مكتب التنظيم والرقابة لقطاع الكهرباء و المياه

RSB FOR ELECTRICITY & WATER

# Water Quality Regulations

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**Version history**

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## Article 1 Scope of regulations

1. These regulations are issued pursuant to:
    a. Article 2 of Executive Council Resolution 2 of 2010 for the Establishment of the Regulatory and Supervisory Bureau for the Electricity and Water sector in Dubai.
    b. Article 4 of Law 6 of 2011 Regulating the Participation of the Private Sector in Electricity and Water Production in the Emirate of Dubai.
2. These regulations apply to all Producers licensed by the RSB to produce water intended for human consumption and any third parties contracted to carry out work on behalf of Producers in respect of that production.
3. The objective of these regulations is to ensure that water produced by Producers, and intended for human consumption, is wholesome and clean.
4. Nothing in these regulations shall supercede any other Dubai or Federal legal requirements relating to the production of water intended for human consumption.

## Article 2 Definitions

| | |
|---|---|
| Council | means the Dubai Supreme Council of Energy |
| Customer | means DEWA or any other entity that a Producer is authorized to supply |
| DEWA | means Dubai Electricity and Water Authority |
| DM | means Dubai Municipality |
| Producer | means any entity, licensed by the RSB, to produce water intended for human consumption |
| RSB | means the Regulatory and Supervisory Bureau for the Electricity and Water Sector |
| Water intended for human consumption | means:<br>a. All water either in its original state or after treatment, intended for drinking, cooking, food preparation or other domestic purposes regardless of its origin; and,<br>b. All water used in any food production undertaking for the manufacture, processing, preservation or marketing of products or substances intended for human consumption. |

## Article 3 General obligations

1. Producers shall take measures necessary to ensure that water intended for human consumption is wholesome and clean. For the purposes of the minimum requirements of these regulations, water intended for human consumption shall be wholesome and clean if it:
    a. Is free from any micro-organisms and parasites and from any substances which, in numbers or concentrations, constitute a potential danger to human health, and
    b. Meets the minimum requirements set out in Annex 1.

**Article 4 Quality standards**

1. The RSB, in consultation with DM and DEWA, may update values applicable to water intended for human consumption for the parameters set out in Annex I.
2. The values set in accordance with paragraph 1, shall not be less stringent than the existing values set out in Annex I. As regards the parameters set out in Annex I, Part C, the values need be fixed only for monitoring purposes and for the fulfillment of the obligations imposed in Article 7.

**Article 5 Point of compliance**

1. The parametric values set in accordance with Article 4 shall be complied with at the sample point(s), identified in the Producer's licence, at which the water leaves the licensee's facility.

**Article 6 Monitoring**

1. Producers shall take all measures necessary to ensure that regular monitoring of the quality of water intended for human consumption is carried out, in order to check that the water produced meets the requirements of these regulations and in particular the parametric values in Annex 1. Samples should be taken so that they are representative of the quality of the water produced throughout the year. In addition, Producers shall take all measures necessary to ensure that, where disinfection forms part of the preparation of water intended for human consumption, the efficiency of the disinfection treatment applied is verified, and that any contamination from disinfection by-products is kept as low as possible without compromising the disinfection.
2. To meet the obligations in paragraph 1, appropriate monitoring programmes shall be established by Producers for all water intended for human consumption. Those monitoring programmes shall meet the minimum requirements set out in Annex II.
3. Guidelines for the monitoring prescribed in this Article may be drawn up in accordance with the procedure laid down in Article 11.
4. Producers shall comply with the specifications for the analysis of parameters set out in Annex III.
    a. Methods other than those specified in Annex III, Part 1, may be used, providing it can be demonstrated that the results obtained are at least as reliable as those produced by the methods specified. Where alternative methods are adopted, the adopting entity shall provide the RSB with all relevant information concerning such methods and their equivalence.
    b. For those parameters listed in Annex III, Parts 2 and 3, any method of analysis may be used provided that it meets the requirements set out therein.
5. All samples must be analyzed at a laboratory approved by the RSB.

**Article 7 Remedial action and enforcement**

1. Producers shall ensure that any failure to meet the parametric values:
    a. in Annex I is immediately investigated in order to identify the cause.
    b. in Annex I, Parts A or B, is immediately reported to the RSB.

