Italian legislation on drinking water quality and quantity

(LP, FB1, FB2, FB3)

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Date last release	July 2, 2015
State of document	FINAL

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Adriatic IPA
Cross Border Cooperation 2007-2013

The project is co-funded by the European Union,
Instrument for Pre-Accession Assistance

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1. Introduction

The Italian legislation concerning the quality of surface and groundwater intended for human consumption basically derives from the application of EU Drinking Water Directive (1998), according to the following steps:

1. 1998 - EU Drinking Water Directive 98/83/EC
2. 2001 – Legislative Decree no. 31 of 2 February 2001, concerning "Attuazione della Direttiva 98/83/CE relativa alla qualità delle acque destinate al consumo umano", published in "Supplemento Ordinario alla Gazzetta Ufficiale della Repubblica Italiana, no. 52 del 3 Marzo 2001" (Implementation of EU Drinking Water Directive 98/83/EC on the quality of water intended for human consumption)
3. 2002 - Legislative Decree no. 27 of 2 February 2002, concerning "Modifiche ed integrazioni al D.Lgs. 2 febbraio 2001, no. 31, recante attuazione della direttiva 98/83/CE relativa alla qualità delle acque destinate al consumo umano" (An integration/modification of the previous Legislative Decree, no. 31/2001)
4. 2006 – Legislative Decree no. 152 of 3 April 2006, concerning "Norme in Materia Ambientale", published in "Supplemento Ordinario alla Gazzetta Ufficiale della Repubblica Italiana, no. 88 del 14 Aprile 2006" and further modifications (A unified text of law that takes into account several aspects connected to Environmental quality and actions; among other aspects: Environmental Impact Assessment (EIA), Water management and pollution prevention, Waste management and Contaminated soils remediation, Air protection and pollution prevention, Compensation claims against environmental damages)

2. Italian legislation on the quality of water intended for human Consumption

The main law text establishing drinking water microbiological/chemical features and contaminants concentration limits is the above mentioned Legislative Decree no. 31 of 2 February 2001, concerning "Attuazione della Direttiva 98/83/CE relativa alla qualità delle acque destinate al consumo umano" (Implementation of EU Drinking Water Directive 98/83/EC on the quality of water intended for human consumption).

The Decree concerns health-related quality standards of water intended for human consumption either in its natural status or after treatment, regardless of its origin and whether it is supplied from a distribution network, from a tanker, or in bottles or containers. It refers to water intended for drinking, cooking, food preparation or other domestic purposes, but also to water used in food (and drinks) production, affecting the final product wholesomeness.

It defines:

- Point of compliance;
- Involved actors (State, Regions, Local Health Unit, Utilities, etc.), general obligations and specific competences and responsibilities;
- Possible Derogations and Exceptional circumstances;

- Quality standards: parameters and parametric values applicable to water intended for human consumption (microbiological and chemical parameters), as well as indicator parameters;
- Quality assurance of treatment, equipment and materials (see also Ministerial Decree n. 174 of 6 April 2004).;
- Remedial actions and restrictions in use;
- Internal and external monitoring;
- Check and Audit monitoring and other kind of official control activities to be implemented in order to protect human health from adverse effects of any contamination of water intended for human consumption;
- Parameters to be analyzed, and specific methods of analysis for some of them, to ensure reliable check and audit monitoring;
- Frequency of sampling, depending on the volume of water produced or distributed (different for check and audit monitoring);
- Procedures to be implemented and reporting activity in case of non compliance with the given parametric values.

2.1 Parameters and Parametric values

Parameters and parametric values are listed in ANNEX I. General requirements concerning microbiological (PART A) and chemical parameters (PART B) for drinking water supplied from a distribution network are reported in tables 1 and 2.

Table 1: Microbiological parameters

Parameter	**Parametric value (number / 100 ml)**
Escherichia coli (*E. coli*)	0
Enterococci	0

Table 2: Chemical parameter limits in drinking water

Parameter	**Parametric value**	**Unit**
Acrylamide	0,10	µg/l
Antimony	5,0	µg/l
Arsenic	10	µg/l
Benzene	1,0	µg/l
Benzo(a)pyrene	0,010	µg/l
Boron	1,0	mg/l
Bromate	10	µg/l
Cadmium	5,0	µg/l
Chromium	50	µg/l

Parameter	Parametric value	Unit
Copper	1,0	mg/l
Cyanide	50	µg/l
1,2-dichloroethane	3,0	µg/l
Epichlorohydrin	0,10	µg/l
Fluoride	1,50	mg/l
Lead	10	µg/l
Mercury	1,0	µg/l
Nickel	20	µg/l
Nitrate (as NO_3)	50	mg/l
Nitrite (as NO_2)	0,50	mg/l
Pesticides	0,10	µg/l
Pesticides - total	0,50	µg/l
Polycyclic aromatic hydrocarbons	0,10	µg/l
Selenium	10	µg/l
Tetrachloroethene plus Trichlorethene	10	µg/l
Trihalomethanes - total	30	µg/l
Vinyl chloride	0,5	µg/l
Chlorite	200	µg/l
Vanadium	50	µg/l

Indicator parameters (Table 3) and relating Parametric values are reported in the same ANNEX I (PART C), also including radioactivity (Table 4).

Table 3: Indicator parameters

Parameter	Parametric value	Unit
Aluminium	200	µg/l
Ammonium	0,50	mg/l
Chloride	250	mg/l
Clostridium perfringens (including spores)	0	number/100 ml
Colour	Acceptable to consumers and no abnormal change	
Conductivity	2 500	µS cm^{-1} at 20 °C
Hydrogen ion concentration	≥6.5 and ≤9.5	pH units
Iron	200	µg/l
Manganese	50	µg/l
Odour	Acceptable to consumers and no abnormal change	
Oxidisability	5,0	mg/l O_2
Sulphate	250	mg/l
Sodium	200	mg/l
Taste	Acceptable to consumers and no abnormal change	

Parameter	Parametric value	Unit
Colony count at 22 °C	No abnormal change	
Coliform bacteria	0	number/100 ml
Total organic carbon (TOC)	No abnormal changes	
Turbidity	Acceptable to consumers and no abnormal change	
Residual chlorine		mg/l
Turbidity	Acceptable to consumers and no abnormal change	

Note: some values are suggested for three additional parameters: Hardness: 15-50 °F; Dry residue at 180°C: 1500 mg/L; residual disinfectant: 0,2 mg/l (if used)

Table 4: Radioactivity limits in drinking water

Parameter	Parametric value	Unit
Tritium	100	Bq/l
Total indicative dose	0,10	mSv/year

Warning

As indicated in Article 8, Local Health Unit (ASUR) shall ensure, that additional monitoring is carried out, on a case-by-case basis, of substances and micro-organisms for which no parametric value has been set in accordance with Article 4 (ANNEX I), if there is reason to suspect that they may be present in amounts or numbers which constitute a potential danger to human health.

As an example, ASUR Local Department could research the following additional parameters: Alghe, Bacteriofages anti E. coli, Helmints, Pathogenic Enterobacteria, Enteroviruses, Fungi, Protozoa, *Pseudomonas aeruginosa,* Pathogenic staphylococci. These parameters must be analyzed according the methods given by Italian National Institute for Health ("Istituto Superiore di Sanità", ISS). Enteroviruses, Bacteriofages anti E. coli, Pathogenic Enterobacteria, and Pathogenic staphylococci must be constantly absent in drinking water.

2.2 Monitoring

ANNEX II, TABLE A, gives a list of the parameters subject to check an audit monitoring, (Table 5), while in TABLE B1 of the same ANNEX II the minimum frequency of sampling and analysis for water intended for human consumption supplied from a distribution network or from a tanker or used in a food-production undertaking.

1. *Check monitoring*

The purpose of check monitoring is regularly to provide information on the organoleptic and microbiological quality of the water supplied for human consumption as well as information on 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 the Decree.

Table 5: Parameters for check monitoring

Physical-chemical and chemical
Aluminium
Ammonium
Colour
Conductivity
Clostridium perfringens (including spores)
Escherichia coli (*E. coli*)
Hydrogen ion concentration (pH)
Iron
Nitrite
Odour
Pseudomonas aeruginosa
Taste
Colony count at 22 °C and 37 °C
Coliform bacteria at 37 °C
Turbidity
Residual disinfectant (if used)

2. *Audit monitoring*

The purpose of audit monitoring is to provide the information necessary to determine whether or not all of the Decree's parametric values are being complied with. All parameters set must be subject to audit monitoring unless it can be established by Local Health Unit, for a certain period of time, that a 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. This disposition does not apply to the parameters set for radioactivity.

3. *Frequency of sampling*

The minimum frequency of sampling and analysis for water intended for human consumption supplied from a distribution network or from a tanker or used in a food-production undertaking, reported in ANNEX II, TABLE B1, is given below (Table 7).

Samples must be taken at the points of compliance as defined in Article 6, to ensure that water intended for human consumption meets the requirements of the Decree. However, in the case of a distribution network, the samples may be taken within the supply zone or at the treatment works for particular parameters if it can be demonstrated that there would be no adverse change to the measured value of the parameters concerned.

Table 7: Minimum frequency of sampling and analyses depending on the volume of water distributed in a supply zone

<table>
<tr><th>Volume of water distributed or produced each day within a supply zone (notes 1 and 2)
m^3</th><th>Check monitoring number of samples per year (notes 3, 4 and 5)</th><th>Audit monitoring number of samples per year</th></tr>
<tr><td>V ≤100</td><td>(Note 6)</td><td>(Note 6)</td></tr>
<tr><td>100 < V ≤ 1.000</td><td>4</td><td>1</td></tr>
<tr><td>1.000 < V ≤ 10.000</td><td rowspan="3">4

+ 3 for each 1.000 m^3/d and
part thereof of the total volume</td><td>1

+ 1 for each 3.300 m^3/d and part thereof of the total volume</td></tr>
<tr><td>10.000 < V ≤ 100.000</td><td>3

+ 1 for each 10.000 m^3/d and part thereof of the total volume</td></tr>
<tr><td>V > 100.000</td><td>10

+ 1 for each 25.000 m^3/d and part thereof of the total volume</td></tr>
</table>

Note 1: A supply zone is a geographically defined area within which water intend for human consumption comes from one or more sources and within which water quality may be considered as being approximately uniform.

Note 2: The volumes are calculated as averages taken over a calendar year. It is possible to use the number of inhabitants in a supply zone instead of the volume of water to determine the minimum frequency, assuming a water consumption of 200 l/day/capita.

Note 3: In the event of intermittent short-term supply the monitoring frequency of water distributed by tankers is to be decided by the Local Health Unit.

Note 4: For the different parameters in Annex I, the Local Health Unit 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 the water.

The lowest frequency applied must not be less than 50% of the number of samples specified in the table except in the particular case of note 6.

Note 5: As far as possible, the number of samples should be distributed equally in time and location.

Note 6: The frequency is to be decided by the Local Health Unit.

ANNEX III to Italian Legislative Decree 31/2001 gives specifications for the analysis of some parameters.

2.3 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, or for guidance, pending the possible future adoption, in accordance with the procedure laid down in Article 12 of the Directive 98/83/EC, of further CEN/ISO international methods for these parameters.

Coliform bacteria and *Escherichia coli (E. coli)* (ISO 9308-1)
Enterococci (ISO 7899-2)
Pseudomonas aeruginosa (prEN ISO 12780)
Enumeration of culturable microorganisms — Colony count at 22 °C (prEN ISO 6222)
Enumeration of culturable microorganisms — Colony count at 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 to 30 seconds.

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

Tryptose	30 g
Yeast extract	20 g
Sucrose	5 g
L-cysteine hydrochloride	1 g
$MgSO_4 \cdot 7H_2O$	0,1 g
Bromocresol purple	40 mg
Agar	15 g
Water	1 000 ml

Dissolve the 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	400 mg
Polymyxine-B sulphate	25 mg

Indoxyl-β-D-glucoside

to be dissolved in 8 ml sterile water before addition	60 mg
Filter — sterilised 0,5% phenolphthalein diphosphate solution	20 ml
Filter — sterilised 4,5 % $FeCl_3 \cdot 6H_2O$	2 ml

2.4 Parameters for which performance characteristics are specified

For 35 listed 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. Methods which are different from those given as reference must be submitted, verified and approved by National Institute for Health (ISS). 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. In Table 8 below the values referring to the first 5 parameters of this list are given: *the complete Table is attached as PDF document in the Appendix 1:*

Table 8: Specified performance characteristics

Parameters	Trueness % of parametric value (Note 1)	Precision % of parametric value (Note 2)	Limit of detection % of parametric value (Note 3)	Conditions
Acrylamide				To be controlled by product specifications
Aluminum	10	10	10	
Ammonium	10	10	10	
Antimony	25	25	25	
Arsenic	10	10	10	
etc. (See Annex)				

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 0,2 pH 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 it is necessary striving 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. Treatment of water intended for human consumption

Though the main purpose of Italian Legislative Decree no. 152/2006 is to reach good environmental standards in terms of quality and management, it also establishes the treatment approach according to the characteristics of the source, particularly referring to surface water intended for human consumption.

3.1 Surface water intended for human consumption

Three different level of treatment are prescribed (A1, A2 and A3, see Table 9) according to raw water characteristics: two values (I: Imperative; G: Guidance), relating 46 parameters are given for water bodies classification. Table 10, summarizes some of these values, as an example (Ref. Table 1/A, Annex 2, Part III to of the Decree).

The complete Table is reported as PDF document in the Appendix 1.

Table 9: treatment level for surface water intended for human consumption:

Category	treatment
A1	Physical Treatment and disinfection
A2	Physical and Chemical Treatment and disinfection
A3	Advanced Physical and Chemical Treatment, refining, disinfection

Table 10: characteristics of surface water intended for human consumption

N.	Parameter	Unit	A1 G	A1 I	A2 G	A2 I	A3 G	A3 I
1	pH	pH units	6,5-8,5	-	5,5-9,0	-	5,5-9,0	-
10	dissolved Fe	mg/l Fe	0,1	0,3	1,0	2,0	1,0	-
13	Zn	mg/l Zn	0,5	2,0	1,0	5,0	1,0	5,0
43	Total Coliforms	N / 100 ml	50	-	5.000	-	50.000	-
44	Faecal Coliforms	N / 100 ml	20	-	2.000	-	20.000	-
45	Faecal Streptococci	N / 100 ml	20	-	1.000	-	10.000	-
46	*Salmonella*	-	Absent in 5.000 ml	-	Absent in 5.000 ml	-	-	-

3.2 Groundwater quality

Specific concentration limits for contaminants in groundwater bodies are detailed in the same Legislative Decree no. 152/2006 and further modifications and integrations.
In some Countries (e.g. Greece) limits for Nitrates and Pesticides in groundwater intended for human consumption (Table 11) are set by specific Regulations.

