal Vaishet) KBIBHCO (Hazira)
Foster Wheeler (UK)	: Nagarjuna (Kakinada)

*As appearing in the text of the Booklet

INDEX

Participants*	Projects
G	
Girdler (USA)	: RCFL (Trombay)
Grande Paroisse (France)	: NFL (Nangal)
H	
Heurtey (France)	: HFC (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)
I	
ICI = Imperial Chemical Industries (UK)	: CFL (Vizag); FACT (Alwaye); FACT (Cochin); HFCL (Durgapur); FCI (Sindri); GSFC (Baroda); IEL (Kanpur); MCFL (Mangalore); SPIC (Tuticorin); ZACL (Goa)
Inventa (Switzerland)	: GSFC (Baroda)
K	
KTI = Kinetics Technology International (Netherlands)	: FACT (Alwaye); HFC (Barauni); HFC (Namrup- Expn) FCI (Sindri); RCFL (Trombay-Debottle).
Kellogg (USA)	: CFL (Vizag); IFFCO (Kandla); IFFCO (Phulpur); RCFL (Thal Vaishet); KRIBHCO (Hazira).
Koppers (West Germany)	: FCI (Korba); FCI (Ramagundam); FCI (Talcher); SAIL (Rourkela)
Krebs (France)	: FACT (Alwaye); HZL (Debari)
L	
Larsen & Toubro (India)	: MAIDC (Panvel).
Linde (West Germany)	: FACT (Alwaye); NFL (Nangal); SAIL (Rourkela); NLC (Neyveli); GNVFC (Bharuch).
Lumus (USA)	: CFL (Vizag).
Lurgi (West Germany)	: HFC (Haldia); FCI (Korba); NFL (Nangal-Expn.) FCI (Ramagundam); FCI (Sindri-Modern); FCI (Talcher); HZL (Debari); NFL (Bhatinda); NFL (Panipat).
M	
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); SFC (Kota).
Monsanto (USA)	: FACT (Alwaye).
Montedison/Technimont (Italy) (see Technimont/Moutedison)	
N	
Nissan (Japan)	: HFC (Haldia); RCFL (Trombay); GSFC (Baroda); SPIC (Tuticorin);
Norsk Hydro (Norway)	: FACT (Cochin II)

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Participants*	Projects
O	
Otto (West Germany)	: SAIL (Rourkela)
P	
PEC—Potasse et Engrais Chimiques (France)	: RCFL (Trombay)
PGC—Power Gas Corporation (UK)	: FACT (Alwaye); FACT (Cochin); HFC (Durgapur); FCI (Sindri); GSFC (Baroda); SPIC (Tuticorin); ZACL (Goa).
Pintsch Bamag (West Germany)	: NFL (Nangal); NCJM (Varanasi); NLC (Neyveli); RCFL (Trombay IV); SAIL (Rourkela)
Polimex—Cekop (Poland)	: HFC (Haldia)
Prayon (Belgium)	: EID (Ennore); FACT (Alwaye); FACT (Cochin II); FCI (Sindri-Ration); HCL (Khetri).
S	
St. Gobain (France)	: NFL (Nangal).
Selas (USA)	: FACT (Alwaye); HFC (Barauni); HFC (Namrup) Expn.); FCI (Sindri); RCFL (Trombay-Debottle)
Shell (UK)	: EID (Ennore); FCI (Gorakhpur); FCI (Gorakhpur- Expn.); HFC (Haldia); NFL (Nangal-Expn.); FCI (Sindri-Modern); RCFL (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); RCFL (Trombay V); GNVFC (Bharuch); RCFL Thal Vaishet); KRIBHCO (Hazira)
Solvay (Belgium)	NCJM (Varanasi)
Stamicarbon (Netherlands) (DSM)	: HFC (Haldia); RCFL (Trombay IV); IFFCO (Kandla); MCFL (Mangalore); SAIL (Rourkela); SFC (Kota); Nagarjuna (Kakinada).
T	
Technimont/Montedison (Italy)	: FACT (Cochin); HFC (Barauni); HFC (Durgapur); HFC (Haldia); FCI (Korba); HFC (Namrup-Expn.); NFL (Nangal Expn.); FCI (Ramagundam); FCI (Sindri); FCI (Sindri Modern); FCI (Talcher); NLC (Neyveli)
Technip (France)	: GSFC (Baroda)
Techno Export (Bulgaria)	: FCI (Sindri-Ration)
Tecno Export (Czechoslovakia)	: FCI (Ramagundam); FCI (Talcher)
Texaco (USA)	: FACT (Alwaye); GNVFC (Bharuch); Nagarjuna (Kakinada)
Topsoe (Denmark)	: HFC (Haldia); NFL (Nangal Expn.); FCI (Sindri- Modern); RCFL (Trombay V); GNVFC (Bharuch); MFL (Mansli); NFL (Bhatinda); NFL (Panipat); SFC (Kota); Nagarjuna (Kakinada); RCFL (Thal Vaishet)

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Participants*	Projects
TEC=Toyo Engineering Corporation (Japan)	: FCI (Gorakhpur); FCI (Gorakhpur-Expn.) GSFC (Baroda); IEL (Kanpur); NFL (Bhatinda); NFL (Panipat); SPIC (Tuticorin); ZACL (Goa); RCFL (Thal Vaishet); KRIBHCO (Hazira)
TVA=Tennessee Valley Authority (USA)	: SPIC (Tuticorin)
U	
Uhde (West Germany)	: FCI (Sindri-Modern); RCFL (Trombay IV); (SAIL (Rourkela), NCJM (Varanasi)
V	
Veba Chemie (West Germany)	: NFL (Bhatinda); NFL (Panipat);
Vetrocoke (Italy)	: FACT (Cochin); HFC (Barauni); HFC (Durgapur);
Vulcan (USA)	HFC (Namrup Expn.) GSFC (Baroda); NLC (Neyveli) ZACL (Goa)
W	
Wellman Lord/DPG (USA) (See DPG/Wellman Lord)	: CFL (Vizag)
Winkler (USA)	: NCL (Neyveli)

Abbreviations for Factories/Projects

CFL	— Coromandel Fertilisers Ltd.	MAIDC	— Maharashtra Agro-Industries Development Corporation Ltd.
DMCC	— Dharamsi Morarji Chemical Co. Ltd.	MCFL	— Managlore Chemicals and Fertilisers Ltd.
FACT	— Fertilisers & Chemicals, Travancore Ltd.	MFL	— Madras Fertilisers Ltd.
FCI	— Fertilizer Corporation of India Ltd.	NCJM	— New Central Jute Mills Co. Ltd.
F(PD)IL	— Fertiliser (Planning & Development) India Ltd.,	NFCL	— Nagarjuna Fertilizer & Chemicals 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 Fertilizers & Chemicals Ltd.
HFCL	— Hindustan Fertilizer Corporation Ltd.	RCFL	— Rashtriya Chemicals & Fertilisers Ltd.
HZL	— Hindustan Zinc Ltd.	SAIL	— Steel Authority of India Ltd.
IEL	— Indian Explosives Ltd.	SFC	— Shriram Fertilisers and Chemicals
IFFCO	— Indian Farmers Fertiliser Co-operative Ltd.	SPIC	— Southern Petrochemical Industries Corpn. Ltd.
IISIO	— Indian Iron & Steel Co. Ltd.	TISCO	— Tata Iron & Steel Co. Ltd.
KRIBHCO	— Krishak Bharatiya Coop. Ltd.	ZACL	— Zuari Agro Chemicals Ltd.