

Volume II : City Appraisal

12. Kochi

CITY APPRAISAL

KOCHI

12.0 Introduction

Kochi is a West Coast city, and lies between 9° 57' North latitude and 76° 15' East latitude. Kochi has one of the best harbours in the world. It commands the sea lane of the Arabian Sea and is a major port. The city of Kochi is midway between Thiruvananthapuram - the capital of Kerala, in the South and Kozhikkode the former chief city of Malabar, in the North. The total area covered under Greater Kochi Corporation measures to 94.88 sq km and the total population is 5,64,589. The climatic conditions are tropical. Kochi experiences humidity throughout the year. The temperature varies from 35°C to a low of 20°C. The average rainy days are 132 and the annual rainfall is 3100 mm. The predominant wind is westerly and northwesterly.

The drinking water supply is under the control of Kerala Water Authority (KWA).

12.1 Water Sources

As per records, the city water supply was started during 1936, supplying limited quantity of water, for the British ships launched in the Cochin Port. During 1963 public water supply system was established and a new plant was constructed at Aluva with the capacity of 48 MLD. The raw water source, then and now, is the perennial river Periyar. At present there are four intake wells on the bank of the river at Aluva, approximately 12 km. away from Kochi city. The inlet is protected with a wire mesh structure. During 1975, an additional conventional type treatment plant with 72 MLD capacity was constructed. During 1993, under World Bank Aided Programme, a new treatment plant with 70 MLD capacity was constructed at Aluva. Another plant with 35 MLD capacity was installed at Aluva under HUDCO scheme during 2000. Total quantity of treated water supplied from Aluva Head Works is 210 - 235 MLD out of which approximately 70 MLD is available for city consumption and rest is supplied to adjacent area.

There are four clear water reservoirs in the Aluva Water Treatment Plant with holding capacity 676.8 m³, 172.8 m³, 4009.9 m³ and 1513.75 m³.

12.2 Water Treatment

All the four water treatment plants are conventional type with rapid gravity filters. Treatment for the raw water is coagulation using alum and lime and the design dose of alum is 500 kg/day. Chemical mixing is done mechanically in flash mixers of size 1.5 m x 0.85 m x 3.5 m with the retention time of 49 seconds. At Aluva water treatment plants mechanical flocculation is in practice. There are four clariflocculator units for plant No. 1 and 2 and three clariflocculator units for plant no. 3 and 4. Detention time for flocculator is 30 minutes and for clarifier it is 2 hours. There are altogether 32 rapid sand filters, out of which six are for plant no. 1, eight for plant no.2, twelve for plant no. 3 and six for plant no. 4. Filter media details are given below:

I st layer	-	50mm x 37mm gravel, 75mm depth
II nd layer	-	37mm x 12 mm gravel, 75mm depth
III rd layer	-	12mm x 6mm gravel, 75mm depth
IV th layer	-	6mm x 2.5mm Grit, 150mm depth
V th layer	-	1.8mm x 0.5mm Sand, 65mm depth

Back washing is done by air scouring and the back wash water rate is 80 m³/hr. Chlorine gas is used for disinfection and bleaching powder is also used when there is shortage of chlorine gas. There are six chlorinators out of which four are with 12 kg capacity and two with 4 kg capacity; all work under vacuum. Point of application is sump and the contact period is 24 hrs upto final delivery of water.

Studies revealed that reported dose of alum (500 kg per day, design dose) was sufficient for the treatment. Treatment units were functioning properly. Maintenance of the units was satisfactory. Regular washing of filter units and clariflocculator units were recorded and observed. A film of oil and grease was observed on the surface of water in the filter bed. Salinity intrusion is a major problem faced by the Aluva water treatment plant. Due to the high salinity concentration, plants are often shut down and water supply cut off for two to three days in summer.

12.2.1 Laboratory Facilities

A common laboratory is there in Plant No. III which at present carries out the following tests (1) pH (2) Turbidity (3) Jar Tests (4) Residual Chlorine (Hourly). Trained operators / Overseers / Assistant Engineers are carrying out these tests.

12.3 Water Distribution System and Leak Detection

The corporation of Kochi city with 66 divisions is covered by water distribution system and there are three distribution zones in the city, viz. Karuvelippady, Ernakulam and Kaloor. Divisions 1 to 26 are included in Karuvelippady zone and 27 to 66 divisions in the Ernakulam and Kaloor zones. The service reservoirs are located at Thevara, Perumannoor and Pachalam where booster chlorination facilities are available.

A portion of the water is distributed through cast iron pipes while the replacement by PVC pipes is under progress. There is continuous pumping from main service reservoirs at Thammanam and Perumannoor but the supply is intermittent, viz. from 05:00 hrs to 07:30 hrs and from 17:00 hrs to 19:30 hrs at Karuvelippady zone. Cross connections are avoided by providing control valves. Mattanchery, Thoppumpady and Fort Kochi are the low-pressure areas in the city. KWA is undertaking routine monitoring for leak detection. The replacement of old and damaged G.I. Pipes by PVC pipes is carried out.

12.4 Waste Management and Sanitation

12.4.1 Solid Waste Management

On an average 323 tonnes per day of solid waste is generated in the city. The transport of the solid waste from the city to the disposal site is done by covered vehicles, tipper lorries, tempos etc. Disposal sites are located at Cheranalloor and Brahmapuram. Out of the total quantity, hospitals are contributing 5% of the solid waste. Disposal practices adopted in the city are inadequate. At the disposal sites the potential hazard of the water pollution due to seepage was suspected.

12.4.2 Sewerage and Sewage Treatment

The area covered by sewerage system in the city is only 6 sq km and an average of 3 MLD sewage is treated daily. The sewage treatment plants consist of grit chamber, primary settling, aeration and final settling. The treated effluent is disposed off in the natural waterways.

12.5 Health Status

In the city, the recorded diseases are cholera, typhoid, gastro-enteritis and diarrhea. During the last five years (1996 - 2000) number of people affected by gastro-enteritis and diarrhea were 14064 (1996), 63157 (1997), 633588(1998), 71947(1999) and 48550(2000). Cholera was the less prone disease and no case was reported during 1996 - 1998. However, 25 cases were reported during 1999 and one case during 2000. The number of people affected by typhoid was 98 during 1996 and 275 during 1997. In the year 1998, the number of reported cases were 446, which were increased to 1030 during to 1999. As compared to the year 1999, the reported cases were less in 2000 and were only 581. Health authorities are adopting preventive measures effectively for the prevention of outbreak of epidemics. Certain programmes being conducted are: disinfection through chlorination, awareness creation, inter-sectoral coordination, strengthening of ORS depots, regular and water quality monitoring.

12.6 Field Studies and Water Quality Evaluation

The preliminary survey of field studies has been conducted for the water supply system and distribution area and sampling points were identified. Water Quality Surveillance was conducted for three seasons, viz. winter, summer and monsoon.

Sample Collection

Water samples were collected from Aluva treatment plant and various consumer end points. In the treatment plant, the samples of raw water, settled water, filtered water and finished water were collected and analysed. Apart from this, 30 samples were collected from main service reservoirs, service reservoirs and consumer end points. Initially one sample was collected from each division. The numbers of samples were limited after studying the residual chlorine contents in the samples i.e. the only samples with residual chlorine content below 0.2 mg/L were taken for bacteriological analysis. All together 30 samples were collected daily for each seasons. All the parameters were studied for raw water and clear water. The main reservoir samples were analysed for physico-chemical and bacteriological parameters. Settled and filtered samples were studied only for sulphate and turbidity.

Water Quality

The raw water source was free from noticeable contamination/pollution. No remarkable changes in the daily water quality were observed but seasonal changes were noted. For example, salinity intrusion in the river even beyond the raw water intake point was a severe problem during summer. Laboratory studies revealed that, raw water was contaminated with Total coliforms, fecal coliforms and E.coli during all seasons. The concentration of all the physico-chemical parameters except salinity, during summer, were within the limit stipulated by CPHEEO during all the seasons. Out of 30 samples, presence of total coliforms, fecal coliforms and E-coli were observed in the samples collected from Mattanchery for all the days and for all

the seasons. During winter season, samples from 14 zones showed bacterial contamination for 2 days. However, the contamination was not persistent and for rest of the days the bacterial count was nil. Delay or shortage of booster chlorination from main service reservoirs may be the reason for contamination.

During summer, physico-chemical analysis of the samples revealed that the concentrations of various parameters were within the limit stipulated by CPHEEO. Out of 30 samples collected from consumer ends, presence of coliforms were observed in samples of Mattanchery, Vaduthala West, Palarivattom, Kadavanthra and Thrikkanarvattom for all the days. On the first day of sampling and analysis, ten samples were found to be bacteriologically contaminated. On the second day the number of samples contaminated were twelve, while on 3rd, 4th and 5th day the number of samples contaminated were eight, six and five respectively. Comparing to winter season samples, the turbidity and sulphate concentration of summer samples were higher.

The same pattern of sampling and analysis as for winter and summer seasons, was followed in monsoon also. Bacteriological contamination was observed in samples of raw water, Mattanchery and Vaduthala West. Out of 30 sites, 23 samples were found contaminated on alternate days. This indicates the need of more effective booster chlorination from the service reservoirs. Turbidity and sulphate concentration were high in all the samples. For the entire period of study, all the physico-chemical parameters were within the limits stipulated by CPHEEO. The water quality analysis data for winter, summer and monsoon seasons is given in **Table 12.1 to 12.12**. The samples from certain locations, viz. Mattanchery, Vaduthala West were found contaminated. These are the thickly populated, water logged areas of the city. The area is also identified as the most cholera and typhoid prone areas of the State. The West Kochi and the islands covered under city area suffer severe drinking water scarcity. From Aluva water treatment plant, none of the areas gets adequate drinking water except places in the vicinity of the plant.

Status of Laboratory Facilities

For proper implementation of the surveillance programme, the existing laboratory facilities are inadequate. Quality control laboratory is doing water quality analysis for treatment plants and rural water supply. Routine monitoring of raw water and treated water is conducted by the laboratory. Water quality analysis of different units of the plant is not in practice.

Basic instruments required for the water analysis are available in the quality control laboratory and all are in good condition. Lack of manpower is the main problem faced by the laboratory.

12.7 KAP Survey

Findings of the Study: Salient Points

➤ *Perceived State of Drinking Water Pollution*

Quality control division of Kerala Water Authority (KWA) conducts monthly water sampling from treatment plant, distribution system and consumer ends for physico-chemical and bacteriological analysis. Daily routine sampling is done by the chemist of the treatment plant laboratory. The treatment plant operators carry out hourly sampling for residual chlorine and turbidity. About 30% of the respondents considered the state of the water quality of Kochi City Corporation to be very good.

- *Awareness of the SDWQ and information on drinking water standards*
Thirty five per cent of the general public, 65% water works personnel and 55% of health agencies are aware of the SDWQ programme in the city of Kochi. The people are aware of the water quality standards. The media is also creating awareness among the public about the quality and standards of drinking water.
- *Information on private water supply*
Kerala Water Authority is the only agency supplying treated drinking water in Corporation of Kochi and there is no private water supply.
- *Accountability for the efficient and effective delivery of water supply*
Seventy five per cent of water works personnel have reported 100% water supply efficiency and 55% general public responded for the satisfactory water supply. Others complained about shortage of drinking water supply in the out skirt of the corporation area.
- *Knowledge of individuals/institutions with water supply agency services*
100 % of the respondents among public are aware that KWA is the only agency supplying treated water to the population of Kochi City.
- *Procedures for the complaints against drinking water supply*
Kochi City Corporation is divided into 4 zones and every zone is headed by an assistant engineer. This office maintains a register for complaints from the general public for water supply and distribution. A 95% of the respondents of water works personnel is of the view that immediate measures are taken for the reported complaints regarding water supply.
- *Knowledge of sanitary survey*
There are chief medical officer, city health officer, asst. health officer, zonal sanitary officer, health inspectors and sanitary workers for maintaining sanitary practices and health aspects. Among general public 65 % of the respondents indicated that they were aware of the sanitary programme and health aspects related to sanitation practices.
- *Knowledge of preventive measures and health education*
There are number of primary health centres in addition to health office at every zonal centre of the city corporation. The health centres are taking steps for preventive measures especially during the seasons inceptible to epidemics. Therefore, 80% of the respondents among general public are aware of the preventive measure for water borne diseases.

12.8 Current Status of Quality Control and Surveillance

12.8.1 Water Quality Control

12.8.1.1 Status

Kerala Water Authority (KWA) is the agency responsible for water supply in the city. The raw water source is the perennial river Periyar. There are four intake wells at Aluva, approximately 12 km. from Kochi city. The inlet is protected with a wire mesh structure. Total quantity of treated water supplied from Aluva Head Works is 210 - 235 MLD out of which approximately 70 MLD is available for city consumption and rest is supplied to adjacent area.

There are four clear water reservoirs in the Aluva Water Treatment Plant with holding capacity 676.8 m³, 172.8m³, 4009.9 m³ and 1513.75 m³.

All the four water treatment plants are conventional type and treatment units were functioning properly. Maintenance of the units was satisfactory. Regular washing of filter units and clariflocculator units was observed. A film of oil and grease was observed on the surface of water in the filter bed. Salinity intrusion is a major problem faced by the Aluva water treatment plant. Due to the high salinity concentration plants are often shut down and water supply cut off for two to three days in summer.