Table 11: Quality standards and limits for pollutants in groundwater

Pollutant	**Quality Standards**
Nitrates	50 mg/l
Active substances in pesticides	0.1 µg/l 0.5 µg/l (total)

Italian Legislative Decree no. 152/2006 gives the Maximum Allowable Concentrations (MAC, Ref. Table 2, Annex 5, Part IV of the Decree) of natural and anthropogenic contaminants, taking into account 92 parameters (metals, inorganic, chlorinated hydrocarbons, nitrobenzenes, etc.). Italian Legislation is probably the more restrictive in Europe with very low limits for a wide set of contaminants: if only one of these contaminants is above the limit, the site is considered contaminated and a remediation procedure has to be undertaken in order to clean it up.
It is important to stress that while for contaminated soils Risk Analysis can be applied, possibly resulting in less restrictive concentration limits for some of the contaminants in the list, this is not possible for groundwater intended for human consumption, thus meaning that prescription given by Legislative Decree no. 31/2001 cannot be derogated, unless specified in the same Decree. Table 12 reports the limit values for some of the most important contaminants. *The complete Table is reported as PDF document in the Appendix 1.*

Table 12: Maximum allowable concentrations (µg/l) for some parameters

N°	Parameter	MAC (µg/l)
1	Aluminum	200
2	Antimonium	5
4	Arsenic (As)	10
6	Cadmium (Cd)	5
22	Nitrites	500
23	Sulfates	250 **mg/l**
24	Benzene	1
29	Benzo (a) antracene	0,1
41	Vinyl chloride	0,5
53	1,1,2,2 tetrachloroethane	0,05
58	Nitrobenzene	3,5
62	Monochlorobenzene	40
69	2-chlorophenol	180
88	PCB	0,01

The implementation of Water Framework Directive 200/60/EC and following Directive 2006/118/EC, through Italian Legislative Decree 30/2009, required a review and adjustment of the monitoring plans for water protection. With particular regard to groundwater the aim of the new legislation is to allow the development of a conceptual model that represents the knowledge base for the design of monitoring programs and risk assessment. The main points of the Decree 30/2009 can be summarized as follow:

- Identification of hydrogeological complex and aquifers;
- Identification and characterization of groundwater bodies;
- Analysis of pressures and impacts;
- Groundwater bodies Vulnerability assessment in relation to identified pressures;
- Monitoring of groundwater bodies, including chemical status evaluation, identification of significant quality trends and durable changes; quantitative status definition and groundwater quality status presentation;
- Definition of the conceptual model

4 References

- EU Drinking Water Directive, Council Directive 98/83/EC, as of 3 November 1998;

  http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31998L0083

- Directive 2000/60/EC of the European Parliament and of the Council, of 23 October 2000, establishing a framework for Community action in the field of water policy (Water Framework Directive, WFD);

  http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32000L0060

- Italian Legislative Decree no. 31, of 2 February 2001, concerning "Attuazione della Direttiva 98/83/CE relativa alla qualità delle acque destinate al consumo umano", published in "Supplemento Ordinario alla Gazzetta Ufficiale della Repubblica Italiana, n. 52 del 3 Marzo 2001" (Implementation of EU Drinking Water Directive 98/83/EC on the quality of water intended for human consumption);

  http://gazzette.comune.jesi.an.it/2001/52/4.htm

- Italian Legislative Decree no. 27, of 2 February 2002, concerning "Modifiche ed integrazioni al D.Lgs. 2 febbraio 2001, n. 31, recante attuazione della direttiva 98/83/CE relativa alla qualità delle acque destinate al consumo umano" (An integration/modification of the previous Legislative Decree, n. 31/2001);

  http://www.parlamento.it/parlam/leggi/deleghe/02027dl.htm

- Italian Ministerial Decree no. 174, of 6 April 2004, concerning "Regolamento concernente i materiali e gli oggetti che possono essere utilizzati negli impianti fissi di captazione, trattamento, adduzione e distribuzione delle acque destinate al consumo umano ", published in "Gazzetta Ufficiale n. 166 del 17 Luglio 2004";

  http://www.ambientediritto.it/Legislazione/ACQUA/2004/dm%202004%20n.174.htm

- Italian Legislative Decree no. 152, of 3 April 2006, concerning "Norme in Materia Ambientale", published in "Supplemento Ordinario alla Gazzetta Ufficiale della Repubblica Italiana, n. 88 del 14 Aprile 2001" and further modifications, (Italian "Environmental Code");

  http://www.camera.it/parlam/leggi/deleghe/06152dl6.htm

- Directive 2006/118/EC of the European Parliament and of the Council, of 12 december 2006, on the protection of groundwater against pollution and deterioration (Groundwater Directive, GWD);

  http://eur-lex.europa.eu/legal-content/IT/TXT/?uri=CELEX:32006L0118

- Italian Legislative Decree no. 30, of 16 march 2009, concerning "Attuazione della direttiva 2006/118/CE, relativa alla protezione delle acque sotterranee dall'inquinamento e dal deterioramento." (Implementation of EU Groundwater Directive).

  http://www.camera.it/parlam/leggi/deleghe/09030dl.htm

5 List of Annexes

- Annex 1:

  Table 8 – Parametri per i quali vengono specificate le caratteristiche di prestazione

- Annex 2:

  Table 10 – Caratteristiche di qualità per acque superficiali destinate alla produzione di acqua potabile

- Annex 3:

  Table 12 – Concentrazione soglia di contaminazione nelle acque sotterranee

Table 8: Parametri per i quali vengono specificate le caratteristiche di prestazione

Parametri	Esattezza in % del valore di parametro	Precisione in % del valore di parametro	Limite di rivelabilità in % del valore di parametro	Condizioni	Note
	(Nota 1)	**(Nota 2)**	**(Nota 3)**		
Acrilammide				Controllare secondo le specifiche del prodotto	
Alluminio	10	10	10		
Ammonio	10	10	10		
Antimonio	25	25	25		
Arsenico	10	10	10		
Benzo(*a*)pirene	25	25	25		
Benzene	25	25	25		
Boro	10	10	10		
Bromato	25	25	25		
Cadmio	10	10	10		
Cloruro	10	10	10		
Cromo	10	10	10		
Conduttività	10	10	10		
Rame	10	10	10		
Cianuro	10	10	10		Nota 4
1,2 dicloroetano	25	25	10		
Epicloridrina				Controllare secondo le specifiche del prodotto	
Floruro	10	10	10		
Ferro	10	10	10		
Piombo	10	10	10		
Manganese	10	10	10		
Mercurio	20	10	20		
Nichel	10	10	10		
Nitrati	10	10	10		
Nitriti	10	10	10		
Ossidabilità	25	25	10		Nota 5
Antiparassitari	25	25	25		Nota 6
Idrocarbuti policiclici aromatici	25	25	25		Nota 7
Selenio	10	10	10		
Sodio	10	10	10		
Solfato	10	10	10		
Tetracloroetilene	25	25	10		Nota 8
Tricloroetilene	25	25	10		Nota 8
Trialometani totali	25	25	10		Nota 7
Cloruro di vinile				Controllare secondo le specifiche del prodotto	

Tabella 10: Caratteristiche di qualità per acque superficiali destinate alla produzione di acqua potabile

Num. Param.	Parametro	Unità di misura	A1	A1	A2	A2	A3	A3
			G	I	G	I	G	I
1	pH	unità pH	6,5-8,5	-	5,5-9	-	5,5-9	-
2	Colore (dopo filtrazione semplice)	mg/L scala pt	10	20(o)	50	100(o)	50	200(o)
3	Totale materie in sospensione	mg/L MES	25	-	-	-	-	-
4	Temperatura	°C	22	25(o)	22	25(o)	22	25(o)
5	Conduttività	µS/cm a 20°	1000	-	1000	-	1000	-
6	Odore	Fattore di diluizione a 25 °C	3	-	10	-	20	-
7 *	Nitrati	mg/L NO3	25	50(o)	-	50(o)	-	50(o)
8	Fluoruri [1]	mg/L F	0,7/1	1,5	0,7/1,7	-	0,7/1,7	-
9	Cloro organico totale estraibile	mg/L C1	-	-	-	-	-	-
10 *	Ferro disciolto	mg/L Fe	0,1	0,3	1	2	1	-
11 *	Manganese	mg/L Mn	0,05	-	0,1	-	1	-
12	Rame	mg/L Cu	0,02	0,05(o)	0,05	-	1	-
13	Zinco	mg/L Zn	0,5	2	1	5	1	5
14	Boro	mg/L B	1	-	1	-	1	-
15	Berillio	mg/L Be	-	-	-	-	-	-
16	Cobalto	mg/L Co	-	-	-	-	-	-
17	Nichelio	mg/L Ni	-	-	-	-	-	-
18	Vanadio	mg/L V	-	-	-	-	-	-
19	Arsenico	mg/L As	0,01	0,05	-	0,05	0,05	0,1
20	Cadmio	mg/L Cd	0,001	0,005	0,001	0,005	0,001	0,005
21	Cromo totale	mg/L Cr	-	0,05	-	0,05	-	0,05
22	Piombo	mg/L Pb	-	0,05	-	0,05	-	0,05
23	Selenio	mg/L Se	-	0,01	-	0,01	-	0,01
24	Mercurio	mg/L Hg	0,0005	0,001	0,0005	0,001	0,0005	0,001
25	Bario	mg/L Ba	-	0,1	-	1	-	1
26	Cianuro	mg/L CN	-	0,05	-	0,05	-	0,05
27	Solfati	mg/L SO4	150	250	150	250(o)	150	250(o)
28	Cloruri	mg/L C1	200	-	200	-	200	-
29	Tensioattivi (che reagiscono al blu di metilene)	mg/L (solfato di laurile)	0,2	-	0,2	-	0,5	-
30 *	Fosfati [2]	mg/L P2O5	0,4	-	0,7	-	0,7	-
31	Fenoli (indice fenoli) paranitroanilina, 4 amminoantipirina	mg/L C6H5OH	-	0,001	0,001	0,005	0,01	0,1
32	Idrocarburi disciolti o emulsionati (dopo estrazione mediante etere di petrolio)	mg/L	-	0,05	-	0,2	0,5	1
33	Idrocarburi policiclici aromatici	mg/L	-	0,0002	-	0,0002	-	0,001
34	Antiparassitari-totale (parathion HCH, dieldrine)	mg/L	-	0,001	-	0,0025	-	0,005
35 *	Domanda chimica ossigeno (COD)	mg/L O2	-	-	-	-	30	-
36 *	Tasso di saturazione dell'ossigeno disciolto	% 02	>70	-	>50	-	>30	-

37 *	A 20 °C senza nitrificazione domanda biomichica di ossigeno (BOD5)	mg/L 02	< 3	-	< 5	-	< 7	-
38	Azoto Kjeldahl (tranne NO_2 ed NO_3)	mg/L N	1	-	2	-	3	-
39	Ammoniaca	mg/L NH4	0,05	-	1	1,5	2	4(o)
40	Sostanze estraibili al cloroformio	mg/L SEC	0,1	-	0,2	-	0,5	-
41	Carbonio organico totale	mg/L C	-	-	-	-	-	-
42	Carbonio organico residuo (dopo flocculazione e filtrazione su membrana da 5µ) TOC	mg/L C	-	-	-	-	-	-
43	Coliformi totali	/100 mL	50	-	5000	-	50000	-
44	Coliformi fecali	/100 mL	20	-	2000	-	20000	-
45	Streptococchi fecali	/100 mL	20	-	1000	-	10000	
46	Salmonelle	-	assenza in 5000 mL	-	assenza in 1000 mL	-	-	-

Legenda:

- Categoria A1 - Trattamento fisico semplice e disinfezione
- Categoria A2 - Trattamento fisico e chimico normale e disinfezione
- Categoria A3 - Trattamento fisico e chimico spinto, affinazione e disinfezione
- I = Imperativo
- G = Guida
- (o) = sono possibili deroghe in conformità al presente decreto

* = sono possibili deroghe in conformità al presente decreto

Note:

[1] I valori indicati costituiscono i limiti superiori determinati in base alla temperatura media annua (alta e bassa temperatura)

[2] Tale parametro è inserito per soddisfare le esigenze ecologiche di taluni ambienti.

Tabella 12: Concentrazione soglia di contaminazione nelle acque sotterranee

N° ord	SOSTANZE	Valore limite (μ/1)
METALLI		
1	Alluminio	200
2	Antimonio	5
3	Argento	10
4	Arsenico	10
5	Berillio	4
6	Cadmio	5
7	Cobalto	50
8	Cromo totale	50
9	Cromo (VI)	5
10	Ferro	200
11	Mercurio	1
12	Nichel	20
13	Piombo	10
14	Rame	1000
15	Selenio	10
16	Manganese	50
17	Tallio	2
18	Zinco	3000
INQUINANTI INORGANICI		
19	Boro	1000
20	Cianuri liberi	50
21	Fluoruri	1500
22	Nitriti	500
23	Solfati (mg/L)	250
COMPOSTI ORGANICI AROMATICI		
24	Benzene	1
25	Etilbenzene	50
26	Stirene	25
27	Toluene	15
28	para-Xilene	10
POLICLICI AROMATICI		
29	Benzo (a) antracene	0.1
30	Benzo (a) pirene	0.01
31	Benzo (b) fluorantene	0.1
32	Benzo (k,) fluorantene	0.05
33	Benzo (g, h, i) perilene	0.01
34	Crisene	5
35	Dibenzo (a, h) antracene	0.01
36	Indeno (1,2,3 - c, d) pirene	0.1
37	Pirene	50
38	Sommatoria (31, 32, 33, 36)	0.1
ALIFATICI CLORURATI CANCEROGENI		
39	Clorometano	1.5
40	Triclorometano	0.15
41	Cloruro di Vinile	0.5
42	1,2-Dicloroetano	3
43	1,1 Dicloroetilene	0.05
44	Tricloroetilene	1.5
45	Tetracloroetilene	1.1
46	Esaclorobutadiene	0.15
47	Sommatoria organoalogenati	10
ALIFATICI CLORURATI NON CANCEROGENI		
48	1,1-Dicloroetano	810
49	1,2-Dicloetilene	60
50	1,2-Dicloropropano	0.15
51	1,1,2-Tricloroetano	0.2
52	1,2,3-Tricloropropano	0.001
53	1,1,2,2-Tetracloroetano	0.05
ALIFATICI ALOGENATI CANCEROGENI		
54	Tribromometano	0.3
55	1,2-Dibromoetano	0.001
56	Dibromoclorometano	0.13
57	Bromodiclorometano	0.17

NITROBENZENI		
58	Nitrobenzene	3.5
59	1,2-Dinitrobenzene	15
60	1,3-Dinitrobenzene	3.7
61	Cloronitrobenzeni (ognuno)	0.5
CLOROBENZENI		
62	Monoclorobenzene	40
63	1,2 Diclorobenzene	270
64	1,4 Diclorobenzene	0.5
65	1,2,4 Triclorobenzene	190
66	1,2,4,5 Tetraclorobenzene	1.8
67	Pentaclorobenzene	5
68	Esaclorobenzene	0.01
FENOLI E CLOROFENOLI		
69	2-clorofenolo	180
70	2,4 Diclorofenolo	110
71	2,4,6 Triclorofenolo	5
72	Pentaclorofenolo	0.5
AMMINE AROMATICHE		
73	Anilina	10
74	Difenilamina	910
75	p-toluidina	0.35
FITOFARMACI		
76	Alaclor	0.1
77	Aldrin	0.03
78	Atrazina	0.3
79	alfa-esacloroesano	0.1
80	beta-esacloroesano	0.1
81	Gamma - esacloroesano (lindano)	0.1
82	Clordano	0.1
83	DDD, DDT, DDE	0.1
84	Dieldrin	0.03
85	Endrin	0.1
86	Sommatoria fitofarmaci	0.5
DIOSSINE E FURANI		
87	Sommatoria PCDD, PCDF (conversione TEF)	4×10^{-6}
ALTRE SOSTANZE		
88	PCB	0.01
89	Acrilammide	0.1
90	Idrocarburi totali (espressi come n-esano)	350
91	Acido para-ftalico	37000
92	Amianto (fibre A > 10 mm) (*)	da definire

(*) Non sono disponibili dati i letteratura tranne il valore di 7 milioni fibre/l comunicato da ISS, ma giudicato da ANPA e dallo stesso ISS troppo elevato. Per la definizione del limite si propone un confronto con ARPA e Regioni.

Hanc ego cum tene sententiam – Trieste 22.04.2014

Italian legislation on drinking water quality and quantity

(LP, FB1, FB2, FB3)

Venice, July 2015

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DRINK ADRIA

Adriatic IPA
Cross Border Cooperation 2007-2013

The project is co-funded by the European Union,
Instrument for Pre-Accession Assistance

National legislation for water quality and quantity and for drinking water - Slovenia

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(FB5)

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Date last release	9.9.2014
State of document	Final

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Adriatic IPA
Cross Border Cooperation 2007-2013

The project is co-funded by the European Union, Instrument for Pre-Accession Assistance

Table of content

1 Introduction

The main regulation concerning water in Slovenia is the Slovenian Waters Act (Official gazette of Republic of Slovenia No. 67/02, 2/04, 41/04, 57/08, 57/12, 40/14). Slovenian legislation dealing with the surface and groundwater quality and monitoring is presented in several regulations:

- Decree on groundwater status (Official gazette of Republic of Slovenia No. 25/09, 68/12, orig. Uredba o stanju podzemnih voda)

- Rules on groundwater monitoring (Official gazette of Republic of Slovenia No. 31/09, orig. Pravilnik o monitoringu podzemnih voda)

- Decree on surface water status (Official gazette of Republic of Slovenia No. 14/09, 98/10, 96/13, orig. Uredba o stanju površinskih voda)

- Rules on surface water status monitoring (Official gazette of Republic of Slovenia No. 10/09, 81/11, orig. Pravilnik o monitoringu stanja površinskih voda)

The main legislation regarding drinking water quality and monitoring are:

Rules on drinking water (Official gazette of republic of Slovenia No. 19/04, 35/04, 26/06, 92/06, 25/09, orig. Pravilnik o pitni vodi)

In the following chapters the main characteristics of these regulations are presented with emphasis on limit values and monitoring of surface and groundwater and drinking water.

2 Waters Act

This Act regulates the management of the sea, inland waters and groundwater as well as aquatic and coastal land. Management of water and coastal land comprises water protection, water management and water use. The law also regulates the public good and public services in the field of water, water facilities and other issues related to water management.

The objectives of the Water Act are (1) to achieve good status of waters and water-related ecosystems, (2) to provide protection against harmful effects of water, (3) preservation and control of water quantities and (4) to promote the sustainable use of water with the aim of long-term quantity and quality protection.

2.1 Water protection

In the context of water protection this Act provides guidelines for the establishment of water protection areas (for drinking water) and also provides protection for other waters such as bathing water and water for cultivation of bivalve and crustaceans.

2.2 Water use

The Act specifies the conditions for common and special water use. For common use (public good) is determined by the principle of the water use, which provides only slight effect on water quantity and quality and with this water rights for other people are not restricted or disabled. Special water use is determined on the basis of water rights, which can be issued as concessions (in case of sale of water) or water permits (private water supply, public water supply, all other water uses) upon payment for the use of water.

