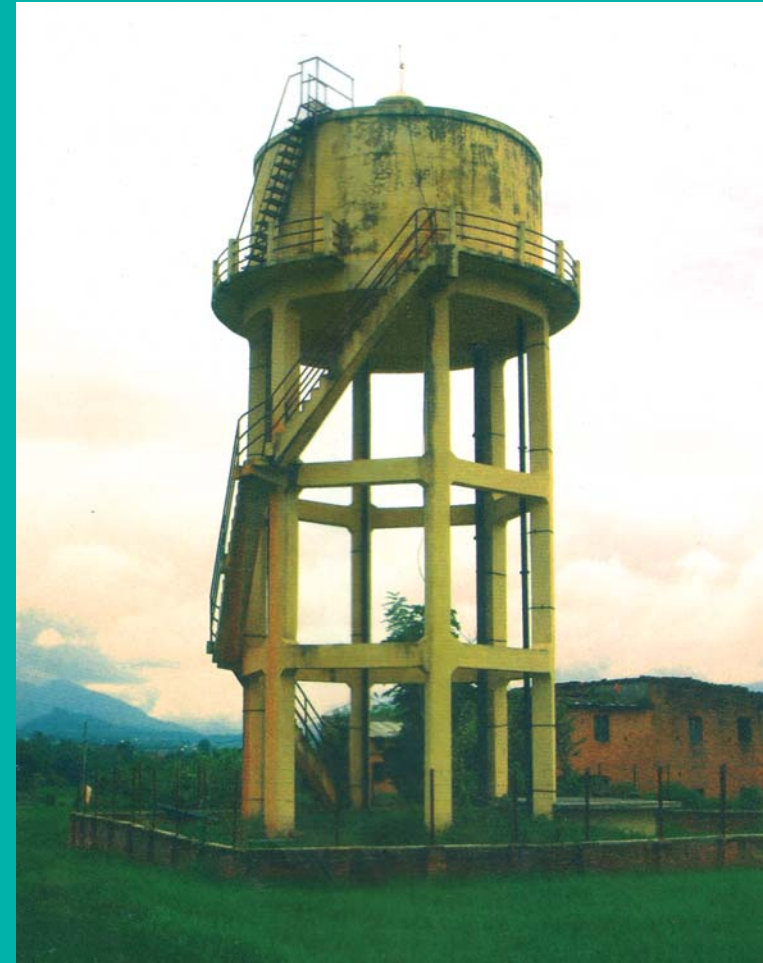




Government of Nepal
Ministry of Physical Planning and Works
Singhadarbar Kathmandu



World Health Organisation Nepal



Department of Water Supply & Sewerage
Maharajaganja, Kathmandu

National Drinking Water Quality Standards, 2005 Implementation Directives for National Drinking Water Quality Standards, 2005

*Unofficial English Translation from Nepali version of "
Rashtriya Khanepani Gunastar Mapdanda, 2062 tatha Rashtriya
Khanepani Gunastar Mapdanda Karyanwayan Nirdeshika, 2062"*

Government of Nepal
Notice issued by Ministry of Physical Planning and Works
National Drinking Water Quality Standards, 2062

Government of Nepal has issued this notice of implementation of National Drinking Water Quality Standards, 2062 under the provision of Water Resources Act, 2049, Clause 18 and Sub Clause 1.

(A) National Drinking Water Quality Standard

S.N.	Category	Parameters	Units	Concentration Limits	Remark
1	Physical	Turbidity	NTU	5 (10)	
2		pH		6.5-8.5*	
3		Color	TCU	5 (15)	
4		Taste and Odor		Non-objectionable	
5		TDS	mg/L	1000	
6		Electrical conductivity (EC)	µs/cm	1500	
7	Chemical	Iron	mg/L	0.3 (3)	
8		Manganese	mg/L	0.2	
9		Arsenic	mg/L	0.05	
10		Cadmium	mg/L	0.003	
11		Chromium	mg/L	0.05	
12		Cyanide	mg/L	0.07	
13		Fluoride	mg/L	0.5 -1.5*	
14		Lead	mg/L	0.01	
15		Ammonia	mg/L	1.5	
16		Chloride	mg/L	250	
17		Sulphate	mg/L	250	
18		Nitrate	mg/L	50	
19		Copper	mg/L	1	
20		Total Hardness	mg/L as CaCO ₃	500	
21		Calcium	mg/l	200	
22		Zinc	mg/L	3	
23		Mercury	mg/L	0.001	
24		Aluminum	mg/L	0.2	
25	Residual Chlorine	mg/L	0.1-0.2*	in systems using chlorination	
26	Microbiological	E. Coli	MPN/100 ml	0	
27		Total Coliform	MPN/100 ml	0 in 95% samples	

* These values show lower and upper limits

() Values in parenthesis refers the acceptable values only when alternative is not available.

