

Original Application no. 141/2021 (SZ)

State of Kerala & Others : Respondent(s)

**Report filed by the Chief Environmental Engineer,
Kerala State Pollution Control Board, Regional Office, Thiruvananthapuram
on behalf of the Kerala State Pollution Control Board,
in Original Application No. 141/2021 (SZ)**

Adv. Remasmrithi.V.K

ADDITIONAL STANDING COUNSEL

RESPONDENT No. 5

Original Application no. 141/2021 (SZ)

Tribunal on its own motion SUO MOTU
Based on the News Item in Kerala Kaumudi
Newspaper, web edition dt: 06.06.2021,
“A New Ray of Life for Pallikkalar”.

Vs.

The Principal Secretary to Government of Kerala,
Department of Environment,
Thiruvananthapuram
and Ors

...Respondents

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Dated this the 28th day of September 2022.

Remasmrithi. V.K., Advocate
Additional Standing Counsel
Respondent No. 5

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Dated this the 28th day September 2022.

Remasmrithi V.K., Advocate
Additional Standing Counsel
Respondent No.5

**BEFORE THE HONOURABLE NATIONAL GREEN TRIBUNAL
SOUTHERN ZONE, CHENNAI**

Original Application no. 141/2021 (SZ)

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...Respondents

VERIFICATION

I, Sreekala S. , Chief Environmental Engineer, Kerala State Pollution Control Board, Regional Office, Thiruvananthapuram, do hereby verify on this the 28th day of September 2022, that all what is stated above are true and correct to the best of my knowledge, information and belief.




Sreekala S.
Chief Environmental Engineer
KSPCB
SREEKALA S.
Chief Environmental Engineer

BEFORE THE HONOURABLE NATIONAL GREEN TRIBUNAL

SOUTH ZONE, CHENNAI

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...Respondents


Report filed by Chief Environmental Engineer, Kerala State Pollution Control Board, Regional Office, Thiruvananthapuram on behalf of The Kerala State Pollution Control Board, in Original Application No. 141/2021.

Introduction

The report is filed in continuation to the interim report filed on 25/11/2021 and in accordance with the order of the Hon'ble NGT dated 15/09/2021. The Board has conducted survey along the banks of the Pallickal river and identified sampling locations and collected water as well as sediment sample for analysis and had requested one month time for submitting final report on receiving complete analysis report of the collected samples. Accordingly Board has submitted an action taken report to the Environment department on 14/06/2022.

1. The Board conducted detailed survey near the banks of the river Pallikkal in Kollam, Pathanamthitta & Alappuzha District and water samples and


SREEKALA S.
Chief Environmental Engineer

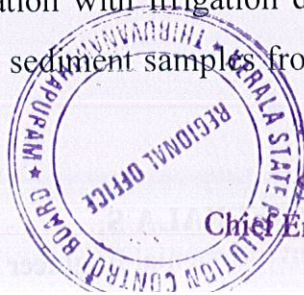


sludge samples were collected from various locations during 2021 October and November. The analysis of water samples in Adoor, Nellimugal (Both in Pathanamthitta district) and Thodiyoor (Kollam district) locations, under state Water Quality Monitoring Programme, collected from January 2019 to June 2021 do not show any sign of industrial pollution. However, the presence of fecal coliform were identified in the river water. As informed by the LSGIs concerned, encroachment is a main issue and that eventually reduced the width of the stream considerably at many places.

2. A reconnaissance survey was conducted from 30.10.2021 to 03.11.2021 jointly by the Board, Suchitwa Mission and LSGD in Kollam district. The observation follows.

The sources of pollution noticed were domestic effluent and solid wastes disposed from nearby houses/shops, discharge of untreated sewage/septage and dumping of chicken and slaughter wastes by unauthorized waste collectors. There are no major industries or activities in the drainage area that could result in such a sediment character. Directions were issued to the respective establishments in this regard to rectify the defects. The water and sludge sample analysis were carried out in Kollam district during October, November and December 2021. The analysis of sludge samples showed that the value of Copper exceeded for one station (upstream Kothumukku) and mercury exceeded in 16 stations. It has been further informed that LSGD has taken action to resolve the identified issues noticed during the site visit.

