

BEFORE THE NATIONAL GREEN TRIBUNAL
EASTERN ZONE BENCH, KOLKATA



ORIGINAL APPLICATION NO. 115/2024/EZ

CONCERN FOR CALCUTTA

.....APPLICANT(S)

VERSUS

THE STATE OF WEST BENGAL & ORS.

.....RESPONDENT(S)

REPORT ON AFFIDAVIT FILED BY THE WEST
BENGAL POLLUTION CONTROL BOARD.

INDEX

SL No	PARTICULARS	ANNEXURE	PAGE
1.	Affidavit		1-7
2.	Copy of the water sample report of the State Board	'R'	8-28

Filed by

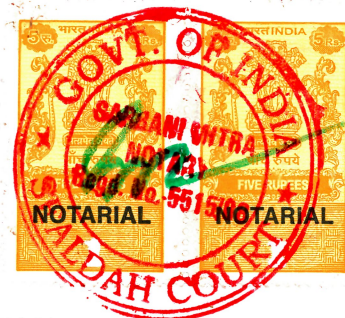
SIBOJYOTI CHAKRABORTI
ADVOCATE

SL. NO. 25. Dt.- 28 JAN 2025

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BENGAL POLLUTION CONTROL BOARD.

Most Respectfully Sheweth

I, Sri Ramkrishna Saha, son of Late Gopal Gobindo Saha, aged about 55 years, by faith-Hindu, Occupation- Service, working at West Bengal Pollution Control Board office at 10A, Block-LA, Sector-III. Bidhannagar, Kolkata-700108, do hereby solemnly declare and say as follows:-

28 JAN 2025



01. That, I am the Chief Scientist, West Bengal Pollution Control Board (hereinafter will be referred to as the 'State Board') and I am well acquainted with the facts and circumstances of the case. I have been duly authorized by the Respondent No. 03, to affirm this Affidavit on its behalf and as such, I am competent to do so.
02. That, this affidavit is being affirmed in pursuant to the orders passed by this Hon'ble Tribunal dated 01.10.2024 and 29.11.2024.
03. That, in compliance to the order of the National Green Tribunal (NGT), Eastern Zone Bench, dated 01.10.2024 it was directed that the State Board shall take water samples from Rabindra Sarobar Lake and continue monitoring the quality of the water regularly. Accordingly, West Bengal Pollution Control Board is Monitoring Rabindra Sarobar Lake on monthly basis. Detail Physico-Chemical Characteristics of the Lake water is depicted in the table below from May 2024 to October 2024.

28 JAN 2025

Table: Physico-chemical characteristics of Rabindra Sarobar lake, Kolkata (May 2024 – October 2024)

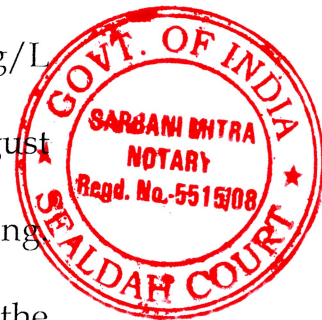
Parameters → Month ↓	Units	pH	Temp (Water)	°C	NTU	Turbidity	Ec	mg/L										mg/L				MPN/100 ml							
								DO	BO D	COD	TSS	TDS	PO ₄ -P	NO ₃ -N	T.Hardness	Chloride	SO ₄	T-Alkalinity	Fluoride	p-Alkalinity	NH ₄ -N	Boron	Na ⁺	Potassium	Ca ⁺⁺	Mg ⁺⁺	TFS	TC	FC
May 2024		7.54	31.0		6.71		337.80	8.26	3.88	22.00	36.00	292.00	0.10	0.32	90.00	44.99	29.06	110.00	0.30	nil	BDL	BDL	56.00	7.80	19.20	10.21	312.00	21 × 10 ²	9.3 × 10 ²
June 2024		7.87	28.0		7.00		309.80	7.14	3.70	23.68	46.00	208.00	0.12	0.76	74.00	39.99	31.05	110.00	0.29	nil	0.12	BDL	30.00	7.90	20.80	5.24	242.00	26 × 10 ²	13 × 10 ²
July 2024		7.84	29.0		3.00		247.00	7.21	3.11	24.19	42.00	162.00	0.02	0.55	74.00	41.99	27.60	88.00	0.26	nil	BDL	BDL	52.00	7.20	20.80	5.35	148.00	17 × 10 ²	78 × 10
August 2024		7.20	29.0		5.00		319.20	7.34	3.37	23.23	12.00	204.00	0.07	0.67	80.00	31.30	24.16	88.00	0.29	nil	BDL	BDL	34.00	7.40	20.80	6.80	156.00	4.5 × 10 ²	2.0 × 10 ²
September 2024		7.31	31.0		2.00		339.30	6.50	3.03	20.75	40.00	134.00	0.05	0.62	86.00	30.85	37.10	92.00	0.28	nil	0.12	BDL	42.00	6.80	20.00	8.75	130.00	11 × 10 ²	17 × 10
October 2024		8.97	30.0		7.00		276.50	7.54	3.17	16.66	32.00	204.00	0.04	0.57	110.00	29.00	24.50	92.00	0.24	8.00	BDL	BDL	27.00	6.40	20.00	14.58	96.00	40 × 10	11 × 10



28 JAN 2025

Data in the above table reveals the pH is in the alkaline range except August and September 2024 i.e 7.20 and 7.31 respectively. But in the month of May, June, July and October it is alkaline in nature and varies from 7.54 to 8.97. Dissolved oxygen ranges from 6.50 to 8.26 mg/L. But BOD value ranges from 3.0 to 3.88 mg/L and the data reveals that in the month of May, June, July, August and October it violates the water Quality Criteria for Bathing. Faecal Coliform violates the bathing water quality Criteria in the month of May and June 2024, which may be due to birds dropping. It is inferred that most of the water quality parameters are well within the optimal levels. The levels of ammonia and nitrate is quite low to below Detection Limit thus ruling out the toxic effects of ammonia and nitrate for fish kills. Apart from this, chloride, SO₄ and Fluoride is also below the drinking water Standard of BIS 10500-2012.

Copy of the water sample report of the State Board is annexed herewith and marked with letter "R".



28 JAN 2025

04. It is therefore respectfully prayed that Hon'ble Tribunal may pass such order/orders as it deems fit and proper in the interest of justice.

Banukrishneshe

DEPONENT



28 JAN 2025

7

VERIFICATION



I, Sri Ramkrishna Saha, son of Late Gopal Gobindo Saha, aged about 55 years, by faith-Hindu, Occupation- Service, working at West Bengal Pollution Control Board office at 10A, Block-LA, Sector-III. Bidhannagar, Kolkata-700108, do hereby solemnly declare and say as follows:-

1. That, I am the Chief Scientist, West Bengal Pollution Control Board and I am well acquainted with the facts and circumstances of the instant Original Application.
2. That, the statements made in paragraph 1 of this affidavit is true to my knowledge and belief.
3. That, the statements made in paragraphs 2 to 3 of this affidavit are my information derived from the records available in the office of the State Board which I verily believe to be true and the rest are my respectful submission before this Hon'ble Tribunal.

Ramkrishna Saha

DEPONENT

Identified and corrected by me
Advocate *Madhaba Kumar*
WBPCB *Advocate*

Solemnly Affirmed &
Declared Before Me
On Identification By *hm*

SARBANI MITRA
NOTARY
Regd. No. 5515/08

28 JAN 2025

In Compliance to the order of the National Green Tribunal (NGT), Eastern Zone Bench, Kolkata relating to the original application No.115/2024/EZ in which the matter was heard on 01.10.2024 and where it is directed West Bengal Pollution Control Board to take water samples from Rabindra Sarobar Lake and continue monitoring the quality of the water regularly.

Accordingly, West Bengal Pollution Control Board is Monitoring Rabindra Sarobar Lake on monthly basis. Detail Physico-Chemical Characteristics of the Lake water is depicted in the table below from May 2024 to October 2024.

