GOVERNMENT OF INDIA
TARIFF COMMISSION

REPORT
ON
The Fair Selling Prices of Caustic Soda, Chlorine, Hydrochloric Acid and Bleaching Powder

BOMBAY 1967

PRINTED BY THE MANAGER GOVERNMENT OF INDIA PRESS NASIK
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India, Tariff (——Commission)

Report on the Fair Selling Prices of Caustic Soda, Chlorine, Hydrochloric Acid and Bleaching Powder 1967.

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PERSONNEL OF THE COMMISSION

SHRI M. P. PAI	*Chairman (till 31-7-1967)*
SHRI M. ZAHEER	*Member*
PROF. K. T. MERCHANT	*Member*
SHRI S. SUBRAMANIAN	*Member*

SECRETARY

DR. P. V. GUNISHASTRI

GOVERNMENT OF INDIA

MINISTRY OF PETROLEUM AND CHEMICALS
(DEPARTMENT OF CHEMICALS)

New Delhi, the 2nd May, 1968
Vaisakha 12, 1890 (S)

RESOLUTION

No. 5(30)/67/CH. II.—The selling prices of caustic soda and allied items *viz.* chlorine, hydrochloric acid and stable bleaching powder were decontrolled in December, 1963. After the decontrol, the industry increased the selling prices of all varieties of caustic soda from time to time, and by November, 1966, there were three increases, first in January, 1964; second in November, 1965 and the third in October, 1966 on the ground that the costs of production had gone up since the decontrol. In the circumstances of the case, it was considered necessary to ascertain through the agency of the Tariff Commission whether there was adequate justification for the increases. The Tariff Commission was accordingly requested under Section 12(a) of the Tariff Commission Act, 1951, to enquiry into the cost structure of the caustic soda industry, as a whole, and suggest fair selling prices for caustic soda (all vareities), cholrine (liquid and gas), hydrochloric acid and bleaching powder and also consider the possibility of laying down a formula for automatic revision of selling prices based on the variations in the costs of production and suggest a formula if considered possible. The Commission has submitted its Report. Its main recommendations are as follows :

(1) The fair selling price ex-works of caustic lye (100% NaOH content) may be fixed at Rs. 780/- per tonne.

(2) The fair selling price ex-works of solid caustic soda (pure) comes to Rs. 940/- per tonne. For caustic soda, of technical grade, the fair selling price as derived would be Rs. 900/- per tonne.

(3) The fair selling price ex-works for caustic soda flakes of technical grade comes to Rs. 980/- per tonne, the price for higher purity to be adjusted suitably.

(4) No selling prices need be fixed for chlorine gas, liquid chlorine and hydrochloric acid.

(5) The fair selling prices for stable bleaching powder in packings of 100 Kgs., 50 Kgs., 25 Kgs., 12.5 Kgs., 3 Kgs., 1.5 Kgs., and 0.5 Kgs. work out to Rs. 87.55, Rs. 45.90, Rs. 27.55, Rs. 15.45, Rs. 5.10, Rs. 3.00 and Rs. 1.60 respectively.

(6) With effect from the date they are brought into force, the fair selling prices for caustic soda (all varieties) and bleaching powder suggested may continue for a period of three years subject to the condition in (7) below.

(7) It is not possible to lay down a workable formula for automatic revision of selling prices based on variations in the cost of important raw materials and power for various reasons. It is, however, suggested that should there be any substantial increase in the costs of production during the price period, due to factors beyond the control of the industry such as increase in the price of salt, mercury and graphite and in the rates of electricity or railway freight, the industry may approach Government for revision of the selling prices.

(8) Government may examine the question of licensing of additional capacity of chlorine which will develop as a result of the capacity sanctioned for caustic soda, in keeping with the policy that may be worked out for its utilisation.

(9) The installation of small package units of ammonia by large scale alkali and caustic soda manufacturers may be encouraged for the manufacturer of ammonia and ultimately that of ammonium chloride.

(10) No further licences be given till the existing units in the caustic soda industry come up to the economic size. New licences, if any, be issued for economic size units only, whether independent or captive.

(11) Not only are the power rates different from State to State but these are also discriminatory even in the same State from unit to unit and even for different plants of the same unit. Such disparities should be removed.

(12) Government may give consideration to the needs of the chemical industry in the matter of rate of electricity duty and take such steps as they may consider advisable to bring about not only uniformity in rates but also in the surcharges and the duties levied.

(13) Imports of mercury should be so arranged that it is available to the producers of caustic soda at as favourable terms as possible and that the large units which are willing to do so may be allowed to import it directly.

(14) The railways should develop additional capacity of tank wagons for the transport of caustic soda lye in order that the expenditure on converting it into solid is avoided and until such wagons are provided, modify their rules so that plastic sheet bags commensurate with the degree of safety needed for their transport are acceptable for carriage.

(15) Exports may be encouraged with adequate incentive to efficient and economic units only, so that the country may not have to bear the unnecessary burden of subsidising exports for long.

Government have given careful consideration to the recommendations (1) to (3), (5) and (6) relating to selling prices. Having regard to the facts that the production has caught up with the demand and that prevailing market prices, which are not uniform correspond more or less to the fair selling prices recommended by the Commission, Government consider that at this stage, it is not necessary to control the prices and that the situation be watched.

Government have taken note of the recommendations (4), (7), (8), (9), (10), (13), (14) and (15).

Attention of the State Governments is drawn to recommendations (11) and (12) for suitable action.

ORDER

ORDERED that the Resolution be published in the Gazette of India and copy thereof communicated to all concerned.

(M. RAMAKRISHNAYYA)

Joint Secretary to the Government of India.

Errata list to the Commission's Report on the fair Selling Prices of Caustic Soda and Bleaching Podwer.

(1967)

Sl. No.	Page No.	Para	Line	For	Read
1	(i)	...	14	enquiry	enquire
2	(ii)	9	3	manufacturer	manufacture
3	1	(2)1	13	itmes	items
4	4	(4)1	2	prosective	prospective
5	5	(4)1	3	there	then
6	12	6.6	4	latlers	latters
7	17	8.1	4	delete the word	'more'
8	36	9.4.2	15	the	he
9	39	9.4.6	1	at	as
10	48	10.5	20	basis	basic
11	49	10.6.3	2	n	an
12	50	10·7	17	nut	unit
13	52	11.1	8	than	then
14	52	11.1	17	14	140
15	52	11.1	21	at the beginning	add 'of'
16	57	12.2.3	last line	following figures	figures on page '58'
17	66	1	25	following figures	figures on page '67'
18	80	18.1	3	below	on page '81'
19	93	19.8.3	last line	paragraph 2.04	paragraph 20.4
20	96	21.5	third line	delete the word	'he' after the words "even if"
21	103	...Against Sl. No. 21.....		Nepangar	Nepanagar
22	103	...Under heading C..... and Sl. Nos. 1 and 2		Manufacturers, Association	Manufacturers' Association
23	109	...Against item No. 5...		Jameshdji Tata Road	Jamshedji Tata Road
24	110	...Against item 26...		Caustic soad project	Caustic soda project
25	118	...Against Sl. No. 1... in the Remarks Column		excluesive	exclusive
26	120	...Against Sl. No. 4 in the column under packing		ontainers	containers

GIPN—S5—3 T. C. Bom./69—24-10-69—450.

REPORT ON THE FAIR SELLING PRICES OF CAUSTIC SODA, CHLORINE, HYDROCHLORIC ACID AND BLEACHING POWDER

1. Reference to the Commission

By their letter No. F.20(5)-Tar/66, dated November 9, 1966 (copy in Appendix 1), the Government of India in the Ministry of Commerce made a reference under Section 12(d) of the Tariff Commission Act, 1951 asking us to undertake an inquiry into the cost structure of the caustic soda industry and to furnish our recommendations to Government. Government desired that we should go into the cost structure of the caustic soda industry as a whole and suggest fair prices for caustic soda (all varieties), chlorine (liquid and gas), hydrochloric acid and bleaching powder for a period of three years or so, and also consider the possibility of laying down a formula for automatic revision of selling prices based on the variations in the costs of production and suggest a formula if considered possible. It is in consequence of this reference that the present inquiry has been undertaken.

2. Previous inquiries

2.1. No less than six protection inquiries and two price inquiries have in the past been conducted into the caustic soda industry. Protection was for the first time granted to the industry in 1947 and it continued until December 31, 1964 when the industry was deprotected. An inquiry into the fair ex-works prices as well as fair selling prices of caustic lye, fused caustic soda solid, caustic soda flakes, dry gas chlorine, liquid chlorine, hydrochloric acid and bleaching powder was for the first time conducted by the Commission, in 1958 and Government's decisions on the Commission's Report were conveyed in Resolution No. CH(1)-31(36)/58, dated October 27, 1959 fixing the prices of all itmes except bleaching powder. The prices of stable bleaching powder in different sizes of packing were fixed under Resolution No. CH-31(44)/59, dated 31st May, 1960. These prices were to

remain in force until December, 1960 pending the completion of a review of the prices by Government. Since there was some delay in the completion of the review, these prices continued in force until January 31, 1961 on which date Resolution No. CH(1)-15(29)/60 was issued, after the completion of the review and taking into account the representations that were received from the industry, fixing the prices of caustic soda, chlorine and hydrochloric acid. By Government Resolution No. CH(1)-31(44)/59 of the same date, the prices of stable bleaching powder in different sizes of packing were also fixed.

2.2. The second inquiry into the fair selling prices of caustic soda and allied products was conducted by the Tariff Commission on 1961 and as a result of the recommendations of the Commission, prices were fixed under Resolution No. CH(1)-15(41)/61, dated 31st January, 1962. The table on page 3 gives particulars of the prices fixed on these three occasions.

The prices fixed in 1962 were operative until December 16, 1963 when control on prices of caustic soda and allied products, along with that on the prices of other commodities, was lifted under the Government of India, Ministry of Petroleum and Chemicals, Notification No. CH(1)/1(91)/62. Immediately after decontrol, the Alkali Manufacturers' Association decided to raise the price of caustic soda by Rs. 80 per tonne. Except for Tata Chemicals, all the units raised their prices varying from Rs. 50 to Rs. 100 per tonne as mentioned in paragraph 15 of the Commission's Report on the protection inquiry conducted in 1964.

2.3. On receipt of complaints from the consumers in respect of the prices charged by the producers, the question of the desirability of reimposing controls on caustic soda was considered by Government and the matter was discussed in a meeting held between the representatives of the Government and the Alkali Manufacturers' Association on May 11, 1965. It was agreed at this meeting that the Association would take Government into confidence before any price increase was announced. Subsequently, an increase of Rs. 40 per tonne was announced by the Association to be operative

from 15-11-1965. Later on, a Joint Committee consisting of the representatives of the Association and Government was formed in order that increases, if any, may be effected after consideration by this Committee. A proposal for a

TABLE No. 1

Previous price fixations

Date of Tariff Commission Report.	16-10-1958		*		23-11-1961	
Date of Government Resolution.	27-10-1959		31-1-1961		31-1-1962	
Period for which prices were fixed.	27-10-1959 to 31-12-1960 (subsequently extended to 31-1-1961)		1-2-1961 to 31-1-1962		1-2-1962 to 31-12-1964	
	Rs. per cwt.	Rs. per tonne	Rs. per cwt.	Rs. per tonne	Rs. per cwt.	Rs. per tonne
Caustic soda lye (basis 100% NaOH content)	29	570.84	31.50	620.05	..	620
Fused caustic soda solid.	35	688.94	36.50	718.47	..	720
Caustic soda flakes .	40	787.36	41.50	816.89	..	820
Chlorine gas . .	13	255.89	13.00	255.89	..	..
Chlorine liquid .	22.20	436.98	22.20	436.98	..	437
Hydrochloric acid .	10.80	212.59	10.80	212.59	..	194
Bleaching powder stable.	55 kg. .. 29.65 (effective from 1-6-1960)		55 kg. .. 32.55 (initially for six months from 1-2-1961)		..	55 kg. 31.25

*These were fixed as a result of a review by Government.

further increase by Rs. 64 per tonne was placed before the Joint Committee in May, 1966 and when no agreement was reached between the representatives of the producers and those of the Government, the increase of Rs. 64 per tonne was brought into effect from October, 1965. Since decontrol, therefore, the Alkali Manufacturers' Association announced three increases in prices of caustic soda in January, 1964, November, 1965 and October, 1966 amounting to a total of Rs. 184 per tonne; in the case of one unit namely Tata Chemical, there were two increases only of Rs. 60 and Rs. 40 on 7th June, 1965 and 1st May, 1966 respectively making a total of Rs. 100 per tonne.

3. Scope of inquiry

3.1. In accordance with the terms of reference, the scope of the inquiry includes (1) the examination of the cost structure and recommendation of fair selling prices for :

(i) Caustic soda lye (100 % NaOH content)
(ii) Fused casustic soda
(iii) Caustic soda flakes
(iv) Liquid chlorine
(v) Dry gas chlorine
(vi) Hydrochloric acid (commercial grade)
(vii) Stable bleaching powder

and (2) consideration of the possibility of laying down a formula for automatic revision of selling prices based on the variations of costs of production and formulation of proposals for the same.

3.2. We have considered it desirable to undertake a brief survey of the present position of the industry, the problem of utilisation of chlorine, requirement and economics of the use of important raw materials and other connected matters as preliminary to the formulation of our proposals for fair selling prices and price revision formulae.

4. Method of inquiry

4.1. Questionnaires were issued to producers (both existing and prosective) and consumers of caustic soda and allied products. The Alkali Manufacturers Association was requested to send a memorandum on the issues relevant to the inquiry. A pres

note was also issued inviting those interested in any aspect of the inquiry to obtain copies of the relevant questionnaires and to submit their replies. The Directorate General of Technical Development (hereinafter referred to as the D.G.T.D.) was requested to provide information on the present position of the industry. The State Trading Corporation of India Ltd. was addressed for data on imports of caustic soda. The Directorate General of Supplies and Disposals was requested to furnish a memorandum on the issues arising out of the questionnaire sent to consumers. The Indian Standards Institution was addressed for information on the present position in respect of the standard specifications issued for the products covered by the inquiry. The State Governments were requested to furnish memoranda on the industry in their respective States, with special reference to the possibilities of meeting the power requirements of the existing as well as prospective units. The Railway Board was addressed for information on the freight rates on salt and the conditions stipulated for its movement in bulk in loose condition. The Indian High Commissions/Embassies in U.K., U.S.A., Italy, Japan and France were requested to furnish data on the current domestic and export prices of caustic soda and the allied products in question in the respective countries. The Basic Chemicals, Pharmaceuticals and Soaps Export Promotion Council was addressed for information on the prospects of export of caustic soda and chlorine in the next few years. A list of the parties to whom questionnaires/letters were issued is given in Appendix 2. We also had discussions with representatives of the Alkali Manufacturers' Association on two occasions.

4.2. The industry is today comprised of 25 units of which seven are captive and have insignificant sales. The total production of caustic soda (all forms) of the units which produce caustic soda for sale was 208,048 tonnes in 1966. We desired to select as large and representative a sample for costing as possible. We, therefore, selected six units which had in 1966 a total production of 116,085 tonnes of caustic soda (all forms) which represents 56% of the total production for sale in the country. We also consulted representatives of the Alkali Manufacturers' Association in deciding upon the units to be costed. In selecting the units to be costed, care was taken to ensure

that in the electrolytic process of manufacture of caustic soda which accounts for 92% of the production and 96% of the units, both asbestos diaphragm as well as mercury cell units were adequately represented. Of the five units costed, one has both diaphragm and mercury cells, one only diaphragm cells and the other three mercury cells. Only two units in the country employ the chemical process of which the one with the larger capacity was selected for costing. Bleaching powder is being manufactured by two units only, one of which was costed.

4.3. The cost of production of the following factories was investigated. The process of manufacture and products costed are mentioned against each unit.

1. The Mettur Chemical & Industrial Corporation Ltd., Mettur Dam.	Diaphragm as well as mercury cells.	Caustic soda lye, solid, flakes, liquid chlorine, hydrochloric acid, stable bleaching powder.
2. Dhrangadhra Chemical Works Ltd., Sahupuram.	Mercury cells	Caustic soda lye, solid, flakes, liquid chlorine, hydrochloric acid.
3. Kanoria Chemicals & Industries Ltd., Renukoot.	Mercury cells	Caustic soda lye, solid, liquid chlorine, hydrochloric acid.
4. Century Chemicals, Kalyan	Mercury cells	Caustic soda lye, liquid chlorine, hydrochloric acid.
5. The Alkali & Chemical Corporation of India Ltd., Rishra.	Diaphragm cells	Caustic soda lye, liquid chlorine, hydrochloric acid.
6. Saurashtra Chemicals, Porbandar.	Chemical process	Caustic soda solid flakes.

4.4. A list of the factories visited by the Commission and its officers is given in Appendix 3.

4.5. The public inquiry into this industry was held on 5th July, 1967. A list of the persons who attended the inquiry is given in Appendix 4.

5. Present position of the industry

5.1. From an annual capacity of about 14,000 tonnes of caustic soda in 1946 spread over three independent and a few captive units the industry has now gone up to a capacity of 296,333 tonnes with a total of 25 units of which seven are captive. Of this capacity, mercury cells account for 203,728 tonnes with 13 independent and three captive units. The capacity of asbestos diaphragm cells is 66,205 tonnes with five independent and five captive units. Chemical process accounts only for 26,400 tonnes with two independent units. Two units, namely, Rohtas Industries Ltd. and Mettur Chemical & Industrial Corporation Ltd. have both mercury as well as diaphragm cells. One unit, namely, Tata Chemicals Ltd., has both diaphragm cells as well as a chemical process plant. These three units have, therefore, been counted twice over in this classification. The chemical process plant of Tata Chemicals is at present not in continuous production. The other chemical plant unit, Saurashtra Chemicals, has a capacity of 20,400 tonnes annually and converts a part of its soda ash production into caustic soda. The production of all the independent units is not exclusively available for sale, some of these constitute departments of larger concerns having other activities for which caustic soda and/or chlorine are needed. The production of the captive units is entirely for their own use.

5.2. The sizes of the caustic soda plants are divergent. Two of the units—both captive—have each a capacity of only two tonnes per day, while the biggest has a capacity of 160

tonnes per day. Distribution of the units by size is as follows :—

Size group according to daily capacity	No. of units	Names of the units
Below 5 tonnes . . .	2	Shree Gopal Paper Mills Ltd., The Mysore Paper Mills Ltd.
5 to 10 tonnes . . .	3	The Titaghur Paper Mills Co. Ltd. No. 2, Calico Mills Chemical Division, J. K. Chemicals Ltd.
10 to 15 tonnes . . .	4	The Titaghur Paper Mills Co. Ltd. No. 1, The NN&P Mills Ltd., Orient Paper Mills Ltd., Hindusthan Heavy Chemicals Ltd.
15 to 20 tonnes . . .	3	The Sirpur Paper Mills Ltd., Rohtas Industries Ltd., The Atul Products Ltd.
20 to 30 tonnes . . .	4	The Andhra Sugars Ltd., Century Chemicals, Tata Chemicals Ltd., The Alkali & Chemical Corporation of India Ltd.
30 to 40 tonnes . . .	4	Hukumchand Jute Mills Ltd., The D.C.M. Chemical Works, Calico Chemicals & Plastics Division, The Travancore-Cochin Chemicals Ltd.
40 to 50 tonnes . . .	2	Shriram Vinyl & Chemical Industries, Kanoria Chemicals & Industries Ltd.
50 to 60 tonnes . . .	1	The National Rayon Corporation Ltd.
60 to 70 tonnes . . .	..	Nil
70 to 80 tonnes . . .	1	Saurashtra Chemicals.
80 to 100 tonnes . . .	..	Nil
Above 100 tonnes . .	2	The Mettur Chemical and Industrial Corporation Ltd., Dhrangadhra Chemical Works Ltd.
	26*	

*Two units of Titaghur Paper Mills are considered separately.

There are six units producing caustic soda liquid and solid; three produce only solid and flakes for sale and 16 produce only liquid caustic soda. Chlorine, being an inevitable product in the process of the manufacture of electrolytic caustic soda, is produced by all the units, except Saurashtra Chemicals which produces caustic soda by the chemical process. It is, however, utilised only in varying proportions according to the local demand. Hydrochloric acid is produced for commercial utilisation by 17 units only and bleaching powder only by two.

5.3. The State-wise distribution of the units is as follows:—

State	No. of units
Andhra Pradesh	2
Bihar	1
Delhi	1
Gujarat	4
Haryana	1
Kerala	1
Madhya Pradesh	2
Maharashtra	4
Mysore	1
Madras	2
Orissa	1
Rajasthan	1
Uttar Pradesh	1
West Bengal	3
	25

6. Capacity

6.1. *Caustic Soda.*—At the last protection inquiry in 1964, the total annual installed capacity for caustic soda was estimated at 233,362 tonnes, while the rated capacity was estimated at 210,026 tonnes. The installed capacity now reported by the D.G.T.D. is 296,333 tonnes.

6.2. *Chlorine.*—In the electrolytic process, chlorine equivalent to about 87% of the caustic soda is obtained. This can be converted either into liquid chlorine for sale or into hydrochloric acid. Such of the hydrochloric acid as has a market can be sold and the rest has to be diluted and then drained away. The capacity for liquid chlorine reported by the D.G.T.D. is 127,655 tonnes.

6.3. *Hydrochloric acid.*—The D.G.T.D. has reported a capacity of 58,470 tonnes per annum. The capacity for hydrochloric acid is, however, flexible and can be adjusted to suit the demand.

