COMMISSION OF THE EUROPEAN COMMUNITIES

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Proposal for a

COUNCIL DIRECTIVE

relating to the quality of water
for human consumption

(submitted to the Council by the Commission)

I EXPLANATORY MEMORANDUM

The setting of standards for the quality of water intended for human consumption is an integral part of the aims, principles and activities laid down in the Programme of Action on the Environment adopted by the Council of Ministers on 22 November 1973.*

While the setting of standards for water intended for human consumption is clearly in keeping with the programme aimed at reducing pollution and nuisances, it should also include an objective evaluation of the threat to human health presented by pollution. **

Such a task is difficult and contains many unknown quantities. The Environmental Action Programme, taking account of the uncertainties in the cause-effect relationship in certain parameters, thus states that, in the case of pollutants for which adequate information is available at international level, standards should be fixed before 31 December 1974 (see Action Programme Part II Title I, Chapter 2B).

*) Official Journal C 112 of 20 December 1973

**) Health, in this context, is considered in the sense of the WHO definition, "health is not merely an absence of illness or infirmity, but also a complete state of physical, mental and social well-being".

This directive deals with the establishment of these standards, i.e. the choice of a series of parameters, the numerical values given to them and also the measures relating to the monitoring and supervision of water intended for human consumption.

The average amount of water used per inhabitant per diem differs from one Community country to another; depending on the type of population concerned, it varies from less than 150 litres to more than 500 litres. Industry alone uses very considerable quantities each day. Because of the increase in water requirements, it is necessary to draw on all potential sources of water which can be processed for human use; in particular, surface waters are increasingly used for this purpose, and since they often contain non-degradable polluting substances, these waters must be subjected to increasingly elaborate purification processes. The quality of water supplied for human consumption must therefore be supervised, and levels of toxicity and noxiousness fixed with reference to the most up-to-date scientific knowledge in this field. A draft directive* on the quality of surface water intended for the production of drinking water, presented by the Commission to the Council, was approved by the Council at its meeting on 7 November 1974.

In analysing the legislation in force in the Member States of the European Communities, one finds a certain number of provisions applicable to drinking water which, although in the same category, are neither comprehensive nor at the same stage of planning and development. The following references summarize the situation in each Member State.

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* Official Journal No. C 44 of 19 April 1974

Belgium:

24 April 1965 - Royal Decree on drinking water.

21 May 1973 - Draft decision of the Commission of Ministers of the Benelux Economic Union regarding the harmonization of legislation on the supply of water to industrial plants or to cottage industries in which foodstuffs are produced, processed, packaged or treated.

Denmark:

October 1973 - Danish standards for drinking water - draft on testing of water. Simplified bacteriological examination.

France:

May 1973 - Definition of the quality of drinking water supplied to the public - draft in anticipation of the Community decision - revised edition of the texts of the decrees, orders and circular letters of the years 1961 and 1962 (Ministry of Public Health and Population).

Ireland:

There are no mandatory standards for drinking water. The WHO European standards for drinking water are used as guidelines. Each Health Authority is responsible for the standards of the water supplies under its control. Legislation on the fluoridation of water (Health Fluoridation of Water Supplies Act 1960) is applicable to water supplies.

Italy:

Standards dealing with the quality of drinking water were approved by the Council for Health on 13 December 1972. Provisional national legislation is based on these standards pending the publication of European standards.

Luxembourg:

13 November 1970 - Grand-ducal Regulation on water intended directly or indirectly for human consumption.

Netherlands:

1960 - Decree on drinking water.

1974 - The 'Health Council' defined the criteria to be met by surface waters intended for the production of drinking water.

Federal Republic of Germany:

1961: Law relating to measures aimed at preventing communicable diseases in man (Federal law on epidemics) of 18 July 1961 (BGBl I, No. 53, p. 1012).

1975: Regulation concerning drinking water and industrial water used in the food processing industry (regulation on drinking water) of 31 January 1975 (BGBl I, p. 453).

1974: Law relating to the reorganization and coordination of legislation on standards for food products, tobacco products, cosmetics and other consumer goods (law on the overall reform of standards for food products) of 15 August 1974 (BGBl Part I No. 95, p. 1945).

1959: Regulation concerning the addition of extraneous substances in the treatment of drinking water (regulation concerning the treatment of drinking water) of 19 December 1959 (as amended by the regulation concerning the treatment of drinking water of 27 June 1960 (BGBl part I, No. 53, p. 479)).

United Kingdom:

Water Act 1973, Chapter 37.

1969, 4th edition: The Bacteriological Examination of Water Supplies (Department of Health and Social Security, Welsh Office, Ministry of Housing and Local Government).

A study of the complete texts of these documents shows that drinking water standards, although they are similar, have not the same degree of precision or clarity of definition in the Member States of the European

Community. Moreover, some provisions are based simply on the European standards of the World Health Organization, and others on a more or less comprehensive system of national legislation.

