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COUNCIL DIRECTIVE

of 9 October 1979

concerning the methods of measurement and frequencies of sampling and analysis of surface water intended for the abstraction of drinking water in the Member States

(79/869/EEC)

THE COUNCIL OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Economic Community, and in particular Articles 100 and 235 thereof,

Having regard to the proposal from the Commission [1],

Having regard to the opinion of the European Parliament [2],

Having regard to the opinion of the Economic and Social Committee [3],

Whereas the programme of action of the European Communities on the environment [4] provides for the standardization or harmonization of the measuring methods used, so as to render the results of pollution measurements in the Community comparable;

Whereas Council Directive 75/440/EEC of 16 June 1975 concerning the quality required of surface water intended for the abstraction of drinking water in the Member States [5], and in particular Article 5 (2) thereof, provides for adoption of a Community policy regarding the frequency of sampling and analysis of parameters, together with methods of measurement;

Whereas any disparity between the provisions already applicable or in preparation in the various Member States concerning methods of measurement and the frequency of sampling and analysis for each parameter to determine the quality of surface water may create unequal conditions of competition and consequently directly affect the functioning of the common market; whereas it is therefore necessary to approximate the laws in this field, under Article 100 of the Treaty;

Whereas it seems necessary for this approximation of laws to be accompanied by Community action designed to achieve through more comprehensive legislation one of the objectives of the Community in the sphere of protection of the environment and improvement of the quality of life; whereas certain specific provisions to this effect should therefore be laid down; whereas Article 235 of the Treaty should be invoked, as the powers required for this purpose have not been provided by the Treaty;

Whereas, for the analyses carried out in the Member States, it is necessary to fix common reference methods of measurement to determine the values of the parameters defining the physical, chemical and microbiological characteristics of surface water intended for the abstraction of drinking water;

Whereas, for the purpose of monitoring the required quality, it is necessary to take a regular minimum number of samples of surface water in order that the parameters specified in Annex II to Directive 75/440/EEC may be measured;

Whereas the minimum frequency of sampling and analysis for each parameter should increase in proportion to the volume of water abstracted and the population served; whereas the frequency should increase with the degree of risk engendered by the deterioration of the quality of the water;

[1] OJ No C 208, 1. 9. 1978, p. 2.
[2] OJ No C 67, 12. 3. 1979, p. 48.
[3] OJ No C 128, 21. 5. 1979, p. 4.
[4] OJ No C 112, 20. 12. 1973, p. 1.
[5] OJ No L 194, 25. 7. 1975, p. 34.

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Whereas technical and scientific progress may necessitate the rapid adjustment of some of the requirements defined in Annex I to this Directive, in order to take account, in particular, of alterations in the levels of the parameters specified in Annex II to Directive 75/440/EEC; whereas, in order to facilitate implementation of the necessary measures, a procedure should be laid down for establishing close collaboration between the Member States and the Commission in a Committee on Adaptation to Technical and Scientific Progress,

HAS ADOPTED THIS DIRECTIVE:

Article 1

This Directive concerns the reference methods of measurement and frequencies of sampling and analysis for the parameters listed in Annex II to Directive 75/440/EEC.

Article 2

For the purposes of this Directive:

— 'reference method of measurement' means the designation of a measurement principle or a succinct description of a procedure for determining the value of the parameters listed in Annex I to this Directive,

— 'limit of detection' means the minimum value of the parameter examined which it is possible to detect,

— 'precision' means the range within which 95% of the results of measurements made on a single sample, using the same method, are located,

— 'accuracy' means the difference between the true value of the parameter examined and the average experimental value obtained.

Article 3

1. Analysis of samples of water taken shall concern those parameters set out in Annex II to Directive 75/440/EEC to which I and/or G values have been assigned.

2. Member States shall as far as possible use the reference methods of measurement referred to in Annex I to this Directive.

3. The values for the limit of detection and for the precision and accuracy of the methods of measurement used to check the parameters set out in Annex I to this Directive must be respected.

Article 4

1. The minimum annual frequencies of sampling and analysis for each parameter are set out in Annex II to this Directive. Sampling must as far as possible be spread over the year so as to give a representative picture of the quality of the water.