6.4. *Bleaching powder.*—Only two units, namely, Mettur Chemical and D.C.M. Chemical are manufacturing bleaching powder. The figures of annual capacity, as furnished by the D.G.T.D., are as follows :—

Mettur Chemical & Industrial Corpn. Ltd.	10,800 tonnes
D.C.M. Chemical Works . . .	5,500 tonnes

6.5. On the basis of the capacities reported by the units as well as by the D.G.T.D., the capacities for each of the units arrived at in respect of caustic soda, liquid chlorine and hydrochloric acid are as follows :—

TABLE NO. 2

Unitwise data on present capacity

(In tonnes per annum)

Sl. No.	Unit	Installed capacity for		
		Caustic Soda	Liquid chlorine	Hydrochloric acid
1	2	3	4	5
1	Dhrangadhra Chemical Works Ltd., Sahupuram.	54,000	19,800	770

TABLE NO. 2—*contd.*

1	2	3	4	5
2	The Mettur Chemical & Industrial Corporation Ltd., Mettur Dam.	40,000	14,300	16,500
3	The National Rayon Corporation Ltd., Kalyan.	19,800	9,470	3,600
4	Shriram Vinyl & Chemical Industries, Kota.	16,500	14,300	12,000
5	Kanoria Chemicals & Industries Ltd , Renukoot.	16,500	9,075	6,600
6	The Travancore-Cochin Chemicals Ltd , Udyogmandal.	13,200	3,025	9,240
7	Hukumchand Jute Mills Ltd., Amlai.	10,800	7,920	500
8	Calico Chemicals & Plastics Division, Bombay.	10,800	6,990	1,006
9	The Andhra Sugars Ltd., Tanuku.	9,900	7,920	2,600
10	Century Chemicals, Kalyan	9,900	3,300	8,910
11	The Atul Products Ltd., Bulsar	6,600	3,300	2,200
12	Hindusthan Heavy Chemicals Ltd., Calcutta.	4,200	1,980	..
13	The National Newsprint & Paper Mills Ltd., Nepanagar.	4,068	825	200
14	Rohtas Industries Ltd., Dalminagar.	5,400	1,670	244
15	Orient Paper Mills Ltd., Brajrajnagar.	3,240	..	..
16	J. K. Chemicals Ltd., Bombay	1,000	850	..
17	The D.C.M. Chemical Works, Delhi.	11,550	10,230	5,610

TABLE No. 2—*contd.*

1	2	3	4	5
18	The Alkali & Chemical Corporation of India Ltd., Calcutta.	9,240	5,340	1,290
19	Tata Chemicals Ltd., Mithapur	13,000	5,460	2,058
20	Sirpur Paper Mills Ltd., Sirpur-Kaghaznagar.	6,270	..	..
21	The Titaghur Paper Mills Co. Ltd., Titaghur.	6,420	..	..
22	Calico Mills Chemical Division, Ahmedabad.	2,310	1,900	604
23	Shree Gopal Paper Mills Ltd., Jagadhri.	660	..	..
24	The Mysore Paper Mills Ltd., Bhadravati.	575	..	..
25	Saurashtra Chemicals, Porbandar.	20,400	Not applicable	Not applicable
	TOTAL .	296,333	127,655	73,932

6.6. For caustic soda and chlorine, the figures furnished by the D.G.T.D. have been adopted. In the case of hydrochloric acid, there are wide variations between the figures reported by the units and the D.G.T.D. and on the latters advice, the figures furnished by the units have been adopted.

7. Future expansion

7.1. At the last inquiry held in 1964, the D.G.T.D. had indicated that additional capacity for caustic soda of the order of 218,168 tonnes had been licensed partly for the expansion of existing units and partly for the establishment of new ones. Installation of capacity to the extent of 179,368 tonnes only was likely to be effected by the end of the financial year 1966-67 and the remaining capacity was not likely to be installed. The position now is that out of the additional capacity expected to

come up, only a capacity of 70,968 tonnes has so far been installed and of the remaining, a capacity of 79,800 tonnes is likely to be installed during the current year and in the next. Licences for capacities to the extent of 16,600 tonnes given to NNP & Paper Mills (5,000), J.K. Chemicals (6,600) and Rohtas Industries (1st stage 5,000) have been revoked, cancelled or surrendered, and the installation of 12,000 tonnes capacity covered by licences issued upto 1964 may go beyond 1968. In the meanwhile, additional licences for a total capacity of 209,150 tonnes have been issued of which 123,990 tonnes are for expansion of the existing units and the remaining 85,160 tonnes for the installation of new units. Details of the capacity licensed until 1964 and not yet installed together with the dates by which this capacity is likely to be implemented the licences for expansion of the existing capacity as well as those issued to new units are as follows :—

TABLE NO. 3(a)

Future expansion of capacity for caustic soda

(In tonnes)

Units	Capacity for which licence granted		Year by which implementation was expected	Year by which installation now expected
	Expansion	New		
1	2	3	4	5
Licences granted until 1964 but not yet implemented				
1. Jayshree Chemicals	..	16,500	1965-66	1967
2. Mysore Chemicals & Fertilisers (Now Mysore Sugars).	..	12,000	1966-67	1970
3. Indian Dyestuff Industries (Now Standard Mills Co.).	..	33,000	1966-67	1967
4. Travancore-Cochin Chemicals Ltd.	19,800	..	1965-66	1968
5. Durgapur Chemicals	..	10,500	1965-66	1968
TOTAL	19,800	72,000	91,800	

TABLE No. 3 (a)—*contd.*

1	2	3	4	5
Additional licences granted				
6. Standard Mills Co. .	..	1,660	..	1967
7. The Titaghur Paper Mills Co. Ltd.	1,650	..	..	1968
8. The D.C.M. Chemical Works.	4,950	..	..	1968
9. The Atual Products Ltd.	1,800	..	..	1968
10. Century Chemicals .	6,600	..	..	1968
11. Shriram Vinyl & Chemical Industries.	16,500	..	..	1968
12. Hindusthan Heavy Chemicals Ltd. .	2,400	..	..	1968
13. Calico Chemicals & Plastics Division.	1,650	..	..	1968
14. Shree Gopal Paper Mills.	5,940	..	..	1969
15. Hindusthan Organic Chemicals.	..	11,500	..	1969
16. Gwalior Rayon .	..	33,000	..	1969
17. Calico Chemicals & Plastics Division.	16,500	..	..	1970
18. Madras Chemicals .	..	16,500	..	1970
19. Kailas Textiles & Chemicals.	..	6,000	..	1970
20. Shriram Vinyl & Chemical Industries.	66,000	..	..	1971
21. Chemico . .	..	16,500	..	1971
TOTAL .	123,990	85,160	209,150	
GRAND TOTAL .		300,950		

The following table gives the expected annual increase of capacity.

TABLE NO. 3(b)

Annual break-up of future capacity

(In tonnes)

Year of installation of capacity	Capacity based on: Licences granted upto 1964 and in force		Licences granted from 1964 to now and in force		Total
	Expansion	New	Expansion	New	
1967	..	49,500	..	1,660	51,160
1968	19,800	10,500	35,550	..	65,850
1969	..	..	5,940	44,500	50,440
1970	..	12,000	16,500	22,500	51,000
1971	..	..	66,000	16,500	82,500
TOTAL	19,800	72,000	123,990	85,160	300,950

The total installed capacity for caustic soda according to the data received from the D.G.T.D. is 296,333 tonnes and an additional capacity of 300,950 tonnes is likely to be set up within the next four years. If implemented, this will be more than double the present capacity of caustic soda in the country and by 1971, the total capacity for caustic soda would be of the order of about 597,000 tonnes. It is to be hoped that the future demand for caustic soda as well as its inevitable co-product chlorine will keep up with this greatly increased capacity.

7.2. *Chlorine.*—No separate licensing of additional or new capacities of liquid chlorine has been done by the D.G.T.D. The matter nevertheless needs the attention of Government since the chlorine produced has a value and if it cannot be realised by its utilisation and sale, its cost of production has inevitably to be loaded on to caustic soda. We would, therefore, suggest that Government may examine the question of licensing of the additional capacity of chlorine which will develop as a result of the capacity sanctioned for caustic soda, in keeping with the policy that may be worked out for its utilisation. This is discussed in paragraph 10.

7.3. *Hydrochloric acid.*—No licences for additional or new capacities for hydrochloric acid have been issued, according to the information conveyed to us by the D.G.T.D.

7.4. *Bleaching Powder.*—The D.G.T.D. has also informed us that a licence for the production of 16,000 tonnes of bleaching powder has been given to Kanoria Chemicals & Industries Ltd., and out of this it would commence the production of 5,500 tonnes from the year 1968. By next year, therefore, the total effective capacity for bleaching powder will go up to 21,800 tonnes. In the course of the discussions which w had with the representatives of the industry, grave doubts were expressed whether indigenous demand was likely to keep pace with this great increase in capacity and production. For, it was stated that while Kanoria Chemicals & Industries Ltd., was not yet in production, stocks to the extent of 950 tonnes were held by Mettur Chemical & Industrial Corporation Ltd. for want of demand. The demand for bleaching powder, we have been informed, is not likely to rise spectacularly on the other hand, a shift to the demand for other bleaching chemicals resulting in the shrinkage of the demand for bleaching powder is more likely.

8. Production

8.1. During the last 10 years, there has been a spectacular increase in the production of caustic soda as would be seen from the table below :—

TABLE No. 4

Production of caustic soda

(In tonnes)

Year	Technical grade	Rayon grade	Total
1957	..	..	43,721
1958	44,229	14,082	58,311
1959	45,515	24,968	70,483
1960	52,740	44,660	97,400
1961	66,859	51,551	118,410
1962	71,304	52,324	123,628
1963	81,929	70,069	151,998
1964	75,843	108,182	184,025
1965	80,056	134,898	214,954
1966	74,295	156,164	230,459

The figures of production of caustic soda by individual units during the last three years as reported by the D.G. T.D. in each of the three forms, liquid, solid and flakes, are given in Appendix 5. more Particulars of the total production together with capacity and percentages of the capacity utilised are as follows :—

TABLE NO. 5

Production and capacity of caustic soda utilised by individual units

(In tonnes)

Sl. No.	Unit	1964			1965			1966			Remarks
		Capacity	Production	% utilisation	Capacity	Production	% utilisation	Capacity	Production	% utilisation	
1	2	3	4	5	6	7	8	9	10	11	12
	Electrolytic (Mercury)										
1	Dhrangadhra Chemical Works, Ltd. . .	54,000	40,898	75·7	54,000	38,748	77·8	54,000	40,632	75·2	
2	The Mettur Chemical & Industrial Corporation Ltd.	..	..	..	19,800	675	4·4	19,800	4,614	23·3	
3	The National Rayon Corporation Ltd.	19,800	15,371	77·6	19,800	17,809	89·9	19,800	21,442	108·3	
4	Shriram Vinyl & Chemical Industries .	16,500	13,486	81·7	16,500	11,076	67·1	16,500	9,204	55·8	
5	Kanoria Chemicals & Industries Ltd. .	16,500	1,851	11·2	16,500	13,506	81·9	16,500	15,055	91·2	
6	The Travancore-Cochin Chemicals Ltd.	13,200	10,495	79·5	13,200	11,325	85·8	13,200	8,064	61·1	
7	Hukumchand Jute Mills Ltd. . . .	..	..	..	10,800	3,075	28·5	10,800	12,177	112·8	
8	Calico Chemicals & Plastics Division .	10,800	10,961	101·5	10,800	11,422	105·8	10,800	10,486	97·1	
9	The Andhra Sugars Ltd.	..	..	..	9,900	1,240	12·5	9,900	4,267	43·1	
10	Century Chemicals	9,900	1,494	15·1	9,900	10,543	106·5	9,900	15,029	151·8	
11	*The Atul Products Ltd. . . .	6,600	2,630	39·8	6,600	3,056	46·3	6,600	3,000	45·5	*The unit has reported that its capacity is partly utilized for the production of caustic potash also.
12	Hindusthan Heavy Chemicals Ltd. .	4,200	1,791	42·6	4,200	2,397	57·1	4,200	2,615	62·3	
13	The National Newsprint & Paper Mills Ltd.	..	..	..	4,068	994	24·4	4,068	1,986	48·8	
14	Rohtas Industries Ltd.	3,420	4,590	134·2	3,420	4,660	136·3	3,420	3,502	102·4	

15	Orient Paper Mills Ltd.	3,240	3,285	101·4	3,240	3,208	99·0	3,240	3,024	93·3
16	J. K Chemicals Ltd.	1,000	1,330	133·3	1,000	1,164	116·4	1,000	1,067	106·7
	TOTAL	159,160	108,182	68·0	203,728	134,898	66·2	203,728	156,164	76·7
	Electrolytic (Diaphragm)									
2(a)	Mettur Chemical & Industrial Corporation Ltd.	20,200	15,433	76·4	20,200	18,676	92·5	20,200	17,672	87·5
17	The D. C. M. Chemical Works	11,550	12,800	110·8	11,550	13,592	117·7	11,550	12,423	107·6
18	The Alkali & Chemical Corporation of India Ltd.	6,930	7,572	109·3	9,240	8,055	87·2	9,240	7,188	77·8
19	Tata Chemicals Ltd.	7,000	3,878	55·4	7,000	4,759	68·0	7,000	4,685	66·9
20	The Sirpur Paper Mills Ltd.	6,270	5,433	86·7	6,270	5,690	90·7	6,270	5,329	85·0
21	The Titaghur Paper Mills Co. Ltd.	6,420	5,385	83·9	6,420	5,929	92·4	6,420	5,998	93·4
22	Calico Mills Chemical Division	2,310	2,633	114·0	2,310	2,434	105·4	2,310	2,533	109·7
14(a)	Rohtas Industries Ltd.	1,980	1,685	85·1	1,980	1,806	91·2	1,980	1,379	69·6
23	Shree Gopal Paper Mills Ltd.	660	710	107·6	660	649	98·3	660	723	109·5
24	The Mysore Paper Mills Ltd.	575	534	92·9	575	429	74·6	575	470	81·7
	TOTAL	63,895	56,063	87·7	66,205	62,019	93·7	66,205	58,400	88·2
	Chemical									
25	Saurashtra Chemicals	20,400	19,780	97·0	20,400	18,037	88·4	20,400	15,895	77·9
19(a)	Tata Chemicals Ltd.	6,000	Marginal	..	6,000	Marginal	..	6,000	Marginal	..
	GRAND TOTAL	249,455	184,025	73·8	296,333	214,954	72·5	296,333	230,459	77·8

8.2. There has been a significant under-utilisation of capacity in the case of Shriram Vinyl and Chemical Industries Kota, The Travancore-Cochin Chemicals Ltd., Udyogmandal, The Alkali & Chemical Corporation of India Ltd., Rishra and Rohtas Industries Ltd., Dalmianagar. Shriram Vinyl and Chemical Industries has stated that the fall in production resulted from the introduction of power cut upto 60% by the Rajasthan State Electricity Board. We understand that in the case of The Travancore-Cochin Chemicals and Rohtas Industries Ltd. low output was due to labour troubles, while The Alkali & Chemical Corporation had a fall in output owing to loss in efficiency of the plant. In the previous two years, no less than 11 and 12 units respectively achieved the production of more than 90% of their capacity and in 1966, the production was well above the installed capacity in eight cases. In the case of Century Chemicals, Kalyan, the production in 1966 was 151.8% of the capacity licensed and said to be installed. Hukumchand Jute Mills Ltd. achieved 112.8% of its capacity in the same year. While the performance is no doubt creditable, there is need in both cases to reassess the installed capacity and, if necessary, to regularise it by issuing licences for additional capacity. The average figures of under-utilisation are not fully representative of the industry, since in some cases under-utilisation resulted from teething troubles of newly installed units and in others, from other reasons. It would be reasonable to expect that in future the industry should be able to utilise the installed capacity to the extent of 90%.

8.3. Break-up of the production into technical and rayon grades and the forms in which caustic soda was produced is as follows :

TABLE NO. 6

Break-up of production of caustic soda by grades and forms

(In tonnes)

Forms	1964			1965			1966		
	Technical Grade	Rayon Grade	Total	Technical Grade	Rayon Grade	Total	Technical Grade	Rayon Grade	Total
	1	2	3	1	2	3	1	2	3
Liquid	43,675	64,250	107,926	48,700	92,623	141,323	43,687	108,243	151,930
Fused Solid	23,894	36,144	60,038	18,999	34,118	53,117	21,208	40,545	61,753
Flakes	8,273	7,788	16,061	12,357	8,157	20,514	9,400	7,376	16,776
Total .	175,843	108,182	184,025	80,056	134,898	214,954	74,295	156,164	230,459
%of Cols . 1 & 2 to Col. 3	41·2	58·8	100	37·2	62·8	100	32·2	67·8	100

A few significant trends can be discerned from these figures There has been an increase in the proportion of the rayon grade to technical grade. Of the total caustic soda produced, 58.8% was rayon grade in 1964 which went up to 62.8% in 1965 and to 67.8% in 1966. Liquid caustic soda was 58.6% of the total production in 1964, and went up to 65.7% in 1965 and 65.9% in 1966. There appears thus to be a clear tendency for the utilisation of a greater proportion of caustic soda in liquid form which is more economical than converting it into solid or flakes. Flakes constituted only 8.7% of the total production in 1964, 9.5% in 1965 and 7.3% in 1966. As a result of the utilisation of caustic soda in the liquid form, the demand for black steel sheets for drums is not likely to have gone up appreciably.

8.4. *Liquid Chlorine.*—Particulars of liquid chlorine produced by the different units during the last three years are as follows :

TABLE NO. 7

Figures of production of liquid chlorine

(In tonnes)

Sl. No.	Unit	Installed capacity as in 1966	Production during 1964	1965	1966
1	2	3	4	5	6
1	Dhrangadhra Chemical Works Ltd.	19,800	Nil	1,954	1,460
2	The Mettur Chemical & Industrial Corporation Ltd. .	14,300	9,491	10,581	10,460
3	The National Rayon Corporation, Ltd.	9,470	3,400	5,213	6,096
4	Shriram Vinyl & Chemical Industries	14,300	2,428	Nil	603

TABLE No. 7—*Contd.*

1	2	3	4	5	6
5	Kanoria Chemicals & Industries Ltd.	9,075	476	6,121	6,314
6	The Travancore-Cochin Chemicals Ltd.	3,025	2,979	3,362	2,272
7	Hukumchand Jute Mills Ltd.	7,920	..	486	5,380
8	Calico Chemicals & Plastics Division	6,990	4,825	4,797	3,638
9	The Andhra Sugars Ltd. .	7,920	..	271	1,004
10	Century Chemicals . .	3,300	50	2,685	3,065
11	The Atul Products Ltd. .	3,300	1,379	1,425	1,512
12	Hindusthan Heavy Chemicals Ltd.	1,980	942	1,196	1,355
13	The National Newsprint & Paper Mills Ltd. . . .	825	..	..	127
14	Rohtas Industries, Ltd. .	1,670	443	392	435
15	Orient Paper Mills Ltd. .	..	..	..	..
16	J. K. Chemicals Ltd. . .	850	1,244	1,105	652
17	The D. C. M. Chemical Works	10,230	8,819	9,125	8,863
18	The Alkali & Chemical Corporation of India Ltd. . .	5,340	6,092	5,844	5,186
19	Tata Chemicals Ltd. . .	5,460	2,640	2,932	2,461
20	Sirpur Paper Mills, Ltd. .	..	..	..	..
21	The Titaghur Paper Mills Co., Ltd.	..	..	..	..
22	Calico Mills Chemical Division	1,900	974	1,152	1,308
23	Shree Gopal Paper Mills Ltd.	..	..	..	..
24	The Mysore Paper Mills Ltd.	..	..	..	..
	TOTAL .	127,655	46,182	58,641	62,191

8.5. It would be observed that even less than half of the installed capacity was utilised in 1966 owing to lack of demand. If the potential of capacity for chlorine, which is linked with the production of caustic soda, is taken into consideration, it would amount to 182,380 tonnes, of which only 62.2 per cent has been utilised in the form of liquid chlorine as well as chlorine in other forms. Since every litre of caustic soda produced is loaded with the cost of the unutilised chlorine, it is necessary to emphasize the extent to which the burden of lack of utilisation of capacity for liquid chlorine falls on caustic soda. This would be evident from the statement given on page Nos. 25 & 26 which contains particulars of the chlorine available, the actual quantity of chlorine utilised and the percentage of utilisation.