2.3 Water management

Interventions in the aquatic and riparian land as well as in the protected and risk zones are limited and an official permission is demanded for constructions affecting the water regime and water status.

The Waters Act defines the basis for the implementation of water management such as integrated river basin management plan for the Danube and Adriatic basin ,programmes of measures, and detailed management plans for sub-basins or their parts.

3 Decree on groundwater status

The Decree (Official gazette of republic of Slovenia No. 25/09, 68/12) defines the procedure for determination of the threshold values for groundwater quality, parameters for chemical and quantitative state, groundwater quality standards, threshold values for groundwater quality, conditions for good quality and quantity state, criteria for the identification of significant and sustained upward trends of pollution and criterions to determine the groundwater body pollution load.

Groundwater status is determined on the basis of monitoring results of the chemical and quantitative status of groundwater. The chemical status of groundwater is determined on the basis of the following criteria:

- exceeding of the quality standards and threshold values,

- the effects of saltwater intrusion or other intrusions into the groundwater body,

- concentrations of pollutants that cause deterioration of the ecological and chemical status of surface waters that are connected with the groundwater bodies and adversely effect on aquatic and terrestrial ecosystems, which are directly dependent on them.

The parameters of the chemical status, quality standards and threshold values on the basis of which chemical status of the groundwater body are noted, are presented in Annex 2 (part of this regulation).

In the table 1 the parameters from which quality standards are defined and in table 2 the parameters from which the threshold value are specified.

Table 1: Parameters with quality standards

Parameter	*Unit*	*Quality standard*
Nitrates	mg NO_3/L	50
Individual pesticide and its relevant degradation products	µg/l	0.1
Sum of all measured pesticides and their relevant degradation produktov	µg/l	0.5

Table 2: Parameters and threshold standards

Parameter	*Unit*	*Threshold standard*
Dichloromethane	µg/l	2
Tetrachloromethane	µg/l	2
1,2-Dichloroethane	µg/l	3
1,1-Dichloroethene	µg/l	2
Trichloroethene	µg/l	2
Tetrachloroethene	µg/l	2
The sum of volatile aliphatic halogenated hydrocarbons	µg/l	10

4 Rules on groundwater monitoring

This Rules (Official gazette of republic of Slovenia No. 31/09) sets out the method and the extent of groundwater monitoring, sampling frequency, analyses or measurements and requirements for groundwater monitoring.

The groundwater monitoring includes monitoring of groundwater chemical status and monitoring of groundwater quantity. The monitoring sites have to be selected in the way that the chemical status in each catchment area is noted and the long term trends of rising pollutants concentration are detected. The Rules define the range of chemical parameters, the monitoring sites, the frequency of monitoring, sampling and analysis methods. The purpose of groundwater quantity monitoring is to control the groundwater level oscillation regime and to define the quantative status of groundwater bodies.

5 Decree on surface water status

The Decree (Official gazette of republic of Slovenia No. 14/09, 98/10, 96/13) defines the criterion for surface water quality status, environmental quality standards for determining the chemical status and criteria and environmental quality standards for the determination of the ecological status of surface water and types of surface water monitoring. The decree includes the provisions to define chemical and ecological status of surface water body.

This Decree provides for surface water chemical status:
- chemical parameters for determining the chemical status of surface waters,
- environmental quality standards for parameters of the chemical status of surface water,
- criteria for determining the chemical status of surface waters and classification of surface water bodies in the classes of chemical status.

This Decree provides for ecological status of surface waters:
- quality elements for the determination of ecological status and ecological potential of surface waters,
- methods for the evaluation of individual biological elements of ecological status,
- parameters for evaluating the quality of individual chemical elements supporting the biological elements of ecological status,
- parameters for the evaluation of individual general physico-chemical quality elements supporting the biological elements of ecological status,
- parameters for the evaluation of individual hydrological quality elements supporting the biological elements of ecological status,
- classes and attribute definitions of ecological status of surface water bodies and classes of ecological potential of artificial and heavily modified water bodies,
- thresholds for individual classes of ecological status for the evaluation of the biological elements of ecological status,
- thresholds for individual classes of ecological status for a specific pollutant,
- thresholds for individual classes of ecological status for general physical-chemical parameters,
- criteria for the evaluation of individual elements of ecological status,
- criteria for determining ecological status of surface water bodies and their grading ecological status.

6 Rules on surface water status monitoring

This policy (Official gazette of republic of Slovenia No. 10/09, 81/11) defines the methods, extend and requirements monitoring the status of surface water as well as the way and form to prepare the report about surface water state monitoring. Monitoring of surface water includes also monitoring of hydrological phenomena related to the chemical and ecological status of surface water bodies

The frequency of monitoring in respect of the ecological status of surface water varies for types of surface waters and the elements of quality. The maximum allowable intervals for monitoring of ecological status are given in Annex I of this document and presented in table 3. The frequency of monitoring of surface water bodies using for drinking water supply are presented in table 4.

Table 3: The maximum allowable intervals for monitoring of ecological status

	Rivers	*Lakes*	*Brackish*	*Coastal waters*
Biological quality elements				
Phytoplankton	6 months	6 months	6 months	6 months
Other aquatic flora	3 years	3 years	3 years	3 years
Benthic invertebrates	3 years	3 years	3 years	3 years
Fish	3 years	3 years	3 years	
Hydromorphological quality elements				
Continuity of flow	6 years	not relevant	not relevant	not relevant
Hidrology	permanent	1 month	not relevant	not relevant
Morphology	6 years	6 years	6 years	6 years
General physico-chemical quality elements				
Thermal conditions	3 months	3 months	3 months	3 months
Oxygenation conditions	3 months	3 months	3 months	3 months
Salinity	3 months	3 months	3 months	
Nutrient status	3 months	3 months	3 months	3 months
Acidity	3 months	3 months		
Total organic carbon (TOC)	3 months	3 months		
Suspended solids after drying	3 months			
Transparency		3 months	3 months	
Specific pollutants				
Synthetic and non-synthetic pollutants and other specific pollutants	3 months	3 months	3 months	3 months

Table 4: The frequency of monitoring of surface water bodies where water abstraction for drinking water supply

Serviced population	*Frequency*
< 10.000	4 times a year
10.000 to 30.000	8 times a year
> 30.000	12 times a year (monthly)

7 Rules on drinking water

The regulation »Rule on drinking water« (Official gazette of the Republic of Slovenia No. 19/04, 35/04, 26/06, 92/06, 25/09) defines the requirements for public drinking water supply to protect human health against harmful effects due to any drinking water pollution.

In this regulation the limit values of parameters for drinking water (Annex I) and monitoring conditions (Annex II) are discussed.

7.1 Limit values for drinking water

Parameters and the limit values of parameters are presented in Annex I which is divided in three parts. In the PART A general requirements for microbiological parameters of drinking water are given and presented in table 5.

Table 5: Microbiological parameters – general requirements for drinking water

Parameter	*The maximum value of the parameter (number / 100 ml)*
Escherichia coli (E. coli)	0
Enterococci	0

Part B deals with maximum values of chemical parameters for drinking water that are presented in table 6.

Table 6: Chemical parameters of drinking water

Parameter	*The maximum value of the parameter*	*Unit*
Acrylamide	0.10	µg/l
Antimony	5.0	µg/l
Arsenic	10	µg/l
Cooper	2.0	mg/l
Benzene	1.0	µg/l
Benzo(a)pyrene	0.010	µg/l
Boron	1.0	mg/l
Bromate	10	µg/l
Cyanide	50	µg/l
1,2-dichloroethane	3.0	µg/l
Epichlorohydrin	0.10	µg/l
Fluoride	1.5	mg/l
Chromium	5.0	µg/l
Nickel	20	µg/l
Nitrate	50	mg/l
Nitrite	0.50	mg/l
Pesticides	0.10	µg/l
Pesticides - sum	0.50	µg/l
Polycyclic aromatic hydrocarbons	0.10	µg/l
Lead	10	µg/l
Selenium	10	µg/l
Tetrachlorethylene and Trichlorethylene	10	µg/l
Trihalomethanes - sum	100	µg/l
Vinyl chloride	0.50	ug/l
Mercury	1.0	µg/l

Part C represents the limit values and units of indicator parameters, which are presented on Table 7. In addition, this part also deals with radioactivity (Table 8).

Table 7: Indicator parameters of drinking water

Parameter	*The maximum value of the parameter/specification*	*Unit*
Aluminium	200	µg/l
Ammonium	0.50	mg/l
Colour	Acceptable to consumers and no abnormal change	
Total organic carbon (TOC)	No abnormal changes	
Clostridium perfringens (including spores)	0	number/100 ml
Conductivity	2500	µS cm^{-1} at 20 ℃
Chloride	250	mg/l
Coliforms	0	number/100 ml
Hydrogen ion concentration (pH)	≥6.5 and ≤9.5	units pH
Manganese	50	µg/l
Turbidity	Acceptable to consumers and no abnormal change	
Sodium	200	mg/l
Oxidising	5.0	mg O_2/l
Taste	Acceptable to consumers and no abnormal change	
Sulphate	250	mg/l
Number of colonies at 22 ℃	No abnormal change	
Number of colonies at 37 ℃	Less than 100	number/ml
Smell	Acceptable to consumers and no abnormal change	
Iron	200	µg/l

Table 8: Radioactivity of drinking water

Parameter	*The maximum value of the parameter*	*Unit*
Tritium	100	Bq/l
Total dose received	0.10	mSv/year

7.2 Monitoring of drinking water

The yearly program of monitoring must specify the sampling sites, frequency of sampling, samplers and laboratories that perform testing of samples. It has to be made in accordance with the conditions set out in Annex II (part of this regulation). The monitoring is divided to:

(1) Regular testing that provides basic information on drinking water and information on efficiency of the preparation of drinking water (especially disinfection), where it is used. The scope of regular testing included parameters Presented in table 9.

Table 9: Parameters for regular monitoring

Aluminium	*Clostridium perfringens* (including spores)
Ammonium	*Escherichia coli* (E. coli)
Colour	Coliforms
Conductivity	*Pseudomonas aeruginosa*
Hydrogen ion concentration (pH)	Number of colonies at 22 ℃ and 37 ℃
Turbidity	
Nitrite	
Taste	
Smell	
Iron	

(2) Periodic testing that provides information about consistency of drinking water for all parameters presented in Annex I. In the preparation of monitoring the parameters, which are likely not to be exceeded limit values may be determined and should not be included in the monitoring.

In Annex II the minimum annual frequency of sampling and testing of drinking water from the water supply network, from a tanker or used in the facility for the production and marketing of food are defined and presented in table 10. Minimal number of sampling is determined on the basis of number of inhabitants on the supply area and the amount of water distributed in the supply area.

Table 10: Minimum annual frequency of sampling and testing drinking water regarding number of habitants and amount of water distributed in the supply area

Number of inhabitants on the supply area	*The amount of water distributed in the supply area m^3 / day*	*Number of samples for regular testing*	*Number of samples for periodic testing*
≤500	≤100	6	Determined in the annual monitoring program
501 – 5,000	101 – 1,000	12	1
5,001 – 20,000	1,001 – 4,000	24	3
20,001 – 50,000	4,001 – 10,000	36	4
50,001 – 100,000	50,001 – 20,000	72	6
> 100,000	> 20,000	120	8

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National legislation for water quality and quantity and for drinking water - Ljubljana, September 2014

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Adriatic IPA
Cross Border Cooperation 2007-2013

The project is co-funded by the European Union,
Instrument for Pre-Accession Assistance

Croatian legislation for drinking water and water resources quality monitoring

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Rijeka, 2015

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Date last release	31.01.2015.
State of document	FINAL

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Cross Border Cooperation 2007-2013

The project is co-funded by the European Union,
Instrument for Pre-Accession Assistance

Table of content

1 Introduction

Water legislation in the Republic of Croatia functions within a legal framework comprised of several regulations. Those are:

1. *Water Act* (Official gazette of Republic of Croatia No. 153/09, 130/11, 56/13, 14/14**,** *orig. Zakon o vodama*) [1]
2. *Act on water intended for human consumption* (Official gazette of Republic of Croatia No. 056/2013, *orig. Zakon o vodi za ljudsku potrošnju*) [2]
3. *Regulation on parameters compliance and analysis methods for water intended for human consumption* (Official gazette of Republic of Croatia No. 125/2013, *orig. Pravilnik o parametrima sukladnosti i metodama analize vode za ljudsku potrošnju*) [3]
4. *Decree on water quality standard* (Official gazette of Republic of Croatia No. 073/2013, *orig. Uredba o standardu kakvoće voda*) [4]
5. *Regulation on protection measures and conditions for determination of sanitary protection zones of the drinking water source* (Official gazette of Republic of Croatia No. 066/2011, *orig. Pravilnik o uvjetima za utvrđivanje zona sanitarne zaštite izvorišta*) [5]
6. *The Water Management Financing Act* (Official gazette of Republic of Croatia No. 153/09, 90/11,056/13 *orig. Zakon o financiranju vodnoga gospodarstva*) [6]
7. *The Constitution of the Republic of Croatia* ((Official gazette of Republic of Croatia No. 56/90, 135/97, 8/98, 113/00, 124/00, 28/01, 41/01, 55/01, 76/10, 85/10, orig. Ustav RH) [7].

The Constitution of the Republic of Croatia defines water a resource of particular interest for the Republic of Croatia and guarantees it special protection.

In the following chapters the main characteristics of these regulations are presented with emphasis on parametric values and monitoring of surface, groundwater and drinking water.

2 Water Act

The *Water Act* [1] is regulating the legal status of water, water resources and the hydraulic structures, management of water quality and quantity, flood protection, melioration, drainage and irrigation, activities for public water supply and sewerage, special activities for water management, the institutional structure for these activities and other issues related to water and water resources. This law also regulates the radiological contamination of water and water resources.

3 Act on water intendent for human consumption

Act on water intendent for human consumption [2] regulates the health safety of water for human consumption, the competent authority for the implementation of this Act and the type of reporting to the European Commission on the implementation of this Act, the liability of legal persons engaged in the supply of water for human consumption in Croatia, procedures and reporting in case of deviation from the parameters to check the consistency of water for human consumption, monitoring and other official control of the safety of water for human consumption and their financing, in order to protect human health from adverse effects of any contamination of water intended for human consumption and to ensure the safety of water for human consumption on Croatian territory.

4 Regulation on parameters compliance and analysis methods for water intended for human consumption

Regulation on parameters compliance and analysis methods for water intended for human consumption [3] defines:

- Parameters of the safety of water for human consumption (microbiological and chemical) and indicator parameters of water for human consumption (microbiological and chemical),
- Frequency of sampling water for human consumption within the system of self-control operators in the food industry,
- Frequency of sampling water for human consumption within the system of self-control by the operators in the food industry, which fill water into bottles or other containers for placing on the market,
- Parameters, the type and scope of the analysis of water samples for human consumption for the implementation of regular and audit monitoring,
- Frequency of sampling water for human consumption for check and audit monitoring,
- The type and scope of the analysis and the number of required samples of water for human consumption in order to test its safety in buildings before issuing a permit,
- Laboratory methods for testing the safety of water for human consumption.

4.1 Parametric values for drinking water

Parameters and parametric values are presented in *Regulation on parameters compliance and analysis methods for water intended for human consumption* [3] in Annex I. In ANNEX I maximum permitted values for drinking water are given for:

- microbiological parameters (table 1),
- chemical parameters (table 2)
- Indicator parameters (table 3)
- radioactivity (table 4).

Table 1: Microbiological parameters – general requirements for drinking water

Parameter	*Unit*	*Parametric value*
Escherichia coli (*E. coli*)	*number / 100 ml*	0
Enterococci	*number / 100 ml*	0
Clostridium perfringens (including spores) *	*number / 100 ml*	0
Pseudomonas aeruginosa **	*number / 100 ml*	0
Enteroviruses ***	*number / 5000 ml*	0

* It is determined only if drinking water is by origin surface water
** It is determined only in water samples taken on place of consumption
*** It is determined once a year during monitoring, and more often if necessary

Table 2: Chemical parameters of drinking water

Parameter	*Parametric value*	*Unit*
Acrylamide	0.10	µg/l
Antimony	5.0	µg/l
Arsenic	10	µg/l
Cooper	2.0	mg/l
Benzene	1.0	µg/l
Benzo(a)pyrene	0.010	µg/l
Boron	1.0	mg/l
Bromate	10	µg/l
Cadmium	5.0	mg/l
Cyanide	50	µg/l
1,2-dichloroethane	3.0	µg/l
Epichlorohydrin	0.10	µg/l
Fluoride	1.5	mg/l
Chromium	50	µg/l
Nickel	20	µg/l
Nitrate	50	mg/l

Nitrite	0.50	mg/l
Pesticides	0.10	µg/l
Pesticides - sum	0.50	µg/l
Polycyclic aromatic hydrocarbons (PAH)	0.10	µg/l
Lead	10	µg/l
Selenium	10	µg/l
Tetrachlorethylene and Trichlorethylene	10	µg/l
Trihalomethanes (THM) – sum	100	µg/l
Vinyl chloride	0.50	ug/l
Mercury	1.0	µg/l
Chlorite *	400	µg/l
Chlorate *	400	µg/l
Dissolved ozone	50	µg/l

* Not determined for water in bottles or other packaging

NOTE: For other remarks please see *Regulation on parameters compliance and analysis methods for water intended for human consumption* [3].

