

MAHARASHTRA ECONOMIC DEVELOPMENT COUNCIL,

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REPORT ON
PROBLEM OF WATER SHORTAGE
AS AFFECTING INDUSTRIES IN
BOMBAY CITY (GREATER BOMBAY)

11.8.1964

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REPORT O

AGE AS AFFECTING INDUSTRIES IN BOMBAY CITY (GREATER BOMBAY)

I. IMPORTANCE OF BOMBAY CITY IN NATIONAL ECONOMY

Maharashtra is one of the most highly industrialised States and Bombay City is one of the two principal centres of cotton textile industry, which is the largest industry in India. Maharashtra is also the second largest producer of various industrial products in India. The proportionate contribution of the factory sector to the industrial employment in Maharashtra is 2.2 per cent which is nearly three times the national average. The industrial progress of Maharashtra is reflected in its high *per capita* income of more than Rs. 392 which is higher by about 20 per cent than the national average. Maharashtra has the highest rate of savings and investment and accounts for more than 36 per cent of the paid-up capital of the joint stock companies in India. It is however pertinent to observe that the industrial progress of Maharashtra is mainly due to the industrial progress of Bombay City in which 4,035 factories (47 per cent) out of the total registered 8,622 factories in Maharashtra, giving employment to about 5 lakhs (64 per cent) of the factory workers in the State, are located. About 19 per cent of India's industrial output comes from Bombay City and more than 15 per cent of the income from the manufacturing and commercial activities in India is concentrated in this City. The industrial concentration in Bombay City is the outcome of historical and other causes as well as its locational advantages. Industries were first attracted to Bombay City on account of port and other special facilities which it offered. Thereafter, more and more people migrated into Bombay City in search of business and employment. Industries which had been already established gave impetus to the establishment of new industries. These in turn led to the multiplication of commercial, banking, insurance and other organisations. The offices of the State Government and the Government of India went on expanding and new Government offices were opened. While this chain-reaction has promoted the development of Bombay City, it has at the same time contributed to the congestion of industries. Several of the new industries that are being floated in India like petro-chemicals and intermediates for dyes and pharmaceuticals, prefer to locate them in Bombay City. The industrial prosperity of Maharashtra is thus mainly due to the industrial development of Bombay City and the rest of Maharashtra is as undeveloped as most of the areas in the other States of India. The importance of Bombay City in our national economy thus underlines the fact that *the problems faced by industries in Bombay*

City are not merely problems of regional importance but are also problems of national importance and therefore need the assistance of the Government of India for their solution.

2. INDUSTRIES AND WATER REQUIREMENTS

Industries in Maharashtra, large, medium and small, have clustered in Bombay City due to availability of socio-economic overheads and facilities. Preference for Bombay City and its neighbouring areas still persists and it is in the interest of Maharashtra as well as India that steps should be taken to ensure that the existing industries in Bombay City are not handicapped owing, *inter alia*, to the shortage of water. The problem is of vital importance to industries like textiles and chemicals which need water on a large scale. There are also a number of industries located in Bombay City, which need an appreciable quantity of water in connection with their manufacturing operations.

We issued a Questionnaire on the subject to different categories of industries and industrial establishments in Bombay City with a view to collecting information regarding their present and future requirements of water and also their difficulties. We have received replies from various categories of industries and particularly from textile, engineering and chemical industries.

The textile mills require water for humidification, sizing, dyeing, mercerizing, printing and finishing, and for air-conditioning, sprinklers, hydrants, compressors and boilers. The rest of the factories need water mainly for washing, cooling, cleaning, sanitation, rinsing tanks, testing, sprinkling, boilers, furnaces, electroplating, bleaching, soaking, purification, lubrication, distillation, painting, pickling, galvanising, drilling and polishing. Water is also required by industries for non-industrial uses such as bathing, drinking and fire-fighting.

3. RELIABILITY OF SAMPLE

The 140 factories (including 56 textile mills) which have replied to our Questionnaire employ about 2,50,000 workers and consume about 18 million gallons of water per day as against the total number of 5,03,473 industrial workers employed by all the factories in Bombay City and 50 million gallons of water consumed by these factories per day. Thus the 140 factories which have replied to our Questionnaire employ about 50 per cent of industrial workers in Bombay City and use about 36 per cent of water consumed by all industries. Therefore, in our opinion, the information supplied by them gives a fairly good idea of the water requirements of industries in Bombay City. From the information supplied by 101 factories regarding their water requirements in 1981, it appears that their requirements by that time would be somewhat more than double the present requirements, and this estimate is more or less in conformity with

the estimate made by the Committee of Experts appointed by the Municipal Corporation recently to investigate the problem of water supply to Bombay City.