If the parameters selected are classified under six headings - organoleptic factors, physical and chemical factors, biological factors, undesirable and toxic factors, bacteriological and virological factors, and radiological factors, it can be seen that the organoleptic factors are seldom taken into account, and that, as regards the intrinsic nature of the water, i.e. its physical and chemical properties, considerable differences exist between one country and another.

They are, however, almost unanimous as regards toxic substances, although, in general, the various regulations do not take account of the results of recent research into the long-term health risks arising from the persistence of certain substances in water.

Moreover all Member States are concerned to protect the consumer at all costs against microbial contamination. All the regulations place particular emphasis on bacteriological properties; the virological aspects contained in the World Health Organization standards of 1971 are not systematically taken into account.

In the case of radioactivity, the Member States generally refer to the measures recommended by the agencies specializing in this field, especially to the basic standards drawn up in connection with the Euratom Treaty.

It should be noted that several States are taking steps to limit residual additives persisting after treatment of the water.

The discrepancies noted in the national legislations of Member States on the quality of water intended for human consumption are an obstacle to trade within the Community and thus have a direct bearing on the functioning of the Common Market. It is therefore essen-

tial, in the light of the EEC Treaty, that the different legislations be harmonized. Such harmonization will also make it possible to complete the projects planned in the European Community's Action Programme on water intended for human consumption.

While it is certain that the Standards of the World Health Organization can provide an essential foundation for any national legislation, it must be said that these provisions do not meet present-day requirements, particularly as a new era has begun in the definition of standards.

Since the WHO standards were fixed, and in spite of recent revision, the significance to health tightly attached to the presence of metallic ions in drinking water has increased considerably and is now much more important than that envisaged when the standards were drafted.

The same remark could be made with reference to other groups of substances, in particular organic and organo-metallic micro-pollutants.

Furthermore, another very important factor is that the properties of the water available are often altered by the consumer with a view to protecting his domestic supply system. This problem, which was not envisaged by the WHO, has been studied in detail by the competent departments of the Commission.

Leaving aside the general use of bacteriological standards, which provide a better safeguard for the consumer in the immediate future, each Member State has selected what appeared to be the best parameters having regard to local conditions. So long as the countries remained autonomous as regards water supplies because their own resources were adequate, standardization often only meant finding the solution to a domestic problem. Today the situation is changed. Because of the increase in demand, associated with population growth and new habits and

requirements, former sources are insufficient; surface water must be used. However, such water has many uses and the rivers and streams must henceforth cope simultaneously with widely differing requirements including those of navigation, the disposal of industrial and urban refuse, and that of water supplies.

Where international rivers are concerned, it evidently becomes necessary to compare the measures needed and to coordinate facilities for appraising the situation. This explains the continuous efforts made over the past 20 years to maintain or restore a raw water quality consistent with the production of drinking water. A standardized system of monitoring for each basin was therefore devised and a return to the previous position is extremely unlikely.

Considerable reserves of ground water are now also being drawn on, supplied on a commercial basis and exported to countries of the European Community and also to non-member countries. This is particularly true of table waters. In recent years, these exchanges have raised questions of a technical, legal and medical nature.

Another important aspect very much in the limelight is the use of softening systems to modify the composition of water supplied to the consumer. The remarkable growth in these systems, due to the pressure of changes made in the methods of satisfying normal demand, is taking place, because of the inadequacy of existing regulations, in a partial legal vacuum. In view of the equipment and products being used, this question is at present as important, on an international scale, as that of the treatment of ground water in containers made of material of varying stability.

It is therefore not merely the quality of the source water which is at issue, but that of the finished product on which the consumer is directly dependent. This situation requires that existing national regulations, which often refer to the non-mandatory standards of the World Health Organization, should be harmonized and supplemented if necessary by a directive drawn up by the European Communities.

In relation to the international standardization of the quality of water supplies, the World Health Organization and the Commission of the European Communities have powers to define standards, the former only in the form of non-binding recommendations, the latter in the form of mandatory directives. Other international authorities are concerned with secondary problems relating to the quality of raw water intended for the production of drinking water, and with prohibitions or limited tolerances referring to the discharge of certain substances resulting from industrial activities or urban sewage.

To sum up, the enactment of this directive is in keeping with general rethinking on the subject of water quality and is intended to reconcile the conflicting needs of productivity on the one hand and public health on the other; these needs are linked with the necessity to use surface waters which must serve several purposes simultaneously (in particular navigation and the drainage of effluent or other water).

II. TECHNICAL ASPECTS

This draft directive sent to the Council deals with the standards applicable to the quality of water intended for human consumption. It also covers drinking water as such and water used in preparing food and in the food manufacturing industry, with the exception of natural mineral waters and medicinal waters, recognized as such, and also of aerated waters.

Water intended for human consumption must possess a certain number of properties, shown in the appended tables.