Table 3: Indicator parameters of drinking water

Parameter	*Parametric value*	*Unit*
Aluminium	200	µg/l
Ammonium	0.50	mg/l
Barium *	700	µg/l
Beryllium *		µg/l
Colour	20	mg/PtCo scale
Zinc *	3000	µg/l
Detergents - anionic	200	µg/l
*Detergents - non anionic**	200	µg/l
Phenols(total) *		µg/l
Phosphates *	300	µg/l
Calcium *		mg/l
Potassium *	12	mg/l
Total organic carbon (TOC)	No abnormal changes	mg/l
Conductivity	2500	µS cm^{-1} at 20 °C
Chloride	250	mg/l
Cobalt *		µg/l
Hydrogen ion concentration (pH)	≥6.5 and ≤9.5	units pH
Magnesium *		mg/l
Manganese	50	µg/l
Hydrocarbons *	50	µg/l

Turbidity	4	NTU
Sodium	200	mg/l
Oxidising	5.0	mg O_2/l
Taste	Without	
*Silicates **	50	mg/l
*Free chlorine **	0.5	mg/l
*Silver **	10	µg/l
Sulphate	250	mg/l
*Temperature **	25	°C
*Total hardness **		$CaCO_3$ mg/l
*Total suspension **	10	mg/l
Use of $KMnO_4$	5.0	O_2 mg/l
*Vanadium **	5.0	V µg/l
*Hydrogen sulphide **	Without	
*Number of colonies at 22 °C **	100	number/1 ml
*Number of colonies at 37 °C **	20	number/1 ml
Smell	Without	
Iron	200	µg/l
*Total Coliforms **	0	number/100 ml

* Not determined for water in bottles or other packaging

NOTE: For other remarks please see *Regulation on parameters compliance and analysis methods for water intended for human consumption* [3].

Table 4: Radioactivity of drinking water

Parameter	*Parametric value*	*Unit*
Tritium	100	Bq/l
Total dose received	0.10	mSv/year

4.2 Monitoring of drinking water

The yearly program of monitoring must specify the sampling sites, frequency of sampling, samplers and laboratories which are analysing the samples. It has to be made in accordance with the conditions set out in ANNEX I (part of this regulation). The monitoring is divided to (according to ANNEX II) into:

(1) Check monitoring that provides basic information on drinking water and information on efficiency of the preparation of drinking water (especially disinfection), where it is used. The scope of regular monitoring included parameters presented in table 5.

Table 5: Parameters for check monitoring

Physical-chemical and chemical
Aluminium
Ammonium
Colour
Conductivity
Hydrogen ion concentration (pH)
Turbidity
Nitrite
Taste
Odour
Iron
Chloride
Nitrate
Use of $KMnO_4$
Temperature
Residues of disinfectant
Microbiological
Clostridium perfringens (including spores)
Escherichia coli (*E. coli*)
Total coliforms
Enterococci
Pseudomonas aeruginosa *
Number of colonies at 22 °C and 37 °C *

* It is necessary to track for water samples in bottles or other packaging or in bottles taken on place of consumption

NOTE: For other remarks please see Regulation on parameters compliance and analysis methods for water intended for human consumption.

(2) Audit monitoring that provides information about consistency of drinking water for all parameters presented in ANNEX I. In the preparation of monitoring the parameters, which are likely not to be exceeded parametric values may be determined and should not be included in the monitoring.

In ANNEX II the frequency of sampling and testing of drinking water from the water supply network, from a reservoir or used in the facility for the production and marketing of food are defined and presented in table 6. Minimal number of sampling is determined on the supply area and the amount of water distributed in the supply area.

Table 6: Frequency of sampling and testing drinking water regarding amount of water distributed in the supply area

The amount of water distributed in the supply area m^3 / day	*Number of samples per year for regular monitoring*	*Number of samples per year for audit monitoring*	*Multiplication factor for RH*
≤100	2	1	1
>100 ≤1,000	4	1	2
>1,000 ≤10,000	4 + 3 for each 1,000 *m^3 / day and part thereof of the total volume*	1 + 1 for each 3,300 *m^3 / day and part thereof of the total volume*	3
>10,000 ≤100,000	4 + 3 for each 1,000 *m^3 / day and part thereof of the total volume*	3 + 1 for each 10,000 *m^3 / day and part thereof of the total volume*	4
>100,000 -200,000	4 + 3 for each 1,000 *m^3 / day and part thereof of the total volume*	10 + 1 for each 25,000 *m^3 / day and part thereof of the total volume*	4

5 Decree on water quality standard

The *Decree on water quality standard* [4] defines the water quality standards for surface waters, including coastal waters and territorial sea waters and groundwater, specific goals for water protection criteria establishes the objectives, the protection of water, the conditions for the extension of deadlines for achieving the objectives of protection water elements for the assessment of water status, the monitoring of water status and reporting of water.

State of surface water is determined on the basis of ecological and chemical status of the water body or group of water bodies.

The ecological state of surface water is assessed in relation to biological, hydro-morphological and basic physic-chemical and chemical elements that accompany biological elements listed in ANNEX II of this Decree:

- standards for determination of ecological status of surface waters,
  - quality elements of ecological status,
  - indicators and indices of ecological status,
  - permitted values for categories of ecological status.

The chemical state of surface water is assessed based on indicators of chemical status listed in ANNEX V of this Decree:

- quality standards for determining the chemical status of surface waters,
  - list of priority substances,
  - quality standards for assessing the chemical status,
  - substances subject to review to determine if they are priority substances or priority hazardous substances.

For artificial and significantly altered surface water bodies elements for assessment of the state of those natural surface water bodies which are most similar to them are used.

Condition of artificial and significantly altered surface water bodies is determined on the basis of ecological potential and chemical status of bodies or groups of bodies.

This policy also defines the methods, extend and requirements monitoring the status of surface waters as well as the way and form to prepare the report about surface water state monitoring.

The frequency of surveillance monitoring in respect of the ecological status of surface water varies for types of surface waters and the elements of quality. The maximum allowable intervals for monitoring of ecological status are given in ANNEX VII of this Decree and presented in table 7.

Groundwater:

In *Decree on water quality standard* [4] methods and the extent of groundwater monitoring, sampling frequency, analyses or measurements and requirements for groundwater monitoring are given also.

Groundwater status is determined on the basis of quantitative and chemical status of the groundwater.

Elements for evaluating quantitative and chemical status of groundwater bodies are:

1. For quantitative status:
   - Groundwater level,
   - Abundance;

2. For chemical status:
   - In general - electric conductivity, dissolved oxygen, pH,
   - Pollutants - nitrates, ammonium, specific pollutants.

Table 7: The maximum allowable intervals for monitoring of ecological status

	Rivers	*Lakes*	*Brackish*	*Coastal waters*
Biological quality elements				
Phytoplankton	6 months	6 months	6 months	6 months
Other aquatic flora	1 year	1 year	1 year	1 year
Benthic invertebrates	1 year	1 year	1 year	1 year
Fish	1 year	1 year	1 year	
Hydro-morphological quality elements				
Continuity of flow	1 year			
Hydrology	permanent	1 month		
Morphology	1 year	1 year	1 year	1 year
General physic-chemical quality elements				
Thermal conditions	3 months	3 months	3 months	3 months
Oxygenation conditions	3 months	3 months	3 months	3 months
Salinity	3 months	3 months	3 months	3 months
Nutrient status	3 months	3 months	3 months	3 months
pH	3 months	3 months		
Specific pollutants	3 months	3 months	3 months	3 months
Priority pollutants	1 month	1 month	1 month	1 month

The chemical status of groundwater bodies is assessed on the basis of:

1. Groundwater quality standards set out ANNEX 6 of this Regulation and,

2. Permitted values of specific pollutants given also in ANNEX 6 of this Decree, accordance to the the procedure established in Article 43 of this Decree for the pollutants for which the analysis of the characteristics of the river basin district from Article 45 of the *Water Act* is established that the groundwater body is in the state of risk. To estimate the risk of failing to achieve a good status are taken into consider at least the indicators set out in ANNEX 6 of this Decree for which are established the standards for quality groundwater.

For the assessment of the chemical status of groundwater bodies is applied the average annual concentration. The average annual concentration is calculated on the basis of all measurement results for indicators of chemical status, measured at the monitoring stations of the groundwater body at different times during the calendar year.

In the table 8 the parameters from which quality standards are defined.

Table 8: Parameters with quality standards

Parameter	*Unit*	*Average annual concentration*
Nitrates	mg NO_3/L	50
Individual pesticide	µg/l	0.1
Sum of all measured pesticides and their relevant degradation product	µg/l	0.5

The groundwater monitoring includes monitoring of groundwater chemical status and monitoring of groundwater quantity. The monitoring sites have to be selected in the way that the chemical status in each catchment area is noted and the long term trends of rising pollutants concentration are detected. The Decree defines the range of chemical parameters, the monitoring sites, and the frequency of monitoring, sampling and analysis methods. The purpose of groundwater quantity monitoring is to control the groundwater level oscillation regime and to define the quantitative status of groundwater bodies.

6 References

[1] *Water Act* (Official gazette of Republic of Croatia No. 153/09, 130/11, 56/13, 14/14**,** *orig. Zakon o vodama*),

[2] *Act on water intended for human consumption* (Official gazette of Republic of Croatia No. 056/2013, *orig. Zakon o vodi za ljudsku potrošnju*, http://narodne-novine.nn.hr/clanci/sluzbeni/2013_05_56_1138.html

[3] *Regulation on parameters compliance and analysis methods for water intended for human consumption* (Official gazette of Republic of Croatia No. 125/2013, *orig. Pravilnik o parametrima sukladnosti i metodama analize vode za ljudsku potrošnju*), http://narodne-novine.nn.hr/clanci/sluzbeni/2013_10_125_2694.html

[4] *Decree on water quality standard* (Official gazette of Republic of Croatia No. 073/2013, *orig. Uredba o standardu kakvoće voda*), http://narodne-novine.nn.hr/clanci/sluzbeni/2013_06_73_1463.html

[5] *Regulation on protection measures and conditions for determination of sanitary protection zones of the drinking water source* (Official gazette of Republic of Croatia No. 066/2011, *orig. Pravilnik o uvjetima za utvrđivanje zona sanitarne zaštite izvorišta*)

[6] *The Water Management Financing Act* (Official gazette of Republic of Croatia No. 153/09, 90/11,056/13, *orig. Zakon o financiranju vodnoga gospodarstva*)

[7] *The Constitution of the Republic of Croatia* (Official gazette of Republic of Croatia No. NN 56/90, 135/97, 8/98, 113/00, 124/00, 28/01, 41/01, 55/01, 76/10, 85/10, orig. *Ustav RH*)

Croatian legislation for monitoring – Rijeka 31.01.2015.

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DRINK ADRIA

Adriatic IPA
Cross Border Cooperation 2007-2013

The project is co-funded by the European Union,
Instrument for Pre-Accession Assistance

Legislation for water quality monitoring and for health safety of drinking water in Bosnia and Herzegovina

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Date last release	October, 29th 2014
State of document	Final

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Table of content

1 INTRODUCTION

Surface and ground water quality requirements are regulated differently on the national and entity level in the Bosnia and Herzegovina.

Quality of the ground water that is aimed for drinking is under the authority of the Bosnia and Herzegovina, and is regulated according to:

1. Rulebook on Drinking Water Safety (Official Gazette of BiH no. 40/10 and 30/12);
2. Rulebook on Natural Mineral and Natural Spring Water (Official Gazette of BiH no. 26/10);

Additionally, in the Federation of B&H there is also Decision on Characterization of Surface and Ground Waters, Reference Requirements, and Parameters for the Assessment of Water Status and Water Monitoring (Official Gazette of FBiH no. 1/14) that deal with the quality of ground water but only in the terms of determination of the water quality status (good, bad, moderate), pollution pressures, quantity and similar parameters necessary for the issuing management plan for river basins. However, threshold limits regulated by this decision are not relevant for the drinking water quality, but more to evaluation of the pollution pressure on the groundwater aquifer.

Quality of the surface water for the rivers under the authority of the FB&H is regulated according to:

3. Regulation on Dangerous and Harmful Substances in Water (Official Gazette of FBiH no. 43/07);
4. Regulation on Classification of Waters and Coastal Sea Waters within the Borders of Former Socialist Republic of Bosnia and Herzegovina (Official Gazette of SR BiH no. 18/80);
5. Regulation on Watercourse Categorization (Official Gazette of SR BiH no. 43/67);
6. Decision on Characterization of Surface and Ground Waters, Reference Requirements, and Parameters for the Assessment of Water Status and Water Monitoring (Official Gazette of FBiH no. 1/14);
7. Water law (Official Gazette of FBiH no. 70/06);

Similar as for the groundwater, Decision 1/14 is dealing with the detection of the quality status, which is in line with the recommendation that comes from the Directive 2000/60/EC of the European Parliament and the European Council dating from October 23rd 2000, and aiming to establish a Community Action Framework within the field of water policy. Currently, all aforementioned regulations are in force, but it is likely to expect that Decision 1/14 will be transformed to the other legal act (regulation or rulebook), since it is

harmonised with the related European directives, while Regulation 43/07 and Regulation 18/80 will be withdrawn or transformed.

Quality of the surface water for the rivers under the authority of the Republic of Srpska is regulated according to

8. Low on water (Official Gazette RS, no. 50/06);
9. Regulation on classification and categorization of watercourses (Official Gazette RS, no. 42/01).

In the following chapters the main characteristics of these regulations are presented with emphasis on limit values and monitoring of surface and groundwater and drinking water.

2 Drinking water legislation

Rulebook on Drinking Water Safety (Official Gazette of BiH no. 40/10 and 30/12) defines the requirements for ground water and public drinking water supply to protect human health against harmful effects due to any possible drinking water pollution. There is also Rulebook on Natural Mineral and Natural Spring Water (Official Gazette of BiH no. 26/10) which defines regulation of manufacturing and distribution of mineral and bottled water, but quality requirements for physical – chemical characteristics are the same.

In this regulation the limit values of parameters for drinking water (Annex I), monitoring conditions (Annex II) and Specification for analysis of parameters (Annex III) are discussed.

2.1 Limit values for drinking water

Parameters and the limit values of parameters are presented in Annex I which is divided in three parts. In the PART A general requirements for microbiological parameters of drinking water are given and presented in table 1.

Table 1: Microbiological parameters – general requirements for drinking water

Parameter	*The maximum value of the parameter (number / 100 ml)*
Escherichia coli (E. coli)	0
Enterococci	0

Part B deals with maximum values of chemical parameters for drinking water that are presented in table 2.

Table 2: Chemical parameters of drinking water

Parameter	*The maximum value of the parameter*	*Unit*
Acrylamide	1.0	µg/l

Antimony	5.0	µg/l
Arsenic	10.0	µg/l
Benzene	1.0	µg/l
Benzo(a)pyrene	0.010	µg/l
Boron	1.0	mg/l
Bromate	10.0	µg/l
Cyanide	50.0	µg/l
Copper	2.0	mg/l
1,2-dichloroethane	3.0	µg/l
Anionic surfactants	200.0	mg/l
Cationic surfactants	200.0	mg/l
Epichlorohydrin	0.10	µg/l
Fluoride	1.5	mg/l
Chromium	50.0	µg/l
Cadmium	5.0	µg/l
Mineral oils	20.0	µg/l
Nickel	20.0	µg/l
Nitrate	50.0	mg/l
Nitrite	0.50	mg/l
Lead	10.0	µg/l
Pesticides	0.10	µg/l
Pesticides total	0.50	µg/l
Polycyclic aromatic hydrocarbons	0.10	µg/l
Selenium	10.0	µg/l
Tetrachlorethylene and Trichlorethylene	10.0	µg/l
Trihalomethanes total	100.0	µg/l
Vinyl chloride	0.50	ug/l
Mercury	1.0	µg/l

Part C represents the limit values and units of indicator parameters, which are presented on Table 3. In addition, this part also deals with radioactivity (Table 4).