2. If, despite the measures taken to meet the obligations imposed in Article 3, water intended for human consumption does not meet the parametric values in Annex 1, Parts A or B, Producers shall ensure that the necessary remedial action is taken as soon as possible to restore its quality. In addition, the RSB shall consider enforcement action in accordance with the provisions of Law (6) of 2011, Article (26), or Executive Council Resolution (2) of 2010 Article (2), as the case may be, having regard inter alia to the extent to which the relevant parametric value has been exceeded and to the potential danger to human health.
3. Whether or not any failure to meet the parametric value has occurred, Producers shall ensure that production of water intended for human consumption which constitutes a danger to human health is avoided or its use restricted or such other action is taken as is necessary to protect human health. In such cases Customers shall be informed promptly thereof and given the necessary advice.
4. In the event of non-compliance with the parametric values or with the specifications set out in Annex I, Part C, the Producer shall consider whether that non-compliance poses any risk to human health. It shall take remedial action to restore the quality of the water, where that is necessary, to protect human health.
5. Producers shall ensure that, where remedial action is taken, Customers are notified except where it considers the non-compliance with the parametric value to be trivial.

**Article 8 Derogations**

1. The RSB, after consultation with DEWA and DM, may grant derogations from the parametric values set out in Annex I, Part B, up to a maximum value to be determined by it, provided no derogation constitutes a potential danger to human health. Derogations shall be limited to as short a time as possible and shall not exceed one year, towards the end of which a review shall be conducted to determine whether sufficient progress has been made.
2. In exceptional circumstances, a Producer may request a second derogation for a period not exceeding one year. The RSB shall take a decision on any such request within one month.
3. Any derogation granted in accordance with paragraphs 1 or 2 shall specify the following:
    a. The grounds for the derogation;
    b. The parameter concerned, previous relevant monitoring results, and the maximum permissible value under the derogation;
    c. The geographical area, the quantity of water supplied each day, the population concerned and whether or not any food-production undertaking would be affected;
    d. An appropriate monitoring scheme, with an increased monitoring frequency where necessary;
    e. A summary of the plan for the necessary remedial action, including a timetable for the work and an estimate of the cost and provisions for reviewing; and
    f. The required duration of the derogation.
4. If the RSB considers the non-compliance with the parametric value to be trivial, and if action taken in accordance with Article 7(2) is sufficient to remedy the problem within 30 days, the requirements of paragraph 3 need not be applied. In that event, only the maximum permissible value for the parameter concerned and the time allowed to remedy the problem shall be set by the RSB.
5. Recourse may no longer be had to paragraph 4, if failure to comply with any one parametric value for a given water production site, has occurred on more than 30 days in aggregate during the previous 12 months.

**Article 9 Quality assurance of treatment, equipment and materials**

1. Producers shall take all measures necessary to ensure that no substances or materials for new installations used in the preparation of water intended for human consumption, or impurities associated with such substances or materials for new installations, remain in water intended for human consumption in concentrations higher than is necessary for the purpose of their use and do not, either directly or indirectly, reduce the protection of human health provided for in these regulations.

**Article 10 Review of annexes**

1. At least every five years, the RSB, in consultation with DEWA and DM, shall review Annexes II, and III in the light of scientific and technical progress and shall make amendments in accordance with the procedure laid down in Article 11.

**Article 11 Committee procedure**

1. The RSB shall be assisted by a committee composed of representatives of DM & DEWA. The Committee shall be chaired by the RSB.
2. The committee shall be tasked with:
    a. Issuing guidelines for monitoring requirements in accordance with Article 6(3); and
    b. Periodic review of Annexes II and III in accordance with Article 10.
3. The committee chairman shall submit to the committee a draft of the proposed changes or guidelines. The committee shall deliver its opinion on the draft within a time limit which the chairman may lay down according to the urgency of the matter. The opinion shall be delivered by the majority.
4. The RSB shall submit those proposed changes or guidelines to the Council for ratification and on such ratification, such measures shall apply immediately.

**Article 12 Information and reporting**

1. All Producers shall take the measures necessary to ensure that adequate and up-to-date information on the quality of water intended for human consumption is available to Customers.
2. Producers shall submit a report to the RSB by the 31st January each year on its performance during the preceding calendar year.
3. The formats and the minimum information for the reports provided for in paragraph 2 shall be determined having special regard to the measures referred to in Article 4, Article 6(2), Article 7, Article 8.

