BEFORE THE NATIONAL GREEN TRIBUNAL PRINCIPAL BENCH NEW DELHI

ORIGINAL APPLICATION No. 728 OF 2023

IN THE MATTER OF:

In Re: News Item Appearing In Hindustan Dated 30.11.2023 Titled “ARSENIC FOUND IN GROUNDWATER IN 25 STATES, FLUORIDE IN 27 STATES: GOVT.”

REPORT FILED BY THE SECRETARY ENVIRONMENT FOR STATE OF KERALA

FILED BY: NISHE RAJEN SHONKER FOR STATE OF KERALA

STATEMENT IN OA No.728/2023 IN HON'BLE NATIONAL GREEN TRIBUNAL (PB), SUBMITTED BY SECRETARY, ENVIRONMENT, GOVERNMENT OF KERALA ON BEHALF OF THE 12th RESPONDENT

It is submitted that regarding this Hon'ble National Green Tribunal vide order dated 20.12.2023 in OA No.728/2023 "Arsenic found in groundwater in 25 States, fluoride in 27 States Government." a comprehensive report illustrating the current status of the State of Kerala is furnished herewith.

Arsenic is a naturally occurring trace element found in rocks, soils and the water in contact with them. Arsenic has been recognized as a toxic element and is considered a human health hazard. The maximum permissible limit of Arsenic for drinking purpose is 0.01 mg/l (or 10 ppb) as per BIS (Bureau of Indian Standards) Drinking Water Standards (IS 10500:2012). The BIS permissible limit of Arsenic was revised from 0.05 mg/l (50 ppb) to 0.01 mg/l (10 ppb) in the year 2015.

BIS has recommended an upper desirable limit of 1.0 mg/l, as desirable concentration of fluoride in drinking water, which can be extended to 1.5 mg/l, in case no alternative source of water is available. Water with concentration of fluoride more than 1.5 mg/l, are not suitable for drinking purposes.

As per the report by Hon'ble NGT in OA No.728/2023, the cases of Arsenic > 0.01 mg /l, have been recorded in ground water in Kollam District of Kerala and various Districts of Kerala namely, Palakkad,

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Alappuzha, Idukki, Ernakulum, Thiruvananthapuram, Malappuram reported Fluoride content > 1.5 mg/l.

Various departments namely, Central Ground Water Board (CGWB), Ground Water Department, Kerala and Centre for Water Resources Development and Management (CWRDM) was instructed to submit a report in this regard by Kerala State Pollution Control Board. An online meeting was also conducted on 31-1-24 in this regard(Minutes of the meeting is enclosed). As per the analysis by these departments, main reason for these contaminants are reported as the geogenic sources. Reports were obtained from the corresponding Departments and the findings are detailed below.

1) Centre for Water Resources Development and Management

CWRDM conducted analysis on total number of 350 samples for fluoride, water quality parameters including bacteriological parameters from 94 Panchayaths of 13 blocks of Palakkad district between May 2014 and December 2014. A total of 48 sampling stations showed value of Fluoride > 1 mg/l (Table 1). Out of which, 25 sampling stations showed value of Fluoride > 1.5 mg/l

Table 1: Details of Locations with Fluoride Concentration >1ppm in Palakkad District.

Sl. No	Station	Latitude-N	Longitude -E	Well type	Panchayath	Fluride concentration (mg/1)
1	Santhosh AS	10° 34'4. 8"	76°48'5 4.0"	Bore well	Muthala mada	1.30

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	Muthalamada					
2	**Public well Muthalamada**	**10° 34' 44.4"**	**76° 46' 19.2"**	**Open well**	**Muthalamada**	**2.0**
3	**Rajappan Chulliyarmedu Muthalamada**	**10° 34' 37.2"**	**76° 46' 51.6"**	**Open well**	**Muthalamada**	**2.10**
4	**Jailavudeen KSJ Manzil Muthalamada**	**10° 34' 37.2"**	**76° 46' 58.8"**	**Open well**	**Muthalamada**	**1.60**
5	**Haneefa Adavumaram Muthalamada**	**10° 36' 18.0"**	**76° 48' 28.8"**	**Bore well**	**Muthalamada**	**1.90**
6	Mohanan Nideesh Agro Farm Muthalamada	10° 34' 15.6"	76° 47' 42.0"	Bore well	Muthalamada	1.50
7	G L P S Muchenkund	10° 37' 4.8"	76° 44' 6.0"	Open well	Muthalamada	1.30

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	u Muthalamada					
8	**Public well Muthalamada**	**10° 37' 26.4"**	**76° 46' 19.2"**	**Open well**	**Muthalamada**	**2.90**
9	Veluchami Govindapuram Muthalamada	10° 35' 52.8"	76° 49' 30.0"	Open well	Muthalamada	1.10
10	**Selvaraj Govindapuram Muthalamada**	**10° 37' 37.2"**	**76° 45' 14.4"**	**Open well**	**Muthalamada**	**1.60**
11	Public well Valiyachella Muthalamada	10° 37' 30.0"	76° 47' 38.4"	Open well	Muthalamada	1.50
12	**Ravi Valiyachella Muthalamada**	**10° 34' 22.8"**	**76° 49' 40.8"**	**Bore well**	**Muthalamada**	**1.80**
13	**Mythri Public**	**10° 33' 46.8"**	**76° 33' 46.8"**	**Open well**	**Muthalamada**	**1.80**

