REPORT

OF THE

Indian Tariff Board

ON THE

CAUSTIC SODA AND BLEACHING POWDER INDUSTRY

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सत्यमेव जयते

PERSONNEL OF THE BOARD

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REPORT ON THE CAUSTIC SODA AND BLEACHING POWDER INDUSTRY

Application for protection.

In a statement of their industrial policy made in April 1945, the Government of India reiterated the assurance given earlier during the war to grant protection or assistance to such industries as were started or developed in wartime and were established on sound lines, and invited such industries to submit their applications to Government. In response to this invitation, the Mettur Chemical and Industrial Corporation, Limited, which manufactures, among other things, caustic soda and bleaching powder, submitted an application for assistance or protection in June 1945 in which it requested—

(1) that the present import duty on caustic soda and bleaching powder should be raised and a subsidy paid to it out of the proceeds; and

(2) that special freight rates should be given to it for the transport of its raw materials, including fuel, to the factory and of its finished products to the consuming centres.

2. In a further letter in August 1945, the same firm asked for a bounty to be paid to it sufficient to enable it to sell its products at the import price, and also requested that its fair selling price should be fixed so as to cover the works cost, overhead charges and a profit margin of 10 per cent.

Reference to the Board.

3. The application submitted by the Mettur Chemical and Industrial Corporation, Limited, was referred by the Government of India to the Tariff Board under the Department of Commerce Resolution No. 218-T(55)/45, dated the 3rd November 1945. In referring this application, Government requested the Board to investigate the claim of the industry for protection in the light of the following conditions:—

(1) that it is established and conducted on sound business lines; and

(2) (*a*) that, having regard to the natural or economic advantages enjoyed by the industry and its actual or probable costs, it is likely within a reasonable time to develop sufficiently to be able to carry on successfully without protection or State assistance; or

(*b*) that it is an industry to which it is desirable in the national interest to grant protection or assistance and that the probable cost of such protection or assistance to the community is not excessive.

Where a claim to protection or assistance is found to be established, i.e., if condition (1) and condition (2) (*a*) or (*b*) are satisfied, the Board will recommend—

(i) whether, at what rate and in respect of what articles, or class or description of articles, a protective duty should be imposed;

(ii) what additional or alternative measures should be taken to protect or assist the industry; and

(iii) for what period, not exceeding three years, the tariff or other measures recommended should remain in force.

4. Government further directed the Board to give due weight to the interests of the consumers in the light of the prevailing conditions and also to consider how its recommendations would affect industries using the articles in respect of which protection was granted.

Scope of inquiry.

5. Though the terms of reference relate to caustic soda and bleaching powder, since bleaching powder is made from chlorine gas, which is generated in the process of manufacture of caustic soda by the electrolytic process and since in many cases it can be used as a substitute for bleaching powder, the inquiry has to necessarily cover chlorine as well. Furthermore, since a firm engaged in the production of chlorine and/or bleaching powder may also prepare bleach liquor which is used by some industries, some attention will have to be paid to this product as well, though it may not be necessary to consider it in a detailed manner.

Method of inquiry.

6. The Board issued a press communique on the 28th November 1945, inviting associations, firms or persons interested in the manufacture, import or consumption of caustic soda and bleaching powder to forward their written representations so as to reach the Board not later than 31st December 1945. The Mettur Chemical and Industrial Corporation responded by submitting its representation on the 31st December 1945, reiterating its earlier request made to Government for a bounty to enable it to sell its products at the import prices. The detailed questionnaire prepared for the chemical industries, including caustic soda and bleaching powder, was addressed, on the 22nd December 1945, to the following firms who were reported to be interested in this industry :—

(1) Kamala Soap and Chemical Works, Baroda.

(2) Dhrangadhra Chemical Works, Dhrangadhra.

(3) Mysore Paper Mills, Bhadravati.

(4) Alkali and Chemical Corporation of India, Ltd., Calcutta.

(5) Sarabhai Chemicals, Ahmedabad.

(6) Tata Chemicals, Mithapur.

(7) Rhotas Industries, Dalmianagar.

(8) Mettur Chemical and Industrial Corporation, Ltd., Mettur Dam.

(9) The Bombay Chlorine Products, Ltd., Bombay.

Of the above firms, the first three replied that, as they were not manufacturing either of these chemicals at present, they were not interested in the inquiry. The Alkali and Chemical Corporation of India, Ltd., Calcutta (which is a subsidiary of the Imperial Chemical Industries, Limited), stated that it had not applied for protection, that it was unable to submit a detailed reply, but that it would be willing to give any information which might be useful to the Board in making the inquiry. Sarabhai Chemicals, while submitting a general memorandum on the subject, stated that they were not producers of these chemicals at present but that they were shortly erecting a plant in Ahmedabad with an annual productive capacity of 1,800 tons of chlorine and 1,500 tons of caustic soda. Tata Chemicals stated in their reply that, although they had been in operation for a little over two years, this period had been marked with interrupted and restricted production ;

they were not, therefore, able to submit a detailed reply to the Board's questionnaire nor give actual figures of cost of production which would be representative of their costs when working at or near the full capacity. They, however, promised to give tentative estimates of costs to help the Board in the inquiry. No reply was received from Rhotas Industries, Ltd., Dalmianagar; while Chlorine Products, Limited, Bombay, stated that they were not yet in manufacture as they were awaiting the import of their plant from abroad. Thus, a detailed reply to the Board's questionnaire was received only from the Mettur Chemical and Industrial Corporation, Ltd.

7. In the course of the preliminary inquiry, it came to the knowledge of the Board that several large paper mills in India were producing caustic soda and bleach liquor for their own consumption. In view of this fact, the Titaghur Paper Mills were requested to furnish such information relating to costs of manufacture as might be useful to the Board in the inquiry, and to send a representative to appear before the Board at the time of the oral examination. They expressed their inability to comply with either of these requests. Consequently, a letter was sent to the All-India Paper Manufacturer's Association, Calcutta, asking it to furnish the figures for the total production of caustic soda and bleaching powder or chlorine by the paper mills for their own consumption, if these figures were available at its office.

8. Separate letters were also addressed to consumers and importers for obtaining information in regard to c.i.f. prices, domestic consumption, quality of domestic products, etc. A list of the associations, consumers and importers who submitted written representations to the Board in regard to the importation and consumption of caustic soda and bleaching powder is given in Appendix I. The opinion of the consumers regarding the quality was divided, some of them expressing approval of, while others expressing dissatisfaction with, the quality of caustic soda and bleaching powder produced in the country. They, however, generally opposed the request for any increase in the customs duties on the ground that this would raise the price of these chemicals which were used in very large quantities in several important industries, such as soap, textile, paper etc., and would adversely affect the general standard of living of the masses. These representations received due consideration from the Board.

9. The Departments of the Central Government concerned and the Provincial Governments and Administrations were also requested to forward such information as might be available with them regarding this industry and to express their views on the desirability of affording protection to it during the transition period. Much valuable information was supplied to the Board in response to these requests especially by the Department of Industries and Supplies of the Government of India which sent a detailed note on the subject and deputed Dr. J. N. Ray to assist the Board in its inquiry.

10. The factory of the Alkali and Chemical Corporation at Rishra near Calcutta was visited by Dr. Nazir Ahmad on the 5th April 1946, while the factory of the Mettur Chemical and Industrial Corporation was visited by Mr. Desai, Dr. Nazir Ahmad and Dr. Dey on the 30th May 1946. The latter factory has been costed in detail by the Cost Accounts Officer attached to the Board, while the Alkali and Chemical Corporation also furnished its data of costs of manufacture in the form prescribed by the Board. Oral evidence was taken on the 6th, 7th and 8th June 1946; the names of the manufacturers, consumers and importers who were examined are given in Appendix II.

History of the industry.

11. (1) *Early History.*—Caustic soda is one of the most important heavy chemicals and is used in large quantities in so many industries that, like sulphuric acid, its consumption may be regarded as an index of the industrial development of a country. It not only enters intimately into the economic life of a people but is also an essential commodity for defence purposes. The chief raw materials required for its production are common salt in the electrolytic process and soda ash and lime in the causticizing process. For the economic working of the former process, cheap and abundant electric power is essential, while for the latter process, good quality lime is an essential requirement. These raw materials are available in India, while as regards electric power, it is estimated that by tapping the hydro-electric resources of India, nearly 27 million horse-power could be generated, of which only 3 per cent. has so far been harnessed. In regard to the industries in which caustic soda and bleaching powder or chlorine are required, the soap, textile, paper and vegetable-ghee industries have already been established in India on a fairly large scale. Further, the transport of these chemicals from one place to another does not offer any serious handicap as in the case of sulphuric acid. In spite of these natural advantages of the availability of raw materials and the existence of a large market, the caustic soda and bleaching powder industry was not developed in India before the war, and there was no indigenous production, except possibly by some of the paper mills at their premises for their own consumption. The requirements of the various consuming industries in respect of these chemicals, which amounted in 1939-40 to nearly 35,000 tons for caustic soda and nearly 12,000 tons for bleaching powder, were met almost entirely by imports from abroad. In 1936-37, some firms began to take an active interest in the manufacture of these chemicals, but their actual production did not start till the third or fourth year of the war. The present position with regard to the production of these chemicals in the country may be summarised below.—

(2) *The Mettur Chemical and Industrial Corporation, Limited, Mettur Dam.*—This Corporation was registered in 1936 with a subscribed capital of Rs. 10 lakhs. The Managing Agents, Messrs. Dayaram and Sons, obtained a plant from Germany for the manufacture of caustic soda by the electrolytic process with a rated capacity of five tons per day. Though the erection of the factory was started in October 1937, work had to be suspended owing to financial difficulties. The present Managing Agents, Messrs. Seshasayee Brothers, Ltd., took over the management in September 1940, and commercial production commenced in the middle of 1941. Since then, the firm has expanded its works, and has now several sections at the same site. In its alkali section, the company produces solid caustic soda in the form of sticks and flakes, bleaching powder, liquid chlorine and bleach liquor. Hydrogen, which is a by-product in the manufacture of caustic soda by the electrolytic process, is used by the company partly in its vegetable ghee plant and partly in the manufacture of hydrochloric acid where part of the chlorine generated in the electrolytic process is combined with hydrogen to yield the acid. Besides the alkali section, the company has a chemical section for the manufacture of miscellaneous chemicals like potassium chlorate, calcium chloride, stannic chloride, hydrochloric acid, sodium acetate, etc., as well as an oil products section in which it manufactures vegetable ghee, refined oil, tallow and soap.