4. EFFECTS OF WATER SHORTAGE ON INDUSTRIES BOMBAY CITY

The shortage of water has adversely affected many factories in Bombay City and a number of them have been constrained to curtail their production appreciably. Industrialists are making serious efforts to meet the shortage of water which is threatening to jeopardize the smooth running of their factories. About half of the factories which have replied to our Questionnaire have had to curtail production with the result that their profits are substantially reduced and in some cases heavy losses have occurred. 15 per cent of the factories have been obliged to employ drastic economy measures and some of the factories have had to transport water from long distances and to incur heavy expenditure for it. Some of the factories have strengthened their storage system and used additional pumps and pipes, etc., and some have resorted to measures such as use of push-cocks, employment of supervisors, posting signboards, recirculation, steam-condensation, use of pond water for non-industrial purposes, and collection of rain water and using the same during the rainy season for suitable purposes. One of the factories dumps large quantities of ice in its storage tanks to keep minimum levels and temperatures. Besides, the unsatisfactory position in regard to water supply is due not only to shortage in supply of water, but also due to defects in the system of distribution. Lack of enough reservoirs has overtaxed the distribution system and resulted in erratic pressures in Municipal mains. This has also necessitated releasing water at inconvenient hours. It is imperative that the entire distribution system should be examined in consultation with experts in order to ensure equitable and convenient distribution of water to all the areas in Bombay City.

5. EFFECTS OF WATER SHORTAGE ON LOCAL POPULATION

Industries and population go hand in hand in so far as requirements of water are concerned. It is estimated that about 15 to 20 lakhs of people in Bombay City are dependent upon industrial employment for their livelihood. In addition to this, the number of persons who are dependent for their livelihood on banking, insurance and commercial organisations which have come up in the wake of industrial development is very large.

We gather that 45 lakhs of people in Bombay City consume about 125 million gallons of water per day, out of about 210 million gallons of water available for distribution. The *per capita* consumption of water is about 30 gallons per day, which is much less than the minimum consumption of 100 gallons of water per day in many cities in the United States of America.

In fact, the *per capita* consumption of water in some of the cities in the United States of America is about 200 gallons per day. Under tropical conditions, the *per capita* consumption of water in Bombay City should be more than in the United States of America where the climate is temperate but it is actually 33 per cent of the minimum in many cities in the United States of America. The population of Bombay City is growing rapidly and it is estimated that at the present rate of growth, the population which is 45 lakhs today would increase to 75 lakhs by 1981 unless rigorous steps are taken to control it. The problem of water shortage which is already acute, is therefore bound to worsen as time passes, unless effective measures are devised to increase the water supply adequately and they are implemented as expeditiously as possible.

The seriousness of the problem of the water shortage can hardly be exaggerated. It is well known that the masses of people in Bombay City do not get water even for their bare requirements. In several localities, where the masses of people live, water is not available at all and has to be fetched from Municipal hydrants situated at long distances. Generally speaking, water is available for staggered hours only and special efforts have to be made at night to store water required for daily consumption. In certain areas, the pressure is very low and, therefore, it becomes necessary for the people residing in these areas to bring water from distant places. The condition of the people using common taps is still worse and in their anxiety to get water quickly a scramble takes place frequently ending in untoward incidents.

6. WASTAGE OF WATER

The shortage of water has, to some extent, aggravated the supply position. During night time, it is not uncommon to find that taps are kept open so that when the supply of water is commenced, the drums placed below open taps on the ground floor are filled with water. This practice involves considerable wastage as the drums overflow with water and renders it difficult for persons residing on the first and upper floors to get any water. Fire hydrants are also used by many persons for drawing water for bathing and drinking purposes and care is generally not taken to see that they are closed when no further water is needed. It is understood that all these factors together with defective taps and leakages in the distribution system account for a wastage of 15 to 20 per cent of the total supply of water to the city. The wastage of water is thus almost equal to the shortage in the present supply of water which is considered necessary for meeting the bare requirements of the people.

7. WATER REQUIREMENTS OF INDUSTRIES AND WORKERS

Out of the 140 factories which have replied to the Questionnaire and are employing at present 2,50,690 workers, 73 factories contemplate an

increase of 21,683 workers by 1965, 71 factories of 28,410 workers by 1970, 60 of 42,800 by 1975, 66 of 54,589 workers by 1980. Thus on an average these factories have estimated that by 1965 the percentage of workers employed by them would go up by 16.5 per cent by 1965, by 22 per cent by 1970, by 40 per cent by 1975 and by 46 per cent by 1980. In other words, according to the present trend the total number of industrial workers in Bombay City would rise from five lakhs to 7.30 lakhs by 1980. On the basis of a minimum requirement of 40 gallons per head per day, and on the assumption that a worker has on an average a family of 3 persons in Bombay City, these 7.30 lakh workers would need 29.2 million gallons of water per day and their families would need 87.6 million gallons of water per day by 1980.