The parameters selected form a coherent whole on the basis of which the properties of water intended for human consumption can be logically defined. Toxic substances and noxious germs are given priority, as shown in the Commission's environmental programme, but they must be integrated with another group of parameters which, while not having the same priority, often condition the behavior and effect of toxic substances and noxious germs. For that reason, in order to view the problem objectively they must be taken into consideration. Five types of parameter have therefore been shown in the tables appended to the draft directive.

The choice of parameters was based on several criteria. They relate to:

- essential health requirements; in this connection Maximum Admissible Concentrations (MAC)* were fixed for all pollutants and Minimum Required Concentrations (MRC)** were laid down for calcium, magnesium, bicarbonates, chlorides and sulphates.
- the need to consider special local situations (climate, hydrogeology), and the concern of the responsible authorities to be able to take appropriate action in exceptional circumstances (natural catastrophe, floods). To this end it is possible to incorporate Exceptional Maximum Admissible Concentrations (EMAC)***

- the wish to improve the quality of water intended for human consumption. The Guide Levels (GL)**** chosen represent target quality objectives.

It is necessary to define and agree on terminolgy to be used within the Community in order to eliminate the ambiguities of terminologies at present in use both at national and international levels.

+) (MAC): the concentration below which a substance in water cannot, in the course of continuous ingestion, cause or directly or indirectly result in an identifiable effect harmful to health in a statistically representative sample of the population involved.

++) (MRC): the minimum concentration of a substance, the presence of which is essential for preventing the occurrence of identifiable harmful effects in a statistically representative sample of the population involved, either directly or indirectly, as a result of repeated ingestion.

+++) (EMAC): the exceptional maximum admissible concentration which may be authorized locally by the relevant authorities, either temporarily in view of particular meteorological conditions, or permanently in view of geographical or geological conditions.

++++) (GL): the concentration of a given substance in water which it is advisable not to exceed.

The considerations underlying the choice of the different parameters are based on present scientific knowledge of the effects produced by water pollutants or by substances contained in water on the population in general or on specific population groups (children, aged persons, the sick ...).

This scientific knowledge relates both to the immediate effects and also to the long-term consequences. Since there are still considerable gaps in our knowledge in this area it is necessary to be very cautious in deciding what levels to select.

The updating of technical and scientific knowledge will necessitate a five-yearly revision of these standards. Moreover, a request for a partial revision may be made, either my a Member State or in answer to a proposal from the Commission, particularly with reference to Exceptional Maximum Admissible Concentrations; these must be of a temporary nature.

With reference to the monitoring of these standards, representative sampling and a recognised system of analysis should ensure that meaningful and comparable results are obtained.

Spot sampling, usually only single samples, on the basis of which multiple tests are carried out, should be abandoned in favour of multiple sampling on which only a few tests, and not all, are based.

The size of the population involved and the capacity of the source of supply should also be considered.

Moreover, the consumer, in order to ensure his own amenity and to protect his domestic distribution system, sometimes modifies his water supply. Since this modification has an effect on both health and the safety of installations, it is essential that the sampling after rinsing which is normally practised, should be preceded by an initial sampling of water which has stagnated in the pipework.

There is, therefore, an order of priority among the parameters determining the frequency of sampling and analyses. This order of priority is taken into account in the system of standard analyses already in use in certain Community countries. Three types of analysis, A, B, C of increasing complexity, are selected: (see Annex II)

- Analysis A constant monitoring of distribution networks supplied from either

  - underground, stable water with the usual protection perimeters (analysis A1)

- surface or mixed water (analysis A2) subdivided according to the size of the supply.

- Analysis B regular systematic monitoring, to supplement the monitoring by analysis A1 and a2 whatever the origin of the water.

- Analysis C occasional tests in exceptional or accidental circumstances, complementary to analyses A and B.

The frequency of these standard analyses is determined by two essential factors:

- for analyses A and B, the capacity of the installation and the size of the population served,

- for analysis C, the source vulnerability and the hazzards threatening it, regardless of the size of the population served and the capacity of the installation.

With reference to the analytical techniques themselves, a number of sampling methods have been suggested which take account both of the most recent technical advances and of conditions found in some laboratories which are not yet adequately equipped.

PROPOSAL FOR A COUNCIL DIRECTIVE ON THE REQUIRED QUALITY OF DRINKING WATER IN THE MEMBER STATES

The Council of the European Communities,

HAVING REGARD to the Treaty establishing the European Communities, and in particular Article 100 thereof,

HAVING REGARD to the proposal from the Commission,

HAVING REGARD to the opinion of the European Parliament,

HAVING REGARD to the opinion of the Economic and Social Committee,

WHEREAS in view of the increasing use of water intended for human consumption, it is necessary to lay down quality standards with which such water must comply,

WHEREAS national legislation relating to the quality of water intended for human consumption differs from one Member State to another, these discrepancies being an obstacle to trade within the Community and therefore having a direct bearing on the functioning of the Common Market,