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	Well Muthalamada					
14	**Yusuf Muthalamada**	**10° 34' 58.8"**	**76° 45' 0.0"**	**Pond**	**Muthalamada**	**1.80**
15	**Jailavudeen Manchira Muthalamada**	**10° 36' 0.0"**	**76° 42' 57.6"**	**Open well**	**Muthalamada**	**1.80**
16	**Ismail Manchitra Muthalamada**	**10° 36' 0.0"**	**76° 43' 0.9"**	**Open well**	**Muthalamada**	**1.60**
17	Saludeen Muthalamada	10° 36' 0.0"	76° 43' 0.8"	Bore well	Muthalamada	1.10
18	Rajamani Muthalamada	10° 36' 0.0"	76° 44' 0.0"	Open well	Muthalamada	1.30
19	UmmerHathab Muthalamada	10° 36' 0.0"	76° 44' 0.0"	Bore well	Muthalamada	1.10
20	Govt. L P School Elappully	10° 45' 28.8"	76° 44' 29.7"	Bore well	Elappully	1.10

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21	Govt. LP School Elappully	10 ° 45' 2 8.8"	76 ° 44' 2 9.7 "	Open well	Elappully	1.20
22	Govt. H S S Kanjikkode	10 ° 47' 5 6.4"	76 ° 44' 3 9.6 "	Bore well	Pudusseri	1.10
23	Govt. L P School Muthalamada	10 ° 36' 2 5.2"	76 ° 44' 2 6.5 "	Open well	Muthala mada	1.10
24	**Govt. L P School Muthalamada**	**10 ° 36'** 2 5.2"	**76 ° 45'** 3 8.4 "	**Bore well**	**Muthala mada**	**3.10**
25	**Arvindakshan Pudunagaram**	**10 ° 39'** 5 0.4"	**76 ° 41'** 1 5.1"	**Open well**	**Pudunaga ram**	**1.90**
26	**Narayanan Chettiyar M adom Pallassana**	**10 ° 39'1.** 4.4"	**76 °** 39' 3 8.7 "	**Bore well**	**Pallassena**	**1.60**
27	Saleem Tharappadam Ayiloor, Nenmara	10 ° 34' 3 0.0"	76 ° 33' 4 1.6 "	Bore well	Nemmara	1.40
28	Vishnudas Vattekadu	10 ° 36' 3 2.4"	76 ° 40' 5 0 "	Open well	Elavancher y	1.30

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29	Eeswaran Namboodiri Kannadi Kuzhalmandam	10° 43' 58.8"	76° 36' 51.4"	Bore well	Kuzhalmandam	1.30
30	Unnikrishnan Kuzhalmandam	10° 55' 0.0"	76° 37' 30.7"	Bore well	Kuzhalmandam	1.30
31	Dr. Sunil Kottayi Kuzhalmandam	10° 36' 12.5"	76° 39' 30.4"	Bore Well	Kuzhalmandam	1.10
32	Mammu Muthuthala Pattambi	10° 48' 13.3"	76° 9' 49.3"	Bore well	Muthuthala	1.10
33	Marappan, Kottamedu	**11° 13' 20"**	**76° 41' 42"**	**Bore well**	kottamedu	**1.90**
34	Nakkappathi piriveOoru, Agali	**11° 4' 59"**	**76° 35' 42"**	**Open well**	**Agali**	**2.30**
35	Ponnan, Matthukadu	11° 5' 6"	76° 41' 2"	Pipe line	Sholayoor	1.30

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	Sholayoor					
36	Jayan, Thekkumukkayoor	11° 7' 23"	76° 41' 49"	Jalanidhi project		1.50
37	Sumathi, KodapattyOoru, Sholayoor	11° 8' 35"	76° 42' 58"	Pipe line	Sholayoor	1.40
38	**Chamy N, Naikerpady Agali**	**11° 3' 43"**	**76° 37' 44"**	**Open Well**	**Agali**	**2.10**
39	Kuruvankandi Ooru, Thavalam Agali	10° 58' 19"	76° 34' 30"	Hand Pump	Agali	1.10
40	Balasubhramanyan, PadavayalOoru Pudur	11° 9' 0"	76° 26' 28"	Bore Well	Pudur	1.10
41	**MadheyanKallumukki Ooru '60 families**	**11° 11' 13"**	**76° 36' 14"**	**Hand pump**		**1.70**
42	**Palanichami Goundar Sholayur**	**11° 56' 56"**	**76° 38' 46"**	**Bore well**	**Sholayur**	**2.80**
43	**R Velligiri Mattathukk**	**11° 8' 46"**	**76° 42' 60"**	**Open well**	**Sholayur**	**2.30**