The present daily consumption of the 140 factories which have replied to the Questionnaire is about 22.21 million gallons, and out of this, the daily consumption of 123 factories was 18.92 million gallons in the year 1961. As regards the future daily requirements, keeping in view the programme of rehabilitation, modernisation and expansion, 133 factories have stated that they would need about 30.81 million gallons by 1965, 109 factories 29.98 million gallons by 1970, 101 factories 33.06 million gallons by 1975, and 101 factories 37.53 million gallons by 1980. Thus on an average the consumption of factories in terms of the present consumption would increase to 146 per cent by 1965, 174 per cent by 1970, 206 per cent by 1975 and 234 per cent by 1980, and their consumption in terms of the consumption in 1961 would rise to 151 per cent by 1965, 179 per cent by 1970, 213 per cent by 1975 and 242 per cent by 1980. Thus, the daily consumption of water of the factories would increase from 50 million gallons in 1961 to 75.5 million gallons in 1965, 89.5 million gallons in 1970, 106.5 million gallons in 1975 and 121 million gallons in 1980.

The Committee of Experts appointed by the Municipal Corporation recently has estimated that the water requirements of industries in 1961 were about 50 million gallons per day and that the requirements would rise to 60 million gallons per day in 1965, 80 million gallons in 1971, 90 million gallons in 1976 and 100 million gallons in 1981. These estimates are somewhat on the lower side than the above estimates.

8. REMEDIES TO IMPROVE SUPPLY OF WATER

The following measures are suggested to improve the situation:

IMMEDIATE

- (i) Metering of water supply should be introduced as widely as possible.
- (ii) The convenience of the people should be kept in view while fixing the staggered hours of supply.

- (iii) Mobile squads should be posted in different localities to check misuse of water from fire hydrants and taps left open, and to render free service such as replacing old washers by new washers in leaky taps.
- (iv) Ceaseless propaganda should be carried on through press, radio, films, talks, etc. to educate people to use water economically and to avoid wastage of every kind.
- (v) During the Second World War, wells in Bombay City were opened for use in emergency but were closed by the Municipal Corporation after the War was over. In our opinion, it would be useful if wells are re-opened and such of them as contain water of tolerably good quality are allowed to be used for industrial purposes wherever it is possible.
- (vi) Encouragement should be given to industries to dig new wells within the compounds of their factories.
- (vii) Industries favourably situated near the sea should explore the possibility of using sea water for cooling purposes after blending it with pipe or well water.
- (viii) The Municipal Corporation should consider whether it would be feasible to feed fire hydrants with sea water in selected localities.

INTERIM MEASURES

- (i) All works included in the Master Plan of the Municipal Corporation such as construction of additional service reservoirs, laying of additional feeder and distribution mains, repairs to existing dams, where necessary, etc. should be carried out as expeditiously as possible.
- (ii) Steps should be taken to encourage industries to instal recirculation and cooling plants to reduce water consumption by giving them rebate on water rates.
- (iii) The working of the sewage treatment plants should be improved so as to enable them to produce effluent of good quality which could be used by industries for processing purposes.
- (iv) We understand that about 25 million gallons of water are lost daily by evaporation from the Tansa lake against the draw off of 90 million gallons per day. It is said that vaporisation in Bombay's lakes is normally between 10 and 20 per cent depending on geographical factors. A good deal of experimental work is being done for controlling evaporation losses from large bodies of fresh water by the use of monolayers. In the Hefner lake in the United States of America, studies were made on a water surface of 2,500 acres, when evaporation reduction of 9 per cent was

observed during a trial period of three months. These studies were followed up in the subsequent year by studies at the Boulder Basin of the Mead Lake in Arizona-Nevada and at the Saburao lake in Arizona especially with a view to observing the persistence of the monolayer under the effects of various wind conditions. The work done so far shows that the techniques of application are far from perfect and further work is necessary. It is towards this objective that future studies should be carried out. Some experimental work on evaporation control has been done in India at Faridabad near Delhi, Poondi near Madras, Kakrahalli near Krishnasagar Mysore and Walwhan near Lonavla. It is understood that experiments carried out by the Water Works Department of the Bombay Municipal Corporation to minimise losses by evaporation in the Vihar lake with cetyl alcohol spray have proved to be successful. It is, therefore, hoped that this method would be adopted every year for the Vihar lake and extended to other lakes also.

LONG-TERM MEASURES

There are some rivers within a reasonable distance of Bombay City like Tansa, Vaitarna, Dahisar, Kalu, Pinjal, Bhatsai and Gargai which flow to the Arabian Sea and whose water can be stored at a high altitude and supplied to Bombay City without having recourse to pumping.