Table: Physico-chemical characteristics of Rabindra Sarobar lake, Kolkata (May 2024 – October 2024)

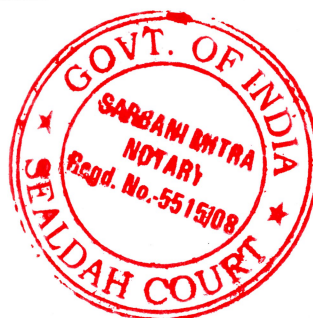
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			Temp (Water)	Turbidity		Ec	DO	BOD	COD	TSS	TDS	PO ₄ -P	NO ₃ -N	T.Hardness	Chloride	SO ₄	T.Alkalinity	Fluoride	P-Alkalinity	NH ₄ -N	Boron	Na ⁺	Potassium	Ca ⁺⁺	Mg ⁺⁺	TFS
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Designated Best Use Water Quality Criteria

Designated-Best-Use	Class of water	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	Total Coliforms Organism MPN/100ml shall be 50 or less pH between 6.5 and 8.5 Dissolved Oxygen 6mg/l or more Biochemical Oxygen Demand 5 days 20C 2mg/l or less
Outdoor bathing (Organised)	B	Total Coliforms Organism MPN/100ml shall be 500 or less pH between 6.5 and 8.5 Dissolved Oxygen 5mg/l or more Biochemical Oxygen Demand 5 days 20C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	Total Coliforms Organism MPN/100ml shall be 5000 or less pH between 6 to 9 Dissolved Oxygen 4mg/l or more Biochemical Oxygen Demand 5 days 20C 3mg/l or less
Propagation of Wild life and Fisheries	D	pH between 6.5 to 8.5 Dissolved Oxygen 4mg/l or more Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	pH between 6.0 to 8.5 Electrical Conductivity at 25C micro mhos/cm Max.2250 Sodium absorption Ratio Max. 26 Boron Max. 2mg/l



MINISTRY OF ENVIRONMENT AND FORESTS**NOTIFICATION**

New Delhi, the 25th September, 2000

G.S.R. 742(E).— In exercise of the powers conferred by sections 6 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government hereby makes the following rules further to amend the Environment (Protection) Rules, 1986, namely.

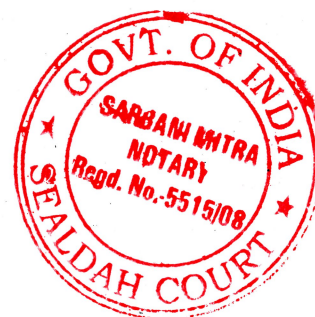
1. (1) These rules may be called the Environment (Protection) Amendment Rules, 2000.
- (2) Save as otherwise provided in this notification, they shall come into force on the date of their publication in the Official Gazette.
2. In the Environment (Protection) Rules, 1986,—
 - (1) In Schedule I, after serial number 89 relating to Noise standards for fire crackers and the entries relating thereto, the following serial numbers and entries shall be inserted, namely:—

“90. Standards for coal mines**1. Air Quality Standards**

The Suspended Particulate Matter (SPM), Respirable Particulate Matter (RPM), Sulphur dioxide (SO₂) and Oxides of Nitrogen (NO_x) concentration in downwind direction considering predominant wind direction, at a distance of 500 metres from the following dust generating sources shall not exceed the standards specified in the Tables I, II and III given below:

Dust Generating Sources

Loading or unloading, Haul road, coal transportation road, Coal handling plant (CHP), Railway sliding, Blasting, Drilling, Overburden dumps, or any other dust generating external sources like coke ovens (hard as well as soft), briquette industry, nearby road etc.



93. Primary Water Quality Criteria for Bathing Waters.

In a water body or its part, water is subjected to several types of uses. Depending on the types of uses and activities, water quality criteria have been specified to determine its suitability for a particular purpose. Among the various types of uses there is one use that demands highest level of water quality or purity and that is termed as "Designated Best Use" in that stretch of water body. Based on this, water quality requirements have been specified for different uses in terms of primary water quality criteria. The primary water quality criteria for bathing water are specified along with the rationale in table 1.

Table 1.

PRIMARY WATER QUALITY CRITERIA FOR BATHING WATER (Water used for organised outdoor bathing)

CRITERIA		RATIONALE
1. Fecal Coliform MPN/100 ml:	500 (desirable) 2500 (Maximum Permissible)	To ensure low sewage contamination. Fecal coliform and fecal streptococci are considered as they reflect the bacterial pathogenicity.
2. Fecal Streptococci MPN/100 ml:	100 (desirable) 500 (Maximum Permissible)	The desirable and permissible limits are suggested to allow for fluctuation in environmental conditions such as seasonal change, changes in flow conditions etc.
2. pH:	Between 6.5 –8.5	The range provides protection to the skin and delicate organs like eyes, nose, ears etc. which are directly exposed during outdoor bathing.
3. Dissolved Oxygen:	5 mg/l or more	The minimum dissolved oxygen concentration of 5 mg/l ensures reasonable freedom from oxygen consuming organic pollution immediately upstream which is necessary for preventing production of anaerobic gases (obnoxious gases) from sediment.
4. Biochemical Oxygen demand 3 day, 27°C:	3 mg/l or less	The Biochemical Oxygen Demand of 3 mg/l or less of the water ensures reasonable freedom from oxygen demanding pollutants and prevent production of obnoxious gases";



IS 10500 : 2012

भारतीय मानक
पीने का पानी — विशिष्टि
(दूसरा पुनरीक्षण)

Indian Standard
DRINKING WATER — SPECIFICATION
(*Second Revision*)

ICS 13.060.20



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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

May 2012

Price Group 6

**AMENDMENT NO. 1 JUNE 2015
TO
IS 10500 : 2012 DRINKING WATER -- SPECIFICATION**

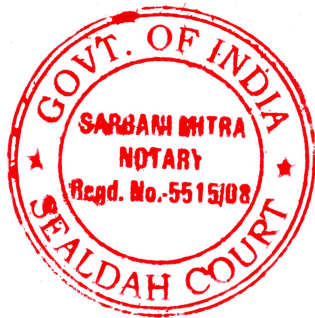
(Second Revision)

[Page 2, Table 2, Sl.No. xii), col 3] — Substitute '1.0' for '0.3'.

[Page 3, Table 3, Sl.No. x), col 4] — Substitute 'No relaxation' for '0.05'.

(FAD 14)

Publication Unit, BIS, New Delhi, India



Drinking Water Sectional Committee, FAD 25

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Drinking Water Sectional Committee had been approved by the Food and Agriculture Division Council.

This standard was originally published in 1983. A report prepared by the World Health Organization in cooperation with the World Bank showed that in 1975, some 1 230 million people were without safe water supplies. These appalling facts were central to the United Nations decision to declare an International Drinking Water Supply and Sanitation decade, beginning in 1981. Further, the VI Five-Year Plan of India had made a special provision for availability of safe drinking water for the masses. Therefore, the standard was formulated with the objective of assessing the quality of water resources, and to check the effectiveness of water treatment and supply by the concerned authorities.

The first revision was undertaken to take into account the up-to-date information available about the nature and effect of various contaminants as also the new techniques for identifying and determining their concentration. Based on experience gained additional requirements for alkalinity; aluminium and boron were incorporated and the permissible limits for dissolved solids, nitrate and pesticides residues modified.

As per the eleventh five year plan document of India (2007-12), there are about 2.17 lakh quality affected habitations in the country with more than half affected with excess iron, followed by fluoride, salinity, nitrate and arsenic in that order. Further, approximately, 10 million cases of diarrhoea, more than 7.2 lakh typhoid cases and 1.5 lakh viral hepatitis cases occur every year a majority of which are contributed by unclean water supply and poor sanitation. The eleventh five year plan document of India (2007-2012) recognizes dealing with the issue of water quality as a major challenge and aims at addressing water quality problems in all quality affected habitations with emphasis on community participation and awareness campaigns as well as on top most priority to water quality surveillance and monitoring by setting up of water quality testing laboratories strengthened with qualified manpower, equipments and chemicals.