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	ad Ooru Sholayur					
44	Thulasi Vannanthala Ooru Sholayur	11° 7' 56"	76° 44' 41"	Jalanidhi	Sholayur	2.70
45	Thoova Ooru Sholayur	11° 4' 60"	76° 44' 11"	Pipe line	Sholayur	3.10
46	Duraisami Kottathurai Sholayur	11° 8' 16"	76° 41' 33"	Open well	Sholayur	2.10
47	Nanjamma Vattalakki	11° 7' 23"	76° 43' 9"	Bore well	Sholayur	2.0
48	Selvan Sholayur	11° 5' 35"	76° 43' 60"	Bore well	Sholayur	2.80

The study mainly focused on mapping and monitoring of fluoride in selected regions of Palakkad district to delineate fluoride concentration in the groundwater samples. Sholayur Panchayath of Attappady block in Palakkad District is grossly contaminated with fluoride. Selected schools of eastern parts of Palakkad were surveyed and water samples were collected and analyzed (Table 2). Two de fluoridation filters based on Reverse Osmosis technology was supplied to Govt. H.S.S Muthalamada and Govt. L.P.S Moochenkundu schools

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in Muthalamada Panchayath where concentration of fluoride > 1 mg/l was detected. CWRDM reported that arsenic contamination was not reported in their studies. Report by CWRDM is submitted as Annexure I. (Page No. 14- 17).

Table 2: Details of Locations with Fluoride Concentration > 1ppm in schools of Palakkad District.

Sl. No.	Name of School	Panchayath	Fluoride Concentration(mg/l)
1	Govt. L.P School, Moochenkundu Muthalamada	Muthalamada	1.30
2	Govt. L.P School, Muthalamada	Muthalamada	1.10
3	Govt U.P School, Elappully	Elappully	1.20
4	Govt. H.S.S,Muthalamada	Muthalamada	3.10

2) Central Ground Water Board

CGWB reported fluoride content only in districts namely Malappuram (Village: Manjeri), Palakkad (Village: Koppanur and Vattaluki) and Alappuzha (Village: Pazhaveedu and Komalapuram – 1). Locations showing Fluoride concentration higher than BIS limit is shown in Table 3. Arsenic content was not found in the studies conducted by CGWB. Report by CGWB is submitted as Annexure II. (Page No. 18).

Table 3: Locations showing the Fluoride concentration higher than BIS limit (>1.5mg/L)

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S.No.	District	Block	Village	Latitude	Longitude	F
1	Malappuram	Manjeri	Manjeri	11.1201	76.1201	2.092
2	Palakkad	Chittur	Koppanur	10.7600	76.7800	4.49
3	Palakkad	Attappadi	Vattaluki	11.1400	76.7200	1.52
4	Alappuza	Ambalappuzha	Pazhaveedu	9.4644	76.3655	1.88
5	Alappuza	Aryad	Komalapuram-1	9.5422	76.3422	1.8

3) Central Laboratory, KSPCB

Heavy metal testing is done half yearly by the Board in 17 stations. As per the analysis conducted, the value of Fluoride is within limits and Arsenic values are found to be within limits in all cases except once (well at Kureepuzha, Kollam) which showed a value of As as 0.031 mg/l (>0.01 mg/l) in October 2023. Further studies will be carried out in this regard. Report by Central Laboratory, KSPCB is submitted as Annexure III (Page No. 19-21).

4) Ground Water Department, Kerala

As per the report by Kerala Groundwater Department fluoride concentration greater that 1.5 mg/l is reported in Palakkad (Village: Kannambra, Kalladikode, Cheruplacherry, Mannarkad, Nallepilly and

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Elavancherry) and Alappuzha (Village: Ramankari). Locations showing the Fluoride concentration higher than BIS limit (>1.5mg/L) is shown in Table 4. Arsenic content higher than BIS limit is not reported by Ground Water Department. The State Groundwater Department is implementing remedial measures such as artificial recharge measures, activities such as Catch the rain Programme of Ministry of Jal Sakthi and also conducting awareness programs to the concerned. Report by Ground Water Department, Kerala is submitted as Annexure IV.

(Page No. 22 - 24)

Table 4: Observation Well Locations showing the Fluoride concentration higher than BIS limit (>1.5mg/L)- established by State Groundwater Department.

District	Block	Village	Well Type	Latitude	Longitude	Fluoride(FI) (>1.5mg/L)
Palakkad	Alathur	Kannambra	Open Well	10.6158	76.4583	1.85
Palakkad	Mannarkad	Kalladikode	Open Well	10.8930	76.5391	1.53
Palakkad	Ottappalam	Cherpulacherry	Open Well	10.8813	76.3186	1.97
Palakkad	Mannarkkad	Mannarkad	Open Well	10.9925	76.4586	1.87
Palakkad	Chittur	Nalleppilly	Open Well	10.7405	76.8169	1.7
Palakkad	Chittur	Elavancherry	Bore Well	10.5974	76.6636	3.58
Alappuzha	Kuttanad	Ramankari	Tube Well	9.4286	76.4674	1.6

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Based on the details furnished from corresponding Departments, it can be concluded that Fluoride contamination is mostly seen in Palakkad (Panchayats: Muthalamada, Pallassena, Agali and Sholayur; Villages- Koppanur, Vattaluka), Malappuram (Village – Manjeri) and Alappuzha (Komalapuram-1, Pazhaveedu) . Arsenic contamination is not reported in the studies. The source of contamination is probably geogenic in nature.