(3) *The Alkali and Chemical Corporation of India, Ltd., Rishra (near Calcutta).*—This Company is a subsidiary of the Imperial Chemical Industries (India), Ltd., and is registered in India. Installation of its plant, which is of British manufacture was started in 1938, but actual production began in April 1940. The plant is

designed to produce five tons of liquid chlorine per day, which is regarded as the main product, while the caustic soda, obtained in the electrolytic process, is supplied in the form of 48 per cent. liquor to the consumers. During the war Government put up a factory at Rishra for the manufacture of bleaching powder with a capacity of 3 tons per day, but this factory is no longer in operation. Similarly, during the war, the hydrogen, generated in the electrolytic process, was used for filling balloons, but with the cessation of hostilities, this work has been suspended and the hydrogen is allowed to escape into the atmosphere. The company also manufactures a small quantity of weak chlorine liquor, but besides this it does not manufacture any other chemicals at Rishra.

(4) *The Tata Chemicals, Ltd., Mithapur.* The rated capacity of this firm's plant at Mithapur for the production of caustic soda is 8,800 tons per annum, of which 6,000 tons is expected to be produced by the causticizing process from soda ash and 2,800 tons by the electrolytic process. So far, only the latter process has been in operation, and the total production from it from the 1st July 1945 to the 30th June 1946 amounted to only 325 tons. The company's estimate of production during 1946-47 from both the processes, on a very rough basis, is about 2,000 tons subject to adequate supplies of raw materials and fuel being available. As regards bleaching powder, its rated capacity is 4,000 tons per annum against which production from 1st July 1945 to 30th June 1946 amounted to only 575 tons. Its estimate of production of bleaching powder for 1946-47 is about 1,500 tons subject to the supply of raw materials as in the case of caustic soda.

(5) *Miscellaneous.* -(i) In addition to the firms mentioned above, several paper mills are reported to be producing caustic soda for their own consumption and according to the "Report on the Development of Industries for War Supplies" by Dr. P. J. Thomas, issued by the Department of Supply, the quantity of caustic soda produced by the paper mills amounts to 14,000 tons per annum. As mentioned earlier, the All-India Paper Mills' Association was requested to give exact information on this point. It has not been able to give complete information but only in respect of 5 of its member mills for which the production figures per annum are: caustic soda -1705 tons, chlorine -- 420 tons and bleaching powder— 1910 tons. It would appear that some of the large paper mills are not members of this Association.

(ii) Apart from the electrolytic plants which are already in operation, it is understood that licences have been issued by the Government of India for importing four more electrolytic plants with a total rated capacity of 25 tons of caustic soda and corresponding amount of chlorine and/or bleaching powder. These will be located at Bombay, Ahmedabad, Calcutta, and Delhi. In addition, some more firms are also contemplating putting up electrolytic plants in Porbundar, Mandi, Mysore and South India; but, as their plans have not yet matured, their details are not known.

(iii) Soda ash, from which caustic soda can also be prepared by the causticizing process, is at present being manufactured in India by three firms. The Alkali and Chemical Corporation has a factory at Khewra in the Punjab with a rated capacity of 60 tons of soda ash per day. Their production of soda ash started in August 1944, but they have not so far manufactured caustic soda from it. The Dhrangadhra Chemical Works also manufacture soda ash, but have not so far undertaken the manufacture of caustic soda from it. The rated capacity of the Tata Chemicals' plant at Mithapur for the production of soda ash is 100 tons per day; and out of a part of it they propose to manufacture 6,000 tons of caustic soda annually by the causticizing process.

12. (1) *Caustic soda.*—Caustic soda, of which the chemical name is sodium hydroxide, can be manufactured by adopting either (i) a chemical process, or (ii) an electrolytic process.

Process of manufacture.

(i) *Chemical process.*—The starting material in this process is soda ash or sodium carbonate which by the interaction of lime is converted into caustic soda. The causticizing process yields a solution of about 10 per cent. caustic soda from the settling system. This is further concentrated up to 50 per cent. in multiple-effect evaporators. The strong liquor is stored for some time for allowing separation of fine impurities by settling. At the end of this period, the solution may be further concentrated in single-effect evaporators up to 70 to 75 per cent. as required. The final evaporation to fused anhydrous caustic is performed in cast iron pots heated by direct fire. The product of these pots is either pumped into sheet-iron drums, where it solidifies to form the ordinary fused caustic, or it may be sent to a flaker where it is chilled to form flake caustic, the final product, in either case, being packed in drums. Unlike the electrolytic process, the lime process has no joint products, such as chlorine and hydrogen, which have to be disposed of for the economical working of the factory.

(ii) *Electrolytic process.*—The starting material in this process is common salt or sodium chloride which is obtained either as rock salt or from sea brine. It must be purified before it can be used as a source of caustic soda. By passing a current of electricity through the sodium chloride solution in an electrolytic cell, the salt is decomposed into chlorine at the positive terminal and sodium at the negative terminal. But the latter at once decomposes water of the solution, forming caustic soda and setting free hydrogen. Hence the products of electrolysis are caustic soda, chlorine and hydrogen. The electrolytic process requires cheap electric power and salt which is either reasonably free of impurities or can be purified at a cost which is not excessive. The presence of sulphates, iron, calcium and magnesium in the salt solution is likely to affect the efficiency of the process. The electrolytic cells are of different type, such as the diaphragm type, the mercury type and the bell type. The caustic liquor produced by electrolysis is contaminated to some extent with salt and is dilute, requiring purification and evaporation. The process of further concentration is more or less similar to that adopted for the chemical process.

(2) *Chlorine and bleaching powder.*—

(i) *Chlorine.*—The methods adopted for the production of chlorine before the development of the electrolytic process are of historical interest, and need not be described. With the introduction of the electrolytic cell, it became possible to produce directly chlorine of high concentration. Formerly, all chlorine was converted into bleaching powder by absorbing it in lime. The first serious attempts to liquefy chlorine on a large scale were made about 1910; and now practically all chlorine is sold in liquid form. For this purpose, the gas is first dried in towers containing 93 per cent. sulphuric acid. It is compressed and then cooled with brine at a temperature of 10°F, which liquefies it, and finally pumped into steel cylinders having a capacity of 100 to 150 pounds.

(ii) *Bleaching powder.*—When chlorine gas is passed over hydrated lime at a temperature below 50°C, bleaching powder is formed. The compound is rather unstable and gradually decomposes, even at ordinary temperatures. It cannot, therefore, be stored for any length of time. The absorption of chlorine in lime may be effected in stationary absorption chambers, or in mechanical chlorinators. High-grade lime of pure quality is essential for this purpose. Good bleaching powder contains about 35 per cent. "available" chlorine.

Relative importance of the two processes, the chemical and the electrolytic.

13. Thirty years ago the world's consumption of chlorine was approximately one-third of its consumption of caustic soda. Consequently, the production of electrolytic caustic soda was limited by the amount of chlorine that could be utilised, and the rest of the world's production of caustic soda was made up by the chemical process. Since then, the world's demand for chlorine has increased at an extremely rapid rate, mostly for chorination products, pulp bleaching and sanitation. In fact, in many centres of production, caustic soda has become the by-product. As a result, the production of caustic soda by the electrolytic process has increased by leaps and bounds. For example, while in 1929 the production of caustic soda by the electrolytic process in the U. S. A. was less than half of that by the chemical process, by 1940 the electrolytic production had not only overtaken but exceeded the chemical production, the figures for the two years being as follows :—

	Chemical process.	Electrolytic process.
	(Short tons.)	(Short tons.)
1929	524,985	236,807
1940	505,000	595,000

14. So far as India is concerned, it will be necessary to take both processes, into account in planning the development of the alkali industry so as to meet the country's total requirements of caustic soda. The demand for chlorine and its compounds in the country is small, and is likely to remain so far some years to come, as compared with the demand for caustic soda ; and this factor, while putting an upper limit to the economic production of caustic soda by the electrolytic process, compels attention being paid to the causticizing process. It is estimated that the production of chlorine by the plants in existence and those on order will very nearly satisfy the immediate requirements of the country ; and unless, therefore, a great advance is made in the utilisation of chlorine or the manufacture of its compounds, it will be necessary to have recourse to the lime process for expanding the production of caustic soda. In this connection, however, it should be remembered that the country is not at present self-sufficient in the matter of soda ash, and therefore if larger quantities of caustic soda are prepared from this product, it would be necessary either to enlarge the capacity of the existing soda ash factories or to establish new ones at suitable places.

Economic size of the unit.

