IDEXX Summary #:5BX

Topic: El Salvador approval of enzymatic substrates for detection of coliforms, *E coli* and HPC in drinking water

Source: Ministry of Public Health and Social Welfare, Obligatory Salvadoran Standard NSO13.07.01.04 Water, Drinking Water

Date: February 2, 2006

Highlights:

- IDEXX coliform and *E coli* products can be used for testing drinking and source water because of the acceptance of the use of enzymatic substrate methods for assessment of water quality. This includes: Colilert, Colilert-18 and Colisure
- As stated in Section 7, in addition to being a enzymatic substrate method, the method must also be approved or recognized by one of several country or organizational bodies including: Drinking water standards: **US EPA**, **WHO** Guidelines for Drinking Water Quality, 3rd Edition (2004), **Standard Methods for the Examination of Water and Wastewater**, 20th Edition or APHA-AWWA-WEF.

REPUBLIC OF EL SALVADOR

MINISTRY FOR PUBLIC HEALTH
AND SOCIAL WELFARE

OFFICE OF COMPREHENSIVE
ENVIRONMENTAL HEALTH SERVICES

OBLIGATORY SALVADORAN STANDARD
NSO 13.07.01.04 WATER. DRINKING WATER

PUBLISHED IN THE OFFICIAL GAZETTE
DATED 02 FEBRUARY 2006,
in Vol. No. 370, number 23

San Salvador. El Salvador C.A.

0. INTRODUCTION

Water for human use should not be a vehicle for the transmission of diseases. Parameters and maximum permissible limits must therefore be established to guarantee that it is sanitarily safe.

1. AIM

The aim of this standard is to lay down the physical, chemical and microbiological requirements that drinking water must meet in order to product public health.

2. SCOPE

This standard applies to the entire national territory and covers all public, municipal and private services, regardless of the system or distribution network used, with regard to the prevention and control of water contamination, irrespective of its physical state.

3. TECHNICAL DEFINITIONS

3.1. Drinking water: water suitable for human consumption and meeting the physical, chemical and microbiological parameters laid down in this standard.

3.2. Treated water: water whose characteristics have been modified by physical, chemical or biological processes or any combination thereof.

3.3. Alkalinity: the measure of the alkaline substances present in water, which may include hydroxides, carbonates, bicarbonates, etc.

3.4. Mesophilic aerobic bacteria: bacteria that live in the presence of free oxygen at temperatures between 15º C and 45º C.

3.5. Heterotrophic bacteria: bacteria that obtain carbon from organic compounds.

3.6. Colonies: discrete groups of microorganisms on a surface, as opposed to dispersed growth in a liquid culture medium.

3.7. *Escherichia coli*: aerobic or facultative anaerobic, Gram-negative, non-spore forming bacteria. They are indicative of fecal contamination.

3.8. Total coliform group: bacilli, facultative anaerobic, Gram-negative, non-spore forming bacteria. They are indicative of microbial contamination.

3.9. Thermotolerant or fecal coliform group: coliform bacteria that multiply at 44.5º C ± 0.2º C. The majority come from fecal contamination of warm-blooded animals and humans.

3.10. Maximum Permissible Limit (MPL): the maximum concentration of a parameter, above which water is not drinkable.

3.11. Most probable number (MPN): the estimated value of the average density of coliform bacteria in a water sample.

3.12. Pesticide: any substance designed to prevent, destroy, attract, repel or combat any pest, including unwanted plants or animal species, during production, storage, transport, distribution and elaboration of foodstuffs, agricultural products or animal feed, and those administered to animals to combat ectoparasites.

3.13. Parameter: a characteristic that is measured.

3.14. Pour plate: a method used to count heterotrophic bacteria in which a solid medium is melted, cooled to 45 ºC and poured into Petri dishes containing a defined quantity of a sample. The result is expressed as colony forming units (CFU)/ml.

3.15. Radioactivity: the emission of radioactive atomic energy, caused by the splitting of the nucleus in the atoms of some elements.

3.16. Distribution network: the means by which water for human consumption is brought to the population: plumbing, pipes, tank lorries and any other type of tank (except for those covered by NSO 13.07.02:98).