From the above, it is humbly submitted that it is necessary to earmark the affected areas by spatial analysis studies by the State Ground Water Department and remedial measures like provision of rain water harvesting facilities, provision of filter such as Reverse Osmosis plant, use of surface water for drinking purpose or alternative source of water to the people are to be taken in the affected area by concerned departments like Kerala Water Authority or Water Resources Department through the respective Local Self Government Institution.

Dated this 16th February 2024

ENVIRONMENT DEPARTMENT
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GOVT. SECRETARIAT

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FILED ON: 13.03.2024

ANNEXURE I (Report of CWRDM)

Report of Fluoride analysis in drinking water of Palakkad District

A total number of 350 samples were analyzed for fluoride, water quality parameters including bacteriological parameters from 94 Panchayaths of 13 blocks of Palakkad district by CWRDM between May 2014 and December 2014. The details of locations where Fluoride concentration was more than 1ppm (acceptable limit of BIS) is provided in the table below.

Details of Locations with Fluoride Concentration > 1ppm in Palakkad District

Sl. No.	Station	Latitude-N	Longitude-E	Well type	Panchayath	Fluoride concentration (mg/l)
1	Santhosh A S Muthalamada	10° 34' 4.8"	76° 48' 54.0"	Bore well	Muthalamada	1.30
2	Public well Muthalamada	10° 34' 44.4"	76° 46' 19.2"	Open well	Muthalamada	2.0
3	Rajappan Chulliyarmedu Muthalamada	10° 34' 37.2"	76° 46' 51.6"	Open well	Muthalamada	2.10
4	Jailavudeen KSJ Manzil Muthalamada	10° 34' 37.2"	76° 46' 58.8"	Open well	Muthalamada	1.60
5	Haneefa Adavumaram Muthalamada	10° 36' 18.0"	76° 48' 28.8"	Bore well	Muthalamada	1.90
6	Mohanan Nideesh Agro Farm Muthalamada	10° 34' 15.6"	76° 47' 42.0"	Bore well	Muthalamada	1.50
7	G L P S Muchenkundu Muthalamada	10° 37' 4.8"	76° 44' 6.0"	Open well	Muthalamada	1.30
8	Public well Muthalamada	10° 37' 26.4"	76° 46' 19.2"	Open well	Muthalamada	2.90
9	Veluchami Govindapuram Muthalamada	10° 35' 52.8"	76° 49' 30.0"	Open well	Muthalamada	1.10
10	Selvaraj Govindapuram Muthalamada	10° 37' 37.2"	76° 45' 14.4"	Open well	Muthalamada	1.60
11	Public well Valiyachella Muthalamada	10° 37' 30.0"	76° 47' 38.4"	Open well	Muthalamada	1.50
12	Ravi Valiyachella Muthalamada	10° 34' 22.8"	76° 49' 40.8"	Bore well	Muthalamada	1.80
13	Mythri Public Well Muthalamada	10° 33' 46.8"	76° 33' 46.8"	Open well	Muthalamada	1.80
14	Yusuf	10° 34'	76° 45' 0.0"	Pond	Muthalamada	1.80