15. In view of the fact that the production of caustic soda and bleaching powder in the country is much below its requirements, it would be desirable to increase the production of these products by setting up additional plants. In this connection the question of the economic size of a unit becomes important. The Board did not have the opportunity to go into this question in any detail, but was advised that an electrolytic plant having a rated capacity of 15 to 20 tons of caustic soda per day would constitute an economic unit. In this connection it may be of interest to note the actual productive capacity of the plants which are installed in the U. S. A. According to the information given in " Manufacture of Caustic

Soda" by T. P. Hou (1942), the rated capacity of 42 plants for the manufacture of caustic soda in U. S. A. is estimated as follows :—

Capacity (short tons.)	Number of plants.	Capacity (short tons.)	Number of plants.
0— 5	6	40—50	2
5—10	4	50—75	5
10—15	7	75—100	2
15—20	3	100—150	3
20—25	3	150—200	1
25—30	1	200—350	2
30—40	3		

16. As regards the causticizing process for the manufacture of caustic soda, the information available to the Board is even more meagre. It may, however, be noted in this connection that Messrs. Tata Chemicals Ltd., propose to manufacture at their Mithapur plant 20 tons of caustic soda per day by this process, and it may be presumed that they must have given due consideration to the question of the economic size of the unit.

Uses.

17. (1) *Caustic soda* is one of the important heavy chemicals which finds numerous uses in many industries. It is used extensively in the rayon and cellulose film industry and in the manufacture of soap, cotton textiles, paper and pulp, dyestuffs and explosives. It is used for rubber reclaiming and in the petroleum refining industry, in the manufacture of glues and adhesives, litho-printing, electro-plating, and in the production of vegetable oils. It is used as an insecticide in plantations, as a degreasing and cleaning agent, and in the manufacture of many heavy and fine chemicals. The extent to which this chemical is consumed in various industries in an industrially advanced country may be seen from the following table which gives the estimated consumption of caustic soda in its different uses in U. S. A. in 1940 :

Consuming industry.	*Short tons.*
Rayon and cellulose film	230,000
Chemicals	220,000
Soap	95,000
Petroleum refining	88,000
Pulp and paper	50,000
Textiles	48,000
Rubber reclaiming	20,000
Vegetable oils	16,000
Miscellaneous	175,000
Lye	48,000
Exports	105,000
Total	1,095,000

(2) *Bleaching powder* is used chiefly for bleaching paper pulp, cotton yarn and textiles, as a disinfectant for public health and sanitation purposes, and in the manufacture of organic chemicals such as chloroform, etc. It is being gradually replaced by liquid chlorine as the latter possesses several advantages over it. Owing to the relatively heavy weight of the containers, the liquid chlorine cannot be easily imported into a country, and, therefore, enjoys indirect protection like sulphuric acid. Unlike chlorine, bleaching powder is unstable especially in tropical climates, and deteriorates with time. In the bleaching of fine quality goods especially those which have to be subsequently dyed, chlorine is regarded preferable as traces of calcium salts in the bleached fabric interfere in dyeing.

(3) *Chlorine.*—The industrial use of this product has increased rapidly during the past few decades. It is used extensively for the manufacture of organic solvents, chlorination products, as a disinfectant, in the bleaching of textiles and pulp, and in the preparation of numerous chemical compounds, such as carbon tetrachloride, chloroform, chloral, ethylchloride, hydrochloric acid, ferric-chloride, zinc-chloride, potassium chlorate, barium chloride, etc. It is required for the production of ferro-chrome, which is used in the manufacture of stainless steel. It would be interesting to note the distribution of its consumption in the various industries in U. S. A., which is as follows :—

	Percentage.
Pulp bleaching	21
Chlorination products	60
Disinfectants and sanitation	6
Textiles	5
Miscellaneous	8
	100

So far as India is concerned, it may be mentioned that at present hydrochloric acid is being made largely with the use of sulphuric acid. Since India is deficient in sulphur, the production of hydrochloric acid from chlorine and hydrogen, which are generated in the electrolytic process, should be encouraged. Similarly, the use of chlorine in much larger quantities than at present for water purification and sanitation purposes should be stimulated.

(4) *Hydrogen.*—Since hydrogen is one of the by-products in the electrolytic process of caustic soda manufacture, it would be necessary to find useful outlets for it in order to reduce costs. It may be used for the production of hydrochloric acid with chlorine generated in the electrolytic process, for the hydrogenation of oils and fats to yield vegetable ghee and in filling up balloons required for military or survey purposes. Since liquefaction of hydrogen for transport purposes is an elaborate and difficult task, it can only be used profitably on the site and cannot be transported easily to other consuming centres.

Imports.

18. Statements showing the quantity, total value and average value of caustic soda and bleaching powder imported from different countries since 1936-37 are given in Appendix III. It will be seen that the bulk of imports of both the products has always come from the United Kingdom, while almost the entire imports in recent years have been from that country. These imports were

practically the monopoly of the Imperial Chemical Industries (India), Ltd.; and, during the war, the Supply Department arranged, on an informal basis, for the control of all the imports through the I. C. I. During this period, import licences were issued for every half-year, January to June and July to December. The following statement with regard to the licences issued during the last two years is based on the data supplied by the Chief Controller of Imports, New Delhi, during a discussion held on the 7th January 1946 :—

[Figures in tons.]

Year.	Quantity licensed.	Estimated domestic production.	Estimated domestic consumption.
Caustic Soda—			
1944	53,500	....	....
1945	40,000	5,200	45,200
1946 (January to June)	30,000	4,000	....
Bleaching Powder—			
1944	10,750	....	....
1945	7,500	4,600	10,600
1946 (January to June)	5,000	4,600	....

19. Lately Government have begun to grant licences to other importers besides the I. C. I. who are in a position to produce definite offers of supply from the United Kingdom. They have also relaxed the position with regard to imports from the U. S. A. which were refused previously on account of the difficulty of obtaining dollar exchange. Since caustic soda is a basic chemical of very great importance to several industries and is consumed in large quantities in the country, we are of the opinion that any system of control or monopoly which may have existed in the past or been found necessary during wartime should now be brought to an end, and that this product should be included in the open general licence from U.K. We are further of the opinion that licences for importing this article at competitive prices from non-sterling countries should be given freely, so that the present short supply position may be remedied, and the Indian industries consuming it may be able to obtain it to their full requirements.

20. According to the Indian Customs Tariff (Twenty-sixth issue), the existing

Existing rates of customs duty.

rates of customs duty are as follows :—

(1) *Caustic soda.*—It is subject to a preferential revenue duty at a standard rate of 36 per cent. *ad valorem*, a preferential rate of 24 per cent. *ad valorem* for the U.K. and British Colonies, and 12 per cent. *ad valorem* for Burma. For the purpose of assessing the duty, the tariff value for solid caustic soda has been fixed at Rs. 15 per cwt. for 1946.

(2) *Bleaching powder.*—There is no import duty on this product.

(3) *Chlorine.*—The same rates of duty apply to chlorine as in the case of caustic soda. For the purpose of assessing the duty, its tariff value has been fixed at Re. 0-8-0 per lb. for 1946.

C.i.f. prices.

21. The pre-war and present-day c.i.f. prices, together with customs duty, clearance charges, etc., of caustic soda and bleaching powder imported from the United Kingdom and the U.S.A., as furnished by two leading importers, are as follows :—

(1) ex-U.K.

	Price per cwt. of			
	Caustic Soda		Bleaching Powder	
	Pre-war (1939)	Present (1946)	Pre-war (1939)	Present (1946)
	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
C.i.f.	7 2 10	11 9 1	4 4 7	10 13 9
Duty	1 9 7	3 9 7	..	..
Clearance charges	0 3 7	0 7 4	0 3 5	0 7 3
Total landed cost ..	9 0 0	15 10 0	4 8 0	11 5 0
Selling price	10 7 0	17 8 0	6 0 0	13 0 0

(2) ex-U. S. A.

	Price per cwt. of			
	Caustic Soda		Bleaching Powder	
	Pre-war (1939)	Present (1946)	Pre-war (1939)	Present (1946)
	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
C.i.f.	17 8 3	18 5 0	(a)	19 11 0
Duty	3 0 0	5 6 6	(a)	..
Clearance charges	0 6 0	0 8 0	(a)	0 5 0
Total landed cost ..	20 14 3	24 3 6	..	20 0 0

(a) Information not available.

For the purpose of our inquiry, U.K. is obviously the principal competing country, and, therefore, we have adopted the c.i.f. prices of U.K. imports for determining the measure of protection.

Domestic demand.

22. Taking into consideration all the evidence placed before the Board, our estimate of the future demand for these products during the next three years, together with the break-up into various uses, is as follows :—

(1) *Caustic Soda.*—

	Tons.
Soap	30,000 to 35,000
Textiles	20,000
Paper (excluding consumption of caustic soda produced by the paper mills in their own premises)	10,000
Miscellaneous	7,500
	67,500 to 72,500

In this estimate the requirements of the rayon industry have not been included, although it is likely that some rayon plants may go into production during the period of protection. It is estimated that a viscose rayon plant having a capacity of 5 tons per day will require 7 tons of caustic soda per day. The future caustic soda requirements of the rayon industry should, therefore, be calculated on this basis when plants for the production of rayon are established and their capacity is known. It should be mentioned in this connection that the caustic soda required by the rayon industry must be of a very high standard of purity and that the ordinary commercial product will not serve the purpose. We understand that the purification of caustic soda for the rayon industry has improved to such an extent that it is now possible to refine caustic soda from diaphragm type electrolytic cells, so that the chlorate content is reduced to zero and the chloride content to 0·1 to 0·2 on the dry basis. This result is obtained by the purification of caustic soda from the diaphragm cells by a new process patented by the Columbia Chemical Division of Pittsburgh Plate Glass Company. If, instead of diaphragm cells, mercury electrolytic cells are installed, it is possible to obtain from them practically pure caustic soda which would be quite suitable for the rayon industry.

