Government of India
Ministry of Railways
Railway Board

No. 2012/H-1/9/5 New Delhi dated 30.11.2017

Pr. Chief Medical Directors,
All Indian Railways,
Chief Medical Officers,
All Production Units.

Sub: - Drinking water quality monitoring over Indian Railways.
Ref: - 1. Board's letter No. 2004/LMB-II/9/1 Vol II dated 01.04.2016.
2. Board's letter No. 2012/H-1/9/5 dated 02.05.2016.

In pursuance to Board's letter under reference 01 & 02, it has been decided to amend the proviso Para 911 to 916 (Provision of Safe Water Supply) of the Indian Railway Medical Manual, 2000:

911. Responsibilities:
912. Chlorination:
913. Residual chlorine:
914. Bacteriological and Chemical examination:
915. Action on Test reports:
916. Accountability in case of lapse in supply of safe drinking water:

The amendment is as follows:-

Ministry of Drinking Water & Sanitation has issued "Uniform Drinking Water Quality Monitoring Protocol" in February 2013. The protocol is available at the URL http:/wss.hry.nic.in/Documents/UniformDrinkingWaterQualityMonitoring Protocol.pdf.

The protocol emphasises the importance of frequent inspection and maintenance of the whole system rather than relying on end of pipe water testing. It has been decided that Railway shall strive to follow the Protocol mentioned above and supply water as per BIS specifications IS: 10500-2012 (Second revision) Please see Annexure II of the protocol) w.e.f. 01.07.2016.

2. Supply of safe drinking water is the responsibility of engineering department, while medical department has been entrusted with monitoring the quality of the water supplied. It is highly desirable that Railway supply drinking water with the quality constituents at least within the cause for rejection limits (Permissible Limit in the absence of alternative source) of IS-10500:2012 & graduate steadily to supply drinking water within the desirable limits (Acceptable Limit). (As per Annexure II of the protocol)

3. In case, requisite facilities for water testing is not available in the laboratories of Railway hospitals, water sample may be got tested through the laboratories of State Governments and private NABL accredited laboratories. Expenditure incurred will be charged to Revenue. The testing in State

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Government laboratory can be done on single quotation basis. However for private laboratories due process has to be followed in a transparent manner.

4. Section Engineer (Works) and Health & Malaria Inspector will have to be provided with Multi-Parameter Water Quality Field Test Kits and Bacteriological Test vials respectively as mentioned in protocol at page no. 10-11. Expenditure for purchase of kits can be charged to Revenue. The procurement of Multi-parameter Water Quality Field Test Kits and Bacteriological Test Vials have to be done through stores departments. The Section Engineer shall be conducting periodical inspection of the water supply systems at a frequency that each system shall be covered at least twice in a year with Multi-parameter Water Quality Field Test Kits. Similarly H & MI shall also be inspecting each system at least twice a year with Bacteriological Test Vials. Any suspect report will have to be communicated by the SSE to H&MI and vice versa so that SSE can do corrective measures and H&MI can get the water sample tested in detail in laboratory. The detailed chemical testing shall be done at the time of commissioning of any new water source, change of water source and whenever there is a suspect result in field test kit.

5. The controlling officer of the SSE and the H & MI shall be kept informed and wherever the problem is not getting solved they shall be intervening in the matter. The ADENs shall be doing inspection of at least 25 % of the water supply system falling within their jurisdiction in a year.

6. Residual chlorine level shall be checked by H&MI daily at stations/colonies where he/she is posted and at least once a month at other stations falling within his jurisdiction. In addition residual chlorine level should also be checked by H&MI during visit of any station/colony within his jurisdiction.

7. Apart from above frequency of testing wherever there is any complaint/suspicion of poor water quality the SSE (works) and H&MI should inspect the system, do field testing and if required take samples for detailed analysis in laboratory.

Hema Sanhotra

(Mrs. H. K. Sanhotra)
Deputy Director/H&FW
Railway Board.

DA: As above

Annexure II

Bureau of Indian Standards
Drinking Water – Specifications for some of the important parameters
IS 10500 – 2012 (Second revision)

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	Total Dissolved Solids (TDS)	Milligram/litre	500	2000
2	Colour	Hazen unit	5	15
3	Turbidity	NTU	1	5
4	Total Hardness	Milligram/litre	200	600
5	Ammonia	Milligram/litre	0.5	0.5
6	Free Residual Chlorine	Milligram/litre	0.2	1.0
7	pH	--	6.5-8.5	6.5-8.5
8	Chloride	Milligram/litre	250	1000
9	Fluoride	Milligram/litre	1.0	1.5
10	Arsenic	Milligram/litre	0.01	0.05
11	Iron	Milligram/litre	0.3	0.3
12	Nitrate	Milligram/litre	45	45
13	Sulphate	Milligram/litre	200	400
14	Selenium	Milligram/litre	0.01	0.01
15	Zinc	Milligram/litre	5.0	15.0
16	Mercury	Milligram/litre	0.001	0.001
17	Lead	Milligram/litre	0.01	0.01
18	Cyanide	Milligram/litre	0.05	0.05
19	Copper	Milligram/litre	0.05	1.5
20	Chromium	Milligram/litre	0.05	0.05
21	Nickel	Milligram/litre	0.02	0.02
22	Cadmium	Milligram/litre	0.003	0.003
23	E-Coli or Thermocolerant coliforms	Number/ 100 ml	NIL	NIL