	Muthalamada	58.8"				
15	Jailavudeen Manchira Muthalamada	10° 36' 0.0"	76° 42' 57.6"	Open well	Muthalamada	1.80
16	Ismail Manchitra Muthalamada	10° 36' 0.0"	76° 43' 0.9"	Open well	Muthalamada	1.60
17	Saludeen Muthalamada	10° 36' 0.0"	76° 43' 0.8"	Bore well	Muthalamada	1.10
18	Rajamani Muthalamada	10° 36' 0.0"	76° 44' 0.0"	Open well	Muthalamada	1.30
19	UmmerHathab Muthalamada	10° 36' 0.0"	76° 44' 0.0"	Bore well	Muthalamada	1.10
20	Govt. L P School Elappully	10° 45' 28.8"	76° 44' 29.7"	Bore well	Elappully	1.10
21	Govt. L P School Elappully	10° 45' 28.8"	76° 44' 29.7"	Open well	Elappully	1.20
22	Govt. H S SKanjikkode Pudusseri	10° 47' 56.4"	76° 44' 39.6"	Bore well	Pudusseri	1.10
23	Govt.L P School Muthalamada	10° 36' 25.2"	76° 43' 56.5"	Open well	Muthalamada	1.10
24	Govt.School Muthalamada	10° 36' 25.2"	76° 45' 38.4"	Bore Well	Muthalamada	3.10
25	Aravindakshan Pudunagaram	10° 39' 50.4"	76° 41' 15.1"	Open well	Pudunagaram	1.90
26	Narayanan Chettiyar Madom Pallassana	10° 39' 14.4"	76° 39' 38.7"	Bore Well	Pallassena	1.60
27	Saleem Tharappadam Ayiloor, Nenmara	10° 34' 30.0"	76° 33' 41.6"	Bore Well	Nemmara	1.40
28	Vishnudas Vattekadu Elavancheri	10° 36' 32.4"	76° 40' 5.0"	Open Well	Elavanchery	1.30
29	Eeswaran Namboodiri Kannadi Kuzhalmandam	10° 43' 58.8"	76° 36' 51.4"	Bore well	Kuzhalmannam	1.30
30	Unnikrishnan Kuzhalmandam	10° 55' 0.0"	76° 37' 30.7"	Bore well	Kuzhalmannam	1.30
31	Dr. Sunil Kottayi Kuzhalmandam	10° 36' 12.5"	76° 39' 30.4"	Bore Well	Kuzhalmannam	1.10
32	Mammu Muthuthala Pattambi	10° 48' 13.3"	76° 9' 49.3"	Bore well	Muthuthala	1.10
33	Marappan, Kottamedu	11° 13' 20"	76° 41' 42"	Bore well		1.90
34	Nakkappathipirive Ooru Agali	11° 4' 59"	76° 35' 42"	Open well	Agali	2.30
35	Ponnan, Mattathhukadu Sholayoor	11° 5' 6"	76° 41' 2"	Pipe line	Sholayur	1.30

36	Jayan, Thekkumukkayoor	11° 7' 23"	76° 41' 49"	Jalanidhi project		1.50
37	Sumathi, KoodapattyOoru, Sholayoor	11° 8' 35"	76° 42' 58"	Pipe line	Sholayur	1.40
38	Chamy N, Naikerpady Agali	11° 3' 43"	76° 37' 44"	Open Well	Agali	2.10
39	KuruvankandiOoru, Thavalam Agali	10° 58' 19"	76° 34' 30"	Hand Pump	Agali	1.10
40	Balasubhramanyan, PadavayalOoru Pudur	11° 9' 0"	76° 26' 28"	Bore Well	Pudur	1.10
41	MadheyanKallumukkiOoru '60 families	11° 11' 13"	76° 36' 14"	Hand pump		1.70
42	Palanichami Goundar Sholayur	11° 56' 56"	76° 38' 46"	Bore well	Sholayur	2.80
43	R Velligiri MattathukkadOoru Sholayur	11° 8' 46"	76° 42' 60"	Open well	Sholayur	2.30
44	Thulasi VannanthalaOoru Sholayur	11° 7' 56"	76° 44' 41"	Jalanidhi	Sholayur	2.70
45	ThoovaOoru Sholayur	11° 4' 60"	76° 44' 11"	Pipe line	Sholayur	3.10
46	Duraisami Kottathurai Sholayur	11° 8' 16"	76° 41' 33"	Open well	Sholayur	2.10
47	Nanjamma Vattalakki	11° 7' 23"	76° 43' 9"	Bore well	Sholayur	2.0
48	Selvan Sholayur	11° 5' 35"	76° 43' 60"	Bore well	Sholayur	2.80

The study mainly focused on mapping and monitoring of fluoride in selected regions of Palakkad district to delineate fluoride concentration in the groundwater samples. Sholayur Panchayath of Attappady block in Palakkad District is grossly contaminated with fluoride. Selected schools of eastern parts of Palakkad were surveyed and water samples were collected and analysed. Two defluoridation filters based on Reverse Osmosis technology was supplied to Govt. H.S.S Muthalamada and Govt. L.P.S Moochenkundu schools in Muthalamada Panchayath where comparatively high concentration of fluoride was detected.

Details of Locations with Fluoride Concentration > 1ppm in schools of Palakkad District

Sl. No.	Name of School	Panchayath	Fluoride Concentration(mg/l)
1	Govt. L.P School, Moochenkundu Muthalamada	Muthalamada	1.30
2	Govt. L.P School, Muthalamada	Muthalamada	1.10
3	Govt U.P School, Elappully	Elappully	1.20
4	Govt. H.S.S,Muthalamada	Muthalamada	3.10

ANNEXURE II (Report of CGWB)

1. Locations showing the Fluoride concentration higher than BIS limit (>1.5mg/L)

S.No.	District	Block	Village	Latitude	Longitude	F
1	Malappuram	Manjeri	Manjeri	11.1201	76.1201	2.092
2	Palakkad	Chittur	Koppanur	10.7600	76.7800	4.49
3	Palakkad	Attappadi	Vattaluki	11.1400	76.7200	1.52
4	Palakkad	Ambalappuzha	Pazhaveedu	9.4644	76.3655	1.88
5	Alappuza	Aryad	Komalapuram-1	9.5422	76.3422	1.8

2. Locations showing the Arsenic concentration higher than BIS limit (>0.01mg/L)

Nil

ANNEXURE III (Report of Central Lab, KSPCB)