WHEREAS the Programme of Action of the European Communities on the Environment (1) provides for the setting of standards for toxic chemical substances and for germs which endanger health and are present in water intended for human consumption, and also for the definition of physical, chemical and biological parameters corresponding to the different uses of such water and in particular to drinking water,

(1) OJ no C 112 of 20 December 1973

WHEREAS Council Directive No of on the harmonization of the legislation of Member States relating to the use and marketing of natural mineral waters lays down special rules for such waters, and whereas, furthermore, it is necessary to exclude medicinal and aerated waters from the scope of this directive,

WHEREAS the values fixed for certain parameters must be lower than the concentration below which substances in the water cannot, in the course of continuous ingestion , cause or directly or indirectly result in an identifiable effect harmful to health in a statistically representative sample of the population involved (Maximum Admissible Concentration),

WHEREAS the values fixed for certain other parameters must be equal to or greater than the minimum concentration in water of a substance, the presence of which is essential for preventing the occurrence of identifiable harmful effects in a statistically representative sample of the population involved, either directly or indirectly, as a result of repeated ingestion (Minimum Required Concentration),

WHEREAS values lower than the Guide Level values (the concentration in water of a given substance which should ideally not be exceeded) must be considered to be entirely satisfactory,

WHEREAS in order to achieve a certain flexibility in the application of this directive, the possibility must be left to Member States to foresee derogations to the present directive to take account of special specific situations ,

WHEREAS in order fully to attain the objectives relating to quality and particularly to check thetrue concentrations of the different parameters, it is necessary to provide that Member States take the steps required to ensure regular monitoring of the quality of water intended for human consumption,

WHEREAS the technical specifications defined in the annexes to this directive must be rapidly updated to take account of technical progress, and whereas, in order to facilitate the application of the measures necessary for this purpose, provision must be made for a procedure establishing close cooperation between the Member States and the Commission within the Committee responsible for adaptation of this Directive to technical progress,

HAS ADOPTED THIS DIRECTIVE

ARTICLE 1

This Directive deals with the standards which water intended for human consumption must satisfy.

ARTICLE 2

For the purpose of this Directive, water intended for human consumption shall mean water, used for that purpose, either in its original state or after treatment to modify its physico-chemical structure, regardless of origin, private wells and drill-holes in particular. It shall include:

- water supplied to the consumer by a public mains system,
- water stored or delivered in bottles or other containers,
- water used for washing containers or in the preparation or preservation of foodstuffs, including ice-cream, and the preparation of drinks, aerated or otherwise.

ARTICLE 3

This Directive shall not apply:

a) to mineral waters recognized as such by the Health Authorities in accordance with the provisions of the Council Directive on the harmonization of the laws of the Member States relating to the use and marketing of natural mineral waters, Directive of ... (+)

b) to medicinal waters recognized as such by the relevant Health Authorities and supplied and used for therapeutic purposes.

(+) OJ No ...

c) to aerated waters.

ARTICLE 4

1) The Member States shall fix values applicable to water intended for human consumption for all the parameters shown in Annex I. The values to be fixed may not be greater than the values shown in the Maximum Admissible Concentration columns. They shall be equal to or greater than the values shown in the Minimum Required Concentration columns.

2) With reference to the values given in the Guide Level columns, the Member States shall fix limits based on those shown in those columns; any concentration less than that provided for in the Guide Level columns shall be considered to be entirely satisfactory.

3) In interpreting the values shown in columns 3,4,5 of the tables in Annex I, account shall be taken of any references in column 6, "Comments."

4) The Member States shall take the steps required to ensure that water intended for human consumption conforms to the above values.

ARTICLE 5

1) The Member States may make provision for departures from the terms of this Directive in order to take account of:

a) situations arising from the nature and structure of the ground in the geographical area from which the source in question emanates,

b) situations arising from exceptional climatic conditions.

When a Member State intends to make a departure as provided for in 1)a) above, it shall inform the Commission accordingly within two months, stating the reasons therefor.

When a Member State intends to make a departure as provided for in 1)b) above, it shall inform the Commission accordingly within eight days of the appearance of the exceptional climatic conditions and shall state the reasons and the period involved.

2) The Member States may make provision for Exceptional Maximum Admissible Concentrations where such a possibility is mentioned in the 'Comments' column of Annex I.

By Exceptional Maximum Admissible Concentration is meant the maximum admissible concentration which may be authorized locally by the relevant authorities, either temporarily in view of particular meteorological conditions, or permanently in view of geographical or geological conditions.

3) In no case shall the departures taken by Member States by virtue of this Article exempt them from the conditions imposed for the protection of public health.

ARTICLE 6

The Member States shall take all necessary steps to ensure regular monitoring of the quality of water intended for human consumption, particularly in order to check the true concentration of the different parameters measured.

Where such monitoring is based on sampling and analysis, the frequency of sampling shall be determined by the relevant national authorities; it shall be based on the capacity of the water supply installation, the size of the population served and on special circumstances such as, in particular, periods of drought or flooding and the risk of epidemics.