In the laboratory at the treatment plants, the parameters examined are only residual chlorine and turbidity. No qualified chemists are appointed in any of the plants. The laboratory of Aluva Water Treatment Plant is equipped with chemicals and instruments - pH meter, turbidity meter, jar test apparatus, oven and field kit which are essential for conducting the basic water quality tests. In addition to this, the Division laboratory has capacity to test the parameters such as Colour, Acidity, Alkalinity, Conductivity, TDS, Total hardness, Calcium hardness, Magnesium hardness, Nitrate, Arsenic, Sulphate, BOD, COD, DO and Fecal Coliforms. The laboratory is provided with adequate supply of power, gas and distilled water. The instruments are regularly checked and repair and maintenance is carried out. The laboratory staff and field engineering staff are doing the sampling works. At present there are 3 Nos. qualified Chemists appointed on regular basis and 3 Laboratory Assistants for assisting Chemists. Microbiologist is appointed on contract basis. No training has been offered to the laboratory staff for water quality analysis. Financial resource is through State Govt. (Plan Budget). The Quality Control Division of KWA collects and analyse water samples from treatment plants, distribution system and consumer ends. Samples are collected from raw water, clarifiers, filters and treated water before and after chlorination. Samples are analysed for physico-chemical and bacteriological parameters. The bacteriological examinations of the samples are carried out by multiple tube fermentation technique. Hourly sampling and analysis of water in the quality control laboratory are carried out at the time of emergencies i.e. during outbreak of an epidemic or boosting of salinity in the drinking water etc. The results are reported to the authorities of Kerala Water Authority.

Solid waste disposal practices are inadequate. At the disposal sites the potential hazard of the water pollution due to leachates was suspected.

The area covered by sewerage system in the city is only 6 sq km and an average of 3 MLD sewage is treated daily.

In the city, the recorded diseases are cholera, typhoid, gastro-enteritis and diarrhoea.

No remarkable change in the daily water quality of raw water sources was observed but seasonal changes were noted without any noticeable contamination/pollution. Salinity intrusion in the river even beyond the raw water intake point was a severe problem during summer. Presence of total coliforms, Fecal coliforms and E-coli were observed in the samples collected from Mattanchery for all the days and for all the seasons. During winter season, samples from 14 zones showed bacterial contamination for 2 days. However, the contamination was not persistent and for rest of the days the bacterial count was nil. Presence of coliforms were observed in samples collected from consumer ends. The samples of the thickly populated, water logged areas of the city were found contaminated.

The existing laboratory facilities are inadequate. KWA carry out leak detection programme. The replacement of old and damaged G.I. Pipes by PVC pipes is carried out.

12.8.1.2 Scope for Improvement

There is a need to upgrade the existing quality control laboratory with respect to staff and modern analytical instruments/equipment. The existing staff for water analysis and field sampling should be strengthened. There is also need to impart the training to laboratory staff for new methods of water quality analysis. Upgradation of solid waste collection system and sewage treatment facility is necessary to prevent the outbreak of epidemic. Modern instruments are required to be provided for routine check-up of UFW.

12.8.2 Surveillance of Drinking Water Quality (SDWQ)

12.8.2.1 Status

Kerala Water Authority, reportedly, undertake water quality surveillance through the quality control laboratory.

12.8.2.2 Scope for Improvement

The Surveillance of Drinking Water Quality (SDWQ) programme need be started with reliance on Volume I, Section 5 & 6.

12.9 The Water Supply Agency's comments on the Draft Report

The Kerala Water Authority furnishes comment on the Draft Report. The comments were of corrective nature and also provided additional information. The corrections as mentioned in their communication have been incorporated. The additional information provided by the agency is presented.

There is proposal for upgradation of Quality Control Division Lab at Aluva. It is proposed to procure shortly and Atomic Adsorption Spectrophotometer for detection of various trace metals in water and a Gas Chromatograph for detecting the pesticide contents, if any, in water. There is also an urgent need to strengthen the capacity of chemists and other staffs by imparting training for handling such equipments.

The Chief Engineer (CR) in his communication also mentions specifically that the Draft Report has almost satisfactorily covered most aspects of the water supply in Kochi city.

Table 12.1 : Water Quality of Treatment Plants - Winter

City : Kochi

Sl. No.	Sampling Date	Sampling Point	Sample ID No.	Temp (°C)	pH	Turb (NTU)	Cond (S/cm)	TDS (mg/L)	TAK (mg/L)	T-Hard (mg/L)	Ca (mg/L)	Mg (mg/L)	Cl (mg/L)	SO ₄ (mg/L)	NO ₃ (mg/L)	PO ₄ (mg/L)	F (mg/L)	Na (mg/L)	K (mg/L)	DO (mg/L)	COD (mg/L)	Phenol (mg/L)	Fe (mg/L)	Mn (mg/L)	Cu (mg/L)	Cd (mg/L)	Cr (mg/L)	Pb (mg/L)	Zn (mg/L)	As (mg/L)	Res.Cl (mg/L)	TC (CFU/100ml)	FC (CFU/100ml)					
1	23-Feb-02	Aluva WTP Raw Water-1	100	30.1	6.9	5	42	29.6	16	20	10	10	31	15	-	-	-	0.32	4.4	0.9	-	-	0	0.08	ND	0.03	ND	ND	ND	ND	ND	ND	ND	0	120	30		
	24-Feb-02			30	6.5	4	45	30	15	20	11	9	33	14	-	-	-	0.34	4.6	0.9	-	-	0	0.06	ND	0.02	ND	ND	ND	ND	ND	ND	ND	0	200	50		
	25-Feb-02			31	6.9	4	40.7	28.5	14	20	10	10	30	20	-	-	-	0.36	4.4	0.9	-	-	0	0.12	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	0	102	40	
	26-Feb-02			30	6.9	5	42.2	29.8	18	20	10	10	38	18	-	-	-	0.31	4.3	0.9	-	-	0	0.07	ND	0.03	ND	ND	ND	ND	ND	ND	ND	ND	0	100	20	
	27-Feb-02			31	7	5	41.2	34.6	18	20	10	10	31	15	-	-	-	0.32	4.4	0.9	-	-	0	0.1	ND	0.03	ND	ND	ND	ND	ND	ND	ND	ND	0	90	30	
	28-Feb-02			31	7	5	42.5	37.6	20	20	10	10	28	16	-	-	-	0.41	4.5	3	-	-	0	0.04	ND	0.03	ND	ND	ND	ND	ND	ND	ND	ND	0	105	30	
	1-Mar-02			30	6.8	6	36.7	30.1	14	18	10	8	31	19	-	-	-	0.38	5.2	1.4	-	-	0	0.04	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	0	120	40	
	24-Feb-02			Aluva WTP Raw Water-2	101	29	6.5	5	37	35	16	20	12	8	32	12	-	-	-	0.32	4.3	0.9	-	-	0	0.31	0.01	0.03	ND	ND	ND	ND	ND	ND	ND	0	60	40
25-Feb-02	31	6.8	4			35.9	39.4	14	19	10	9	28	18	-	-	-	0.33	4.4	0.9	-	-	0	0.2	ND	0.03	ND	ND	ND	ND	ND	ND	ND	ND	0	50	15		
26-Feb-02	30	6.9	4			36.2	30.8	16	24	14	10	36	20	-	-	-	0.32	4.2	0.9	-	-	0	0.19	ND	0.03	ND	ND	ND	ND	ND	ND	ND	ND	0	75	28		
27-Feb-02	30	6.9	5			35.7	29.1	18	18	10	8	31	19	-	-	-	0.33	4.2	0.9	-	-	0	0.12	ND	0.03	ND	ND	ND	ND	ND	ND	ND	ND	0	80	25		
28-Feb-02	30.5	7	5			36.6	29.1	18	18	10	8	26	14	-	-	-	0.38	4.3	0.9	-	-	0	0.1	ND	0.03	ND	ND	ND	ND	ND	ND	ND	ND	0	75	18		
1-Mar-02	30.5	7	5			38.5	30.6	18	18	10	8	26	14	-	-	-	0.38	4.3	0.9	-	-	0	0.12	ND	0.03	ND	ND	ND	ND	ND	ND	ND	ND	0	80	20		
23-Feb-02	Aluva WTP Raw Water-3	102	29.9			6.8	5	37.1	33.7	15	20	10	10	32	17.5	-	-	-	0.35	4.4	0.9	-	-	0	0.21	ND	0.03	ND	ND	ND	ND	ND	ND	ND	ND	0	80	39
24-Feb-02			29			6.6	5	38	37	14	18	10	8	31	17	-	-	-	0.33	5.2	1.1	-	-	0	0.51	0.02	0.03	ND	ND	ND	ND	ND	ND	ND	ND	0	200	120
25-Feb-02			30	6.8	4	37.2	33.6	13	22	10	12	29	18.5	-	-	-	0.36	4.3	0.9	-	-	0	0.32	0.01	0.03	ND	ND	ND	ND	ND	ND	ND	ND	0	70	30		
26-Feb-02			30	6.8	7	36.1	33.1	15	22	10	12	34	16	-	-	-	0.31	4.2	0.9	-	-	0	0.41	0.01	0.03	ND	ND	ND	ND	ND	ND	ND	ND	0	90	32		
27-Feb-02			30.5	6.9	5	39.1	32.7	16	20	10	10	32	17.5	-	-	-	0.35	4.4	0.9	-	-	0	0.33	0.03	0.02	ND	ND	ND	ND	ND	ND	ND	ND	0	105	30		
28-Feb-02			30	6.9	5	42.4	33.5	18	18	10	8	28	14	-	-	-	0.39	4.4	1.2	-	-	0	0.18	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	0	100	30		
1-Mar-02			30	6.9	5	42.4	33.5	18	18	10	8	28	14	-	-	-	0.36	4.4	0.9	-	-	0	0.35	0.02	0.02	ND	ND	ND	ND	ND	ND	ND	ND	0	75	30		
23-Feb-02			Aluva WTP- Chlorinated- Plant-1	103	29.8	6.9	0.1	45.6	36.5	16	14	10	4	18	14	-	-	-	0.28	4.8	1.1	-	-	0	0.12	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	0	0	0
24-Feb-02	29	6.8			0.1	46	35	16	14	10	4	16	13	-	-	-	0.24	4.5	1.1	-	-	0	0.09	0.01	ND	ND	ND	ND	ND	ND	ND	ND	2	0	0	0		
25-Feb-02	29	7.1			0.1	44.6	35.5	14	16	10	6	19	17	-	-	-	0.29	4.8	1.1	-	-	0	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	0	0	0		
26-Feb-02	30	6.9			0.1	45.9	35.9	14	14	10	4	18	14	-	-	-	0.26	6.4	2.1	-	-	0	0.76	0.01	ND	ND	ND	ND	ND	ND	ND	ND	2	0	0	0		
27-Feb-02	30	6.9			0.1	39.6	31.4	16	14	10	4	18	14	-	-	-	0.28	4.6	1.2	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	0	0	0		
28-Feb-02	30	6.8			0.1	41.6	32.8	16	14	10	4	16	12	-	-	-	0.31	5	1.3	-	-	0	0.17	0.03	ND	ND	ND	ND	ND	ND	ND	ND	2	0	0	0		
1-Mar-02	30.5	6.9			0.1	43.6	34.3	16	14	10	4	16	12	-	-	-	0.29	4.6	1.1	-	-	0	ND	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	0	0	0	
23-Feb-02	Aluva WTP- Chlorinated- Plant-2	104			29.9	6.9	0.1	45.8	36.7	14	18	10	8	17	14	-	-	-	0.28	4.2	0.9	-	-	0	0.14	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.5	0	0	0
24-Feb-02			29	6.9	0.1	47	37	14	18	11	7	17	12	-	-	-	0.27	4.3	0.9	-	-	0	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.5	0	0	0		
25-Feb-02			30	6.9	0.1	44.8	36.3	13	20	10	10	18	16	-	-	-	0.26	4.3	1	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	0	0	0		
26-Feb-02			30	6.6	0.1	45.1	35.7	14	16	10	6	18	14	-	-	-	0.26	5	0.9	-	-	0	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.5	0	0	0	
27-Feb-02			30.5	6.9	0.1	40.6	32.6	18	18	10	8	17	14	-	-	-	0.28	4	0.8	-	-	0	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	0	0	0	
28-Feb-02			30.5	6.9	0.1	40.2	32.2	16	16	10	6	16	10	-	-	-	0.29	4.7	0.9	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	0	0	0		
1-Mar-02			29.9	6.9	0.1	41.4	33.4	16	16	10	6	16	10	-	-	-	0.29	4.9	1	-	-	0	0.23	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	0	0	0		
23-Feb-02			Aluva WTP- Chlorinated- Plant- 3&4	105	29.9	6.9	0.1	42.1	33.7	12	18	12	6	18	13	-	-	-	0.3	4.3	1	-	-	0	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.5	0	0	0
24-Feb-02	29	6.8			0.1	45	37	12	18	10	8	20	13	-	-	-	0.31	4.2	1	-	-	0	0.25	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.5	0	0	0	
25-Feb-02	29	6.9			0.1	42.7	37.3	12	18	10	8	17	18	-	-	-	0.31	4.5	1	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	0	0	0		
26-Feb-02	30.5	6.8			0.1	42.8	32.7	12	16	12	4	18	15	-	-	-	0.28	4	0.9	-	-	0	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.5	0	0	0	
27-Feb-02	29.8	6.8			0.1	38.1	30.7	16	18	12	6	18	13	-	-	-	0.3	4.8	1	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	0	0	0	
28-Feb-02	30	6.8			0.1	38.4	31.2	14	16	12	4	18	14	-	-	-	0.33	4.6	1	-	-	0	ND	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	2	0	0	
1-Mar-02	30.5	7			0.1	39.1	32	16	14	10	4	18	14	-	-	-	0.3	4	1	-	-	0	0.11	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	0	0	0		