3.17. Pesticide residues: any substance present in water as a result of the use or handling of pesticides.

3.18. Turbidity: the expression of the optical property that causes light to be dispersed and absorbed on being transmitted in straight lines through a sample, due to the presence of suspended solids in the water.

3.19. Colony Forming Units (CFU): the number of colonies resulting from a cell or pairs, chains or groups of cells.

4. REQUIREMENTS

4.1 MICROBIOLOGICAL QUALITY REQUIREMENTS

Table 1

Maximum Permissible Limits for Microbiological Quality

PARAMETER	MAXIMUM PERMISSIBLE LIMIT		
	TECHNIQUES		
	MEMBRANE FILTRATION	MULTIPLE TUBES	POUR PLATE
Total coliform bacteria	0 CFU/100 ml	<1.1 MPN/100 ml	----
Thermotolerant or fecal coliform bacteria	0 CFU/100 ml	<1.1 MPN/100 ml	----
Escherichia coli	0 CFU/100 ml	<1.1 MPN/100 ml	----
Heterotrophic and aerobic mesophilic bacteria count	100 CFU/ml	----	100 CFU ml
Pathogenic organisms	ABSENCE		

When a sample shows total coliform organisms not within the Standard, in accordance with Table 1, corrective measures should be taken and daily samples should be immediately taken from the same sampling point and should continue to be taken until at least two consecutive samples are obtained that show that the water meets the quality requirements stipulated in Table 1.

A number higher than 100 microorganisms per ml in the total heterotrophic bacteria count indicates that corrective measures should be taken and the need for a complete sanitary inspection of the water supply system to determine the source of contamination.

In each technique, traditional substrates or enzymatic substrates may be used, duly approved by an international body that has been duly recognised in relation to drinking water quality.

4.2 PHYSICAL-CHEMICAL QUALITY REQUIREMENTS

Table 2

Permissible limits for physical and organoleptic characteristics

PARAMETER	UNITS	MAXIMUM PERMISSIBLE LIMIT
True color	Pt-Co	15
Smell	-	Not rejectable
pH	-	8.5 [1]
Taste	-	Not rejectable
Total dissolved solids	mg/l	1000 [2]
Turbidity	NTU	5 [3]
Temperature	º C	Not rejectable

[1)] Minimum Permissible Limit: 6.0 units.
[2)] Due to the characteristic conditions of the country.
[3)] For treated water at the outflow from surface water treatment plants, the permissible limit is 1.

Table 3

Chemical values

PARAMETER	MAXIMUM PERMISSIBLE LIMIT mg/l
Aluminium	0.2
Antimony	0.006
Copper	1.3
Total Hardness as ($CaCo_3$)	500
Fluorides	1.00
Total Iron	0.30 [1]
Manganese	0.1 [1]
Silver	0.07
Sodium	200.00
Sulphates	400.00
Zinc	5.00

[1] When the iron and manganese values exceed the maximum permissible limit established in this standard but do not exceed the maximum accepted sanitary values of 2.0 mg/l for iron and 0.5 mg/l for manganese, the use of chelants shall be permitted to avoid the aesthetic problems with color, turbidity and taste that cause.

Table 4

Values for inorganic chemicals posing major health risks

PARAMETER	MAXIMUM PERMISSIBLE LIMIT [1] mg/l
Arsenic	0.01
Barium	0.70
Boron	0.30
Cadmium	0.003
Cyanide	0.05
Chromium (Cr_{6+})	0.05
Mercury	0.001
Nickel	0.02
Nitrate (NO_3) [2]	45.00
Nitrate (measured as Nitrogen)	1.00
Molybdenum	0.07
Lead	0.01
Selenium	0.01