8.6. Captive units are likely to have achieved full utilisation as is evident from the figures of the five units which have reported, namely The NN & P Mills, Rohtas Industries, Sirpur Paper Mills, The Titaghur Paper Mills, and The Mysore Paper Mills. Of the sixteen independent units, as many as six utilised in 1966 more than 90% of the chlorine produced, three more than 75%, five between 50 and 75% and only two below 50% of which Dhrangadhra Chemical Works had the lowest utilisation percentage of 8.7. Particulars for the utilisation of chlorine for different products in the previous three years are given on page Nos. 27 & 28 :—

TABLE NO. 8

Utilisation of chlorine by different units

(In tonnes)

Sl. No.	Unit	Chlorine available	Chlorine utilised (in all forms)	Percentage utilisation	Chlorine available	Chlorine utilised (in all forms)	Percentage utilisation	Chlorine available	Chlorine utilised (in all forms)	Percentage utilisation
1	2	3	4	5	6	7	8	9	10	11
1	Dhrangadhra Chemical Works . . .	36,429	767	2·1	35,177	2,020	5·7	36,785	3,189	8·7
2	The Mettur Chemical & Industrial Corporation Ltd.	14,614	10,885	73·1	17,299	12,867	75·4	20,676	13,517	65·4
3	The National Rayon Corporation Ltd. .	12,660	6,876	54·3	15,074	8,285	54·9	17,850	10,339	57·9
4	Shriram Vinyl & Chemical Industries .	11,965	10,486	87·6	9,818	7,952	81·1	8,158	7,361	90·2
5	Kanoria Chemicals & Industries Ltd. .	1,643	530	33·3	12,130	6,774	55·9	13,362	7,606	56·9
6	The Travancore-Cochin Chemicals Ltd. .	9,961	8,595	86·3	10,914	9,249	84·7	7,763	6,609	85·1
7	Hukumchand Jute Mills Ltd. . . .	..	..	..	2,707	1,474	54·5	10,701	8,253	77·1
8	Calico Chemicals & Plastics Division .	9,711	9,180	94·5	10,121	9,729	96·1	9,291	8,471	91·2
9	[illegible]				1,224	271	22·2	2,297	1,348	58·6
10	[illegible]							13,299	6,933	52·0
11	The Atul Products Ltd. . .									
12	Hindusthan Heavy Chemicals Ltd. . .	1,577	1,218	77.2	2,109	[illegible]				
13	The National Newsprint & Paper Mills Ltd.	..	..	..	881	809	91·8	1,763	1,667	94·6
14	Rohtas Industries Ltd.	5,441	5,404	99·3	5,865	5,823	99·3	5,717	5,676	99·3

TABLE No. 8—*Contd.*

1	2	3	4	5	6	7	8	9	10	11
15	Orient Paper Mills Ltd.	2,662	2,662	100·0	2,662	2,662	100·0	2,662	2,662	100·0
16	J. K. Chemicals Ltd.	2,409	1,693	70·2	2,257	1,205	53·4	1,528	1,066	71·1
17	The D. C. M. Chemical Works . .	11,510	10,397	90·3	11,412	10,717	93·9	11,251	10,724	98·3
18	The Alkali & Chemical Corporation of India Ltd.	7,486	7,420	99·1	7,808	7,723	98·9	7,130	7,034	98·7
19	Tata Chemicals Ltd.	3,620	3,588	99·1	3,782	3,755	99·3	3,374	3,312	98·2
20	Sirpur Paper Mills Ltd.	4,943	4,943	100·0	5,813	5,183	100·0	4,917	4,917	100·0
21	The Titaghur Paper Mills Ltd. No. 1 .	2,905	2,775	95·5	2,975	2,744	92·3	2,998	2,924	97·5
	No. 2 .	1,767	1,767	100·0	2,187	2,787	100·00	2,225	2,225	100·0
22	Shree Gopal Paper Mills Ltd. . . .	..	..	..	..	..	..	..	..	..
23	Calico Mills Chemical Division . .	2,379	2,342	98·4	2,280	2,258	99·0	2,379	2,313	97·2
24	The Mysore Paper Mills	532	492	92·5	532	394	74·1	534	411	77·3
	TOTAL .	148,449	94,380	63·6	177,136	113,608	64·1	182,664	123,738	67·7

TABLE No. 9

Chlorine utilized in 1964, 1965 *and* 1966

(In tonnes)

	1964	1965	1966
1. Chlorine in forms such as Liquid Chlorine, Bleaching powder and Bleach Liquor for :—			
(a) Paper	43,560	49,525	54,000
(b) Textiles	7,000	8,000	9,000
(c) Water treatment and Sanitation	6,300	7,000	8,500
TOTAL	56,860	64,525	71,500
2. Chlorine for manufacture of Hydrochloric acid for :—			
(a) Direct use as acid	2,270	3,130	3,540
(b) Manufacture of Zinc Chloride	270	480	300
(c) Ammonium Chloride	2,780	3,560	2,655
(d) Other Chlorides such as Nickel Chloride, Phosphorous Chloride, Aluminium Chloride, Copper Chloride etc.	1,010	925	1,020
(e) Rare earths	1,545	1,910	1,650
(f) Other inorganic products such as Bleaching earth and Bleaching Powder	7,565	7,405	9,485
TOTAL	15,440	17,410	18,650

TABLE NO. 9—*Contd.*

(In tonnes)

	1964	1965	1966
3 Chlorine for :—			
(a) Insecticides	11,935	12,795	13,520
(b) Plastic raw materials	6,900	9,140	8,100
(c) Miscellaneous Organic and Inorganic Chemicals	940	1,355	1,760
TOTAL	19,775	23,290	23,380
GRAND TOTAL	92,075	105,225	113,530
1. Production of electrolytic Caustic Soda in the years	164,245	196,918	214,564
2. Production of Chlorine Gas @0·85 tonne per tonne of Caustic Soda	139,600	167,380	182,380
3. Percentage of Chlorine utilized on the basis of details worked out above	65·9	62·8	62·2

There is some variation between the unit-wise figures of utilisation and the overall figures but the differences are not significant and may have arisen in so far as Table No. 9 is concerned, from the estimation of the utilisation which has necessarily to be made in respect of the various uses, while figures in Table No. 8 are based on actual sales and utilisation of individual units.

8.7. *Hydrochloric acid.*—Chlorine (combined with hydrogen) is converted into hydrochloic acid for use either as a chemical or for destruction of the surplus chlorine, since chlorine cannot in liquid or gaseous form and without conversion into another less injurious chemical be let out into the atmosphere or otherwise drained. The production of hydrochloric acid is, therefore, to a considerable extent flexible and depends on its demand. The unit-wise production of usable hydrochloric acid for the last three years was as follows :—

TABLE NO. 10

Figures of production of hydrochloric acid

(In tonnes)

Sl. No.	Unit	1964	1965	1966
1.	Dhrangadhra Chemical Works .	587	476	1,456
2.	The Mettur Chemical & Industrial Corporation Ltd. . .	1,212	1,540	1,762
3.	The National Rayon Corporation	2,475	3,072	4,242
4.	Shriram Vinyl & Chemical Industries	6,155	7,343	5,734
5.	Kanoria Chemicals & Industries Ltd.	54	653	1,197
6.	The Travancore-Cochin Chemicals Ltd.	2,682	2,607	1,663

TABLE No. 10—*Contd.*

(In tonnes)

Sl. No.	Unit	1964	1965	1966
7.	Hukumchand Jute Mills Ltd.	..	55	303
8.	Calico Chemicals and Plastics Division	603	855	675
9.	The Andhra Sugars Ltd.	..	..	190
10.	Century Chemicals	333	1,987	3,257
11.	The Atul Products Ltd.	788	1,009	1,498
12.	Hindusthan Heavy Chemicals Ltd.	271	539	792
13.	The National Newsprint & Paper Mills Ltd.	..	156	764
14.	Rohtas Industries Ltd.	136	101	327
15.	Orient Paper Mills Ltd.	..	..	..
16.	J. K. Chemicals Ltd.	448	95	434
17.	The D. C. M. Chemical Works	1,353	1,364	1,600
18.	The Alkali & Chemical Corporation of India Ltd.	1,329	1,882	1,851
19.	Tata Chemicals Ltd.	881	723	810
20.	Sirpur Paper Mills Ltd.	..	..	..
21.	The Titaghur Paper Mills Co. Ltd.	..	..	..
22.	Calico Mills Chemical Division	571	350	288
23.	Shree Gopal Paper Mills Ltd.	..	..	..
24.	The Mysore Paper Mills Ltd.	..	..	..
	TOTAL	19,878	24,807	28,843

8.8. *Bleaching powder.*—Upto 1965, The Mettur Chemical & Industrial Corporation Ltd. was the sole producer of stable bleaching powder. The plant of the D. C. M. Chemical Works was commissioned in 1966 and produced 2,670 tonnes of stable bleaching powder in that year. The total production of stable bleaching powder according to the D. G. T. D. during the last three years was as follows :—

TABLE NO. 11

Production of Bleaching powder

(In tonnes)

Year	Mettur	D.C.M.	Total
1964 .	7,937	Nil	7,937
1965 .	7,369	Nil	7,369
1966 .	8,140	2,670	10,810

9. Utilisation stocks and future demand

9.1.1. Ever since the industry was protected about twenty years ago, the production has gone up continuously. On the other hand, the availability of caustic soda does not reveal any consistent pattern. For, there have been large imports in certain years, while in other years these have been much smaller. Except in 1966, imports were fairly heavy during the previous four years and varied between 68,000 and 76,000 tonnes annually. The figures of availability of caustic soda during the last five years are as follows :—

TABLE NO. 12

Production and imports of caustic soda

(In tonnes)

Year	Production	Imports	Total
1962 .	123,628	75,886	199,514
1963 .	151,998	67,913	219,911
1964 .	184,025	73,508	257,533
1965 .	214,954	71,680	286,634
1966 .	230,459	20,640	251,099

9.1.2. As against these figures, the particulars of utilisation furnished to us by the D. G. T. D. are as follows :—

TABLE NO. 13

Utilisation of caustic soda

Name of the consuming industry	Consumption of caustic soda (in thousand tonnes)		
	1964	1965	1966
1. Rayon	62	65	69
2. Textiles	41	42	43
3. Paper	39	43	47
4. Soap	34	36	40
5. Aluminium	12	13	15
6. Vanaspati	3	4	4
7. Petroleum refining . .	2	2	2
8. Others	31	33	35
	224	238	255

9.1.3. At the public inquiry, the representative of the Textile Commissioner informed us that the consumption of caustic soda by the textile industry was of the order of 51,000, 50,000 and 49,000 tonnes for the years 1964, 1965 and 1966 respectively. We are inclined to adopt these figures and to substitute them for those of the D. G. T. D. for arriving at the totals of consumption in the previous three years. This would raise the consumption figures to 234,000, 246,000 and 261,000 tonnes for the corresponding years.

9.2.1. The figures of availability during a particular year necessarily include the stocks brought over from the previous year. According to the information received from

the D. G. T. D. with regard to the stocks with indigenous producers and those of imported caustic soda with the State Trading Corporation, the figures are as follows :—

TABLE NO. 14

Stocks of caustic soda

(In tonnes)

	1964	1965	1966	1967
1. Indigenous stocks brought forward . . .	3,142	3,821	7,574	18,615
2. Imported stocks brought forward . . .	3,985	15,690	17,920	21,651
3. Total of 1 and 2 . .	7,127	19,511	25,494	40,266
4. Production during the year	184,025	214,954	230,459	
5. Imports during the year	73,508	71,680	20,640	
6. Availability during the year (indigenous) . .	187,167	218,775	238,033	
7. Availability during the year (imported) . .	77,493	87,370	38,560	
8. Total of 6 and 7 . .	264,660	306,145	276,593	
9. Utilisation reported during the year . . .	234,000	246,000	261,000	
10. Difference between 8 and 9	30,660	60,145	15,593	
11. Carried forward . .	19,511	25,494	40,266	
12. Difference between 10 and 11.	11,149	34,651	(—)24,673	

9.2.2. The figures of the stocks carried forward received from the Alkali Manufacturers' Association as well as from the individual units have a reasonable correspondence with the figures reported by the D. G. T. D. But taking into consideration the figures of consumption, these stocks are far short of the actual balances left over. The result is that the carry forward to the year 1967 from 1966 is 24,673 tonnes in excess of the apparent stock that should have been left over at the end of the year 1966. It appears, therefore, that there were certain other stocks held either by the consuming industries, selling agents or the importers in the years 1965 and 1966 which have not been shown. Even after setting off the excess carry over against the balance left in the previous two years, there is still an unaccounted surplus of more than 21,000 tonnes according to these figures. If the excess of actuals intimated to us by the representatives of the Textile Commissioner over those reported by the D. G. T. D. is discounted, this unaccounted surplus of availability to utilisation would go upto more than 45,000 tonnes. The actuals of consumption reveal a large gap which needs to be accounted for. For, it is unlikely that notwithstanding the easy availability of caustic soda the dealers or consumers would carry large stocks with them. It was contended by the representative of one of the soap manufacturing interests that as against the D. G. T. D's estimate of 40,000 tonnes as the total consumption of caustic soda for soap making in 1966, the actual consumption both by the organised as well as the small scale sector was likely to be 53,000 tonnes. If this estimate is accepted and similar increases adopted for the previous years too, the unaccounted surplus is likely to disappear. We would, however, suggest that the data should be collected more accurately in respect of consumption.

9.3. There are no imports of liquid chlorine or hydrocloric acid and domestic demand is fully met by indigenous production. There has also been no significant build-up of stocks since the production is usually adjusted to demand.

9.4.1. *Future Demand.*—The figures of future demand as estimated by the D. G. T. D. and communicated to us are as follows :—

TABLE NO. 15(a)

Future Demand of Caustic Soda as estimated by the D.G.T.D.

(In '000 tonnes)

Sl. No.	Industry or product	1967	1968	1969	1970
1.	Rayon	78	84	91	107
2.	Textiles	45	47	49	51
3.	Paper	49	53	59	66
4.	Soap	44	48	54	60
5.	Aluminium	21	28	39	54
6.	Vanaspati	4	5	5	6
7.	Petroleum Refining	5	6	7	8
8.	Rare Earths & Miscellaneous	33	35	38	41
	TOTAL	279	306	342	393

On the other hand, the Alkali Manufacturers' Association's estimate from 1967 to 1969 is as follows :—

TABLE NO. 15 (b)

Alkali Manufacturers' Association's Estimate of Future Demand of Caustic Soda

(In '000 tonnes)

Sl. No.	Consuming industry	1967	1968	1969
1.	Rayon	100	110	120
2.	Textiles	47	49	50
3.	Paper and paper boards	70	75	80
4.	Soap	55	60	65
5.	Aluminium	25	30	40
6.	Others	30	35	40
	TOTAL	327	359	395

9.4.2. The estimates of the Alkali Manufacturers' Association as compared to those of the D. G. T. D. are higher by 48,000; 53,000 and 53,000 tonnes for the years 1967, 1968 and 1969 respectively. The matter was discussed at some length at the public inquiry. The representatives of the Alkali Manufacturers' Association said that they had framed these estimates on the basis of the targets fixed by the Planning Commission. It was observed on behalf of the Association that for rayon, the consumption would be of the order of 80,000; 90,000 and 100,000 tonnes for the years 1968, 1969 and 1970 respectively. The representative of the Textile Commissioner observed that the consumption of caustic soda for the textile industry excluding rayon was 51,000; 50,000 and 49,000 tonnes for the years 1964, 1965 and 1966 respectively and the expected an annual consumption of the order of 50,000 tonnes during the current and the next two years. The representative of Hindustan Lever Ltd. estimated that the total consumption of caustic soda by the soap industry in 1966 was 53,000 tonnes as against 40,000 tonnes now reported by the D. G. T. D., that it would be 57,000 tonnes in the current year as against 44,000 tonnes estimated by the D. G. T. D. and 60,000 tonnes for 1968, 63,000 tonnes for 1969 and 65,000 tonnes for 1970. The corresponding figures of the D. G. T. D. for the years 1968, 1969 and 1970 are 48,000 54,000 and 60,000 tonnes respectively. For aluminium the estimate for the future consumption suggested by the representative of the Indian Aluminium Co. Ltd., was 28,000 tonnes for each of the years with an increase on the basis of units that were likely to come up in the year 1970 and later.

9.4.3. According to the figures furnished by the D. G. T. D., the consumption of caustic soda for 1965 was 238,000 tonnes only. Even if the additional estimate of consumption by the Textile industry as intimated by the Textile Commissioner is added, this figure would come to 246,000 tonnes. The D. G. T. D. has estimated a demand of 393,000 tonnes in the year 1970. If the consumption of caustic soda by the various industries in the previous years can be any guide for the determination of the future demand, the estimate as now framed by the D. G. T. D., though on the high side in respect of some items, does not appear to be exaggerated

Taking into consideration the evidence offered before us by the various interests concerned, we have arrived at the following estimates of future demand of caustic soda for the current and the next three years.

TABLE NO. 16

Our Estimates of future Consumption of Caustic Soda

(In thousand tonnes)

Sl. No.	Industry	1967	1968	1969	1970
1.	Rayon	78	84	91	100
2.	Textiles	50	50	50	51
3.	Paper	49	53	59	66
4.	Soap	44	48	54	60
5.	Aluminium	21	28	28	28
6.	Vanaspati	4	5	5	6
7.	Petroleum refining	5	6	7	8
8.	Others	33	35	38	41
	TOTAL	284	309	332	360

9.4.4. In paragraph 6 we have worked out the installed capacity as now available and the capacity likely to be established according to the implementation programme for future years as intimated to us by the D. G. T. D. On the basis of these figures, the capacity at the end of each year including the current capacity can be worked out. Since new capacities may be installed and worked for varying periods of less than twelve months in the years in which these are set up, it would be safe to assume only partial utilisation to the extent of half the capacity in the year in which the unit is

installed. On this basis, the effective capacity as against the total installed capacity in the years 1967 to 1971 will be as follows :—

TABLE NO. 17

Effective Future Capacity as against Total Installed Capacity

(in tonnes)

Year	Capacity at beginning of year	New or additional capacity	Half of column 3	Total Effective capacity	Total installed capacity
(1)	(2)	(3)	(4)	(5)	(6)
1967 . .	296,333	51,160	25,580	321,913	347,493
1968 . .	347,493	65,850	32,925	380,418	413,343
1969 . .	413,343	50,440	25,220	438,563	463,783
1970 . .	463,783	51,000	25,500	489,283	514,783
1971 . .	514,783	82,500	41,250	556,033	597,283

Assuming that the production will be equivalent to at least 90% of the capacity available in each of these years, the pattern of production, demand and surplus will be as follows:—

TABLE NO. 18

Estimated future production and demand

(000' tonnes)

Year	Estimated production	Estimated demand	Estimated surplus
1967	290	284	6
1968	342	309	33
1969	394	332	62
1970	440	360	80

9.4.5. With effect from 1969 there would, therefore, be substantial quantities of caustic soda available in the country for export.

9.4.6. Particulars of the estimated future production of liquid chlorine as given by some of the units which have replied are shown in Appendix 6. As against the production of 62,191 tonnes in 1966, the production is likely to go up to 85,984, 101,634 and 109,730 tonnes in 1967, 1968 and 1969 respectively. Against this, the D. G. T. D's estimates of the production of liquid chlorine are as follows :—

	Tonnes
1967	70,000
1968	80,000
1969	95,000
1970	120,000

Details of the future demand for chlorine in all forms at worked out by the D. G. T. D. are as follows :

TABLE NO. 19

Estimates of demand for chlorine

(In tonnes)

	Demand in			
	1967	1968	1969	1970
1	2	3	4	5
1. Chlorine in forms such as liquid chlorine, bleaching powder and bleach liquor for :				
(a) Paper	56,000	62,500	69,000	76,000
(b) Textiles	10,000	12,000	15,000	18,000
(c) Water treatment & sanitation	10,500	12,000	13,500	15,000
TOTAL	76,500	86,500	97,500	109,000
2. Chlorine for manufacture of hydrochloric acid for :				
(a) Direct use as acid	3,500	4,800	5,400	6,000
(b) Manufacture of—				
(i) Zinc Chloride	360	420	480	600
(ii) Ammonium Chloride	4,000	5,400	6,700	10,000

(iii) Other chlorides such as Nickel Chloride, Phosphorous Chloride, Aluminium Chloride etc. . . .	1,800	2,050	2,300	2,700
(iv) Rare Earths	1,950	2,000	2,100	2,400
(v) Other inorganic Products such as Bleaching earth and Bleaching Powder	11,500	13,800	17,000	21,500
TOTAL .	23,110	28,470	33,980	43,200
3. Chlorine for :				
(a) Insecticides	21,800	34,750	53,700	65,600
(b) Fertilizers	..	..	5,000	10,000
(c) Chlorinated rubber	100	130	170	200
(d) Dyestuff intermediates and Drug intermediates .	2,000	3,000	4,500	6,000
(e) Plastic raw materials	15,000	26,500	37,500	49,000
(f) Organic solvents and other organic chemicals . .	1,000	1,500	2,000	3,000
TOTAL .	39,900	65,880	102,870	133,800
Total demand for Chlorine (1+2+3) . .	139,510	180,850	234,350	286,000
Say .	140,000	181,000	234,000	286,000

9.4.7. Adopting figures of chlorine availability at 87 per cent of the caustic soda produced for the non-reporting unit and assuming total utilisation in its case, the position of the availability and utilisation of chlorine during the last three years would be as follows :—

TABLE NO. 20

Total Chlorine Utilisation

(in tonnes)

Year	Total chlorine available	Chlorine utilised	% of utilisation
1964	149,067	94,998	63.7
1965	177,701	114,173	64.3
1966	183,293	124,367	67.9

The estimates now framed by the D. G. T. D. though on the high side for future years do not appear to be excessive for the current year. However, basing the potential availability of chlorine on the projected figures of future-production of caustic soda and adopting the demand estimates of the D.G. T.D., the position would be as follows :—

TABLE NO. 21

Potential availability of chlorine

('000 tonnes)

Year	Chlorine available	Demand	Surplus
1967	226	140	86
1968	269	181	88
1969	289	234	55
1970	313	286	27

We do not have enough data at our disposal to be in a position to frame more realistic estimates of demand for chlorine in future years. Chlorine being the inevitable co-product of caustic soda, its production cannot be controlled or planned on the basis of any projected demand. There would be in future a very large quantity of surplus chlorine in the country for which methods of utilisation have to be devised. It is however, definite that unless new avenues for chlorine utilisation are not found, the consumption pattern as it now exists will not be able to use up all the chlorine produced even if the demand goes up appreciably in respect of certain items.

9.4.8. *Hydrochloric acid.*—The totals of the future production of hydrochloric acid as estimated by 17 units amount to 56,417, 68,992 and 70,732 tonnes for the current and next two years respectively. Unit-wise details of these are given in Appendix 6. The DGTD's estimates of future production which are as follows are lower :—

	Tonnes
1967	36,000
1968	48,000
1969	54,000
1970	60,000

We have not been able to obtain any estimates of the future demand for hydrochloric acid; it will depend on the utilisation pattern of chlorine. No separate estimates of demand for hydrochloric acid have, therefore, been framed.

9.4.9. *Bleaching Powder.*—It has been stated already that the installed capacity in the country is 16,300 tonnes and it is likely to go up to 21,800 as a result of the installation of the new capacity licensed in favour of Kanoria Chemicals & Industries Ltd. The D.G.T.D's estimates of the future production of bleaching powder are as follows :

	Tonnes
1967	12,000
1968	15,000
1969	18,000
1970	22,000

9.4.10. There was however a protest from one of the units against licensing of additional capacity for bleaching powder without the possibility of increase in demand. We are, however, not in a position to express any view on the future demand for bleaching powder.

9.5. We would wish to add a word in respect of future estimates based on the examination of the forecasts made in the past *vis-a-vis* the actual performance or utilisation. According to the estimates furnished to us in 1964 by the D.G.T.D., the production of caustic soda in 1964, 1965 and 1966 was expected to be 195,000; 265,000 and 330,000 tonnes respectively but the actuals were 184,000; 215,000 and 230,000 tonnes respectively. While the variation in terms of percentage was only 5.6% for the first year, it rose to 18.8% for 1965 and 30.3% for 1966. The annual increase in production expected was much higher than actually achieved. In the matter of the estimates of demand and actual consumption, the position during the last ten years was as follows:—

TABLE NO. 22

Past Estimates of Demand and Actual Consumption of Caustic Soda

(in thousand tonnes)

Year in which estimate framed	Year	Estimated demand	Actual consumption
1958	1958	124	113
	1959	130	129
	1960	144	141
1961	1961	195	165
	1962	225	190
	1963	265	220
	1964	300	224
1964	1964	260	224
	1965	295	238
	1966	350	255

The estimates and actuals for the triennium 1958 to 1960 are very close to each other. The disparity was wider in the forecast and actuals for the quadrennium 1961 to 1964, and it is widest in the next triennium. This leads to the inevitable conclusion that both in estimating production as well as demand a much grater degree of optimism was progressively employed than actual conditions warranted. If more accurate estimates are framed based on the anticipated growth of the industries which consume caustic soda and allied products, the estimates are likely to be much closer to actuals as was the case from 1958 to 1961.