(2) *Bleaching powder.*—The annual requirements of bleaching powder for the next three years are estimated by the Board at 13,600 tons per annum, which is also the present consumption. It is, however, likely to increase substantially, if the manufacture of DDT which is under contemplation materialises during this period. One pound of DDT will require approximately 3 lbs. of bleaching powder.

(3) *Chlorine.*—The annual requirements of chlorine have been estimated by the Board at 2,000 tons per annum for the next three years. It should, however, be noted in this connection that both in the textile as well as the paper industries abroad there is a strong tendency to substitute bleaching powder by chlorine. If the Indian textile and paper factories also follow this tendency, it is possible that the consumption of chlorine will go up, but in that case the consumption of bleaching powder will decrease to a proportionate extent, 1 ton of chlorine being approximately equal to 3 tons of bleaching powder. Furthermore, if the use of chlorine for sanitation and public health purposes and in the manufacture of hydrochloric acid goes up as expected, the annual consumption may be higher than that indicated above.

Domestic production.

23. As stated in an earlier paragraph, only a few factories are at present in regular production of these chemicals, though a number of additional factories are under contemplation. The following estimate of production during the next three years is based upon the data available with regard to these factories :—

(1) *Caustic soda.*—

[Figures in tons.]

	1946-47.	1947-48.	1948-49.
The Mettur Chemical and Industrial Corporation Ltd.	1,600	1,600	1,600
Tata Chemicals, Ltd., Mithapur	2,000	4,000	8,000
The Alkali and Chemical Corporation of India, Ltd., Calcutta.	1,600	1,600	1,600
Rhotas Industries, Ltd., Dalmianagar ..	530	530	530
	5,730	7,730	11,730

The rated capacity of the Mettur plant is 5 tons of caustic soda per day, at which rate it should be able to produce 1,825 tons of caustic soda per annum assuming that, as in the U.S.A., the plant works continuously for 365 days in the year. The Company, however, submitted that, on the basis of its past experience with a plant of this type and owing to the necessity of allowing for stoppages for carrying out necessary repairs, it would find it difficult to exceed 1,600 tons per year. The Company proposes to install in the near future additional cells to raise its production to 7½ tons per day, and to modernise its existing plant. If these plans materialise during the protection period, its output may well exceed the figure given above.

As regards Tata Chemicals, Ltd., its production of caustic soda would be divided between the causticizing and electrolytic processes approximately in the proportion of 50 : 50 in 1946-47, 80 : 20 in 1948-49, and some intermediate figure in 1947-48. As regards the Alkali and Chemical Corporation of India, Ltd., it does not at present manufacture solid caustic soda, but produces 48 per cent. caustic liquor. Its main item of manufacture is liquid chlorine and the production of caustic liquor is regulated on the basis of the latter. The quantities shown above are, therefore, approximate and are the equivalents of 48 per cent. caustic liquor.

The above figures relate to factories which are known to be in regular production or will be so during the next three years. In addition, it is known that licences for import of machinery have been granted for four additional plants having a total rate production of 25 tons of caustic soda per day. It is not possible to say when these plants will go into production ; but, if and when they are established, the production of caustic soda in the country will increase proportionately. As stated in paragraph 11 (5) (i), a number of paper mills have their plants for producing caustic soda for their own consumption. Since the requirements of the paper industry, as shown in paragraph 22 (1), are exclusive of their own production, the actual quantity produced by the paper mills has not been included in the domestic production.

(2) *Bleaching powder.*—The following is the Board's estimate for the production of this chemical during the next three years :—

[Figures in tons.]

	1946-47.	1947-48.	1948-49.
The Mettur Chemical and Industrial Corporation, Ltd.	2,000	2,000	2,000
Tata Chemicals, Ltd. .. .	1,500	2,000	4,000
Rhotas Industries, Ltd.	Capacity 9 tons per day, actual production not known.		

Although the production of bleaching powder by the Mettur Chemical and Industrial Corporation has been taken at 2,000 tons per annum, it is possible that, in actual practice, it may be able to exceed this limit. In 1943-44, its actual production of bleaching powder was 2,270 tons ; while in 1944-45 its production was 2,323 tons. On the basis of its actual production of chlorine and its utilisation in the different sections of the factory, it has enough surplus to prepare more than 2,000 tons of bleaching powder per annum. When, with the addition of new, and the modernisation of the existing plant, its production of caustic soda goes up, its production of bleaching powder and/or chlorine should increase proportionately.

(3) *Liquid chlorine.*—The Board's estimate for the production of this chemical during the next three years is as follows :—

[Figures in tons.]

	1946-47.	1947-48.	1948-49.
The Mettur Chemical and Industrial Corporation, Ltd.	400	400	400
The Alkali and Chemical Corporation of India, Ltd.	1,500	1,500	1,500
Total ..	1,900	1,900	1,900

24. In regard to bleaching powder and liquid chlorine, it should be noted that, if the additional plants for the manufacture of caustic soda by the electrolytic process, having a rated capacity of 25 tons per day, are installed during the period, they would generate approximately 22·5 tons of chlorine per day. It is not known at present whether the companies installing these plants propose to prepare liquid chlorine or to manufacture bleaching powder or to utilise chlorine in any other way in the manufacture of chemicals. Since one ton of chlorine can yield approximately 3 tons of bleaching powder, it follows that, with the installation of these plants, there would be scope for the manufacture of considerable additional quantities of bleaching powder if required. If all these four plants come into production during the period of protection and 30 per cent. of the chlorine made available is utilised for the manufacture of bleaching powder, it would be possible to produce approximately an additional 6,600 tons of bleaching powder per annum, which, with the projected manufacture of 6,000 tons by the existing factories, should very nearly meet the country's requirements of this product. This would leave a balance of approximately 5,200 tons per annum of chlorine for liquefaction or other purposes.

Quality of indigenous products.

25. In the various representations received by us from consumers as well as in the course of the oral examination, opinions were expressed that the products prepared by the Mettur Chemical and Industrial Corporation did not come up to the level of the imported products. We were informed that the caustic soda manufactured by the Company contained at times 3 to 4 per cent. common salt, while the bleaching powder made by the Company had been found to be deficient in available chlorine. The Company's representatives admitted that their caustic soda contained a larger percentage of salt than the imported material and explained that this was due to lack of adequate equipment. They, however, stated that they were taking immediate steps to rectify the position and expressed the hope that in the immediate future they would be able to market caustic soda of the well recognised standards of purity. We are of the opinion that the Company should take immediate steps to improve the quality of their caustic soda so as to reach a standard of 97 to 98 per cent. purity and to ensure that the bleaching powder prepared by it has 53 to 35 per cent. available chlorine.

Cost of production.

26. As mentioned in paragraph 6, of the various firms which are reported to be producing caustic soda and bleaching powder, only the Mettur Chemical and Industrial Corporation submitted a detailed reply to the Board's questionnaire and only that factory was costed by the Cost Accounts Officer attached to the Board. These costs were carefully scrutinised by us with the help of the Technical Advisers co-opted for the enquiry. In the course of the enquiry, we were able to point out several directions in which economies were possible and the Company's representatives agreed to carry out our suggestions. They, however, submitted that, as these economies required considerable readjustments, it would take a little time before they could be put into effect. This request appeared reasonable to us, and accordingly we have divided our scheme of protection, which is designed for a period of two and a half years from 1st October 1946 to 31st March 1949, into two equal periods, namely, from 1st October 1946 to 31st December 1947 and from 1st January 1948 to 31st March 1949. This division is all the more desirable, as under the scheme of protection recommended by us the Company will need assistance only during the first half of the period, but will be able to stand on its own legs during the latter half. Before we give our estimates of the cost of production of these chemicals, it should be explained that they apply only to the conditions pevailing at Mettur, though the quantities of raw materials, etc., given by us are capable of more general application. Our estimates of the cost of production of these chemicals during the next two and a half years, divided as explained above into two equal periods of 15 months each, are given in Appendix IV. The cost of manufacture has been worked out on the basis of a daily production of 5 tons of caustic soda, making due allowance for inevitable stoppages and breakdowns. It is summarised in the following table :—

Board's estimate of the cost of production per cwt. of caustic soda, bleaching powder and liquid chlorine by the Mettur Chemical and Industrial Corporation, Limited, Mettur Dam

	Basis: Tons per annum.	First half of the protection period. 1st October 1946 to 31st December 1947.	Second half of the protection period. 1st January 1946 to 31st March 1949.
		Rs.	Rs.
Caustic soda (solid)	1,600	15·12	13·04
Bleaching powder	2,000	11·19	9·39
Liquid chlorine	400	17·76	16·89

27. *Interest on working capital.*—As regards interest on the working capital, we accepted the Company's contention that, in view of the necessity of maintaining fairly large stocks of accessories and other materials imported from abroad, they should be allowed working capital equal to the value of six months' output in respect of each product. On this basis the amounts allowed for working capital for each of the products for the two different periods are as follows :—

	First half of the protection period.	Second half of the protection period.
	Rs.	Rs.
Caustic soda	2,40,000	2,08,000
Bleaching powder	2,20,000	1,90,000
Liquid chlorine	68,000	66,000

28. *Credit for chlorine and hydrogen.*—In working out the costs of manufacture of caustic soda we have given credit for the chlorine which is generated in the process and is used for other purposes (*e.g.*, manufacture of bleaching powder, hydrochloric acid, etc.) at the rate of Rs. 5 per cwt. in the first half of the protection period and at Rs. 4·15 in the second half of the period. Similarly, we have allowed credit for the hydrogen which is also generated simultaneously and is used by the Company in its vegetable ghee plant, at the rate of Rs. 3 per ton of vegetable oil produced.