Table 3: Indicator parameters of drinking water

Parameter	*The maximum value of the parameter/specification*	*Unit*
Aluminium	200.0	µg/l
Ammonium	0.50	mg/l
Colour	Acceptable to consumers and no abnormal changes	
Number of colonies at 22 ℃	No abnormal change	number/ml
Number of colonies at 37 ℃	Less than 100	number/ml

Clostridium perfringens (including spores)	0	number/100 ml
Conductivity	2500.0	µS cm^{-1} at 20 °C
Chloride	250.0	mg/l
Coliforms	0	number/100 ml
Hydrogen ion concentration (pH)	≥6.5 and ≤9.5	pH units
Manganese	50.0	µg/l
Smell	Acceptable to consumers and no abnormal change	
Sodium	200.0	mg/l
Oxidising ($KMnO_4$)	5.0	mg O_2/l
Taste	Acceptable to consumers and no abnormal change	
Sulphate	250.0	mg/l
Total organic carbon (TOC)	No abnormal changes	
Turbidity	Acceptable to consumers and no abnormal change	NTU units
Iron	200.0	µg/l
Free residual Chlorine	0.5	mg/l

Table 4: Radioactivity of drinking water

Parameter	*The maximum value of the parameter*	*Unit*
Tritium	100.0	Bq/l
Total dose received	0.10	mSv/year

2.2 Monitoring of drinking water

The yearly program of monitoring must specify the sampling sites, frequency of sampling, samplers and laboratories that perform testing of samples. It has to be made in accordance with the conditions set out in Annex II (part of this regulation). The monitoring is divided to:

(1) Regular testing that provides basic information on drinking water and information on efficiency of the preparation of drinking water (especially disinfection), where it is used. The scope of regular testing included parameters Presented in table 5.

Table 5: Parameters for regular monitoring

Physical-chemical and chemical parameters	Microbiological parameters
Aluminium	Number of colonies at 22 °C

Ammonium	Number of colonies at 37 °C
Colour	*Clostridium perfringens* (including spores)
Conductivity	*Escherichia coli* (E. coli)
Hydrogen ion concentration (pH)	Coliforms
Smell	*Pseudomonas aeruginosa*
Turbidity	
Nitrite	
Nitrate	
Taste	
Oxidising ($KMnO_4$)*	
Temperature	
Iron	

* This parameter is not necessary to analyse if TOC is already analysing, with exceptions of professional requests

(2) Periodic testing that provides information about consistency of drinking water for all parameters presented in Annex I. In the preparation of monitoring the parameters, which are likely not to be exceeded limit values may be determined and should not be included in the monitoring.

In Annex II the minimum annual frequency of sampling and testing of drinking water from the water supply network, from a tanker or used in the facility for the production and marketing of food are defined and presented in table 6. Minimal number of sampling is determined on the basis of number of inhabitants on the supply area and the amount of water distributed in the supply area.

Table 6: Minimum annual frequency of sampling and testing drinking water regarding amount of water distributed in the supply area

The amount of water distributed in the supply area m^3 / day	*Annual number of samples for regular testing*	*Annual number of samples for periodic testing*
≤100	6	6
<100 – 1,000	4	1
<1,000 – 10,000	4 + additional 3 on every 1000 m^3 / day and part of that number from total amount	1 + additional 1 on every 3300 m^3 / day and part of that number from total amount
<10,000 – 100,000		3 + additional 1 on every 10000 m^3 / day and part of that number from total

		amount
> 20,000		10 + additional 1 on every 25000 m^3 / day and part of that number from total amount

3 Decree on groundwater status

Decision on Characterization of Surface and Ground Waters, Reference Requirements, and Parameters for the Assessment of Water Status and Water Monitoring (Official Gazette of FBiH no. 1/14) defines the procedure for determination of the threshold values for groundwater quality, parameters for chemical and quantitative state, groundwater quality standards, threshold values for groundwater quality, conditions for good quality and quantity state, criteria for the identification of significant and sustained upward trends of pollution and criterions to determine the groundwater body pollution load.

Decision mentioned above will be active soon on territory of Federation BiH for now, and it is used for evaluation of groundwater status only. Rulebook on Drinking Water Safety (Official Gazette of BiH no. 40/10 and 30/12) and Rulebook on Natural Mineral and Natural Spring Water (Official Gazette of BiH no. 26/10) are main Drinking water legislations on the level of entire Bosnia and Herzegovina.

Groundwater status is determined on the basis of monitoring results of the chemical and quantitative status of groundwater. The chemical status of groundwater is determined on the basis of the following criteria:

- sustainable long term trend of average exploitation of ground water which do not exceed usable amount of ground water reserves,

- changes caused by anthropogenic activities in ground water level are not jeopardise achieving of “Water Frame Directive” goals,

- there is not significant degradation of ecosystem which depends on ground water or presence of pollution caused by change of ground water flow direction.

If requested parameters values described above are not achieved, the ground water status has to be classified as bad.

Monitoring and frequency of ground water analysis depends of all of this parameters, geological and hydrological characteristics, as well as evaluated risks of anthropogenic pollution with special attention of not impact on ecosystem.

In the table 7 the inorganic parameters from which quality standards are defined, in table 8 other parameters and in table 9 organic parameters from which the threshold value are specified.

Table 7: Inorganic parameters and threshold standards

Parameter	*Unit*	*Threshold standard*
Arsenic (As)	A	10.0
Lead (Pb)	µg/l	7.0
Cadmium (Cd)	µg/l	0.5
Mercury (Hg)	µg/l	0.2
Ammonia (NH_4^+)	mg/l	0.5
Chlorides (Cl^-)	mg/l	250.0
Cyanides (CN)	µg/l	5.0 (50.0 if no presence of free cyanides)
Sulphates (SO_4^{2-})	mg/l	240.0

Table 8: Other parameters with quality standards

Parameter	*Unit*	*Quality standard*
Nitrates	mg NO_3/L	50.0
Individual pesticide and its relevant degradation products	µg/l	0.1
Sum of all measured pesticides and their relevant degradation products	µg/l	0.5

Table 9: Other parameters with quality standards

Parameter	*Unit*	*Quality standard*
Tri- and tetra-chloroethylene total	µg/l	10.0

4 Decree on surface water status

Class of the watercourse has been determined based on the values of physical-chemical water quality parameters and calculated saprobe indexes obtained by the performed water quality measurements. The physical-chemical parameters for which limit values have been established by the Regulation for Hazardous and Harmful Substances in Water (Official Gazette No. 43/07) were taken as relevant for the assessment of chemical quality of water in the Federation BiH. The final class for each group of parameters (basic parameters, nutrients, priority substances and biological parameters), for each measurement profile have been defined on the basis of the worst analysis result. Categorization of the watercourse has been defined based on relevant regulation in force ("Regulation on Categorization of Watercourses in the SR BiH", no. 42/67). This regulation is still active on the territory of FBiH.

On the territory of Republic of Srpska entity, monitoring plan was created according to recommendations from the Directive 2000/60/EC, and supporting EC directives. For rivers

with catchment area >1,000 km2, the monitoring network consists of the following elements:

- Surveillance monitoring I: Monitoring of surface water status-rivers (SM 1);
- Surveillance monitoring II: Monitoring of specific pressures; (TNMN monitoring stations, SM 2,
- Operational monitoring (OM).

For the Federation of BiH entity, it is expected to start with implementation of "Decision on Characterization of Surface and Ground Waters, Reference Requirements, and Parameters for the Assessment of Water Status and Water Monitoring" (Official Gazette of FBiH no. 1/14) defines the criteria for surface water quality status, environmental quality standards for determining the chemical status and criteria and environmental quality standards for the determination of the ecological status of surface water and types of surface water monitoring. This legislative includes the provisions to define chemical and ecological status of surface water body. However, this legislative is still at decision level in Federation BiH, so legislation 42/67 is still main law regulation for evaluation of surface water class.

Decision mentioned above provides for surface water chemical status:
- chemical parameters for determining the chemical status of surface waters,
- environmental quality standards for parameters of the chemical status of surface water,
- criteria for determining the chemical status of surface waters and classification of surface water bodies in the classes of chemical status.

This Decision provides for ecological status of surface waters:
- quality elements for the determination of ecological status and ecological potential of surface waters,
- methods for the evaluation of individual biological elements of ecological status,
- parameters for evaluating the quality of individual chemical elements supporting the biological elements of ecological status,
- parameters for the evaluation of individual general physical-chemical quality elements supporting the biological elements of ecological status,
- parameters for the evaluation of individual hydrological quality elements supporting the biological elements of ecological status,
- classes and attribute definitions of ecological status of surface water bodies and classes of ecological potential of artificial and heavily modified water bodies,
- thresholds for individual classes of ecological status for the evaluation of the biological elements of ecological status,
- thresholds for individual classes of ecological status for a specific pollutant,
- thresholds for individual classes of ecological status for general physical-chemical parameters,
- criteria for the evaluation of individual elements of ecological status,
- criteria for determining ecological status of surface water bodies and their grading ecological status.

5 Legislations for surface water status monitoring

Decision on Characterization of Surface and Ground Waters, Reference Requirements, and Parameters for the Assessment of Water Status and Water Monitoring (Official Gazette of FBiH no. 1/14) defines methods, extent and requirements for monitoring the status of surface water, as well as the way and form to prepare the report about surface water state monitoring. Monitoring of surface water includes also monitoring of hydrological phenomena related to the chemical and ecological status of surface water bodies.

The frequency of monitoring in respect of the ecological status of surface water varies for types of surface waters and the elements of quality. The maximum allowable intervals for monitoring of ecological status are given in Annex I of this document and presented in table 10.

Table 10: The maximum allowable intervals for supervising monitoring of ecological status

	Rivers	*Lakes*	*Coastal waters*
Biological quality elements			
Phytoplankton	6 months	6 months	6 months
Other aquatic flora	3 years	3 years	3 years
Benthic invertebrates	3 years	3 years	3 years
Fish	3 years	3 years	
Hydromorphological quality elements			
Continuity of flow	6 years		
Hidrology	permanent	1 month	
Morphology	6 years	6 years	6 years
General physico-chemical quality elements			
Thermal conditions	3 months	3 months	3 months
Oxygenation conditions	3 months	3 months	3 months
Salinity	3 months	3 months	
Nutrient status	3 months	3 months	3 months
Acidity	3 months	3 months	
Other polluters	3 months	3 months	3 months
Suspended solids after drying			
Specific pollutants			
Synthetic and non-synthetic pollutants and other specific pollutants	1 month	1 month	1 month

6 References

Pravilnik o zdravstvenoj ispravnosti vode za piće (Rulebook on Drinking Water Safety), 2010 (Official Gazette of BiH no. 40/10 and 30/12). Online available: http://www.fmpvs.gov.ba/index.php?user=44759bb409f258a81cb806fafe48ada1&sector=3&pageID=189&pageOwner=180 (25.9.2014)

Pravilnik o prirodnim mineralnim i prirodnim izvorskim vodama (Rulebook on Natural Mineral and Natural Spring Water) 2010 (Official Gazette of BiH no. 26/10) Online available: http://www.fsa.gov.ba/hr/wp-content/plugins/downloads-manager/upload/Pravilnik%20o%20prirodnim%20mineralnim%20i%20prirodnim%20izvorskim%20vodam.pdf (25.09.2014)

Uredba o opasnim i štetnim materijama u vodama (Regulation on Dangerous and Harmful Substances in Water), 2007 (Official Gazette of FBiH no. 43/07). Online available: http://www.fmpvs.gov.ba/index.php?user=44759bb409f258a81cb806fafe48ada1&sector=3&pageID=191&pageOwner=180 (25.9.2014)

Uredba o klasifikaciji voda i voda obalnog mora Jugoslavije u granicama Socijalističke Republike Bosne i Hercegovine (Regulation on Classification of Waters and Coastal Sea Waters within the Borders of Former Socialist Republic of Bosnia and Herzegovina), 1980 (Official Gazette of SR BiH no. 18/80). Online available: http://www.fmpvs.gov.ba/index.php?user=44759bb409f258a81cb806fafe48ada1&sector=3&pageID=191&pageOwner=180 (25.9.2014)

Uredba o kategorizaciji vodotoka (Regulation on Watercourse Categorization), 1967 (Official Gazette of SR BiH no. 43/67). Online available: http://www.fmpvs.gov.ba/index.php?user=44759bb409f258a81cb806fafe48ada1&sector=3&pageID=191&pageOwner=180 (25.9.2014)

Odluka o karakterizaciji površinskih i podzemnih voda, referentnim uslovima i parametrima za ocjenu stanja voda i monitoringu voda (Decision on Characterization of Surface and Ground Waters, Reference Requirements, and Parameters for the Assessment of Water Status and Water Monitoring), 2014 (Official Gazette of FBiH no. 1/14). Online available: http://www.fmpvs.gov.ba/index.php?user=44759bb409f258a81cb806fafe48ada1&sector=3&pageID=190&pageOwner=180 (25.9.2014)

Zakon o vodama FBiH (Water law) 2006 (Official Gazette of FBiH no. 70/06). Online available: http://www.fmpvs.gov.ba/index.php?user=84ce98abd1bd5628085b0c752403b234&sector=3 (25.9.2014)

Uredba o klasifikaciji voda i kategorizaciji vodotoka (Regulation on classification and categorization of watercourses) 2001 (Official Gazette RS, no. 42/01). Online available: http://www.voders.org/index.php/propisi/uredbe (25.9.2014)

Zakon o vodama RS (Law on water) 2006 (Official Gazette RS, no. 50/06). Online available:http://www.vladars.net/sr-SP-Cyrl/Vlada/Ministarstva/mps/Documents/Zakon%20o%20vodama.pdf (25.9.2014)

Institut za hidrotehniku Građevinskog fakulteta u Sarajevu – Sarajevo, October 2014

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Adriatic IPA
Cross Border Cooperation 2007-2013

The project is co-funded by the European Union,
Instrument for Pre-Accession Assistance

Montenegrian legislation for monitoring water quality and quantity

Public Utility" Vodovod i kanalizacija" - Niksic
(FB14)

Nikšić, 2015

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Date last release	2015. year
State of document	FINAL

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Cross Border Cooperation 2007-2013

The project is co-funded by the European Union,
Instrument for Pre-Accession Assistance

Table of contents

1 Introduction

The following regulations refer to the field of drinking water in Montenegro:

1. Water Law (*Water Law, Official Gazette of MNE No. 27/2007, 32/2011 & 47/2011*)
2. Regulation on the hygienic quality of drinking water (*Regulation on the* hygienic quality of drinking water*, Official Gazette of MNE No. 24/2012-42*)
3. Regulations on methods for determining and maintaining sanitary protection zones for drinking-water sources and restrictions in the related zones (*Regulations* on *methods* for *determining* and *maintaining sanitary protection zones* for *drinking-water sources* and *restrictions* in the related *zones*, Official Gazette of MNE No. 66/2009),
4. Law on water management financing (*Law on water management financing, Official Gazette of MNE No. 65/2008, 74/2010-62 & 40/2011-1*)
5. Law on communal activities (*Law on communal activities, Official Gazette of RoM No. 12/95*)

The description of these regulations- with the emphasis on drinking water quality and the use of surface and ground water for this purpose- is given in the following chapters.

2 Water Law

This law regulates the legal status and method of integrated water management, water and coastal land and water facilities, conditions and terms of performing water activities and other issues of importance for water resource management.

Funds for water management are provided in accordance with the special law.

This law applies to:

- Surface and groundwater and saline water of estuaries that flow into the sea;
- Mineral and thermal waters;
- Water resources;
- Sites of drinking water in the territorial sea;
- Coastal sea water against pollution from land.

This law does not apply to the use of mineral and thermal waters for obtaining mineral raw materials or geothermal energy. The Government of Montenegro, at the proposal of the ministry responsible for water management and with prior opinion given by the ministry responsible for maritime affairs, establishes the separation line between inland waters and coastal sea water.

3 Regulation on the hygienic quality of drinking water

This regulation prescribes the hygienic quality of drinking water used for public supply of the population or for the production of food for sale and it is determined by: systematic basic and periodical testing of raw water at equal intervals during a month, or a year, depending on the number of equivalent inhabitants:

3.1. Parameters of drinking water quality

Table 1: Microbiological parameters for drinking water

Ord. No.	Types of microorganisms	Treated and disinfected water and bottled water at source	Natural water	
			Closed sources	Open sources
1	Bacteria of Salmonella species,, Shigella species, *Vibrio cholerae* and other pathogens, coliforms and faecal streptococci, Proteus-species, Pseudomonas aeruginosa	Must not contain		
2	Intestinal protozoa, helminths and their forms			
3	Vibrio			
4	Bacteriophage			
5	Algae and other organisms that can change the appearance, odour and taste of water			
6	Aerobic mesophilic bacteria on agar after incubation for 48 hours at 310.16 K (37 °C) in 1 ml of water up to	10*	100	300
7	Total coliforms determined as the most probable number per 100 ml of water (MPN) up to	0	10	100
	Total coliforms determined by a membrane- filter method in 100 ml up to	0	5	10
8	Sulphate- reducing clostridia in 100 ml of water up to	0	1	10
9	The number of infectious units of enteroviruses in 10 litres of water	None	One	One

*In bottled natural water that is in circulation more than 12 hours after it has been filled in, 50 aerobic mesophilic bacteria are allowed.