National Drinking Water Quality Standards and Directives, 2005

(B) Implementation of National Drinking Water Quality Standard

- 1. First Phase of Implementation:** Its implementation will be within 5 years of approval of NDWQS for the following projects or water suppliers.
 - a. Existing urban water supply projects as well as small town water supply projects serving more than 10,000 populations.
 - b. All other new urban water supply projects implemented after approval of NDWQS
 - c. All new and existing urban water supply projects serving the population less than 10,000 but having high risk of water related diseases
 - d. Urban water suppliers, private industries and agencies related with Health Services

- 2. Second Phase of Implementation:**

Its implementation will be in the period of 5 to 10 years of approval of NDWQS as follows.

 - a. NDWQS will be effective in all water supply schemes in district head quarters within first three years of the second phase
 - b. NDWQS will be effective in all rural water supply schemes within second phase
 - c. The parameters of NDWQS for water supply schemes under 2 (b) will be as per Annexes 1 and 2.

(C) Water supplier should carry out the following tasks:

- a. The water supplier under first phase of implementation should submit a water quality improvement programme to the concerned ministry and the Ministry of Population and Health during the first year after approval of NDWQS.
- b. After endorsement of the water quality improvement programme by the ministry, the water supplier is obliged to implement it from the second year onward
- c. The water suppliers of district headquarters under second phase should submit a water quality improvement programme within the first year of the second phase to District Development Committees and within three years should supply drinking water as per NDWQS.

- d. All water suppliers of rural community water supply schemes should supply drinking water as per NDWQS within 5 years of second phase.
- e. The water suppliers should follow the provisions of Implementation Directives for National Drinking Water Quality Standards, 2062 for maintaining Drinking Water Quality Parameters as per NDWQS.

Secretary
Government of Nepal
Ministry of Physical Planning and Works

Annex 1: Parameters of NDWQS applicable for Rural Surface Water Supply Systems

Category	Parameter	Unit	Maximum Concentration Limits	Remarks
Physical	Turbidity_	NTU	5(10)	
	pH		6.5-8.5*	
	Color	TCU	5(15)	
	Taste & Odor		Non objectionable	
	Electrical Conductivity	µS/cm	1500	
Chemical	Iron	mg/l	0.3(3)	
	Manganese	mg/l	0.2	
	Chromium	mg/l	0.05	
	Fluoride	mg/l	0.5-1.5*	
	Ammonia	mg/l	1.5	
	Nitrate	mg/l	50	
	Total Hardness	mg/l	500	
	Calcium	mg/l	200	
	Residual Chlorine	mg/l	0.1-0.2*	In systems using chlorination
Microbiological	E-Coli	MPN /100 ml	0	
	Total Coliform	MPN /100 ml	0 (95% sample)	

* This represents minimum and maximum concentration limits.

() When there is no alternative, the values kept under parentheses will apply

Annex 2: Parameters of NDWQS applicable for Rural Ground Water Supply Systems

Category	Parameter	Unit	Maximum Concentration Limits	Remarks
Physical	Turbidity_	NTU	5(10)	
	pH		6.5-8.5*	
	Color	TCU	5(15)	
	Taste & Odor		Non objectionable	
	Electrical Conductivity	µS/cm	1500	
Chemical	Iron	mg/l	0.3(3)	
	Manganese	mg/l	0.2	
	Arsenic	mg/l	0.05	
	Fluoride	mg/l	0.5-1.5*	
	Ammonia	mg/l	1.5	
	Nitrate	mg/l	50	
	Total Hardness	mg/l	500	
	Calcium	mg/l	200	
	Residual Chlorine	mg/l	0.1-0.2*	In systems using chlorination
Microbiological	E-Coli	MPN /100 ml	0	
	Total Coliform	MPN /100 ml	0 (95% sample)	

* This represents minimum and maximum concentration limits.

() When there is no alternative, the values kept under parentheses will apply

Government of Nepal
Ministry of Physical Planning and Works
Implementation Directives for National Drinking Water Quality
Standard, 2062

The Implementation Directives for National Drinking Water Quality Standard are prepared to ensure that the water supplied by agencies to general consumers confirm to NDWQS.