29. As already mentioned, the Company's representatives informed the Board that they were contemplating to increase the productive capacity of their plant to 7½ tons of caustic soda per day and that they have already taken preliminary steps in this direction towards obtaining the necessary additional plant and equipment. If the production of this plant were increased to 7½ tons of caustic soda per day, there would be a further reduction in costs of manufacture. The Company's representatives, however, were unable to say definitely when they would be able to instal and operate the new plant. We suggest that a review should be undertaken at the end of 1947 to find out if the Company's plans in regard to the installation of additional plant have been carried out. Since, according to the scheme of protection recommended by us, the Company would not need any assistance after 31st December 1947, when the production assumed is 1,600 tons per annum, this review would not in any way affect our scheme. But the increased production, if realised, should have the effect of still further reducing the fair selling price in the second half of the period, and should there be a fall in the c.i.f. price below that assumed by us, this result would obviate the need for any additional compensatory protection.

Fair selling price.

30. In order to arrive at the fair selling price of the products manufactured by the Company (the Mettur Chemical and Industrial Corporation, Ltd.), we must add to the manufacturing costs (1) profits to be allowed to the Company and (2) railway freight.

(1) *Profits.*—In calculating the profits we have followed our usual practice of allowing 10 per cent. profit on block. In regard to this point, the Company's representatives submitted that the depreciated value of their plant was about Rs. 22 lakhs and that profit should be allowed on this amount. We are, however, unable to accept this figure for the following reasons :—

(i) We were advised that the cost of importing and erecting a new electrolytic plant of a more up-to-date design having a capacity of 5 tons of caustic soda per day would at present be about Rs. 22 lakhs. This plant would be more efficient than the Company's plant which is of an older design and has already given service for several years.

(ii) The present plant which is of an older design and not as efficient as a new one is very costly to maintain. The Company has recognised the necessity of gradually replacing their existing plant by a more efficient one. But in the meanwhile we have no wish to put any excessive burden on the community for the heavy upkeep of a relatively less efficient plant.

(iii) In the last few years, the Company has been engaged in the manufacture of several chemicals besides caustic soda, bleaching powder, and liquid chlorine; and has accordingly spent considerable amounts of money on the erection and maintenance of plants for the production of these chemicals. From the records of the Company it was not possible for us to allocate separately the expenditure on these various plants.

Taking all these factors into account, the Board decided that, for the purpose of evaluating the block capital spent upon the production of caustic soda, bleaching powder and liquid chlorine, a sum of Rs. 16 lakhs to be allocated among the different items as shown below would be quite reasonable :—

	Lakhs of rupees.
Caustic soda	7·25
Bleaching powder	6·75
Liquid chlorine	2·00
Total ..	16·00

(2) *Railway freight.*—The Company's representatives submitted that the bulk of their products was consumed in centres situated at considerable distances from the factory and that in this respect they were at a certain disadvantage as compared with the importers who were able to import their products at various ports situated close to the consuming centres. This point appeared to be reasonable, and accordingly we have allowed them railway freight at the average rate of 4 annas per cwt. of caustic soda and bleaching powder produced by them, which is equivalent to freight for 100 miles.

31. Taking into account the costs of manufacture, profit on block and the railway freight, the fair selling prices for the Company of the different products manufactured by it work out as follows :—

	First half of the protection period.	Second half of the protection period.
	Rs.	Rs.
Caustic soda—		
Cost of manufacture per cwt. ..	15·12	13·04
Profit (at 10 per cent. on Rs. 7·25 lakhs)	2·27	2·27
Railway freight ..	0·25	0·25
	17·64	15·56
	or Rs. 17-10-0	or Rs. 15-9-0
Bleaching Powder—		
Cost of manufacture per cwt. ..	11·19	9·39
Profit (at 10 per cent. on Rs. 6·75 lakhs)	1·69	1·69
Railway freight ..	0·25	0·25
	13·13	11·33
	or Rs. 13-2-0	or Rs. 11-5-0
Chlorine—		
Cost of manufacture per cwt. ..	17·76	16·89
Profit (at 10 per cent. on Rs. 2 lakhs) ..	2·50	2·50
	20·26	19·39
	or Rs. 20-4-0	or Rs. 19-6-0

Comparison between landed cost and fair selling price.

32. The position regarding the landed costs, including duty, and the fair selling prices of the products for the Company may now be summed up as follows :-

	Landed cost, including duty, per cwt.	Fair selling price per cwt.	
		First half of the protection period.	Second half of the protection period.
	Rs. a. p.	Rs. a. p.	Rs. a. p.
Caustic soda ..	15 10 0	17 10 0	15 9 0
Bleaching powder ..	11 5 0	13 2 0	11 5 0
Liquid chlorine ..	Not known.	20 4 0	19 6 0

The selling price per cwt. of imported caustic soda is Rs. 17-8-0 and of bleaching powder Rs. 13. As regards liquid chlorine, the Alkali and Chemical Corporation of India, Ltd., have been selling it at Re. 0-8-0 per lb. It is understood that this may be reduced to about Re. 0-6-0 per lb. which is equivalent to Rs. 42 per cwt.

Scheme of protection.

33. It will be seen from a comparison of the figures given above that only during the first half of the protection period the Company's fair selling prices of caustic soda and bleaching powder are higher than the landed costs including duty, while during the second half of the protection period the Company's fair selling prices are practically equal to the landed costs including duty. In the case of chlorine, the Company should be able to manufacture this product in both periods at a cost which is considerably lower than the present market price. Any protection, therefore, which is needed by the Company for caustic soda and bleaching powder, should apply only to the first half of the period ; during the second half, the Company should be able to stand on its own legs and meet competition from imports without any assistance.

34. The protection needed by the Company in regard to caustic soda could be given by raising the duty on this product, while in the case of bleaching powder the protection might be afforded by imposing a small duty on the product which is at present imported free of duty. We are, however, definitely opposed either to any increase in the duty on caustic soda or to levying any duty on bleaching powder. We take this view on the ground that both caustic soda and bleaching powder are important chemicals used in very large quantities by many industries, such as textile, paper, soap, etc., which have already been established in the country and that any increase in the duty on them would seriously hamper their further development. Caustic soda is already subject to a duty at a standard rate of 36 per cent. *ad valorem* and a preferential rate of 24 per cent. *ad valorem*, which, in view of the basic nature of this material, are fairly high. So far as bleaching powder is concerned, apart from its use in the textile industry, it would be required in large quantities in the manufacture of chloroform and may also be required in substantial quantities in the manufacture of DDT if the production of this material is taken up in the country. Since we do not think it desirable that the production of chloroform, which is an important anaesthetic, or the manufacture of DDT, which is an extremely valuable disinfectant, should be hampered by imposing a duty on bleaching powder, we are opposed to the imposition of any duty on this product. We may further note that out of a total estimated requirement of nearly 70,000 tons of caustic soda, the country's likely production in 1948-49 will be about 12,000 tons, or about 18 per cent. ; and we, therefore, feel that any increase in the duty on a basic material, of which the bulk of the supplies will have to be obtained by imports, is undesirable.

35. Since we have found that the Mettur Chemical and Industrial Corporation, Ltd., has established its case for protection during the first half of the period, we are of the opinion that this protection should be given by granting a subsidy on the basis of its actual sales which would equate its fair selling prices to the landed costs including duty. At the same time, since we are definitely opposed to any increase in the price of these products having regard to the interest of the consuming industries, we are of the opinion that during the period that the Company receive a subsidy from Government, it must give an undertaking to sell these products at prices not higher than those of the imported articles. This condition is necessary in view of the short supply position of these products, especially caustic soda, taking advantage of which the producer may be tempted to sell it at a price higher than the price of the imported product.

36. On the above basis, our recommendations regarding the grant of subsidy to the Company are as follows :—

Subsidy.

(1) *Caustic soda.*—(i) A subsidy of Rs. 2 per cwt. which represents the difference between its fair selling price and the landed cost including duty, should be paid to the Company on the basis of its actual sales of caustic soda from 1st October 1946 to 31st December 1947. If, during this period, the landed cost including duty falls below or rises above Rs. 15-10-0 per cwt., the subsidy should be increased or reduced by a corresponding amount. Assuming that the landed cost will remain at the present level of Rs. 15-10-0 per cwt., the subsidy for a period of 15 months at the rate of Rs. 40 per ton on the basis of a production of 1,600 tons per annum, would amount to Rs. 80,000.

(ii) For the second half of the protection period, if the landed cost of caustic soda remains at the present level, no subsidy should be paid to the Company. If, however, the landed cost falls below Rs. 15-9-0 per cwt., the Company should be paid a subsidy on their actual sales of caustic soda at a rate equal to the difference between Rs. 15-9-0 being the Company's fair selling price of the product and the average landed cost including duty for the period.

(2) *Bleaching powder.*—(i) During the first half of the protection period, the Company should be paid a subsidy at the rate of Rs. 1-13-0 per cwt. on its actual sales of bleaching powder up to the 31st December 1947. If, during this period, the landed cost including duty of bleaching powder falls below or rises above Rs. 11-5-0 per cwt., the subsidy should be increased or reduced correspondingly. On the assumption that the landed cost will remain at the present level of Rs. 11-5-0 per cwt., the subsidy for a period of 15 months at the rate of Rs. 36-4-0 per ton, on the basis of a production of 2,000 tons per annum, would amount to Rs. 90,623.

(ii) If, during the second half of the protection period, the present landed cost of Rs. 11-5-0 per cwt., remains steady, no subsidy should be paid to the Company. If, however, during this period, the landed cost falls below Rs. 11-5-0 per cwt., the Company should be paid a subsidy, on actual sales, equal to the difference between Rs. 11-5-0 being the Company's fair selling price of the product and the average landed cost including duty for the year.