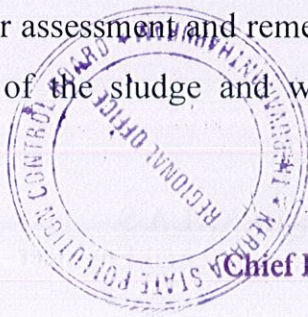
3. Field inspection & sampling of the Pallickal River in Pathanamthitta district at various locations was conducted on 11/08/2021 & 12/08/2021 in consultation with Irrigation department & Adoor taluk office. Water samples & sediment samples from 10 locations were collected, including



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Chief Environmental Engineer

one sample from each local body. From preliminary observation it was understood that the river passes through agricultural land, residential area & commercial area in Pathanamthitta district. Major towns included are located in Ezhamkulam Grama Panchayat & Adoor municipality. Possibilities of pollution are due to solid waste disposal, pesticide disposal from agricultural land, sewage discharge from commercial & residential area. Industrial units are not located in immediate proximity of the river. More chances of liquid/ solid waste discharge are in Ezhamkulam Grama Panchayat & Adoor municipality. As per the analysis report from Pathanamthitta district, both water & sediment samples were collected from 10 locations during 2021 October and November, in which the value of zinc exceeded in one station (Near Janasevana kendram TB junction) whereas the value of mercury exceeded in nine locations. Directions were issued to Ezhamkulam gramapanchayat and Adoor municipality in this regard. Adoor municipality has submitted an action plan regarding the solid waste management in the local body. Copy of the same is produced herewith as **Annexure 1.**

4. The analysis report of water sample from Kollam and Pathanamthitta, shows the parameters are within the limits as per IS 2296/1982 (Tolerance limits for inland surface water subject to pollution), while sludge samples showed the presence of heavy metals. Sampling was repeated in the identified locations to check the presence of heavy metals, once more. Reanalysis was carried out during the month of February and March, 2022 and observed that the values of heavy metals fall under the permissible limit in all stations as per MoEFCC-guidelines (Guidance document for assessment and remediation of contaminated sites in India). The details of the sludge and water sample analysis for Kollam and



SREKALA S.
Chief Environmental Engineer

Pathanamthitta district are produced herewith as **Annexure 2 & 3** respectively.

5. In Alappuzha district, site enquiry was conducted at Erappan para and Kurunankulangara which are points from the same rivulet in Thamarakulam Gramapanchayath. The rivulet flows from Kurunankulangara to Erappanpara and joins Pallickal river which is flowing through Kollam district. Another location was identified at Chooran vayal which flows through the boundary of Alappuzha district. This is a rivulet of Pallickalar. Sample was taken from the identified location at Chooran vayal .The water quality and sludge samples from the 2 rivulets of the river during October, November months of 2022, in Alappuzha district were within the limits. The details of the sludge and water sample analysis for Alappuzha district are produced as **Annexure 4**. There are neither any polluting industries nor hospitals / commercial complexes in this area. Markets are located near the banks of the rivulet. It was noticed that the people living in and around the banks of rivulet are mainly depending on agriculture sector for their livelihood.
6. As per the analysis report from Pathanamthitta district, the concentrations of parameters in the water samples fall under the prescribed limits except for Total Coliforms and Fecal Coliforms. Certain actions suggested to reduce the pollution such as identification of sources which are discharging into the drains and stoppage of discharge, ensuring decentralized facilities for treatment of sewage and sullage in panchayaths, construction of STP and septage treatment plant for Adoor Municipality, installation of surveillance cameras, strengthening of Haritha Karma Sena and 100% Door to Door collection by panchayats and municipalities have to be implemented by the co-operation of line departments.



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Chief Environmental Engineer

7. As per the report from Kollam district, it is understood that there are no industries discharging effluent into the river. Only major problem is encroachment and this issues need to be addressed by the Revenue Department.
8. As per the report from Alappuzha district, there is no major industries, hotels, slaughter house, hospitals along the sides of the rivulet. It was found that the rivulet join Pallickal river from Alappuzha district is not causing pollution to the river. The concerned local body should take strict and preventive measures like building fences, installing surveillance camera, night patrolling to monitor the dumping of municipal solid waste.
9. The survey along the river bank and analysis of the water quality reveals that the river is polluted mainly due to the presence of Total Coliforms and Fecal Coliforms. No industries were seen located /discharging their effluent to this water body. Hence the concerned local bodies shall take necessary action to treat the sewage/sullage and also the municipal solid waste generation from their jurisdiction. The pollution status of the river and action to be taken to mitigate the pollution as detailed above was submitted to Environment Department.