The details of the present sources of water supply to Bombay City are as follows:

<i>Source.</i>	<i>Maximum Supply.</i>	<i>Distance in miles from Town Hall, Bombay.</i>
Tansa	92 mgpd	66
Vaitarna	108 mgpd	74
Vihar	20 mgpd	18
Tulsi	3 mgpd	22
	223 mgpd	

We understand that the Municipal Corporation has approved the Dahisar river scheme which would supply about 6 million gallons of water per day and would cost about Rs. 3½ crores and that the State Government have commenced work in respect of a scheme at Cheena Nala for supplying about 6 million gallons of water per day to the industries in the suburban area around Ghodbunder Road. The Upper Vaitarna Scheme has been already included in the Third Five-Year Plan by the State Government and it is necessary to take up its execution on priority basis in order to make up the deficiency of 70 million gallons per day existing at present in water supply to Bombay City to meet even the barest level of

consumption as estimated by the Municipal Corporation. We gather that the Upper Vaitarna and Bhatsai Schemes would supply about 120 million and 230 million gallons per day, and would cost about Rs. 30 crores and Rs. 33.5 crores respectively. The pipelines required for conveying additional supply from the Upper Vaitarna Scheme could be conveniently laid along the existing route of the Tansa-Vaitarna trunk mains. This will enable the Municipal Corporation to bring additional supply of water from the Hydro-Electric Scheme in stages by cross-connecting the new pipeline with the existing ones.

With the completion of the Upper Vaitarna Scheme together with the Bhatsai Scheme, it would be possible to increase the supply of water to about 560 million gallons per day and thereby to meet the reasonable demand for water of industries and the population in Bombay City.

9. DECONGESTION OF BOMBAY CITY

The water problem is becoming more and more acute as time passes and, therefore, it is imperative in our opinion not only to increase the supply of water by all possible means but also to take necessary measures to reduce the demand for water. The demand for water can be reduced by not allowing any new industries except service industries to be established in Bombay City and by discouraging further expansion of industries likely to employ additional persons and of commercial and administrative establishments in Bombay City. This can be achieved by constructing new towns on modern lines in the Thana-Panvel area and by offering inducements to industries and commercial and administrative establishments and their employees and other people in Bombay City to shift to these towns. This is however a question of long-term policy which calls for urgent attention of Government. Recently, Hon'ble Shri V. P. Naik, Chief Minister of Maharashtra, had kindly granted us an interview in connection with the subject of water supply to industries in Bombay City and during the course of discussion we had urged that measures should be devised to decongest Bombay City. He desired that a Note should be prepared on this subject and submitted to him. Accordingly, we have prepared and submitted a Note to Hon'ble Chief Minister which is attached to this Report as an Appendix.

10. PURITY OF WATER

With a view to improving the quality of water, we recommend that adequate pressure should be maintained in the distribution system during non-peak hours to prevent contamination of water by percolation of sewage into the pipe system. We further recommend that the proposed filtration plants should be installed as early as possible and provision should be made now for increasing the number of filtration plants with increase in the supply of water to Bombay City. There is a pressing neces-

sity of evolving economical designs for the filtration plants to be installed in India. We are glad to observe that some efforts have already been made by the Bombay Municipal Corporation in this direction.

11. SEWERAGE FACILITIES

We gather that the proposals made in 1948 for the construction of relief sewers have not yet been fully implemented. We therefore recommend that their execution should be expedited. Steps should also be taken from now to formulate proposals to deal with additional quantities of water that would be made available after completion of the contemplated schemes for augmentation of the water supply.

The existing sewage treatment plants should be expanded to cope with the additional supply and new plants installed where necessary to deal with the sewage of partially and wholly unserved areas. It is also desirable that steps should be taken for reclamation of effluents from the sewage treatment plants for their reuse for industrial operations in such a manner as would not create any health hazards. In foreign countries there is a trend to reuse effluents from sewage treatment plants after subjecting them to tertiary treatment either in lagoons, filtration plants or by polishing them with micro strainers. It is suggested that experiments on the above lines may be started to find out if any economical solution of the problem can be evolved.

12. REQUIREMENTS OF STEEL, FOREIGN EXCHANGE, ETC.

The Upper Vaitarna Scheme would require a pipeline of 47 miles and the Bhatsai Scheme a pipeline of 35 miles. Huge quantities of steel plates and other imported or controlled materials, such as cement would be required for these works and large amounts of foreign exchange would be necessary for importing some of these items. As suggested by us before, the work on the pipelines for bringing water to Bombay City from the Upper Vaitarna Scheme should be taken in hand immediately with whatever quantity of steel could be procured and efforts should now be initiated for procuring more steel, cement, etc. required in future. We further recommend that the highest priority should be obtained from the Government of India for supply of indigenous materials and foreign exchange required for steel and accessories and the State Government and the Municipal Corporation should, with the assistance of the Government of India, endeavour to obtain long-term loans from the World Bank and other International Organisations.