Note : Please refer to BIS Standard IS-10500- 2012 (second revision) for other parameters

5.1.1 Multi-parameter Water Quality Field Test Kits

Multi-parameter Water Quality Field Test Kit is used for physico-chemical analysis. The kit offers quantitative and semi-quantitative results. Quantitative test includes total hardness, total alkalinity and chloride tests. Semi-quantitative tests are used for remaining parameters using color comparison charts. This kit can carry out 100 tests for 11 parameters listed below:

i. Turbidity by visual comparison method
ii. pH by pH strips colour comparison method
iii. Total Hardness by Titrimetric method
iv. Total Alkalinity by Titrimetric method
v. Chloride by Titrimetric method
vi. Ammonia by visual comparison method (Optional)
vii. Phosphate by visual comparison method (Optional)
viii. Residual Chlorine by visual colour comparison method
ix. Iron by visual colour comparison method
x. Nitrate by visual colour comparison method
xi. Fluoride by visual colour comparison method

A separate arsenic field test kit is also available in the market, which could be used in States where arsenic is detected in drinking water sources.

The colour comparator is quick and easy to use. The kit is used in conjunction with tablet reagents and colour charts to test different parameters. Just add a tablet reagent to the test sample, place the tube in the comparator and match the colour against the appropriate colour disc. The kits are portable, easy to carry anywhere, easy to operate and do not require any kind of energy or power. Even a layman can use it comfortably and not require any technical support. The kit provides includes a User's manual with simple step-by-step instructions on how to conduct the water quality tests. This makes it easy for people to use and does not require a high level of training.

All positively tested samples using field test kits (with certain probability of contamination) shall be referred to the nearest district/ sub-divisional water quality testing laboratory for confirmation. Mere analysis of drinking water using field test kits alone shall not be binding for any official purpose.

5.1.2 Bacteriological Test Vials

A simple bacteriological test vial indicates the presence/ absence of pathogens in water samples. This is simple field test kit to indicate the presence of bacterial colonies in water. The principle of test is similar to that of Presumptive Coliform Test. It does not attempt to find pathogens but only shows the indicator for the presence of pathogens. The test kit can be used for any water irrespective of its source, including chlorinated water. The test can detect very low bacterial contamination with high specificity and sensitivity. The advantage of the method is its simplicity, low cost and ability to be performed

in the absence of a typical microbiology laboratory or field laboratory, test tubes or other containers holding the test material and can be used in the field by minimally trained personnel.

The latest intervention is the availability of reusable bacterial vials, which could also be used, so as to reduce dumping of plastic/ glass bottles.

5.2 Water Quality Analysis Requirements

5.2.1 Parameters to be monitored

Parameters to be monitored at State, District and Sub-district laboratories are provided in Annexure III and methods, instruments and chemicals required for these parameters are provided in Annexure IV. However, thirteen basic minimum parameters that need to be tested for drinking water quality will be pH, turbidity, TDS, Total Hardness, alkalinity, fluoride, chloride, sulphate, nitrate, arsenic, iron, total coliforms and E-coli. **For establishing a baseline status in the country, it is suggested that all district and sub-district level water quality testing laboratories conduct drinking water quality analysis once each in pre-monsoon and post-monsoon seasons in a year for chemical parameters and bacteriological as suggested in Annexure IV and then subsequently monitor only those parameters which are found to be present or the concentrations nearing the desirable limits.** The State level laboratory shall concentrate on analysis of specific parameters of local importance like pesticides, toxic substances, bacteriological and virological parameters, Poly Aromatic Hydrocarbons (PAH), Poly Chlorinated Biphenyls (PCB), Disinfection bi-products like Tri Chloro Methanes (TCM), etc. .

5.2.2 Protocol for Sampling

There are many important factors for accurate analysis of the sample. These factors include proper collection of the samples, method of storage and protocol for microbial and chemical analysis, data analysis and interpretation. If any of these steps are carried out with insufficient care, the result will be inaccurate and, the entire operation will result in wastage of energy, time and money. The general precautions in the Bureau of Indian Standards i.e., IS-3025/1622 and/or Standard Methods for the Examination of Water & Wastewater- latest edition [Published jointly by American Public Health Association (APHA), and American Society for Testing and Materials (ASTM) shall be referred to for detailed information on sampling and testing procedures.

5.2.3 General Guidelines and Precautions for drinking water sampling

- Collect a sample that conforms to the requirement of the sampling programme and handle it carefully so that it does not deteriorate or get contaminated during its transport to the laboratory. Before filling the container, rinse it two or three times with the water being collected.