All that stated above are true to the best of my knowledge and belief.

Dated this the 28th day of September 2022.


Sreekala S.

Chief Environmental Engineer



KSPCB

SREEKALA S.

Chief Environmental Engineer

Solemnly affirmed and signed by the deponent who is known to me on this the 28th day of September 2022.

BEFORE THE HONOURABLE
NATIONAL GREEN
TRIBUNAL (SZ)

OA no. 141/2021 (SZ)

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Environmental Engineer,
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Board, Regional Office,
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Adv. Remasmrithi.V.K

ADDITIONAL
STANDING COUNSEL

RESPONDENT No.5

9445782946

ANNEXURE 1

ACTION PLAN ON SOLID WASTE MANAGEMENT

Name of LSGI: Adoor Municipality

Total population : 29173

District: Pathanamthitta

No. of HH : 7911

No. of Institutions: 1860

SINo	Description	Current status	Gap	Action to be taken	Timeline for Compliance (Months)
1. 100% Door to Door Collection of Waste					
a.	Door to Door Collection from Households (%)	70%	30%	Harithakarma Sena Instructed to cover 100% Door to Door Collection	31/12/2021
b.	Door to Door Collection from Institutions/ Commercial Establishments (%)	40%	60%	Harithakarma Sena Instructed to cover 100% Door to Door Collection	31/12/2021
2. Material Collection Facility					
a.	No. of MCFs which are functional	1	1	A Project of MCF is submitted before DPC for Approval.	31/03/2022
b.	Ensure quantification of incoming and outgoing waste at MCF	Yes	NA	NA	NA
	i. Installation of weighing machine	Yes	NA	NA	NA
	ii. Maintaining WQR	Yes	NA	NA	NA
3. Resource Recovery Facility					
a.	Ensuring forward linkage for Resource recovery either by linkage to RRF or agreement with CKCL/Private firm	Not Existing	100%	A Project of RRF is Submitted before DPC for Approval	31/03/2022
b.	Ensure quantification of incoming and outgoing waste at RRF (if own RRF)	NA	NA	NA	NA
	i. Installation of weighing machine	NA	NA	NA	NA
	ii. Maintaining WQR	NA	NA	NA	NA



Handwritten signature and name of the official.

4. Composting					
a.	No. of Household level composting units	Pipe Compost - 1210, Ring Compost- 326, Bin - Pot-105	Ring Compost- 750, Biodigester Pot-940, Biogas Plant - 281, Bin- Pot - 2794	Projects submitted	31/03/2022
b.	No. of Institutional level composting units (eg: Schools, hospitals etc)	Bio Bin(Hospital - 1), Aerobic Composting unit (Hospital) - 3, Biobin (School) - 7	NIL	NA	NA
c.	No. of Community Level composting units	NIL	NIL	NA	NA
d.	No. of Centralized composting units	1	NIL	NA	NA
5. Biomechanation					
a.	No. of Household level Biogas plants	0	281	Projects submitted	31/01/2022
b.	No. of Institutional level Biogas plants (eg: Schools, hospitals etc)	NIL	NIL	NA	NA
c.	No. of Community Level Biogas plants	NIL	NIL	NA	NA
d.	No. of Centralized Biogas plants	NIL	NIL	NA	NA
6. Biodegradable Waste processing by bulk waste generators					
a.	No. of agencies collecting and processing Biodegradable Waste from bulk waste generators in the LSGI		NIL	NA	NA
b.	No. of agencies certified/ authorized by the LSGI for this purpose:		NIL	NA	NA



7. Legacy Waste Management

a. No of legacy dump sites identified	1	1	Agreement Execute with Clean Kerala Company and Legacy Waste handed over to Clean Kerala Company	31/12/2021
b. No of legacy dumpsites quantified	NIL	NA	NA	NA
c. No. of legacy waste dumpsite in which remediation has been initiated	1	40%	Agreement Execute with Clean Kerala Company and legacy waste handed over to Clean Kerala Company	31/12/2021
d. No. of legacy waste dumpsite remediated	0	NA	NA	NA