**Article 14 Timescale for compliance**

1. Producers shall take the measures necessary to ensure that the quality of water intended for human consumption complies with these regulations within one year of its entry into force.

**Annex I: Parameters and Parametric Values** (maximum unless otherwise stated)

**Part A - Microbiological parameters**

| Parameter | Parametric Value (number/100ml) |
|---|---|
| Escherichia coli (E.coli) | 0 |
| Enterococci | 0 |

**Part B – Chemical Parameters**

B1: Naturally occurring chemicals that are of health significance in drinking-water

| Parameter | Parametric Value | Unit | Notes |
|---|---|---|---|
| **Inorganic** | | | |
| Arsenic | 10 | µg/l | |
| Barium | 1300 | µg/l | |
| Boron | 2.4 | mg/l | |
| Chromium | 50 | µg/l | |
| Fluoride | 1.5 | mg/l | |
| Selenium | 40 | µg/l | |
| Uranium | 30 | µg/l | |
| **Organic** | | | |
| Microcystin-LR | 1 | µg/l | |

B2: Chemicals from industrial sources and human dwellings that are of health significance in drinking water

| Parameter | Parametric Value | Unit | Notes |
|---|---|---|---|
| **Inorganic** | | | |
| Cadmium | 3 | µg/l | |
| Mercury | 6 | µg/l | |
| **Organic** | | | |
| Benzene | 10 | µg/l | |
| Carbon tetrachloride | 4 | µg/l | |
| 1,2-Dichloroethane | 30 | µg/l | |
| 1,2-Dichloroethene | 50 | µg/l | |
| Dichloromethane | 20 | µg/l | |
| Di(2-ethylhexyl)phthalate | 8 | µg/l | |
| 1,4-Dioxane | 50 | µg/l | |
| Edetic Acid (EDTA) | 600 | µg/l | |
| Hexachlorobutadiene | 0.6 | µg/l | |
| Nitrilotriacetic acid | 200 | µg/l | |
| Pentachlorophenol | 9 | µg/l | |
| Tetrachloroethene | 40 | µg/l | |
| Trichloroethene | 20 | µg/l | |

B3: Chemicals from agricultural activities that are of health significance in drinking water

| Parameter | Parametric Value | Unit | Notes |
|---|---|---|---|
| Nitrate | 50 | mg/l | Note 1 |
| Nitrite | 3 | mg/l | Note 1 |
| Pesticides | 0.1 | µg/l | Notes 2 and 3 |
| Pesticides – Total | 0.5 | µg/l | Notes 2 and 4 |

Note 1: In addition to the limits stated, the condition that [nitrate]/50 + [nitrite]/3 <=1, the square brackets signifying the concentrations in mg/l for nitrate (NO3) and nitrite (NO2), must be complied with.

Note 2: Pesticides means:

- Organic insecticides,
- Organic herbicides,
- Organic fungicides,
- Organic nematocides,
- Organic acaricides,
- Organic rodenticides,
- Organic slimicides,
- Related products (inter alia growth regulators)

and their relevant metabolites, degradation and reaction products.

Only those pesticides which are likely to be present in a given sample need be monitored.

Note 3: The parametric value applies to each individual pesticide. In case of aldrin and dieldrin the combined total parametric value is 0.030 µg/l.

Note 4: 'Pesticides – Total' means the sum of all individual pesticides detected and quantified in the monitoring procedure.

B4: Chemicals used in water treatment or materials in contact with drinking water that are of health significance in drinking water