[1] Subject to greater restrictions

[2] As nitrates and nitrites may be present at the same time in drinking water, the sum of the ratio of each to its respective maximum permissible limit should not exceed one unit, i.e.:

$$\frac{NO_3}{MPL.NO_3} + \frac{NO_2}{MPL.NO_2} \leq 1$$

Table 5

Values for organic chemicals posing major health risks

PARAMETER	*MAXIMUM PERMISSIBLE LIMIT (µg/liter)
Oils and fats	Absent
Benzene	10
Carbon tetrachloride	4
2-ethylhexyl phthalate	8
1,2-dichlorobenzene	1000
1,4-dichlorobenzene	300
1,2-dichloroethane	4
1,1-dichloroethene	30
1,2-dichloroethene	50
Dichloromethane	20
1,4 Dioxane	50
Edetic acid (EDTA)	600
Ethylbenzene	300
Hexachlorobutadiene	0.6
Nitrilotriacetic acid (NTA)	200
Pentachlorophenol	9
Styrene	20
Tetrachloroethene	40
Toluene	700
Trichloroethene	70
Xylenes	500

Table 6

Pesticide residue values

PARAMETER	MAXIMUM PERMISSIBLE LIMIT (µg/liter)
Alachlor	20
Aldicarb	10
Aldrin/dieldrin	0.03
Atrazine	2
Carbofuran	7
Chlordane	0.2
Chlortoluron	30
Cyanazine	0.6
2,4-D (2,4-dichlorophenoxyacetic acid)	30
2,4-DB (2,4-dichlorophenoxy)butyric acid	90
1,2-Dibromo-3-chloropropane	1
1,2-Dibromomethane	15
1,2-Dichloropropane (1,2-DCP)	40
1,3-Dichloropropene	20
Dichloropropene	100
Dimethoate	6
Endrin	0.6
Fenoprop	9
Hexachlorobenzene	1
Isoproturon	9
Lindane	0.3
MCPA (4-chloro-2-methylphenoxy acetic acid)	2
Mecoprop	10
Methoxychlor	20
Metolachlor	10
Molinate	6
Pendimethalin	20
Pentachlorophenol	9
Simazine	2
2,4,5-T acetic acid (2,4,5-Trichlorophenoxyacetic acid)	9
Terbuthylazine	7
Trifluralin	20

Table 7

Values for disinfectants and disinfection byproducts

PARAMETER	MAXIMUM PERMISSIBLE LIMIT µg/l
Bromate	10
Bromodichloromethane	60
Bromoform	100
Chloral hydrate (trichloroacetaldehyde)	10
Chlorate	700
Chlorite	700
Chloroform	200
Cyanogen chloride	70
Dibromoacetonitrile	70
Dibromochloromethane	100
Dichloroacetic acid	40
Dichloroacetonitrile	20
Formaldehyde	900
Monochloroacetate	20
Trichloroacetic	200
2,4,6-trichlorophenol	200
Total trihalomethanes	100 The sum of the ratio of the concentrations to their maximum permitted values should not exceed Σ C/MPL < = 1

Table 8

Residual chlorine values

PARAMETER	MAXIMUM PERMISSIBLE LIMIT
Free residual chlorine	1.1 mg/l [1]

[1] Minimum: 0.3 mg/l in conditions in which there is no outbreak of disease due to the consumption of contaminated water.

The recommended safe and desirable limit of free residual chlorine in the first house closest to the point in which the water supply is injected with chlorine is 1.1 mg/l and in the points farthest away from the distribution system is 0.3 mg/l, after 30 minutes of contact, for the primary purpose of reducing enteric pathogens by 99.99%.

Where there exists a threat or prevalence of outbreaks of water-borne diseases, residual chlorine should be maintained at a maximum permissible limit of 1.5 mg/l and a minimum permissible limit of 0.6 mg/l in all parts of the distribution system, regardless of the taste and smell of water for consumption. Similar measures should be taken in cases of interruptions or decreases in the efficiency of treatments to render water drinkable.

The recommended values and the maximum admissible value in these specifications are subject to change when a simple, but accurate and exact, analytical method can be used to determine the presence of substances known as "Total Trihalomethanes" (TTHM) in water for consumption, provided the limit of 100 µg/liter is not exceeded.