 മെമ്പർ
 അസിസ്റ്റന്റ് സെക്ഷൻ
 അസിസ്റ്റന്റ് സെക്ഷൻ

WATER SAMPLE ANALYSIS									
PARAMETERS	MONTH	KOLLAM							
		PR1	PR2	PR3	PR4	PR5	PR6	PR7	PR8
pH	October	6.4	7.4	6.8	7.9	6.9	7.9	6.8	6.9
Turbidity	October	2.8	1.3	BDL	0.9	2.5	3.3	2.1	BDL
Electrical conductivity	October	183	242	200	245	291	188	220	111
DO	October	5.6	5.7	5.3	5.4	5.1	4.6	5.1	4.6
BOD	October	2	1.9	2.5	2.2	2.6	2.3	2.5	2.3
COD	October	7	6	7	9	8	6	7	5
NH3N	October	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chloride	October	5	20	17	18	24	19	20	16
Phosphate	October	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Total Alkalinity	October	12	14	14	18	21	20	14	20
Total Hardness	October	20	26	16	45	48	36	30	18
Calcium	October	15	24	15	43	45	20	19	8
Magnesium	October	5	2	1	2	3	16	11	10
Boron	October	0.26	0.39	0.18	BDL	0.22	BDL	0.2	0.17
TC,cfc	October	160	180	210	300	280	190	200	170
FC,cfc	October	ND	90	80	100	90	60	70	90
Fecal Streptococcus	October	ND	ND	ND	ND	ND	ND	ND	ND
Temperature	October	21	20.1	21	22.4	21.4	22	23	22.2
Sulphate	October	1.56	0.13	BDL	BDL	4.68	1.04	BDL	4013
Iron	October	2.5	4.7	1.8	BDL	1.6	2.69	1.9	1.2
TDS	October	34.2	50.1	51	28.3	25.49	21.8	38.5	46.9
TFS	October	26.8	23.6	30.4	20.4	19.6	21.5	29.1	30.9
TSS	October	30.8	21.3	26.8	24.6	14.1	19.6	35.2	28.6
Flouride	October	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Cadmium	December	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Total Chromium	December	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Copper	December	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Iron	December	0.19	0.21	2.27	0.27	0.26	0.61	1.27	0.43
Manganese	December	BDL	BDL	0.07	BDL	BDL	BDL	BDL	BDL
Nickel	December	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Lead	December	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Zinc	December	0.15	BDL	0.05	0.04	0.03	0.08	0.05	0.03
Arsenic	December	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mercury	December	BDL	BDL	0.01	BDL	BDL	BDL	0.01	BDL
Nitrate	December	0.34	0.39	0.56	0.22	0.19	0.37	0.27	0.17
Alpha BHC	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Gamma BHC	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Delta BHC	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Aldrine	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Dicofol	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Alpha endosulphan	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Dieldrin	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Beta Endosulphan	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
OP-DDT	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
PP-DDT	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

KOLLAM			
PR1	Kothumukku palam	PR5	Kallukadavu palam
PR2	Upstream kothumukku	PR6	Kallelilpalam
PR3	Chandhakkadavu	PR7	Anoorkkavu
PR4	Thodiyoor palam	PR8	Karoorkadavu palam