ND : Not detected
- : Not done

Table 12.2 : Water Quality - Treatment Stages - Winter

City : Kochi

Sl. No.	Sampling Date	Source	Turbidity (NTU)	Sulphate (mg/L)
1	23-Feb-02	ALUVA WTP SETTLED WATER CLARIFIER-1	2.0	16
	24-Feb-02		2.2	16
	25-Feb-02		1.8	15
	26-Feb-02		2.0	16
	27-Feb-02		1.6	16
	28-Feb-02		1.6	14
	1-Mar-02		1.6	14
2	23-Feb-02	ALUVA WTP SETTLED WATER CLARIFIER-2	2.3	17
	24-Feb-02		2.3	17
	25-Feb-02		2.1	18
	26-Feb-02		1.9	18
	27-Feb-02		1.4	17
	28-Feb-02		1.4	14
	1-Mar-02		1.4	14
3	23-Feb-02	ALUVA WTP SETTLED WATER CLARIFIER-3	2.0	20
	24-Feb-02		2.0	18
	25-Feb-02		1.6	20
	26-Feb-02		1.8	20
	27-Feb-02		1.8	20
	28-Feb-02		1.8	16
	1-Mar-02		1.8	16
4	23-Feb-02	ALUVA WTP SETTLED WATER CLARIFIER-4	2.0	19
	24-Feb-02		2.0	19
	25-Feb-02		1.5	18
	26-Feb-02		2.0	20
	27-Feb-02		1.6	19
	28-Feb-02		1.6	14
	1-Mar-02		1.6	14
5	23-Feb-02	ALUVA WTP SETTLED WATER CLARIFIER-5	1.8	18
	24-Feb-02		1.0	16
	25-Feb-02		1.6	17
	26-Feb-02		2.1	18
	27-Feb-02		1.5	18
	28-Feb-02		1.5	12
	1-Mar-02		1.5	12
6	23-Feb-02	ALUVA WTP SETTLED WATER CLARIFIER-6	2.0	19
	24-Feb-02		2.0	19
	25-Feb-02		1.7	20
	26-Feb-02		1.9	19
	27-Feb-02		1.4	19
	28-Feb-02		1.4	14
	1-Mar-02		1.4	14

...Contd. Table 12.2

Sl. No.	Sampling Date	Source	Turbidity (NTU)	Sulphate (mg/L)
7	23-Feb-02	ALUVA WTP SETTLED WATER CLARIFIER-7	1.5	20
	24-Feb-02		1.0	20
	25-Feb-02		1.5	19
	26-Feb-02		1.8	20
	27-Feb-02		1.2	20
	28-Feb-02		1.2	12
	1-Mar-02		1.2	12
8	23-Feb-02	ALUVA WTP FILTERED WATER UNIT-1	0.1	18
	24-Feb-02		0.1	18
	25-Feb-02		0.1	16
	26-Feb-02		0.1	18
	27-Feb-02		0.1	18
	28-Feb-02		0.1	12
	1-Mar-02		0.1	12
9	23-Feb-02	ALUVA WTP FILTERED WATER UNIT-2	0.1	16
	24-Feb-02		0.1	16
	25-Feb-02		0.1	15
	26-Feb-02		0.1	18
	27-Feb-02		0.1	16
	28-Feb-02		0.1	14
	1-Mar-02		0.1	14
10	23-Feb-02	ALUVA WTP FILTERED WATER UNIT-3	0.1	19
	24-Feb-02		0.1	17
	25-Feb-02		0.1	16
	26-Feb-02		0.1	16
	27-Feb-02		0.1	19
	28-Feb-02		0.1	16
	1-Mar-02		0.1	16
11	23-Feb-02	ALUVA WTP FILTERED WATER UNIT-4	0.1	18
	24-Feb-02		0.1	18
	25-Feb-02		0.1	19
	26-Feb-02		0.1	18
	27-Feb-02		0.1	18
	28-Feb-02		0.1	14
	1-Mar-02		0.1	14

ND : Not detected

Nil : Absent

- : Not done

City : Kochi

Table 12.3 : Water Quality - Reservoir : MBR & ESR - Winter

Sl. No.	Sampling Date	Sampling Point	Sample ID No.	Temp (°C)	pH	Turb (NTU)	Cond (S/cm)	TDS (mg/L)	TAK (mg/L)	T-Hard (mg/L)	Ca (mg/L)	Mg (mg/L)	Cl (mg/L)	SO ₄ (mg/L)	NO ₃ (mg/L)	PO ₄ (mg/L)	F (mg/L)	Na (mg/L)	K (mg/L)	DO (mg/L)	COD (mg/L)	Phenol (mg/L)	Fe (mg/L)	Mn (mg/L)	Cu (mg/L)	Cd (mg/L)	Cr (mg/L)	Pb (mg/L)	Zn (mg/L)	As (mg/L)	Res.Cl (mg/L)	TC (CFU/100ml)	FC (CFU/100ml)			
1	23-Feb-02	Aluva WTP- Raw Water-1	100	30.1	6.9	5	42	29.6	16	20	10	10	31	15	-	-	0.32	4.4	0.9	-	-	0	0.08	ND	0.03	ND	ND	ND	ND	ND	ND	ND	0	120	30	
	24-Feb-02			30	6.5	4	45	30	15	20	11	9	33	14	-	-	-	0.34	4.6	0.9	-	-	0	0.06	ND	0.02	ND	ND	ND	ND	ND	ND	ND	0	200	50
	25-Feb-02			31	6.9	4	40.7	28.5	14	20	10	30	20	-	-	-	0.36	4.4	0.9	-	-	0	0.12	ND	0.03	ND	ND	ND	ND	ND	ND	ND	ND	0	102	40
	26-Feb-02			30	6.9	5	42.2	29.8	18	20	10	10	38	18	-	-	-	0.31	4.3	0.9	-	-	0	0.07	ND	0.03	ND	ND	ND	ND	ND	ND	ND	0	100	20
	27-Feb-02			31	7	5	41.2	34.6	18	20	10	10	31	15	-	-	-	0.32	4.4	0.9	-	-	0	0.1	ND	0.03	ND	ND	ND	ND	ND	ND	ND	0	90	30
	28-Feb-02			31	7	5	42.5	37.6	20	20	10	10	28	16	-	-	-	0.41	4.5	3	-	-	0	0.04	ND	0.02	ND	ND	ND	ND	ND	ND	ND	0	105	30
	1-Mar-02			30	6.8	6	36.7	30.1	14	18	10	8	31	19	-	-	-	0.38	5.2	1.4	-	-	0	0.04	ND	0.02	ND	ND	ND	ND	ND	ND	ND	0	120	40
	24-Feb-02			29	6.5	5	37	35	16	20	12	8	32	12	-	-	-	0.32	4.3	0.9	-	-	0	0.31	0.01	0.03	ND	ND	ND	ND	ND	ND	ND	0	60	40
2	23-Feb-02	Aluva WTP- Raw Water-2	101	31	6.8	4	35.9	39.4	14	19	10	9	28	18	-	-	-	0.33	4.4	0.9	-	-	0	0.2	ND	0.03	ND	ND	ND	ND	ND	ND	ND	0	50	15
	24-Feb-02			30	6.9	4	36.2	30.8	16	24	14	10	36	20	-	-	-	0.32	4.2	0.9	-	-	0	0.19	ND	0.03	ND	ND	ND	ND	ND	ND	ND	0	75	28
	25-Feb-02			30	6.9	5	35.7	29.1	18	18	10	8	31	19	-	-	-	0.33	4.2	0.9	-	-	0	0.12	ND	0.03	ND	ND	ND	ND	ND	ND	ND	0	80	25
	26-Feb-02			30.5	7	5	36.6	29.1	18	18	10	8	26	14	-	-	-	0.38	4.3	0.9	-	-	0	0.1	ND	0.03	ND	ND	ND	ND	ND	ND	ND	0	75	18
	27-Feb-02			30.5	7	5	38.5	30.6	18	18	10	8	26	14	-	-	-	0.38	4.3	0.9	-	-	0	0.12	ND	0.03	ND	ND	ND	ND	ND	ND	ND	0	80	20
	28-Feb-02			29.9	6.8	5	37.1	33.7	15	20	10	10	32	17.5	-	-	-	0.35	4.4	0.9	-	-	0	0.21	ND	0.03	ND	ND	ND	ND	ND	ND	ND	0	80	39
	23-Feb-02			29	6.6	5	38	37	14	18	10	8	31	17	-	-	-	0.33	5.2	1.1	-	-	0	0.51	0.02	0.03	ND	ND	ND	ND	ND	ND	ND	0	200	120
	24-Feb-02			30	6.8	4	37.2	33.6	13	22	10	12	29	18.5	-	-	-	0.36	4.3	0.9	-	-	0	0.32	0.01	0.03	ND	ND	ND	ND	ND	ND	ND	0	70	30
3	23-Feb-02	Aluva WTP- Raw Water-3	102	30	6.8	7	38.1	33.1	15	22	10	12	34	16	-	-	-	0.31	4.2	0.9	-	-	0	0.41	0.01	0.03	ND	ND	ND	ND	ND	ND	ND	0	90	32
	24-Feb-02			30.5	6.9	5	39.1	32.7	16	20	10	10	32	17.5	-	-	-	0.35	4.4	0.9	-	-	0	0.33	0.03	0.02	ND	ND	ND	ND	ND	ND	ND	0	105	30
	25-Feb-02			30	6.9	5	42.4	33.5	18	18	10	8	28	14	-	-	-	0.39	4.4	1.2	-	-	0	0.18	ND	0.02	ND	ND	ND	ND	ND	ND	ND	0	100	30
	26-Feb-02			30	6.9	5	42.4	33.5	18	18	10	8	28	14	-	-	-	0.36	4.4	0.9	-	-	0	0.35	0.02	0.02	ND	ND	ND	ND	ND	ND	ND	0	75	30
	27-Feb-02			29.8	6.9	0.1	45.6	36.5	16	14	10	4	18	14	-	-	-	0.28	4.8	1.1	-	-	0	0.12	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	0	0
	28-Feb-02			29	6.8	0.1	46	35	16	14	10	4	16	13	-	-	-	0.24	4.5	1.1	-	-	0	0.09	0.01	ND	ND	ND	ND	ND	ND	ND	ND	2	0	0
	23-Feb-02			29	7.1	0.1	44.9	35.5	14	16	10	6	19	17	-	-	-	0.29	4.8	1.1	-	-	0	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	0	0
	24-Feb-02			30	6.9	0.1	45.9	35.9	14	14	10	4	18	14	-	-	-	0.26	6.4	2.1	-	-	0	0.76	0.01	ND	ND	ND	ND	ND	ND	ND	ND	2	0	0
4	23-Feb-02	Aluva WTP- Chlorinated- Plant-1	103	30	6.9	0.1	39.6	31.4	16	14	10	4	18	14	-	-	-	0.28	4.6	1.2	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	0	0
	24-Feb-02			30	6.8	0.1	41.6	32.8	16	14	10	4	16	12	-	-	-	0.31	5	1.3	-	-	0	0.17	0.03	ND	ND	ND	ND	ND	ND	ND	ND	2	0	0
	25-Feb-02			30.5	6.9	0.1	43.6	34.3	16	14	10	4	16	12	-	-	-	0.29	4.6	1.1	-	-	0	ND	0.01	ND	ND	ND	ND	ND	ND	ND	ND	2	0	0
	26-Feb-02			29.9	6.9	0.1	45.8	36.7	14	18	10	8	17	14	-	-	-	0.28	4.2	0.9	-	-	0	0.14	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.5	0	0
	27-Feb-02			29	6.9	0.1	47	37	14	18	11	7	17	12	-	-	-	0.27	4.3	0.9	-	-	0	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.5	0	0
	28-Feb-02			30	6.9	0.1	44.8	36.3	13	20	10	10	18	16	-	-	-	0.26	4.3	1	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	0	0
	23-Feb-02			30	6.6	0.1	45.1	35.7	14	16	10	6	18	14	-	-	-	0.26	5	0.9	-	-	0	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.5	0	0
	24-Feb-02			30.5	6.9	0.1	40.6	32.6	18	18	10	8	17	14	-	-	-	0.28	4	0.8	-	-	0	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	0	0
5	23-Feb-02	Aluva WTP- Chlorinated- Plant-2	104	30.5	6.9	0.1	40.2	32.2	16	16	10	6	16	10	-	-	-	0.29	4.7	0.9	-	-	0	0.23	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	0	0
	24-Feb-02			30.5	7.1	0.1	41.4	33.4	16	16	10	6	16	10	-	-	-	0.29	4.9	1	-	-	0	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	0	0
	25-Feb-02			29.9	6.9	0.1	42.1	33.7	12	18	12	6	18	13	-	-	-	0.3	4.3	1	-	-	0	ND	0.01	ND	ND	ND	ND	ND	ND	ND	ND	1.5	0	0
	26-Feb-02			29	6.8	0.1	45	37	12	18	10	8	20	13	-	-	-	0.31	4.2	1	-	-	0	0.25	0.02	ND	ND	ND	ND	ND	ND	ND	ND	1.5	0	0
	27-Feb-02			29	6.9	0.1	42.7	37.3	12	18	10	8	17	18	-	-	-	0.31	4.5	1	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	0	0
	28-Feb-02			30.5	6.8	0.1	42.8	32.7	12	16	12	4	18	15	-	-	-	0.28	4	0.9	-	-	0	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.5	0	0
	23-Feb-02			30	6.8	0.1	38.1	30.7	16	18	12	6	18	13	-	-	-	0.3	4.8	1	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	0	0
	24-Feb-02			30	6.8	0.1	38.4	31.2	14	16	12	4	18	14	-	-	-	0.33	4.6	1	-	-	0	ND	0.01	ND	ND	ND	ND	ND	ND	ND	ND	0.07	0.05	2
6	23-Feb-02	Aluva WTP- Chlorinated- Plant-3&4	105	30.5	7	0.1	39.1	32	16	14	10	4	18	14	-	-	-	0.3	4	1	-	-	0	0.11	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	0	0
	1-Mar-02																																			