Table 9

Limits for radioactive parameters for drinking water (Radionuclides)

PARAMETER	MAXIMUM PERMISSIBLE LIMIT
Gross Alpha	15 (pCi/l) [1] equivalent to annual dose
Beta and photon particle activity	4 (mrem[2]/year) equivalent to annual dose
Radium 226 and 228	5 (pCi/l) [1] equivalent to annual dose
Uranium	30 µg/l

[1] (pCi/l) = picocuries/l
[2] mrem = millirem

Table 10

Frequency of sampling to certify the bacterial quality of drinking water

The following table shows the number of samples required according to the size of the population using the service:

POPULATION SIZE (Inhabitants)	MINIMUM NUMBER OF SAMPLES/MONTH
< 5,000	1
5,000 - 100,000	1 Sample / 5,000 users
> 100,000	1 Sample / 10,000 users plus 10 additional samples

Table 11

Sampling interval for bacteriological analysis

POPULATION SIZE (Inhabitants)	MAXIMUM PERIOD BETWEEN CONSECUTIVE SAMPLES
< 25,000	1 month
25,000 - 100,000	Twice a month
100,001 – 300,000	Weekly
> 300,000	Every 3 days

The following are the bacterial quality requirements for water for human consumption:

In a period of one year, 80 percent of the results of the analyses for compounds affecting the aesthetic and organoleptic quality of the water for human consumption should not exceed the established concentrations or values.

The fecal coliform content per 100 milliliters in all samples taken at the exit point from the treatment plant, and the water supply for human consumption, should comply with the following:

(i) 95% of the samples should contain no fecal coliform, where fifty (50) or more water samples are taken in one year; or

(ii) 90% of the samples should contain no fecal coliform, where fewer than fifty (50) samples are taken in one year.

5. FREQUENCY OF PHYSICO-CHEMICAL ANALYSES

Frequent sampling and analyses are necessary in the case of microbiological components, whereas less frequent sampling and analyses are required with health-related organic and inorganic compounds present in the water. A complete examination should be performed when a new water service is implemented and immediately after any major modification to a treatment processes. Subsequently, periodic analyses of samples are required, the frequency of which will depend on local conditions. Furthermore, local information on changes in the catchment area (particularly regarding agricultural and industrial activities) is important. This information may be used to forecast possible contamination problems and, therefore, to determine the need for more frequent inspection for the presence of specific compounds.

It is impossible to generalize in terms of the frequency with which drinking water should be examined to evaluate its organoleptic properties. Some components, for example, sodium or chlorine, are found in spring water, whilst others are added during the treatment processes. Other properties and components, such as taste, iron, zinc, etc., may vary considerably due to other factors or depending on the type of distribution system and the prevalence of corrosion problems. Clearly, in case of some components and parameters, the examination should be fairly frequent, whilst in case of others, where concentrations vary very little, less frequent examination will be sufficient.

Table 12
Parameters to be determined per frequency type for the physico-chemical analysis

NO.	PARAMETER	TYPE OF ANALYSIS		
		MINIMAL	NORMAL	COMPLETE
MICROBIOLOGICAL				
1	Total Coliform Bacteria	√	√	√
2	Fecal Coliform Bacteria	√	√	√
3	Escherichia Coli	√	√	√
4	Heterotrophic and mesophilic aerobic bacteria			√
ORGANOLEPTIC				
1	True color		√	√
2	Smell[1]		√	√
PHYSICAL-CHEMICAL				
1	Temperature		√	√
2	Turbidity	√	√	√
3	pH		√	√
4	Total dissolved solids		√	√
5	Sulphates			√
6	Aluminium		√	√
7	Residual Chlorine	√	√	√
8	Total Hardness			√
9	Zinc			√
UNDESIRABLE SUBSTANCES				
1	Nitrates			√

2	Nitrites			√
3	Boron			√
4	Iron		√	√
5	Manganese		√	√
6	Fluorine			√
TOXIC SUBSTANCES				
1	Barium		√	√
2	Arsenic		√	√
3	Cadmium		√	√
4	Cyanides		√	√
5	Chromium		√	√
6	Mercury		√	√
7	Nickel		√	√
8	Lead		√	√
9	Antimony		√	√
10	Selenium		√	√
11	Organochlorine pesticides			√
12	Organophosphate pesticides			√
13	Carbamate pesticides			√
14	Disinfection by-products (THM)			√

[1] Sensory

For the parameters considered in this standard and not included in the table, the Ministry for Health will establish the need for analysis and the sampling frequently in special situations.