WATER SAMPLE ANALYSIS

KOLLAM

PR9	PR10	PR11	PR12	PR13	PR14	PR15	PR16	PR17	PR18	PR19	Limit
6.9	6.9	7.1	6.9	6.4	6.9	7.1	6.9	6.8	6.7	6.8	8.5
1.2	0.4	1.2	1.3	1	1.1	1.2	1.4	1.6	0.8	0.9	-
89	93	83	78	140	92	93	86	79	112	179	-
5	4.9	5.9	6.4	6.8	6.7	5.8	6.4	5.2	4.9	4.5	-
2.4	2	1.6	1.3	1	1.2	1.8	1.8	1.9	2.6	2	2mg/L
8	9	6	7	9	8	7	6	7	5	8	-
BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
15	17	13	13	11	13	11	18	13	17	17	-
BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
12	10	10	12	10	10	9	14	10	12	15	-
19	18	18	16	21	19	18	15	17	18	22	300mg/L
10	11	10	11	13	10	10	10	13	9	12	80.1mg/L
9	7	8	5	8	9	8	5	4	9	10	24.28mg/L
BDL	0.22	0.4	BDL	0.21	BDL	0.21	0.22	0.219	0.32	0.39	-
230	210	180	200	190	200	210	200	190	170	230	-
50	80	40	60	90	100	90	70	ND	40	80	-
ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-
22	23	21.9	21.5	20.3	22.4	21.5	20.5	21.4	22.1	21.1	-
2.99	4.29	2.73	4.16	4.42	4.16	4.03	3.9	4.42	4.29	4.16	400 mg/L as SO4
0.56	BDL	0.62	BDL	0.64	1.004	BDL	0.86	1.95	1.79	2.4	0.3mg/L
66.8	64.5	70.2	67.5	80.9	72.5	83.6	72.1	106.8	84.3	79.6	500mg/L
32.5	28.4	34.2	37.2	34.3	40.1	31.8	28.6	31.6	43.2	40.6	-
21.4	34.6	22	28.3	21	29.4	37.6	30.8	28.8	30.4	27.3	-
BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.5mg/L as F
BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.01mg/L
BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05mg/L
BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.5mg/L
0.58	0.51	0.59	0.52	0.52	0.53	0.9	0.51	0.71	0.5	0.65	0.3mg/L
BDL	BDL	BDL	BDL	BDL	BDL	0.05	BDL	BDL	0.05	0.08	0.5mg/L
BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.1mg/L
0.03	0.04	0.04	0.02	0.03	0.09	0.1	0.15	0.11	0.23	0.51	15mg/L
BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05mg/L
BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.01	0.01	0.01	BDL	0.001mg/L
1.1	0.23	0.26	0.16	0.14	0.15	0.17	0.18	0.1	0.21	0.11	20mg/L as NO3
BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05	-
BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.14	-
BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.84	-
BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-

KOLLAM			
PR9	Kaniyankadavu	PR15	Chathankulampalam
PR10	Valiyathuravakkadavu	PR16	Kaliyanchantha
PR11	Ambikkadavu	PR17	Pavumbathekku
PR12	Aanayadippalam	PR18	kallekkadavu
PR13	Moovakkodu	PR19	Chambakkadavu
PR14	Palathinkadavup		



SLUDGE SAMPLE ANALYSIS

PARAMETERS	MONTH	KOLLAM							
		PR1	PR2	PR3	PR4	PR5	PR6	PR7	PR8
Cadmium	November	4	BDL	BDL	2	BDL	BDL	BDL	1.8
	November	16	22	14	24	32	20	44	36
Total Chromium	November	18	1600	16	40	18	6	16	22
	March		1.11						
Iron	November	7880	14760	3700	6480	13140	17160	21200	19900
Manganese	November	142	60	22	38	54	14	70	264
Nickel	November	BDL	BDL	BDL	BDL	10	BDL	16	22
Lead	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Zinc	November	22	182	38	42	40	20	42	28
Arsenic	November	BDL	BDL	BDL	2	BDL	BDL	BDL	BDL
Mercury	November	52	108	30	56	96	114	156	146
	March				BDL	BDL	BDL	BDL	BDL

STATIONS

PR1	Kothumukku palam
PR2	Upstream kothumukku
PR3	Chandhakkadavu
PR4	Thodiyoor palam
PR5	Kallukadavu palam
PR6	Kallelilipalam
PR7	Anoorkkavu
PR8	Karoorkadavu palam



SLUDGE SAMPLE ANALYSIS

KOLLAM

PR9	PR10	PR11	PR12	PR13	PR14	PR15	PR16	PR17	PR18	PR19	Limit mg/kg
BDL	1.6	1	3.6	3.8	BDL	1	2.4	BDL	1.2	4	13
12	50	50	28	34	20	36	60	42	46	38	-
4	20	92	8	16	6	18	22	22	34	22	190
4920	27580	20720	11440	9580	5500	19280	18040	16840	44000	18600	-
36	82	156	108	32	54	214	70	68	250	66	-
BDL	22	14	BDL	14	BDL	10	18	14	26	56	100
BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	530
22	44	46	20	32	16	40	34	38	66	54	720
BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	50
42	204	148	78	66	58	138	128	116	278	144	36
BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	36