| Parameter | Parametric Value | Unit | Notes |
|---|---|---|---|
| **Disinfectants** | | | |
| Chlorine | ≤5 and ≥0.5 | mg/l | Note 3 |
| Chlorine dioxide | ≤0.5 and ≥0.4 | Mg/l | Note 3 |
| Monochloramine | 3 | mg/l | |
| Sodium dichloroisocyanurate | 50 | mg/l | |
| Cyanuric acid | 40 | mg/l | |
| **Disinfection by-products** | | | |
| Bromate | 10 | µg/l | Note 1 |
| Bromodichloromethane | 60 | µg/l | |
| Bromoform | 100 | µg/l | |
| Chlorate | 700 | µg/l | |
| Chlorite | 700 | µg/l | |
| Chloroform | 300 | µg/l | |
| Dibromoacetonitrile | 70 | µg/l | |
| Dibromochloromethane | 100 | µg/l | |
| Dichloroacetate | 50 | µg/l | |
| Dichloroacetonitrile | 20 | µg/l | |
| Monochloroacetate | 20 | µg/l | |
| N-nitrosodimethylamine | 0.1 | µg/l | |
| Trichloroacetate | 200 | µg/l | |
| Trihalomethanes – Total | ≤1 | Ratio | Notes 1 and 2 |
| **Contaminants from treatment chemicals** | | | |
| Acrylamide | 0.50 | µg/l | |
| Epichlorohydrin | 0.4 | µg/l | |
| **Contaminants from pipes and fittings** | | | |
| Antimony | 20 | µg/l | |
| Benzo(a)pyrene | 0.7 | µg/l | |
| Copper | 2 | mg/l | Note 4 |
| Cyanide | 70 | µg/l | |
| Lead | 10 | µg/l | |
| Nickel | 70 | µg/l | |
| Vinyl chloride | 0.3 | µg/l | |

Note 1: Where possible, without compromising disinfection, Producers should strive for a lower value.

Note 2: The ratio calculation is as follows:

$$\frac{C_{bromoform}}{GV_{bromoform}} + \frac{C_{DBCM}}{GV_{DBCM}} + \frac{C_{BDCM}}{GV_{BDCM}} + \frac{C_{chloroform}}{GV_{chloroform}} \leq 1$$

Where C= concentration and GV = guideline value.

The compounds are: chloroform, bromoform, dibromochloromethane (DBCM) and bromodichloromethane (BDCM).

Note 3: Supplies may be disinfected by chlorine or chlorine dioxide but not both. In the case of water entering the DEWA potable water network only chlorine dioxide may be used as the primary disinfectant.

Note 4: A parametric value of 1mg/l applies to water entering the DEWA potable water network.

**Part C – Indicator Parameters**

| Parameter | Parametric Value | Unit | Notes |
|---|---|---|---|
| Aluminium | 200 | µg/l | |
| Ammonia | 1.50 | mg/l | |
| Chloride | 250 | mg/l | Note 1 |
| Clostridium perfringens (including spores) | 0 | number/100ml | |
| Colour | No visible colour | | |
| Conductivity | 2500 | µS $cm^{-1}$ at 20°C | Note 2 |
| Hydrogen ion concentration | ≥6.5 and ≤8.5 | pH units | Note 3 |
| Iron | 300 | µg/l | |
| Manganese | 100 | µg/l | |
| Odour | Acceptable to consumers | | |
| Sulphate | 250 | mg/l | Note 4 |
| Sodium | 200 | mg/l | |
| Taste | Acceptable to consumers | | |
| Total organic carbon (TOC) | No abnormal change | | |
| Turbidity | 0.4 | NTU | |

Note 1: A parametric value of ≥25 and ≤250mg/l applies to water entering the DEWA potable water network.

Note 2: A parametric value of ≥200 and ≤900 µS/cm at 25°C applies to water entering the DEWA potable water network.

Note 3: A parametric value of ≥7.9 and ≤8.5 applies to water entering the DEWA potable water network.

Note 4: A parametric value of ≥2 and ≤35mg/l applies to water entering the DEWA potable water network.

Radioactivity

| | | | |
|---|---|---|---|
| Tritium | 100 | Bq/l | Note 1 |
| Gross alpha activity | 0.5 | Bq/l | Note 2 |
| Gross beta activity | 1 | Bq/l | Note 2 |

Note 1: Tritium will not be detected by standard gross activity measurements. Routine analysis for this radionuclide is not necessary but, if there is any reason for believing that it may be present, radionuclide specific sampling should be used.

Note 2: Given that the treatment process used in Dubai will involve reverse osmosis or distillation, both of which are considered most effective for removing radionuclide, in the event that these limits are exceeded the RSB must be notified. An investigation into the source of the radionuclide should be undertaken and alternative sources of water must be considered.

## Annex II: Monitoring

1. Check monitoring

The purpose of check monitoring is to regularly provide information on the organoleptic, physical and microbiological quality of the effectiveness of drinking-water treatment (particularly of disinfection) where it is used, in order to determine whether or not water intended for human consumption complies with the relevant parametric values laid down in these regulations.