(3) *Liquid chlorine.*—Since the Company's fair selling price for this product is well below the present-day selling price, no subsidy or protection is required. The Company should sell it at competitive rates so as to stimulate the consumption of this important chemical in India and to encourage its consumers to use this product in large quantities.

37. The total subsidy payable to the Company under the scheme of protection proposed by us is of the order of Rs. 1,70,000. On the basis of the figures for domestic demand and consumption assumed by us, the imports during the first half of the protection period covering 15 months may be expected to be of the order of 75,000 tons of caustic soda. At the present rate of duty, these imports would yield a revenue of about Rs. 54 lakhs. The subsidy recommended by us, therefore, amounts to 3 per cent. of the revenue expected to be realised from the duty on caustic soda. We feel that, in view of the imperative need of protecting a nascent and nationally important industry and enabling it to stand on its legs during the initial period, this is a small amount.

38. Having recommended a subsidy, we must now decide about the rate of duty to be continued. The existing rate of duty for caustic soda ex-U.K. is Rs. 3-9-7 per cwt., while bleaching powder is imported duty free. Normally, where we come to the conclusion that an industry is entitled to protection and assistance, we recommend the conversion of the revenue duty into a protective duty. In this particular case, however, we have refrained from making this recommendation for the following reasons. Caustic soda is a very important raw material for other industries. The total demand for caustic soda is far in excess of what the country is actually producing to-day or will be in a position to produce in the near future. If, in the interests of the general industrial advancement of the country, the Government should decide, during the protection period, to lower the cost of caustic soda to consumers by reducing or abolishing the existing duty, the actual landed cost assumed by us would naturally automatically come down. If such a contingency happens, the subsidy will have to be increased in proportion so as to equalise the fair selling price with the new landed cost.

39. In view of the fact that the Company will be receiving fairly large sums of money as subsidy on the basis of our recommendations, we suggest that the Government should appoint an Inspector who should visit the factory periodically and ensure that all possible measures of economy are being undertaken and that the Company's plans for making its plant up-to-date and adding new machinery to it are being pushed forward in a vigorous manner. We put this proposal to the Company's representatives and were informed that they would have no objection. The Company would have no objection to the appointment of a Government Director on its Board of Directors, but we think that in this case an Inspector would serve the purpose.

Burden of protection.

40. We have considered the incidence of the cost of caustic soda and bleaching powder on the total cost of manufacture in the various industries in which they are used. From the evidence before us we have been able to elicit the following information :—

(1) *Caustic soda.*—For the textile industry it was stated that on the basis of a price of As. 3 per lb. for imported caustic soda, the incidence of the cost of caustic soda in dyeing a pound of yarn is about 4 pies, and the incidence of its cost for dyeing a pound of cloth is about 9 pies, the burden of the price of caustic soda being heavier on coarser than on finer counts of yarns. In the soap industry, caustic soda worth Rs. 60 is required for one ton of soap costing about Rs. 900. The incidence varies from 7 per cent. in the case of bigger producers to 15 per cent. in the case of small producers. No data were available with regard to the paper industry, as the Titaghur Paper Mills, who were asked to send a representative, failed to comply with the Board's request.

(2) *Bleaching powder.*—The incidence of the cost of bleaching powder in bleaching yarn ranges from 2 to 4 per cent.

We have not recommended any increase in the existing duties on caustic soda and chlorine, nor have we recommended the imposition of any duty on bleaching powder, and therefore the question of additional burden as a result of the scheme of protection proposed by us on the consuming industries does not arise.

General recommendations.

41. So far our recommendations have dealt with the Mettur Chemical and Industrial Corporation, Ltd., whose costs of manufacture were examined by us and for whom we have suggested a scheme of protection to enable the Company to stand on its legs during the first half of the protection period until it is able to compete with the imported articles on equal ground. In view of the fact, however, that caustic soda is a basic chemical of great importance to many industries, we have given some consideration to the development of the alkali industry so that it may be able to meet the country's full requirements. In order to attain this objective, we recommend that the following measures should be undertaken by the Government at as early a date as possible :—

(*a*) Government should give facilities to the manufacturers of caustic soda, bleaching powder and liquid chlorine for importing up-to-date plant from abroad or for making replacements of their machinery by new parts. For this purpose they should be given import licences and the necessary amount of foreign exchange. The import duty on machinery hereafter imported for the production of caustic soda, bleaching powder and liquid chlorine should be refunded.

(*b*) Government should consider the desirability of either themselves setting up, or giving encouragement to the installation of, two or three large factories for the manufacture of caustic soda so as to satisfy the requirements of the country which amount to nearly 70,000 tons per annum.

(*c*) In setting up these factories, due consideration should be given to the disposal of chlorine which has so far proved a handicap in the development of the alkali industry in India. From this point of view, some of these plants should be based on the production of caustic soda by the causticizing of lime process in which the problem of disposal of chlorine does not arise.

(*d*) Where cheap electric power is available and other factors are favourable to the setting up of electrolytic plants, plans should be devised for the proper disposal of chlorine by the manufacture of its compounds, so that the chlorine generated in the process may be fully utilised.

(*e*) Similarly, plans should be made for the full utilisation of the hydrogen generated in the electrolytic process.

(*f*) Where such large plants for the manufacture of caustic soda either by the electrolytic or by the causticizing process are established, Government should grant concession rates for the transport of materials and especially low rates for electric power ; so that caustic soda and bleaching powder may be manufactured and supplied to the consuming industries at reasonable rates.

(*g*) These plants should be of fairly large size preferably having a capacity of 15 to 20 tons of caustic soda per day, so that the incidence of overheads on the cost of manufacture may be small.

(*h*) Arrangements should be made for getting experts, specially conversant with the alkali industry, to work these plants for the first few years till the alkali industry in India is placed on a sound and firm footing and is able to stand on its own legs. These experts should be such as can advise the managing agents in the utilisation of by-products and the development of the allied industries.

Eligibility for protection.

42. In regard to the conditions laid down by Government for eligibility for protection, we are satisfied that the Mettur Chemical and Industrial Corporation, Ltd., fulfils the first condition, namely, that it is established and conducted on sound business lines. It took over the plant from the previous Managing Agents who were unable to work it and made it a going concern. It has installed other plants on the same premises, such as the vegetable ghee plant, the hydrochloric acid plant, etc., in which the joint products of the electrolytic process like chlorine and hydrogen can be profitably consumed. It is conscious of the necessity of making all possible economies so as to reduce the costs of manufacture and has agreed to implement the recommendations of the Board in this respect. It is fully alive to the desirability of modernising and enlarging its plant so as to reduce further its costs of manufacture and produce larger quantities of the basic chemicals, according to the generally accepted standards of purity, at competitive prices.

We are also satisfied that the Company fulfils the second condition. It is fortunate in possessing a source of lime of very high purity which is used in the manufacture of bleaching powder, and it produces its own salt from sea brine. The production of both salt and lime is carried out not far from the Company's plant at Mettur. It is able to obtain electric power which is consumed in large quantities at fairly low rates from the hydro-electric works at Mettur Dam. The market in India for caustic soda and bleaching powder is fairly large and the South Indian market alone is able to absorb the products made by the Company. We should also like in this connection to point out specially that the protection recommended by us is only for a short period and that in the course of less than a year and a half the Company should be able to carry on successfully without any State assistance.

Apart from these considerations, we are of the opinion that the alkali industry is one of those industries to which it is desirable in the national interest to grant protection or assistance, if necessary, and that the cost of the assistance recommended by us is not excessive to the community.

For these reasons we are satisfied that the Company has fulfilled all the conditions laid down by the Government for becoming eligible for protection.

Summary of conclusions and recommendations.

43. Our conclusions and recommendations may be summarised as follows :—

(1) As the production of caustic soda and bleaching powder in the country is much below its requirements, it is desirable to increase the production of these chemicals by setting up additional plants. The Board was advised that an electrolytic plant with a rated capacity of 15 to 20 tons of caustic soda per day would constitute an economic unit. (Paragraph 15.)

(2) Any wartime system of control or monopoly should now be brought to an end and caustic soda should be included in the open general licence. Licences for importing this article at competitive prices from non-sterling countries should be given freely. (Paragraph 19.)

(3) The scheme of protection recommended by us for the Mettur Chemical and Industrial Corporation for a period of two and a half years from 1st October 1946 to 31st March 1949 may be divided into two equal halves, namely, from 1st October 1946 to 31st December 1947 and from 1st January 1948 to 31st March 1949. The Company will need assistance only during the first half of the protection period and should be able to stand on its own legs during the second half.

A review should be undertaken at the end of 1947 to find out if the Company's plans in regard to the installation of additional plant have been carried out. (Paragraph 26.)

(4) Protection should be given to the Company through a subsidy, on the basis of its actual sales, equal to the difference between its fair selling prices and the landed costs including duty. During the period that the Company receives a subsidy from Government, it must give an undertaking to sell these products at prices not higher than those of imported articles. (Paragraph 35.)

(5) (i) *Caustic soda.*—A subsidy of Rs. 2 per cwt. should be paid to the Company on the basis of actual sales of caustic soda from 1st October 1946 to 31st December 1947. If during this period the landed cost (including duty) falls below or rises above Rs. 15-10-0 per cwt., the subsidy should be increased or reduced correspondingly. For the second half of the protection period, if the landed cost of caustic soda remains at the present level, no subsidy should be paid to the Company. If the landed cost falls below Rs. 15-9-0, a subsidy should be paid on the actual sales at a rate equal to the difference between Rs. 15-9-0 being the Company's fair selling price of the product and the average landed cost (including duty) for the period. [Paragraph 36 (1).]