Table 13
Number of samples and sampling frequency for the physico-chemical analysis

POPULATION SIZE (Inhabitants)	MINIMAL	NORMAL	COMPLETE
< 25,000	1 sample per month	1 sample every 2 months	1 annual per year
25,000 - 100,000	1 sample/5,000 Total samples divided in two fortnightly samplings	1 sample every 2 months/50,000 users	1 sample per week/50,000 users
100,001 – 300,000	1 sample/10,000 users plus 5 additional samples. (Total samples divided in four monthly samplings)	1 sample every month/50,000 users	1 sample every 3 months/50,000 users
> 300,000	1 sample/10,000 users plus 10 additional samples. (Total samples divided in 10 samplings per month)	1 sample/50,000 users (Total samples divided in two fortnightly samplings)	1 sample every 2 months/100,000 users

If, after one year, the concentration values of the parameters of the samples taken for the chemical analysis in any water supply system for human consumption consistently show levels less than the maximum permitted limits established by this standard and there is no known or foreseeable factor that might reduce the quality of the water, the public health authority may allow the tests on the described parameters not to be performed on the system, except for chlorine and other disinfectants approved by the Ministry for Public Health and Social Welfare.

The Ministry for Public Health and Social Welfare shall require that a full analysis of the parameters be conducted every three years in order to verify that they are always below the maximum permissible limits.

6. CORRESPONDENCE WITH OTHER STANDARDS

World Health Organization Guidelines for Drinking Water Quality. Third Edition

7. STANDARDS AND REFERENCE DOCUMENTS

*Informe sobre la Consultoría en Normas de Calidad de Agua y Vertidos. (Report on the Consultancy on Water Quality and Dumping Standards)
Projects: EL S/85/006-PNUD, EL S/CWS-050/PD-OPS/OMS (1987)
"Suministros de Agua Potable y Saneamiento a Poblaciones Afectadas" (Supply and treatment of drinking water in affected towns).
Miguel Angel Arcienaga.

*APHA-AWWA-WPCF. Standard methods for the examination of water and waste water. 15th ed. American Public Health Association.

*Drinking water standard, CAPRE.

*Drinking water standard, CANADA.

*Drinking water standard, EEC.

*Drinking water specifications (1975) CDU 663.6 Mandatory Standards, June 1989, COGUANOR N60 29 001. P. 10, June 1984.

*Drinking water standard, EPA.

*Water and Wastewater Technology. Ed. John Wiley and Sons NY.
M.J. Hammer.

*Drinking water specifications (1975) CDU 663.6 Central American Standard. October 1985, ICAITI 29 001

*Inland Waters Directorate. Analytical Methods Manual. Water Quality Branch. Environment. Ottawa (Canada). 1979.

*Drinking water standards. Mexico.

*WHO Guidelines for Drinking Water Quality. Third Edition. 2004.

*Propuesta de Normas de Calidad de Agua para distintos usos (Proposed water quality standards for different uses). Drafts: PAHO/WHO.

*US Environmental Protection Agency Office of Drinking Water. Fed. Register. Vol. 54 N.97 PP 22062-65.1989

- Columbian Technical Standard. Water. Drinking Water 813. Second Revision 1994-10-19
- Codex Alimentarios, Requisitos generales (General requirements), second edition, revised in 1999.

* Standard Methods for the Examination of Water and Wastewater. 20th Edition.

*Normas Provinciales de Calidad y Control de Agua para Bebida (Provincial standards for drinking water quality and control), Provincial Office of Water and Water Treatment (Di.P.A.S.) Resolution 608/93, Provincial Office of Water and Water Treatment of Cordoba. Spain.

8. OVERSIGHT AND VERIFICATION

The oversight and verification of this standard correspond to the Ministry for Public Health and Social Welfare. Observance and compliance with the standard correspond to all public and private companies and institutions and, in general, any party in any way involved in the supply and sale of water to the Salvadoran population.