10. Utilisation of chlorine

10.1. There can be no quantitative control on the production of chlorine, for it comes out of the plant in the proportion of 85 to 90 per cent of the output of caustic soda. The cost on the production of chlorine is, therefore, almost equal to that of caustic soda. Many decades ago in the West, there was not as much use for chlorine as for caustic soda and a good deal of the chlorine produced had, therfore, to be destroyed. In course of time, however, as a result of the greater development of the chemical industry, larger uses of chlorine were discovered and in some cases, chlorine is relatively more in demand than caustic soda itself and there is a tendency now in some advanced industrial countries to treat cuastic soda as a co-or by-product of chlorine rather than the other way round. Since caustic soda and chlorine are produced in the same stream, a considerable degree of caution was emphasised at the time of the initial development of the caustic soda industry in India. About two decades ago, it was considered necessary to find avenues of full utilisation of chlorine before embarking on the production of caustic soda. As a result of this emphasis during the early stages of the growth of the industry in India, the aim of self-sufficiency was overlooked. In 1946 at the time of the Tariff Board's first inquiry it was estimated that the production of chlorine by the plants then in existence and those on order would nearly meet the country's requirements which were estimated to be 2,000 tons per annum for the next three years ending 1949 against the estimated production of 1,900 tons annually for the same period. The Tariff Board stated categorically that since the demand for chlorine and its compounds was small and it was likely to remain so for some

years as compared with the demand for caustic soda, the economic production of caustic soda by the electrolytic process was hampered to that extent, requiring attention towards causticising process. It added that unless greater advance was made in the utilisation of chlorine or manufacture of its combinations, it would be necessary to have recourse to the lime process for expanding the production of caustic soda. In view of this emphasis on the full utilisation of chlorine and consequently on finding avenues for its uses, the growth of the industry remained stifled for a long time. It was not until many years later that it was realised that the only alternative in the absence of an assurance of full utilisation of chlorine was heavy imports of caustic soda from abroad. Unfortunately the latter was adopted in spite of the fact that unlike other heavy industries the basic raw material and power were available in abundance in the country. The result, therefore, was that until two years ago, vast quantities of caustic soda were imported since the indigenous capacity of caustic soda was not built up to the extent of the demand. This would be apparent from the following figures of import from 1947 to 1966.

TABLE NO. 23

Annual import of Caustic Soda from 1947 *to* 1966

Year	Quantity
1947	21,231 Tons
1948	90,616 Tons
1949	12,989 ,,
1950	21,993 ,,
1951	62,713 ,,
1952	25,552 ,,
1953*	17,041 ,,
1954	52,638 ,,
1955	54,881 ,,
1956	93,594 ,,
1957	66,042 ,,
1958	62,725 Tonnes
1959	149,522 ,,
1960	54,041 ,,
1961	20,014 ,,
1962	75,886 ,,
1963	67,913 ,,
1964	73,508 ,,
1965	71,680 ,,
1966	20,640 ,,

*April to September

Notwithstanding the emphasis on the full utilisation of chlorine, the industry did develop to a certain extent and though the progress was not as rapid as could have been expected, a very large capacity was developed during the Second Five Year Plan. This progress was maintained during the Third Five Year Plan too, by which time it had become evident that if the growth of the industry were to be dependent on the stipulation of full utilisation of chlorine, imports of caustic soda would become an inevitable and permanent feature of the economy of the chemical industry in India.

10.2 At the inquiry of 1964, the Commission reached the conclusion that the expansion of the caustic soda industry should be encouraged despite the loss of chlorine which was inevitable for some time. In the Third Five Year Plan, the demand for chlorine from chemical, paper and other industries increased substantially so that larger utilisation was possible though in proportion to the total quantity of caustic soda produced the percentage of utilisation fell. The position of the utilisation of chlorine from 1954 to 1966 was as follows :

TABLE NO. 24

Percentage utilisation of chlorine

	%
1954	72
1955	76
1956	85
1957	88
1958	84
1959	73
1960	61
1961	65
1962	61
1963	63
1964	64
1965	64
1966	68

(NOTE.—Figures for 1954 to 1960 are based on Tariff Commission's past reports, those for 1961 to 1963 on the information submitted by the Alkali Manufacturers' Association and those for 1964 to 1966 on the basis of data collected for the present enquiry.)

10.3. There was an initial rise upto 1957, then decline from 1968 to 1960, rise in 1961, and then progressive increase since 1963.

10.4. At a symposium on the utilisation of chlorine and development of chlorine-based industries in India sponsored by the Development Council for Inorganic Chemical Industries held at Madras in 1965, numerous papers were contributed on this issue. Some of the important suggestions made at the symposium are the following.

10.5. The manufacture of ammonium chloride using liquid chlorine should be encouraged. A plant with an annual capacity of 50,000 tonnes of ammonium chloride can absorb about one lakh tonnes of liquid chlorine easily. If our steel plants are able to supply ammonia at a reasonable price, the caustic soda plants can come forward to manufacture ammonium chloride by using their surplus chlorine. The replacement of sulphuric acid by hydrochloric acid in some applications such as the manufacture of fertiliser like ammonium chloride would be doubly effective and our dependence on imported sulphur would diminish. Metallurgical engineers can use surplus chlorine available to process the ores for higher extraction of metals advantageousely. The treatment of wastes from factories by chlorine would solve to a large extent the problem of pollution of streams. Chlorine utilisation lagged behind in India because of non-availability of other materials in conjunction with which chlorine could be effectively used. Lubricants, anaesthetics and other solvents, insecticides, dry cleaning agents and a variety of other products require chlorine as one of the basis raw materials. But they also require a variety of other chemicals. The non-availability of these chemicals in India has been the major factor responsible for the low utilisation of chlorine. With the development of petroleum refinement and naphtha cracking, it is expected that special emphasis would be laid on the production of inorganic chemicals in this country.

10.6. Some of the views expressed by the various units in respect of avenues of utilisation of chlorine and the efforts they were making in this direction are as follows :—

10.6.1. *Dhrangadhra Chemical Works Ltd.*—The unit has a scheme for the manufacture of dry-chloroethylene/

perchloroethylene and has a licensed capacity of 5,400 tonnes. There is another Scheme for manufacturing beneficiated ilmenite with a capacity of 30,000 tonnes per annum.

10.6.2. *Mettur Chemical and Industrial Corporation Ltd.*—It is putting up a plant for manufacture of chloromethanes. It is likely that chlorine to the extent of 7,000 tonnes per annum will be utilised.

10.6.3. *National Rayon Corporation Ltd.*—Installation of n EDC plant of one tonne daily capacity is nearing completion. It proposes to take up a few other projects.

10.6.4. *Shriram Vinyl and Chemical Industries.*—It proposes to expand the capacity of its PVC plant from 20 to 40 tonnes a day.

10.6.5. *Hukumchand Jute Mills Ltd.*—It has got a licensed capacity for manufacture of bleaching powder and it is examining the possibility of manufacturing other chlorine chemicals including B. H. C.

10.6.6. *Calico Chemical & Plastics Division.*—It has been utilising chlorine for the manufacture of polyvinyl chloride and plant for the manufacture of trichloroethylene and perchloroethylene is ready for commissioning. At full capacity, both the plants are expected to consume approximately 80 per cent of the chlorine produced.

10.6.7. *Andhra Sugars Ltd.*—The unit is examining the possibility of using chlorine for the establishment of a unit for benzene hexachloride.

10.6.8. *Century Chemicals.*—It has been granted a licence for a ten tonne capacity phosphoric acid plant; but the scheme is under consideration of the management. It has applied for a licence for manufacture of BHC and DDT, but it has not so far been granted.

10.6.9. *D. C. M. Chemical Works.*—The present utilisation is for manufacture of stable bleaching powder. It has no further expansion programme in view.

10.6.10. *Alkali and Chemical Corporation of India Ltd., Rishra.*—Owing to a large demand in Calcutta, it is able to dispose of most of its chlorine.

10.6.11. *Tata Chemicals, Mithapur.*—The demand for benzene hexachloride has so considerably increased that its production of chlorine is not adequate and it has to purchase liquid chlorine from the open market. This is a most welcome situation but a solitary one. It has stated that the primary raw material *viz.*, benzene is in short supply on account of which its programme for the manufacture of benzene hexachloride has suffered setbacks.

10.7. The Alkali Manufacturers' Association has suggested that the two ways by which the utilization of chlorine could be encouraged are the use of hydrochloric acid for pickling of steel and manufacture of ammonium chloride as fertiliser. Instead of sulphuric acid hydrochloric acid can be used for pickling. It has a price advantage and this would result in reducing the consumption of sulphuric acid and thereby saving of foreign exchange on import of sulphur. It was also stated at the public inquiry that the process of pickling with hydrochloric acid has greater efficiency than with sulphuric acid. In Europe and America, we understand, the trend is towards the utilisation of hydrochloric acid for this purpose. But it was stated before us that the steel plants in the country are perhaps not amenable to this view since they have their own captive sulphuric acid plants and receive liberal import licences for the import of sulphur for manufacture of sulphuric acid. In the case of a nut like the Tatas, it was stated that the cost would not be more than three and a half lakhs of rupees and for other plants an expenditure of a few lakhs of rupees for each plant would do in order to make the necessary conversion. It was urged upon us to recommend that the Iron and Steel Ministry should encourage the steel plants to change over to hydrochloric acid. The other use of surplus chlorine is to produce ammonium chloride. It has been stated by the Association that the usefulness of ammonium chloride as a fertiliser has been widely recognised, and recent technological advances have resulted in the designing of plants with a fifty tonne capacity per day which can be ecounomically operated. The encouragement for

setting up ammonium chloride fertiliser plants by private entrepreneurs in conjunction with the caustic soda industry having surplus chlorine would therefore help the profitable use of chlorine. However, since ammonia prices are high in the market and were quoted at about one thousand rupees a tonne, it has been suggested that it would be desirable to encourage the setting up of an independent plant for manufacture of liquid ammonia upto 33,000 tonnes capacity a year or the existing caustic soda units may be allowed to set up amonia plants by installing capcity for the same. Since the technology of making ammonia has advanced considerably, small package units of ammonia are now available which can be operated fairly satisfactorily and economically. We therefore, suggest that the installation of such units by large scale alkali and caustic soda manufacturers may be encouraged for the manufacture of ammonia and ultimately that of ammonium chloride.

10.8. During the public inquiry, it was mentioned that the National Rayon Corporation has made a plan for setting up such an ammonia plant and the matter was under the consideration of the Government. This needs the careful attention of Government as it would be in the nature of a Pilot project.

10.9. Closely allied with the question of utilisation of chlorine is that of the provision of tank wagons for the transport of hydrochloric acid. It was stated at the public inquiry that the railways had a plan to add to the existing 16 wagons a fleet of 116 in the Fourth Plan but no progress has yet been made in this direction. If large scale transport of hydrochloric acid becomes necessary as a result of the adoption of its use for pickling as well as for production of ammonium chloride, it will be necessary to increase the transport facilities for it. There is also the possibility of exporting chlorine to Japan and an enquiry was actually addressed to the Commission which has been forwarded to Government. This avenue needs also to be explored particularly in the case of the Dhrangadhra Unit which is situated almost on the

seacoast from where bulk shipment of chlorine in liquid form would also not present any road transport problems.

10.10. Now that self-sufficiency in the manufacture of caustic soda has almost been achieved, greater attention needs to be paid to the utilisation of chlorine in order that the cost of caustic soda is brought down.

11. Economic size of the unit

11.1. At the first enquiry of the Indian Tarriff Board in 1946 when caustic soda industry was almost in its infancy in this country, the economic rated capacity of an electrolytic plant was considered to be between 15 and 20 tons per day, and for a plant equipped for causticising process 20 tons was considered to be an economic size on the basis of a plant than under way. Subsequently, however, the concept underwent some change and in 1961 at the time of the fifth protection inquiry by the Commission, the opinion was generally voiced that in the conditions then prevailing in the country the technical optimum or the economic size of a caustic soda unit was 100 tonnes per day. The Commission had then remarked that the view found support from the costing of the Dhrangadhra Chemical Works, a unit which then had a daily capacity of 80 tonnes, proposed to be raised to 14 tonnes. It was also advantageously placed in regard to salt and power and its fair ex-works price then was Rs. 577 per tonne even when it was not able to utilise chlorine and the cost of production which had to be loaded on to that of caustic soda. However, even at that time Government proposed to set up units of 50 tonnes daily capacity in each State in pursuance of the policy of zonal distribution and fuller utilisation of chlorine. At the next inquiry in 1964, the same view of 100 tonnes per day capacity, being the optimum was reiterated. In connection with the present inquiry, we asked the various units for their views in respect of the economic as well as the optimum size.

11.2. Before we proceed to consider the views expressed, we may draw the distinction between the concept of the econo-

mic as against the optimum size. The economic size of a unit is the size below which the economies of production are not adequately realised and imbalances leading to disadvantages are created. The economic size is, therefore, the barest minimum for a unit to be viable. On the other hand, the optimum size is that at which the unit is in full equilibrium, and its average costs are at a minimum. Production in an optimum firm is expected to take place at the lowest cost. Of the eighteen units which replied six were of the view that the minimum economic size for a caustic soda unit would be a capacity of 50 tonnes a day and that the optimum size would be a capacity of 100 tonnes a day. Two other units referred to the capacity of 50 tonnes a day as economic size but did not specifically express any views in respect of the optimum size. The remaining ten units stated that their views would be conveyed by the Alkali Manufacturers' Association. The Alkali Manufacturers' Association has stated that the optimum size is a capacity of 100 tonnes a day and the economic size a capacity of 50 tonnes a day. We are, therefore inclined to agree with the views expressed that the minimum economic size should be a capacity of 50 tonnes a day or 16,500 tonnes a year and a unit of optimum size should have a capacity of 100 tonnes a day or the annual capacity of 33,000 tonnes adopting a year of 330 working days. As regards captive units, the capacity of the unit to utilise the entire production should constitute the criterion for the economic size. But it is generally held that any unit producing less than 10 tonnes a day is not likely to provide minimal economies necessary even for a captive unit. On this basis, of the eighteen independent units now working, two, namely, Dhrangadhra Chemical Works Ltd. and Mettur Chemical & Industrial Corporation Ltd. are of the optimum size, another four units, namely, Kanoria Chemicals & Industries Ltd., The National Rayon Corporation Ltd., Shriram Vinyl & Chemical Industries and Saurashtra Chemicals are of the economic size. After implementation of the additional licences for future expansion, Shriram Vinyl & Chemical Industries and Travancore-Cochin Chemicals Ltd. will grow to the optimum size. Three more units, *viz.*, Calico Chemicals and Plastics Division, Century Chemicals and D. C. M. Chemical Works will also reach the economic size as a result of future expansion. This would still leave

eight units which will continue to be below the economic size and these are as follows :—

	Tonnes
The Andhra Sugars Ltd.	9,900
The Atul Products Ltd.	8,400
Hindusthan Heavy Chemicals Ltd. . .	6,600
Hukumchand Jute Mills Ltd. . . .	10,800
J. K. Chemicals Ltd.	1,000
The Alkali and Chemical Corporation of India Ltd.	9,240
Calico Mills Chemical Division . .	2,310
Tata Chemicals Ltd.	13,000

11.3. Once the principle has been agreed upon that licences should not be granted for capacities which are not economic, it follows that additional licensing should aim at making the uneconomic units economic and that for the remaining capacity needed in the country on the basis of future estimation of demand, only economic units should be licensed. The facts, however, reveal that neither of these two principles has been acted upon. For, of the new units to be set up, for which licences have already been granted and the capacity for which is likely to be installed by 1971, only two units are of the optimum size, *viz.*, Standard Mills with a licensed capacity of 34,660 tonnes and Gwalior Rayon with a licensed capacity of 33,000 tonnes. Only three of the new units will have capacities of the economic level, namely, Jayshree Chemicals, Madras Chemicals and Chemico, each licensed for the capacity of 16,500 tonnes. Four licences for new units have been granted for capacities which are appreciably below the economic size and these are :

Durgapur Chemicals	10,500 tonnes
Hindustan Organic Chemicals . . .	11,500 ,,
Mysore Sugars	12,000 ,,
Kailas Textiles & Chemicals . . .	6,000 ,,

There would thus be twelve units of uneconomic size at the end of 1971 with an average production of 26 tonnes per day as against the minimum of 50 tonnes adopted for the economic size. We would like to point out that new units are allowed to come up even when the existing units have unutilised capacity or possibilities of expansion because of their existing uneconomic size. This entails avoidable economic loss to the country. We, therefore, suggest that no further licences be given till the existing units in the caustic soda industry come up to the economic size and that new licences, if any, be issued for economic size units only, independent or captive.

12. Raw Materials

12.1. Salt is the basic raw material for the manufacture of caustic soda. In the case of the electrolytic process it is used directly after being dissolved with water as brine, while in the causticising process it is used after conversion into soda ash. In the electrolytic process power constitutes by far the greatest proportion of the cost. The main materials needed for electrolytic caustic soda are mercury, graphite and asbestos. Electric power is used for electrolysis. For chemical caustic soda, soda ash and limestone are needed. Lime required in the process is produced by burning it in the kiln. Coal and fuel oil are used for generating steam. A few other chemicals such as barium chloride, barium carbonate, sulphuric acid, sodium sulphide, and flocculating agents are also used in both processes in small quantities. Black M.S. sheets are needed for the fabrication of drums in which caustic soda solid or flakes is packed.

12.2.1. *Salt.*--The consumption of salt depends on the quality of salt as well as the efficiency in the process of storing, handling and purification. The tentative norm of the consumption of salt which was generally agreed to by the industry at the public inquiry is 1.90 tonnes per tonne of caustic soda though the theoretical norm should be much lower. The Standard Specification of salt for chemical industries is contained in IS : 797-1955 but salt of this standard specification is not available and what can be had contains certain impurities as would be evident from the record of analysis of salt

compiled by the Development Council for Alkalis and Allied Industries in their report (1960) on norms and efficiency in the caustic soda industry which is reproduced below :

TABLE NO. 25

Analytical results of salt at different salt works

Sources of salt	Salt	Percentage of Magnesium	Calcium	Sulphate	Remarks
Saurashtra/Kutch	94.96	0.6 0.2	0.3 0.44	0.24 1.17	Variation very high
Kharagoda	92.8	0.58	0.2	0.95	..
Sambhar	94.0	..	..	0.80	$Na_2Co_3O_2$ NoCa,Mg
Andhra	93.0	0.3	0.3	0.6	..
Adirampatnam	88.7	0.33	0.1	0.72	2.1 in Solubles
Tuticorin	95.0	0.12	0.16	0.47	..

(All analysis was on wet basis, that is, with natural moisture content)

Dhrangadhra Chemical Works and Mettur Chemical obtain their supply from Tuticorin, the latter also from Adirampatnam. National Rayon, Travancore-Cochin Chemicals, Alkali and Chemical Corporation, Tata Chemicals and Calico Mills, Ahmedabad receive their supplies from Saurashtra and Kutch.

Shriram Vinyl, Kanoria Chemicals and D.C.M. Chemical obtain their supplies from Sambhar Lake. The distances over which salt has to travel by coastal steamer or rail extend upto 2,400 k.m.

12.2.2. It has already been mentioned that the norm of salt consumption agreed to per tonne of caustic soda comes to 1.90 tonnes. However, the consumption of salt by different units varied from 1.70 tonnes for Hindustan Heavy Chemicals to 2.31 tonnes for Calico Mills, Chemical Division, on the basis of their production for the year 1966. The variation in the consumption of salt is said to be due to the fact that the sodium chloride contents may vary from 92 to 98 per cent and the other impurities need to be eliminated by chemical process as these add to weight. Certain amounts of salt are also lost in the process of chemical treatment. We feel, however, that where the source of supply is the same the incidence of consumption per tonne should be confined to a close range. Any wide variation in the case of salt coming from the same source reflects on the efficiency of the plants. Hindustan Heavy Chemicals which has the lowest consumption of salt per tonne of caustic soda receives its supply from the same source in Gujarat as a number of other units whose consumption goes upto 2.31 tonnes. We consider, therefore, that there is considerable scope for increasing the efficiency of the plants in order to reduce the rate of the consumption of salt.

12.2.3. While the basic value of salt at the works ranges between Rs. 16.25 and Rs. 22.48 per tonne the freight costs make it swell to almost four times. This accounts for the high rates paid by units situated at long distances from the salt works, as the following figures would show.

12.2.4. The incidence of railway freight on the price of salt is particularly high in the case of the units situated in the interior and the eastern region. In spite of the proximity of the units situated in West Bengal to the sea, they have to obtain their supply of salt from Gujarat. The industry has also complained that it experiences difficulty in securing adequate transport facilities which force the units to keep abnormally high stocks locking up considerable funds. The Alkali Manufacturers' Association has requested that freight rates for the movement of salt should be made more telescopic so that the unduly heavy burden on the units located in the interior and western region can be reduced. It has also

TALBE NO. 26

Raw Materials—Salt input per tonne, source, distance, and price and freight paid

Sl. No.	Unit	Actual average input reported (tonnes)	Source	Distance in Km.	Means of transport	Cost of salt per tonne (1966)	Freight & transport per tonne	Other expenses	Total Cost
1	2	3	4	5	6	7	8	9	10
						Rs.	Rs.	Rs.	Rs.
1	Dhrangadhra Chemical Works.	1.90	Tuticorin	Nil	..	22.48	..	..	22.48
2	The Mettur & Chemical & Industrial Corpn. Ltd.	2.07	Adirampatnam, Vedaranyam, Tuticorin.	410	Rail and Trucks	28.83	25.45	..	54.28
3	The National Rayon Corpn. Ltd.	1.81	Kutch	..	Coastal vessel & trucks	17.15	38.36	7.39	62.90
4	Shriram Vinyl & Chemical Industries.	1.74	Sambhar	310	Road	37.30	18.00	4.59	59.89

5	Kanoria Chemicals & Industries, Ltd.	2.02	Sambhar	..	Rail	21.18	54.78	12.74	88.70
6	The Travancore-Cochin Chemicals Ltd.	2.20	Kutch-Saurashtra.	2500	Coastal Steamer	20.36	31.25	18.34	69.95
7	Hukumchand Jute Mills Ltd.	1.98	Saurashtra & Gujarat.	..	Rail	32.34	49.66	..	82
8	Calico Chemicals & plastics Divn.	2.00	Kutch & Saurashtra.	600	..	16.25	33.12	4.60	53.97
9	The Andhra Sugars Ltd.	2.20	Vedaranyam Appana, Visakhapatnam.	..	..	..	..	..	65.00
10	Century Chemicals .	1.80	Gujarat	56	..	..	..	..	62.00
11	The Atul Products Ltd.	2.01	Bhavnagar	..	Country craft	..	..	..	44.50
12	Hindustan Heavy Chemcals Ltd.	1.70	Gujarat	2400	..	..	..	..	88.38
13	The National Newsprint & Paper Mills Ltd.	..	Kharagoda, Cambay.	..	Rail	25.56 36.70	30.50 27.80	12.70 ..	68.76 64.50
14	Rohtas Industries Ltd.	..	Sambhar	800	Rail	38.60	39.08	3.40	81.08
15	Orient Paper Mills Ltd.	1.9	Tuticorin Kandla	2014 1966	.. ..	42.80 37.00	.. ..	.. ..	100.00 ..