The following parameters must be subject to check monitoring:

- Aluminium (Note 1)
- Ammonia
- Bromate
- Chlorine (Note 3)
- Chlorine Dioxide (Note 3)
- Clostridium perfringes (including spores) (Note 2)
- Colour
- Conductivity
- Escherichia coli (E. coli)
- Hydrogen ion concentration
- Iron (Note 1)
- Nitrite (Note 4)
- Odour
- Taste
- Coliform bacteria
- Turbidity

Note 1: Necessary only when used as a flocculant.

Note 2: Necessary only if the water originates from or is influenced by surface water.

Note 3: Necessary only when used as a disinfectant.

Note 4: Necessary only when chloramination is used as a disinfectant.

2. Audit Monitoring

The purpose of audit monitoring is to provide the information necessary to determine whether or not all of this regulation's parametric values are being complied with. All parameters set in accordance with Article 4(1) and (2) must be subject to audit monitoring unless it can be established by the Producer, to the satisfaction of the RSB, that the parameter is not likely to be present in a given supply in concentrations which could lead to the risk of a breach of the relevant parametric value.

**Table B1 – Minimum frequency of sampling and analysis for water intended for human consumption**

Producers must take samples at the point of compliance as defined in Article 5 to ensure water intended for human consumption meets the requirements of these regulations.

| Volume of water produced each day (Note 1) $m^3$ | Check monitoring number of samples per year (Note 2 and 3) | Audit monitoring number of samples per year (Note 3) |
|---|---|---|
| <=10,000 | 52 | 2 |
| >10,000 <=100,000 | 185 | 6 |
| >100,000 <=500,000 | 365 | 12 |
| >500,000 | 730 | |

Note 1: The volumes are calculated as averages taken over a calendar year

Note 2: For the different parameters in Annex I, a producer may reduce the number of samples specified in the table if:

a) The values of the results obtained from samples taken during a period of at least two successive years are constant and significantly better than the limits laid down in Annex I, and

b) No factor is likely to cause a deterioration of the quality of water.

The lowest frequency applied must not be lower than 50% of the number of samples specified in the table.

Note 3: As far as possible, the number of samples should be distributed equally over the year.

## Annex III: Specifications for the analysis of parameters

Each Producer must ensure that any laboratory at which samples are analysed has a system of analytical quality control that is subject from time to time to checking by a person who is not under the control of the laboratory and who is approved by the RSB for that purpose.

1. Parameters for which methods of analysis are specified

The following principles for methods of microbiological parameters are given either for reference whenever a CEN/ISO method is given for guidance, pending the possible future adoption, in accordance with the procedure laid down in Article 11, of further CEN/ISO international methods for these parameters. Producers may use alternative methods, providing the provisions of Article 6(4) are met.

Coliform bacteria and Escherichia coli (E.coli) (ISO 9308-1)
Enterococci (ISO 7899-2)
Enumeration of cultural microorganisms – Colony count 22°C (prEN ISO 6222)
Enumeration of cultural microorganisms – Colony count 37°C (prEN ISO 6222)
Clostridium perfringens (including spores)
Membrane filtration followed by anaerobic incubation of the membrane on m-CP agar (Note 1) at 44 +/- 1°C for 21 +/- 3 hours. Count opaque yellow colonies that turn pink or red after exposure to ammonium hydroxide vapours for 20-30 seconds.

Note 1: The composition of m-CP agar is:

Basal medium

| | |
|---|---|
| Tryptose | 30g |
| Yeast Extract | 20g |
| Sucrose | 5g |
| L-cysteine hydrochloride | 1g |
| $MgSO_4 \cdot 7H_2O$ | 0.1g |
| Bromocresol purple | 40mg |
| Agar | 15g |
| Water | 1000ml |

Dissolve ingredients of the basal medium, adjust pH to 7.6 and autoclave at 121°C for 15 minutes. Allow the medium to cool and add:

| | |
|---|---|
| D-cycloserine | 400mg |
| Polymyxine-B sulphate | 25mg |
| Indoxyl-β-D glucoside | 60mg |
| to be dissolved in 8ml sterile water before addition | |
| Filter – sterilised 0.5% phenolphthalein phosphate solution | 20ml |
| Filter sterilised 4.5% $FeCl_3 \cdot 6H_2O$ | 2ml |