The second revision was undertaken to upgrade the requirements of the standard and align with the internationally available specifications on drinking water. In this revision assistance has been derived from the following:

- a) EU Directives relating to the quality of water intended for human consumption (80/778/EEC) and Council Directive 98/83/EC.
- b) USEPA standard — National Primary Drinking Water Standard, EPA 816-F-02-013 dated July, 2002.
- c) WHO Guidelines for Drinking Water Quality, 3rd Edition Vol. 1 Recommendations, 2008.
- d) Manual on Water Supply and Treatment, third edition — revised and updated May 1999, Ministry of Urban Development, New Delhi.

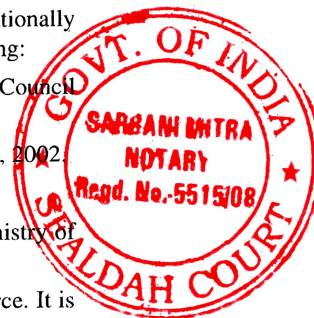
This standard specifies the acceptable limits and the permissible limits in the absence of alternate source. It is recommended that the acceptable limit is to be implemented as values in excess of those mentioned under 'Acceptable' render the water not suitable. Such a value may, however, be tolerated in the absence of an alternative source. However, if the value exceeds the limits indicated under 'permissible limit in the absence of alternate source' in col 4 of Tables 1 to 4, the sources will have to be rejected.

Pesticide residues limits and test methods given in Table 5 are based on consumption pattern, persistence and available manufacturing data. The limits have been specified based on WHO guidelines, wherever available. In cases where WHO guidelines are not available, the standards available from other countries have been examined and incorporated, taking in view the Indian conditions.

In this revision, additional requirements for ammonia, chloramines, barium, molybdenum, silver, sulphide, nickel, polychlorinated biphenyls and trihalomethanes have been incorporated while the requirements for colour, turbidity, total hardness, free residual chlorine, iron, magnesium, mineral oil, boron, cadmium, total arsenic, lead, polynuclear aromatic hydrocarbons, pesticides and bacteriological requirements have been modified.

In this revision, requirement and test method for virological examination have been included. Further, requirements and test methods for cryptosporidium and giardia have also been specified.

Routine surveillance of drinking water supplies should be carried out by the relevant authorities to understand the risk of specific pathogens and to define proper control procedures. The WHO Guidelines for Drinking Water Quality, 3rd Edition, Vol. 1 may be referred for specific recommendations on using a water safety approach incorporating risk identification. Precautions/Care should be taken to prevent contamination of drinking water from chlorine resistant parasites such as cryptosporidium species and giardia.



Indian Standard
DRINKING WATER — SPECIFICATION
(Second Revision)

**1 SCOPE**

This standard prescribes the requirements and the methods of sampling and test for drinking water.

2 REFERENCES

The standards listed in Annex A contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 TERMINOLOGY

For the purpose of this standard the following definition shall apply.

3.1 Drinking Water — Drinking water is water intended for human consumption for drinking and cooking purposes from any source. It includes water (treated or untreated) supplied by any means for human consumption.

4 REQUIREMENTS

Drinking water shall comply with the requirements given in Tables 1 to 4. The analysis of pesticide residues given in Table 3 shall be conducted by a recognized laboratory using internationally established test method meeting the residue limits as given in Table 5.

Drinking water shall also comply with bacteriological requirements (*see 4.1*), virological requirements (*see 4.2*) and biological requirements (*see 4.3*).

4.1 Bacteriological Requirements**4.1.1 Water in Distribution System**

Ideally, all samples taken from the distribution system including consumers' premises, should be free from coliform organisms and the following bacteriological quality of drinking water collected in the distribution system, as given in Table 6 is, therefore specified when tested in accordance with IS 1622.

4.2 Virological Requirements

4.2.1 Ideally, all samples taken from the distribution

Table 1 Organoleptic and Physical Parameters
(Foreword and Clause 4)

SI No.	Characteristic	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source	Method of Test, Ref to Part of IS 3025	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
i)	Colour, Hazen units, <i>Max</i>	5	15	Part 4	Extended to 15 only, if toxic substances are not suspected in absence of alternate sources
ii)	Odour	Agreeable	Agreeable	Part-5	a) Test cold and when heated b) Test at several dilutions
iii)	pH value	6.5-8.5	No relaxation	Part 11	—
iv)	Taste	Agreeable	Agreeable	Parts 7 and 8	Test to be conducted only after safety has been established
v)	Turbidity, NTU, <i>Max</i>	1	5	Part 10	—
vi)	Total dissolved solids, mg/l, <i>Max</i>	500	2 000	Part 16	—

NOTE — It is recommended that the acceptable limit is to be implemented. Values in excess of those mentioned under 'acceptable' render the water not suitable, but still may be tolerated in the absence of an alternative source but up to the limits indicated under 'permissible limit in the absence of alternate source' in col 4, above which the sources will have to be rejected.

IS 10500 : 2012

Table 2 General Parameters Concerning Substances Undesirable in Excessive Amounts
(Foreword and Clause 4)

Sl No.	Characteristic	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source	Method of Test, Ref to	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
i)	Aluminium (as Al), mg/l, <i>Max</i>	0.03	0.2	IS 3025 (Part 55)	—
ii)	Ammonia (as total ammonia-N), mg/l, <i>Max</i>	0.5	No relaxation	IS 3025 (Part 34)	—
iii)	Anionic detergents (as MBAS) mg/l, <i>Max</i>	0.2	1.0	Annex K of IS 13428	—
iv)	Barium (as Ba), mg/l, <i>Max</i>	0.7	No relaxation	Annex F of IS 13428* or IS 15302	—
v)	Boron (as B), mg/l, <i>Max</i>	0.5	1.0	IS 3025 (Part 57)	—
vi)	Calcium (as Ca), mg/l, <i>Max</i>	75	200	IS 3025 (Part 40)	—
vii)	Chloramines (as Cl ₂), mg/l, <i>Max</i>	4.0	No relaxation	IS 3025 (Part 26)* or APHA 4500-Cl G	—
viii)	Chloride (as Cl), mg/l, <i>Max</i>	250	1 000	IS 3025 (Part 32)	—
ix)	Copper (as Cu), mg/l, <i>Max</i>	0.05	1.5	IS 3025 (Part 42)	—
x)	Fluoride (as F) mg/l, <i>Max</i>	1.0	1.5	IS 3025 (Part 60)	—
xi)	Free residual chlorine, mg/l, <i>Min</i>	0.2	1	IS 3025 (Part 26)	To be applicable only when water is chlorinated. Tested at consumer end. When pro- tection against viral infec- tion is required, it should be minimum 0.5 mg/l
xii)	Iron (as Fe), mg/l, <i>Max</i>	0.3	No relaxation	IS 3025 (Part 53)	Total concentration of man- ganese (as Mn) and iron (as Fe) shall not exceed 0.3 mg/l
xiii)	Magnesium (as Mg), mg/l, <i>Max</i>	30	100	IS 3025 (Part 46)	—
xiv)	Manganese (as Mn), mg/l, <i>Max</i>	0.1	0.3	IS 3025 (Part 59)	Total concentration of man- ganese (as Mn) and iron (as Fe) shall not exceed 0.3 mg/l
xv)	Mineral oil, mg/l, <i>Max</i>	0.5	No relaxation	Clause 6 of IS 3025 (Part 39) Infrared partition method	—
xvi)	Nitrate (as NO ₃), mg/l, <i>Max</i>	45	No relaxation	IS 3025 (Part 34)	—
xvii)	Phenolic compounds (as C ₆ H ₅ OH), mg/l, <i>Max</i>	0.001	0.002	IS 3025 (Part 43)	—
xviii)	Selenium (as Se), mg/l, <i>Max</i>	0.01	No relaxation	IS 3025 (Part 56) or IS 15303*	—
xix)	Silver (as Ag), mg/l, <i>Max</i>	0.1	No relaxation	Annex J of IS 13428	—
xx)	Sulphate (as SO ₄) mg/l, <i>Max</i>	200	400	IS 3025 (Part 24)	May be extended to 400 pro- vided that Magnesium does not exceed 30
xxi)	Sulphide (as H ₂ S), mg/l, <i>Max</i>	0.05	No relaxation	IS 3025 (Part 29)	—
xxii)	Total alkalinity as calcium carbonate, mg/l, <i>Max</i>	200	600	IS 3025 (Part 23)	—
xxiii)	Total hardness (as CaCO ₃), mg/l, <i>Max</i>	200	600	IS 3025 (Part 21)	—
xxiv)	Zinc (as Zn), mg/l, <i>Max</i>	5	15	IS 3025 (Part 49)	—