ND : Not detected Nil : Absent - : Not done

Table 12.4 : Water Quality - Consumer Ends - Winter

City : Kochi

Sl. No.	Sampling Date	Location	Res.Cl (mg/L)	TC (CFU/100ml)	FC (CFU/100ml)
1	23-Feb-02	KARIPPALAM-03	Nil	0	0
	24-Feb-02		Nil	0	0
	25-Feb-02		Nil	0	0
	26-Feb-02		Nil	0	0
	27-Feb-02		Nil	0	0
	28-Feb-02		Nil	0	0
	1-Mar-02		Nil	0	0
2	23-Feb-02	MATTANCHERY-04	Nil	10	8
	24-Feb-02		Nil	15	3
	25-Feb-02		Nil	200	50
	26-Feb-02		Nil	23	9
	27-Feb-02		Nil	35	10
	28-Feb-02		Nil	40	20
	1-Mar-02		Nil	50	10
3	23-Feb-02	CHIRALAI-05	Nil	0	0
	24-Feb-02		Nil	0	0
	25-Feb-02		Nil	0	0
	26-Feb-02		Nil	0	0
	27-Feb-02		Nil	0	0
	28-Feb-02		Nil	0	0
	1-Mar-02		Nil	0	0
4	23-Feb-02	KOCHANGADI -06	Nil	70	40
	24-Feb-02		Nil	8	4
	25-Feb-02		Nil	0	0
	26-Feb-02		Nil	0	0
	27-Feb-02		Nil	0	0
	28-Feb-02		Nil	0	0
	1-Mar-02		Nil	0	0
5	23-Feb-02	THOPPUMPADY-09	Nil	0	0
	24-Feb-02		Nil	0	0
	25-Feb-02		0.2	0	0
	26-Feb-02		Nil	0	0
	27-Feb-02		Nil	0	0
	28-Feb-02		Nil	0	0
	1-Mar-02		Nil	0	0
6	23-Feb-02	THAREBHAGAM- 10	Nil	20	14
	24-Feb-02		Nil	0	0
	25-Feb-02		Nil	20	9
	26-Feb-02		Nil	3	0
	27-Feb-02		Nil	0	0
	28-Feb-02		Nil	0	0
	1-Mar-02		0.2	0	0

Contd....

...Contd. Table 12.4

Sl. No.	Sampling Date	Location	Res.Cl (mg/L)	TC (CFU/100ml)	FC (CFU/100ml)
7	23-Feb-02	KADEBHAGAM -11	0.2	0	0
	24-Feb-02		0.2	0	0
	25-Feb-02		0.2	0	0
	26-Feb-02		0.2	0	0
	27-Feb-02		0.2	0	0
	28-Feb-02		0.2	0	0
	1-Mar-02		0.2	0	0
8	23-Feb-02	PERUMPADAPPU -15	0.2	0	0
	24-Feb-02		0.2	0	0
	25-Feb-02		0.2	0	0
	26-Feb-02		0.2	0	0
	27-Feb-02		0.2	0	0
	28-Feb-02		0.2	0	0
	1-Mar-02		Nil	0	0
9	23-Feb-02	MUNDAMVELI - 20	Nil	0	0
	24-Feb-02		Nil	0	0
	25-Feb-02		Nil	0	0
	26-Feb-02		Nil	0	0
	27-Feb-02		Nil	0	0
	28-Feb-02		Nil	0	0
	1-Mar-02		Nil	0	0
10	23-Feb-02	NAZRETH - 23	Nil	0	0
	24-Feb-02		Nil	0	0
	25-Feb-02		Nil	0	0
	26-Feb-02		Nil	0	0
	27-Feb-02		Nil	0	0
	28-Feb-02		Nil	0	0
	1-Mar-02		Nil	0	0
11	23-Feb-02	WELLINGTON ISLAND - 26	Nil	0	0
	24-Feb-02		Nil	0	0
	25-Feb-02		Nil	40	20
	26-Feb-02		Nil	0	0
	27-Feb-02		Nil	0	0
	28-Feb-02		Nil	0	0
	1-Mar-02		Nil	0	0
12	23-Feb-02	VADUTHALA WEST - 27	Nil	64	40
	24-Feb-02		Nil	0	0
	25-Feb-02		Nil	0	0
	26-Feb-02		Nil	0	0
	27-Feb-02		Nil	0	0
	28-Feb-02		Nil	0	0
	1-Mar-02		Nil	0	0

Contd....

...Contd. Table 12.4

Sl. No.	Sampling Date	Location	Res.Cl (mg/L)	TC (CFU/100ml)	FC (CFU/100ml)
13	23-Feb-02	KUNNUMPURAM- 32	Nil	0	0
	24-Feb-02		Nil	0	0
	25-Feb-02		Nil	0	0
	26-Feb-02		Nil	0	0
	27-Feb-02		Nil	0	0
	28-Feb-02		Nil	0	0
	1-Mar-02		Nil	0	0
14	23-Feb-02	EDAPALLY - 33	Nil	70	50
	24-Feb-02		Nil	0	0
	25-Feb-02		Nil	0	0
	26-Feb-02		Nil	0	0
	27-Feb-02		Nil	0	0
	28-Feb-02		Nil	0	0
	1-Mar-02		0.2	0	0
15	23-Feb-02	DEVAN KULANGARA - 34	0.2	0	0
	24-Feb-02		0.2	0	0
	25-Feb-02		0.2	0	0
	26-Feb-02		0.2	0	0
	27-Feb-02		0.2	0	0
	28-Feb-02		0.2	0	0
	1-Mar-02		Nil	0	0
16	23-Feb-02	KARUKAPALLI - 36	Nil	100	49
	24-Feb-02		Nil	0	0
	25-Feb-02		Nil	0	0
	26-Feb-02		Nil	0	0
	27-Feb-02		Nil	0	0
	28-Feb-02		Nil	0	0
	1-Mar-02		Nil	0	0
17	23-Feb-02	PALARIVATTOM - 40	Nil	0	0
	24-Feb-02		Nil	0	0
	25-Feb-02		Nil	0	0
	26-Feb-02		Nil	0	0
	27-Feb-02		Nil	0	0
	28-Feb-02		Nil	0	0
	1-Mar-02		Nil	0	0
18	23-Feb-02	INTERNATIONAL STADIUM - 41	Nil	80	30
	24-Feb-02		Nil	0	0
	25-Feb-02		Nil	0	0
	26-Feb-02		Nil	0	0
	27-Feb-02		Nil	0	0
	28-Feb-02		Nil	0	0
	1-Mar-02		Nil	0	0

Contd....

...Contd. Table 12.4

Sl. No.	Sampling Date	Location	Res.Cl (mg/L)	TC (CFU/100ml)	FC (CFU/100ml)
19	23-Feb-02	ELAMKULAM - 43	Nil	0	0
	24-Feb-02		Nil	120	70
	25-Feb-02		Nil	0	0
	26-Feb-02		Nil	0	0
	27-Feb-02		Nil	0	0
	28-Feb-02		Nil	0	0
	1-Mar-02		Nil	0	0
20	23-Feb-02	POONITHURA -47	0.2	0	0
	24-Feb-02		0.2	0	0
	25-Feb-02		0.2	0	0
	26-Feb-02		0.2	0	0
	27-Feb-02		0.2	0	0
	28-Feb-02		0.2	0	0
	1-Mar-02		0.2	0	0
21	23-Feb-02	KADAVANTHRA - 51	Nil	0	0
	24-Feb-02		Nil	0	0
	25-Feb-02		Nil	51	40
	26-Feb-02		Nil	0	0
	27-Feb-02		Nil	0	0
	28-Feb-02		Nil	0	0
	1-Mar-02		Nil	0	0
22	23-Feb-02	THEVARA - 53	Nil	0	0
	24-Feb-02		Nil	0	0
	25-Feb-02		Nil	120	100
	26-Feb-02		Nil	0	0
	27-Feb-02		Nil	0	0
	28-Feb-02		Nil	0	0
	1-Mar-02		Nil	0	0
23	23-Feb-02	GANDHI NAGAR - 56	Nil	0	0
	24-Feb-02		Nil	0	0
	25-Feb-02		Nil	0	0
	26-Feb-02		Nil	0	0
	27-Feb-02		Nil	0	0
	28-Feb-02		Nil	0	0
	1-Mar-02		Nil	0	0
24	23-Feb-02	ERNAKULAM SOUTH -57	Nil	70	60
	24-Feb-02		Nil	0	0
	25-Feb-02		Nil	0	0
	26-Feb-02		Nil	0	0
	27-Feb-02		Nil	0	0
	28-Feb-02		Nil	0	0
	1-Mar-02		Nil	0	0

Contd....

...Contd. Table 12.4

Sl. No.	Sampling Date	Location	Res.Cl (mg/L)	TC (CFU/100ml)	FC (CFU/100ml)
25	23-Feb-02	KTHRIKADAVU - 60	Nil	90	50
	24-Feb-02		Nil	70	51
	25-Feb-02		Nil	0	0
	26-Feb-02		Nil	0	0
	27-Feb-02		Nil	0	0
	28-Feb-02		Nil	0	0
	1-Mar-02		Nil	0	0
26	23-Feb-02	KALOOR SOUTH - 61	Nil	0	0
	24-Feb-02		Nil	0	0
	25-Feb-02		Nil	0	0
	26-Feb-02		Nil	0	0
	27-Feb-02		Nil	0	0
	28-Feb-02		Nil	0	0
	1-Mar-02		Nil	0	0
27	23-Feb-02	KALOOR NORTH - 62	Nil	110	50
	24-Feb-02		Nil	10	2
	25-Feb-02		Nil	0	0
	26-Feb-02		Nil	0	0
	27-Feb-02		Nil	0	0
	28-Feb-02		Nil	0	0
	1-Mar-02		Nil	0	0
28	23-Feb-02	THRIKANARVATTOM - 63	Nil	28	11
	24-Feb-02		Nil	7	4
	25-Feb-02		Nil	0	0
	26-Feb-02		Nil	0	0
	27-Feb-02		Nil	0	0
	28-Feb-02		Nil	0	0
	1-Mar-02		Nil	0	0
29	23-Feb-02	PACHALAM - 65	Nil	0	0
	24-Feb-02		Nil	0	0
	25-Feb-02		Nil	0	0
	26-Feb-02		Nil	0	0
	27-Feb-02		Nil	0	0
	28-Feb-02		Nil	0	0
	1-Mar-02		Nil	0	0
30	23-Feb-02	THATTAZHAM - 66	Nil	65	31
	24-Feb-02		Nil	0	0
	25-Feb-02		Nil	0	0
	26-Feb-02		Nil	0	0
	27-Feb-02		Nil	0	0
	28-Feb-02		Nil	0	0
	1-Mar-02		Nil	0	0