13. ADMINISTRATIVE SET-UP

The Schemes to be undertaken involve a very large amount of work and it would be difficult to expedite the execution of the schemes unless the Project Organisation is separated from the Maintenance Organisation

of the Water Works Department of the Bombay Municipal Corporation. At present, the Hydraulic Engineer is heavily burdened with the duties and responsibilities of distribution and maintenance of the available supply of water and has very little time to devote to the planning and execution of new projects. We, therefore, recommend that a Special Project Organisation should be established by the Municipal Corporation under a highly qualified and experienced Public Health Engineer to be named as Project Engineer for the planning and execution of the schemes. He should be assisted by qualified and experienced engineers of the rank of superintending Engineers and Executive Engineers. This Organisation should devote its attention to the new schemes only and should not be entrusted with the day-to-day working of the Water Works Department. The Head of this Organisation should be given adequate status and powers to enable him to carry out his duties expeditiously and efficiently. The separation of the Project Organisation from the Maintenance Organisation would enable the Hydraulic Engineer to concentrate his whole attention on the work of distribution and maintenance of the available supply of water and to improve the same. We further recommend that the State Government and the Municipal Corporation should consider the possibility of securing the services of a competent Public Health Engineer as a consultant from the United Nations Organisation on loan for a period of five years to assist the Project Engineer and the Hydraulic Engineer in designing and executing the major schemes of water supply and sewerage and to improve radically the water supply, drainage and public health services in the City.

14. DESALINATION OF SEA WATER

With the shortage and high cost of fresh water from natural sources, the sea is being looked upon as a new possible source of water supply to port cities as it is an inexhaustible reservoir of water. There are a number of processes like thermal distillation, solar distillation, electric membrane separation, osmotic processes, separation by algae, high frequency sound and high frequency current that have been evolved for removing the salt content of sea water and making it fit for drinking as well as industrial consumption. These processes of desalination of sea water are costly and in the opinion of the Committee of Experts, appointed by the Bombay Municipal Corporation, the cost of demineralising sea water would be as high as Rs. 5 per 1,000 gallons and would be appreciably higher than the cost of bringing water from the Upper Vaitarna and other new sources. In the United States of America, the cost varies between 1.75 to 2.8 dollars per 1,000 gallons when the distillation process is employed and research is being carried out to bring the cost down to 50 cents per 1,000 gallons. Considerable research work has already been done and sustained efforts are being made in the Western countries, especially in the United Kingdom, Holland and Israel to bring down the cost of demineralised water.

We recommend that work in this direction should be carried out by the Municipal Corporation and that fuel from the Fertiliser Factory at Turbhe should be made available to the Municipal Corporation at a concessional rate, as the main cost in distillation is that of fuel. It is gathered that in the United States of America, the cost of desalination of sea water by the use of nuclear energy is likely to be reduced to 10-20 cents per 1,000 gallons. As a Nuclear Power Station is being established at Tarapore, at a distance of about 70 miles, from Bombay City, we recommend that it would be worthwhile to investigate whether the nuclear energy from this station could be utilised for economical desalination of sea water.

SUMMARY

- (1) The problems faced by industries in Bombay City are not merely problems of regional importance but are also problems of national importance and therefore need the assistance of the Government of India for their solution.
- (2) The present consumption of water by industries in Bombay City is 55 million gallons per day.
- (3) By 1980, the water requirements of industries in Bombay City are expected to be 121 million gallons per day.
- (4) The present unsatisfactory position in regard to supply of water to industries in Bombay City is due not only to shortage of water but also due to defects in the system of distribution.
- (5) It is imperative that the entire distribution system should be examined in consultation with experts in order to ensure equitable and convenient distribution of water to all the areas in Bombay City.
- (6) The population of Bombay City is growing rapidly and it is estimated that at the present rate of growth, the population which is 45 lakhs today would increase to 75 lakhs by 1981, unless rigorous steps are taken to control it.
- (7) The problem of water shortage which is already acute, is bound to worsen as time passes, unless effective measures are devised to increase the water supply adequately and they are implemented as expeditiously as possible.
- (8) The wastage of water from taps kept open, from leaky taps, from misuse of fire hydrants and from defects in the distribution system amounts daily to 15 to 20 per cent of the total supply of water to Bombay City.

(9) The following immediate, interim and long-term measures should be taken to improve supply of water to Bombay City.

(10) *Immediate:*

- (i) Metering of water supply should be introduced as widely as possible.
- (ii) The convenience of the people should be kept in view while fixing the staggered hours of supply.
- (iii) Mobile squads should be posted in different localities to check misuse of water from fire hydrants and taps left open, and to render free service such as replacing old washers by new washers in leaky taps.
- (iv) Ceaseless propaganda should be carried on through press, radio, films, talks, etc. to educate people to use water economically and to avoid wastage of every kind.
- (v) During the Second World War, wells in Bombay City were opened for use in emergency but were closed by the Municipal Corporation after the War was over. In our opinion, it would be useful if wells are re-opened and such of them as contain water of tolerably good quality are allowed to be used for industrial purposes wherever it is possible.
- (vi) Encouragement should be given to industries to dig new wells within the compounds of their factories.
- (vii) Industries favourably situated near the sea should explore the possibility of using sea water for cooling purposes after blending it with pipe or well water.
- (viii) The Municipal Corporation should consider whether it would be feasible to feed fire hydrants with sea water in selected localities.