(ii) *Bleaching powder.* During the first half of the protection period, the Company should be paid a subsidy at the rate of Rs. 1-13-0 per cwt. on its actual sales of bleaching powder from 1st October 1946 up to the 31st December 1947. If, during this period, the landed cost (including duty) of bleaching powder falls below or rises above Rs. 11-5-0 per cwt., the subsidy should be increased or reduced correspondingly. If, during the second half of the protection period, the present landed cost of Rs. 11-5-0 per cwt. remains steady, no subsidy should be paid to the Company. If, however, during this period, the landed cost falls below Rs. 11-5-0 per cwt., the Company should be paid a subsidy, on actual sales, equal to the difference between Rs. 11-5-0 being the Company's fair selling price of the product and the average landed cost (including duty) for the year. [Paragraph 36 (2).]

(iii) *Liquid chlorine.*—Since the Company's fair selling price for this product is well below the present-day selling price, no subsidy or protection is required. The Company should sell it at competitive rates so as to stimulate the consumption of this important chemical in India and to encourage its consumers to use this product in large quantities. [Paragraph 36 (3).]

(6) We do not recommend the conversion of the existing revenue duty on caustic soda into a protective duty. If, in the interests of the general industrial advancement of the country, Government should decide during the protection period to lower the cost of caustic soda to consumers by reducing or abolishing the existing duty, the subsidy should be increased correspondingly so as to equalise the fair selling price with the new landed cost consequent on the reduction or abolition of the duty. (Paragraph 38.)

(7) Government should appoint an Inspector to visit the Company's works periodically and ensure that all possible measures of economy are being undertaken and that the Company's plans for making its plant up-to-date and for adding new machinery are being implemented. (Paragraph 39.)

(8) Government should give facilities to the manufacturers of caustic soda, bleaching powder and liquid chlorine, for importing up-to-date plant from abroad or for making replacements of their machinery by new parts. For this purpose manufacturers should be given import licences and the necessary foreign exchange. The import duty on machinery hereafter imported for the production of caustic soda, bleaching powder and liquid chlorine should be refunded. (Paragraph 41).

(9) Government should consider the desirability of either themselves setting up, or giving encouragement to the installation of, two or three large factories for the manufacture of caustic soda so as to satisfy the requirements of the country which amount to nearly 70,000 tons per annum. (Paragraph 41.)

(10) In setting up these factories, due consideration should be given to the disposal of chlorine which has so far proved a handicap in the development of the alkali industry in India. From this point of view, some of these plants should be based on the production of caustic soda by the causticizing of lime process in which the problem of disposal of chlorine does not arise. (Paragraph 41.)

(11) Where cheap electric power is available and other factors are favourable to the setting up of electrolytic plants, plans should be devised for the proper disposal of chlorine by the manufacture of its compounds, so that the chlorine generated in the process may be fully utilised. (Paragraph 41.)

(12) Plans should be made for the full utilisation of the hydrogen generated in the electrolytic process. (Paragraph 41.)

(13) Where plants for the manufacture of caustic soda either by the electrolytic or by the causticizing process are established, Government should grant concession rates for the transport of materials and especially low rates for electric power, so that caustic soda and bleaching powder may be manufactured and supplied to consuming industries at reasonable rates. (Paragraph 41.)

(14) These new plants should be of fairly large size, preferably having a capacity of 15 to 20 tons of caustic soda per day, so that the incidence of overheads on the cost of manufacture may be small. (Paragraph 41.)

(15) Arrangements should be made for getting experts, specially conversant with the alkali industry, to work these plants for the first few years till the alkali industry in India is placed on a sound and firm footing and is able to stand on its own legs. (Paragraph 41.)

Acknowledgments.

44. The Board would like to place on record its thanks to Dr. J. N. Ray of the Department of Industries and Supplies and to Dr. M. S. Patel, for the valuable help rendered by them in the course of this inquiry. The thanks of the Board are also due to Dr. Madan, its Deputy Secretary, for the help rendered by him during the inquiry at all stages and in the preparation of the report; and to Dr. V. V. Kelkar, its Technical Adviser, and Mr. P. V. Raghava Rao, its Cost Accounts Officer, for the assistance given by them in regard to technical matters and in going through the cost data of the Company.

The Board was somewhat handicapped by the failure of the Titaghur Paper Mills Company to furnish its details of cost of manufacture of caustic soda or to send any representative to appear before the Board for oral examination. The paper industry is one of the protected industries, and, therefore, it was all the more surprising that an important unit of a protected industry did not realise the value of co-operation with the Board even at some inconvenience to itself.

SHANMUKHAM CHETTY—President.

C. C. DESAI—Member-Secretary.

NAZIR AHMAD—Member.

H. L DEY ~~Member~~

B. K. MADAN—Deputy Secretary.

Bombay, the 20th July 1946.

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APPENDIX I

List of producers, consumers and importers who submitted written evidence to the Board.

Producers—

Alkali and Chemical Corporation of India, Ltd., Calcutta.

Ahmedabad Manufacturing and Calico Printing Co., Ltd., on behalf of Sarabhai Chemicals, Ahmedabad.

Mettur Chemical and Industrial Corporation, Ltd., Mettur Dam.

Consumers—

Ahmedabad Millowners' Association, Ahmedabad.

Buckingham and Carnatic Mills, Ltd., Madras.

Director of Public Health, Government of Bombay, Poona.

Elphinstone Spinning and Weaving Co., Ltd., Bombay.

Godrej Oil and Soap Co., Ltd., Bombay.

Government Agricultural Research Institute, Coimbatore.

India United Mills, Bombay.

Indian Bleaching, Dyeing and Printing Works, Ltd., Bombay.

Kothandaram Spinning and Weaving Mills, Ltd., Madura.

Lever Bros. (India), Ltd., Bombay.

Modi Soap Works Ltd., Modinagar.

Morarjee Goculdas Spinning and Weaving Co., Ltd., Bombay.

Mysore Paper Mills, Bhadravati.

Techno Chemical Industries, Ltd., Calicut.

Titaghur Paper Mills Company, Ltd., Calcutta.

Western India Match Co., Ltd., Bombay.

Importers—

Imperial Chemical Industries (India), Ltd., Calcutta.

Kantawala Nanavathi & Co., Ltd., Bombay.

APPENDIX II

List of manufacturers, consumers and importers who tendered oral evidence before the Board.

Manufacturers—

The Mettur Chemical and Industrial Corporation, Ltd., Mettur Dam (Salem District), represented by— Mr. V. Seshasayee ,, K. K. Raman ,, S. Ramaswamy ,, T. M. Krishna Rao ,, K. K. Dharamarajan	6th, 7th and 8th June 1946.
The Tata Chemicals, Ltd., Bombay House, Bruce Street, Bombay, represented by— Mr. M. B. Bhagvat ,, A. K. Bannerji	Ditto.

Consumers—

The Buckingham and Carnatic Mills, Ltd., Armenian Street, Madras, represented by— Mr. C. B. Young	6th June 1946.
The Tata Oil Mills and Co., Ltd., Bombay House, Bruce Street, Bombay, represented by— Mr. P. T. John	Ditto.

Importers—

No importers were present.

APPENDIX III

Statement showing the quantity, value and average value per cwt. of imports of Caustic Soda into India since 1936-37 and Import Duty

	1936-37	1937-38	1938-39	1939-40	1940-41	1941-42	1942-43	1943-44	1944-45 (8 months from April to November).	1945-46
I. *Quantity of imports from :—*										
1. U. K. Cwt. (000) .	355·27	468·56	460·50	631·17	675·26	512·93	541·47	702·60	846·32	518·88
2. Germany ,, ..	3·49	7·56	7·44	7·75	0·55	....	....	....	Information not available.	
3. Japan ,, ..	36·05	1·60	....	31·06	1·06	0·03	....	....	,,	,,
4. China ,, ..	....	....	....	6·19	19·30	....	....	....	,,	,,
5. France ,, ..	0·50	0·70	2·19	1·50	1·50	....	....	....	,,	,,
6. U. S. A. ,, ..	28·66	46·06	30·99	34·87	1·51	18·22	9·56	4·34	,,	,,
7. Other Countries. ,, ..	0·04	0·01	0·01	1·07	....	0·61	0·15	0·16	..	,,
Total	404·33*	518·49	501·13	713·61	698·82	531·79	551·18	707·10	847·17	5·19
II. *Value of imports from :—*										
1. U. K. Rs. (Lakhs).	30·85	38·63	41·75	60·90	73·13	63·20	81·25	109·69	131·00	80·71
2. Germany ,, ..	0·27	0·66	0·74	0·71	....	....	....	....	Information not available.	
3. Japan ,, ..	2·88	0·11	....	4·47	0·19	0·02	....	....	,,	,,
4. China ,, ..	....	....	....	0·77	1·85	....	....	....	,,	..

5. France ,, ..	0·05	0·07	0·22	0·18	0·19	....	....	....	..	,,
6. U. S. A. ,, ..	2·43	3·32	2·72	5·07	0·22	4·23	2·08	1·18	,,	,,
7. Other Countries. ,,	0·09	0·02	0·02	0·21	0·04	0·12	0·04	0·04	,,	,,
Total ,, ..	34·64*	42·81	45·45	72·31	75·62	67·57	83·37	110·91	131·07	80·71
III. *Average value per Cwt. of imports from :—*										
1. U. K. Rs. as. ..	8 9	8 4	9 1	9 11	10 13	12 5	15 0	15 10	15 8	15 8
2. Germany ,, ..	7 10	8 11	10 0	9 2	10 9	....	....	....	Information not available.	
3. Japan ,, ..	8 0	6 13	65 8	14 6	18 7	76 12	....	....	,,	,,
4. China ,, ..	....	....	....	12 7	9 10	....	....	....	,,	,,
5. France ,, ..	10 2	10 8	9 14	12 3	12 8	....	....	....	,,	,,
6. U. S. A. ,, ..	8 11	8 5	8 13	14 8	14 5	23 4	21 13	27 2	,,	,,
Total imports ..	8 9	8 4	9 1	10 2	10 13	12 11	15 2	15 11	15 7	15 8

IV. *Import Duty as in force on 1st January 1946 :—*

(*a*) Standard Rate	36%
(*b*) For imports from U. K.	24%
(*c*) For imports from Br. Colony	24%
(*d*) For imports from Burma	12%

*Excluding imports into Burma.