Table 2: Physical, physical-chemical and chemical parameters for drinking water- (regular situations, treated water)

Ord. No.	Parameters	Maximum allowable concentrations
1.	Colour	5 degrees of platinum cobalt scale
2.	Odour and taste	Without
3.	Turbidity	Up to 1 NTU*
4.	Hydrogen-ion concentration (pH)	6.8 – 8.5
5.	Oxidability (mg KMnO4/l)	Up to 8**
6.	Conductivity (m Scm, at 20 ℃)	Up to 1000
7.	Temperature	The temperature of the source or lower
8.	Dissolved oxygen (% saturation)	50***
9.	Sulphates	250****
10.	Hydrogen sulfide	Without*****
11.	Total organic carbon	-

** For water supply systems with 5,000 inhabitants, turbidity of up to 5 NTU (nephelometric Turbidity Units) is permitted*
*** It is believed that water is good in the event that in about 20% of the measurements, which are not consecutive in a year, the value of the parameters reaches 12 mgKMnO4 / l; frequency of measurements according to the current regulations.*
Water whose consumption of KMnO4 is above 8 mg/l must not be chlorinated and other ways of disinfection must be used.
**** It does not refer to ground water*
***** Odour must not be felt.*
****** Compulsory parameter for the plants where ozonation is done; in other plants it is necessary to introduce this parameter as a control for the following 5 years*

4 Regulations on methods for determining and maintaining sanitary protection zones for drinking-water sources and restrictions in the related zones

This Regulation prescribes the manner of determining and maintenance of sanitary protection zones of sources that are used or can be used for drinking water supply and restrictions in these zones.

The provisions of this Regulation also apply to the facilities for drinking water supply.

5 Law on water management financing

This Law regulates the sources of water management financing, methods of calculation and payment of fees for the protection and use of water and water resources and other issues of importance for the provision and use of these funds.

This law applies to water, water resources and water facilities and systems established by the law governing water.

Water management financing is based on the following principles:

1) funds for water management financing are provided from water fees paid by users of

water and water resources as well as water pollutants, as well as from other resources defined by this law;

2) the funds derived from water charges are used, as a rule, for purposes established by this Law;

3) the use of funds provided by this Law is carried out in accordance with programs, water management plans and programs of measures provided by law;

4) water has its economic value that is determined on the basis of economic analysis of expenditures required for ensuring its availability and protection, as well as encouraging users to use water resources rationally;

5) fees paid under this Law are determined in accordance with the principles of "user pays - polluter pays ";

6) funds derived from fees paid under this law can be irrevocably assigned to utility service providers (water supply, sanitation and waste water treatment) in order to encourage the construction of water facilities for water use or water pollution protection.

6 Law on communal activities

Communal activities, governing principles, general conditions and manner of their performance are defined by this Law.

In terms of this law, communal activities include:

1) water supply,
2) wastewater treatment and disposal,
3) heat supply,
4) public transport in cities and other settlements;
5) maintenance of cleanliness in towns and other settlements,
6 landscaping and maintenance of parks, public green and recreation areas,
7) maintenance of streets, roads and other public areas in cities and other settlements and public lighting, as well as the construction, maintenance and use of local roads,
8) construction, maintenance and use of landfills,
9) construction, maintenance and use of bridges, public buildings and regulation and maintenance of riverbeds,
10) maintenance of cemeteries and funeral services,
11) chimney services, maintenance of public toilets, maintenance of public baths, dog pounds, public parking lots, maintenance and providing services to markets.

7 References

1. Water Law (*Water Law, Official Gazette of MNE No. 27/2007, 32/2011 & 47/2011*)
2. Regulation on the hygienic quality of drinking water (*Regulation on the* hygienic quality of drinking water*, Official Gazette of MNE No. 24/2012-42*)
3. Regulations on methods for determining and maintaining sanitary protection zones for drinking-water sources and restrictions in the related zones (*Regulations* on *methods* for *determining* and *maintaining sanitary protection zones* for *drinking-water sources* and *restrictions* in the related *zones*, Official Gazette of MNE No. 66/2009),
4. Law on water management financing (*Law on water management financing, Official Gazette of MNE No. 65/2008, 74/2010-62 & 40/2011-1*)
5. Law on communal activities (*Law on communal activities, Official Gazette of RoM No. 12/95*)

Hanc ego cum tene sententiam – Trieste 22.04.2014

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The project is co-funded by the European Union,
Instrument for Pre-Accession Assistance

Serbian Legislation for drinking water and water resources quality monitoring

Jaroslav Černi Institute for
Water resources Development
Belgrade, Serbia
(FB10)

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Date last release	02.07.2015.
State of document	FINAL

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Cross Border Cooperation 2007-2013

The project is co-funded by the European Union,
Instrument for Pre-Accession Assistance

Table of content

1 Introduction

In Republic of Serbia drinking water and water resources quality monitoring legal framework includes number of Acts and by laws. Within the scope of DRINAKADRIA project activities 4.3 the following is consider to be the most significant:

1. *Water Act* (Official gazette of Republic of Serbia 30/2010 and 93/2012), original title*: Zakon o vodama*) [1];

2. *Act on Sanitary Observation* (Official gazette of Republic of Serbia, no. 125/2004), original title*: Zakon o sanitarnom nadzoru* [2];

3. *Drinking water supply sources management and protection Act* (Official gazette of Republic of Serbia, no. 27/77, 24/85, 29/88, 49/89 and 46/91) original title: *Zakon o iskorišćavanju i zaštiti izvorišta vodosnabdevanja* [3];

4. *Environmental protection Act and Act on amendments and additions to the Act on environmental protection* (Official Gazette RS", no. 135/04, 36/09 and 72/09 – 43/11-constitutional court) original title: *Zakon o zaštiti životne sredine* [4];

5. *Act on Public Health* (Official Gazette RS", no. 72/2009) original title: *Zakon o javnom zdravlju* [5];

6. *By - law on drinking water sanitary standards (*Official Gazette RS, no. 42/98 and 44/99) original title: *Pravilnik o higijenskoj ispravnosti vode za piće* [6];

7. *By – law on Establishment and management of drinking water source protection zones (*Official Gazette RS, no*.* 92/08) original title: *Pravilnik o načinu određivanja i održavanja zona sanitarne zaštite izvorišta vodosnabdevanja* [7];

8. *By-law on surface water ecological and chemical status parameters and groundwaterchemical and quantitative status parameters* (Official Gazette of Republic of Serbia, no 74/2011) original title: *Pravilnik o parametrima ekološkog i hemijskog statusa površinskih voda i parametrima hemijskog i kvantitativnog statusa podzemnih voda* [8].

2 Water Act

The most important law regulating the entire water sector is the Water Act (OG Republic of Serbia No. 30/2010) that replaced the previous 1991 Water Act, amended by by-laws in 1993, 1994, 1996 and 2005. Actually this Act covers surface water and ground water, including drinking water, wastewater, thermal and mineral water, internal and transboundary water, and inland water bodies in Serbia. This Law prescribes and regulates:

- water assets (definition), water facilities/ structures;
- integrated water management;
- defines water acts and documents (e.g. water criteria , water approvals, water permits, water orders , water journal and water register);
- bans, limiting rights and obligations of the owners and beneficiaries/users of water land and water facilities;
- entities in water management;
- information and water information system;
- funding of water management;
- (inspection) supervision;
- penalty provisions.

The Water Act foresees the development of following strategic and planning documents to govern the water sector:

- The water management strategy is a planning document that sets a long-term direction of water management and contains: an assessment of the current situation in water management, objectives and guidelines for the water management, implementation measures to achieve the set objectives and a projection on the development of water management. This document has to be harmonized with other strategic documents on the Republic's level in the field of spatial planning, sustainable development, utilization of natural heritage and resources, and environmental protection. The strategy should be adopted during the year 2015.

- Water management plans for water management are developed for a period of six years and should be adopted, in compliance with the above strategy, for the Danube River Basin and for other water regions Sava River, Belgrade, Morava River, Danube River, Srem, Backa and Banat, Kosovo and Metohija). The water management plans contain, among other things, in most general terms, the analysis of current state of water resources, environmental objectives for surface and ground water, as well as a presentation of the approved program of activities, measures as well as ways and means as to how the set goals will be achieved in all areas of water management (water usage, water protection, and protection from adverse effects of water).

More precisely, with respect to drinking water supply and monitoring, Water Act specifies following:

- Water facilities for monitoring (article 20);
- Water use (article 67);
- Temporary limitation for water use(article 67);
- Purpose, conditions and priorities in water use (article 71);
- Water use for drinking water supply (article 72);
- Water quantity and quality mandatory control (article 74);
- Health standards for water for human consumption and facilities in distribution network (article 75);
- Protection zones (article 77);
- Water sources quality control (article 78);
- Water status monitoring (article 107);
- Annual monitoring programme (article 108);
- Implementation of annual monitoring programme (article 109).

3 The Law on Environmental Protection

This document regulates integral system of environmental protection, which shall ensure human right to live and develop in a healthy environment with a balanced economic growth. The main principles of the Law on environmental protection are:

- The principle of Environmental Liability, according to which a legal or natural entity who is involved in environmental pollution by illegal or improper activities, as well as in the case of liquidation or bankruptcy, is responsible for the environmental damage. Accordingly, the polluter or its legal successor shall be bound to eliminate the cause of pollution or the consequences of direct or indirect environmental pollution. In addition, changes in the ownership of companies or other legal entities or other changes in the ownership structure shall include assessment of the environmental status and allocation of liability for environmental pollution as well as settlement of debts of the ex ex-owner on account of pollution and/or damage to the environment.
- The “Polluter pays” principle which means that the polluter shall pay the charges for environmental pollution if it causes or may cause, in particular if he produces, utilizes or markets raw material, semi finished or final product containing material dangerous

for the environment. Moreover, the polluter shall bear the total costs of measures for prevention and reduction of pollution, including cost related to the restoration/remediation of the damaged environment. This principle has been fully included into the new Law on Water.

- The “User pays” principle which means that a person who utilizes natural values (in particular water) shall pay real cost for their abstraction as well as for the restoration of exploited or damaged resource. For water this implies that the cost related to water purification and distribution, as well as wastewater collection and treatment shall be borne by the users. This principle has been fully included into the new Law on Water, especially through the recovery of cost for water services.
- The principle of Subsidiary Liability according to which that State authorities, within their financial abilities, shall eliminate the consequences of environmental pollution and reduce damages when the polluter is unknown and when pollution originates from the sources outside the territory of the Republic.
- The principle of Environmental Incentives which obliges State authorities, as well as those of the autonomous province and local self-governing units to take the measures for the preservation and sustainable management of environmental capacities, particularly by reduced utilization of raw materials and energy and prevention or reduction of environmental pollution via economic instruments and other measures, by the best available techniques, facilities and equipment which does not require excessive costs and through selection of products and services. The new law on Water provides for the description of incentives measure in the Water Management Plans.

General guidelines relating to the water protection are regulated by provisions of the Article 23 of the Law on Environmental Protection. Considering that protection and use of waters is realized within integrated water management (“implementation of measures for preservation of surface and ground waters and its reserves, quality and quantity as well as riverbed protection, coastal area and basins”), the provision has general character since it refers to the implementation of the Water Act (RS 30/2010).

4 By - law on drinking water sanitary standards

Define number of sampling, frequency and parameters required for sampling of water intended for human use and for food production. Propose regular and periodic monitoring. In addition it clarifies public water supply and population equivalents (p.e) i.e., it equals consumption of 150 l/day. In addition it provides parameters to be monitored and controlled.

Number of sampling frequencies with respect to in line P.E

(P.E)	Monthly	Annually	Regular/ Yearly	Total. period.	Total
do 5000	1	1	11	1	12
5001-10000	2	1	23	1	24
10001-50000	3	1	35	1	36
50001-100000	6	2	70	2	72
100001-200000	10	4	116	4	120
200001-400000	15	6	174	6	180
more than 400000	30	12	348	12	360

Parameters frequencies, parametric values, etc are provided as an attachment (original document) with excel table for summary on legislation for drinking water supply in Republic of Serbia. In comparison to EU legislation it should be underlined that Serbian by – law comprises of 12 tables that define standards for drinking water and bottled water. On the other hand, Drinking Water Directive (80/778/EEC) includes 3 categories of parameters, namely microbiological, chemical and indicator based parameters.

Parameters required for status monitoring for surface water and ground water bodies are comprehensively explained in national by-law .Majority of EU Water Framework Directive requirements are transposed, but country specificities are considered with respect to parameters and typology for surface water categories.

5 Surface and Ground Water Monitoring

In order to ensure a coordinated and comprehensive overview of the surface and ground water statuses, all in accordance with Article 107 of the Water Act, quantitative and qualitative characteristics of the surface and ground water need to be determined through monitoring the relevant parameters. The monitoring results are also used for defining the levels in water courses which are needed for the regulation of the said water courses and the protection from water's harmful impact, including forecasts necessary for flood prevention.

For several decades, the Republic Hydrometeorological Service of Serbia has been performing the monitoring of the parameters of surface water and the ground water from water table aquifers, all in accordance with the annual programme prescribed by law. From 2011 onwards, this programme has been implemented by the Serbian Environment Agency, which has taken over the charge of the Environment Sector from the Republic Hydrometeorological Service. Monitoring is also performed by other legal entities authorised for this type of work.

For the purpose of the monitoring of quantitive parameters, there is a developed network (Primary Network) of hydrological stations placed near every significant water course on the Republic of Serbia's territory, comprising 184 such stations (not taking into account the territory of Kosovo and Metohija), out of which 69 are reporting stations. Water level is monitored at all stations, water temperature at 74 of them, whereas hydrometrical measurements of water discharge are performed at 148 stations. Occurrence of ice is monitored at 172 stations, while 29 stations belong to the system for identification of suspended debris transport. Processed data are published in the Republic Hydrometeorological Service's almanacs, and are available to the public.

In Serbia, surface water quality monitoring is performed in rivers, certain canals and accumulations, and, lately, for the ground water from water table aquifers as well. Both the gauge stations positions and the number and frequency of measurements performed, are not always adequate, whereas the monitoring of small and middle-sized water courses are not frequent enough, all of which has a negative impact on the reliability of the surface and ground water state assessment. Moreover, deep aquifers are not monitored at all, an omission that needs to be corrected in the near future.

National And Local Registers of Pollution Sources

National (or Local) Register of Pollution Sources is a register of legal entities and entrepreneurs under obligation to produce annual reports on their emissions into air, water and soil, as well as on their generated waste management. The list of activities and the minimal limit values that require producing reports for the National/Local Registers of Pollution Sources, are both prescribed by the Rule Book on Methodology for Development of National and Local Registers of Pollution Sources, along with the methodology which is to be used in data collection (˝Official Gazette RS˝ No. 91/2010).

In accordance with the Law on Environmental Protection (˝Official Gazette RS˝ No. 135/04, 36/09, 36/09), National Register of Pollution Sources is managed by the Serbian Environment Agency, whereas the Local Register of Pollution Sources is managed by the local governemnt's authorised body.

Cadaster of Point Sources of Pollution

In accordance with the Serbian Water Act, the Cadaster of Point Sources of Pollution (KIZ) is a part of the Serbian Water Management Information System. The Cadaster is still in the development phase, and it is not fully functional yet. The idea is that the KIZ application should be able to provide all the relevant information on pollution sources in the surface water originating from built-up areas and industry. However, data entry is not performed promptly, nor is the entered data complete, meaning that the cadaster data cannot be considered reliable and does not cover the entire territory the cadaster should cover. An equivalent of this cadaster has been developed in Vojvodina. The two cadasters are not connected even though the original project requires them to be so.

Public water management companies are in charge of ensuring that the cadaster is functional and up-to-date. The data they collect for this purposes are neither methodologically nor qualitatively in accordance with the requirements stated in the cadaster's design documentation. Still, the cadaster data concerning some parts of the covered territory is periodically updated. The data concerning the Sava river area is updated regularly, as well as the data concerning certain parts of the Belgrade water area, while other areas do not follow this update dynamics.

6 References

[1] ***Water Act*** (Official gazette of Republic of Serbia 30/2010 and 93/2012, original title*:* ***Zakon o vodama;***

[2] ***Act on Sanitary Observation*** (Official gazette of Republic of Serbia, no. 125/2004, original title*:* ***Zakon o sanitarnom nadzoru;***

[3] ***Drinking water supply sources management and protection Act*** (Official gazette of Republic of Serbia, no. 27/77, 24/85, 29/88, 49/89 and "Official Gazette RS", no. 46/91)
original title: ***Zakon o iskorišćavanju i zaštiti izvorišta vodosnabdevanja;***

[4] ***Environmental protection Act and Act on amendments and additions to the Act on environmental protection*** (Official Gazette RS", no. 135/04, 36/09 and 72/09 –43/11-constitutional court) original title: ***Zakon o zaštiti životne sredine;***

[5] ***Act on Public Health*** (Official Gazette RS", no. 72/2009) original title: ***Zakon o javnom zdravlju;***

[6] ***By - law on drinking water sanitary standards*** *(*Official Gazette RS, no. 42/98 and 44/99)) original title: ***Pravilnik o higijenskoj ispravnosti vode za piće;***

[7] ***By – law on Establishment and management of drinking water source protection zones*** *(*Official Gazette Republic of Serbia, no. 92/08) original title: ***Pravilnik o načinu određivanja i održavanja zona sanitarne zaštite izvorišta vodosnabdevanja;***

[8] ***By-law on surface water ecological and chemical status parameters and groundwater chemical and quantitative status parameters*** (Official Gazette of Republic of Serbia, no 74/2011) original title: ***Pravilnik o parametrima ekološkog i hemijskog statusa površinskih voda i parametrima hemijskog I kvantitativnog statusa podzemnih voda*** .