Nil : Absent

Table 12.5 : Water Quality of Treatment Plants - Summer

City : Kochi

Sl. No.	Sampling Date	Sample ID No.	Sampling Point	Temp (°C)	pH	Turb (NTU)	Cond (S/cm)	TDS (mg/L)	T.A.K (mg/L)	T.Hard (mg/L)	Ca (mg/L)	Mg (mg/L)	Cl (mg/L)	SO ₄ (mg/L)	NO ₃ (mg/L)	PO ₄ (mg/L)	F (mg/L)	Na (mg/L)	K (mg/L)	DO (mg/L)	COD Phenol (mg/L)	Fe (mg/L)	Mn (mg/L)	Cu (mg/L)	Cd (mg/L)	Cr (mg/L)	Pb (mg/L)	Zn (mg/L)	As (mg/L)	Res.Cl (mg/L)	TC (CFU/100ml)	EC (µS/cm)			
1	15-Apr-02	100	Aluva WTP	30	7.39	8.0	23	18	16	10	10	0	14	14	-	-	0.3	2.8	1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	0	250	200
2		101	Aluva WTP	31	7.28	11.0	25	20	16	20	10	10	16	14	-	-	0.3	2.8	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	0	110	78
3		102	Raw Water-2	31	7.35	9.0	23	19	20	18	12	6	13	13	-	-	0.3	2.5	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	0	60	40
4		103	Aluva WTP	30	7.28	0.8	29	23	16	18	14	4	16	15	-	-	0.3	2.5	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0	0
5	16-Apr-02	104	Chlorinated-Plant-1	31	7.3	0.8	29	23	18	16	10	6	15	14	-	-	0.3	2.5	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	1.5	0	0
6		105	Aluva WTP	30	7.29	0.9	28	23	16	16	10	6	10	15	-	-	0.3	2.5	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	0	0
7		100	Raw Water-1	30	7.27	10.0	22	18	14	14	10	4	13	15	-	-	0.4	4.5	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	0	205	178
8		101	Aluva WTP	30	7.27	9.0	23	18	14	12	10	2	17	14	-	-	0.3	2.5	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	0	180	110
9	17-Apr-02	102	Raw Water-2	30	7.28	9.0	23	18	16	12	8	4	12	14	-	-	0.3	2.5	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	0	75	36
10		103	Raw Water-3	30	7.27	0.8	27	21	20	16	12	4	11	18	-	-	0.3	2.5	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0	0
11		104	Chlorinated-Plant-1	30	7.27	1.0	27	21	18	14	8	6	9	18	-	-	0.3	2.5	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	0	0
12		105	Chlorinated-Plant-2	30	7.32	0.8	25	20	18	12	10	2	11	17	-	-	0.3	2.8	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	1.5	0	0
13	17-Apr-02	100	Aluva WTP	30	7.3	10.0	23	18	14	14	10	4	13	12	-	-	0.4	4.8	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	0	220	113
14		101	Aluva WTP	30	7.23	11.0	21	17	20	16	6	10	13	13	-	-	0.3	2.8	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	0	200	110
15		102	Aluva WTP	30	7.33	8.0	21	17	16	12	6	6	15	14	-	-	0.4	2.8	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	0	105	78
16		103	Raw Water-3	30	7.29	0.8	28	22	20	14	8	6	16	15	-	-	0.3	2.8	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	1.5	0	0
17	18-Apr-02	104	Aluva WTP	30	7.28	0.6	26	21	20	16	10	6	15	16	-	-	0.3	2.5	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0	0
18		105	Aluva WTP	30	7.29	0.6	25	20	20	16	8	8	22	15	-	-	0.3	2.8	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0	0
19		100	Aluva WTP	30	7.3	10.0	24	20	16	16	8	8	14	12	-	-	0.3	2.5	0.6	-	-	-	-	-	-	-	-	-	-	-	-	0	205	118	
20		101	Raw Water-1	30	7.24	12.0	22	18	20	16	10	6	16	14	-	-	0.3	3.0	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	0	150	100
21	20-Apr-02	102	Aluva WTP	30	7.33	10.0	21	17	18	16	8	8	14	12	-	-	0.3	2.5	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	0	98	60
22		103	Raw Water-3	30	7.29	0.8	27	22	20	18	8	10	16	16	-	-	0.3	2.5	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	2	0	0
23		104	Aluva WTP	30	7.28	0.6	26	20	18	16	10	6	16	16	-	-	0.3	2.5	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	1.5	0	0
24		105	Chlorinated-Plant-2	31	7.3	0.6	24	19	16	16	8	8	14	16	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	0	0
25	18-Apr-02	100	Aluva WTP	30	7.39	12.0	25	18	16	14	8	6	16	16	-	-	0.4	3.0	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	0	180	65
26		101	Aluva WTP	31	7.28	10.0	23	19	16	12	6	6	18	14	-	-	0.4	2.5	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	0	230	170
27		102	Raw Water-2	31	7.32	10.0	22	18	16	14	8	6	16	14	-	-	0.4	2.5	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	0	98	55
28		103	Aluva WTP	30	7.2	0.8	27	22	18	16	8	8	16	18	-	-	0.3	2.8	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	1.5	0	0
29	29-Apr-02	104	Chlorinated-Plant-1	31	7.05	0.6	26	22	16	14	8	6	16	16	-	-	0.3	2.5	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	2	0	0
ND			Chlorinated-Plant-2												-	-	0.3	2.5	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	

ND : Not detected
- : Not done

Table 12.6 : Water Quality - Treatment Stages - Summer

City : Kochi

Sl. No.	Sampling Date	Source	Turbidity (NTU)	Sulphate (mg/L)
1	15-Apr-02	ALUVA WTP SETTLED WATER CLARIFIER-	3	18
2		ALUVA WTP SETTLED WATER CLARIFIER-	3.2	16
3		ALUVA WTP SETTLED WATER CLARIFIER-	3.5	18
4		ALUVA WTP SETTLED WATER CLARIFIER-	3	16
5		ALUVA WTP SETTLED WATER CLARIFIER-	2.8	16
6		ALUVA WTP SETTLED WATER CLARIFIER-	3	15
7		ALUVA WTP SETTLED WATER CLARIFIER-	2	15
8		ALUVA WTP FILTERED WATERUNIT-1	0.8	12
9		ALUVA WTP FILTERED WATER UNIT-2	0.8	12
10		ALUVA WTP FILTERED WATER UNIT-3	1	16
11		ALUVA WTP FILTERED WATER UNIT-4	0.8	16
12	16-Apr-02	ALUVA WTP SETTLED WATER CLARIFIER-	3	16
13		ALUVA WTP SETTLED WATER CLARIFIER-	3	20
14		ALUVA WTP SETTLED WATER CLARIFIER-	3	18
15		ALUVA WTP SETTLED WATER CLARIFIER-	2.5	16
16		ALUVA WTP SETTLED WATER CLARIFIER-	3	16
17		ALUVA WTP SETTLED WATER CLARIFIER-	2	18
18		ALUVA WTP SETTLED WATER CLARIFIER-	2.5	20
19		ALUVA WTP FILTERED WATERUNIT-1	0.5	16
20		ALUVA WTP FILTERED WATER UNIT-2	0.5	16
21		ALUVA WTP FILTERED WATER UNIT-3	0.5	18
22		ALUVA WTP FILTERED WATER UNIT-4	0.5	18
23	17-Apr-02	ALUVA WTP SETTLED WATER CLARIFIER-	3	16
24		ALUVA WTP SETTLED WATER CLARIFIER-	3	18
25		ALUVA WTP SETTLED WATER CLARIFIER-	3	20
26		ALUVA WTP SETTLED WATER CLARIFIER-	2.5	18
27		ALUVA WTP SETTLED WATER CLARIFIER-	3	16
28		ALUVA WTP SETTLED WATER CLARIFIER-	2.5	18
29		ALUVA WTP SETTLED WATER CLARIFIER-	2	18
30		ALUVA WTP FILTERED WATERUNIT-1	0.5	16
31		ALUVA WTP FILTERED WATER UNIT-2	0.5	16
32		ALUVA WTP FILTERED WATER UNIT-3	0.5	16
33		ALUVA WTP FILTERED WATER UNIT-4	0.5	16

...Contd. Table 12.6

Sl. No.	Sampling Date	Source	Turbidity (NTU)	Sulphate (mg/L)
34	18-Apr-02	ALUVA WTP SETTLED WATER CLARIFIER-	3	18
35		ALUVA WTP SETTLED WATER CLARIFIER-	3.5	18
36		ALUVA WTP SETTLED WATER CLARIFIER-	4	20
37		ALUVA WTP SETTLED WATER CLARIFIER-	3	16
38		ALUVA WTP SETTLED WATER CLARIFIER-	3.5	16
39		ALUVA WTP SETTLED WATER CLARIFIER-	2.5	18
40		ALUVA WTP SETTLED WATER CLARIFIER-	2	18
41		ALUVA WTP FILTERED WATER UNIT-1	0.5	16
42		ALUVA WTP FILTERED WATER UNIT-2	0.5	16
43		ALUVA WTP FILTERED WATER UNIT-3	0.5	16
44		ALUVA WTP FILTERED WATER UNIT-4	0.5	16
45	19-Apr-02	ALUVA WTP SETTLED WATER CLARIFIER-	3	18
46		ALUVA WTP SETTLED WATER CLARIFIER-	2.5	18
47		ALUVA WTP SETTLED WATER CLARIFIER-	3	16
48		ALUVA WTP SETTLED WATER CLARIFIER-	2	16
49		ALUVA WTP SETTLED WATER CLARIFIER-	2.5	18
50		ALUVA WTP SETTLED WATER CLARIFIER-	2	16
51		ALUVA WTP SETTLED WATER CLARIFIER-	2	16
52		ALUVA WTP FILTERED WATER UNIT-1	0.5	18
53		ALUVA WTP FILTERED WATER UNIT-2	0.5	16
54		ALUVA WTP FILTERED WATER UNIT-3	0.5	18
55		ALUVA WTP FILTERED WATER UNIT-4	0.5	18

Table 12.7 : Water Quality - Reservoir : MBR & ESR - Summer

City : Kochi

Sl. No.	Sampling Date	Sample ID No.	Location	Sampling Point	Temp (°C)	pH	Turb (NTU)	Cond (µs/cm)	TDS (mg/L)	TALK (mg/L)	THard (mg/L)	Ca (mg/L)	Mg (mg/L)	Cl (mg/L)	SO ₄ (mg/L)	NO ₃ (mg/L)	PO ₄ (mg/L)	F (mg/L)	Na (mg/L)	K (mg/L)	DO (mg/L)	COD (mg/L)	Phenol (mg/L)	Mn (mg/L)	Cu (mg/L)	Cd (mg/L)	Cr (mg/L)	Pb (mg/L)	Zn (mg/L)	As (mg/L)	ResCl (mg/L)	TC (CFU/100ml)	FC (CFU/100ml)			
1	15-Apr-02	106	Karuvellipaddy Sump	After Chlorination	31.0	7.3	1.2	30.5	24.4	16	16	10	6	12	12	-	-	0.3	2.5	0.5	-	-	0	-	-	-	-	-	-	-	-	0.2	0	0		
2		107	Perumanoor Sump-1	After Chlorination	31.4	7.3	1	31.5	25.3	14	14	8	6	10	13	-	-	0.3	2.8	0.6	-	-	0	-	-	-	-	-	-	-	-	0	-	-		
3		108	Perumanoor Sump-2	After Chlorination	29.9	7.4	1	27.5	22.0	16	16	10	6	15	15	-	-	0.3	2.5	0.6	-	-	0	-	-	-	-	-	-	-	-	0	-	-		
4		109	Thammanam Sump	After Chlorination	29.9	7.3	1.2	27.3	22.0	18	16	8	8	12	15	-	-	0.3	2.5	0.7	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-	
5	16-Apr-02	106	Karuvellipaddy Sump	After Chlorination	30.0	7.3	1.2	28.9	23.2	18	20	16	4	14	18	-	-	-	0.4	2.8	0.5	-	-	0	-	-	-	-	-	-	-	-	1	0	0	
6		107	Perumanoor Sump-1	After Chlorination	30.1	7.4	1.2	28.0	22.4	18	18	10	8	11	18	-	-	-	0.4	2.8	0.6	-	-	0	-	-	-	-	-	-	-	-	0.5	-	-	
7		108	Perumanoor Sump-2	After Chlorination	29.9	7.5	1.2	33.0	26.8	16	18	12	6	11	17	-	-	-	0.4	2.8	0.5	-	-	0	-	-	-	-	-	-	-	-	0.2	-	-	
8		109	Thammanam Sump	After Chlorination	29.9	7.4	1	29.0	19.9	18	24	12	12	10	18	-	-	-	0.4	2.5	0.6	-	-	0	-	-	-	-	-	-	-	-	-	1.5	-	-
9	17-Apr-02	106	Karuvellipaddy Sump	After Chlorination	30.1	7.3	0.9	26.6	21.2	16	18	12	6	19	16	-	-	-	0.3	-	-	-	-	0	-	-	-	-	-	-	-	-	-	0.5	0	0
10		107	Perumanoor Sump-1	After Chlorination	30.2	7.3	0.9	27.3	21.9	16	16	10	6	17	15	-	-	-	0.3	2.5	0.6	-	-	0	-	-	-	-	-	-	-	-	-	1.5	-	-
11		108	Perumanoor Sump-2	After Chlorination	30.0	7.3	1	25.5	20.4	16	16	10	6	16	16	-	-	-	0.3	2.5	0.6	-	-	0	-	-	-	-	-	-	-	-	-	1	-	-
12		109	Thammanam Sump	After Chlorination	30.1	7.3	1	26.0	21.7	16	16	10	6	16	16	-	-	-	0.3	2.5	0.6	-	-	0	-	-	-	-	-	-	-	-	-	1.5	-	-
13	18-Apr-02	106	Karuvellipaddy Sump	After Chlorination	30.2	7.3	0.9	26.2	20.9	18	18	10	8	20	18	-	-	-	0.3	2.8	0.5	-	-	0	-	-	-	-	-	-	-	-	-	0.5	0	0
14		107	Perumanoor Sump-1	After Chlorination	30.2	7.3	0.9	26.1	20.3	18	16	8	8	18	15	-	-	-	0.3	2.5	0.6	-	-	0	-	-	-	-	-	-	-	-	-	1	-	-
15		108	Perumanoor Sump-2	After Chlorination	31.1	7.3	0.9	25.0	19.0	16	16	8	8	18	16	-	-	-	0.3	2.8	0.7	-	-	0	-	-	-	-	-	-	-	-	-	0.5	-	-
16		109	Thammanam Sump	After Chlorination	31.0	7.3	1	24.2	19.8	16	16	8	8	18	15	-	-	-	0.3	2.5	0.6	-	-	0	-	-	-	-	-	-	-	-	-	1	-	-
17	19-Apr-02	106	Karuvellipaddy Sump	After Chlorination	30.8	7.3	0.8	28.9	20.1	18	18	10	8	20	18	-	-	-	0.3	3.0	0.6	-	-	0	-	-	-	-	-	-	-	-	-	0.2	0	0
18		107	Perumanoor Sump-1	After Chlorination	30.4	7	0.8	28.2	21.8	18	18	8	10	18	18	-	-	-	0.3	2.8	0.5	-	-	0	-	-	-	-	-	-	-	-	-	0.5	-	0
19		108	Perumanoor Sump-2	After Chlorination	31.0	7.4	0.8	30.2	25.8	18	16	8	8	18	18	-	-	-	0.3	2.8	0.6	-	-	0	-	-	-	-	-	-	-	-	-	0.2	-	0
20		109	Thammanam Sump	After Chlorination	30.8	7.3	0.8	29.8	20.7	18	18	10	8	18	16	-	-	-	0.3	2.5	0.7	-	-	0	-	-	-	-	-	-	-	-	-	0.5	-	0