NOTES

1 In case of dispute, the method indicated by '*' shall be the referee method.

2 It is recommended that the acceptable limit is to be implemented. Values in excess of those mentioned under 'acceptable' render the water not suitable, but still may be tolerated in the absence of an alternative source but up to the limits indicated under 'permissible limit in the absence of alternate source' in col 4, above which the sources will have to be rejected.



Table 3 Parameters Concerning Toxic Substances
(Foreword and Clause 4)

Sl No.	Characteristic	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source	Method of Test, Ref to	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
i)	Cadmium (as Cd), mg/l, <i>Max</i>	0.003	No relaxation	IS 3025 (Part 41)	—
ii)	Cyanide (as CN), mg/l, <i>Max</i>	0.05	No relaxation	IS 3025 (Part 27)	—
iii)	Lead (as Pb), mg/l, <i>Max</i>	0.01	No relaxation	IS 3025 (Part 47)	—
iv)	Mercury (as Hg), mg/l, <i>Max</i>	0.001	No relaxation	IS 3025 (Part 48)/ Mercury analyser	—
v)	Molybdenum (as Mo), mg/l, <i>Max</i>	0.07	No relaxation	IS 3025 (Part 2)	—
vi)	Nickel (as Ni), mg/l, <i>Max</i>	0.02	No relaxation	IS 3025 (Part 54)	—
vii)	Pesticides, µg/l, <i>Max</i>	See Table 5	No relaxation	See Table 5	—
viii)	Polychlorinated biphenyls, mg/l, <i>Max</i>	0.000 5	No relaxation	ASTM 5175*	—
ix)	Polynuclear aromatic hydro- carbons (as PAH), mg/l, <i>Max</i>	0.000 1	No relaxation	APHA 6440	or APHA 6630 —
x)	Total arsenic (as As), mg/l, <i>Max</i>	0.01	0.05	IS 3025 (Part 37)	—
xi)	Total chromium (as Cr), mg/l, <i>Max</i>	0.05	No relaxation	IS 3025 (Part 52)	—
xii)	Trihalomethanes:				
a)	Bromoform, mg/l, <i>Max</i>	0.1	No relaxation	ASTM D 3973-85* or APHA 6232	—
b)	Dibromochloromethane, mg/l, <i>Max</i>	0.1	No relaxation	ASTM D 3973-85* or APHA 6232	—
c)	Bromodichloromethane, mg/l, <i>Max</i>	0.06	No relaxation	ASTM D 3973-85* or APHA 6232	—
d)	Chloroform, mg/l, <i>Max</i>	0.2	No relaxation	ASTM D 3973-85* or APHA 6232	—

NOTES

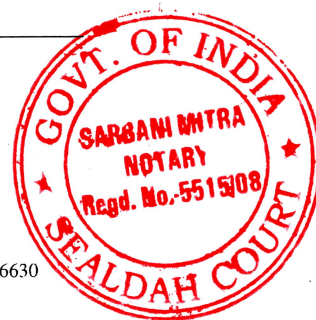
1 In case of dispute, the method indicated by '*' shall be the referee method.

2 It is recommended that the acceptable limit is to be implemented. Values in excess of those mentioned under 'acceptable' render the water not suitable, but still may be tolerated in the absence of an alternative source but up to the limits indicated under 'permissible limit in the absence of alternate source' in col 4, above which the sources will have to be rejected.

Table 4 Parameters Concerning Radioactive Substances
(Foreword and Clause 4)

Sl No.	Characteristic	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source	Method of Test, Ref to Part of IS 14194	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
i)	Radioactive materials:				
a)	Alpha emitters Bq/l, <i>Max</i>	0.1	No relaxation	Part 2	—
b)	Beta emitters Bq/l, <i>Max</i>	1.0	No relaxation	Part 1	—

NOTE — It is recommended that the acceptable limit is to be implemented. Values in excess of those mentioned under 'acceptable' render the water not suitable, but still may be tolerated in the absence of an alternative source but up to the limits indicated under 'permissible limit in the absence of alternate source' in col 4, above which the sources will have to be rejected.



IS 10500 : 2012

Table 5 Pesticide Residues Limits and Test Method
(Foreword and Table 3)

SI No.	Pesticide	Limit µg/l	Method of Test, Ref to	
			USEPA (4)	AOAC/ ISO (5)
(1)	(2)	(3)		
i)	Alachlor	20	525.2, 507	—
ii)	Atrazine	2	525.2, 8141 A	—
iii)	Aldrin/ Dieldrin	0.03	508	—
iv)	Alpha HCH	0.01	508	—
v)	Beta HCH	0.04	508	—
vi)	Butachlor	125	525.2, 8141 A	—
vii)	Chlorpyrifos	30	525.2, 8141 A	—
viii)	Delta HCH	0.04	508	—
ix)	2,4- Dichlorophenoxyacetic acid	30	515.1	—
x)	DDT (<i>o, p</i> and <i>p, p</i> – Isomers of DDT, DDE and DDD)	1	508	AOAC 990.06
xi)	Endosulfan (alpha, beta, and sulphate)	0.4	508	AOAC 990.06
xii)	Ethion	3	1657 A	—
xiii)	Gamma — HCH (Lindane)	2	508	AOAC 990.06
xiv)	Isoproturon	9	532	—
xv)	Malathion	190	8141 A	—
xvi)	Methyl parathion	0.3	8141 A	ISO 10695
xvii)	Monocrotophos	1	8141 A	—
xviii)	Phorate	2	8141 A	—

NOTE — Test methods are for guidance and reference for testing laboratory. In case of two methods, USEPA method shall be the reference method.

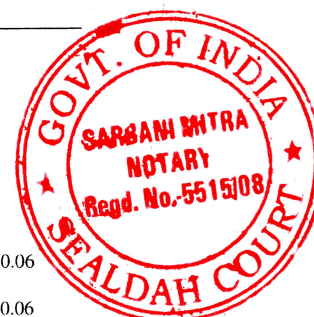


Table 6 Bacteriological Quality of Drinking Water¹⁾
(Clause 4.1.1)

SI No.	Organisms	Requirements
(1)	(2)	(3)
i)	<i>All water intended for drinking:</i>	
a)	<i>E. coli</i> or thermotolerant coliform bacteria ^{2), 3)}	Shall not be detectable in any 100 ml sample
ii)	<i>Treated water entering the distribution system:</i>	
a)	<i>E. coli</i> or thermotolerant coliform bacteria ²⁾	Shall not be detectable in any 100 ml sample
b)	Total coliform bacteria	Shall not be detectable in any 100 ml sample
iii)	<i>Treated water in the distribution system:</i>	
a)	<i>E. coli</i> or thermotolerant coliform bacteria	Shall not be detectable in any 100 ml sample
b)	Total coliform bacteria	Shall not be detectable in any 100 ml sample

¹⁾Immediate investigative action shall be taken if either *E.coli* or total coliform bacteria are detected. The minimum action in the case of total coliform bacteria is repeat sampling; if these bacteria are detected in the repeat sample, the cause shall be determined by immediate further investigation.