Serbian legislation for monitoring – Belgrade, 02.07.2015.

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Adriatic IPA
Cross Border Cooperation 2007-2013

The project is co-funded by the European Union,
Instrument for Pre-Accession Assistance

Albanian legislation for water quality and monitoring

SHUKALB: Water Supply and Sewerage Utility of Albania (FB11)

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Date last release	08.10.2014
State of document	Final

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Cross Border Cooperation 2007-2013

The project is co-funded by the European Union, Instrument for Pre-Accession Assistance

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1. INTRODUCTION

Water Framework Directive is not operative in Albania, but the Law on "Integrated Management of Water Resources" and some other DCM updated these years are written in compliance with this directive. Albania legislation dealing with the surface water, groundwater and drinking water quality monitoring is presented in several laws and regulations:

1. Law No. 1. 111/2012, date 15.12.2012 "Integrated Management of Water Resources"

2. DCM no 1189, dated 18.11.2009 "to the rules and procedures for the drafting and implementation of a national program of environmental monitoring"

3. DCM. 246, dated 04.30.2014 "for determination of the environmental quality standards for surface waters"

4. DCM nr.797, dated 29.09.2010 "On approving of hygiene and sanitation regulations for the management of bathing water quality"

5. DCM no 1304, dated 11.12.2009 "The Approval of the Regulation" On the Water Supply and Sewage services in the service area of the water-joint stock Supply and Sewage Utilities"

6. DCM no 145, dated 26.02.1998 for the approval of the "hygiene and health regulation for the control of drinking water quality, the design, construction and supervision of systems of drinking water supply." And a new proposal for Regulation “On Drinking Water Quality”

In the following chapters the main characteristics of these regulations are presented with emphasis on limit values and monitoring of surface, groundwater and drinking water.

2. LAW NO. 1. 111/2012, DATE 15.12.2012 “ON INTEGRATED MANAGEMENT OF WATER SOURCES”

This law aims:

a) protection and improvement of the aquatic environment, surface water, either temporary or permanent, internal sea waters, territorial waters, exclusive economic zones, continental shelf, transboundary waters, groundwater's, and the status of them;

b) the provision, protection, development and rational utilization of water resources, essential for the life and for the social and economic development of the country;

c) the distribution of water resources according the intention of use and direction of their effective administration;

d) protection of water resources from pollution, overuse and consumption on actual needs;

e) defining the institutional framework, national and local level, for the implementation of a national policy for the administration and management of water resources for the good of the community and the social and economic interests of the country.

3. DCM NO 1189, DATED 18.11.2009 (IS IN THE APPROVAL PROCESS WITH ANOTHER DCM TO ENTER THE OFFICIAL JOURNAL OF REVERSES THIS DECISION)

This decision aims to:
1- Establishing the rules and procedures for the draft national monitoring program
2- Organization and Functioning of the National Monitoring Network

According to Annex I of this decision environmental indicators that monitor the state of the environment in terms of water resources are:

4.1. For surface waters (rivers, lakes):
a) alkalinity;
b) specific conductivity;
c) acidity;
d) chemical oxygen demand, COD;
d) biochemical oxygen demand, BOD;
f) content of nitrates and nitrogen;
e) the content of phosphorus, P;
h) ammoniac content, NH3;
f) the pH value;
g) the value of natural radioactive stock and water radioactivity;
k) the sustainability of river beds;
h) bacterial indicators;
i) the river flow

4.2. For sea and coast
a) biochemical oxygen demand for marine waters, BOD;
b) chemical oxygen demand for marine waters, COD;
c) microbiological parameters in marine waters and beaches;
d) the amount of phyto and zooplankton;
d) the content of chlorophyll and primary production;
f) water content in marine mussels heavy metals, organic pollutants sustainable, and radioactivity;
e) water radioactivity;
h) communication between the sea and the lagoon;
f) the dynamics of estuaries of rivers;
g) morphology and topography of the sea shelf;
k) the morphology of the coast.

4.3. For groundwater:
a) pH;
b) hardness
c) alkalinity;
d) acidity;
d) content of nitrates;
f) saltiness.

4.4. For surface waters, groundwater and marine, the potential sources of industrial and agricultural pollution:
a) heavy metal content;
b) the content of pesticides;
c) the content of hydro carbon compounds.

Currently a revised DMC is writen and after its publication in the official gazette the DMC no 1189, dated 18.11.2009, will be invalid.

4. DCM. 246, DATED 04.30.2014 "FOR THE DETERMINATION OF THE ENVIRONMENTAL QUALITY STANDARDS FOR SURFACE WATERS"

The aim of this decision is to establish environmental quality standards of surface water bodies, for priority substances and other pollutants, in order to achieve good chemical status of surface waters and in accordance with environmental objectives under Article 25 of Law no. 111/2012, "For integrated water resources management"

In Annex I of the decision are provided normal environmental quality of water bodies for certain substances.

No	Name	Number(1) CAS (Chemical Abstract Service)	EQN(2) annual average Internal surface waters	EQN (2) annual average Other surface waters	MAC-EQN (4) Internal surface waters	MAC-EQN (4) Other surface waters
1	Alachlor	15972-60-8	0,3	0,3	0,7	0,7
2	Anthracene	120-12-7	0,1	0,1	0,4	0,4
3	Atrazina	1912-24-9	0,6	0,6	2,0	2,0
4	Benzene	71-43-2	10	8	50	50
5	Bromine Difenil Eter	32534-81-9	0,0005	0,0002	Non applicable	Non applicable
6	Cadmium and its compounds (depending on water rigidit categories)	7440-43-9	≤ 0,08 (Category 1)	0,2	≤ 0,45 (Category 1)	≤ 0,45 (Category 1)
			0,08 (Category 2)		0,45 (Category 2)	0,45 (Category 2)
			0,09 (Category 3)		0,6 (Category 3)	0,6 (Category 3)
			0,15 (Category 4)		0,9 (Category 4)	0,9 (Category 4)
			0,25 (Category 5)		1,5 (Category 5)	1,5 (Category 5)
6a	Carbon Tetrachloride	56-23-5	12	12	Non applicable	Non applicable
7	C10-13 Chloroalkane	85535-84-8	0,4	0,4	1,4	1,4
8	Chlorfenvinphos	470-90-6	0,1	0,1	0,3	0,3
9	Chlorpyrifos (Ethyl Chlorpyrifos)	2921-88-2	0,03	0,03	0,1	0,1
9	Cyclodiene Pesticides		Σ = 0,01	Σ = 0,005	Non applicable	Non applicable
	Aldrin(7)	309-00-2				

9	Dieldrin[7]	60-57-1	Σ = 0,01	Σ = 0,005	Non applicable	Non applicable
	Endrin	72-20-8				
	Azodrini[7]	465-73-6				
9b	Total DDT [7][8]	Non applicable	0,025	0,025	Non applicable	Non applicable
	Pre-DDT[7]	50-29-3	0,01	0,01	Non applicable	Non applicable
10	1,2- Dichloromethane	107-06-2	10	10	Non applicable	Non applicable
11	Dichloromethane	75-09-2	20	20	Non applicable	Non applicable
12	Di(2-etileksil)- phthalate(DEHP)	117-81-7	1,3	1,3	Non applicable	Non applicable
13	Diuron	330-54-1	0,2	02	1,8	1,8
14	Endosulfan	115-29-7	0,005	0,0005	0,01	0,004
15	Fluoranthene	206-44-0	0,1	0,1	1,0	1,0
16	Hexachloro-benzene	118-74-1	0,01[9]	0,01[9]	0,05	0,05
17	Hexachloro-butadiene	87-68-3	0,1[9]	0,I[9]	0,6	0,6
18	Hexachloro-cikloheksan	608-73-1	0,02	0,002	0,04	0,02
19	Isoproturon	34123-59-6	0,3	0,3	1,0	1,0
20	Lead and its compounds	7439-92-1	7,2	7,2	Non applicable	Non applicable
21	Mercury and its compounds	7439-97-6	0,05[9]	0.05[9]	0,07	0,07
22	Naphthalene	91-20-3	2,4	1.2	Non applicable	Non applicable
23	Nickel and its compounds	7440-02-0	20	20	Non applicable	Non applicable
24	Nonylphenol (4-Nonilfenoli)	104-40-5	0,3	0,3	2,0	2,0
25	Oktilfenol ((4-(1,1',3,3' - tetramethylbutyl)-fenoli))	140-66-9	0,1	0,01	Non applicable	Non applicable
26	Pentachloro-benzene	608-93-5	0,007	0,0007	Non applicable	Non applicable
27	Pentachloro -fenoli	87-86-5	0.4	0,4	1,0	1,0
28	Polycyclic aromatic hydrocarbons (HPA)[10]	Non applicable	Non applicable	Non applicable	Non applicable	Non applicable
	Benzo(a)pyrene	50-32-8	0,05	0,05	0,1	0,1
	Benzo(b)fluoranthene	205-99-2	Σ = 0.03	Σ = 0,03	Non applicable	Non applicable
	Benzo(k)fluoranthene	207-08-9				
	Benzo(g,h,i)-perylene	191-24-2	Σ = 0,002	Σ = 0,002	Non applicable	Non applicable
	Indeno(I,2,3-cd)- perylene	193-39-5				
29	Simazine	122-34-9	1,0	1,0	4,0	4,0
	Tetrachloroethylene	127-18-4	10	10	Non applicable	Non applicable
	Trichloroethylene	79-01-6	10	10	Non applicable	Non applicable
30	Tributyltin compounds (Tributiltin-	36643-28-4	0,0002	0,0002	0,0015	0,0015
31	Trichlorobenzene	12002-48-1	0,4	0,4	Non applicable	Non applicable
32	Trichloromethane	67-66-3	2,5	2,5	Non applicable	Non applicable
33	Trifluralin	1582-09-8	0,03	0,03	Non applicable	Non applicable

5. DCM NR.797, DATED 29.09.2010 "ON APPROVAL OF HYGIENE AND SANITATION REGULATIONS FOR THE MANAGEMENT OF BATHING WATER QUALITY"

1 This decision aims to prevent, reduce and avoid pollution of the receiving water environment from hazardous substances discharged into them through wastewater, setting limit values for ingredients allowed under Annexes attached to this decision and are part of it.

2 In terms of this decision, hazardous substances composed of liquid discharges, are grouped in the lists I and II of Schedule 1, attached to the decision on the basis of their characteristics, associated with toxicity, stability and bioaccumulation.

3 For the liquid discharges in the trans-boundary waters, which are governed by international environmental agreements to which the Republic of Albania is a party, apply higher limit values resulting from the comparison of the requirements of these agreements with those provided for this decision.

ANNEX I of this decision requirements for bathing water quality microbiological parameters

For internal waters

Nr.	A. Parameter	B. Very good	C. Good	D. Sufficient	E. Analytical reference methods
1	Enterokoki intestinal (cfu/100 ml)	200(*)	400(*)	330(**)	S SH ISO 7899-1 or S SH ISO 7899-2
2	Escherichia coli (cfu/100 ml)	500(*)	1000(*)	900(**)	S SH ISO 9308-3 or S SH ISO 9308-1

(*)Based on the evaluation of percentiles 95.
(**)Based on the evaluation of percentiles 90.

Transitional and coastal waters

Nr.	A. Parameter	B. Very good	C. Good	D. Sufficient	E. Analytical reference methods
1	Intestinal enterococci (cfu/100 ml)	100(*)	200(*)	185(**)	S SH ISO 7899-1 or S SH ISO 7899-2
2	Escherichia coli (cfu/100 ml)	250(*)	500(*)	500(**)	S SH ISO 9308-3 or S SH ISO 9308-1

Physical-chemical parameters

Nr.	A. Parameter	G Guiding	I	Minimum frequency of sampling	The method of analysis and inspection
1	pH	-	6-9 (0)	(2)	Electrometer calibrated in pH 7 and 9.
2	Color	- -	No changeable abnormal color (0)	Twice in month (1) (2)	Photometry with standard scale Pt.Co .
3	Mineral Oils (mg/l)	- ≤ 0.3	Non visible membrane on the water surface and flagrance free	Twice in month (1) (2)	Visual inspection or extraction using a sufficient volume and weighing the dry residue.
4	Surface active substances that interacts with blue methylene (mg/l) (Lauryl Sulphate)	- ≤ 0.3	Unstable foam -	Twice in month (1) (2)	Visual inspection or spectral-photometry with blue methylene absorption.
5	Phenol mg/l (phenol indicator) C6 H5 OH	- ≤ 0.005	No special flavor ≤ 0.05	Twice in month (1) (2)	Verification of the absence of special smell of phenol or spectral - photometry method with 4 – aminoantipyrines absorption (4 AAP)

6	Transparency m	2	1 (0)	Twice in month (1)	Sochi disk
7	Dissolved Oxygen (Saturation %) O2	80 - 120	-	(2)	Winkler method or electrometric method.
8	Bituminous residues and floating materials like: wood, plastic materials, bottles, rubber etc. ,Trash or chips	Do not have	-	Twice in month (1)	Visual inspection
9	Ammonia (mg/l NH4)	-	-	(3)	Absorption Spectral-photometry, Nessler method, or blue indophenols method.
10	Kjeldahl Nitrogen (mg/l N)	-	-	(3)	Kjeldahl method

(0) Exceeding the limits specified in the case of the particular geographic and geological.
(1) When the analysis of samples in the last two years have results that are significantly better than those in this appendix and when there is no new factor that may reduce water quality, ISS may reduce the sampling frequency by a factor of 2.
(2) ISS controls the concentration when an inspection in the bathing area shows that the case can be present or that the quality of water has deteriorated.
(3)These parameters should be controlled by the ISS when there is a tendency towards eutrophication of water.

Bathing water monitoring

1. Just before the start of each washing season should be taken a sample. Taking into account this extra sample and application according the paragraph 2, in each bathing season will be taken and analyzed no less than 4 samples.
2. However, for every washing season, need to be taken and analyzed, only three samples in case of bathing waters:

   a) with a bathing season not exceeding 8 weeks; or

   b) located in a region that is subject to special geographical limitations.
3. The dates of taking the samples, are distributed along the bathing season with intervals between these dates that never pass a month.
4. In the case of short-term pollution, is taken one sample extra in order to confirm that the incident has ended. This sample should not be part of a series of data quality of bathing waters. If you need to replace a culled sample, it should be additional taken a sample in 7 days after the end of the short term pollution.
5. If bathing waters are classified as water quality "good", "sufficient" or "poor", the water profile should be reviewed periodically to assess whether any of the aspects of listed in paragraph 1 has changed, and if so, the details need to be updated. Frequency and extent of the review depends on the nature of pollution. However, the review must comply at least with the provisions of the following table and performed with the frequency shown.