ND : Not detected
- : Not done

Table 12.8 : Water Quality - Consumer Ends - Summer

City : Kochi

Sl. No.	Sampling Date	Location	Res.Cl (mg/L)	TC (CFU/100ml)	FC (CFU/100ml)
1	15-Apr-02	KARIPPALAM-03	Nil	0	0
2		MATTANCHERY-04	Nil	38	25
3		CHIRALAI-05	Nil	25	23
4		KOCHANGADI -06	Nil	0	0
5		THOPPUMPADY-09	0.5	0	0
6		THAREBHAGAM- 10	Nil	0	0
7		KADEBHAGAM -11	Nil	100	75
8		PERUMPADAPPU -15	Nil	0	0
9		MUNDAMVELI - 20	Nil	0	0
10		NAZRETH - 23	Nil	224	180
11		WELLINGTON ISLAND - 26	0.2	0	0
12		VADUTHALA WEST - 27	Nil	11	10
13		KUNNUMPURAM- 32	Nil	0	0
14		EDAPALLY - 33	Nil	0	0
15		DEVAN KULANGARA - 34	1.5	0	0
16		KARUKAPALLI - 36	Nil	4	2
17		PALARIVATTOM - 40	Nil	15	10
18		INTERNATIONAL STADIUM - 41	0.2	0	0
19		ELAMKULAM - 43	Nil	55	47
20		POONITHURA -47	0.5	0	0
21		KADAVANTHRA - 51	Nil	81	70
22		THEVARA - 53	Nil	0	0
23		GANDHI NAGAR - 56	Nil	0	0
24		ERNAKULAM SOUTH -57	Nil	0	0
25		KTHRIKADAVU - 60	0.5	0	0
26		KALOOR SOUTH - 61	Nil	0	0
27		KALOOR NORTH - 62	Nil	0	0
28		THRIKANARVATTOM - 63	Nil	150	75
29		PACHALAM - 65	Nil	0	0
30		THATTAZHAM - 66	0.2	0	0
31	16-Apr-02	KARIPPALAM-03	Nil	0	0
32		MATTANCHERY-04	Nil	78	23
33		CHIRALAI-05	Nil	0	0
34		KOCHANGADI -06	Nil	0	0
35		THOPPUMPADY-09	1.3	0	0
36		THAREBHAGAM- 10	Nil	0	0
37		KADEBHAGAM -11	Nil	73	19
38		PERUMPADAPPU -15	0.2	0	0
39		MUNDAMVELI - 20	0.2	0	0
40		NAZRETH - 23	Nil	80	53
41		WELLINGTON ISLAND - 26	0.2	0	0
42		VADUTHALA WEST - 27	Nil	9	7

...Contd. Table 12.8

Sl. No.	Sampling Date	Location	Res.Cl (mg/L)	TC (CFU/100ml)	FC (CFU/100ml)
43	17-Apr-02	KUNNUMPURAM- 32	Nil	0	0
44		EDAPALLY - 33	Nil	0	0
45		DEVAN KULANGARA - 34	Nil	0	0
46		KARUKAPALLI - 36	Nil	60	40
47		PALARIVATTOM - 40	Nil	20	8
48		INTERNATIONAL STADIUM - 41	Nil	0	0
49		ELAMKULAM - 43	Nil	10	5
50		POONITHURA -47	Nil	0	0
51		KADAVANTHRA - 51	Nil	65	48
52		THEVARA - 53	0.2	0	0
53		GANDHI NAGAR - 56	Nil	0	0
54		ERNAKULAM SOUTH -57	Nil	12	8
55		KTHRIKADAVU - 60	Nil	0	0
56		KALOOR SOUTH - 61	Nil	0	0
57		KALOOR NORTH - 62	Nil	0	0
58		THRIKANARVATTOM - 63	Nil	75	48
59		PACHALAM - 65	Nil	32	4
60		THATTAZHAM - 66	Nil	19	15
61		KARIPPALAM-03	Nil	0	0
62		MATTANCHERY-04	Nil	48	32
63		CHIRALAI-05	Nil	40	20
64		KOCHANGADI -06	Nil	0	0
65		THOPPUMPADY-09	1.3	0	0
66		THAREBHAGAM- 10	0.5	0	0
67		KADEBHAGAM -11	Nil	0	0
68		PERUMPADAPPU -15	Nil	0	0
69		MUNDAMVELI - 20	0.2	0	0
70		NAZRETH - 23	0.5	0	0
71		WELLINGTON ISLAND - 26	Nil	0	0
72		VADUTHALA WEST - 27	Nil	13	11
73		KUNNUMPURAM- 32	Nil	0	0
74		EDAPALLY - 33	Nil	0	0
75		DEVAN KULANGARA - 34	Nil	0	0
76		KARUKAPALLI - 36	Nil	0	0
77		PALARIVATTOM - 40	Nil	10	5
78		INTERNATIONAL STADIUM - 41	Nil	0	0
79		ELAMKULAM - 43	Nil	0	0
80		POONITHURA -47	Nil	0	0
81		KADAVANTHRA - 51	Nil	7	4
82		THEVARA - 53	0.2	0	0
83		GANDHI NAGAR - 56	Nil	0	0
84		ERNAKULAM SOUTH -57	Nil	10	5
85		KTHRIKADAVU - 60	Nil	0	0
86		KALOOR SOUTH - 61	0.2	0	0

...Contd. Table 12.8

Sl. No.	Sampling Date	Location	Res.Cl (mg/L)	TC (CFU/100ml)	FC (CFU/100ml)
87	18-Apr-02	KALOOR NORTH - 62	0.5	0	0
88		THRIKANARVATTOM - 63	Nil	74	38
89		PACHALAM - 65	Nil	22	8
90		THATTAZHAM - 66	Nil	0	0
91		KARIPPALAM-03	Nil	0	0
92		MATTANCHERY-04	Nil	40	15
93		CHIRALAI-05	Nil	0	0
94		KOCHANGADI -06	Nil	0	0
95		THOPPUMPADY-09	Nil	0	0
96		THAREBHAGAM- 10	Nil	0	0
97		KADEBHAGAM -11	Nil	20	10
98		PERUMPADAPPU -15	0.2	0	0
99		MUNDAMVELI - 20	Nil	0	0
100		NAZRETH - 23	Nil	0	0
101		WELLINGTON ISLAND - 26	Nil	0	0
102		VADUTHALA WEST - 27	Nil	10	5
103		KUNNUMPURAM- 32	Nil	0	0
104		EDAPALLY - 33	Nil	0	0
105		DEVAN KULANGARA - 34	0.2	0	0
106		KARUKAPALLI - 36	Nil	0	0
107		PALARIVATTOM - 40	Nil	8	3
108		INTERNATIONAL STADIUM - 41	Nil	0	0
109		ELAMKULAM - 43	Nil	0	0
110		POONITHURA -47	0.2	0	0
111		KADAVANTHRA - 51	Nil	18	10
112		THEVARA - 53	Nil	0	0
113		GANDHI NAGAR - 56	Nil	0	0
114		ERNAKULAM SOUTH -57	Nil	0	0
115		KTHRIKADAVU - 60	Nil	0	0
116		KALOOR SOUTH - 61	Nil	0	0
117		KALOOR NORTH - 62	Nil	0	0
118		THRIKANARVATTOM - 63	Nil	30	15
119		PACHALAM - 65	Nil	0	0
120		THATTAZHAM - 66	Nil	0	0
121	19-Apr-02	KARIPPALAM-03	Nil	0	0
122		MATTANCHERY-04	Nil	55	36
123		CHIRALAI-05	Nil	0	0
124		KOCHANGADI -06	Nil	0	0
125		THOPPUMPADY-09	Nil	0	0
126		THAREBHAGAM- 10	Nil	0	0
127		KADEBHAGAM -11	Nil	0	0
128		PERUMPADAPPU -15	Nil	0	0
129		MUNDAMVELI - 20	Nil	0	0
130		NAZRETH - 23	Nil	0	0
131		WELLINGTON ISLAND - 26	Nil	0	0

...Contd. Table 12.8

Sl. No.	Sampling Date	Location	Res.Cl (mg/L)	TC (CFU/100ml)	FC (CFU/100ml)
132		VADUTHALA WEST - 27	Nil	2	0
133		KUNNUMPURAM- 32	Nil	0	0
134		EDAPALLY - 33	Nil	0	0
135		DEVAN KULANGARA - 34	0.2	0	0
136		KARUKAPALLI - 36	Nil	0	0
137		PALARIVATTOM - 40	Nil	5	2
138		INTERNATIONAL STADIUM - 41	Nil	0	0
139		ELAMKULAM - 43	Nil	0	0
140		POONITHURA -47	0.2	0	0
141		KADAVANTHRA - 51	Nil	6	3
142		THEVARA - 53	Nil	0	0
143		GANDHI NAGAR - 56	Nil	0	0
144		ERNAKULAM SOUTH -57	Nil	0	0
145		KTHRIKADAVU - 60	Nil	0	0
146		KALLOOR SOUTH - 61	Nil	0	0
147		KALLOOR NORTH - 62	Nil	0	0
148		THRIKANARVATTOM - 63	Nil	52	23
149		PACHALAM - 65	Nil	0	0
150		THATTAZHAM - 66	Nil	0	0