(11) *Interim:*

- (i) All works included in the Master Plan of the Municipal Corporation such as construction of additional service reservoirs, laying of additional feeder and distribution mains, repairs to existing dams, where necessary, etc. should be carried out as expeditiously as possible.
- (ii) Steps should be taken to encourage industries to instal recirculation and cooling plants to reduce water consumption by giving them rebate on water rates.
- (iii) The working of the sewage treatment plants should be improved so as to enable them to produce effluent of good quality which could be used by industries for processing purposes.

(iv) Efforts should be made by the Bombay Municipal Corporation to minimise losses by evaporation in the Vihar Lake with cetyl alcohol spray and extended to other lakes also.

(12) *Long-term:*

(i) The execution of the Upper Vaitarna Scheme which would supply about 120 million gallons per day should be taken up on priority basis in order to make up the deficiency of 70 million gallons per day existing at present in water supply to Bombay City. Its cost would be about Rs. 30 crores.

(ii) The Bhatsai Scheme would supply about 230 million gallons per day to Bombay City. Its cost is estimated at Rs. 33.5 crores.

(13) It is imperative to reduce the demand for water by not allowing new industries except service industries and new commercial and administrative establishments to be established in Bombay City and by discouraging further expansion of industries and of commercial and administrative establishments likely to employ additional persons in Bombay City.

(14) For the above purpose, new towns on modern lines should be established in the Thana-Panvel area and inducements should be offered to industries and commercial and administrative establishments and their employees and other people in Bombay City to shift to these new towns.

(15) Adequate pressure should be maintained in the distribution system during non-peak hours to prevent contamination of water by percolation of sewage into the pipe system.

(16) The proposed filtration plants should be installed as early as possible and provision should be made now for increasing the number of filtration plants with increase in the supply of water to Bombay City.

(17) Steps should be taken to formulate proposals to deal with additional quantities of water that would be made available after completion of schemes for augmentation of water supply to Bombay City.

(18) The existing sewage treatment plants should be expanded to cope with the additional supply and new plants installed where necessary to deal with the sewage of partially and wholly unserved areas.

(19) Whatever quantity of steel is available should be procured for the Upper Vaitarna Scheme and efforts should be initiated to procure more steel, cement, etc. required in future.

(20) Long-term loans should be obtained for the Upper Vaitarna Scheme from the World Bank or other International Organisations.

- (21) A special Project Organisation should be established by the Bombay Municipal Corporation under a highly qualified and experienced Public Health Engineer, for the planning and execution of the new schemes of water supply to Bombay City.
 - (22) The possibility of securing the services of a competent Public Health Engineer as a consultant from the United Nations Organisation on loan for a period of five years should be explored.
 - (23) Research work should be undertaken by the Bombay Municipal Corporation to bring down the cost of demineralising sea water by using the fuel from the Fertiliser Factory at Turbhe and the nuclear energy from the Nuclear Power Station at Tarapore when it is commissioned.
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APPENDIX

NOTE ON

MEASURES TO DECONGEST BOMBAY CITY

1. Nature of Problem :

The population of Bombay City (Greater Bombay as defined in the Bombay Municipal Corporation Act) is growing too rapidly and it is estimated that at the present rate of growth, the population of Bombay City which is about 45 lakhs today will increase to about 75 lakhs by 1981. Of the 8,622 factories registered in the Maharashtra State, Bombay City alone has 4,035 factories (47 per cent) giving employment to about 5 lakhs of workers in the State (64 per cent). The overcrowding of population and congestion of industries in Bombay City have given rise to numerous problems, some of which such as housing, transport, water supply, sewerage, drainage and slums have become very acute. The housing shortage in particular has affected the family life and created a variety of social problems. These factors are having an adverse effect not only upon the productivity of industries, but also upon the morale of workers. The natural increase in population which is intensified by continuous influx of people from outside is impairing the hygienic conditions of the City. The following extract from the Report of the Study Group on Greater Bombay appointed by the Government of Bombay under the Chairmanship of Shri S. G. Barve gives a vivid account of the conditions of living existing in Bombay City:

“The absence of playgrounds and recreational spaces for children as well as the citizen-body; school buildings unworthy of the coming generation; a deficit of housing to the extent of a third of the total population with all that this shortfall means to the lower income group categories who have to bear the entire incidence of the deficit; the squalor and disgrace of slums accounting for several lakhs of the population; large proportions of working people perforce living single and bereft of domestic life with all the inevitable effect of this deprivation on social vice; ceaseless squabbles, litigation and a chronic state of “cold war” between tenants and landlords; the degradation and shame of queues and quarrels over water taps and the use of sanitary conveniences; the daily grind to several hundred thousand persons who have to travel $1\frac{1}{2}$ to 2 hours each way in choked trains to and from their work; a myriad scowls and distempers attending upon Traffic as it daily snarls up at a hundred places in trying to force its way through a wholly inadequate circulation system; this is the unvarnished picture of living conditions generally in which the 43 lakhs of population in this ‘Urbs Prima in Indis’ have to subsist.”