NWMP SAMPLING OCTOBER 2022					
STNCode	Name of Monitoring Location	District	Frequency Of Monitoring	Flouride	Arsenic
19	Eloor well	Eranakulam	Half Early	BDL	0.001
35	Well at Punalur	Kollam	Half Early	BDL	BDL
1581	Well at Pappanamcodu	Thiruvananthapuram	Half Early	BDL	0.004
1582	Well at Nedumangadu	Thiruvananthapuram	Half Early	BDL	
1583	Well at Kundara	Kollam	Half Early	BDL	BDL
1584	Well at Cherthala	Alappuzha	Half Early	0.80	
1585	Vyttila Well	Eranakulam	Half Early	BDL	0.004
1586	Edayar Well	Eranakulam	Half Early	BDL	0.004
1587	Kalamassery well	Eranakulam	Half Early	BDL	0.002
1589	Well at Malappuram	Malappuram	Half Early	BDL	0.003
2313	Well at Sarvodayapuram	Alapuzha	Half Early	0.80	BDL
2314	Well at kureepuzha	Kollam	Half Early	BDL	BDL
2315	Well at Chavara	Kollam	Half Early	BDL	BDL
2320	Manjery well at G.B.H.S.S Manjery	Malappuram	Half Early	BDL	0.001
2323	Brahmapuram Well	Eranakulam	Half Early	BDL	BDL
2324	Ambalamugal Borewell	Eranakulam	Half Early	BDL	0.002
2327	Well at Kurukamani	Palakkad	half yearly	BDL	0.008

	NWMP SAMPLING APRIL - 2023					
STN Code	Name Of Monitoring Location	Type Water Body	District	Frequency of Monito	Fluoride (mg/L)	Arsenic (mg/L)
19	WELL AT ELOOR,ERNAKULAM	GROUND WATER	ERNAKULAM	HALF-YEARLY	0.4	BDL
35	WELL AT PUNALUR, KERALA	GROUND WATER	KOLLAM	HALF-YEARLY	BDL	BDL
1581	WELL AT PAPPANAMKODE, THIRUVANANTHAPURAM, KERALA	GROUND WATER	THIRUVANANTHA	HALF-YEARLY	BDL	BDL
1582	WELL AT NEDUMANGAD, THIRUVANANTHAPURAM, KERALA	GROUND WATER	THIRUVANANTHA	HALF-YEARLY	BDL	BDL
1583	WELL AT KUNDARA, KOLLAM DISTT. , KERALA	GROUND WATER	KOLLAM	HALF-YEARLY	BDL	BDL
1584	WELL AT CHERTHALA, ALLEPPY, KERALA	GROUND WATER	ALAPPUZHA	HALF-YEARLY	BDL	BDL
1585	WELL AT VYTTILA, ERNAKULAM DISTT. KERALA	GROUND WATER	ERNAKULAM	HALF-YEARLY	0.5	BDL
1586	WELL AT EDAYAR ERNAKULAM DISTT., KERALA	GROUND WATER	ERNAKULAM	HALF-YEARLY	0.4	BDL
1587	WELL AT KALAMASSERY ERNAKULAM DISTT. ,KERALA	GROUND WATER	ERNAKULAM	HALF-YEARLY	0.3	BDL
1589	WELL AT MALAPURAM , KERALA	GROUND WATER	MALAPPURAM	HALF-YEARLY	BDL	BDL
2313	WELL AT SARVODAPURAM, ALAPPUZHA	GROUND WATER	ALAPPUZHA	HALF-YEARLY	BDL	BDL
2314	WELL AT KUREEPUZHA (KOLLAM)	GROUND WATER	KOLLAM	HALF-YEARLY	BDL	BDL
2315	WELL AT K.M.M.L. (KOLLAM)	GROUND WATER	KOLLAM	HALF-YEARLY	BDL	BDL
2320	WELL AT MANJERI	GROUND WATER	MALAPPURAM	HALF-YEARLY	BDL	BDL
2323	WELL AT BRAHMAPURAM M.S.W. DUMPARK	GROUND WATER	ERNAKULAM	HALF-YEARLY	0.3	BDL
2324	WELL AT HAZARDOUS WASTE DUMP (AMBALAMUGAL BOREWELL)	GROUND WATER	ERNAKULAM	HALF-YEARLY	0.5	BDL
2327	WELL AT KARUKAMANI	GROUND WATER	PALLAKAD	HALF-YEARLY	BDL	0.008