Nil :
Absent

Table 12.9 : Water Quality of Treatment Plant - Monsoon

City : Kochi

Sl No	Sampling Date	Sample ID No.	Sampling Point	Temp (°C)	pH	Turb (NTU)	Cond (S/cm)	TDS (mg/L)	T.Alk (mg/L)	T-Hard (mg/L)	Ca (mg/L)	Mg (mg/L)	Cl (mg/L)	SO ₄ (mg/L)	NO ₃ (mg/L)	PO ₄ (mg/L)	F (mg/L)	Na (mg/L)	K (mg/L)	DO (mg/L)	COD (mg/L)	Phenol (mg/L)	Fe (mg/L)	Mn (mg/L)	Cd (mg/L)	Cr (mg/L)	Pb (mg/L)	Zn (mg/L)	As (mg/L)	Res.Cl (mg/L)	TC (CFU/100ml)	FC (CFU/100ml)				
1	1-Jul-02	100	Aluva WTP Raw Water-1	28	6.80	8	54	43	4	16	8	8	14	3	-	-	-	0.30	4.8	1.3	-	-	-	0	0.11	ND	ND	ND	ND	0.01	ND	0	18	17		
	2-Jul-02			28	6.85	10	59	47	4	18	10	8	15	3	-	-	-	0.15	4.5	1.3	-	-	-	0	0.83	0.15	ND	ND	ND	ND	0.05	ND	0	41	30	
	3-Jul-02			28	6.75	9	71	57	4	18	16	2	10	3	-	-	-	-	0.15	4.3	1.2	-	-	-	0	0.57	0.03	ND	ND	ND	ND	0.11	ND	0	90	15
	4-Jul-02			28	6.68	8	51	41	4	16	12	4	15	4	-	-	-	-	0.30	4.3	1.1	-	-	-	0	0.30	0.02	ND	ND	ND	ND	0.02	ND	0	55	52
	5-Jul-02			28	6.90	8	59	47	4	16	10	6	15	3	-	-	-	-	0.15	4.5	1.0	-	-	-	0	0.09	0.03	ND	ND	ND	ND	0.06	ND	0	4	2
	6-Jul-02			28	6.85	10	71	43	4	18	10	8	10	4	-	-	-	-	0.15	4.3	1.1	-	-	-	0	0.30	0.02	ND	ND	ND	ND	0.03	ND	0	35	18
	7-Jul-02			28	6.81	9	58	42	4	18	12	6	14	3	-	-	-	-	0.30	4.3	1.1	-	-	-	0	0.02	ND	ND	ND	ND	0.03	ND	0	40	24	
2	1-Jul-02	101	Aluva WTP Raw Water-2	27	6.80	8	46	37	4	14	14	0	14	3	-	-	-	0.25	4.5	1.3	-	-	-	0	0.21	0.02	ND	ND	ND	ND	0.03	ND	0	34	30	
	2-Jul-02			27	6.90	10	47	37	4	22	16	6	14	3	-	-	-	0.30	4.8	1.3	-	-	-	0	0.60	0.01	ND	ND	ND	ND	0.01	ND	0	80	45	
	3-Jul-02			28	6.95	10	47	38	4	14	12	2	12	3	-	-	-	0.25	4.8	1.3	-	-	-	0	0.50	0.01	ND	ND	ND	ND	0.16	ND	0	51	50	
	4-Jul-02			28	6.85	10	46	37	4	22	12	10	13	3	-	-	-	0.30	5.8	1.7	-	-	-	0	0.35	0.01	ND	ND	ND	ND	0.03	ND	0	54	50	
	5-Jul-02			28	6.83	10	47	38	4	20	14	6	14	3	-	-	-	-	0.30	4.5	1.3	-	-	-	0	0.22	ND	ND	ND	ND	0.01	ND	0	24	22	
	6-Jul-02			28	6.94	8	47	37	4	16	12	4	13	3	-	-	-	-	0.30	4.3	1.3	-	-	-	0	0.15	ND	ND	ND	ND	0.02	ND	0	42	34	
	7-Jul-02			28	6.90	10	47	37	4	14	10	4	12	3	-	-	-	-	0.30	4.3	1.3	-	-	-	0	0.30	0.01	ND	ND	ND	ND	0.08	ND	0	45	17
3	1-Jul-02	102	Aluva WTP Raw Water-3	27	7.10	8	51	41	6	20	12	8	8	3	-	-	-	0.25	4.3	1.1	-	-	-	0	0.20	0.01	ND	ND	ND	ND	0	18	15	15	15	
	2-Jul-02			27	6.95	7	63	50	4	16	10	6	9	3	-	-	-	0.30	5.8	1.3	-	-	-	0	0.11	ND	ND	ND	ND	0.03	ND	0	80	40		
	3-Jul-02			27	6.98	8	51	40	6	20	12	8	10	4	-	-	-	0.30	4.5	1.3	-	-	-	0	0.17	0.01	ND	ND	ND	ND	0.04	ND	0	62	60	
	4-Jul-02			27	6.96	9	49	39	8	20	10	10	9	3	-	-	-	0.30	4.3	1.4	-	-	-	0	0.36	0.01	ND	ND	ND	ND	0.03	ND	0	32	30	
	5-Jul-02			27	6.96	8	48	38	6	16	10	6	9	3	-	-	-	-	0.40	4.3	1.3	-	-	-	0	0.20	0.01	ND	ND	ND	ND	0.03	ND	0	44	15
	6-Jul-02			27	6.92	8	51	40	8	16	12	4	8	4	-	-	-	-	0.30	4.3	1.2	-	-	-	0	0.12	0.01	ND	ND	ND	ND	0.02	ND	0	58	33
	7-Jul-02			27	6.95	5	65	52	4	20	14	6	13	6	-	-	-	0.30	4.3	1.2	-	-	-	0	0.37	0.05	ND	ND	ND	ND	0.01	ND	1	0	0	
4	1-Jul-02	103	Aluva WTP- Chlorinated- Plant-1	28	7.05	6	71	57	4	26	16	10	12	6	-	-	-	0.15	4.8	1.2	-	-	-	0	0.17	0.02	ND	ND	ND	ND	0.03	ND	1.5	0	0	
	2-Jul-02			28	7.02	5	69	56	4	22	16	6	13	7	-	-	-	0.30	4.8	1.3	-	-	-	0	0.21	0.01	ND	ND	ND	ND	0.02	ND	0.5	0	0	
	3-Jul-02			28	6.95	6	71	57	4	24	14	10	13	6	-	-	-	0.15	5.0	1.4	-	-	-	0	ND	ND	ND	ND	ND	ND	ND	0.5	0	0	0	
	4-Jul-02			28	7.03	5	70	56	4	22	14	8	12	7	-	-	-	0.30	5.0	1.3	-	-	-	0	ND	ND	ND	ND	ND	ND	ND	1	0	0	0	
	5-Jul-02			28	7.05	6	65	56	4	24	16	8	13	6	-	-	-	0.15	4.5	1.3	-	-	-	0	ND	ND	ND	ND	ND	ND	ND	1	0	0	0	
	6-Jul-02			28	6.95	5	65	52	4	26	14	12	12	6	-	-	-	0.30	4.3	1.2	-	-	-	0	ND	ND	ND	ND	ND	ND	ND	0.5	0	0	0	
	7-Jul-02			28	7.08	6	75	60	4	22	22	0	18	8	-	-	-	0.25	5.0	1.2	-	-	-	0	ND	ND	ND	ND	ND	ND	ND	1.5	0	0	0	
5	1-Jul-02	104	Aluva WTP- Chlorinated- Plant-2	28	6.90	6	80.1	64	4	14	10	4	14	6	-	-	-	0.15	5.5	1.6	-	-	-	0	ND	ND	ND	ND	ND	ND	ND	1	0	0		
	2-Jul-02			28	6.95	5	72.2	57.6	4	20	8	12	14	8	-	-	-	0.20	4.5	1.2	-	-	-	0	ND	ND	ND	ND	ND	ND	ND	0.5	0	0	0	
	3-Jul-02			28	6.88	6	80.8	64.6	4	26	8	18	13	6	-	-	-	0.25	4.5	1.2	-	-	-	0	ND	ND	ND	ND	ND	ND	ND	1	0	0	0	
	4-Jul-02			28	6.93	6	93	74	4	30	8	22	15	6	-	-	-	0.15	4.3	1.1	-	-	-	0	ND	ND	ND	ND	ND	ND	ND	1	0	0	0	
	5-Jul-02			28	6.88	5	80.2	64.1	4	20	10	10	15	8	-	-	-	0.20	4.3	1.1	-	-	-	0	ND	ND	ND	ND	ND	ND	ND	0.5	0	0	0	
	6-Jul-02			28	6.90	6	75	60	4	22	12	10	14	6	-	-	-	0.15	4.8	1.2	-	-	-	0	ND	ND	ND	ND	ND	ND	ND	1.5	0	0	0	
	7-Jul-02			27	6.98	5	63.3	50.2	4	18	12	6	10	5	-	-	-	0.15	4.8	1.1	-	-	-	0	ND	ND	ND	ND	ND	ND	ND	1	0	0	0	
6	1-Jul-02	105	Aluva WTP- Chlorinated- Plant- 3&4	28	7.08	6	62.6	49.9	4	20	12	8	12	6	-	-	-	0.15	4.5	1.1	-	-	-	0	ND	ND	ND	ND	ND	ND	ND	1.5	0	0	0	
	2-Jul-02			28	6.75	6	62.9	50.1	4	20	16	4	10	6	-	-	-	0.15	5.8	1.5	-	-	-	0	ND	ND	ND	ND	ND	ND	ND	0.5	0	0	0	
	3-Jul-02			28	6.90	6	62.5	50	4	18	12	6	12	6	-	-	-	0.15	4.5	1.2	-	-	-	0	ND	ND	ND	ND	ND	ND	ND	1	0	0	0	
	4-Jul-02			28	6.87	6	63.3	50.5	4	16	10	6	12	5	-	-	-	0.20	4.3	1.1	-	-	-	0	ND	ND	ND	ND	ND	ND	ND	0.5	0	0	0	
	5-Jul-02			28	6.90	6	63.3	50.5	4	16	10	6	12	5	-	-	-	0.20	4.3	1.1	-	-	-	0	ND	ND	ND	ND	ND	ND	ND	0.5	0	0	0	
	6-Jul-02			28	6.90	6	62.8	50.2	4	20	12	8	10	6	-	-	-	0.15	5.0	1.2	-	-	-	0	ND	ND	ND	ND	ND	ND	ND	1.5	0	0	0	
	7-Jul-02			27	6.80	5	62.4	50.1	4	22	16	6	12	6	-	-	-	0.30	5.3	1.2	-	-	-	0	ND	ND	ND	ND	ND	ND	ND	0.5	0	0	0	

ND : Not detected
- : Not done

Table 12.10 : Water Quality - Treatment Stages - Monsoon

City : Kochi

Sl. No.	Sampling Date	Source	Turbidity (NTU)	Sulphate (mg/L)
1	1-Jul-02	ALUVA WTP SETTLED WATER CLARIFIER-1	6	3
	2-Jul-02		5	3
	3-Jul-02		5	4
	4-Jul-02		6	3
	5-Jul-02		6	3
	6-Jul-02		5	3
	7-Jul-02		6	3
2	1-Jul-02	ALUVA WTP SETTLED WATER CLARIFIER-2	6	4
	2-Jul-02		7	5
	3-Jul-02		6	3
	4-Jul-02		7	3
	5-Jul-02		5	3
	6-Jul-02		6	5
	7-Jul-02		7	4
3	1-Jul-02	ALUVA WTP SETTLED WATER CLARIFIER-3	7	3
	2-Jul-02		6	4
	3-Jul-02		6	3
	4-Jul-02		7	3
	5-Jul-02		6	2
	6-Jul-02		7	3
	7-Jul-02		6	2
4	1-Jul-02	ALUVA WTP SETTLED WATER CLARIFIER-4	6	2.5
	2-Jul-02		6	3
	3-Jul-02		5	3
	4-Jul-02		5	3
	5-Jul-02		6	2.5
	6-Jul-02		6	3
	7-Jul-02		6	2.5
5	1-Jul-02	ALUVA WTP SETTLED WATER CLARIFIER-5	6	3
	2-Jul-02		7	3
	3-Jul-02		8	2.5
	4-Jul-02		7	2.5
	5-Jul-02		7	4
	6-Jul-02		6	3
	7-Jul-02		7	3

...Contd. Table 12.10

Sl. No.	Sampling Date	Source	Turbidity (NTU)	Sulphate (mg/L)
6	1-Jul-02	ALUVA WTP SETTLED WATER CLARIFIER-6	6	3
	2-Jul-02		7	3
	3-Jul-02		9	2.5
	4-Jul-02		8	3
	5-Jul-02		7	3
	6-Jul-02		6	3
	7-Jul-02		9	2.5
7	1-Jul-02	ALUVA WTP SETTLED WATER CLARIFIER-7	6	4
	2-Jul-02		9	2
	3-Jul-02		9	3
	4-Jul-02		8	2.5
	5-Jul-02		7	3
	6-Jul-02		9	2.5
	7-Jul-02		6	2
8	1-Jul-02	ALUVA WTP FILTERED WATER UNIT-1	4	3
	2-Jul-02		3	4
	3-Jul-02		5	3.5
	4-Jul-02		4	4
	5-Jul-02		3	3
	6-Jul-02		3	4
	7-Jul-02		3	3
9	1-Jul-02	ALUVA WTP FILTERED WATER UNIT-2	4	4
	2-Jul-02		4	3
	3-Jul-02		3	3
	4-Jul-02		3	4
	5-Jul-02		3	5
	6-Jul-02		4	4
	7-Jul-02		4	5
10	1-Jul-02	ALUVA WTP FILTERED WATER UNIT-3	4	3
	2-Jul-02		3	3
	3-Jul-02		3	2
	4-Jul-02		3	2.5
	5-Jul-02		3	3
	6-Jul-02		3	2.5
	7-Jul-02		3	3

Contd....