ANNEX A (REGULATION)
Table 14
PHYSICO-CHEMICAL ANALYSIS

PARAMETER	ANALYTICAL METHOD
Aluminium	Atomic absorption Inductively coupled plasma Colorimetric[1]
Antimony	Atomic absorption Inductively coupled plasma
Arsenic	Atomic absorption Inductively coupled plasma Colorimetric[1]
Barium	Atomic absorption Inductively coupled plasma Colorimetric[1]
Boron	Inductively coupled plasma Colorimetric[1]
Cadmium	Atomic absorption Inductively coupled plasma Colorimetric[1]
Residual chlorine	Volumetric Colorimetric[1]
Copper	Atomic absorption Inductively coupled plasma Colorimetric[1]
Cyanides	Volumetric Colorimetric[1] Ion-Selective Electrode
Chromium	Atomic absorption Inductively coupled plasma Ion chromatography Colorimetric[1]
Total Hardness	Volumetric Atomic absorption (by calculation)
Fluoride	Ion-Selective Electrode Atomic absorption Ion chromatography Colorimetric[1]
Total Iron	Atomic absorption Inductively coupled plasma Colorimetric[1]

Manganese	Atomic absorption Inductively coupled plasma Colorimetric[1]
Mercury	Atomic absorption Colorimetric[1]
Molybdenum	Atomic absorption Inductively coupled plasma Colorimetric[1]
Nitrates	Colorimetric[1] Ion-Selective Electrode Ion chromatography
Nitrites	Colorimetric[1] Ion chromatography
Nickel	Atomic absorption Inductively coupled plasma Colorimetric[1]
Silver	Atomic absorption Inductively coupled plasma Colorimetric[1]
Lead	Atomic absorption Inductively coupled plasma Colorimetric[1]
Selenium	Atomic absorption Colorimetric[1]
Sodium	Atomic absorption Atomic emission Ion-Selective Electrode Inductively coupled plasma
Sulphates	Ion chromatography Gravimetric Nephelometric Colorimetric[1]
Total Dissolved Solids	Gravimetric Conductimetric
Turbidity	Nephelometric
pH	Potentiometric Colorimetric[1]
Zinc	Atomic absorption Inductively coupled plasma Colorimetric[1]

[1] The colorimetric analytical method refers to spectrophotometric methods and/or visual comparison.

ANNEX B (REGULATION)
Table 15
BACTERIOLOGICAL ANALYSIS

PARAMETER	ANALYTICAL METHOD
Escherichia coli	Multiple tube Membrane filtration P/A[1]
Mesophilic aerobic and heterotrophic bacteria	Membrane filtration Pour plate
Fecal coliforms	Multiple tube Membrane filtration P/A[1]
Total coliforms	Multiple tube Membrane filtration P/A[1]

[1] P/A: presence or absence method

ANNEX C (REGULATION)
Table 16
ORGANIC COMPONENTS AND DISINFECTION BYPRODUCTS

PARAMETER	ANALYTICAL METHOD
Oils and fats	Gravimetry Infrared Spectroscopy
Nitrilotriacetic acid (NTA)	Chromatographic
Organochlorine pesticides	Chromatographic
Organophosphate pesticides	Chromatographic
Carbamate pesticides	Chromatographic
Disinfectant byproducts	Chromatographic