TABLE No. 26—*concld.*

1	2	3	4	5	6	7	8	9	10
16	The D.C.M. Chemical Works.	1.89	Sambar	324	Road	37.84	18.49	13.64	69.97
17	The Alkali & Chemical Corpn. of India Ltd.	1.86 1.96	Kutch	2400	Coastal vessel & trucks	..	..	..	86.96
18	Tata Chemicals Ltd.,	1.80 1.93	Saurashtra	..	..	..	..	..	31.50
19	Sirpur Paper Mills Ltd.	2.20	Vizagapatnam	..	..	..	..	..	86.00
20	Calico Mills Chemical Divin.	2.31	Zinzwada & Patni	120	..	..	..	..	37.00
21	Saurashtra Chemicals	..		..	..	..	..	..	25.00

pleaded for higher priority than the present one for the movement of salt and has asked for the removal of surcharge on railway freight. It was stated before us at the public inquiry by the Director of Industries, Government of West Bengal that the freight rates of salt from Saurashtra to Calcutta or from Tuticorin to Calcutta are almost double the rate from Saurashtra to Japan. It was also stated that the freights are going up and in one year there has been a rise of Rs. 5.00 per tonne. The same shipper who is sending salt from Saurashtra to Japan at Rs. 25 a tonne according to the assertion made is charging Rs. 35 a tonne to Calcutta. The result is that while the price of salt per tonne was Rs. 17 the freight on it was Rs. 53, more than three times.

12.2.5. Another problem brought to our notice in regard to the transport of salt by rail concerns the stipulations laid down by the railway authorities in the case of movement of salt in bulk which the industry finds so cumbersome that it has no other alternative but to continue to arrange for transport in gunny bags which results in unnecessary addition to the cost of the salt. We find that this matter has been discussed over and over again in the Commission's previous reports. In its report of 1964 the Commission observed that it had been calculated that the cost of protective measures as defined by the railways would be far in excess of the rebate allowed by the railways and since there was no assurance that the same wagons would be allowed to the consigners in the subsequent transport of salt, the entire incidence of the cost incurred would fall on a single shipment. We have received a communication from the Railway Board in which it has been stated that salt N.O.C. in bulk without bagging in wagon loads will be chargeable under class 42.5A subject to the conditions that wooden shovels are used for loading and unloading and the remnants at the bottom of the wagons are swept off at the time of unloading, that freight charges would be levied on the permissible carrying capacity of the wagons used and the movement should not involve break of guage transhipment. The railways have also been authorised to quote rates from station to station between specific pairs of points at rates equal to class 40A plus 2 paise per quintal. It is hoped that these changes would result in some relief to the industry.

12.3.1. *Power.*—The cost of power for the production of electrolytic caustic soda is almost one-third of the total cost of the product. For, about 3600 k.w.h. are needed per tonne of caustic soda, However, in the case of the diaphragm cells the consumption is lower. The Alkali Manufacturers' Association has stated that instead of power being available to the caustic soda industry at as cheap a rate as possible, the various State Electricity Boards have been imposing heavy surcharges on consumption and in Madras the surcharge went up to as much as 50 per cent. It has also been intimated to us that varying rates of electricity duties are being charged in the different regions of the country as follows :

TABLE NO. 27

Electricity Duty

Rate of Levy per unit	Regionwise incidence in Rupees per tonne			
	North (Delhi)	South (Madras)	East (W. Bengal)	West (Maharashtra)
1/3 paisa . .			12.34	
1 paisa . .	37.00			
10% . .		14.06		
1 paisa . . + ½ paisa sales tax				18.50

12.3.2. The rates per kwh of power consumption together with the consumption per tonne of caustic soda for some units are as follows :

TABLE NO. 28

Power consumption and rates in 1966

Sl. No.	Name of the Unit	Power input per tonne of caustic soda		Rate per KWH (Paise)
		Mercury Cells	Diaphragm Cells	
1	2	3	4	5
1	Dhrangadhra Chemical Works Ltd.	3386	..	4.45
2	The Mettur Chemical & Industrial Corporation Ltd.	3292 (Liquid caustic). 3436 (Solid caustic)	..	5.08
3	The National Rayon Corporation Ltd.	4238	..	6.02
4	Shriram Vinyl & Chemical Industries	3545	..	14.33
5	Kanoria Chemicals & Industries Ltd.	4154@	..	3.44 (inclusive of all charges).
6	The Travancore-Cochin Chemicals Ltd.	3850 (Liquid-caustic).	..	3.5

@Inclusive of consumption in Chlorine Plant, MCL Plant, Fusion plant and other ancillaries.

TABLE NO. 28—*concld.*

1	2	3	4	5
7	Hukumchand Jute Mills Ltd. . .	3677	..	8.89
8	Calico Chemicals & Plastics Division .	3930 (Liquid caustic).	..	6.27
9	Century Chemicals	3634	..	Not furnished.
10	The Atul Products Ltd. . . .	3696 (Liquid caustic).	..	7.40
11	Hindustan Heavy Chemicals Ltd. .	3750	..	9.5
12	The National Newsprint & Paper Mills Ltd.	3355	..	10.67
13	Rohtas Industries Ltd. . . .	4105 (Liquid caustic).	..	7.51
14	Orient Paper Mills Ltd. . . .	4300	..	6.5
15	The D.C.M. Chemical Works . .	..	3463	11.20
16	The Alkali & Chemical Corporation of India Ltd.	..	2971 (Liquid caustic).	7.75

17	Tata Chemicals Ltd.	..	3465 (Solid caustic).	10.35	Generated
18	The Sirpur Paper Mills Ltd. . .	..	3500	9.0 7.0	Purchased Generated
19	The Titaghur Paper Mills Co. Ltd. .	..	4500 (Liquid caustic).	8.58	
20	Calico Mills, Chemical Division . .	..	3621 (Liquid caustic).	9.32	

The two features clearly apparent from the figures set out above are that the rates of electricity duty have a range of variation from one to three times and the tariff rates also vary very greatly from State to State and even from unit to unit. Some consideration needs to be extended to the chemical industry not only in the interest of the development of the industry but also for the purposes of maintaining uniformity of costs throughout the country. Government may give consideration to this matter and take such steps as they may consider advisable to bring about not only uniformity in rates but also in the surcharges and the duties levied. At the last inquiry we had been informed that the Government of Maharashtra had allowed exemption from duty in the case of such undertakings in which the electricity consumed was 25 per cent or more of the cost of production. We, however, regret to learn that these rules have been modified and that this welcome encouragement given to the industry has now been virtually withdrawn. The variation of every paisa per k.w.h. in the rate of power makes a difference of about Rs. 35 to 40 in the cost per tonne of caustic soda. It was brought to our notice that not only are the power rates different from State to State but that these are also discriminatory even in the same State from unit to unit and even for different plants of the same unit as would appear from the following figures of power rates reported to have been charged from the Mettur Chemical and Industrial Corporation Ltd.

We recommend that such disparities should be removed. We have been informed that in the case of certain units production has fallen appreciably owing to power cuts. For instance, in the case of Shriram Vinyl & Chemical Industries there was a considerable fall in the production in 1966 with the result that only 55.8 per cent of the capacity could be utilised, due to a cut upto 60 per cent effected by the State Electricity Board. These power cuts are certainly detrimental to the industry, and they should be avoided particularly in the case of a basic industry like caustic soda. Occasional interruptions in the supply of electricity owing to lack of operational efficiency was also reported. This results invariably in upsetting the processes within the cell leading to the formation of mercury butter and consequent

TABLE No. 29

Rates of electricity charged from Mettur Chemical Plant I (II kv supply)

Period/Date	Rate per KVA Year for first 8400 KW		Rate for next 2000 KW	
upto 30-6-1962		Rs. 155.00		
1-7-1962	Rs. 155 + tax 5%	Rs. 162.75		
1-11-1963	Rs. 155 + SC 10% + tax 5%	Rs. 178.25		
24-3-1964	..	..	Rs. 200 + SC 10% + tax 5%	Rs. 231.00
1-12-1964	Rs. 190 + tax 5%	Rs. 199.50	Rs. 240 + tax 5%	Rs. 252.00
1-2-1965	Rs. 190 + tax 10%	Rs. 208.00	Rs. 240 + tax 10%	Rs. 264.00
1-1-1966	Rs.190 + SC 50% + tax 10%	Rs. 304.00	Rs. 240 + SC 50% +tax 10%	Rs. 384.00
1-1-1967	Rs. 190 + SC 30% + tax 10%	Rs. 266.00	Rs. 240 + SC 30% + tax 10%	Rs. 336.00
1-7-1967	Rs. 220 + SC 30% + tax 10%	Rs. 308.00	Rs. 240 + SC 30% +tax 10%	Rs. 336.00

TABLE NO. 30

Comparison of rate per kva year for plant II Mettur Chemical and for Dhrangadhra Chemical Works Ltd. (110 *kv supply*)

From Date	Rate per KVA year for Plant II (Mettur)		Rate per KVA year	(Dhrangadhra Chem.)
1-12-1964	..	..	Rs. 185 + tax 5%	Rs. 194.25
5-11-1965	Rs. 260 + tax 5%	Rs. 273.00	..	
1-12-1965	Rs. 260 + tax 10%	Rs. 286.00	Rs. 185 + tax 10%	Rs. 203.50
1-1-1966	Rs. 260 + SC 50% + tax 10%	Rs. 416.00	Rs. 185 + SC 50% + tax 10 %	Rs. 296.00
1-1-1967	Rs. 260 + SC 30% + tax 10%	Rs. 364.00	Rs. 185 + SC 30% + tax 10%	Rs. 259.00
1-7-1967	Rs. 240 + SC 30% + tax 10%	Rs. 336.00	Rs. 210 + SC 30% + tax 10%	Rs. 294.00

waste of mercury. These are matters to which attention needs to be paid by the various Electricity Boards in the interest of the more efficient functioning and development of the industry in the country. We have been informed that in the case of newer cells there is a device for the adjustment of anodes which reduces the consumption of electricity while this improvement is not available in the older cells as a result of which the latter consume more electricity. The variations in the consumption of power are excessive, and economies would be possible if greater attention is paid to this matter.

12.4.1. *Mercury.*—Mercury accounts for three to nine per cent of the total cost of caustic soda. Since India does not produce any mercury it has to be imported from Spain, Mexico and U.S.A. and the prices have been fluctuating over a large range for some time past. Theoretically no mercury should be consumed in the process of electrolysis but owing to the formation of mercury butter, interruption of power supply or switching off of the cells there is some waste. A certain amount of wastage occurs from pilferage also. The Alkali Manufacturers' Association has suggested the norm of 0.35 kg. of mercury per tonne of caustic soda. The consumption of mercury per tonne of caustic soda and cost per kg. as reported by some of the units are as follows :

TABLE NO. 31

Mercury consumption and cost

Sl. No.	Name of the units	Mercury	
		Input per tonne of Caustic Soda	Cost per unit or range of cost (Rs. per kg.)
1	2	3	4
1	Dhrangadhra Chemical Works Ltd. . . .	0.31	127.10 (Post-devaluation)

TABLE No. 31—*contd.*

1	2	3	4
2	The Mettur Chemical & Industrial Corporation Ltd.	0.30	155.39 (Pre-devaluation)
3	The National Rayon Corporation Ltd.	0.35	Not furnished
4	Shriram Vinyl & Chemical Industries.	0.40 kg.	137 (Post-devaluation)
5	Kanoria Chemicals & Industries Ltd.	0.56 kg.	131.45 (Post-devaluation)
6	The Travancore-Cochin Chemicals Ltd.	0.35 kg.	150.72 (Post-devaluation)
7	Hukumchand Jute Mills Ltd.	0.35 kg.	156.52 (Post-devaluation)
8	Calico Chemicals & Plastics Division, Anik Chembur.	0.34 kg.	160.29 (Post-devaluation)
9	Century Chemicals . .	0.39 kg.	179.71 (Post-devaluation)
10	The Atul Products Ltd. .	0.40 kg.	148.10 (Pre-devaluation)

12.4.2. The industry has represented that the State Trading Corporation, which has the monopoly of mercury, purchases it at a high price which is unfavourable to the industry and is not prompt enough to take advantage of the best market conditions. Supplies are often offered at port towns farther away from the consumers who have to incur large expenditure by way of clearance charges, freight for transport to factory, sales tax etc. The D.G.T.D. had recommended that import licences should be directly issued to caustic soda manufacturers and the Chief Controller of Imports and Exports actually issued import licences but

shortly afterwards, these licences were revoked and the State Trading Corporation became the sole importer again. The matter was discussed at length at the public inquiry and even though the representative of the State Trading Corporation was present and pleaded on behalf of his organisation no convincing reasons were given for not allowing the various units to import their own mercury which they would be able to arrange at rates more advantageous to themselves. We therefore recommend that imports should be so arranged that mercury is available to the producers of caustic soda at as favourable terms as possible and that the large units which are willing to do so may be allowed to import it directly.

12.5. *Black steel sheets for packing.*—The differential between the selling price of caustic soda lye and caustic soda solid, is at present of the order of Rs. 100 per tonne and as recommended by us in paragraph 19 is likely to go up to Rs. 120 per tonne in the case of technical grade and Rs. 160 per tonne in the case of caustic soda pure. Caustic soda solid is packed in drums of black steel sheets which are cut open to remove the contents and the solid is then converted into lye before it is used. The conversion of the caustic soda into fused solid and packing into drums of black steel sheets is, therefore, an entirely wasteful process since the drum also is destroyed and cannot be brought into any subsequent use. If adequate tank wagons were available for the supply of caustic soda lye it would not be necessary to convert it into solid. Since the complement of wagons available with the railways is not commensurate with the requirements of the industry, the wasteful expenditure involved in the conversion of caustic soda solid and consequently an additional avoidable burden on the consumer continues. Again, the railways are at present not aggreeable to accept fused or flaked caustic soda in plastic bags which are almost as safe as tin sheets so far as transport is concerned. We suggest, therefore, that the railways should develop additional capacity for the transport of caustic soda lye in order that the expenditure on converting it into solid is avoided and until such wagons are provided to modify their rules so that plastic sheet bags commensurate with the degree of safety needed for their transport are acceptable for carriage.

The Indian Standards Institution has the following ISI specifications for the products under inquiry :—

13 Quality and standards

(i) I.S. 252	-1962	Caustic soda technical (Revised)
(ii) I.S. 1021	-1964	Caustic soda pure (Revised) (for rayon grade caustic solid or lye)
(iii) I.S. 646	-1956	Liquid chlorine technical.
(iv) I.S. 265	-1962	Hydrochloric Acid (Revised).
(v) I.S. 1065	-1957	Bleaching Powder stable

Most of the consumers who have replied to our questionnaire have stated that the products are satisfactory. One of the largest users of caustic soda in the country, namely, Hindustan Lever has said that it is having difficulties with one of its suppliers for establishing the basis for the NaOH content. This appears to be an isolated example and by and large the quality of caustic soda as well as the other products appears to be satisfactory.

14 Imports

We have already briefly dealt with the matter of imports in paragraph 10. In view of the near self-sufficiency which has been achieved and the complete self-sufficiency that will be achieved in the course of this year and the next, no future imports of caustic soda will be needed.

15 Exports

15.1. The Basic Chemicals, Pharmaceuticals and Soaps Export Promotion Council has furnished figures of the limited exports of caustic soda and allied products. These are as follows :—

TABLE NO. 32

Export figures of caustic soda and allied products

Item	1964-65		1965-66		1966-67	
	Quantity	Value	Quantity	Value	Quantity	Value
	(Tonnes)	(Rs.)	(Tonnes)	(Rs.)	(Tonnes)	(Rs.)
Caustic Soda (Flakes)	—	—	82.2	1,73,522	2.4	6,774
Caustic Soda (Solid)	—	—	22.7	17,816	Nil	Nil
Chlorine	242.5	2,62,572	N.A.	56,371	N.A.	181,283
Hydrochloric acid	154.2	92,264	443.9	1,41,455	43.7	26,782
Bleaching Powder	—	—	18.5	9,189	10.0	6,865

We have been informed that prospects for export to Ceylon, the Middle East and the Far East are good provided that adequate assistance is given to meet the losses on account of the wide difference between the domestic and the international prices. The Alkali Manufacturers' Association visualises the export of 25,000 tonnes of caustic soda in 1969 and has made a provision in its demand estimates accordingly. According to the Export Promotion Council, the main obstacles in the way of export of chlorine and hydrochloric acid are their high price and non-availability of suitable containers. In the case of hydrochloric acid, exports to Burma, Malaysia and South Vietnam, where excellent markets for these products exist, the freight alone would constitute almost 50% of the best c.i.f. price in these markets. The balance is barely enough to meet the cost of suitable polyethylene containers. Alternatively, if these products are to be sold in buyers' tanks/cylinders, a lengthy procedure has to be undergone before the containers are cleared for filling. This procedure needs to be simplified and steps taken to encourage the manufacture of containers suitable both technically and economically by the grant of necessary materials required therefor.

15.2. At present the export of caustic soda does not attract any incentive either by way of import replenishment or cash assistance. Liquid chlorine and hydrochloric acid carry 10% cash assistance. Bleaching powder of the stable variety attracts a 20% import replenishment licence and 10% cash assistance.

15.3. The cost of production at present is so high that no exports at remunerative prices are possible. By adopting economies of scale, location and greater operational efficiencies, costs can be brought down to a level where the disparity between international prices and the cost of production of indigenous industry is narrowed. We have recommended in paragraph 19 a uniform price for caustic soda for the entire industry based on the weighted average of costs of certain units. Under the system of uniform price fixation, the efficient units will reap a larger profit than the less efficient ones and should, therefore, be able to make up a part of the loss on export sales out of their additional profit margin. Since as indicated in paragraph 9.4.5 we will be left with surplus

production of caustic soda in the near future, it is necessary to encourage exports. We, therefore, recommend that exports may be encouraged with adequate incentives to efficient and economic units only so that the country may not have to bear the unnecessary burden of subsidising exports for long.

16 Selling system and selling prices

16.1. Of the 16 units for whom data are available, eight sell their products both directly as well through agents, two have appointed sole selling agents, four sell directly and one has regional agents and the last unit which consumes the major portion of its production sells the surplus in the open market. All have replied that the method of sales ensures regular supplies at the fixed prices. Deliveries are, according to the producers, effected within a few days, occasional delays being attributable to scarcity of railway wagons.

16.2. Selling prices as prevailing in December, 1963 and on different dates subsequently as reported by the units for each of the four products *viz.*, caustic soda, chlorine, hydrochloric acid and bleaching powder are given in Appendices 7 to 10. The range of the prices may be summarised as follows :—

TABLE NO. 33

(a) *Selling prices of Caustic soda*

(Rs. per tonne)

Form of Caustic Soda	December 1963	January 1964	November 1965	October 1966	January 1967
Lye 100% .	620	620—700	680—790	740—854	740—854
Solid . .	720—755	720—835	780—875	820—954	820—954
Flakes . .	820—893	922—975	880—1010	920—1085	920—1074

(b) *Liquid chlorine*

(Rs. per tonne)

December 1963	January 1964	September 1965	January 1966	January 1967
255—459	110—600	95—600	155—600	110—600

(c) *Hydrochloric acid* 30%

(Rs. per tonne)

December 1963	January 1965	February 1966	November 1966	January 1967
42—194	35—195	25—215	25—215	25—240

(d) *Bleaching powder**

5 February 1962	13 January 1965	15 October 1965	1 August 1966	1 February 1967
Rs.	Rs.	Rs.	Rs.	Rs.
25.35	27.15	32.00	45.00	875 per tonne

*(NOTE.—Except for the last column, all the prices are for packing of 40 kg. drums.)

16.3. Ever since decontrol, prices have been mounting steadily in respect of each of the forms of caustic soda. Between the price of lye in December 1963 and its maximum in January 1967 there was an increase of Rs. 234 or 36.7% in the course of about three years. On the other hand, prices of liquid chlorine fell generally and the same fate was suffered by hydrochloric acid. Bleaching powder, however, did better than caustic soda itself, since the rise in the prices of a drum containing 40 kg. for which compa able figures are available was of the order of 77.5% in the case of the unit which has reported. The reasons for this spectacular rise could not be ascertained.

16.4. Consumers have generally expressed dissatisfaction with the frequent and rapid increase in prices and appear not to be satisfied that there were any reasons for the increases. The aluminium, rayon, paper and soap industries have all stated almost with one voice that there is need for stability of prices in the interest of the production of such

consumer goods in which caustic soda constitutes a substantial portion of the raw material cost. Some of the units which replied to our questionnaire have quoted international prices to show that the indigenous prices are almost double those prevailing in foreign countries. For instance, it has been mentioned on good authority that the price of solid caustic soda in U.K. is Rs. 437.85 per tonne (£20.17 sh. f.o.b. London) as against the indigenous price of Rs. 845 excluding excise duty. One of the units has complained that there is a tendency on the part of traders to corner stocks and has suggested control of distribution also.

16.5. Now that the production of caustic soda will be in excess of the domestic requirements and substantial quantities will have to be exported, it would be of interest to know how our domestic prices compare with the domestic prices of other countries as well as with their export prices. In addition to the figures mentioned in the previous paragraph, the Alkali Manufacturers' Association has also given certain figures of the prices of caustic soda and chlorine in certain other countries in support of its contention that the prices of these two products when added together compare favourably with the same added prices for the indigenous industry.

We have also received some information from our Embassies in U.K., Italy and Japan. The figures furnished by the Alkali Manufacturers' Association are as follows :—

TABLE NO. 34.