...Contd. Table 12.10

Sl. No.	Sampling Date	Source	Turbidity (NTU)	Sulphate (mg/L)
11	1-Jul-02	ALUVA WTP FILTERED WATER UNIT-4	4	4
	2-Jul-02		4	3
	3-Jul-02		4	3
	4-Jul-02		3	4
	5-Jul-02		3	3
	6-Jul-02		3	3
	7-Jul-02		4	4

Table 12.11 : Water Quality - Reservoir : MBR & ESR - Monsoon

City : Kochi

Sl. No.	Sampling Date	Sample ID No.	Location	Sampling Point	Temp (°C)	pH	Turb (NTU)	Cond (S/cm m)	TDS (mg/L)	TAK (mg/L)	T-Hard (mg/L)	Ca (mg/L)	Mg (mg/L)	Cl (mg/L)	SO ₄ (mg/L)	NO ₃ (mg/L)	PO ₄ (mg/L)	F (mg/L)	Na (mg/L)	K (mg/L)	DO (mg/L)	COD (mg/L)	Phenol (mg/L)	Fe (mg/L)	Mn (mg/L)	Cu (mg/L)	Cd (mg/L)	Cr (mg/L)	Pb (mg/L)	Zn (mg/L)	As (mg/L)	Res.Cl (mg/L)	TC (CFU/100ml)	FC (CFU/100ml)			
1	1-July02	106	KARUVALLIPADY SUMP	After Chlorination	28	7.1	6	71	57	4	24	16	8	13	4	-	-	-	0.3	4.0	1	-	-	0	0.03	ND	ND	ND	ND	ND	ND	0.06	ND	1	0	0	
	2-July02				28	7.4	6	69	55	4	22	16	6	12	4	-	-	-	0.3	4.0	1	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	0	0	
	3-July02				28	7.1	6	64	51	8	24	16	8	10	5	-	-	-	0.4	4.5	1	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	0	0	
	4-July02				28	7.1	7	75	60	4	22	16	6	12	4	-	-	-	0.4	4.5	1	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	0	0	
	5-July02				28	7.2	6	73	59	4	22	16	6	13	4	-	-	-	0.4	4.3	1	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.5	0	0	
	6-July02				28	7.1	6	73	57	4	22	16	6	12	5	-	-	-	0.4	4.3	1.1	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	0.14	ND	1	0	0
	7-July02				28	7.2	7	75	51	4	24	16	8	10	4	-	-	-	0.3	4.3	1	-	-	0	0.38	ND	ND	ND	ND	ND	ND	ND	ND	0.5	0	0	
2	1-July02	107	PERUMANOOR SUMP-1	After Chlorination	28	7.1	6	68	54	4	24	18	6	17	4	-	-	-	0.2	4.0	0.9	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.5	0	0	
	2-July02				28	6.9	7	70	56	4	18	14	4	17	5	-	-	-	0.2	4.8	1.1	-	-	0	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	0	0
	3-July02				28	7.2	7	71	56	4	16	14	2	17	4	-	-	-	0.2	4.5	1.2	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	150	110	
	4-July02				28	7.2	6	76	61	4	22	16	6	26	5	-	-	-	0.3	4.3	1.1	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.5	0	0	
	5-July02				28	7.3	6	77	62	4	18	14	4	15	4	-	-	-	0.2	4.5	1.1	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	0	0	
	6-July02				28	7.2	6	70	56	4	24	18	6	16	4	-	-	-	0.3	4.0	1	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.5	0	0	
	7-July02				28	7.1	7	68	61	4	16	14	2	17	5	-	-	-	0.2	4.3	1.1	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	0	0	
3	1-July02	108	PERUMANOOR SUMP-2	After Chlorination	28	7.2	5	67	53	4	22	16	6	12	4	-	-	-	0.2	4.3	1	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.5	0	0	
	2-July02				28	7.2	6	69	55	4	22	14	8	15	4	-	-	-	0.2	4.5	1.1	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	0	0	
	3-July02				28	7.3	7	78	61	4	28	12	16	15	4	-	-	-	0.3	4.3	1	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	0	0	
	4-July02				28	7.3	7	86	69	4	22	20	2	13	4	-	-	-	0.3	4.5	1.1	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.5	0	0	
	5-July02				28	7.2	7	66	53	4	22	20	2	13	5	-	-	-	0.3	4.3	1.1	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	0	0	
	6-July02				28	7.3	6	69	53	4	22	12	10	15	4	-	-	-	0.2	4.0	1	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	0	0	
	7-July02				28	7.3	5	67	54	4	28	16	12	15	4	-	-	-	0.2	4.3	1.1	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	0	0	
4	1-July02	109	THAMANNAM SUMP	After Chlorination	27	7.1	6	64	51	4	20	12	8	13	5	-	-	-	0.3	4.3	1	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.5	0	0	
	2-July02				28	7.2	5	79	63	4	22	18	4	15	4	-	-	-	0.3	4.3	1.1	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	0	0	
	3-July02				28	7.3	6	59	47	4	20	16	4	16	4	-	-	-	0.2	4.0	1.1	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	60	45	
	4-July02				28	7.1	6	60	48	4	18	12	6	14	5	-	-	-	0.3	4.3	1.2	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.5	0	0	
	5-July02				27	7.2	5	61	49	4	18	10	8	15	4	-	-	-	0.3	4.3	1.1	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.2	0	0	
	6-July02				28	7.1	6	71	47	4	20	12	8	14	4	-	-	-	0.2	4.5	1.1	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	0	0	
	7-July02				28	7.2	5	59	49	4	22	16	6	16	5	-	-	-	0.3	4.3	1.1	-	-	0	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.5	0	0	

ND : Not detected - : Not done

Table 12.12 : Water Quality - Consumer Ends - Monsoon**City : Kochi**

Sl. No.	Sampling Date	Location/Code	Res.Cl (mg/L)	TC (CFU/100ml)	FC (CFU/100ml)
1	1-Jul-02	KARIPPALAM-03	0.5	0	0
	2-Jul-02		0	25	3
	3-Jul-02		0	0	0
	4-Jul-02		0	0	0
	5-Jul-02		0	0	0
	6-Jul-02		0	10	4
	7-Jul-02		0	0	0
2	1-Jul-02	MATTANCHERY-04	0	52	46
	2-Jul-02		0	105	50
	3-Jul-02		0	25	21
	4-Jul-02		0	150	140
	5-Jul-02		0	67	64
	6-Jul-02		0	56	37
	7-Jul-02		0	84	48
3	1-Jul-02	CHIRALAI-05	0	33	30
	2-Jul-02		0	0	0
	3-Jul-02		0	250	115
	4-Jul-02		0	44	40
	5-Jul-02		0	40	35
	6-Jul-02		0	0	0
	7-Jul-02		0	18	12
4	1-Jul-02	KOCHANGADI -06	0	0	0
	2-Jul-02		0	54	18
	3-Jul-02		0	28	9
	4-Jul-02		0	192	185
	5-Jul-02		0	45	16
	6-Jul-02		0.5	0	0
	7-Jul-02		0	43	27
5	1-Jul-02	THOPPUMPADY-09	1	0	0
	2-Jul-02		0	0	0
	3-Jul-02		0	0	0
	4-Jul-02		0	0	0
	5-Jul-02		0	0	0
	6-Jul-02		0.5	0	0
	7-Jul-02		0	0	0
6	1-Jul-02	THAREBHAGAM- 10	0	0	0
	2-Jul-02		0	6	4
	3-Jul-02		0	4	4
	4-Jul-02		0	50	35
	5-Jul-02		0	4	3
	6-Jul-02		0.5	0	0
	7-Jul-02		0	13	8
7	1-Jul-02	KADEBHAGAM -11	0	0	0
	2-Jul-02		0	48	35
	3-Jul-02		0	62	36
	4-Jul-02		0	21	8
	5-Jul-02		0	7	4
	6-Jul-02		0	0	0
	7-Jul-02		0	34	17

...Contd. Table 12.12

Sl. No.	Sampling Date	Location/Code	Res.Cl (mg/L)	TC (CFU/100ml)	FC (CFU/100ml)
8	1-Jul-02	PERUMPADAPPU -15	0.5	0	0
	2-Jul-02		0	28	10
	3-Jul-02		0	0	0
	4-Jul-02		0	0	0
	5-Jul-02		0.5	0	0
	6-Jul-02		0.5	0	0
	7-Jul-02		0	0	0
9	1-Jul-02	NAZRETH - 23	1.5	0	0
	2-Jul-02		0	50	45
	3-Jul-02		0	16	14
	4-Jul-02		0	168	48
	5-Jul-02		1	0	0
	6-Jul-02		1.5	0	0
	7-Jul-02		0	84	56
10	1-Jul-02	WELLINGTON ISLAND - 26	0.2	0	0
	2-Jul-02		0	0	0
	3-Jul-02		0	0	0
	4-Jul-02		0	0	0
	5-Jul-02		0	0	0
	6-Jul-02		0.5	0	0
	7-Jul-02		0	0	0
11	1-Jul-02	VADUTHALA WEST - 27	0	29	15
	2-Jul-02		0	23	20
	3-Jul-02		0	50	44
	4-Jul-02		0	35	34
	5-Jul-02		0	21	15
	6-Jul-02		0	18	8
	7-Jul-02		0	22	20
12	1-Jul-02	KUNNUMPURAM- 32	0	0	0
	2-Jul-02		0	0	0
	3-Jul-02		0	35	30
	4-Jul-02		0	0	0
	5-Jul-02		0	0	0
	6-Jul-02		0	0	0
	7-Jul-02		0.5	0	0
13	1-Jul-02	EDAPALLY - 33	0	0	0
	2-Jul-02		0	0	0
	3-Jul-02		0	0	0
	4-Jul-02		0	0	0
	5-Jul-02		0	0	0
	6-Jul-02		0	0	0
	7-Jul-02		0	0	0
14	1-Jul-02	DEVAN KULANGARA - 34	0	0	0
	2-Jul-02		0	0	0
	3-Jul-02		0	0	0
	4-Jul-02		0	0	0
	5-Jul-02		0	0	0
	6-Jul-02		0	0	
	7-Jul-02		0	0	0

...Contd. Table 12.12

Sl. No.	Sampling Date	Location/Code	Res.Cl (mg/L)	TC (CFU/100ml)	FC (CFU/100ml)
15	1-Jul-02	KARUKAPALLI - 36	0	0	0
	2-Jul-02		0	8	7
	3-Jul-02		0	0	0
	4-Jul-02		0	0	0
	5-Jul-02		0	17	3
	6-Jul-02		0	10	4
	7-Jul-02		0	8	3
16	1-Jul-02	PALARIVATTOM - 40	0	0	0
	2-Jul-02		0	0	0
	3-Jul-02		0	20	14
	4-Jul-02		0.5	0	0
	5-Jul-02		0	0	0
	6-Jul-02		0	0	0
	7-Jul-02		0.5	0	0
17	1-Jul-02	INTERNATIONAL STADIUM - 41	0	0	0
	2-Jul-02		0	0	0
	3-Jul-02		0	0	0
	4-Jul-02		0	0	0
	5-Jul-02		0	0	0
	6-Jul-02		0	0	0
	7-Jul-02		0	10	4
18	1-Jul-02	ELAMKULAM - 43	0	0	0
	2-Jul-02		0	0	0
	3-Jul-02		0	0	0
	4-Jul-02		0.5	0	0
	5-Jul-02		0	30	15
	6-Jul-02		0	0	0
	7-Jul-02		0	0	0
19	1-Jul-02	POONITHURA -47	0	0	0
	2-Jul-02		0	0	0
	3-Jul-02		0	0	0
	4-Jul-02		0	0	0
	5-Jul-02		0	0	0
	6-Jul-02		0	0	0
	7-Jul-02		0	0	0
20	1-Jul-02	KADAVANTHRA - 51	0	0	0
	2-Jul-02		0	0	0
	3-Jul-02		0	68	80
	4-Jul-02		0	16	4
	5-Jul-02		0	43	4
	6-Jul-02		0	33	14
	7-Jul-02		0	0	0
21	1-Jul-02	THEVARA - 53	1.5	0	0
	2-Jul-02		0	0	0
	3-Jul-02		0	70	45
	4-Jul-02		0.5	0	0
	5-Jul-02		0	0	0
	6-Jul-02		0	0	0
	7-Jul-02		0	0	0

...Contd. Table 12.12

Sl. No.	Sampling Date	Location/Code	Res.Cl (mg/L)	TC (CFU/100ml)	FC (CFU/100ml)
22	1-Jul-02	GANDHI NAGAR - 56	0	0	0
	2-Jul-02		0	0	0
	3-Jul-02		0	68	55
	4-Jul-02		0	0	0
	5-Jul-02		0	0	0
	6-Jul-02		0	0	0
	7-Jul-02		0	0	0
23	1-Jul-02	ERNAKULAM SOUTH -57	0	0	0
	2-Jul-02		0	28	26
	3-Jul-02		0	0	0
	4-Jul-02		0.5	0	0
	5-Jul-02		0.5	0	0
	6-Jul-02		1	0	0
	7-Jul-02		0	14	8
24	1-Jul-02	KATHRIKADAVU - 60	0.5	0	0
	2-Jul-02		0	0	0
	3-Jul-02		0	0	0
	4-Jul-02		0.5	0	0
	5-Jul-02		0	0	0
	6-Jul-02		0	0	0
	7-Jul-02		0	0	0
25	1-Jul-02	KALOOR SOUTH - 61	0	0	0
	2-Jul-02		0	40	38
	3-Jul-02		0	101	80
	4-Jul-02		0	0	0
	5-Jul-02		0	0	0
	6-Jul-02		0	54	36
	7-Jul-02		0	48	25
26	1-Jul-02	KALOOR NORTH - 62	0	0	0
	2-Jul-02		0	38	34
	3-Jul-02		0	35	30
	4-Jul-02		0.2	0	0
	5-Jul-02		0.5	0	0
	6-Jul-02		0.5	0	0
	7-Jul-02		0	15	10
27	1-Jul-02	THRIKANARVATTOM - 63	0	0	0
	2-Jul-02		0	26	25
	3-Jul-02		0	10	7
	4-Jul-02		0.5	0	0
	5-Jul-02		0.5	0	0
	6-Jul-02		0	14	3
	7-Jul-02		0	23	18
28	1-Jul-02	PACHALAM - 65	0	0	0
	2-Jul-02		0	31	30
	3-Jul-02		0	88	74
	4-Jul-02		0	27	25
	5-Jul-02		0	0	0
	6-Jul-02		0	36	19
	7-Jul-02		0	47	13

...Contd. Table 12.12

Sl. No.	Sampling Date	Location/Code	Res.Cl (mg/L)	TC (CFU/100ml)	FC (CFU/100ml)
29	1-Jul-02	THATTAZHAM - 66	0	0	0
	2-Jul-02		0	32	31
	3-Jul-02		0	5	2
	4-Jul-02		0.5	0	0
	5-Jul-02		0.5	0	0
	6-Jul-02		1	0	0
	7-Jul-02		0	0	0