For such monitoring, the Member States shall as far as possible use the standard model analyses given in Annex II and the analytical methods shown in Annex III.

ARTICLE 7

Any changes which are necessary in order to adapt the Annexes of this Directive to take account of scientific and technical progress shall be adopted in accordance with the procedure laid down in Article 9.

ARTICLE 8

a) A Committee on the Adaptation to Technical Progress of the Directives on the quality of water intended for human consumption, hereinafter called "the Committee", is hereby set up; it shall consist of representatives of the Member States with a representative of the Commission as Chairman.

b) The Committee shall adopt its own rules of procedure.

ARTICLE 9

1) Where the procedure laid down in this Article is to be followed, matters shall be referred to the Committee by the Chairman, either on his own initiative or at the request of the representative of a Member State.

2) The representative of the Commission shall submit to the Committee a draft of the measures to be adopted. The Committee shall deliver its Opinion on the draft within a time limit set by the Chairman having regard to the urgency of the matter. Opinions shall be adopted by a majority of 41 votes, the votes of Member States being weighted as provided in Article 148 (2) of the Treaty. The Chairman shall not vote.

3) a) The Commission shall adopt the measures envisaged where they are in accordance with the Opinion of the Committee.

b) Where the measures envisaged are not in accordance with the Opinion of the Committee, or if no Opinion is adopted, the Commission shall without delay propose to the Council the measures to be adopted. The Council shall act by a qualified majority.

c) If, within three months of the proposal being submitted to it, the Council has not acted, the proposed measures shall be adopted by the Commission.

ARTICLE 10

The Member States shall take all necessary steps to ensure that the application of the measures taken by virtue of this Directive shall in no case have the effect of allowing any further deterioration, directly or indirectly, in the present quality of the waters referred to in this Directive.

ARTICLE 11

Annexes I, II and III shall form an integral part of this Directive.

ARTICLE 12

a) Member States shall put into force the laws, regulations and administrative provisions necessary to comply with this Directive and its Annexes within two years of its notification and shall forthwith inform the Commission thereof.

b) Member States shall communicate to the Commission the texts of the main provisions of national law which they adopt in the field covered by this Directive.

ARTICLE 13

This Directive is addressed to the Member States.

ANNEXES

ANNEX I Tables A to E

ANNEX II Standard analyses

ANNEX III Reference methods of analysis

DRINKING WATER STANDARDS

ANNEX I

Table A Organoleptic factors

Table B Physicochemical factors

Table C Biological factors

Table D Undesirable or toxic factors

Table E Microbiological factors

A) ORGANOLEPTIC FACTORS

PARAMETERS ①	EXPRESSION OF THE RESULTS ②	COMMUNITY VALUES			COMMENTS ⑥
		Guide Level (G.L.) ③	Maximum Admissible Concentration (M.A.C.) ④	minimum Required Concentration (m.R.C.) ⑤	
Colour	Pt units mg/l	5	20		possible recourse to E.M.A.C.
Turbidity	SiO_2 degrees mg/l	5	10		or in Jackson Units G.L. 0.1 M.A.C. 0.3 replaced in certain circumstances by a transparency test, with Secchi disc reading in meters indicative values G.L. :6 M.A.C. : 2
Odour	dilution rate	0	2 at 12°C 3 at 25°C		relate to palatability tests
Palatability	dilution rate	0	2 at 12°C 3 at 25°C		relate to odour tests
Temperature (coolness)	degrees C	12	25		possible recourse to E.M.A.C.

B) PHYSICO-CHEMICAL FACTORS

PARAMETERS (1)	EXPRESSION OF THE RESULTS (2)	COMMUNITY VALUES			COMMENTS (6)
		Guide Level (G.L.) (3)	Maximum Admissible Concentration (M.A.C.) (4)	minimum Required Concentration (m.R.C.) (5)	
pH	pH Units	6,5 - 8,5	9,5	6,00	pH_{si} = 0 (saturation index)
Conductivity	µS/6m	400	1250		possible recourse to E.M.A.C. corresponding resistivity values in ohms/cm 2500 - 800
Total mineral content	dry residue mg/l		1500		possible recourse to E.M.A.C.
Total hardness	hydrometric title	35	1.7	10	
Calcium	Ca: mg/l	100		10	
Magnesium	Mg: mg/l	30	50	5	
Sodium	Na: mg/l	< 20	100		possible recourse to E.M.A.C.
Potassium	K: mg/l	< 10	12		possible recourse to E.M.A.C.
Aluminium	Al: mg/l		0,05		possible recourse to E.M.A.C.
Alkali level	CO_3H^- mg/l	30			
Sulphates	SO_4^{--} mg/l	5	250		possible recourse to E.M.A.C.