2. Parameters for which performance characteristics are specified

2.1 For the following parameters, the specified performance characteristics are that the method of analysis used must, as a minimum, be capable of measuring concentrations equal to the parametric value with a trueness, precision and limit of detection specified. Whatever the sensitivity of the method of analysis used, the result must be expressed using at least the same number of decimals as for the parametric value considered in Annex I, Parts B and C.

| Parameters | Trueness % of parametric value (Note 1) | Precision % of parametric value (Note 2) | Limit of detection % of parametric value (Note 3) | Conditions | Notes |
|---|---|---|---|---|---|
| Acrylamide | | | | To be controlled by product specification | |
| Aluminium | 10 | 10 | 10 | | |
| Ammonium | 10 | 10 | 10 | | |
| Antimony | 25 | 25 | 25 | | |
| Arsenic | 10 | 10 | 10 | | |
| Benzo(a)Pyrene | 25 | 25 | 25 | | |
| Benzene | 25 | 25 | 25 | | |
| Boron | 10 | 10 | 10 | | |
| Bromate | 25 | 25 | 25 | | |
| Cadmium | 10 | 10 | 10 | | |
| Chloride | 10 | 10 | 10 | | |
| Chromium | 10 | 10 | 10 | | |

| | | | | | |
|---|---|---|---|---|---|
| Conductivity | 10 | 10 | 10 | | |
| Copper | 10 | 10 | 10 | | |
| Cyanide | 10 | 10 | 10 | | Note 4 |
| 1,2-dichloroethane | 25 | 25 | 25 | | |
| Epichlorohydrin | | | | To be controlled by product specification | |
| Fluoride | 10 | 10 | 10 | | |
| Iron | 10 | 10 | 10 | | |
| Lead | 10 | 10 | 10 | | |
| Manganese | 10 | 10 | 10 | | |
| Mercury | 20 | 10 | 20 | | |
| Nickel | 10 | 10 | 10 | | |
| Nitrate | 10 | 10 | 10 | | |
| Nitrite | 10 | 10 | 10 | | |
| Oxidisability | 25 | 25 | 10 | | Note 5 |
| Pesticides | 25 | 25 | 25 | | Note 6 |
| Polycyclic aromatic hydrocarbons | 25 | 25 | 25 | | Note 7 |
| Selenium | 10 | 10 | 10 | | |
| Sodium | 10 | 10 | 10 | | |
| Sulphate | 10 | 10 | 10 | | |
| Tetrachloroethene | 25 | 25 | 10 | | Note 8 |
| Trichloroethene | 25 | 25 | 10 | | Note 8 |
| Trihalomethanes-Total | 25 | 25 | 10 | | Note 7 |
| Vinyl chloride | | | | To be controlled by product specification | |

2.2 For hydrogen ion concentration the specified performance characteristics are that the method of analysis used must be capable of measuring concentrations equal to the parametric value with a trueness of 0.2 pH unit and a precision of 0.2pH unit.

*Note 1(*):* Trueness is the systematic error and is the difference between the mean value of the large number of repeated measurements and the true value.

*Note 2(*):* Precision is the random error and is usually expressed as the standard deviation (within and between batch) of the spread of results about the mean. Acceptable precision is twice the relative standard deviation.

(*) These terms are further defined in ISO 5725

*Note 3:* Limit of detection is either:

- Three times the relative within batch standard deviation of a natural sample containing a low concentration of the parameter, or
- Five times the relative within batch standard deviation of a blank sample.

*Note 4:* The method should determine total cyanide in all forms

*Note 5:* Oxidation should be carried out for 10 minutes at 100°C under acid conditions using permanganate.

*Note 6:* The performance characteristics apply to each individual pesticide and will depend on the pesticide concerned. The limit of detection may not be achievable for all pesticides at present, but Producers should strive to achieve this standard.

*Note 7:* The performance characteristics apply to the individual substances specified at 25% of the parametric value in Annex I.

*Note 8:* The performance characteristics apply to the individual substances specified at 50% of the parametric value in Annex I.

3. Parameters for which no method of analysis is specified

Colour

Odour

Taste

Total organic carbon

Turbidity