Paragraph 1 Preliminary

1. Name, Description and Introduction:

- a. The name of this directive is “Implementation Directives for National Drinking Water Quality Standards, 2062”
- b. The Implementation Directives will be effective from the date of enforcement of National Drinking Water Quality Standards.

2. Definition:

In this Implementation Directives, if not mentioned otherwise

1. “Directives” means Implementation Directives for National Drinking Water Quality Standard, 2062
2. “Standard” means National Drinking Water Quality Standard, 2062
3. “Sample” means water sample collected for the purpose of testing/analysis and monitoring with specified procedure as per this directive
4. “Water Supplier” means any agency, private industry and agencies that supply water to general public, agencies related to health services and operators of the water supply projects.

Paragraph 2

Objective and Use of Directives

3. Objectives:

The objective of this directive is as follows:

1. To set the necessary provisions for implementation of NDWQS by the water suppliers.
2. To set the water sampling, testing and analysis procedures used to certify that the drinking water supplied or to be supplied conforms to the NDWQS.
3. To set the monitoring and surveillance procedures to certify that the quality of supplied water conforms to the NDWQS.
4. To set any other matters related to drinking water quality¹ to be followed or abided by the rules by water suppliers or concerned governmental and nongovernmental organizations.

4. Use of the Directives:

The following entities should apply the directives

1. Agencies responsible for providing drinking water service
2. Government agencies related with drinking water supply
3. The consumers of the drinking water supply
4. Laboratories that provide water quality testing services
5. District Development Committees
6. Municipal Development Committees
7. Village Development Committees
8. Municipalities, Sub Metropolis and Metropolis
9. Health related agencies
10. Any other agencies, private industry and organizations, individuals related with health service and drinking water supply.

¹ Refer to the 3d edition of the WHO Guidelines for Drinking Water Quality (2004) for details on a comprehensive Framework for Safe Drinking Water, through the design and application of Water Safety Plans (WSP) (as in schedule C, sub a) above: with reference to the mandatory requirement to develop a “water quality improvement programme” for each scheme)

5. Conditions to Apply the Directives

This directive is to be applied in following conditions.

1. During setting of the necessary provisions for implementation of NDWQS by the water suppliers.
2. During setting the water sampling, testing and analysis procedures used to certify that the drinking water supplied or to be supplied conforms to the NDWQS
3. During monitoring and surveillance to certify that the quality of supplied water conforms to the NDWQS.
4. During setting of any other matters related to drinking water quality to be followed or abided by the rules by water suppliers or concerned governmental and nongovernmental organizations

Paragraph 3

Water Sampling and testing Procedure

6. Methods of Sampling:

The water supplier should test the drinking water to find out if the quality conforms to the NDWQS. For this purpose the sampling should be done as follows

- a. In general the sample should be taken from distribution pipeline in gravity fed and pumping schemes. The sampling points should be fixed as follows:
- b. One sample point shall be selected for each 5 km of primary, secondary and tertiary distribution pipelines.
- c. Public stand posts shall be preferred as sampling points as far as possible
- d. If there is no public stand post the private tap connected with the shortest connection pipe should be taken as sampling point.
- e. If both public tap stands and private taps are not available, a sampling point should be on the distribution pipe line itself.
- f. In case of privately supplied hotels, industries, hospitals, commercial establishments, offices and residential buildings, the sample point should be the outlet of the water tank or reservoir.
- g. The sampling should be taken by experienced personnel
- h. Standards Methods of sampling should be adapted as necessary

7. Criteria for Selection of Sampling Points:

The sampling points should be selected based on the following criteria.

1. The sample should be representative in terms of temporal and spatial variability of quality.
2. The sampling points should be uniformly distributed throughout the distribution system taking in account of the population and number of branches.
3. The samples should be taken from the reservoirs and storage tanks.
4. For water quality monitoring and surveillance, in addition to the aforementioned points, with due attention to the contamination risk samples should be taken from source, low pressured zones of the distribution pipeline and pipe joints.

8. Points to be considered for Sampling and Testing:

The following procedure should be adopted for testing and analyzing the samples taken.

1. Physico-chemical testing:

Following points should be considered for physico-chemical testing.

- a. The samples should be properly collected and stored.
- b. The duration between sampling and testing should be minimized as far possible.
- c. Storage should be done in glass or polyethylene bottles at low temperatures.
- d. Parameters like residual chlorine, pH and turbidity should be tested immediately after sampling.