²⁾Although, *E. coli* is the more precise indicator of faecal pollution, the count of thermotolerant coliform bacteria is an acceptable alternative. If necessary, proper confirmatory tests shall be carried out. Total coliform bacteria are not acceptable indicators of the sanitary quality of rural water supplies, particularly in tropical areas where many bacteria of no sanitary significance occur in almost all untreated supplies.

³⁾It is recognized that, in the great majority of rural water supplies in developing countries, faecal contamination is widespread. Under these conditions, the national surveillance agency should set medium-term targets for progressive improvement of water supplies.

system including consumers' premises, should be free from virus.

4.2.2 None of the generally accepted sewage treatment methods yield virus-free effluent. Although a number of investigators have found activated sludge treatment to be superior to trickling filters from this point of view, it seems possible that chemical precipitation methods will prove to be the most effective.

4.2.3 Virus can be isolated from raw water and from springs, enterovirus, reovirus, and adenovirus have been found in water, the first named being the most resistant to chlorination. If enterovirus are absent from chlorinated water, it can be assumed that the water is safe to drink. Some uncertainty still remains about the virus of infectious hepatitis, since it has not so far been isolated but in view of the morphology and resistance of enterovirus it is likely that, if they have been inactivated hepatitis virus will have been inactivated also.

4.2.4 An exponential relationship exists between the rate of virus inactivation and the redox potential. A redox potential of 650 mV (measured between platinum and calomel electrodes) will cause almost instantaneous inactivation of even high concentrations of virus. Such a potential can be obtained with even a low concentration of free chlorine, but only with an extremely high concentration of combined chlorine. This oxidative inactivation may be achieved with a number of other oxidants also, for example, iodine, ozone and potassium permanganate, but the effect of the oxidants will always be counteracted, if reducing components, which are mainly organic, are present. As a consequence, the sensitivity of virus towards disinfectants will depend on the *milieu* just as much as on the particular disinfectant used.

4.2.5 Viruses are generally resistant to disinfectants as well as get protected on account of presence of particulate and organic matter in water. Because the difference between the resistance of coliform organisms and of virus to disinfection by oxidants increases with increasing concentration of reducing components, for example, organic matter, it cannot be assumed that the absence of available coliform organisms implies freedom from active virus under circumstances where a free chlorine residual cannot be maintained. Sedimentation and slow sand filtration in themselves may contribute to the removal of virus from water.

4.2.6 In practice, >0.5 mg/l of free chlorine for 1 h is sufficient to inactivate virus, even in water that was originally polluted provided the water is free from particulates and organic matter.

4.2.7 MS2 phage are indicator of viral contamination in drinking water. MS2 phage shall be absent in 1 litre of water when tested in accordance with USEPA method 1602. If MS2 phage are detected in the drinking water, virological examination shall be done by the Polymerase Chain Reaction (PCR) method for virological examination as given in Annex B. USEPA method in Manual of Method for Virology Chapter 16, June 2001 shall be the alternate method. If viruses are detected, the cause shall be determined by immediate further investigation.

4.3 Biological Requirements

4.3.1 Ideally, all samples taken including consumers premises should be free from biological organisms. Biological examination is of value in determining the causes of objectionable tastes and odours in water and controlling remedial treatments, in helping to interpret the results of various chemical analysis, and in explaining the causes of clogging in distribution pipes and filters. In some instances, it may be of use in demonstrating that water from one source has been mixed with that from another.

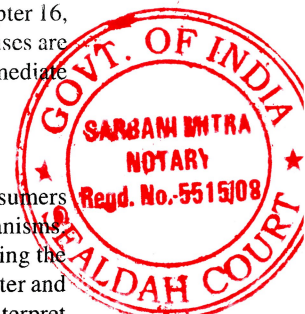
4.3.2 The biological qualities of water are of greater importance when the supply has not undergone the conventional flocculation and filtration processes, since increased growth of methane-utilizing bacteria on biological slimes in pipes may then be expected, and the development of bryozoal growths such as *Plumatella* may cause operational difficulties.

4.3.3 Some of the animalcules found in water mains may be free-living in the water, but others such as *Dreissena* and *Asellus* are more or less firmly attached to the inside of the mains. Although these animalcules are not themselves pathogenic, they may harbour pathogenic organisms or virus in their intestines, thus protecting these pathogens from destruction by chlorine.

4.3.4 Chlorination, at the dosages normally employed in waterworks, is ineffective against certain parasites, including amoebic cysts; they can be excluded only by effective filtration or by higher chlorine doses than can be tolerated without subsequent dechlorination. *Amoebiasis* can be conveyed by water completely free from enteric bacteria; microscopic examination after concentration is, therefore, the only safe method of identification.

4.3.5 Strict precautions against back-syphonage and cross-connections are required, if amoebic cysts are found in a distribution system containing tested water.

4.3.6 The *cercariae of schistosomiasis* can be detected by similar microscopic examination, but there is, in



IS 10500 : 2012

any case, no evidence to suggest that this disease is normally spread through piped water supplies.

4.3.7 The cyclops vector of the embryos of *Dracunculus medinensis* which causes dracontiasis or Guinea-worm disease can be found in open wells in a number of tropical areas. They are identifiable by microscopic examination. Such well supplies are frequently used untreated, but the parasite can be relatively easily excluded by simple physical improvements in the form of curbs, drainage, and apron surrounds and other measures which prevent physical contact with the water source.

4.3.8 Cryptosporidium shall be absent in 10 liter of water when tested in accordance with USEPA method 1622 or USEPA method 1623* or ISO 15553 : 2006.

4.3.9 Giardia shall be absent in 10 liter of water when tested in accordance with USEPA method 1623* or ISO 15553 : 2006.

4.3.10 The drinking water shall be free from microscopic organisms such as algae, zooplanktons, flagellates, parasites and toxin producing organisms. An illustrative (and not exhaustive) list is given in Annex C for guidance.

NOTE — In case of dispute, the method indicated by '*' in 4.3.8 and 4.3.9 shall be referee method.

5 SAMPLING

Representative samples of water shall be drawn as prescribed in IS 1622 and IS 3025 (Part 1).

ANNEX A
(Clause 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	Title	IS No.	Title
1622 : 1981	Methods of sampling and microbiological examination of water (<i>first revision</i>)	(Part 41) : 1992	Cadmium (<i>first revision</i>)
		(Part 42) : 1992	Copper (<i>first revision</i>)
3025	Methods of sampling and test (physical and chemical) for water and waste water:	(Part 43) : 1992	Phenols (<i>first revision</i>)
(Part 1) : 1987	Sampling (<i>first revision</i>)	(Part 46) : 1994	Magnesium
(Part 2) : 2002	Determination of 33 elements by inductively coupled plasma atomic emission spectroscopy	(Part 47) : 1994	Lead
(Part 4) : 1983	Colour (<i>first revision</i>)	(Part 48) : 1994	Mercury
(Part 5) : 1983	Odour (<i>first revision</i>)	(Part 49) : 1994	Zinc
(Part 7) : 1984	Taste threshold (<i>first revision</i>)	(Part 52) : 2003	Chromium
(Part 8) : 1984	Tasting rate (<i>first revision</i>)	(Part 53) : 2003	Iron
(Part 10) : 1984	Turbidity (<i>first revision</i>)	(Part 54) : 2003	Nickel
(Part 11) : 1983	pH value (<i>first revision</i>)	(Part 55) : 2003	Aluminium
(Part 16) : 1984	Filterable residue (total dissolved solids) (<i>first revision</i>)	(Part 56) : 2003	Selenium
(Part 21) : 1983	Total hardness (<i>first revision</i>)	(Part 57) : 2005	Boron
(Part 23) : 1983	Alkalinity (<i>first revision</i>)	(Part 59) : 2006	Manganese
(Part 24) : 1986	Sulphates (<i>first revision</i>)	(Part 60) : 2008	Fluoride
(Part 26) : 1986	Chlorine residual (<i>first revision</i>)	13428 : 2003	Packaged natural mineral water — Specification (<i>first revision</i>)
(Part 27) : 1986	Cyanide (<i>first revision</i>)	14194	Radionuclides in environmental samples — Method of estimation:
(Part 29) : 1986	Sulphide (<i>first revision</i>)	(Part 1) : 1994	Gross beta activity measurement
(Part 32) : 1988	Chloride (<i>first revision</i>)	(Part 2) : 1994	Gross alpha activity measurement
(Part 34) : 1988	Nitrogen (<i>first revision</i>)	15302 : 2002	Determination of aluminium and barium in water by direct nitrous oxide-acetylene flame atomic absorption spectrometry
(Part 37) : 1988	Arsenic (<i>first revision</i>)	15303 : 2002	Determination of antimony, iron and selenium in water by electrothermal atomic absorption spectrometry
(Part 39) : 1989	Oil and grease		
(Part 40) : 1991	Calcium		