2. Surface water samples must be representative of the quality of the water at the sampling point as defined in Article 5 (4) of Directive 75/440/EEC.

Article 5

The containers used for samples, the agents or methods used to preserve part of a sample for the analysis of one or more parameters, the conveyance and storage of samples and the preparation of samples for analysis must not be such as to bring about any significant change in the results of the analysis.

Article 6

1. The competent authorities of the Member States shall fix frequencies of sampling and analysis for each parameter for each sampling point.

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2. The frequencies of sampling and analysis shall be not less than the minimum annual frequencies given in Annex II to this Directive.

Article 7

1. Where a survey by the competent authorities of surface water intended for the abstraction of drinking water shows that the values obtained for certain parameters are considerably superior to those set by the Member States in accordance with Annex II to Directive 75/440/EEC, the Member State concerned may reduce the frequency of sampling and analysis for these parameters.

2. If there is no pollution in the cases referred to in paragraph 1 and if there is no risk of the quality of water deteriorating and if the water in question is superior in quality to the indications given in column A1 of Annex II to Directive 75/440/EEC, the authorities concerned may decide that no regular analysis is necessary.

Article 8

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At intervals of three years the Member States shall send information to the Commission on the implementation of this Directive, in the form of a sectoral report which shall also cover other pertinent Community Directives. This report shall be drawn up on the basis of a question-naire or outline drafted by the Commission in accordance with the procedure laid down in Article 6 of Directive 91/692/EEC (¹) The ques-tionaire (SIC! questionnaire) or outline shall be sent to the Member States six months before the start of the period covered by the report. The report shall be sent to the Commission within nine months of the end of the three-year period covered by it.

The first report shall cover the period from 1993 to 1995 inclusive.

The Commission shall publish a Community report on the implementa-tion of the Directive within nine months of receiving the reports from the Member States.

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Article 9

To take account in particular of alterations in the levels of the para-meters specified in Annex II to Directive 75/440/EEC, the amendments required to adapt:

— the reference methods of measurement set out in Annex I to this Directive,

— the limit of detection, the precision and the accuracy of these methods,

— the materials recommended for the container

to technical progress, shall be adopted in accordance with the proce-dure set out in Article 11 of this Directive.

Article 10

1. A Committee on Adaptation to Technical and Scientific Progress (hereinafter referred to as the 'Committee'), consisting of representa-tives of the Member States and chaired by a Commission representative, is hereby set up for the purpose laid down in Article 9.

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Article 11

1. The Commission shall be assisted by the Committee on Adapta-tion to Technical and Scientific Progress.

(¹) OJ No L 377, 31. 12. 1991, p. 48.

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2. Where reference is made to this Article, Articles 5 and 7 of Decision 1999/468/EC (¹) shall apply.

The period laid down in Article 5(6) of Decision 1999/468/EC shall be set at three months.

3. The committee shall adopt its rules of procedure.

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Article 12

1. Directive 75/440/EEC is hereby amended as follows:

(a) Article 5 (2) shall be deleted;

(b) in Article 5 (3) the words 'those referred to in paragraph 2' shall be replaced by the words 'the parametric values for the water quality in question'.

2. Paragraph 1 shall take effect within two years of the notification of this Directive.

Article 13

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

Article 14

This Directive is addressed to the Member States.

(¹) OJ L 184, 17.7.1999, p. 23.

ANNEX I

Reference method of measuring the I and/or G values of the parameters in Council Directive 75/440/EEC

Parameter		Limit of detection	Precision ±	Accuracy ±	Reference method of measurement	Materials recommended for the container
(A)	(B)	(C)	(D)	(E)	(F)	(G)
1	pH — pH unit	—	0·1	0·2	— Electrometry Measured *in situ* at the time of sampling without prior treatment of the sample	
2	Coloration (after simple filtration) — mg Pt/l	5	10 %	20 %	— Filtering through a glass fibre membrane Photometric method using the platinumcobalt scale	
3	Total suspended solids — mg/l	—	5 %	10 %	— Filtering through a 0·45 µm filter membrane, drying at 105 °C and weighing — Centrifuging (for at least 5 mins with mean acceleration of 2 800 to 3 200 g), drying at 105 °C and weighing	
4	Temperature — °C	—	0·5	1	— Thermometry Measured *in situ* at the time of sampling without prior treatment of the sample	
5	Conductivity at 20 °C — µS/cm	—	5 %	10 %	— Electrometry	
6	Odour — Dilution factor at 25 °C	—	—	—	— By successive dilutions	Glass
7	Nitrates — mg/l NO_3	2	10 %	20 %	— Molecular absorption spectrophotometry	