B) PHYSICO-CHEMICAL FACTORS (continued)

PARAMETERS (1)	EXPRESSION OF THE RESULTS (2)	COMMUNITY VALUES			COMMENTS (6)
		Guide Level (G.L.) (3)	Maximum Admissible Concentration (M.A.C.) (4)	minimum Required Concentration (m.R.C.) (5)	
Chlorides	Cl^- mg/l	5	200		possible recourse to E.M.A.C.
Nitrates	NO_3^- mg/l		50		11.5/l for bottled or other water used for mixing babies' bottles possible recourse to E.M.A.C.
Nitrites	NO_2^- mg/l		0,1		
Ammonia	NH_4^+ mg/l	0,05	0,5		
Kjeldahl Nitrogen	N^+ mg/l (excluding N in NO and NO_3)	0,05	0,5		
Silica	SiO_2 mg/l				5 mg/l above the natural level
Substances extractable in chloroform	dry residue mg/l	0,1			

C) BIOLOGICAL FACTORS

PARAMETERS ①	EXPRESSION OF THE RESULTS ②	COMMUNITY VALUES			COMMENTS ⑥
		Guide Level (G.L.) ③	Maximum Admissible Concentration (M.A.C.) ④	minimum Required Concentration (m.R.C.) ⑤	
Dissolved oxygen	O_2 mg/l	5			
Oxidability	O_2 mg/l ($KMnO_4$)	1	5		possible recourse to E.M.A.C. measured when heated and in acid medium
Biochemical Oxygen demand (BOD_5)	O_2 mg/l	50% of initial dissolved oxygen content			
Total carbon (TOC)	C mg/l				the reason for any increase in the usual concentration must be investigated

D) UNDESIRABLE OR TOXIC FACTORS

PARAMETERS (1)	EXPRESSION OF THE RESULTS (2)	COMMUNITY VALUES			COMMENTS (6)
		Guide Level (G.L.) (3)	Maximum Admissible Concentration (M.A.C.) (4)	minimum Required Concentration (m.R.C.) (5)	
Silver	Ag µg/l		10		
Arsenic	As µg/l		50		
Barium	Ba µg/l		100		Possible recourse to E.M.A.C.
Cadmium	Cd µg/l		5		
Cyanides	CN^- µg/l		50		
Total chromium	Cr µg/l		50		
Copper ...	Cu µg/l		50 1500		Possible recourse to E.M.A.C. 1500 µg/l : after 16 hrs contact at consumer outlet
Fluorine	F µg/l		700 at 1500		M.A.C. varies according to average temperature in geographical area concerned
Iron	Fe µg/l	100	300		possible recourse to E.M.A.C.
Mercury	Hg µg/l		1		
Manganese	Mn µg/l	20	50		possible recourse to E.M.A.C.

D) UNDESIRABLE OR TOXIC FACTORS (continued 1)

PARAMETERS ①	EXPRESSION OF THE RESULTS ②	COMMUNITY VALUES			COMMENTS ⑥
		Guide Level (G.L.) ③	Maximum Admissible Concentration (M.A.C.) ④	minimum Required Concentration (m.R.C.) ⑤	
Nickel	Ni µg/l	5	50		
Phosphorus	P µg/l	300	2000 after isolation		
Lead	Pb µg/l		50		
Hydrogen Sulphide	S^{--} µg/l		nill		
Antimony	Sb µg/l		10		
Selenium	Se µg/l		10		
Zinc	Zn µg/l		100 2000		2000 after 16 hrs of contact at consumer outlet
Mineral oils	residue µg/l		10		
Polycyclic aromatic hydrocarbons	residue µg/l		0,2		
Phenol index	C_6H_5OH µg/l		0,5		

D) UNDESIRABLE OR TOXIC FACTORS (continued 2)

PARAMETERS ①	EXPRESSION OF THE RESULTS ②	COMMUNITY VALUES			COMMENTS ⑥
		Guide Level (G.L.) ③	Maximum Admissible Concentration (M.A.C.) ④	minimum Required Concentration (m.R.C.) ⑤	
Anionic detergents	lauryl sulphate /ug/l		100		

Pesticides and related products
- TOTAL
- SUBSTANCES CONSIDERED SEPARATELY
	/ug/l
	. . . . . .
	. . . . .
		. . . . .	0,5
			0,1
					By pesticides and associated products is meant:
					- insecticides:
					  - persistent organochlorine compounds
					  - organophosphorus compounds
					  - carbamates
					- herbicides
					- fungicides

Other organochlorine compounds	/ug/l		1,0		

E) MICROBIOLOGICAL FACTORS

PARAMETERS		Basic	Supplementary	RESULTS volume of the sample in ml	COMMUNITY VALUES Tap water (1) not disinfected M.A.C.	disinfected M.A.C.	surface water disinfected M.A.C.	treated water not disinfected M.A.C.	COMMENTS
Total coliforms		+		100	5 (3)	0	0	0 (1)	(1) At consumer outlet (2) At catchment (3) On condition that enough samples are analyzed and results are 95% uniform (4) Per type of bacteriophage (5) Qualitative research result
Fecal coliforms		+		100	0	0	0	0 (1)	
Fecal streptococci		+		100	0	0	0	0 (1)	
Total count at	37°	+		1	10	-	-	10 (2)	
	22°	+		1	100	-	-	100 (2)	
	37°		+	1	-	0	0	-	
	22°		+	1	-	20	20	-	
Clostridium (Sulphite reducing)			+	20	2	2	2	0 (1)	
Salmonella			+	5000	0	0	0	0 (1)	
Pathogenic staphylococci			+	100	0	0	0	0 (1)	