Classification of Bathing Waters: Quality	"good"	"enough"	"weak"
Control will be conducted at least every	4 years	3 years	2 years

6. VKM NO 1304, DATED 11.12.2009 "THE APPROVAL OF THE REGULATION "ON THE WATER SUPPLY AND SEWAGE SERVICES IN THE SERVICE AREA OF THE WATER-SUPPLY AND SEWAGE JOINT STOCK UTILITIES",WARTER SUPPLY AND SEWERAGE CODE

The Water Supply and Sewerage Code is written in English and Albanian Language. It has the objective to ensure an environmentally sound and hygienically appropriate disposal of wastewater in the service area being served by the water supply and sewerage companies UK Companies, and to reduce health risks. The Water Supply and Sewerage Code represents an instrument, in hands of the water supply and sewerage Companies that serves to preserve the sewage collection system assets. The Code, in general, seeks to guarantee a technically correct sewage collection system, with suitable wastewater parameters for the wastewater treatment plant. In the annexes of this documents are given the norms for drinking water quality and the pollutants norms of industrial wastewater discharged in the public sewerage network

Annex II- The physical and chemical indexes of drinking water

Indexes	Measuring Unit	Norm	Maximum allowed value	Notes	Methods of definitions
Color	mg/l	1,00	20		STASH 2639/14:1989
Turbulence	mG/l SiO2 NTU	1,00 0,40	10 4		STASH 2639/14:1989
Odor	Number of dilution	0,00	2 in 12 degree C 3 in 25 degree C		STASH 2639/14:1989
Taste	Number of dilution		2 in 12 degree C 3 in 25 degree C		STASH 2639/14:1989
Temperature	C degree	8-15	20		STASH
Concentration of H +	ph	6.5:8.5	9,5		STASH 2639/14:1989
Electric Transmutability	µS Cm-1 në 20 g degrees	400,00		According to water mineralization	STASH 2639/14:1989
General Rigidity	German degrees	10-15	20		STASH
Nitrates	mg/l (NO3)	25,00	50		STASH
Nitrites	mg/l (NO2)	0,00	0,05		STASH
Ammoniac	mg/l (NH4)	0,00	0,05		STASH
Free Clorium	mg/l	0,30	0,5		STASH
Total Coliforms	N/100 ml	0,00			STASH
Fecal Coliforms	N/100 ml	0,00			STASH
Streptococci	N/100 ml	0,00			STASH
Fecal Streptococci	N/100 ml	0,00			STASH
Total Value	N/100 ml	0,00			STASH

Annex III- Allowed limits of values and concentrations of industrial waste water parameters discharged in public sewerage network

	Parameters	**Procedures of Analysis**	**Units**	**Max. of limit value**
1.	Physical parameters			
1.1	Temperature	DIN 38404-4	℃	35
1.2	pH	DIN 38404-5	-	6.5 -10
2.	Components of organic carbon			
2.1	Organic solvent (BTEX), defined as the sum of benzene and its derivatives	DIN 38407-9	mg/l	10
2.2	Halogenated hydrocarbons, organic chlorine compounds	DIN EN ISO 10301	mg/l	1
2.3	Components of the absorbed organic halogens , defined as chloride (AOX)	DIN EN 1485 DIN 38409-22	mg/l	1
2.4	Phenolic Components		mg/l	1
2.5	Hydrocarbon H 53 (mineral oils and their products)	DIN EN ISO 9377-2	mg/l	20
2.6	Extractable substance with low evaporation lipophilic	DIN 38409-17	mg/l	250
3.	Inorganic substances (dissolved)			
3.1	Ammonia	DIN EN ISO 11732	mg N/l	100
3.2	Nitrites	DIN EN 26777	mg N/l	5
3.3	Cyanide , with high evaporation	DIN EN ISO 10304- 2	mg/l	0.2
3.4	Sulfate	DIN EN ISO 10304- 2	mg/l	400
4.	Inorganic substances (total)			
4.1	Arsenic	DIN EN ISO 11969	mg/l	0.1
4.2	Plumb	DIN 38406-2	mg/l	0.5
4.3	Cadmium	DIN EN ISO 5961	mg/l	0.1
4.4	Chrome	DIN EN 1233	mg/l	0.5
4.5	Cuprum	DIN 38406-7	mg/l	0.5
4.6	Nickel	DIN 38406-11	mg/l	0.5
4.7	Mercury	DIN EN 1483	mg/l	0.05
4.8	Silver	DIN 38406-18	mg/l	0.1
4.9	Zink	DIN 38406-8	mg/l	2
4.10	Tin	DIN EN ISO 11969	mg/l	2

7. DCM NO 145, DATED 26.02.1998 FOR THE APPROVAL OF THE "HYGIENE AND HEALTH REGULATION FOR THE CONTROL OF DRINKING WATER QUALITY, THE DESIGN, CONSTRUCTION AND SUPERVISION OF SYSTEMS OF DRINKING WATER SUPPLY." AND A NEW PROPOSAL FOR A REGULATION ON DRINKING WATER QUALITY.

The purpose of this regulation is to ensure healthy and high quality drinking water supply in order to protect the public health from adverse effect of water pollution. In this regulation are established:

- Parameters of the safety of water for human consumption (microbiological and chemical), and indicator parameters of water for human consumption (microbiological and chemical),
- Equipment of water supply from catchment area to the user,
- Frequency of sampling water for human consumption for regular and audit monitoring
- The type and scope of the analysis and the number of required samples of water for human consumption in order to test its safety in buildings before issuing a permit.
- Laboratory methods for testing the safety of water for human consumption

In the new proposal for the Regulation on “Drinking Water Quality”, which is still in approval process, is integrated the WDW norms and regulation.

In the second annex of this new regulation, the minimum number of sampling points for the analysis of drinking water based on the number of inhabitants water supply.

Population connected to the water supply network	The minimum number of sampling
to 15 000 residents	5
from 15 000 to 30 000 residents	10
from 30 000 to 60 000 residents	15
from 60 000 to 90 000 residents	20
90 000 more	25

Minimal frequency of sampling of drinking water analysis supplied form public network, reservoir, wells or water used by food enterprises

Volume of distributed ore produced water per day within the service area (Note 1and 2) m^3	Routine monitoring – Number of sample per year (note 3, 4 and 5)	Verification monitoring – Number of sample per year (Note 3 and 5)
≤ 100	(Note 6)	(Note 6)
> 100 ≤ 1 000	4	1
> 1 000 ≤ 10 000	4 +3 for every 1 000 m^3/d of the total volume and faction 1 000	1 +1 for every 3 300 m^3/d of the total volume and faction3 300
> 10 000 ≤ 100 000		3 +1 for every 10 000 m^3/d of the total volume and faction 10 000
>100 000		10 +1 for every 25 000 m^3/d of the total volume and faction 25 000

6. REFERENCES

Law No. 1. 111/2012, dated 15.12.2012 "Integrated Management of Water Resources", Official gazette of Albania No.157 online available: *Ligj nr. 111/2012 datë 15.11.2012 "Për menaxhimin e integruar të burimeve ujore",* http://www.qbz.gov.al/botime/fletore_zyrtare/2012/PDF-2012/157-2012.pdf

DCM no 1189, dated 18.11.2009, Official gazette of Albania No. 200 online available: *VKM Nr.1189, Date 18.11.2009 "Për rregullat dhe procedurat për hartimin dhe zbatimin e programit kombetar të monitorimit të mjedisit"* http://www.qbz.gov.al/botime/fletore_zyrtare/2009/PDF-2009/200-2009.pdf

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DCM no 1304, dated 11.12.2009 "The Approval of the Regulation" On the Water Supply and Sewage services in the service area of the water-joint stock Supply and Sewage Utilities" *http://www.erru.al/doc/Water_Supply_and_Sewerage_Code.pdf*

DCM no 145, dated 26.02.1998 for the approval of the "hygiene and health regulation for the control of drinking water quality, the design, construction and supervision of systems of drinking water supply." It is not available online.

Let's grow up together

DRINK ADRIA

Adriatic IPA
Cross Border Cooperation 2007-2013

The project is co-funded by the European Union,
Instrument for Pre-Accession Assistance

WP4.3 Report:

National legislation for monitoring water quality (and quantity), water resources and drinking water - Greece

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Date last release	29/4/2015
State of document	Final

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1. Introduction

The Greek and European legislation dealing with the surface and groundwater quality, monitoring and drinking water is presented in several regulations:

1. Joint Ministerial Decision Y2/2600/01 regarding the water quality for human consumption according the European Directive 98/83/EC (Official Gazette of the Greek Republic 892/11-7-01) and its amendment ΔΥΓ2/Γ.Π. οικ 38295 [Official Gazette 630/26-4-07]);
2. National Law 3199/2003 for the "Protection and Management of Water" in compliance with the Water Framework Directive 2000/60/EC;
3. Official Gazette of the Greek Republic 2017B/9-9-2011 regarding the Determination of the national stations network for monitoring the quality and quantity of the water systems;
4. Ministerial Decision 1811 (Official Gazette of the Greek Republic 3322/30-12-2011) for the determination of the maximum allowable concentrations of pollutants in groundwater.
5. Joint Ministerial Decision 51354/2641/E103/2010 (Official Gazette of the Greek Republic 1909B/8-12-2010) for the determination of the Environmental Quality Standards for the concentrations of pollutants in surface waters (according to the Directive 2008/105/EC)

European Directives that apply in water for human consumption are:

1. European Directive for the samplings frequency and the control methods for the surface water intended for drinking 79/869/EC;
2. European Directive regarding the required quality of surface waters intended for human consumption 75/440/EC.

In the following chapters the main characteristics of these regulations are presented with emphasis on limit values and monitoring of surface, groundwater and drinking water.

2. Joint Ministerial Decision on drinking water quality

The Joint Ministerial Decision Y2/2600/01 (Official Gazette of the Greek Republic 892/11-7-01) and its ammendment set the quality standards for drinking water in compliance with the European Directive 98/83/EC. According to the Joint Ministerial Decision (JMD) "drinking water" is the water used for human consumption either in its natural status or after treatment regardless its source and whether it is being distributed through a water distribution network, a water cart or in bottles. It includes the water used for human consumption (drinking, cooking, or other household uses); the water used in the food (and drinks) industries; and the water affecting the final degree of hygiene of food and drinks.

The JMD sets the competent authorities for the implementation of the current legislation: the Ministry of Health, the General Directorate of Public Health and Social Welfare of the Region, the Department of Public Health and Social Welfare of the Regional Units and the Hellenic Food Authority (central and regional units). The JMD was amended in 2007 (Official Gazette 630/26-4-07) while in 2011 a circular was issued (Ref.No.: ΔΥΓ2/οικ.64340/7-6-2011) to include additional monitoring issues for water intended for human consumption. The JMD regulates the liability of legal persons engaged in the supply of water for human consumption in Greece, procedures and reporting in case of deviation from the parameters to check the consistency of water for human consumption, monitoring of the safety of water for human consumption, the protected areas and the parameters values to ensure the safety of water for human consumption (Table 1).

Table 1: Microbiological parameters – general requirements for drinking water

Parameter	**Parametric value (number / 100 ml)**
Escherichia coli (*E. coli*)	0
Enterococci	0

Table 2: Chemical parameters of drinking water

Parameter	**Parametric value**	**Unit**
Acrylamide	0.10	µg/l
Antimony	5.0	µg/l
Arsenic	10	µg/l
Benzene	1.0	µg/l
Benzo(a)pyrene	0.010	µg/l
Boron	1.0	mg/l
Bromate	10	µg/l
Cadmium	5.0	µg/l
Chromium	50	µg/l
Copper	2.0	mg/l
Cyanide	50	µg/l
1,2-dichloroethane	3.0	µg/l
Epichlorohydrin	0.10	µg/l
Fluoride	1.5	mg/l
Lead	10	µg/l
Mercury	1.0	µg/l
Nickel	20	µg/l
Nitrate	50	mg/l
Nitrite	0.50	mg/l
Pesticides	0.10	µg/l
Pesticides - total	0.50	µg/l
Polycyclic aromatic hydrocarbons	0.10	µg/l
Selenium	10	µg/l
Tetrachloroethene and Trichlorethene	10	µg/l
Trihalomethanes - total	100	µg/l
Vinyl chloride	0.50	µg/l

2.1 Limit values for drinking water

Parameters and the limit parametric values are presented as Annex. In ANNEX I general requirements for microbiological parameters of drinking water are given and presented in table 1. Chemical parameters are also presented in ANNEX I (Table 2).

The parametric values of indicator parameters are given in the same ANNEX (Table 3) including radioactivity (Table 4).

Table 3: Indicator parameters of drinking water

Parameter	**Parametric value**	**Unit**
Aluminium	200	µg/l
Ammonium	0.50	mg/l
Chloride	250	mg/l
Clostridium perfringens (including spores)	0	number/100 ml
Colour	Acceptable to consumers and no abnormal change	
Conductivity	2500	µS cm-1 at 20 ℃
Hydrogen ion concentration (pH)	≥6.5 and ≤9.5	pH units
Iron	200	µg/l
Manganese	50	µg/l
Odour	Acceptable to consumers and no abnormal change	
Oxidisability	5.0	mg/l O2
Sulphate	250	mg/l
Sodium	200	mg/l
Taste	Acceptable to consumers and no abnormal change	
Colony count at 22 ℃ and 37 ℃	No abnormal change	
Coliform bacteria	0	number/100 ml
Total organic carbon (TOC)	No abnormal changes	
Residual chlorine		mg/l
Turbidity	Acceptable to consumers and no abnormal change	

Table 4: Radioactivity of drinking water

Parameter	**Parametric value**	**Unit**
Tritium	100	Bq/l
Total indicative dose	0.10	mSv/year

2.2 Monitoring of drinking water

The ANNEX II of the JMD sets the parameters of monitoring and the frequency of sampling. The monitoring includes the check monitoring providing information on the organoleptic and microbiological quality of the water supplied for human consumption as well as information on 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 this Directive.

Table 5: Parameters for check monitoring

Physical-chemical and chemical
Aluminium
Ammonium
Colour
Conductivity
Clostridium perfringens (including spores)
Escherichia coli (*E. coli*)
Hydrogen ion concentration (pH)
Iron
Nitrite
Odour
Pseudomonas aeruginosa
Taste
Colony count at 22 ℃ and 37 ℃
Coliform bacteria
Turbidity
Residual chloride

Audit monitoring provides information about consistency of drinking water for all parameters presented in ANNEX I.

Additional monitoring in emergencies (extraordinary events) includes the following pathogenic bacteria: Salmonella; pathogenic staphylococci; bacteriofages; viruses; E.coli O:157; campylobacter;

And the following organisms: Parasitic organisms (e.g. Giardia lamblia, cryptosporidium); algae; others.

For the above mentioned bacteria and organisms the parametric value is zero. The following chemical parameters are also monitored in emergency cases (Table 6):

Table 6: Chemical parameters

Parameter	Parametric value	Unit
PCB's – PCT's acrylamide	0.50 / 0.10	μg/l
Argentum	10	μg/l
Phenolic compounds (except of pentachlorophenol)	0.50	μg/l
Dissolved or in emulsion Hydrocarbons – Mineral oils	10	μg/l
Surfactants	200	μg/l
Phosphorus (P_2O_5)	5	mg/l
Dry residue	1500	mg/l
Potassium	12	mg/l
Sulphide	undetectable	

Table 7: Frequency of sampling and testing drinking water regarding amount of water distributed in the supply area

Water Volume distributed or produced per day within a supply zone m^3/day	Check monitoring number of samples per year	Audit monitoring number of samples per year
≤100	1	
101-500	4	1
501-1000	6	1
1001-2000	9	1
2001-3000	12	1
3001-4000	15	1
4001-5000	18	2
5001-6000	21	2
6001-7000	24	2 + 1 for every 3300 m^3 / day
7001-8000	27	3
8001-9000	30	3
9001-10000	33	3
……	+ 3 for every 1000 m^3 / day	
19001-20000	63	4
……	+ 3 for every 1000 m^3 / day	+ 1 for every 10000 m^3 / day
29001-30000	93	5
……		
99001-100000	303	12
100001-200000	603	16
……	+ 3 for every 1000 m^3 / day	+ 1 for every 25000 m^3 / day
900001-1000000	3000	52

In ANNEX II the minimum frequency of sampling and analyses for water for human consumption from the water supply network, from a tanker or used in a food-production undertaking is given (Table 7).

ANNEX III includes the specifications for the analysis of parameters.

3. National Law 3199/2003

This Law is issued in accordance with the Water Framework Directive 2000/60/EC (WFD). The law includes the competent authorities; the implementation procedure of the River Basin Management Plans and the Programs of Measures; the water uses; and the sanctions. To fully harmonize the WFD to the Greek legislation several Presidential Decrees and other regulations are issued.

4. Determination of the monitoring stations: Official Gazette of the Greek Republic 2017B/9-9-2011

The regulation adopts the national monitoring network for monitoring surface and groundwater bodies (according to the article 2 of the Law 3199/2003). The competent authority is the Special Water Secretariat of the Ministry of Environment, Energy and Climate Change. The specific monitoring stations are determined in all surface, groundwater, transitional and coastal water bodies in the country.

5. Maximum Allowable Concentrations of pollutants in groundwater: Ministerial Decision 1811 (Official Gazette of the Greek Republic 3322/30-12-2011)

The Regulation defines the maximum allowable concentrations of pollutants in groundwater bodies. The quality standards of groundwater bodies are given in the regulation's ANNEX (Table 8). Table 9 summarizes the maximum allowable concentrations for natural parameters or parameters due to human factors.

Table 8: Quality standards of pollutants in groundwater

Pollutant	**Quality Standards**
Nitrates	50 mg/l
Active substances in pesticides	0.1 μg/l 0.5 μg/l (total)

Table 9: Parameters and maximum allowable concentrations

Parameter	Maximum Allowable Concentration
pH	6,5-9,5
Conductivity	2500 μS/cm
Arsenic (As)	10 μg/l
Cadmium (Cd)	5 μg/l
Lead (Pb)	25 μg/l
Mercury (Hg)	1 μg/l
Nickel (Ni)	20 μg/l
Chromium (Cr)	50 μg/l
Aluminum (Al)	200 μg/l
Ammonium	0,5 mg/l
Nitrites	0,5 mg/l
Chlorides (Cl-)	250 mg/l
Sulfates	250 mg/l
Total synthetic substances (trichloroethylene & tetrachlorethylene)	10 μg/l

6. Environmental Quality Standards in surface water: Joint Ministerial Decision 51354/2641/E103/2010 (Official Gazette of the Greek Republic 1909B/8-12-2010)

The JMD harmonizes the Directive 2008/105/EC of the European Council to the Greek legislation. It includes the list of Environmental Quality Standards for priority substance and pollutants in surface water (inland and other surface waters). The list of the priority substances, their annual average values and their maximum allowable concentrations are given in ANNEX I of the Directive and the JMD.

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Instrument for Pre-Accession Assistance