2. Microbiological testing:

The following additional points should be considered for microbiological testing.

- a. Samples should be collected in specifically sterilized bottles and tested within two hour of collection.
- b. For the testing with Most Probable Number (MPN) method, the samples should be collected in specifically sterilized glass bottles.
- c. For the testing with Membrane Filter (MF) method all collected samples should be tested as early as possible within two hours of collection.

- d. In case of delayed testing samples should be preserved and transported at 4⁰C and tested within 6 hours.
- e. In the case of chlorinated samples the samples should be collected in sterile bottles after chlorine-neutralization.

9. Sample Testing Laboratories:

1. The testing of samples can be done in following laboratories
 - a. Laboratories of Government of Nepal
 - b. Laboratories accredited by Government of Nepal
 - c. Laboratories accredited by Government of Nepal or any other official agencies for testing with specific testing methods
2. The laboratories other than Government of Nepal listed above in 9.1 should produce following papers to the concerned agencies of the GON before or after testing of samples
 - a. The testing methods used by the laboratory.
 - b. Evidence that the method used can determine within or more than concentration limit of parameters.
 - c. Documents which indicates that the testing method is suitable for drinking water services.
 - d. The Standard Operating Procedures (SOP) used by the laboratory

10. Test/Analytical Methods:

Testing and analysis of parameters stated in the NDWQS should be done as follows.

1. Physic-chemical test/analysis:

There could be more than one method for analyzing the physical and chemical parameters. The following methods should be used for testing/analysis for such parameters.

- a. Atomic Absorption Spectrophotometer (AAS): atomic absorption spectroscopy is used for finding out the presence and concentration of heavy metals such as boron, cadmium, chromium, copper, lead, manganese and mercury.
- b. Colorimetry: this technique could be applied for analysis of parameters such as cyanide, TOC and iron.

- c. Inductively Coupled Plasma Mass Spectrometer (ICP-MS) / Inductively Coupled Plasma Atomic Emission Spectrometer (ICP-AES): major or trace metals such as aluminum, boron, cadmium, chromium, calcium, manganese etc. could be analyzed using these techniques.
- d. Portable kits / probes: these instruments are suitable for field measurements. NO₃, As, Cr and F_l could be analyzed with the kit.
- e. Titrimetry: cyanide and hardness are normally determined from titrimetric methods.
- f. X-ray fluorescence or Neutron Activation Analysis: parameters such as chromium could be determined from this method.
- g. Absorbance Analysis or Visual Comparison Methods: color in water is determined from either of these methods.
- h. Silver Diethyldithiocarbamate Spectrometer: arsenic is analyzed using this method. Graphite furnace atomic absorption spectroscopy in combination with high-pressure liquid chromatography is used for various species of arsenic.
- i. Anodic Stripping Voltammetry: this method is used for the analysis of lead.
- j. Ion Chromatography (IC): this method is used for the analysis for inorganic anions such as sulphate, phosphate, nitrate, chloride, fluoride.
- k. Automatic Colorimetric: this procedure can be used for analyses of Nitrite plus Nitrate, samples.
- l. Nephelometry techniques: this method is used for determination of turbidity.

- m. Automatic Atomic Absorption: this method is used to measure the concentration of calcium, magnesium, sodium and potassium ions.
- n. Gas Chromatography/Mass Spectrometry (GC/MS): the determination of organic parameters in water is carried out by this method.

2. Microbiological Analysis:

The analysis should be carried out by experienced microbiologist. The analysis should be carried out by well known MPN or MF or any other prescribed methods.

Following reference materials can be used for details of above mentioned methods:

Methods as described **in the reference “Standard Methods for the Examination of Water and Wastewater”** 20th Edition, 1998, American Public Health Association (APHA), American Water works Association (AWWA), Water Environmental Federation (WEF)

Paragraph 4 Monitoring and Surveillance

11. Responsibility of Monitoring:

The “Water Supplier” themselves are responsible for water quality monitoring

12. Parameters and Frequency of Monitoring:

The parameters and frequency of monitoring are as follows.