ANNEX B
(Clause 4.2.7)

POLYMERASE CHAIN REACTION (PCR) METHOD

B-1 GENERAL

The method involves the concentration of viruses from 100 litre of drinking water to 1 ml by membrane filter technique. The concentrate is subjected to amplification using polymerase chain reaction (PCR) and primers based on highly conserved regions of viral genomes. This method can detect as low as 10 genome copies. Stringent precautions are needed to avoid contamination with amplified DNA products leading to false positive reactions. Detection of hepatitis A virus (HAV) RNA and enterovirus (EV) RNA is considered as an indication of presence of viruses in water. Steps involved include concentration of water, RNA extraction, complementary DNA (cDNA) synthesis and PCR.

B-2 CONCENTRATION OF DRINKING WATER

B-2.1 Apparatus

B-2.1.1 Pressure Pump

B-2.1.2 Membrane Filter Assembly with 144 mm Diameter with Tripod Stand

B-2.1.3 Pressure Vessel (50 litre capacity) with Pressure Gauge

B-2.1.4 Inter-connecting Pressure Tubes

B-2.2 Reagents

Autoclaved double distilled water shall be used for the preparation of reagents/buffers in this study.

B-2.2.1 Aluminium Chloride

B-2.2.2 HCl/NaOH Urea (Extra Pure)

B-2.2.3 Disodium Hydrogen Phosphate ($\text{Na}_2\text{HPO}_4 \cdot 2\text{H}_2\text{O}$) — 0.2 M, filter sterilized.

B-2.2.4 Sodium Dihydrogen Phosphate ($\text{NaH}_2\text{PO}_4 \cdot 2\text{H}_2\text{O}$) — 0.2 M, filter sterilized.

B-2.2.5 Citric Acid — 0.1 M, filter sterilized.

B-2.2.6 L-Arginine — 0.5 M, filter sterilized.

B-2.2.7 Urea-Arginine Phosphate Buffer (U-APB) — Mix 4.5 g of urea with 2 ml of 0.2 M NaH_2PO_4 and 2 ml of 0.5 M L - Arginine and make up the volume to 50 ml with sterile distilled water. The pH of the eluent shall be 9.0.

B-2.2.8 Magnesium Chloride (MgCl_2) — 1 M.

B-2.2.9 McIl Vaines Buffer (pH 5.0) — Mix 9.7 ml of

0.1 M citric acid with 10.3 ml of 0.2 M $\text{Na}_2\text{HPO}_4 \cdot 2\text{H}_2\text{O}$ under sterile conditions.

B-2.3 Procedure

Filter 100 litre of drinking water sample through membrane filter assembly using either positively charged membrane of 144 mm diameter or 0.22 micron diameter pore size nitrocellulose membrane. For positively charged membrane the test water pH need not be adjusted. But for the 0.22 micron nitrocellulose membrane adjust the pH to 3.5 after adding the aluminium chloride as a coagulant to a final concentration of 0.000 5 M.

At lower pH pass the water through the membrane. The flow rate shall be 40 litre/h approximately. After the completion of the filtration, elute the adsorbed particles using 100 ml of urea-arginine phosphate buffer (U-APB). Precipitate the suspended particles using 1 ml of magnesium chloride (1 M). Dissolve the resultant precipitate centrifuged out of the sample in 800-1.0 ml of McIl Vaines buffer. The processed sample can be stored at refrigerator until required.

B-3 RNA EXTRACTION

B-3.1 Apparatus

B-3.1.1 Cooling Centrifuge

B-3.1.2 Deep Freezer (-20°C)

B-3.1.3 Vortex Mixer

B-3.1.4 Pipette Man

B-3.2 Reagents

B-3.2.1 Cetyl Trimethyl Ammonium Bromide (CTAB) Buffer

CTAB	: 1 percent
Sodium Dodecyl Sulphate (SDS)	: 1 percent
EDTA	: 20 mM
Sodium Chloride	: 1 M

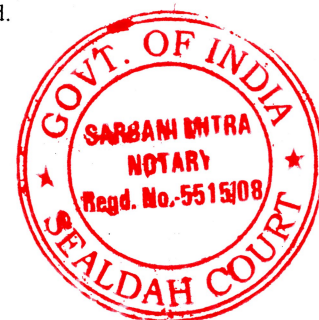
B-3.2.2 Phenol, Chloroform and Isoamylalcohol in the ratio of 25:24:1 (PCI)

B-3.2.3 Ethanol

B-3.2.4 TE Buffer (pH 8.0)

Tris base	: 1 M
EDTA	: 0.5 M

B-3.2.5 Sodium Acetate — 3 M.



IS 10500 : 2012

B-3.3 Procedure

Treat 300 µl of concentrated water sample with equal volume of CTAB and 1/10th volume of PCI. Vortex and centrifuge at 5 000 × g for 30 min at 4°C. Add 1/10th volume of 3 M sodium acetate and double the volume of cold ethanol to the aqueous layer. Keep the mixture at either at -20°C for overnight or in liquid nitrogen for 2-5 min. Centrifuge at 10 000 × g, for 30 min at 4°C. Discard the supernatant and air dry the pellet and dissolve it in 20 µl TE buffer.

B-4 COMPLEMENTARY DNA (cDNA) SYNTHESIS

B-4.1 Apparatus

B-4.1.1 PCR Machine

B-4.1.2 Deep Freezer (-20°C)

B-4.2 Reagents

B-4.2.1 cDNA Synthesis Kit

B-4.3 Procedure

Suspend the extracted RNA in 20 µl of cDNA reaction mixture, which consists of 4 µl of 5X reverse transcriptase reaction buffer [250 mM TRIS-HCl (pH 8.5), 40 mM KCl, 150 mM MgCl₂, 5 mM dithiothreitol (DTT)], 0.5 µl of 10 mM deoxynucleotide phosphate (dNTP), 2 µl of hexa nucleotide mixture, 1 µl of 25 U of Maloney Murine Leukaemia Virus (M-MuLV) reverse transcriptase, 0.5 µl of 20 U of human placental RNase inhibitor. Heat the reaction mixture to 95°C for 5 min and rapidly chill on ice, this is followed by the addition of 1 µl (25 U/µl) of M-MuLV reverse transcriptase. Incubate the reaction mixture as given by the manufacturer of the kit and quickly chill the reaction tube on ice.