Prices of Caustic Soda and Chlorine in foreign countries

(in rupees per tonne)

Country	Caustic Soda	Chlorine
U.S.A. . . .	899	536
Belgium . . .	644	660
France . . .	561	528
Germany . .	743	528
Italy . . .	594	479
U.K. . . .	776	611

16.6. The figures for U.K. and Italy received from our Embassies compare with the above figures. The domestic price of caustic soda in Japan is about Rs. 625 a tonne and the lowest export price is about Rs. 345. The lowest prices are those of Japan and while it is not possible to ascertain what the cost is likely to be, it is safe to assume that it lies somewhere between the domestic and export prices. Japan exports some of its production of caustic soda and even if the export price is regarded as unremunerative the cost of production cannot be much above Rs. 500 a tonne. The only unit which can come anywhere near this unit value of cost is Dhrangadhra Chemical Works; the rest are appreciably higher in cost owing to disadvantage of location as well as size. The chief economies available to this unit are in the cost of salt and power, and also of conversion charges. In spite of the fact that it destroys most of its chlorine, its cost of production including the loading back of value of chlorine destroyed on the price of caustic soda is the lowest. This demonstrates amply the advantage of location and size which ensure—

(i) cheap and easy supply of salt,

(ii) low rates of electricity, and

(iii) economies of operation available as a result of optimum size.

If export of caustic soda is intended, it will be necessary for other units also to operate under the same favourable conditions as this unit, and in course of time, either to device means to neutralize higher costs under certain heads by lowering them under others or strive to achieve the same advantages in raw materials and operation in order that the standards set by this unit are reached. Unless this is done, not only will the costs be high in the domestic market, but also exports, if at all, will be at a distress or at great disadvantage to the domestic consumer.

17 Method of determination of costs of production and selling prices

17.1. To examine the cost structure and determine the fair selling prices of the various products for which the reference had been made, we selected six units, representing a cross section of the industry, and deputed our Cost Accounts Officers to examine the costs of production of the various products

manufactured by them. The names of the units selected for costing, the period for which the costs were examined and the products which were costed are given in the following table.

TABLE NO. 35

Particulars of costed units

Name of the Units	Period for which costs were examined	Products for which costs were examined
1	2	3
1. The Mettur Chemical & Industrial Corporation of India Ltd., Mettur Dam.	Year ended 31st March 1967	1. Caustic Soda (a) Technical grade (b) Rayon grade 2. Liquid chlorine 3. Hydrochloric acid (33%) 4. Bleaching powder
2. Dhrangadhra Chemical Works Ltd. (Caustic Soda Unit), Sahupuram.	Ditto	1. Caustic Soda Rayon grade 2. Liquid chlorine 3. Hydrochloric acid (100%)
3. The Alkali & Chemical Corporation of India Ltd., Calcutta.	Year ended 30th Sept. 1966 and Quarter ended 31st December 1966	1. Caustic soda 2. Liquid chlorine 3. Hydrochloric acid (30%)
4. Century Chemicals, Bombay.	Year ended 31st December 1966	1. Caustic soda 2. Liquid chlorine 3. Hydrochloric acid (32%)
5. Kanoria Chemicals & Industries Ltd., Renukoot.	Year ended 31st March 1967	1. Caustic soda 2. Liquid chlorine 3. Hydrochloric acid (32%)
6. Saurashtra Chemicals Ltd., Saurashtra.	Year ended 31st March 1967	1. Caustic soda (Solid)

Based on the data collected by the Cost Accounts Officers and the discussions we had with the representatives of the costed units, we have estimated the future ex-works costs and the fair selling prices of the different products for each of the units as also for the industry as a whole. While determining the fair selling prices for the industry as a whole, however, we have not taken the costs of Saurashtra Chemicals for the reasons explained in paragraph 19.7. The reports of the Cost Accounts Officers, being confidential, are sent separately as enclosures to this Report.

17.2. Except for Saurashtra Chemicals, where caustic soda is manufactured by the causticisation process, all the other five units have the electrolytic process. Again except Mettur Chemical, which produces caustic soda by the use of both diaphragm and mercury cells, of the rest of the four units, one, *viz.*, Alkali Chemicals has got diaphragm cell and the other three mercury cells. In the process of manufacture of caustic soda by the electrolytic process, there is obtained as joint products chlorine gas and hydrogen gas. The method adopted in apportioning the costs between the three products is the same as was one in the past several inquiries, namely, distributing the cost to the three products in the ratio of their weights of output at the cell stage. The production of chlorine in the country is far in excess of the demand for it and, therefore, the prices realised are much below the costs as worked out on the basis mentioned above. Also, since there is a surplus of this product, in some of the units a large portion has to be destroyed without being put to any effective use. The loss on wastage has been loaded back to the cost of caustic soda and this has been shown as a separate element of cost. In our 1961 Report on the continuance of protection to the caustic soda industry, we dealt at some length on the utilisation of chlorine and opined that as demand for caustic soda was rising much faster than that for chlorine, we have to be reconciled to the fact that at least for a few years to come there would be surplus chlorine in the country which may have to be wasted. We have discussed this problem earlier in paragraph 10. The position, however, at present is that we have come to the inevitable stage when the industry has to sell its chlorine at prices much below those warranted by costs, as assessed by us on the joint

product basis. As we are compensating in full the loss on wastage by loading it back to the cost of caustic soda, it is but fair that for the anticipated short realisation on the sale of chlorine the industry should also be similarly compensated. In determining the future fair selling prices, we have therefore, included this item and have indicated separately the quantum to be loaded in the costs of caustic soda.

17.3. The Commission has been requested to recommend fair prices for (i) Caustic Soda : (a) lye, (b) Solid, and (c) flakes; (ii) chlorine : (a) gas, and (b) liquid; (iii) hydrochloric acid, and (iv) bleaching powder. The products listed under (i), (ii) and (iii) are being manufactured by all the units selected for costing. However, Alkali Chemicals and Century Chemicals do not manufacture caustic soda in solid form but sell their saleable production in 48/50 per cent lye form itself, Saurashtra does not produce lye, and Kanoria does not manufacture any flakes. Product listed under (iv), namely, bleaching powder is being manufactured only by Mettur Chemicals. Hence the fair price for bleaching powder will have to be recommended only on the basis of one unit's cost, while for other products it could be recommended on the basis of the weighted average of more than one unit. In regard to gas chlorine, however, none of the costed units sells it in that form but only after liquefaction and therefore, no fair price is being indicated for chlorine in gas form.

18. Estimates of costs and fair ex-works prices

18.1. Our estimates of costs and the fair selling prices determined on the basis indicated in the above paragraph are tabulated below in respect of the different products manufactured by each of the units costed.

18.2. The factors taken into account in the estimates are explained below under the following broad heads:—

(i) Materials
(ii) Power and fuel
(iii) Conversion charges
(iv) Depreciation
(v) Packing costs
(vi) Return.

TABLE NO: 36

Estimated fair ex-works prices of caustic soda

Name of product	CAUSTIC LYE 100% Na OH					
Type of cells	DIAPHRAGM		MERCURY			
Name of unit	Mettur	Alkali	Dhranga-dhra	Mettur	Century	Kanoria
Production (Tonnes)	18800	8100	44567	18000	17000	16000
1. Raw materials	186.95	193.30	86.94	190.96	165.99	226.82
2. Power and fuel	280.90	349.85	150.00	202.12	321.46	150.91
3. Other conversion charges	188.32	337.03	184.24	174.02	195.67	268.85
4. Depreciation	43.61	40.28	36.43	138.13	126.76	98.08
TOTAL	699.78	920.46	457.61	705.23	809.88	744.66
5. *Less* credit for materials recovered etc.	254.32	274.04	218.34	332.78	365.18	318.53
NET TOTAL	445.46	646.42	239.27	372.45	444.70	426.13
6. Additional Cost of unutilised chlorine	87.23	..	215.61	104.20	153.06	114.86
TOTAL WORKS COST	532.69	646.42	454.88	476.65	597.76	540.99
7. Return	63.52	62.10	76.52	100.96	85.32	102.63
8. Fair Ex-Works Price per Tonne	596.21	708.52	531.40	577.61	683.08	643.62
Weighted average of all units			Rs. 595.57			
Weighted average of all units excluding Dhrangadhra.			Rs. 632.29			

TABLE No. 36—*contd.*

Name of product	Caustic soda Fused Solid				Caustic soda Flakes	
Type of cells	Diaphragm	Mercury			Mercury	
Name of unit	Mettur	Dhrangadhra	Mettur	Kanoria	Dhrangadhra	Mettur
Production (Tonnes)	6000	41500	9000	1600	2500	3600
1. Raw materials	179.91	86.94	190.96	226.82	86.94	190.96
2. Power and fuel	316.76	185.41	245.78	194.89	187.20	247.96
3. Other conversion charges	248.79	201.56	206.24	332.04	202.42	207.85
4. Depreciation	49.02	41.84	172.72	144.89	42.12	174.44
TOTAL	794.48	515.75	815.70	898.64	518.68	821.21
5. *Less* credit for materials recovered etc.	244.74	218.34	332.78	318.53	218.34	332.78
NET TOTAL	549.74	297.41	482.92	580.11	300.34	488.43
6. Packing	75.50	58.46	75.50	67.50	144.43	205.50
7. Additional cost of unutilised chlorine	83.94	215.61	104.20	114.86	215.61	104.20
TOTAL WORKS COST	709.18	571.48	662.62	762.47	660.38	798.13
8. Return	79.08	90.07	132.72	158.57	96.90	139.36
9. Fair Ex-Works Price per Tonne	788.26	661.55	795.34	921.04	757.28	937.49
Weighted average of all units			Rs. 702.51			Rs. 863.63

TABLE NO. 37

Estimated fair ex-works prices of liquid chlorine

Type of cells	Diaphragm		Mercury			
Name of unit	Mettur	Alkali	Dhranga-dhra	Mettur	Century	Kanoria
Saleable production (Tonnes)	12030	5280	5150	13000	5000	6300
1. Raw materials	279.76	309.41	259.84	372.45	464.35	465.77
2. Power and fuel	5.25	34.16	11.22	6.14	55.55	12.44
3. Other conversion charges (Including cylindering charges)	57.09	241.45	52.35	42.46	41.84	59.81
4. Depreciation	8.02	23.14	133.46	29.95	50.70	111.82
TOTAL	350.12	608.16	456.87	451.00	612.44	649.84
Less credit for recoveries	6.00	..	8.16	6.00	8.00	12.38
TOTAL WORKS COST	344.12	608.16	448.71	445.00	604.44	637.46
Return	40.58	30.83	148.07	88.51	97.63	192.73
Fair Ex-Works Price per Tonne	384.70	688.99	596.78	533.51	702.07	830.19
Weighted average of all units	Rs. 577.75					

TABLE NO. 38

Estimated fair ex-works prices of hydrochloric acid

(Commercial)

Type of cell	Diaphragm		Mercury		
Name of unit	Mettur	Alkali	Dhranga-dhra	Century	Kanoria
Saleable production (Tonnes)	4170	6600	2756	11000	5160
1. Raw materials	98.25	95.27	79.75	142.30	136.36
2. Power and fuel	3.49	4.71	1.38	2.78	0.59
3. Other conversion charges	20.71	112.37	7.05	3.45	10.72
4. Depreciation	4.43	10.45	1.59	4.53	7.55
TOTAL	126.88	222.80	89.77	153.06	155.22
5. *Less* credit for recoveries	6.36	..	0.01	..	..
TOTAL WORKS COST	120.52	222.80	89.76	153.06	155.22
Return	14.06	30.61	15.36	22.90	32.64
Fair Ex-Works Price per Tonne	134.58	253.41	105.12	175.96	187.86
Weighted average	Rs. 182.86				

(i) *Materials* : (a) *Salt.*—Sodium chloride or common salt is the main raw material required for the manufacture of caustic soda. While Mettur and Dhrangadhra consume the salt raised in their own works, supplemented by outside purchases, Alkali, Century and Kanoria depend for their requirements only on outside purchases. The rates paid for this raw material varied from unit to unit, depending on the source of purchase and the distance over which it is carried. The requirement of salt per tonne of caustic soda (lye, 100% NaOH) also varied from unit to unit, depending on the purity of the salt as also the losses in transport, handling, etc. The rates and the quantities adopted in estimating the costs for the various units are as below :—

Name of unit	Rate per tonne	Quantity per tonne
	Rs.	Tonne
1. Mettur (a) Diaphragm cells . .	65.00	2.06
(b) Mercury cells . .	65.00	2.00
2. Alkali	92.80	1.94
3. Dhrangadhra	30.55	2.00
4. Century	68.00	1.80
5. Kanoria	91.64	1.80

(b) *Other materials.*—These are the chemicals used for purifying the brine.

(ii) *Power and fuel.*—Included under this head are electricity, furnace oil, coal and water. By and large, the main cost is that of electricity used for the purposes of electrolysis. Here also, the rate of electricity and its consumption varied from unit to unit depending on the charges levied by the State Electricity Boards and the process adopted for manufacture. Furnace oil is used both for generation of steam as also for fusing the caustic lye into solid. Alkali & Chemical

Corporation however, uses coal for generation of steam. The average rates and the consumption factors adopted in estimating the cost for the different units are given below :

TABLE NO. 39

Average rates and consumption factors of power adopted

	Rate per kwh	Quantity per tonne of lye
	Paise	kwh.
(a) *Electricity :*		
1. Mettur		
(a) Diaphragm	4.85	3436
(b) Mercury	5.33	3600
2. Alkali	8.67	2800
3. Dhrangadhra	4.49	3340
4. Century	8.90	3510
5. Kanoria	3.98	3600
	Rate per tonne	Quantity per tonne of lye
	Rs.	Tonne
(b) *Furnace oil/coal for steam :*		
1. Mettur	228.00	0.4327
2. Alkali	39.50	1.82
	Rate per tonne	Quantity per tonne of fused caustic soda
	Rs.	Tonne
(c) *Furnace oil for fusion*		
(i) *For solid*		
1. Mettur		
(a) Diaphragm	228.00	0.1960
(b) Mercury	228.00	0.1471
2. Dhrangadhra	222.50	0.1479
3. Kanoria	290.00	0.1500
(ii) *For flakes*		
1. Mettur	228.00	0.1545
2. Dhrangadhra	222.50	0.1553

(iii) *Conversion charges.*—Under conversion charges we have included the costs in respect of labour and supervision, stores and other administrative and factory expenses. In estimating the costs towards these elements, we have taken into consideration all the known factors affecting the costs, including the recent increase in wage costs due to the interim recommendations of the Central Wage Board for Heavy Chemicals and Fertilisers Industry, the latest price trends in imported and indigenous stores items, etc. We have also adopted suitable norms for the consumption of important stores items like mercury and graphite.

(iv) *Depreciation.*—This element has been calculated on the basis of the rates allowed by the Income-tax authorities for the different types of fixed assets including the shift allowances wherever they are applicable.

(v) *Packing.*—Packing costs are in respect of drums used for fused caustic soda. We have adopted here the same pattern of packing as was obtained in the actual period after making due allowance for the latest price for the sheets used for the drums.

(vi) *Return.*—On all the products for which we are recommending the fair selling prices, we have allowed return at 15 per cent on the employed capital, which has been taken as equivalent to the sum of the average net fixed assets and working capital assessed at five months' costs of production excluding depreciation.

18.3. *Unutilised chlorine.*—The extent to which each of the units will be able to put chlorine obtained to effective use, either by way of self consumption or sale, has been estimated by us as follows for the different units :

	As per cent of total production
1. Mettur	80.3
2. Alkali	98.6
3. Dhrangadhra	14.5
4. Century	55.8
5. Kanoria	57.2

The cost in respect of unutilised chlorine has been loaded back to the cost of caustic soda as indicated in the statements.

19. Fair selling prices

19.1. *Selling commission.*—Having estimated the fair ex-works prices applicable to each of the costed units, we have now to decide the fair selling prices for the industry as a whole. Before we do this, we have to decide the element of commission payable to selling agents to be provided in the price. We have gone through the data collected in this respect by our Cost Accounts Officers. Each company has its own method of distribution. Some have sole selling agents while others distributors. Some pay commission only on actual sales effected through the agents or distributors, nothing being paid on direct sales effected by the company itself. After taking into consideration all the relevant factors as also the actual expenses incurred by the different units towards selling commission, we have come to the conclusion that a provision of 3 per cent on the selling price to be recommended by us will be fair and we have included this element in the price.

19.2. *Short realisation on chlorine sales.*—The second problem, as we have already indicated in paragraph 8.5 above, is the short-realisation on the liquid chlorine and hydrochloric acid available for sale. We have indicated in Tables 37 and 38 above, the fair ex-works prices estimated by us for each of the units on the basis of the joint product costing. The weighted average fair ex-works price for liquid chlorine works out to Rs. 577.75 and that for hydrochloric acid to Rs. 182.86. These prices are applicable only to that portion of the chlorine products, which we anticipate the industry will be able to utilise, the cost of unutilised and wasted chlorine having been already loaded to the cost of caustic soda. We expect that the industry will at least be able to realise on an average Rs. 285 in respect of liquid chlorine and Rs. 130 in respect of hydrochloric acid, per tonne of product sold. The incidence of the balance of unrealised price, per tonne of caustic lye, would work out to Rs. 124.59 and we propose to load this to the cost of caustic soda.

19.3.1. *Fair selling price for caustic lye* (100% NaOH).—The weighted average fair ex-works price per tonne of lye for the five costed units works out to Rs. 595.57 as indicated in Table 36. Taking into account the incidence of anticipated

short realisation on sale of liquid chlorine and hydrochloric acid and the selling commission, the fair selling price per tonne of lye would work out to Rs. 742.43 as follows :—

	Rs./tonne
Fair ex-works price as per Table 36 . .	595.57
Short realisation on liquid chlorine and hydrochloric acid	124.59
Selling commission	22.27
	742.43

19.3.2. The above price is based on the weighted average of all units including Dhrangadhra whose fair ex-works cost happens to be the lowest at Rs. 531.40 per tonne, and the production highest at 44,567 tonnes, about 36 per cent of the total of the costed units. The lowest cost of Dhrangadhra is mainly on account of the advantage it has in the salt cost. In fixing the fair price for the industry, we therefore, propose to exclude Dhrangadhra and base it on the other costed units. By excluding Dhrangadhra, the weighted average fair ex-works price would work out to Rs. 632.29 per tonne. Adding the other elements, the fair selling price would work out to Rs. 780 as follows, and, we recommend that this price be fixed for caustic lye (100% NaOH).

	Rs./tonne
Fair ex-works price excluding Dhrangadhra .	632.29
Short realisation on liquid chlorine and hydrochloric acid	124.59
Selling commission	23.41
	780.29
Say . . .	Rs. 780

19.4. *Fair selling price for caustic soda (Solid).*—Three units, *viz.*, Mettur, Dhrangadhra and Kanoria convert lye into solid for sale. The weighted average of fair ex-works prices of these three units works out to Rs. 702.51 per tonne as indicated in Table 36. We cannot, however, take this price

as the basis for fixing the price for caustic soda (solid). Instead we propose to take only the expenses relating to fusion and the proportionate element of return on the assets employed for fusion. The weighted average of the fusion charges, packing and the return for solid comes to Rs. 156.48. Adding this to the average lye cost as worked out in the paragraph above, the fair selling price for caustic soda (solid) would work out to Rs. 940 as follows :—

	Rs./tonne
Fair price for lye as per Table 36 (excluding Dhrangadhra)	632.29
Short-realisation on liquid chlorine & hydrochloric acid	124.59
Fusion charges (inclusive of return) . .	156.48
Selling commission	28.25
	941.61
Say . . .	940

The price indicated above is for caustic soda pure conforming to I.S.I. Specification No. IS : 1021-1964. For caustic soda of technical grade conforming to I.S.I. Specification No. 15. 252-1962, the fair selling price applicable as derived will be Rs. 900 per tonne.

19.5. *Fair selling price of caustic soda (Flakes).*—Caustic soda flakes are expected to be manufactured by only two units, namely Mettur and Dhrangadhra. In this case also we cannot take the weighted average of total cost of flakes worked out in Table 36, since this is based only on two units. We have to take only their flaking charges together with the return applicable to the assets used therein. Dhrangadhra's flaking charges work out to Rs. 225.88 while those of Mettur at Rs. 359.88 per tonne of caustic soda flakes. Mettur's costs are abnormally high. We, therefore, propose to base our

estimates only on Dhrangadhra. The fair selling price for caustic soda (flakes), based on the flaking charges of Dhrangadhra would work out to Rs. 1,013 as follows :

	Rs./tonne
Fair price for lye as per Table 36 . .	632.29
Short realisation on liquid chlorine and hydrochloric acid	124.59
Flaking charges (inclusive of return) . .	225.88
Selling commission	30.39
	1013.15
Say . . .	Rs. 1013

Again the price indicated above is for caustic soda (flakes) pure. The fair selling price applicable to caustic soda (flakes) of technical grade would be Rs. 973.72 per tonne. The existing difference between lye and flakes is Rs. 200. We propose to maintain this differential and therefore, recommend the price for flakes at Rs. 980 per tonne, the price for higher purity being adjusted suitably.

19.6. *Gas & liquid chlorine and hydrochloric acid.*—In view of the fact that the market prices for these two products are much lower than the fair prices estimated by us and also that we have added the anticipated short realisation on these products to the costs of cuastic soda, we are convinced that that there is no point in fixing fair selling prices for liquid chlorine and hydrochloric acid, though we have been requested to do so in the resolution remitting the case to us. We therefore, recommend that no selling prices be fixed for these two products.

19.7. The fair selling prices for caustic soda in its three forms have been based on the units producing them by the electrolytic process. We had collected the cost data and estimated the fair selling prices of Saurashtra Chemicals, which is producing caustic soda by the causticisation process. Admittedly the costs of production under this process are higher than those of caustic soda produced by the electrolytic

process. The anticipated share of production of chemical caustic soda in the country is a very small portion of the total production. Just because a small percentage of the caustic soda is produced at a higher cost, we do not think it proper to ask the consumers to bear any extra burden by taking the costs of Saurashtra Chemicals in the averages we have worked out. At the same time since production of chemical caustic soda has already come to stay under official sanction, we have to see that this marginal producer does not suffer at least in the recovery of the costs incurred. In this respect we are satisfied that the fair selling price recommended by us covers the works costs of this producer and also leaves a small margin. Another factor which has led us to this conclusion is that for Saurashtra Chemicals the major activity is production and marketing of soda ash and if, in the fair selling price of caustic soda which we are recommending for the industry, Saurashtra Chemicals is not covered fully for a fair return on its investments in caustic soda, no harm is done to it.