STATIONS

PR9	Kaniyankadavu
PR10	Valityathuravakkadavu
PR10	Valityathuravakkadavu
PR11	Ambikkadavu
PR12	Aanayadijpalam
PR13	Moovakkode
PR14	Palathinkadavu
PR15	Chathankulam palam
PR16	Kaliyanchantha
PR17	Pavumbathekku
PR18	kallekkadavu
PR19	Chambakkadavu



WATER SAMPLE ANALYSIS

PATHANAMTHITTA

PARAMETERS	MONTH	PLR1	PLR2	PLR3	PLR4	PLR5	PLR6	PLR7	PLR8	PLR9	PLR10	
pH	October	6.9	7.1	7	7.1	7.1	7.9	6.5	7.1	7	6.9	Limit as per IS 2296/1982
Turbidity	October	3.2	4.3	4.6	6.9	4.9	9.1	4.1	3.1	5.2	4.9	
Electrical conduct	October	76.69	64	106.3	100.5	98.91	100.8	82.39	76.74	71.31	86.6	
DO	October	6	6.9	5.3	6	6.3	4.8	6.3	6.5	6.1	7.1	
BOD	October	0.6	0.4	1.4	0.5	0.6	0.7	0.7	0.5	0.6	0.3	
NH3N	October	BDL	BDL	BDL	BDL	BDL	0.47	BDL	BDL	BDL	BDL	
Nitrate	October	1.215	0.839	0.985	1.013	2.112	1.065	1.303	0.962	1.093	0.731	
Chloride	October	14	16	20	18	20	18	24	18	26	20	
Phosphate	October	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Total Alkalinity	October	12	12	18	14	18	26	20	18	14	17	
Total Hardness	October	22	20	22	24	24	32	22	18	22	26	
Calcium	October	12	12	12	14	16	20	12	10	12	16	
Magnesium	October	10	8	10	10	8	12	10	8	10	10	
Sodium	October	7.3	8.2	9.9	9.2	10.1	8.9	12.2	9.1	12.8	9.7	
Potassium	October	1.277	1.615	2.609	2.541	2.285	1.947	2.829	2.595	2.598	1.228	
SAR	October	0.67668	0.7972	0.91769	0.81649	0.89637	0.68404	1.13089	0.93256	1.1865	0.2709	
TC.cfc	October	100	140	220	280	250	1700	890	110	960	200	
FC.cfc	October	35	45	70	90	80	400	290	35	320	65	
Faecal Streptococci	October	BDL	BDL	BDL	BDL	BDL		NIL	NIL	NIL	NIL	
Temperature	October	28	28	27	27	27	27	27	27	27	28	
Sulfate	October	BDL	BDL	0.615	0.909	0.303	BDL	0.303	BDL	BDL	BDL	
TDS	October	50	46	65	61	60	71	58	52	48	56	
Cadmium	October	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Total Chromium	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Copper	October	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Iron	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Manganese	October	0.83	0.73	1.78	0.77	BDL	BDL	BDL	0.79	0.89	BDL	
Nickel	November	0.68	0.5	1.64	1.34	1.76	1.63	1.48	1.27	1.56	1.48	
	October	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	



Zinc	November	0.11	0.06	0.03	0.1	0.1	0.07	0.04	0.13	0.07	0.1mg/L
Arsenic	October	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mercury	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	15mg/L
	October	0.01	BDL	0.01	BDL	BDL	BDL	BDL	BDL	BDL	0.05mg/L
Alpha BHC	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.001mg/L
	October	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
Gamma BHC	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
	October	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
Delta BHC	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
	October	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
Aldrine	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
	October	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
Dicofof	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
	October	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
Alpha Endosulpha	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
	October	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
Dieldrin	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
	October	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
Beta Endosulphan	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
	October	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
OP-DDT	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
	October	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
PP-DDT	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
	October	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-