B-5 PCR AMPLIFICATION

B-5.1 Apparatus

B-5.1.1 PCR Machine

B-5.1.2 Deep Freezer (-20°C)

B-5.1.3 Micropipette

B-5.2 Reagents

B-5.2.1 Primers for EV and HAV

EV sense primer, 5' — TCC TCC GGC CCC
TGA ATG CG — 3'
antisense primer, 5' — ATT GTC ACC
ATA AGC AGC CA — 3'
HAV sense primer, 5' — GTTTT GCTCC
TCTTT ATCAT GCTAT G-3'

antisense primer, 5' — GGAAA TGTCT
CAGGT ACTTT CTTTG-3'

B-5.2.2 PCR Master Mix

B-5.2.3 Mineral Oil

B-5.3 Procedure

B-5.3.1 PCR Amplification for Hepatitis A Virus (HAV)

In 5 µl of cDNA, add 95 µl of a PCR Master Mix (10 mM TRIS-HCl (pH 8.3), 50 mM KCl, 2.5 mM MgCl₂, 0.01 percent gelatin (1× PCR buffer), 200 µM of each dNTP, 1.5 U of *Thermus aquaticus* polymerase). Add 25 pico moles of sense and antisense oligonucleotide primers of HAV and overlay with mineral oil. Appropriate positive and negative controls shall be included with each run. Set the following reaction at thermo cycler:

Denaturation at 94°C for 2 min

Denaturation for 1.0 min at 94°C

Annealing for 1.0 min at 57°C

Extension for 1.3 min at 72°C

} 35 cycles

Final extension at 72°C for 7 min.

B-5.3.2 PCR Amplification for Enterovirus (EV)

In 5 µl of cDNA, add 95 µl of a PCR Master Mix (10 mM TRIS-HCl (pH 8.3), 50 mM KCl, 2.5 mM MgCl₂, 0.01 percent gelatin (1X PCR buffer), 200 µM of each dNTP, 1.5 U of *Thermus aquaticus* polymerase). Add 25 pico moles of sense and antisense oligonucleotide primers of EV and overlay with mineral oil. Appropriate positive and negative controls shall be included with each run. Set the following reaction at thermo cycler:

Denaturation at 94°C for 2 min

Denaturation for 1.0 min at 94°C

Annealing for 1.0 min at 42°C

Extension for 2.0 min at 72°C

} 35 cycles

Final extension at 72°C for 7 min.

B-6 AGAROSE GEL ELECTROPHORESIS

B-6.1 Apparatus

B-6.1.1 Micropipette

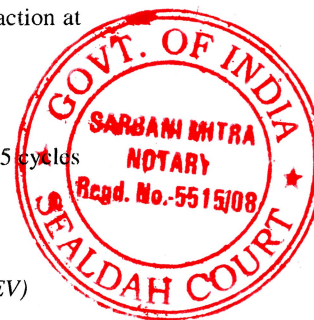
B-6.1.2 Electrophoresis Apparatus

B-6.1.3 Gel Documentation System

B-6.2 Reagents

B-6.2.1 Running Buffer — 50X TAE buffer

Tris base/Tris buffer : 121.00 g



Glacial acetic acid : 28.55 ml
 0.5 M EDTA : 50.00 ml
 Distilled water : 300.45 ml
 (autoclaved)

Make the final volume upto 1 000 ml with deionised distilled water, sterilize and store at 4°C. The final concentration for the preparation of agarose gel and to run the gel shall be 1X.

B-6.2.2 Tracking Dye — 6X bromophenol blue.

B-6.2.3 Ethidium Bromide — 0.5 µg/ml.

B-6.3 Procedure

Run the PCR amplified product of EV and HAV on 1.5 percent agarose gel using 1X TAE buffer. Load 10 µl of amplified product after mixing it with 1 µl 10X loading dye. Run the molecular weight marker along with the samples. Run the electrophoresis at 100 V for 30 min. Stain the gel with ethidium bromide (0.5 µl/ml) for 20 min. Wash it with distilled water and view under UV transilluminator and photograph the gel to analyse the band pattern. EV gives the band as 155 base pair and the HAV gives band as 225 base pair.

ANNEX C

(Clause 4.3.10)

ILLUSTRATIVE LIST OF MICROSCOPIC ORGANISMS PRESENT IN WATER

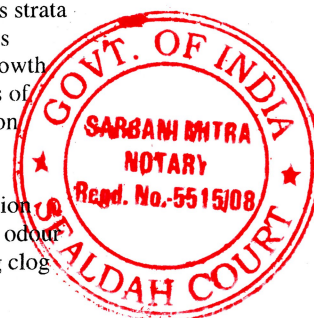
Sl No.	Classification of Microscopic Organism	Group and Name of the Organism	Habitat	Effect of the Organisms and Significance
(1)	(2)	(3)	(4)	(5)
i)	Algae	a) Chlorophyceae:		
		1) <i>Species of</i> Coelastrum, Gompospherium, Micractinium, Mougeotia, Oocystis, Euastrum, Scenedesmus, Actinastrum, Gonium, Eudorina Pandorina, Pediastrum, Zygnema, Chlamydomonas, Careteria, Chlorella, Chroococcus, Spirogyra, Tetradron, Chlorogonium, Stigeoclonium	Polluted water, impounded sources	Impart colouration
		2) <i>Species of</i> Pandorina, Volvox, Gomphospherium, Staurastrum, Hydrodictyon, Nitella	Polluted waters	Produce taste and odour
		3) <i>Species of</i> Rhizoclonium, Cladotrix, Ankistrodesmus, Ulothrix, Micrasterias, Chromulina	Clean water	Indicate clean condition
		4) <i>Species of</i> Chlorella, Tribonema, Clostrium, Spirogyra, Palmella	Polluted waters, impounded sources	Clog filters and create impounded difficulties
		b) Cyanophyceae:		
		1) <i>Species of</i> Anacystis and Cylandrospermum	Polluted waters	Cause water bloom and impart colour
		2) <i>Species of</i> Anabena, Phormidium, Lyngbya, Arthrospira, Oscillatoria	Polluted waters	Impart colour
		3) <i>Species of</i> Anabena, Anacystis, Aphanizomenon	Polluted waters, impounded sources	Produce taste and odour
		4) <i>Species of</i> Anacystis, Anabena, Coelospherium, Cleotrichina, Aphanizomenon	Polluted waters	Toxin producing
		5) <i>Species of</i> Anacystis, Rivularia, Oscillatoria, Anabena	Polluted waters	Clog filters



2A

IS 10500 : 2012

Sl No.	Classification of Microscopic Organism	Group and Name of the Organism	Habitat	Effect of the Organisms and Significance
(1)	(2)	(3)	(4)	(5)
		6) <i>Species of Rivularia</i>	Calcareous waters and also rocks	Bores rocks and calcareous strata and causes matted growth
		7) <i>Species of Agmenellum, Lemanea</i>	Clean waters	Indicators of purification
		c) Diatoms (Bacillareophyceae):		
		1) <i>Species of Stauroneis</i>	—	Cause discoloration
		2) <i>Species of Asterionella, Tabellaria</i>	Hill streams high altitude, torrential and temperate waters	Taste and odour producing clog filters
		3) <i>Species of Synedra and Fragillavia</i>	Polluted waters	Taste and odour producing
		4) <i>Species of Nitzschia, Gomphonema</i>	Moderately polluted waters	Cause discoloration
		5) <i>Species of Cymbella, Synedra, Melosira, Navicula, Cyclotella, Fragillaria, Diatoma, Pleurosigma</i>	Rivers and streams impounded sources	Clog filters and cause operational difficulties
		6) <i>Species of Pinmularia, Cyclotella, Meridion, Cocconeis</i>	Clean waters	Indicators of purification
		d) Xanthophyceae:		
		<i>Species of Botryococcus</i>	Hill streams high altitude and temperate waters	Produces coloration
ii)	Zooplankton	a) Protozoa:		
		1) <i>Amoeba, Giardia, Lamblia, Arcella, Diffflugia, Actinophrys</i>	Polluted waters	Pollution indicators
		2) <i>Endamoeba, Histolytica</i>	Sewage and activated sludge	Parasitic and pathogenic
		b) Ciliates:		
		<i>Paramoecium, Vorticella, Stentor, Colpidium, Coleps, Colopoda, Bodo</i>	Highly polluted waters, sewage and activated sludge	Bacteria eaters
		c) Crustacea:		
		1) <i>Bosmina, Daphnia</i>	Stagnant polluted waters	Indicators of pollution
		2) <i>Cyclops</i>	Step wells in tropical climate	Carrier host of guinea worm
iii)	Rotifers	a) Rotifers:		
		<i>Anurea, Rotaria, Philodina</i>	Polluted and Algae laden waters	Feed on algae
		b) Flagellates:		
		1) <i>Ceratium, Glenodinium, Dinobryon</i>	Rocky strata, iron bearing and acidic waters	Impart colour and fishy taste
		2) <i>Euglena, Phacus</i>	Polluted waters	Impart colour