E) MICROBIOLOGICAL FACTORS (continued)

PARAMETERS	Basic	Supplementary	RESULTS volume of the sample in ml	COMMUNITY VALUES Tap water (1) not disinfected M.A.C.	disinfected M.A.C.	surface water disinfected M.A.C.	treated water not disinfected M.A.C.	COMMENTS
Fecal Bacteriophages		+-	100	0 (4)	0	0	0 (1)	(1) At consumer outlet (4) Per type of bacteriophage (5) Qualitative research result
Enteropathogenic viruses		+	10000	0	0	0	0 (1)	
Protozoa		+	-	nil (5)	nil	nil	nil (1)	
Animalcules		+		nil (5)				

DRINKING WATER STANDARDS

ANNEX II

Standard model analyses

1 - Parameters to be considered,

2 - Frequency of standard analyses,

3 - Sampling,

4 - Comments on the storage of samples

STANDARD MODEL ANALYSES

1 - Parameters to be considered

	A Current monitoring of the distribution networks supplied		B Systematic periodic monitoring supplementary to A1 and A2	C Occasional monitoring in special situations or in case of accidents- supplementary to A and B
	A1 Ground water	A2 Surface or mixed water		
ORGANOLEPTIC FACTORS	Turbidity Temperature	Turbidity Odour Palatability Temperature	Colour Turbidity Odour Palatability Temperature	Colour Turbidity Odour Palatability Temperature
PHYSICO-CHEMICAL FACTORS	pH Conductivity Total hardness Alkali level Sulphates Chlorides Nitrates Ammonia	pH Conductivity Total hardness Alkali level Sulphates Chlorides Nitrates Ammonia	pH Conductivity Total mineral content Total hardness Calcium Magnesium Sodium Potassium Aluminum Alkali level Sulphates Chlorides Nitrates/Ammon. Nitrates/Silica Total Nitrogen	pH Conductivity Total mineral content Total hardness Calcium Magnesium Sodium Potassium Aluminum Alkali level Sulphates Chlorides Nitrates/Ammon. Nitrates/Silica Total Nitrogen

1 - Parameters to be considered (continued)

	A Current monitoring of the distribution networks supplied by A1 Ground water	 A2 surface or mixed water	B Systematic periodic monitoring supplementary to A1 and A2	C Occasional monitoring in special situations or in case of accidents supplementary to A and B
BIOLOGICAL FACTORS	Oxidizability	Oxidizability	Dissolved oxygen Oxidizability	Dissolved oxygen Oxidizability Chemical oxygen demand (COD) Bio-chemical oxygen demand (BOD_5) Total carbon (TOC) Substances extractable in chloroform
UNDESIRABLE OR TOXIC FACTORS	Iron Manganese	Iron Manganese	Carbon dioxide Fluorine Phosphorus Phenol index Anionic detergents + others presumed present	All undesirable or toxic factors presumed present
MICROBIOLOGICAL FACTORS	Total coliforms Fecal coliforms Fecal streptococci Total count	Total coliforms Fecal coliforms Fecal streptococci Total count	Total coliforms Fecal coliforms Fecal streptococci Total count Clostridium (sulphite reducing)	Total coliforms Fecal coliforms Fecal streptococci Total count Clostridium (sulphite reducing) Salmonella Pathogenic staphylococci Fecal bacteriophages Viruses - Amoeba Animalcules

2 - Frequency of standard analyses

STANDARD ANALYSIS	FREQUENCY	
	recommended	compulsory
A1 Current monitoring of distribution networks supplied by ground water	quarterly	six-monthly
A2 Current monitoring of distribution networks supplied by surface or mixed water - very limited or only one supply (i) with protective perimeter * (ii) without protective perimeter * - large supply	 quarterly monthly daily	 six-monthly quarterly weekly
B Systematical periodical monitoring, supplementary to A1 and A2	six-monthly	annually
C Occasional monitoring in exceptional situations or in case of accident: supplementary to A1, A2 and B		As required - to be determined by the competent health authorities

*) The protective perimeter set up on the basis of a geological report is a defined area around a water supply source: spring water, ground water, surface water. A distinction is drawn between:
- the immediate protective perimeter, which is fenced off and within which all activity is forbidden, and
- the outer protective perimeter within which activity is forbidden or subject to regulation.

In the case of supplies drawn directly from a river, protection is ensured within an approximate zone inside which the discharge of waste water should be avoided or, at least may only be permitted after extra treatment.