In these circumstances, it is most essential that adequate and effective measures are devised quickly to reduce the overcrowding of people and congestion of industries. Otherwise, it is feared that the situation would go out of control within the next ten years or so.

2. Vicious Circle :

The industrial congestion in Bombay City is the product of historical causes as well as locational and other advantages. Industries were first attracted to Bombay City on account of port and other special facilities which it offered. Thereafter more and more people migrated into Bombay City in search of business and employment and it began to develop into a larger and larger marketing centre. Industries which had been already established, gave impetus to the establishment of new industries. These in turn led to the multiplication of commercial, banking, insurance and other organisations. The offices of the State Government and the Government of India went on expanding and new Government offices were opened. While this chain-reaction has promoted the development of Bombay City, it has at the same time contributed to the overcrowding of people and congestion of industries. If conditions of living for the masses of people in the City are not to be allowed to be worsened, it is imperative that the vicious circle should be broken and steps should be taken to arrest further deterioration of the situation which is becoming more and more complex as time passes. This can be done in two ways. The first is to check the influx of people from outside into Bombay City. The second is to reduce further employment opportunities in Bombay City by not allowing any new industries except service industries to be established and to offer employment opportunities elsewhere to the people in the City along with more attractive housing and living conditions to induce them to shift to outside locations.

3. Small Industries :

Industries, particularly small industries, had already come into existence by the time some measure of regulation of industries was put into force. A number of small industries had been located in residential areas. In the case of such units of small industries as wish to expand and employ additional workers, it should not be difficult to insist that expansion would be allowed only outside Bombay City, where essential facilities and incentives could be offered. Apart from expansion, a beginning could also be made for the shifting of small industries and non-conforming establishments in residential and other localities to industrial estates outside Bombay City, where facilities such as land, water, electricity, roads and transport could be provided. The State Government have already taken steps to establish some industrial estates and development areas in different parts of the State in order to achieve balanced development. The process of shifting small industries to backward areas outside Bombay City could be hastened

if the following facilities and incentives recommended by the Committee on Dispersal of Industries constituted by the Small-Scale Industries Board of the Government of India are offered:

- (i) Accommodation at concessional rent for the first five years;
- (ii) Housing for workers for which assistance should be given in the form of loans representing $37\frac{1}{2}$ per cent of the total cost for a period of 20 to 25 years and a subsidy of 50 per cent of the total cost;
- (iii) Common services;
- (iv) Priority in supply of materials with a guarantee of a quota for working the factory on the basis of 8-hour shift for at least two years;
- (v) Full subsidy for 5 years to re-imburse the expenditure in respect of sales tax (including sales tax on purchase of machinery), import duties, octroi, municipal taxes, excise duties and income-tax (including Corporation tax);
- (vi) Subsidised electricity tariffs and water rates and subsidy in respect of expenditure for extension of transmission lines to the nearest point of distribution upto the factory site and of switch gears and transformers required;
- (vii) Subsidy to re-imburse the difference between the amount of interest on loans paid to the State Financial Corporations and the amount calculated at 5 per cent on the total amount of loans each year;
- (viii) Extension of repayment terms to ten years in respect of machines and machine tools obtained under the hire purchase scheme of the National Small Industries Corporation;
- (ix) Refund of 20 per cent of the cost of transportation of capital goods and of $33\frac{1}{3}$ per cent of the cost of transportation of raw materials and finished goods upto the point of first delivery for a period of five years from the date of production.

4. Pattern of Industrial Estates :

The programme of setting up of industrial estates particularly in rural areas should be drawn up on the lines of the Guindy Estate at Madras. The Guindy Industrial Estate provides employment to about 3,000 workers and produces goods worth Rs. 3 crores per year. It provides services such as canteen, first aid and rest-shed for workers, post office, telephone exchange, administrative building with show-room for display of manufactured products, bank, fire station, transport office, playground and recreation centre. Apart from these services, various departmental services have been integrated with the estate programme, such as housing for workers at subsidised rents, mechanical, metallurgical and chemical testing labora-

tory, tool room, forging and heat treatment shop, wood working, raw materials depot, technical information section with library, etc. These services costing about Rs. 1 crore which are of great benefit to industries in the Estate provide employment to about 600 workers. There are also training institutes near the Estate where instruction is given in different crafts.

5. Big Industries :

There are three main hurdles for shifting big industries from Bombay City. The first is the heavy cost of dismantling plant, machinery and equipment, of transporting them and of re-erecting them at the new sites. The second is the housing of workers and other employees who would be willing to go to the new places. The third is the retrenchment compensation that will have to be paid to the workers.

These hurdles could however be crossed if the following measures are adopted.