ANNEX D (REGULATION)
Table 17
CONTAINERS FOR SAMPLING AND STORAGE OF SAMPLES

PARAMETER	CONTAINER	PRESERVATIVE	STORAGE TIME Recommended/ Obligatory	MINIMUM SAMPLE SIZE (ml)
Nitrilotriacetic acid (NTA)	Polyethylene-Glass	5 ml conc. HCl. Sample treated with 0.5 ml formaldehyde sol. at 37%, filtered using 0.45 micra membrane filter.	24 Hours	1,000
Oils and fats	Glass-Calibrated wide neck	Cool to 4 ºC with 5 ml (1:1) H_2SO_4/l at pH < 2	24 Hours	1,000
Aluminium	Polyethylene (A) – Glass (A)	2 ml conc. HNO_3/l sample, pH < 2	6 months	1,000
Antimony	Polyethylene	2 ml conc. HNO_3/l sample, pH < 2	6 months	1,000
Arsenic	Polyethylene (A) – Glass (A)	Cool to 4 ºC	6 months	1,000
Barium	Polyethylene (A) – Glass (A)	2 ml conc. HNO_3/l sample, pH < 2	6 months	1,000
Boron	Polyethylene	Cool to 4 ºC	6 months	100
Cadmium	Polyethylene (A) – Glass (A)	2 ml conc. HNO_3/l sample, pH < 2	6 months	1000
Cyanides	Polyethylene – Glass (A)	1 ml NaOH at pH < 12, refrigerate in darkness	24 Hours if there is sulphide / 14 days	500
Residual Chlorine	Polyethylene-Glass	Analyze immediately	0.5 hours / immediately	500
Copper	Polyethylene (A)	Dissolved copper, filter, 2 ml conc. HNO_3/l sample, pH < 2	6 months	500
True color	Polyethylene-Glass	Cool to 4 ºC	48 Hours	500
Chromium VI	Polyethylene (A) – Glass (A)	2 ml conc. HNO_3/l sample, pH < 2	6 months	1,000
Hardness	Polyethylene-Glass	2 ml conc. HNO_3/l sample, pH < 2	6 months	100
Fluoride	Polyethylene	None	28 days	300
Total Iron	Polyethylene-Glass	2 ml conc. HNO_3/l sample, pH < 2	6 months	1,000
Manganese	Polyethylene (A) – Glass (A)	2 ml conc. HNO_3/l sample, pH < 2	6 months	1,000
Mercury	Polyethylene (A) – Glass (A)	HNO_3 at pH < 2, cool to 4 ºC	28 days	1,000
Molybdenum	Polyethylene	2 ml conc. HNO_3/l sample, pH < 2, cool to 4 ºC	7 days	1,000
Nickel	Polyethylene (A) – Glass (A)	2 ml conc. HNO_3/l sample, pH < 2	6 months	1,000
Nitrate	Polyethylene-Glass	Analyze immediately or cool to 4 ºC	48 hours (28 days for chlorinated samples	1,000
Nitrite	Polyethylene-Glass	Analyze immediately or cool to 4 ºC	None/28 days	100
Mercury	Polyethylene (A) – Glass (A)	HNO_3 at pH < 2, cool to 4 ºC	28 days	1,000
Molybdenum	Polyethylene	2 ml conc. HNO_3/l sample, pH < 2, cool to 4 ºC	7 days	1,000
Nickel	Polyethylene (A) – Glass (A)	2 ml conc. HNO_3/l sample, pH < 2	6 months	1,000
Nitrate	Polyethylene-Glass	Analyze immediately or cool to 4 ºC	48 hours (28 days for chlorinated samples	1,000
Nitrite	Polyethylene-Glass	Analyze immediately or cool to 4 ºC	None/28 days	100
Organochlorine pesticides	Glass	Cool to 4 ºC	Ideally extract immediately	2,500
Organophosphate pesticides	Glass	Cool to 4 ºC	48 hours	1,000
Carbamate pesticides	Glass	Cool to 4 ºC	48 hours	1,000
Silver	Polyethylene (A) – Glass (A)	2 ml conc. HNO_3/l sample, pH < 2	6 months	1,000
Lead	Polyethylene (A) –	2 ml conc. HNO_3/l sample, pH < 2	6 months	1,000

	Glass (A)			
Selenium	Polyethylene (A) – Glass (A)	Cool to 4 ºC	6 months	1,000
Sodium	Polyethylene	2 ml conc. HNO_3/l sample, pH < 2	6 months	500
Sulphates	Polyethylene-Glass	Cool to 4 ºC	7 days	250
Turbidity	Polyethylene	Cool to 4 ºC	7 days	500
Temperature	-	Analyze immediately	To be determined at sampling site	500
Total Dissolved Solids	Polyethylene, Glass	Cool to 4 ºC	7 days	1,000
Organic substances	Glass	Cool to 4 ºC	Analyze immediately	1,000
Disinfectants and disinfectant byproducts	Glass	Cool to 4 ºC	Analyze immediately	1,000
Residual chlorine	Polyethylene, Glass	Analyze immediately	0.5 hours	500
Radionuclides	Glass	-	-	1,000
Microbiological tests	Polyethylene, Glass	Cool to 4 ºC	Not exceeding 6 hours	200
Manganese	Polyethylene (A) – Glass (A)	2 ml conc. HNO_3/l sample, pH < 2	6 months	1,000

(A) = washed with HNO_3 1:1

-END OF STANDARD-