PATHANAMTHITTA	
PLR1	Near Anandsram Rubber Nursery puthumala
PLR2	Near Mathirampallil Padiyil, Palamukku
PLR3	Near Park Residency Emson Junction, Ezhamkulam
PLR4	Near Janasevana Kendram T B Junction
PLR5	Near town Juma Masjid Adoor
PLR6	Near Grace Tyres Adoor
PLR7	Near Nirappel Bridge Manakkala
PLR8	Near Nellimukal bridge, Nellimukal
PLR9	Near Chathanakulam Bridge Thengamam
PLR10	Near Villadaswami Temple Sooranadu North



SLUDGE SAMPLE ANALYSIS

PATHANAMTHITTA

PARAMETERS	MONTH	PATHANAMTHITTA										Limit mg/kg as per MOEF Guidelines	
		PLR1	PLR2	PLR3	PLR4	PLR5	PLR6	PLR7	PLR8	PLR9	PLR10		
Cadmium	October	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	13
	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Total Chromium	October	21.2	25.4	27.8	51.4	40.6	14.8	36.4	18.8	34	5.82	-	
	November	16	13.2	4.8	31.2	10.2	13.2	8	3	14.2	21.8		
Copper	October	7.4	6.4	29.8	25.4	36	15.4	34.2	6.8	25.6	35.4	190	
	November	3.2	BDL	2	1.6	1.6	9.4	2.2	BDL	2	4.8		
Iron	October	4960	6420	15620	29940	22160	7120	25100	7240	20360	48360	-	
	November	2320	1229.4	2540	2140	10422	3930	1286	314	1112	5340		
Manganese	October	6.2	25.4	67.8	161.2	116	36.8	198.8	36.8	154.4	380	-	
	November	48.2	6.2	7.4	25.2	6.2	19.6	10.6	2	72	77		
Nickel	October	BDL	BDL	BDL	104	11.6	BDL	9.8	BDL	12.2	21.6	100	
	November	2.2	1.8	BDL	2.6	1.6	2	1.8	BDL	2	5		
Lead	October	10	25.2	28.2	33.8	42.6	18	31.2	32.6	326	30.2	530	
	November	6.4	5.6	3.4	6.2	4.6	6.2	4	BDL	5.4	13.6		
Zinc	October	12	14.8	81	48.4	54	16.6	40.6	11.6	32.6	63.6	720	
	November	64.4	520	21	780	294	330	284	100.8	342	4500		
Arsenic	October	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	50	
	November	BDL	BDL	BDL	3.2	2.2	BDL	BDL	BDL	BDL	BDL		
Mercury	October	28	64	92	184	140	46	160	50	138	372	36	
	November	20	7.4	12	17.4	10.6	25.2	8.2	1.6	9	40.4		
Alpha BHC	February		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-	
	October	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL		
Gamma BHC	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-	
	October	BDL	BDL	BDL	BDL	BDL	7.85	BDL	BDL	BDL	BDL		
Delta BHC	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-	
	October	BDL	19.62	11.15	12.75	17.37	25.75	28.5	BDL	17.27	BDL		
	November	10.3	8.13	BDL	BDL	BDL	13.53	BDL	BDL	17.45	BDL		



Aldrin	October	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.32
	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Dicofof	October	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
	October	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
Alpha Endosulphan	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
	October	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
Diieldrin	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
	October	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
Beta Endosulphan	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
	October	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
OP- DDT	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
	October	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
PP-DDT	November	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-
	October	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	-

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SLUDGE SAMPLE ANALYSIS				Limit mg/kgas per MOEF Guidelines
PARAMETERS	MONTH	Alappuzha		
		P3	P6	
Cadmium	October	1	1	13
	November	BDL	BDL	
Total Chromium	October	40	30	-
	November	14	8	
Copper	October	6	10	190
	November	BDL	BDL	
Iron	October	10000	16400	-
	November	2680	1942	
Manganese	October	24	50	-
	November	16	BDL	
Nickel	October	8	8	100
	November	BDL	BDL	
Lead	October	18	10	530
	November	14	BDL	
Zinc	October	20	28	720
	November	184	10	
Arsenic	October	BDL	BDL	50
	November	BDL	BDL	
Mercury	October	56	100	36
	November	22	12	

ALAPPUZHA	
P3	Erappan para
P6	Chooral vayal