Statement showing the quantity, value and average value per cwt. of imports of Bleaching Powder into India since 1936-37

	1936-37	1937-38	1938-39	1939-40	1940-41	1941-42	1942-43	1943-44	1944-45	1945-46 (8 months from April to November 1945).
I. *Quantity of Imports from:—*										
1. U. K. Cwt (Lakhs).	1·30	1·83	1·70	1·88	1·52	0·98	0·26	0·91	0·81	0·90
2. Germany ,, ..	0·19	0·27	0·26	0·12	....	....	....	....	Information not available.	
3. Belgium ,, ..	0·01	0·11	0·02	0·01	....	....	....	....	,,	,,
4. Italy ,, ..	0·03	0·02	0·04	0·06	0·02	....	....	....	,,	,,
5. Japan ,, ..	0·11	0·13	0·11	0·10	0·03	0·01	....	....	,,	,,
6. U. S. A. ,, ..	....	....	....	0·18	0·14	0·01	....	....	,,	,,
7. Other Countries. ,,	....	0·01	....	0·01	0·01	....	....	....	,,	,,
Total ,, ..	1·63*	2·37	2·13	2·36	1·72	1·00	0·26	0·91	0·81	0·90
II. *Value of Imports from:—*										
1. U. K. Rs. (Lakhs).	5·90	8·42	8·15	10·17	11·08	8·29	2·42	8·20	7·64	8·50
2. Germany ,, ..	2·08	2·86	2·82	1·27	0·01	....	....	....	Information not available.	
Belgium ,, ..	0·03	0·51	0·08	0·06	....	....	....	....	,,	,,
Italy ,, ..	0·10	0·08	0·20	0·74	0·27	....	....	....	,,	,,

5. Japan ,, ..	1·02	1·25	1·23	1·61	1·03	0·44	....	....	..	,,
6. U. S. A. ,, ..	....	....	....	3·85	2·88	0·15	....	....	,,	,,
7. Other Countries. ,,	....	0·01	0·01	0·12	0·02	0·04	....	....	....	0·02
Total ,, ..	9·07*	13·13	12·49	17·82	15·29	8·92	2·42	8·20	7·64	8·52
III. *Average value per cwt. of Imports from:—*										
1. U. K. Rs. as. .	4 9	4 9	4 13	5 7	7 4	8 7	9 3	9 0	9 6	9 7
2. Germany ,, ..	10 14	10 9	10 15	10 6	13 2	....	....	....	Information not available.	
3. Belgium ,, ..	4 8	4 5	5 5	5 9	....	....	....	....	,,	,,
4. Italy ,, ..	3 15	3 10	4 14	11 15	15 2	....	....	....	,,	,,
5. Japan ,, ..	9 0	9 15	10 8	16 3	30 7	46 6	....	....	,,	,,
6. U. S. A. ,, ..	....	....	....	27 8	20 8	13 4	....	....	,,	,,
Total Imports ..	5 9	5 9	5 14	7 9	8 15	8 14	9 3	9 0	9 6	9 7

*Excluding imports into Burma.

APPENDIX IV

(i) *Board's estimate of the cost of production of 1 cwt. of Caustic Soda (Solid) at the Mettur Plant.*

(Basis :—1,600 tons per annum.)

	First half of the protection period			Second half of the protection period		
	Quantity in cwts.	Rate per cwt.	Value Rs.	Quantity in cwts.	Rate per cwt.	Value Rs.
I. MANUFACTURING EXPENSES :—						
1. *Raw materials* :—						
(*a*) Salt	1·800	0·944	1·70	1·800	0·944	1·70
(*b*) Barium chloride	....	....	0·30	....	....	0·30
(*c*) Hydrochloric acid	....	....	0·10	....	....	0·10
(*d*) Soda ash	0·008	....	0·09	0·008	....	0·09
			2·19			1·99
2. *Power and fuel* :—						
(*a*) Steam			2·00			2·00
(*b*) Electricity			2·95			2·20
(*c*) Fuel oil			0·78			0·78
3. Ordinary current repairs and maintenance of buildings, plant and machinery.			3·50			2·65
4. Labour (including bonus)			2·00			1·00

5. General services, supervision and local office charges		1·50		1·50
6. Expenditure on quality control, research and development		0·24		0·24
7. Packing including the cost of drums .		1·10		1·10
8. Miscellaneous, water, lighting, consumable stores, royalties, etc.		0·31		0·31
Total ..		16·57		13·77
II. OVERHEAD CHARGES :—				
9. Depreciation at statutory rates		1·76		1·76
10. Interest on working capital		0·30		0·26
11. Managing Agents charges		0·31		0·31
12. Directors' and Auditors' fees		0·05		0·05
13. Insurance (excluding War Risk) ..		0·19		0·19
14. Rents, rates and taxes excluding income tax and royalties		0·16		0·16
15. Selling expenses (advertisement) ..		0·16		0·16
16. Miscellaneous		0·40		0·40
Total ..		3·33		3·29
GROSS TOTALS (I and II) ..		19·90		17·06
Less credit for materials recovered :—				
Chlorine 0·89 cwt. at Rs. 5 per cwt. ..	4·45		Chlorine at Rs. 4·15 per cwt. .. 3·69	
Hydrogen	0·33		Hydrogen .. 0·33	
		4·78		4·02
NET TOTAL COST OF MANUFACTURE PER CWT. ..		15·12		13·04

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(ii) *Board's estimate of the cost of production of 1 cwt. of Bleaching Powder at the Mettur Plant*

(Basis :—2,000 tons per annum.)

	First half of the protection period			Second half of the Protection period		
	Quantity in cwts.	Rate per cwt.	Value Rs.	Quantity in cwts.	Rate per cwt.	Value Rs.
I. MANUFACTURING EXPENSES :—						
1. *Raw materials* :—						
(a) Limestone	1·46	0·56	0·82	1·46	0·56	0·82
(b) Chlorine	0·32	5·00	1·60	0·32	4·15	1·33
(c) Sulphuric acid			0·11			0·11
			2·53			2·26
2. Power and fuel			1·10			1·10
3. Ordinary current repairs and maintenance of buildings, plant and machinery ..			1·20			0·40
4. Labour (including bonus)			1·40			0·70
5. General Services, supervision and local office charges			0·67			0·67
6. Expenditure on quality control, research and development			0·11			0·11

7. Packing including the cost of drums ..	2·50	2·50
8. Miscellaneous, water, lighting, consumable stores, royalties, etc.	0·03	0·03
TOTAL ..	9·54	7·77
II. OVERHEAD CHARGES:—		
9. Depreciation at statutory rates	0·90	0·90
10. Interest on working capital	0·22	0·19
11. Managing Agents' charges	0·13	0·13
12. Directors' and Auditors' fees	0·02	0·02
13. Insurance (excluding War Risk) ..	0·11	0·11
14. Rents, rates and taxes excluding income-tax and royalties	0·07	0·07
15. Selling expenses (Advertisement) ..	0·05	0·05
16. Miscellaneous	0·15	0·15
TOTAL ..	1·65	1·62
GROSS TOTALS (I and II) ..	11·19	9·39
Less Credit for materials recovered	Nil.	Nil.
NET TOTAL COST OF MANUFACTURE PER CWT. ..	11·19	9·39

(iii) *Board's estimate of the cost of production of 1 cwt. of Liquid Chlorine at the Mettur Plant*

(Basis :—400 tons per annum.)

	First half of the protection period			Second half of the protection period		
	Quantity in cwts.	Rate per cwt.	Value Rs.	Quantity in cwts.	Rate per cwt.	Value Rs.
I. MANUFACTURING EXPENSES :—						
1. *Raw materials* :—						
(*a*) Chlorine	1·009	5·00	5·05	1·009	4·15	4·19
(*b*) Sulphuric acid			0·80			0·80
			..			....
			5·85			4·99
2. Power and fuel			0·36			0·36
3. Ordinary current repairs and maintenance of buildings, plant and machinery ..			3·75			3·75
4. Labour (including bonus)			2·00			2·00
5. General services, supervision and local office charges			1·80			1·80
6. Expenditure on quality control, research and development			0·25			0·25
7. Packing including the cost of drums ..			....			....

8. Miscellaneous, water, lighting, consumable stores, royalties, etc.	0·15	0·15
TOTAL ..	14·16	13·30
II. OVERHEAD CHARGES :—		
9. Depreciation at statutory rates	2·25	2·25
10. Interest on working capital	0·34	0·33
11. Managing Agents' charges	0·10	0·10
12. Directors' and Auditors' fees	0·03	0·03
13. Insurance (excluding War risk)	0·25	0·25
14. Rents, rates and taxes excluding income-tax and royalties	0·13	0·13
15. Selling expenses (Advertisement) ..	0·10	0·10
16. Miscellaneous	0·40	0·40
TOTAL ..	3·60	3·59
GROSS TOTALS (I and II) ..	17·76	16·89
Less—Credit for materials recovered	Nil.	Nil.
NET TOTAL COST OF MANUFACTURE PER CWT. ..	17·76	16·89

सत्यमेव जयते