25

IS 10500 : 2012

<i>Sl No.</i>	<i>Classification of Microscopic Organism</i>	<i>Group and Name of the Organism</i>	<i>Habitat</i>	<i>Effect of the Organisms and Significance</i>
(1)	(2)	(3)	(4)	(5)
iv)	Miscellaneous Organisms	a) Sponges, Hydra	Fresh water	Clog filters and affect purification systems
		b) Tubifex, Eristalls, Chironomids	Highly polluted waters, sewage and activated sludge and bottom deposits	Clog filters and render water unaesthetic
		c) Plumatella	Polluted waters	Produces biological slimes and causes filter operational difficulties
		c) Dreissena, Asellus	Polluted waters	Harbour pathogenic organisms



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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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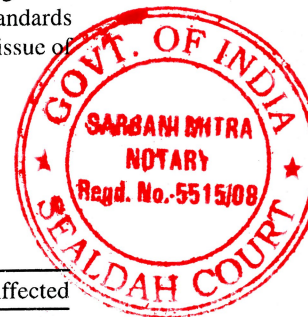
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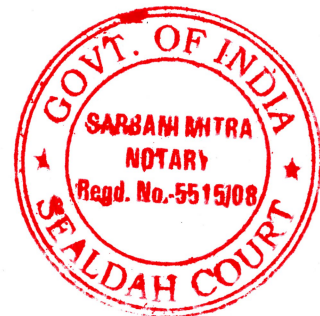
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Minutes of the meeting of Extended Expert Committee of Rabindra Sarobar held on 03.10.2024 at 12:00 Noon at the Conference Room, Paribesh Bhavan, WBPCB, Salt Lake, Kolkata, to discuss the matter related to the accumulation of sediments in the waterbody, dredging of the water body and other miscellaneous issues.

Members present:-

- i. Dr. Kalyan Rudra, Chairman, WBPCB.
- ii. Smt. Nandini Ghosh, IAS, Secretary, KMDA.
- iii. Dr. Anirban Roy, Research Officer, W.B. Bio-Diversity Board.
- iv. The Advisor, KMDA.
- v. The Chief Engineer, E&AM Sector, KMDA.
- vi. The Superintending Engineer, Construction Circle, E&AM, KMDA.
- vii. The Senior Law Officer, KMDA.
- viii. The Executive Engineer, BPPD-I, E&AM Sector, KMDA.
- ix. Representatives from Clubs located within Rabindra Sarobar.



Dr. Kalyan Rudra, Chairman, WBPCB presided over the meeting and detailed discussions were initiated relating to the continuous accumulation of sediments in the Rabindra Sarobar waterbody and to explore the possible mechanisms for addressing this problem.

The following decisions were taken in the meeting regarding the aforesaid matter:-

1. Samples of sediments collected from the bed of the Rabindra Sarobar waterbody is to be tested and examined for assessment of various parameters including Toxicity.
2. DO & BOD of the waterbody to be tested at various layers. Both the above mentioned tests in Sl no. 1 & 2 are to be conducted by WBPCB for which a request letter is to be initiated from the end of KMDA.
3. A Bathymetric survey requires to be conducted for which School of Water Resources, Jadavpur University shall be approached and one request letter in this regard will be placed to them.


Upon the receipt of the test results, the Extended Expert Committee shall explore the requirements of dredging the silt so accumulated in the waterbody. If the dredging work is considered to be essential after assessment of all parameters, Hon'ble NGT may be subsequently approached for mechanical dredging which involves petrol/diesel operated mechanical equipments. It is to be mentioned here that due to the depth of the water and other infrastructural issues, manual dredging may not be possible to be done in the Lake.

Some other miscellaneous issues related to the Rabindra Sarobar premises were also discussed and decisions were taken which are as follows:-

- The committee was appraised regarding the arrangements taken up by KMDA for the forthcoming Chhat Puja.
- A meeting of the Sub Committee of Rabindra Sarobar related to Bio-Diversity, flora and fauna shall be scheduled after Puja as per availability of the members to discuss various afforestation proposals that have been received time to time by KMDA from various organizations.

- The matter regarding installation of Waste Compactor Machine at Safari Park Premises within Rabindra Sarobar has been proposed and verbally consented.
- Fencing work is required for the existing medicinal plant garden within Rabindra Sarobar and for proper maintenance of the garden, deployment of a specialized Mali may be considered if possible.
 - It has been decided that feeding of animals and fishes shall be strictly prohibited inside the Rabindra Sarobar premises and notices shall be put up in conspicuous places and in different locations inside Rabindra Sarobar likewise.
 - Notices shall be put up to restrict Public nuisance at the periphery of the Rabindra Sarobar premises mainly along the Baroj Road side.
 - Kolkata Police shall again be approached with the proposal for installation of CCTVs throughout the Rabindra Sarobar premises for better surveillance.
 - The proposal for inclusion of representative from Fisheries Department, GoWB and Botany Department, Calcutta University into the Extended Expert Committee of Rabindra Sarobar was placed before the committee which was agreed upon by all members. The inclusion of the Fisheries Department will help us in sorting out the underlying causes of occasional fish death in the Lake.
 - Proposal for requirement of Female Security Personnel at the Rabindra Sarobar for better checking and monitoring over the female visitors was placed before the committee which was accepted by all the members.
 - Letter to be issued to the Clubs within Rabindra Sarobar regarding strict compliance to the SOP in connection with the Rowing activities along with a reminder regarding prohibition of disposal of all kinds of food wastes into the Waterbody.
 - A meeting with the clubs is to be scheduled at Rabindra Sarobar after Durga Puja to discuss other related issues.

As there was no other points to discuss, the meeting ended with vote of thanks to and from the chair.

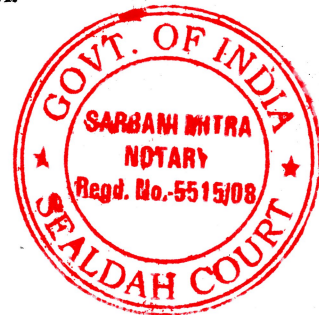

Dr. Kalyan Rudra
Chairman, WBPCB

Dated:-22.10.2024.

Memo no. 12 /1(8)/DG/E&AM/KMDA/F-06

Copy forwarded for information to :-

1. The Secretary, KMDA.
2. Dr. Anirban Roy, Research Officer, W.B. Bio-Diversity Board.
3. The Advisor, KMDA.
4. The Chief Engineer, E&AM Sector, KMDA.
5. The Superintending Engineer, Construction Circle, E&AM, KMDA.
6. The Senior Law Officer, KMDA.
7. The Executive Engineer, BPPD-I, E&AM Sector, KMDA.
8. Representatives from Clubs located within Rabindra Sarobar.



BEFORE THE NATIONAL GREEN TRIBUNAL
EASTERN ZONE BENCH, KOLKATA

ORIGINAL APPLICATION NO. 115/2024/EZ

CONCERN FOR CALCUTTA

.....APPLICANT(S)

VERSUS

THE STATE OF WEST BENGAL & ORS.

.....RESPONDENT(S)

REPORT ON AFFIDAVIT FILED BY THE WEST
BENGAL POLLUTION CONTROL BOARD.

SIBOJYOTI CHAKRABORTI
ADVOCATE