	Parameter		Limit of detection	Precision ±	Accuracy ±	Reference method of measurement	Materials recommended for the container
(A)	(B)		(C)	(D)	(E)	(F)	(G)
8	Fluorides	mg/l F	0·05	10 %	20 %	— Molecular absorption spectrophotometry after distillation if necessary — Ion selective electrodes	
9	Total extractable organic chlorine	mg/l Cl					
10	Dissolved iron	mg/l Fe	0·02	10 %	20 %	— Atomic absorption spectrophotometry after filtering through a filter membrane (0·45 μm) — Molecular absorption spectrophotometry after filtering through a 0·45 μm filter membrane	
11	Manganese	mg/l Mn	0·01 ([2])	10 %	20 %	— Atomic absorption spectrophotometry	
			0·02 ([3])	10 %	20 %	— Atomic absorption spectrophotometry — Molecular absorption spectrophotometry	
12	Copper ([10])	mg/l Cu	0·005	10 %	20 %	— Atomic absorption spectrophotometry — Polarography	
			0·02 ([4])	10 %	20 %	— Atomic absorption spectrophotometry — Molecular absorption spectrophotometry — Polarography	
13	Zinc ([10])	mg/l Zn	0·01 ([2])	10 %	20 %	— Atomic absorption spectrophotometry	
			0·02	10 %	20 %	— Atomic absorption spectrophotometry — Molecular absorption spectrophotometry	

	Parameter		Limit of detection	Precision ±	Accuracy ±	Reference method of measurement	Materials recommended for the container
(A)	(B)		(C)	(D)	(E)	(F)	(G)
14	Boron ([10])	mg/l B	0·1	10 %	20 %	— Molecular absorption spectrophotometry — Atomic absorption spectrophotometry	Materials not containing boron in any significant quantities
15	Beryllium	mg/l Be					
16	Cobalt	mg/l Co					
17	Nickel	mg/l Ni					
18	Vanadium	mg/l V					
19	Arsenic ([10])	mg/l As	0·002 ([2])	20 %	20 %	— Atomic absorption spectrophotometry	
			0·01 ([5])			— Atomic absorption spectrophotometry — Molecular absorption spectrophotometry	
20	Cadmium ([10])	mg/l Cd	0·0 002	30 %	30 %	— Atomic absorption spectrophotometry	
			0·001 ([5])			— Polarography	
21	Total chro-mium ([10])	mg/l Cr	0·01	20 %	30 %	— Atomic absorption spectrophotometry — Molecular absorption spectrophotometry	
22	Lead ([10])	mg/l Pb	0·01	20 %	30 %	— Atomic absorption spectrophotometry — Polarography	
23	Selenium ([10])	mg/l Se	0·005			— Atomic absorption spectrophotometry	

	Parameter		Limit of detection	Precision ±	Accuracy ±	Reference method of measurement	Materials recommended for the container
(A)	(B)		(C)	(D)	(E)	(F)	(G)
24	Mercury ([19])	mg/l Hg	0·0 001 0·0 002 ([5])	30 %	30 %	— Flameless atomic absorption spectrophoto-metry (cold vaporization)	
25	Barium ([10])	mg/l Ba	0·02	15 %	30 %	— Atomic absorption spectrophotometry	
26	Cyanide	mg/l CN	0·01	20 %	30 %	— Molecular absorption spectrophotometry	
27	Sulphates	mg/l SO_4	1C	10 %	10 %	— Gravimetric analysis — EDTA compleximetry — Molecular absorption spectrophotometry	
28	Chlorides	mg/l Cl	1C	10 %	10 %	— Titration (Mohr's method) — Molecular absorption spectrophotometry	
29	Surfactants (reacting with methylene blue)	mg/l (Lauryl Sulphate)	0·05	20 %		— Molecular absorption spectrophotometry	
30	Phosphates	mg/l P_2O_5	0·02	10 %	20 %	— Molecular absorption spectrophotometry	
31	Phenols (phenol index)	mg/l C_6H_5OH	0·0 005 0·001 ([6])	0,0005 30 %	0,0005 50 %	— Molecular absorption spectrophotometry 4 amionoantipyrine method — Paranitraniline method	Glass
32	Dissolved or emulsified hydrocarbons	mg/l	0·01 0·04 ([3])	20 %	30 %	— Infra-red spectrometry after extraction by carbon tetrachloride — Gravimetry after extraction by petroleum ether	Glass