- 1. For urban water supply system, the parameters and frequency will be as per Table 1
- 2. For rural water supply system, the microbiological parameters listed in table 1 will be monitored at least thrice a year (pre-monsoon, during monsoon and post-monsoon season). Monitoring frequency for other parameters will be as mentioned in the table 1

Table 1: Frequency of Monitoring for Urban Water Supply System

S.N.	Category	Parameters	Monitoring frequency
1	Physical	Turbidity	Daily
2		pH	Daily
3		Color	Daily
4		Taste and Odor	Daily
5		EC	Monthly
6		TDS	Quarterly
7	Chemical	Residual Chlorine	Daily
8		Ammonia	Monthly
9		Chloride	Monthly
10		Nitrate	Monthly
11		Total Hardness	Monthly
12		Calcium	Monthly
13		Iron	Yearly
14		Manganese	Yearly
15		Sulphate	Yearly
16		Arsenic	Yearly
17		Cadmium	Yearly
18		Copper	Yearly
19		Fluoride	Yearly
20		Cyanide	Yearly
21		Lead	Yearly
22		Chromium	Yearly
23		Zinc	Yearly
24		Mercury	Yearly
25		Aluminum	Yearly
26	Microbiological	E. coli	Monthly
27		Total coliform	Monthly

13. Major tasks of the Water Supplier during monitoring:

Major tasks during monitoring to be performed by water supplier are cited as follows:

1. Controlling regularly the quality to ascertain that the water supplied complies with the NDWQS.
2. Periodic monitoring of all the components (from source to consumers) of the water supply system from the perspective of sanitation and risk to health.
3. Proper supervision, inspection and maintenance as part of operation of the water supply systems.
4. Development of necessary infrastructure such as water quality testing laboratory and manpower for quality control.

14. Scope of Monitoring:

Following factors should be considered while monitoring:

1. Type of water supply sources such as surface water, springs, dug-wells, shallow wells, deep wells etc and quality of water.
2. Type and size of the water supply system (pipe system, treatment facilities)
3. Local environmental settings (physical infrastructure, geography, etc)
4. Sanitation and hygienic condition surrounding the water supply system.
5. Socio-economic environment at the local level.
6. Site specific conditions for complying with the standards
7. User's opinion and suggestions regarding water quality
8. Health and Hygiene Information (information on water related diseases)

15. Selection of Sampling Points:

For this Paragraph 3, clause 7(4) should be followed.

16. Sampling, test/analyses frequency in unpipied water supply system:

The minimum frequency of sampling and analysis for unpipied supplies is given in the Table 2 below.

17. Sampling, test/analyses frequency in distribution pipelines of piped water supply system:

The minimum frequency of sampling and analysis in the distribution pipelines for piped water supply system should be as follows:

1. for <5000 population served, the number of sampling is 1
2. for 5000 to 100,000 population served, 1 per 5000
3. for >100,000 population served, 1 per 10,000 population, plus 10 additional samples

18. Surveillance:

Surveillance includes continuous and vigilant public health assessment and overview of the safety and acceptability of drinking-water supplies.

19. Surveillance Agency:

The Ministry of Health and Population and its line agencies are responsible for surveillance of drinking water quality.

Table 2: Minimum Frequency of Sampling and Analysis

Source and mode of supply	Minimum frequency of sampling and analysis		Remarks
	Bacteriological	Physical/Chemical	
Open wells for community supply	Sanitary protection measures; bacterial testing only if situation demands	Once initially for community wells	Pollution usually expected to occur
Covered dug wells and shallow tube wells with hand pumps	Sanitary protection measures; bacterial testing only if situation demands	Once initially, thereafter as situation demands	Situations requiring testing: change in environmental conditions, outbreak of waterborne diseases or increase in incidence of waterborne diseases
Deep tube wells with hand pumps	Once initially, thereafter as situation demands	Once initially, thereafter as situation demands	Situations requiring testing: change in environmental conditions, outbreak of waterborne diseases or increase in incidence of waterborne diseases
Protected springs	Once initially, thereafter as situation demands	Periodically for residual chlorine if water was contaminated and has been disinfected	Situations requiring testing: change in environmental conditions, outbreak of waterborne diseases or increase in incidence of waterborne diseases

20. Tasks to be performed prior to surveillance:

In order to make surveillance simple, following tasks should be performed prior to surveillance.

1. Make an inventory of existing water supply schemes with population coverage, scheme types/sizes/condition, location specifics etc.

2. Investigate means for effective participation of local people in surveillance activities encouraging participatory approach in operation/ maintenance and decision making in their own community water supply systems.
3. Organize training programs for those who participate in surveillance works at various levels.
4. Develop data collection forms applicable for all types of water supply schemes.
5. Plan preliminary and then routine surveys.
6. Data collection and analysis of field works.
7. Develop regular site visit plans to all schemes.

21. Selection of Parameters for Monitoring and Surveillance:

The important parameters for monitoring and surveillance of drinking water quality, especially in, small community water supply schemes are as follows.