19.8.1. *Stable bleaching powder.*—Amongst the costed units only Mettur Chemicals manufactures stable bleaching powder and, therefore, we are recommending the fair selling price on the basis of the costs of Mettur. Mettur's capacity for manufacture of bleaching powder is 30 tonnes a day. Actual production for the year ended 31st March, 1967 was 8,416 tonnes. The company represented that in estimating the future costs we should assume an annual average production of 6000 tonnes, as they apprehend that the present annual demand is not likely to go up so as to match with the aggregate capacity licensed by Government. In fact, their share of the market might considerably go down when the third unit, (Kanoria), which is likely to be commissioned in 1967-68, markets its production. We, however, do not subscribe to this pessimistic view. We expect that it should be possible for the company to market at least 8,000 tonnes annually during the price period. We have, therefore, assumed an average annual production of 8,000 tonnes in estimating the future costs for this unit. The important raw materials required for the manufacture of bleaching powder are liquid chlorine and slaked lime. Both these materials are produced in Mettur's own works. In estimating

the costs, we have taken the prices of the above two materials at their works costs. Our estimates of costs per tonne of stable bleaching powder (excluding the cost of packing) are as below :—

	Rs./tonne
Materials	387.44
Power and fuel	27.19
Other conversion charges	129.75
Depreciation	23.17
Works cost	567.55

19.8.2. The normal trade practice is to sell bleaching powder in different size packings. The costs of containers vary depending on their capacities. After adding the costs of such containers, return at 15 per cent on the capital employed, determined as stated in paragraph 18(vi) and 3 per cent on the fair ex-works selling price by way of selling commission, we have estimated the fair selling prices for the different size packings as follows :

Size of packing	Fair selling price Rs.
100 Kgs.	87.55
50 ,, ...	45.90
25 ,, ...	27.55
12.5 ,, ...	15.45
3 ,, ...	5.10
1.5 ,, ...	3.00
0.5 ,, ...	1.60

19.8.3. With effect from the date they are brought into force, the fair selling prices for caustic soda (all varieties) and bleaching powder suggested may continue for a period of three years subject to our recommendation contained in paragraph 2.04.

20. Price revision

20.1. The Government has also requested us to consider the possibility of laying down a formula for automatic revision of selling prices based on variations in the costs of production and suggest a formula if considered possible. The industry had been making such a request in the past and has this time also pleaded for recommending a formula for the automatic revision of prices.

20.2. The Alkali Manufacturers' Association has suggested that a price revision formula should be framed by splitting the cost of production into two factors, factors which are liable to change frequently and those not liable to such frequent changes. In the first category it has suggested salt, power graphite, mercury/steam and the realisation from chlorine. According to the Associaiton the second factor should comprise all other expenses including labour, depreciation, cost of other materials and consumable stores. The Association has also suggested that the formula should be framed on the following principles :

$CPL=[(S+P+G+M+F)-L]+X$

CPL=Cost of production of 50% Lye

S=Cost of salt consumed, *i.e.*, consumption norm in tonnes × cost of salt per tonne.

P=Cost of power consumed *i.e.*, consumption norm in KWH × Cost of power in KWH.

G=Cost of graphite consumed, *i.e.*, consumption norm in Kgs. × cost of graphite per kg.

M=Cost of mercury consumed, *i.e.*, consumption norm in Kgs. × cost of mercury per kg.

F=Cost of fuel consumed, *i.e.*, consumption norm in tonnes × cost of furnace oil/coal per tonne.

L=Realisation on chlorine sold/utilised per tonne of caustic soda production.

X=All other charges, which have not been separately classified, such as cost of consumable stores, depreciation, labour, overheads etc.

20.3. We have given very careful consideration to these suggestions and would have been inclined to accept them if there was the possibility of any reasonable degree of uniformity in the matter of norms of consumption or the cost of the items of the raw materials. We find, however, that in the case of salt not only is the consumption variable from unit to unit as has already been discussed in paragraph 12, but its cost over the entire industry fluctuates from about Rs. 22 to Rs. 100 per tonne and in the case of the costed units from Rs. 30.55 to Rs. 92.80 per tonne. Some units consume salt manufactured in their own salt works, supplemented by outside purchases, while others purchase their entire requirement from outside parties. While in some cases the break up of the cost between purchase price, transport and other handling charges are available, some of the units have their contracted price on the basis of delivery ex-their factory. The mode of transport of salt also is not uniform, in that some units get it by sea route, while some get it either by rail or by rail-cum-road. Similar variations exist in the case of charges of power which are not uniform and vary from State to State and within the same State from unit to unit and within the same unit from plant to plant. In the case of mercury and graphite also there is considerable variation in the consumption from unit to unit.

As regards steam, it is produced from furnace oil or coal and here again the incidence of cost on the production of a given unit of steam would be different in the case of the two different fuels used. Again, of all the units producing caustic soda, one works on the causticising process which would not be amenable to the application of a common formula. The consumption of power varies as between unit to unit. The diaphragm cells do not use mercury. But they use large quantities of steam for evaporation of thin lye into thick lye. Even if a formula were attempted its application over a large number of units would not be possible unless a separate formula is evolved for each unit. Such a project would be tantamount to the fixation of separate prices for individual units, a venture which cannot be attempted even after a full fledged inquiry.

20.4. We, however, suggest that should there be any substantial increase in the costs of production during the price period due to factors beyond the control of the industry, such as revision in the rate of electricity, railway freight rates on salt and imported prices of graphite and mercury, the industry may approach Government for revision of the selling prices. If the case is remitted to us by Government, it will be possible for us to make an assessment of the extra burden without undertaking detailed cost of the units, but basing our estimates on the costs already adopted for this Report and working out suitable adjustments in respect of them. Such an exercise is not likely to take much time since the scope will be limited.

21. Summary of conslusions and recommendations

21.1. Our conclusions and recommendations may be summarised as under :—

21.2. Government may examine the question of licensing of additional capacity of chlorine which will develop as a result of the capacity sanctioned for caustic soda, in keeping with the policy that may be worked out for its utilization.

(Paragraph 7.2.)

21.3. The domestic demand for caustic soda is estimated at 284,000 tonnes for the current year. The estimates for 1968, 1969 and 1970 are 309,000 tonnes, 332,000 tonnes and 360,000 tonnes respectively.

(Paragraph 9.4.3.)

21.4. With effect from 1969 there would be substantial quantities of caustic soda available in the country for export.

(Paragraph 9.4.5.)

21.5. Unless new avenues for chlorine utilisation are found, the consumption pattern as it now exists will not be able to use up all the chlorine produced even if he the demand goes up appreciably in respect of certain items.

(Paragraph 9.4.7.)

21.6. The installation of small package units of ammonia by large scale alkali and caustic soda manufacturers may be encouraged for the manufacture of ammonia and ultimately that of ammonium chloride.

(Paragraph 10.7.)

21.7. No further licences be given till the existing units in the caustic soda industry come up to the economic size. New licences, if any, be issued for economic size units only, whether independent or captive.

(Paragraph 11.3.)

21.8. Not only are the power rates different from State to State but these are also discriminatory even in the same State from unit to unit and even for different plants of the same unit. Such disparities should be removed.

(Paragraph 12.3.2.)

21.9. Government may give consideration to the needs of the chemical industry in the matter of rates of electricity duty and take such steps as they may consider advisable to bring about not only uniformity in rates but also in the surcharges and the duties levied.

(Paragraph 12.3.2.)

21.10 Imports of mercury should be so arranged that it is available to the producers of caustic soda at as favourable terms as possible and that the large units which are willing to do so may be allowed to import it directly.

(Paragraph 12.4.2.)

21.11. The railways should develop additional capacity of tank wagons for the transport of caustic soda lye in order that the expenditure on converting it into solid is avoided and until such wagons are provided, modify their rules so that plastic sheet bags commensurate with the degree of safety needed for their transport are acceptable for carriage.

(Paragraph 12.5.)

21.12. Exports may be encouraged with adequate incentives to efficient and economic units only, so that the country may not have to bear the unnecessary burden of subsidising exports for long.

(Paragraph 15.3.)

21.13. The fair selling price ex-works of caustic lye (100% NaOH content) may be fixed at Rs. 780 per tonne.

(Paragraph 19.3.2.)

21.14. The fair selling price ex-works of solid caustic soda (pure) comes to Rs. 940 per tonne. For caustic soda of technical grade, the fair selling price as derived would be Rs. 900 per tonne.

(Paragraph 19.4.)

21.15. The fair selling price ex-works for caustic soda flakes of technical grade comes to Rs. 980 per tonne, the price for higher purity to be adjusted suitably.

(Paragraph 19.5.)

21.16. No selling prices need be fixed for chlorine gas, liquid chlorine and hydrochloric acid.

(Paragraph 19.6.)

21.17. The fair selling prices for stable bleaching powder in packings of 100 kgs., 50 kgs., 25 kgs., 12.5 kgs., 3 kgs., 1.5 kgs., and 0.5 kg. work out to Rs. 87.55, Rs. 45.90, Rs. 27.55, Rs. 15.45, Rs. 5.10, Rs. 3.00 and Rs. 1.60 respectively.

(Paragraph 19.8.2.)

21.18. With effect from the date they are brought into force, the fair selling prices for caustic soda (all varieties) and bleaching powder suggested may continue for a period of three years subject to our recommendation in paragraph 20.4.

(Paragraph 19.8.3.)

21.19. It is not possible to lay down a workable formula for automatic revision of selling prices based on variations in the cost of important raw materials and power for various reasons. We, however, suggest that should there be any substantial increase in the costs of production during the price period due to factors beyond the control of the industry such as increase in the price of salt, mercury and graphite and in the rates of electricity or railway freight, the industry may approach Government for revision of the selling prices.

(Paragraph 20.4.)

22. We desire to express our thanks to the producers, consumers and representatives of Government Departments for furnishing us with valuable information and assisting us in the conduct of this inquiry.

Acknowledgements

M. ZAHEER,
Member.

K. T. MERCHANT
Member.

S. SUBRAMANIAN
Member

P. V. GUNISHASTRI
Secretary.

BOMBAY,
23*rd August*, 1967.


सत्यमेव जयते

APPENDIX—1

(*Vide* Paragraph 1)

F. No. 20(5)-Tar/66

GOVERNMENT OF INDIA

MINISTRY OF COMMERCE

New Delhi, Dt. the 9th Nov. 66.

To

The Secretary, Tariff Commission,
C.G.O. Building, 101, Queen's Road,
BOMBAY-1.

SUBJECT.—*Enquiry into the cost structure of caustic soda in the country—Reference to the Tariff—Commission for.*

Sir,

I am directed to say that the Alkali Manufacturer's Association of India who had earlier given an assurance to Government that they would not effect any increase in the selling prices of caustic soda without consulting Government, submitted a proposal in June, 1966 to effect an increase of Rs. 64/- per tonne in the selling price of caustic soda. A copy of the Association's letter No. ALK/177 dated the 27th June, 1966 containing the proposal is attached.

The request has been examined by the Government of India and it has been decided to request the Tariff Commission to enquire into the matter with the following terms of reference.—

(i) To go into the cost structure of the caustic soda industry as a whole and recommend fair selling prices for caustic soda (all varieties), chlorine (liquid and gas), hydrochloric acid and bleaching powder for a period of three years or so;

(ii) To consider the possibility of laying down a formula for automatic revision of selling prices based on variations in costs of production, and suggest a formula if considered possible.

I am to request the Tariff Commission under Section 12 (d) of the Tariff Commission Act, 1951 to enquire into the matter as indicated above on a priority basis and furnish its recommendations/Report to the Government as early as possible. The Commission may make interim recommendations if it considers such a course necessary in the circumstances of the case.

*A short note giving the facts of the case is attached.

Yours faithfully,

Sd. (S. SUBRAMANIAN)

Officer on Special Duty.

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*Not reproduced here.

8—2T.C. Bom./68

APPENDIX—2

(*Vide* Paragraph 4.1)

List of those to whom the Commission's questionnaires/ letters were issued

*Those who have replied.

@Those who are not interested.

A. PRODUCERS

*1. Andhra Sugars Ltd., Venkatarayapuram, Post Box No. 2, Tanuku, Andhra Pradesh.

*2. Rohtas Industries Ltd., P.O. Dalmianagar, Bihar.

*3. D.C.M. Chemical Works, Post Box No. 1211, Najafgarh Road, Delhi.

*4. Saurashtra Chemicals, Porbandar, Gujarat.

*5. Tata Chemicals Ltd., Bombay House, Bruce Street, Bombay-1.

*6. Atul Products Ltd., Post Atul, Bulsar.

*7. Calico Mills, Chemical Division, Post Box No. 12, Ahmedabad.

*8. Travancore-Cochin Chemicals Ltd., Udyogamandal P.O., (Via) Alwaye, Kerala.

*9. Dhrangadhra Chemical Works Ltd., (Caustic Soda Division), Sahupuram, P.O. Arumuganeri, Tinnevelly District, Madras State.

*10. Mettur Chemical & Industrial Corporation Ltd., Mettur Dam R.S., Dist. Salem, Madras State.

*11. Hukumchand Jute Mills Ltd., (Caustic Soda Project), Amlai, Madhya Pradesh.

*12. National Rayon Corporation Ltd., Eros Bldg., (West) 1 Jamshedji Tata Road, Post Box No. 177, Bombay-1 (BR).

*13. Century Chemicals, Industry House, Churchgate Reclamation, Bombay-1.

*14. Calico Chemicals & Plastics Division, Anik, Chembur, Bombay-74.

*15. J. K. Chemicals Ltd., Panchapakadi, Pokharan Road, Dist. Thana.

*16. Shriram Vinyl & Chemical Industries, Shrirampur Industrial Area, Kota, Rajasthan.

*17. Kanoria Chemicals & Industries Ltd., 9, Brabourne Road, Calcutta-1.

*18. Alkali & Chemical Corporation of India Ltd., 34, Chowringhee, Calcutta.

*19. Hindustan Heavy Chemicals Ltd., 15, Barrackpore Trunk Road, Khardah, 24 Parganas, West Bengal.

*20. Sirpur Paper Mills Ltd., Sirpur—Kaghaznagar, Andhra Pradesh.

*21. National Newsprint & Paper Mills Ltd., Nepangar, Madhya Pradesh.

*22. Mysore Paper Mills Ltd., Bhadravati Paper Town, Mysore State.

*23. Orient Paper Mills Ltd., P.O. Brajrajnagar, Dist. Sambalpur, Orissa.

24. Shree Gopal Paper Mills Ltd., 25, Brabourne Road, Calcutta-1.

*25. Titaghur Paper Mills Co. Ltd., P.O. Titaghur, 24-Paraganas, West Bengal.

B. PROSPECTIVE PRODUCERS

*1. Jayshree Chemicals Ltd., 14, Netaji Subhas Road, Calcutta-1.

2. The Mysore Sugar Co. Ltd., Sri Jayachamaraja Wadiyar Road, Bangalore-2.

*3. Durgapur Chemicals Ltd., 10, Middleton Road, Calcutta-16.

*4. Standard Mills Co. Ltd., Mafatlal House, Backbay Reclamations, Bombay.

*5. Gwalior Rayon Silk Mfg. (Wvg.) Co. Ltd., Birlagram, Nagda (M.P.).

*6. Hindusthan Organic Chemicals Ltd., P.O. Rasayani Dist. Kolaba, Maharashtra.

C. MANUFACTURERS, ASSOCIATIONS

1. Indian Chemical Manufacturers, Association, India Exchange 8th Floor, India Exchange Place, Calcutta-1.

*2. Alkali Manufacturers, Association of India, Bansilal Mansion, 11, Bruce Street, Fort, Bombay-1.

D. CONSUMERS

*1. The Bengal Paper Mills Co. Ltd., 14, Netaji Subhas Road, Calcutta.

2. India Paper Pulp Co. Ltd., 8, Clive Row, Post Box No. 150, Calcutta-1.

*3. Orient Paper Mills Ltd., 15, India Exchange Place, Calcutta-1.

*4. Hindustan Insecticides Ltd., Udyogmandal, P.O., Kerala State.

*5. Indian Aluminium Co. Ltd., 31, Chowringhee Road, Calcutta-16.

*6. Aluminium Corporation of India Ltd., 7, Council House Street, Calcutta-1.

*7. Burmah-Shell Refineries Ltd., Post Box No. 1725, Bombay-1 (BR).

*8. Caltex Oil Refining (India) Ltd., Visakhapatnam-1.

*9. Hindustan Lever Ltd., Backbay Reclamation, Bombay-1.

10. Godrej Soaps Pvt. Ltd., 316, Delisle Road, Bombay-11 (BC).

*11. Tata Oil Mills Co. Ltd., Bombay House, Bruce Street, Fort, Bombay-1.

*12. National Rayon Corporation Ltd., Eros Bldg. (West), 1, Jamshedji Tata Road, P.B. No. 177, Bombay-1 (BR).

13. Travancore Rayons Ltd., Rayonpuram P.O., Kerala State.

*14. Indian Oxygen Ltd., 16-S, Block 'A', New Alipore Annex, New Alipore Road, Calcutta-27.

*15. The Atul Products Ltd., P.O. Atul, Bulsar.

*16. Dunlop Rubber Co. (India) Ltd., Dunlop House, 57-B, Free School Street, Calcutta-16.

*17. Amar Dye Chem Ltd., Post Box No. 6471, Rang Udyan, Sitladevi Temple Road, Mahim, Bombay-16.

*18. Shambu Nath and Sons Ltd., Post Box No. 12, 12, G.T. Road, Amritsar.

*19. Punalur Paper Mills Ltd., Punalur, Kerala State.

*20. Gwalior Rayon Silk Mfg. (Wvg.) Co. Ltd., Birlagram, Nagda (W. Rly.).

*21. The Sirsilk Ltd., Sirpur-Kaghaznagar (C. Rly.), Andhra Pradesh.

*22. Century Rayon, Industry House, 159, Churchagte Reclamation, Bombay-1.

23. Mahalakshmi Colour Co., Pudupet, Gudiyattam (S. India).

*24. The Buckingham & Carnatic Co. Ltd., Post Box No. 1966, Madras-1.

25. The Express Mills Ltd., Nagpur.

26. The Svadeshi Mills Co. Ltd., Bombay House, Bruce Street, Fort, Bombay-1.

27. The Universal Textile & Dyeing Mills Co., Outside Ghee Mandi Gate, Amritsar.

28. Tata Mills Ltd., Bombay House, Bruce Street, Fort, Bombay-1.

*29. The Upper India Couper Paper Mills Co. Ltd., Nishatganj, Lucknow-7.

*30. The Bechardas Spg. & Wvg. Mills Co. Ltd., Post Box No. 22, Ahmedabad-1.

*31. The Hukumchand Mills Ltd., Indore (M.P.).

*32. The Swadeshi Cotton & Floor Mills Ltd., Indore.

*33. The Central India Spg. & Wvg. Co. Ltd., Bombay House, Bruce Street, Fort, Bombay-1.

34. The Aryodaya Spg. & Wvg. Co. Ltd., Outside Kalupur Gate, Asarva Road, P.O. Box No. 146, Ahmedabad.

35. Sirpur Paper Mills Ltd., 15 India Exchange Place, Calcutta-1.

36. ROM Soap Works, Devdawadi, Rajkot-2.

*37. Tribeni Tissues Pvt. Ltd., 24-B, Park Street, Calcutta.

E. CONSUMERS' ASSOCIATIONS

1. Indian Soap and Toiletries Makers' Association, P-11, Mission Row Extension, Calcutta-1.

*2. The Millowners' Association, Post Box No. 95, Elphinstone Building, Veer Nariman Road, Bombay-1.

*3. The Ahmedabad Millowners' Association, Post Box No. 7, Navarangpura, Ahmedabad-9.

*4. Indian Paper Makers' Association, Royal Exchange, Calcutta-1.

@5. The Vanaspati Manufacturers' Association of India, 5th Floor, India House, Fort Street, Bombay-1.

*6. The Karur Weaving and Knitting Factory Owners' Association, Ltd., Post Box No. 71, Karur (S.I.)

*7. The Madhya Pradesh Millowners' Association, 11, South Tukoganj, Indore (M.P.)

8. The Non-Power Soap Manufacturers' Association, 187, Sheriff Devji Street, Bombay-3.

F. IMPORTER

The State Trading Corporation of India Ltd., Express Building, Post Box No. 79, New Delhi-1.

G. GOVERNMENT DEPARTMENTS

*1. Indian Standards Institution, Manak Bhavan, 9, Bahadur Shah Zafar Marg, New Delhi-1.

*2. The Directorate General of Technical Development (Alkalis and Allied Chemicals Directorate), Udyog Bhavan, Maulana Azad Road, New Delhi.

*3. The Directorate General of Supplies & Disposals, New Delhi.

*4. The Salt Commissioner, Government of India, P.B. No. 139, Jaipur.

*5. The Ministry of Railway (Railway Board), New Delhi.

H. EMBASSIES/HIGH COMMISSIONS

*1. The Minister (Economic) to the High Commission of India in the U.K., India House, Aldwyche, London W.C. 2, ENGLAND.

2. The First Secretary (Commercial) to the Embassy of India, 2107, Massachusetts Avenue, N.W. Washington, 8. D.C., U.S.A.

*3. The First Secretary (Commercial) to the Embassy of India, *Via* Fransisco Denze 36, Rome, ITALY.

*4. First Secretary (Commercial) to the Embassy of India, 11, go No. 2 Chome, Kandan, Mivami, Chiyodaku, Tokyo, JAPAN.

*5. The First Secretary (Commercial) to the Embassy of India, 2, Rue codotde Manroy, Paris, FRANCE.

I. STATE GOVERNMENTS—CHIEF SECRETARIES OF STATES

1. The Chief Secretary to the Government of Andhra Pradesh, HYDERABAD.

2. The Chief Secretary to the Government of Assam, SHILLONG.

3. The Chief Secretary to the Government of Bihar, PATNA.

*4. The Chief Secretary to the Government of West Bengal, CALCUTTA.

*5. The Chief Secretary to the Government of Gujarat, AHMEDABAD.

6. The Chief Secretary to the Government of Jammu & Kashmir, SHRINAGAR.

7. The Chief Secretary to the Government of Kerala, TRIVANDRUM.

*8. The Chief Secretary to the Government of Madhya Pradesh, BHOPAL.