At present, land values are soaring in Bombay City and many of the units of big industries will be able to sell their lands together with buildings thereon at very high prices and to utilize the sale proceeds for the expenditure involved in dismantling plant, machinery and equipment and transporting them and of re-erecting them at the new sites. As however they will be required under the Income-tax Act to pay tax on capital gains, there would be no inducement for them to shift from Bombay City. Therefore, the Government of India will have to be persuaded to waive the recovery of tax on capital gains in such cases. If this is found to be not feasible, the State Government should take over the lands together with buildings thereon from such units and grant them a subsidy sufficient to serve as an inducement to big industries to shift out of Bombay City.

It would of course be necessary to provide facilities such as land, water, electricity, roads, etc. at the new sites. As regards housing of workers, the possibility of shifting units of the textile industry to areas from which the workers come might be examined, because if this is found to be feasible, a large number of workers would be able to live in their own villages or with relations in other villages and attend to their work in the factories from these places. If however this is not possible, subsidy on the lines somewhat similar to those in the case of small industries will have to be paid.

So far as retrenchment compensation is concerned, workers who are willing to go to the new sites would have to be induced not to ask for retrenchment compensation. Some adjustment in regard to wages for their idle period could however be made. As regards workers who are unwilling to go to new sites, or who are found to be surplus, alternative employment would have to be offered to them. In cases in which this is not possible, retrenchment compensation might have to be paid. A subsidy could be

given by the State Government towards a part of this compensation if the amount is very heavy.

6. Discussion with Industries :

Before any scheme for the shifting of industries, small and big, is finalised, the leading representatives of the various industries should be invited by the State Government for discussion and their difficulties ascertained. It is needless to say that any such scheme will have to be formulated on a long-term (about 20 years) basis and can succeed only if full co-operation of the industries concerned is assured. Care will also have to be taken to ensure that the shifting is gradual and that there is no appreciable loss of productivity of these industries or undue hardships to workers and other employees.

There may be certain industries in whose case port facilities are of special significance, and it may not be desirable to shift such industries from Bombay City, unless like facilities can be made available at sites across the harbour, or at places along the sea coast such as Nhava and Ratnagiri.

7. Local Movement :

It would considerably help to reduce congestion in the port and adjoining areas in the South of the City if a town centre were developed in the north of the City at Dharavi or any other suitable area, where large commercial, banking, insurance and other establishments and some of the Government offices could be shifted. This would ease traffic on roads and relieve strain on bus and rail transport.

8. New Towns :

With the construction of the bridge across the Thana creek and of the Diwa Kharpada railway line, a large area would be opened out, where new towns accommodating a population of 50,000 to 60,000 each could be built on modern lines. It would be possible to shift some of the industries to these new towns and also to induce many persons to shift from Bombay City to these towns provided necessary amenities are made available and accommodation is offered at concessional rent. In this connection, it may be mentioned that Shri N. V. Modak, retired Special Engineer of the Bombay Municipal Corporation, has published a brochure, "Planning of Industrial Townships with Special Reference to Greater Bombay" in which he has suggested that about 12 new towns could be built on modern lines in the Thana-Panvel area. We would specially invite the attention of Government to the scheme outlined in this brochure. In the United Kingdom fifteen new model towns have been constructed during the last eighteen years under the New Towns Act where accommodation is provided for a population of 50,000 to 60,000 each. Legislation

on similar lines will have to be enacted if new towns are to be constructed in the Thana-Panvel area and any other areas which may be selected for construction of new towns.

9. Master Plan of Bombay :

The Master Plan prepared by the Municipal Corporation of Bombay formulates a number of schemes with the object of improving the conditions of living in the City. It envisages an expenditure of Rs. 697.75 crores. The WHO experts have estimated an expenditure of Rs. 90 crores for reducing traffic congestion by constructing an additional express way from the northern part to the southern part of the City.

It is apprehended that some of the schemes formulated by the Master Plan might increase the congestion in Bombay City instead of relieving it. Besides, it is doubtful whether even after spending enormous amounts, conditions of living will substantially improve for the masses of the people in Bombay City. A better course would be to spend reasonable amounts on establishing new towns where conditions of living would be far more congenial than in Bombay City and on providing adequate incentives to persons in Bombay City to settle in these towns.

10. New Capital City :

The concentration of offices of the State Government and the Government of India in Bombay City has accentuated the problem of overcrowding and it may be worthwhile to consider the proposal of establishing a new Capital City. It is estimated roughly that the total number of employees of the State Government and the Government of India in Bombay City is about 2 lakhs. If a substantial number out of these could be shifted to the new Capital City, there is no doubt that the congestion in Bombay City would be greatly reduced. New Capital Cities have been built in the States of Orissa, Punjab and Madhya Pradesh. It is understood that the Government of Gujarat are also contemplating to construct a new Capital City for their State. It will take many years to construct a new Capital City on modern lines but the benefits of a new Capital City in the interior of the State would be far-reaching from the point of view of administration and well-being of the people. If however the measures indicated in the preceding paragraphs succeed, it would not be necessary to spend enormous funds to build a new Capital City for Maharashtra.