Note

:For Arsenic,< or= 0.00049 mg/l is reported as BDL

:For Fluoride,< or=0.2 mg/l is reported as BDL

CES, 23/1/24

	NWMP SAMPLING OCTOBER-2023					
STN Code	Name Of Monitoring Location	Type Water Body	District	Frequency of Monitoring	Fluoride (mg/L)	Arsenic (mg/L)
19	WELL AT ELOOR,ERNAKULAM	GROUND WATER	ERNAKULAM	HALF-YEARLY	BDL	BDL
35	WELL AT PUNALUR, KERALA	GROUND WATER	KOLLAM	HALF-YEARLY	BDL	0.007
1581	WELL AT PAPPANAMKODE, THIRUVANANTHAPURAM, K	GROUND WATER	THIRUVANANTHAPURAM	HALF-YEARLY	BDL	0.001
1582	WELL AT NEDUMANGAD, THIRUVANANTHAPURAM, KE	GROUND WATER	THIRUVANANTHAPURAM	HALF-YEARLY	BDL	BDL
1583	WELL AT KUNDARA, KOLLAM DISTT. , KERALA	GROUND WATER	KOLLAM	HALF-YEARLY	BDL	BDL
1584	WELL AT CHERTHALA, ALLEPPY, KERALA	GROUND WATER	ALAPPUZHA	HALF-YEARLY	NA	NA
1585	WELL AT VYTTILA, ERNAKULAM DISTT. KERALA	GROUND WATER	ERNAKULAM	HALF-YEARLY	NA	NA
1586	WELL AT EDAYAR ERNAKULAM DISTT., KERALA	GROUND WATER	ERNAKULAM	HALF-YEARLY	BDL	BDL
1587	WELL AT KALAMASSERY ERNAKULAM DISTT. ,KERALA	GROUND WATER	ERNAKULAM	HALF-YEARLY	BDL	BDL
1589	WELL AT MALAPURAM , KERALA	GROUND WATER	MALAPPURAM	HALF-YEARLY	BDL	BDL
2313	WELL AT SARVODAPURAM, ALAPPUZHA	GROUND WATER	ALAPPUZHA	HALF-YEARLY	BDL	BDL
2314	WELL AT KUREEPUZHA (KOLLAM)	GROUND WATER	KOLLAM	HALF-YEARLY	BDL	0.031
2315	WELL AT K.M.M.L. (KOLLAM)	GROUND WATER	KOLLAM	HALF-YEARLY	BDL	BDL
2320	WELL AT MANJERI	GROUND WATER	MALAPPURAM	HALF-YEARLY	BDL	0.007
2323	WELL AT BRAHMAPURAM M.S.W. DUMPARK	GROUND WATER	ERNAKULAM	HALF-YEARLY	BDL	BDL
2324	WELL AT HAZARDOUS WASTE DUMP (AMBALAMUGAL E	GROUND WATER	ERNAKULAM	HALF-YEARLY	BDL	BDL
2327	WELL AT KARUKAMANI	GROUND WATER	PALLAKAD	HALF-YEARLY	BDL	BDL

Note

:For Arsenic,< or= 0.00049 mg/l is reported as BDL

:For Fluoride,< or=0.2 mg/l is reported as BDL

* NA : Not Analysed

CE-S

23/1/24.

ANNEXURE IV (Report by Ground Water Department, Kerala)

Arsenic found in Groundwater in 25 States , Fluoride in 27 States

Para - 3

a. Arsenic Contamination of Groundwater in Kerala:-

Central Ground Water Board was reported one isolated case of Arsenic contamination in groundwater during the analysis conducted during 2016. Detailed analysis in the location has proved no such contamination .Hence no locations in the State is having Arsenic content higher than the BIS limit.

Para – 4

b. Fluoride contamination of Groundwater in Kerala:-

In Kerala, Fluoride contamination in groundwater is mainly reported in certain pockets in Palakkad, Alappuzha and Malappuram Districts. The fluoride contamination is solely geogenic in nature.

Observation Well Locations showing the Fluoride concentration higher than BIS limit (>1.5mg/L)- Established by Central Groundwater Board

Sl.No.	District	Block	Village	Latitude	Longitude	Fluoride (Fl) (>1.5mg/L)
1	Malappuram	Manjeri	Manjeri	11.1201	76.1201	2.092
2	Palakkad	Chittur	Koppanur	10.7600	76.7800	4.49
3	Palakkad	Attappadi	Vattaluki	11.1400	76.7200	1.52
4	Alappuza	Ambalappuzha	Pazhaveedu	9.4644	76.3655	1.88
5	Alappuza	Aryad	Komalapuram-1	9.5422	76.3422	1.8

Observation Well Locations showing the Fluoride concentration higher than BIS limit (>1.5mg/L)- established by State Groundwater Department

District	Block	Village	Well Type	Latitude	Longitude	Fluoride(Fl) (>1.5mg/L)
Palakkad	Alathur	Kannambra	Open Well	10.6158	76.4583	1.85
Palakkad	Mannarkad	Kalladikode	Open Well	10.8930	76.5391	1.53
Palakkad	Ottappalam	Cherpulacherry	Open Well	10.8813	76.3186	1.97
Palakkad	Mannarkad	Mannarkad	Open Well	10.9925	76.4586	1.87
Palakkad	Chittur	Nalleppilly	Open Well	10.7405	76.8169	1.7
Palakkad	Chittur	Elavancherry	Bore well	10.5974	76.6636	3.58
Alappuzha	Kuttanad	Ramankari	Tube Well	9.4286	76.4674	1.6

Remedial Measures being Implemented by the State Groundwater Department

- The fluoride contamination can be reduced by enhancing the recharge of groundwater in the affected areas. The State Groundwater Department is implementing artificial recharge measures all over the State utilizing the State Budget. Apart from this, Jal Shakti Abhiyan – Catch the rain Programme proposed by Ministry of Jal Shakti, Government of India by utilizing State and Central funds for implementing different water conservation activities .The State is giving priority to areas where the ground water quantity and quality is deteriorating as per the Groundwater Resource Estimation Reports prepared jointly by CGWB and State Groundwater Department.
- In order to reduce the consumption of fluoride contaminated groundwater, the Department is generating awareness classes among the public to opt surface water for drinking purpose and adopt suitable groundwater management interventions in those areas.