*9. The Chief Secretary to the Government of Madras, MADRAS.

*10. The Chief Secretary to the Government of Maharashtra, BOMBAY.

*11. The Chief Secretary to the Government of Mysore, BANGALORE.

12. The Chief Secretary to the Government af Orissa, BHUBANESHWAR.

13. The Chief Secretary to the Government of Punjab, CHANDIGARH.

*14. The Chief Secretary to the Government of Rajasthan, JAIPUR.

15. The Chief Secretary to the Government of Uttar Pradesh LUCKNOW.

16. The Chief Commissioner, Delhi Administration, DELHI.

*17. The Chief Commissioner, Himachal Pradesh, SIMLA.

18. The Chief Secretary to the Government of Haryana, CHANDIGARH.

APPENDIX—3

(*Vide* Paragraph 4.4)

Statement showing the factories visited by the Commission and its Officers

Sl. No.	Name of unit	By whom visited	Date of visit
1	The DCM Chemical Works, Delhi . . .	Shri M. Zaheer, Member	16th February 1967
2	Kanoria Chemicals & Industries Ltd., Renukoot	Shri M. Zaheer, Member	20th February, 1967
3	The Mettur Chemical & Industrial Corporation Ltd., Mettur Dam.	Shri S. R. Mallya, C.A.O.	30th April to 9th May 1967.
4	Dhrangadhra Chemical Works Ltd., Sahupuram	Shri S. R. Mallya, C.A.O.	11th to 21st May, 1967
5	The Alkali & Chemical Corporation of India Ltd., Rishra.	Shri A. T. Mukherjee, A.C. A.O.	29th April to 10th May 1967.
6	Kanoria Chemicals & Industries Ltd., Renukoot .	Shri A. T. Mukherjee, A.C. A.O.	13th to 19th May, 1967
7	Calico Mills, Chemicals Division, Bombay . .	Shri S. Saha, T.D. (C) Shri K. Jayaraman D. (R. & R.). Smt. R. A. Muranjan R.O.	25th April 1967
8	Century Chemicals, Kalyan	Shri A. T. Mukharji A.C. A.O.	7th to 20th March, 1967
9	Saurashtra Chemicals, Porbandar . . .	Shri R. P. Brahma C.A.O.	9th July to 17th July, 1967

APPENDIX—4

(*Vide* Paragraph 4.5)

List of persons who attended the Commission's public inquiry on 5th July 1967

A. PRODUCERS :

1. Shri R. V. Ramani 2. Shri R. Jayaraman 3. Shri T. M. Krishna Rao 4. Shri R. Natarajan	Representing	The Mettur Chemical and Industrial Corporation Ltd., Mettur Dam R.S., Salem Dist., Madras State.
5. M. D. Parekh	,,	National Rayon Corpn. Ltd., Eros Building (West), 1. Jameshdji Tata Road, P.B. No. 177, Bombay-1 (BR).
6. Shri P. C. Jain 7. Shri S. K. Jain	,,	Dhrangadhra Chemical Works Ltd., 15-A, Horniman Circle, Fort, Bombay-1.
8. Shri H. P. Shroff 9. Shri A. R. Subramaniam. 10. Shri R. Krishnamurti	,,	Tata Chemicals Ltd., Bombay House, Bruce Street, Fort, Bombay-1.
11. Shri D. C. Mittal 12. Shri R. K. Jain 13. Shri A. N. Gupta 14. Shri L. R. Gautam	,,	D. C. M. Chemical Works, P.B. No. 1211, Najafgarh Road, Delhi.
15. Shri P. D. Desai 16. Shri C. A. Gharekhan	,,	Calico Mills, Chemical Divn., P.B. No. 12, Ahmedabad.
17. Shri T. K. Chakkunny 18. Shri A. Sreekantan Nair. 19. Shri V. Padmanabhan	,,	The Travancore Cochin Chemicals Ltd., Udyogmandal, P.O. (Via) Alwaye, Kerala State.

20. Shri R. Srinivasan 21. Shri T. R. Majumdar	Representing	Alkali & Chemical Corpn. of India Ltd., 34, Chowringhee, Calcutta-16.
22. Shri M. M. Oswal	,,	Rohtas Industries Ltd., 11, Clive Road, Calcutta-1.
23. Shri H. C. Jain 24. Shri B. N. Kaul. .	,,	Century Chemicals, Industry House, Churchgate Reclamation, Bombay-1.
25. Shri S. N. Tandon	,,	Kanoria Chemical Industries Ltd., 9, Brabourne Road, Calcutta-1.
26. Shri M. C. Goenka	,,	Hukumchand Jute Mills Ltd., (Caustic Soad Project), Amlai, M.P.
27. Shri D. P. Patkar	,,	Saurashtra Chemicals, Porbandar, Gujarat.
28. Shri C. M. Naik	,,	Orient Paper Mills Ltd., 15, India Exchange Place, Calcutta-1.

B. PROSPECTIVE PRODUCERS :

29. Shri H. K. Mohta	,,	Jayshree Chemicals Ltd., 14, Netaji Subhash Road, Calcutta-1.
30. Shri V. Ramadurai 31. Shri D. C. Shah 32. Shri S. A. Dave .	,,	Standard Mills Co. Ltd., Mafatlal House, Backbay Reclamations, Bombay.
33. Shri V. Krishnan	,,	Gwalior Rayon Silk Mfg. (Wvg.) Company Limited, Birlagram, Nagda, Madhya Pradesh.

C. MANUFACTURERS' ASSOCIATION :

34. Shri R. V. Ramani Shri P. C. Jain Dr. M. D. Parekh Shri V. K. M. Menon	Representing	Alkali Manufacturers' Association of India, Bansilal Mansion, 11, Bruce Street, Fort, Bombay-1.

D. IMPORTER :

35. Shri M. M. Saklani	,,	The State Trading Corporation of India Limited, Express Building, P. B. No. 79, New Delhi-1.

E. CONSUMERS :

36. Shri D. K. Baheti	,,	Indian Aluminium Co. Ltd., 31, Chowringhee Road, Calcutta-16.
37. Shri R. A. Taraporewalla.	,,	Hindustan Lever Ltd., Backbay Reclamation, Bombay-1.
38. Shri A. N. Trivedi 39. Shri R. D. Mistri	,,	Tata Oil Mills Co. Ltd., Bombay House, Bruce Street, Fort, Bombay-1.
40. Shri K. G. Krishnaswamy.	,,	The Buckingham & Carnatic Co. Ltd., Post Box No. 1966, Madras-1.
41. Shri T. George John	,,	Hindustan Insecticides Ltd., Udyogmandal P.O., Kerala State.

F. CONSUMERS' ASSOCIATION :

42. Shri H. P. Trivedi 43. Shri C. C. Sampat	,,	The Millowners' Association, Post Box No. 95, Elphinstone Bldg. Veer Nariman Road. Bombay-1.

44. Shri R. A. Tarapore-walla (of Hindustan Lever).	Representing	Indian Soap and Toiletries Makers' Association, P-11, Mission Row Extension, Calcutta-1.

G. GOVERNMENT DEPARTMENTS :

45. Shri K. D. Jain . .	,,	The Directorate General of Technical Development, Udyog Bhawan, Maulana Azad, Road, New Delhi.
46. Shri N. K. Ramaswamy	,,	The Director, Indian Standards Institution, Manak Bhavan, 9, Bahadur Shah Zafar Marg, New Delhi -1.
47 Shri L. V. Dharmadhikari.	,,	The Directorate General of Supplies & Disposals, New Delhi.
48. Shri K. S. Bhujang .	,,	Textile Commissioner, New C.G.O. Building, Queen's Road, Bombay-1.
49. Dr. J. D. Joshi . .	,,	The Director of Industries, Government of Maharashtra, Bombay.
50. Shri U. Chatterjee .	,,	The Director of Industries, Government of West Bengal, Calcutta.
51. Shri P. P. Reddy .	,,	The Director of Industries, Government of Madras, Madras.

APPENDIX—5

(*Vide* Paragraph 8.1)

Production of caustic soda in 1964, 1965 *and* 1966

Sl. No.	Unit	Grade	1964				1965				1966			
			Liquid	Solid	Flakes	Total	Liquid	Solid	Flakes	Total	Liquid	Solid	Flakes	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Electrolytic (Mercury)													
1	Dhrangadhra Chemical Works, Sahupuram.	Rayon	..	35,353	5,545	40,898	..	33,488	5,260	38,748	..	36,664	3,968	40,632
2	Mettur Chemical & Ind. Corpn. Ltd., Mettur Dam.	Rayon	..	..	..	..	675	..	..	675	3,934	680	..	4,614
3	National Rayon Corporation Ltd., Kalyan.	Rayon	15,371	..	..	15,371	17,809	..	..	17,809	21,442	..	..	21,442
4	Sriram Vinyl & Chemical Industires, Kota	Rayon	13,486	..	..	13,486	11,076	..	..	11,076	9,204	..	..	9,204
5	Kanoria Chemicals, Renukoot.	Rayon	1,851	..	..	1,851	13,506	..	..	13,506	13,265	1,790	..	15,055
6	Travancore-Cochin Chemicals, Udyogmandal.	Rayon	7,931	785	1,779	10,495	8,581	627	2,117	11,325	5,996	383	1,685	8,064
7	Hukumchand Jute Mills, Amlai.	Rayon	..	..	..	..	3,075	..	..	3,075	12,177	..	..	12,177
8	Calico Chemical & Plastic Division, Bombay.	Rayon	10,961	..	..	10,961	11,422	..	..	11,422	10,486	..	..	10,486

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
9	Andhra Sugars Ltd., Tanuku.	Rayon	..	..	..	..	1,240	..	..	1,240	2,611	949	707	4,267
10	Century Chemicals, Kalyan.	Rayon	1,494	..	..	1,494	10,543	..	..	10,543	15,029	..	..	15,029
11	Atul Products, Bulsar	Rayon	2,160	6	464	2,630	2,273	3	780	3,056	1,905	79	1,016	3,000
12	Hindusthan Heavy Chemicals Ltd., Calcutta.	Rayon	1,791	..	..	1,791	2,397	..	..	2,397	2,615	..	..	2,615
13	NNP Paper Mills, Nepanagar.	Rayon	..	..	..	..	994	..	..	994	1,986	..	..	1,986
14	Rohtas Industries Ltd., Dalmianagar.	Rayon	4,590	..	..	4,590	4,660	..	..	4,660	3,502	..	..	3,502
15	Orient Paper Mills Ltd., Brajrajnagar.	Rayon	3,285	..	..	3,285	3,208	..	..	3,208	3,024	..	..	3,024
16	J. K. Chemicals Ltd., Thana.	Rayon	1,330	..	..	1,330	1,164	..	..	1,164	1,067	..	..	1,067
	TOTAL .		64,250	36,144	7,788	108,182	92,623	34,118	8,157	134,898	108,243	40,545	7,376	156,164
	Electrolytic (Diaphragm)													
2a	Mettur Chemical & Ind. Corpn., Mettur Dam.	Technical	10,750	3,301	1,382	15,433	14,934	2,463	1,279	18,676	11,884	4,676	1,112	17,672
17	D.C.M. Chemical, Works, Delhi.	Technical	8,439	1,192	3,169	12,800	8,712	733	4,147	13,592	8,183	434	3,806	12,423
18	Alkali & Chemical Corporation of India, Rishra.	Technical	7,572	..	..	7,572	8,055	..	..	8,055	7,188	..	..	7,188

19	Tata Chemicals Ltd., Mithapur.	Technical	535	958	2,385	3,878	62	297	4,400	4,759	..	491	4,194	4,685
20	Sirpur Paper Mills Ltd., Sirpur-Kaghaznagar.	Technical	5,433	..	..	5,433	5,690	..	..	5,690	5,329	..	..	5,329
21	Titaghur Paper Mills Co. Ltd., Titaghur.	Technical	5,385	..	..	5,385	5,929	..	.	5,929	5,998	..	..	5,998
22	Calico Mills, Chemical Division, Ahmedabad.	Technical	2,633	..	..	2,633	2,434	..	..	2,434	2,533	..	..	2,533
22a	Rohtas Industries Ltd., Dalmianagar.	Technical	1,685	..	..	1,685	1,806	..	..	1,806	1,379	..	..	1,379
23	Shree Gopal Paper Mills Ltd., Jagadhri.	Technical	710	..	..	710	649	..	..	649	723	..	..	723
24	Mysore Paper Mills Ltd., Bhadravati.	Technical	534	..	..	534	429	..	..	429	470	..	..	470
	TOTAL . .		43,676	5,451	6,936	56,063	48,700	3,493	9,826	62,019	43,687	5,601	9,112	58,400
	Chemical													
25	Saurashtra Chemicals, Porbunder.	Technical	..	18,443	1,337	19,780	..	15,56	2,531	18,037	..	15,607	288	15,895
19a	Tata Chemicals Ltd. Mithapur.		Production very marginal & hence not included.											
	GRAND TOTAL .		107,926	60,038	16,061	184,025	141,323	53,117	20,514	214,954	151,930	61,753	16,776	230,459

APPENDIX—6

(*Vide* Paragraph 9.4.6)

Statement showing estimates of future production of liquid chlorine and hydrochloric acid

(In tonnes)

Sl. No.	Particulars of unit	Liquid chlorine			Hydrochloric acid		
		1967	1968	1969	1967	1968	1969
1	Dhrangadhra Chemical Works . .	2,400	5,000	8,000	420	420	460
2	Mettur Chemical & Indus. Corpn. .	16,000	19,000	19,000	10,200	5,400	4,500
3	National Rayon Corporation . .	8,400	9,000	9,000	4,000	4,500	5,000
4	Shriram Vinyl & Chemical Industries	300	..	11,200	6,600	8,300	10,000
5	Kanoria Chemicals & Industries . .	5,200	6,190	7,378	7,440	6,552	3,252
6	Travancore-Cochin Chemicals . .	4,500	8,000	8,250	8,000	21,500	23,100
7	Hukumchand Jute Mills . . .	9,900	9,900	9,900	495	495	495
8	Calico Chemicals & Plastics Divn. .	7,500	8,200	8,200	800	900	900
9	Andhra Sugars	5,000	6,000	6,330	300	600	780

10	Century Chemicals	3,300	5,000	6,600	9,000	10,500	12,000
11	Atul Products	5,511	5,511	6,039	1,990	1,990	1,990
12	Hindusthan Heavy Chemicals . .	.....Not furnished.....			....Not furnished.....		
13	NNP & Paper Mills	.....Not furnished.....			700	700	700
14	Rohtas Industries	400	450	450	400	425	425
15	J. K. Chemicals	....Not furnished.....			.....Not furnished.....		
16	D.C.M. Chemical Works . . .	9,800	9,800	9,800	2,500	2,500	2,500
17	Alkali & Chemical Corporation . .	5,090	5,100	4,800	2,212	2,700	3,000
18	Tata Chemicals	2,000	3,800	4,100	810	960	1,080
19	Calico Mills, Chemical Division . .	683	683	683	550	550	550
	TOTAL .	85,984	1,01,634	1,09,730	56,417	68,990	70,732

APPENDIX—7

(*Vide* Paragraph 16.2)

Statement showing prices of caustic soda

(Rs. per tonne)

Sl. No.	Name of producer	Specification of the product and packing	Selling prices prevailing in					Remarks
			December 1963	January 1964	November 1965	October 1966	January 1967	
1	Dhrangadhra Chemical Works.	Solid 98/99% (300 kgs. packing).	742	825	866	932	N.A.	Ex-works, exclusive of excise duty and all other taxes.
		Flakes (100/175 kgs. packing)	843	925	966	1032	N.A.	
		Flakes (50 kgs. packing).	893	975	..	1085	N.A.	
2	Mettur Chemical & Industrial Corporation.	Lye . . .	620	700	740	740	800	Ex-works, exclusive of excise duty and sales tax.
		Solid (300/400 kg. drums.)	720	800	840	840	900	
		Solid (50 kg. drums).	755	835	875	875	..	
		Flakes (40 kg. drums).	860	940	980	980	1040	
3	National Rayon Corporation.	Liquid . . .	620	700	740	804	N.A.	
4	Shriram Vinyl & Chemical Industries.	Liquid (100%) .	620	700	740	804	804	..
5	Kanoria Chemicals & Industries.	Lye . . .	..	..	750	854	854	..

6	Travancore-Cochin Chemicals.	Lye (of solid equivalent 100% NaOH)	620	67[illegible]	74[illegible]	740	740	
		Solid 98/99% (250/300 kg. packing).	739	799	859	859	859	
		Flakes 98/99% (50 kg. packing).	883	964	1004	1004	1004	
		Flakes 98/99% (120 kg. packing).	841	922	962	962	962	
7	Hukumchand Jute Mills.	Liquid . . .	..	..	750	854	854	
8	Calico Chemicals & Plastics Division.	Lye—100% basis .	620	700	740	804	N.A.	Ex-factory excluding excise duty.
9	Atul Products . .	Lye . . .	..	700	790	854	854	..
10	DCM Chemicals Works.	Liquid—Minimum 47.5%	620	700	740	804	N.A.	Ex-works, exclusive of excise duty.
11	Alkali & Chemical Corporation of India.	Liquor 48% . .	298	336	356	356	386	
12	Tata Chemicals .	Liquor 100% NaOH	620	620	680	720	720	Exclusive of excise duty and sales tax.
13	Calico Mills Chemical Division.	Lye—100% basis .	620	700	740	804	N.A.	Ex-factory excluding excise duty.
14	Saurashtra Chemicals (Chemical caustic soda).	Solid (96%) . .	..	800	845	845	895	
		Flakes (96%) .	..	900	945	945	945	

APPENDIX—8

(*Vide* Paragraph 16.2)

Statement showing prices of liquid chlorine (furnished by producers)

(Rs. per tonne)

Sl. No.	Name of producer	Packing	Selling prices prevailing in					Remarks
			December 1963	January 1964	September 1965	January 1966	January 1967	
1	DCM Chemical Works	..	340 to 450	NA.	N.A.	N.A.	300 to 450	Ex-works
2	Dhrangadhra Chemical Works	In the Company's returnable cylinders.	..	..	175	155	155	Ex-works, exclusive of all taxes, production started in Aug. 1965.
3	Alkali & Chemical Corporation of India.	..	437	482	432	432	432	
4	Travancore-Cochin Chemicals.	In tonne ontainers.	437	437	437	437	305	
5	Calico Chemicals & Plastics Divn.	..	325 to 420	260 to 420	95 to 360	95 to 320	N.A.	
6	Calico Mills,Chem, Divn.	..	380 to 437	380 to 437	437	350 to 437	N.A.	Ex-works.
7	Tata Chemicals	Naked	437	437	437	437	437	Ex-works, exclusive of excise duty and sales tax.
8	Mettur Chemical & Industrial Corporation.	..	N.A.	110 to 437	110 to 300	110 to 300	110 to 250	For the paper industry
		..	N.A.	437 to 600	202 to 600	202 to 600	202 to 350	For the textile industry
			N.A.	600	350 to 600	350 to 600	350 to 600	For public health
			N.A.	600	600	600	250 to 600	For other uses
9	Kanoria Chemicals & Industries.	..	..	..	150 to 300	150 to 300	150 to 300	
10	Century Chemicals	..	..	..	125 to 300	125 to 300	125 to 300	Ex-factory
11	National Rayon Corporation	..	420	312	191	183	N.A.	
12	Shriram Vinyl & Chemical Industries.	..	255 to 459	..	..	..	150 to 437	
13	Hukumchand Jute Mills	..	..	..	200 to 350	200 to 350	200 to 350	

APPENDIX—9

(*Vide* Paragraph 16.2)

Statement showing prices of hydrochloric acid (furnished by producers)

(Rs. per tonne)

Sl. No.	Name of producer	Specification of the product and packing	Selling Prices prevailing in December 1963	January 1965	February 1966	November 1967	January 1967	Remarks
1	DCM Chemical Works .	..	42 to 194	35 to 195	110 to 215	110 to 215	122 to 200	Ex-works
2	Dhrangadhra Chemical Works	..	80	100	100	100	100	Ex-works, exclusive of all taxes.
3	Alkali & Chemical Corporation of India.	Hydrochloric acid 30%.	194	205	205	220	240	..
4	Travancore-Cochin Chemicals	Hydrochloric acid, Commercial, naked.	194	194	194	194	194	Ex-factory
5	Calico Chemicals and Plastics Division	Hydrochloric acid, 30%	120 to 194	75 to 160	75 tp 120	75 to 120	N.A.	..
6	Calico Mills, Chemical Division.	Hydrochloric acid, 30% commercial.	194	194	194	194	N.A.	Ex-factory
7	Tata Chemicals . . .	..	194	194	194	194	194	Ex-works, exclusive of excise duty and sales tax.
8	Mettur Chemical & Industrial Corporation.	..	N.A.	80 to 150	80 to 150	80 to 150	65 to 125	For the Iron & Steel Industry.
		..	N.A.	150 to 194	150 to 194	150 to 194	150 to 194	For the textile Industry.
		..	N.A.	160 to 194	160 to 194	160 to 194	160 to 194	For the soap & oil Industries.
		..	N.A.	172 to 194	160 to 194	160 to 194	145 to 194	For other uses
9	Kanoria Chemicals & Industries.	..	..	..	25 to 50	25 to 50	25 to 100	
10	Century Chemicals . .	..	..	55 to 70	55 to 70	55 to 70	55 to 70	Ex-factory
11	National Rayon Corporation	..	194	89	63	63	N.A.	
12	Shriram Vinyl & Chemical Industries.	Hydrochloric acid, (as 100%).	67 to 650	..	..	..	177 to 650	

APPENDIX—10

(*Vide* Paragraph 16.2)

Statement showing prices of bleaching powder (stable) charged by Mettur Chemical & Industrial Corporation Ltd.

Packing	Prices (in Rs.) per drum/bag as on					
	5-2-62	13-1-65	15-10-65	16-7-66	1-8-66	1-2-67
100 kg drum	57·10	66·25	76·00	..	..	..
50 kg drum	30·15	33·00	39·00	..	..	..
40 kg drum	25·35	27·15	32·00	..	45·00	..
25 kg drum	16·10	18·00	23·00	..	37·90	..
35 kg bags	..	..	..	24·00	..	875 per tonne
40 kg bags	..	..	..	27·40	..	

Note : Ex-works prices, sales tax and handling extra. — F. O. R. destination prices, sales tax extra — F.O.R. destination prices.

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