1. E-coli as microbiological parameter
2. Turbidity, Residual chlorine and pH if chlorine is used

Beside other physical and chemical parameters of the NDWQS, the parameters under 21 (1) and 21(2) should be compulsorily tested and analyzed.

22. Sanitary Survey:

Sanitary survey should be considered as one of the activities under monitoring and surveillance. For the purpose of evaluating the regular supply of safe and adequate water, a sanitary survey should be done with onsite inspection of source, facilities, equipment, operation and maintenance of water supply schemes

23. Responsibility of Sanitary Survey:

The Water Supplier shall perform sanitary survey and inspection. The Water Supplier should submit a copy of the sanitary survey records to the concerned District Public Health Office (DPHO).

24. Sanitary Survey and Inspection:

The following places and situations should be selected for sanitary survey and inspection.

1. Sources and Reservoirs
2. Treatment System
3. Low pressure zones in pipeline
4. Pipeline special joints
5. Distribution system
6. Pumps, pump facilities, and controls
7. Monitoring, reporting, and data verification, and
8. System management and operation

25 Institutional Monitoring:

Besides the monitoring by the Water Supplier, the responsibility of monitoring by government agencies lies with the concerned ministry and its line agencies. The surveillance responsibility, however, lies with the Ministry of Health and Population and its line agencies.

26. Execution of Monitoring and Surveillance Report:

The report, with comments and suggestions, of monitoring and surveillance provided by Ministry of Health and Population and its line agencies should be implemented by concerned ministry and its line agencies related to water supplier.

Paragraph 5

Information, Record Keeping and Reporting

27 Implementation of NDWQS:

The responsibility of implementation of NDWQS lies with the Ministry of Population and Health, its line agencies and district offices.

28. Information Sharing:

The “Water Supplier” should regularly report the tests, analyses, monitoring carried out by them to the concerned District Public Health Offices (DPHOs).

29. Record Keeping:

The “Water Suppliers” should keep the records of regular monitoring, test and analyses and produce whenever demanded by the concerned agencies.

30. Information Analysis and Surveillance:

Surveillance report should be prepared analyzing the information provided by the water supplier and made available to stakeholders as per their demands and submitted to the higher level agencies by District Health Offices.

31. Technical Support:

The technical support to Water Suppliers and stakeholders providing water related services shall be provided by the Department of Water Supply and Sewerage (DWSS) and its concerned offices.

Annexes

Annex 1: Parameters of NDWQS applicable for Rural Surface Water Supply Systems

Category	Parameter	Unit	Maximum Concentration Limits	Remarks
Physical	Turbidity	NTU	5(10)	
	pH		6.5-8.5*	
	Color	TCU	5(15)	
	Taste & Odor		Non objectionable	
	Electrical Conductivity	μS/cm	1500	
Chemical	Iron	mg/l	0.3(3)	
	Manganese	mg/l	0.2	
	Chromium	mg/l	0.05	
	Fluoride	mg/l	0.5-1.5*	
	Ammonia	mg/l	1.5	
	Nitrate	mg/l	50	
	Total Hardness	mg/l	500	
	Calcium	mg/l	200	
	Residual Chlorine	mg/l	0.1-0.2*	In systems using chlorination
Microbiological	E-Coli	MPN /100 ml	0	
	Total Coliform	MPN /100 ml	0 (95% sample)	

* This represents minimum and maximum concentration limits.

() When there is no alternative, the values kept under parentheses will apply

Anex 2: Parameters of NDWQS applicable for Rural Ground Water Supply Systems

Category	Parameter	Unit	Maximum Concentration Limits	Remarks
Physical	Turbidity_	NTU	5(10)	
	pH		6.5-8.5*	
	Color	TCU	5(15)	
	Taste & Odor		Non objectionable	
	Electrical Conductivity	µS/cm	1500	
Chemical	Iron	mg/l	0.3(3)	
	Manganese	mg/l	0.2	
	Arsenic	mg/l	0.05	
	Fluoride	mg/l	0.5-1.5*	
	Ammonia	mg/l	1.5	
	Nitrate	mg/l	50	
	Total Hardness	mg/l	500	
	Calcium	mg/l	200	
Residual Chlorine	mg/l	0.1-0.2*	In systems using chlorination	
Microbiological	E-Coli	MPN /100 ml	0	
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* This represents minimum and maximum concentration limits.

() When there is no alternative, the values kept under parentheses will apply