- More spatial analysis studies shall be carried out to understand the spatial concentration of the fluoride contamination in the affected areas. Based on this the possibility of dilution techniques with surface water can be adopted.

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KERALA STATE POLLUTION CONTROL BOARD
കേരള സംസ്ഥാന മലിനീകരണ നിയന്ത്രണ ബോർഡ്
Pattom P.O., Thiruvananthapuram – 695 004
പട്ടം പി.ഒ., തിരുവനന്തപുരം - 695 004

Minutes of Meeting regarding the matter in OA No. 728/2023 held on 31/01/2024 at 03:00 pm

The discussion via VC regarding the matter in OA No. 728/2023, commenced at 03:00 pm on 31/01/2024 with the Member Secretary presiding. Member Secretary welcomed the participants. The following officials attended the meeting.

1. Smt. Soya Y Das, Chief Chemist, Analytical lab, Groundwater Department, Kerala.
2. Sri. A.G. Gopakumar, Superintending Hydrogeologist, Groundwater Department, Kerala
3. Smt. Mini Chandran, Scientific Officer, Central Ground Water Board
4. Dr. Resmi T R, Senior Scientist & Head i/c, Ecology and Environment Research Group, Centre for Water Resources Development and Management
5. Sri. V.T Sajimon, Chief Environmental Scientist, Central lab, KSPCB
6. Er. Pravitha P.K, Assistant Environment Engineer, KSPCB
7. Er. Ivan Biju Varghese, Assistant Engineer, KSPCB
8. Er. Reshma R Pillai, Assistant Engineer, KSPCB

MS briefed about the order of the Hon'ble NGT on OA No. 728/2023 "Arsenic found in groundwater in 25 States, fluoride in 27 States". Representative from CGWB said that Arsenic is not yet reported in any of their analysis. They conducted analysis in 2016 in whole parts of Kerala and only one isolated case was reported then and further reports never showed the presence of Arsenic. As per the Hon'ble NGT order, Arsenic is said to be found in the district Kollam, however, CGWB analysis never shows arsenic contamination in Kollam. In case of Fluorides, Palakkad and Alappuzha shows more fluoride content in the analysis report. She added main source of these contaminants are the geogenic sources. The most recommended and effective solution for Fluoride contamination is dilution. Another process called Nalgonda technique is used, but it is costly. The National Hydrographic station in Attapady shows the presence of fluoride content. Chittur Block, Attappadi

are the blocks in Palakkad which shows fluoride contamination. Micro level studies are being done in these areas.

The Chief Scientist, Kerala Groundwater Department said in Palakkad, Ottapalam, Alathur, Chittur, Mannarkkad, Malampuzha, Pattambi, Sreekrishnapuram, Nemmara, Kollengode are the regions where fluoride contamination is reported. Mostly the values vary seasonally and show a peak value during summer season. Arsenic content is not reported yet as per the analysis reports.

MS instructed all the departments to share a brief report on the same urgently, so that the compiled report can be submitted to the Environment department, as report is to be submitted to the Hon'ble NGT before 15.02.2024. MS asked for a suggestion regarding control measures. The Chief Scientist, Kerala Groundwater Department informed rather than dilution feasible method is, to use alternative source. Superintending Hydrogeologist, Groundwater Department said that sample analysis can be done in affected areas and it can be checked whether any filtration facilities can be provided to reduce the fluoride content. Senior Scientist, Centre for Water Resources Development and Management said that a total number of 350 samples were analyzed for fluoride, water quality parameters including bacteriological parameters from 94 Panchayaths of 13 blocks of Palakkad district between May 2014 and December 2014 were analysed. Contamination is found both in bore wells and open wells. Filters funded by UNICEF were installed in most contaminated area. RO methods were also adopted in some places. MS asked to submit the analysis report after using RO mechanism and the details of the project funded by UNICEF. Chief Environment Scientist, KSPCB informed that analysis report has been already shared via email. As, the analysis report for the year 2023 is only submitted, MS asked to furnish the reports of previous years also to compare the quality of water. Chief Environmental Scientist, Central lab, KSPCB assured that report will be submitted.

MS instructed to submit a detailed report on the water quality and remedial measures to control contamination. She asked to report the list of various Panchayats where contamination is noted, so that actions can be implemented through local bodies.

Meeting was concluded at around 03:45 am.

MEMBER SECRETARY