3 - SAMPLING

In order to carry out typical analyses it is necessary to take samples of sufficient quantities of water with equipment designed for this purpose.

a) Bacteriological examination

Samples of the water should be taken in sterile jars:

- in searching for germs, fecal contamination tests: a sample of 500 cm3 of water
- in searching for salmonella, a sample of 1000 cm3 of water
- in searching for viruses, a sample of 10,000 cm3 of water

b) Chemical examination

- Type A analysis: a sample of 1000 cm3 of water in clean glass or plastic jars
- Type B analysis: a sample of 2000 cm3 of water
- Type C analysis: a sample of 3000 cm3 of water in pyrex type jars with ground stoppers divided as follows:
  - 1000 cm3 in searching for toxic or undesirable substances heavy metals)
  - 2000 cm3 for an analysis of organoleptic, physico-chemical or biological factors.

4 COMMENTS ON THE STORAGE OF SAMPLES

a) Generally speaking, samples should preferably be stored by deep freezing

b) In the case of toxic or undesirable substances, it is sometimes necessary, depending on the element being sought, to use preserving agents which will be added to the sample either when it is taken or in the laboratory.

c) Water samples for microbiological analyses should be taken in sterile jars and kept in a cold temperature ($0^{\circ}C$) during the journey to the laboratory. If possible, the analysis should take place immediately on arrival at the laboratory or, at the latest, 48 hours after the sample is taken.

DRINKING WATER STANDARDS

ANNEX III

Reference methods of analysis

A - 1) Organoleptic factors

A - 2) Physico-chemical factors

A - 3) Biological factors

A - 4) Undesirable or toxic factors

B) Microbiological factors

Note

For the parameters indicated by an asterisk, parameters common to water destined for human consumption and to surface waters to be used for the production of drinking water, the analytical reference methods are currently being studied within the framework of the preparation of a directive on analytical methods regarding the quality of surface waters to be used for the production of drinking water.

Reference methods of analysis

A - 1 ORGANOLEPTIC FACTORS

Colour	*
Turbidity	Harmonized standards under study
Odour	*
Palatability	Successive dilutions Tested at 12° C or 25° C
Temperature	*

A - 2) PHYSICO-CHEMCIAL FACTORS

pH	*
Conductivity	*
Total minerel content	Dessication at 180° C
Total hardness	EDTA complexiметry
Calcium	*
Magnesium	Atomic absorption
Sodium	Atomic absorption Flame test
Potassium	Atomic absorption Flame test
Aluminium	Atomic absorption after concentration Absorption spectrophotometry using a specific reagent
Alkali level	Acidimetry on methyl orange
Sulphates	*
Chlorides	*
Nitrates	*
Nitrites	Absorption spectrophotometry using a specific reagent
Ammonia	*
Kjeldahl NItrogen	*
Silica	Absorption spectrophotometry using molybdosilicic acid with or without reduction
Substances extractable in chloroform	*

A - 3) BIOLOGICAL FACTORS

Dissolved oxygen	*
Oxidizability	$KMnO_4$ boiling for 10 minutes in an acid medium
Biochemical oxygen demand (BOD 5)	*
Total organic carbon (TOC)	*

A - 4) UNDESIRABLE OR TOXIC FACTORS

Silver	Atomic absorption
Arsenic	*
Barium	*
Cadium	*
Cyanides	*
Total Chromium	*
Copper	*
Fluorine	*
Iron	*
Mercury	*
Manganese	*
Nickel	*
Phosphorus	Absorption spectrophotometry using reduced phosphomolybdic acid
Lead	*
Hydrogen sulphide	Absorption spectrophotometry: formation of methylene blue
Antimony	Oxidation to Sb^{5+} Rhodamine B Absorption spectrophotometry
Selenium	*
Zinc	*
Mineral oils and polycyclic aromatic carbons	*
Phenol index	*
Anionic detergents	*
Pesticides and related products	*

B - MICROBIOLOGICAL FACTORS

Total coliform	*
Fecal coliform	*
Fecal streptococci	*
Total count	*
Sulphide reducing	After heating the sample to 80° C a spore count by: - seeding in a medium with glucose, sulphite and iron, counting the black-halo colonies - membrane filtration, deposition of the inverted filter on a medium with glucose, sulphite and iron covered with agar, count of black colonies - distribution in tubes of differential reinforced clostridial medium, reinoculation of the black tubes in a medium of litmus-treated milk, count according to MPN
Salmonella	*
Pathogenic staphylococci	Membrane and culture filtration on a specific medium (e.g. Chapman's hypersaline medium).
Fecal bacteriophages	Guilin's process
Enteropathogenic viruses	Filtration concentration, by flocculation or centrifugation and identification.
Protozoa	Concentration by filtration on a membrane, microscopic examination, test of pathogenicity.
Animalcules (worms - larvae)	Macroscopic or microscopic examination

COMMENTS: The incubation period is generally 24 to 48 hours except for total counts when it is 48 to 72 hours.