(A)	(B) Parameter		Limit of detection (C)	Precision ± (D)	Accuracy ± (E)	Reference method of measurement (F)	Materials recommended for the container (G)
33	Polycyclic aromatic hydro-carbons ([10])	mg/l	0·00 004	50 %	50 %	— Measurement of fluorescence in the UV after thin layer chromatography	Glass or alumi-nium
						Comparative measurement in relation to a mixture of six control substances with the same concentration ([8])	Glass or alumi-nium
34	Total pesticides (parathion, hexachlorocy-clohexane, diel-drin) ([10])	mg/l	0·0 001	50 %	50 %	Gas or liquid chromatography after extrac-tion by suitable solvents and purification	Glass
						Identification of the constituents of the mixture	
						Quantitative analysis ([9])	
35	Chemical oxygen demand (COD)	mg/l O_2	15	20 %	20 %	— Potassium dichromate method	
36	Dissolved oxygen satura-tion rate	%	5	10 %	10 %	— Winkler's method	Glass
						— Electrochemical method	
37	Biochemical oxygen demand (BOD_5) at 20 °C without nitrifi-cation	mg/l O_2	2	1,5	2	— Determination of dissolved oxygen before and after five-day incubation at 20 °C ± 1 °C, in complete darkness Addition of a nitrification inhibitor	
38	Nitrogen by Kjeldahl method (except in NO_2 and NO_3)	mg/l N	0·5	0,5	0,5	— Mineralization, distillation by Kjeldahl method and ammonium determination by means of molecular absorption spectropho-tometry or titration	
39	Ammonium	mg/l NH_4	0·01 ([2]) 0·1 ([3])	0,03 ([2]) 10 % ([3])	0,03 ([2]) 20 % ([3])	— Molecular absorption spectrophotometry	

	Parameter		Limit of detection	Precision ±	Accuracy ±	Reference method of measurement	Materials recommended for the container
(A)	(B)		(C)	(D)	(E)	(F)	(G)
40	Substances extractable with chloroform	mg/l	([11])	—	—	— Extraction at neutral pH value by purified chloroform, evaporation in vacuo at room temperature, weighing of residue	
41	Total organic carbon	mg/l C					
42	Residual organic carbon after flocculation and membrane filtration (5 μm)	mg/l C					
43	Total coliforms	/100 ml	5 ([·]) 500 ([7]) 5 ([·]) 500 ([7])			Culture at 37 °C on an appropriate specific solid medium (such as Tergitol lactose agar, Endo agar, 0·4 % Teepol broth) with filtration ([2]) or without filtration ([·]) and colony count. Samples must be diluted or, where appropriate, concentrated in such a way as to contain between 20 and 100 colonies. If necessary, identification by gasification. Method of dilution with fermentation liquid substrates in at least three tubes in three dilutions. Sub-culturing of the positive tubes on a confirmation medium. Count according to MPN (most probable number). Incubation temperature: 37 °C + 1 °C.	Sterilized glass
44	Faecal coliforms	/100 ml	2 ([·]) 200 ([7])			— Culture at 44 °C on an appropriate specific solid medium (such as Tergitol lactose agar, Endo agar, 0·4 % Teepol broth) with filtration ([2]) or without filtration ([·]) and colony count. Samples must be diluted or, where appropriate, concentrated in such a way as to contain between 10 and 100 colonies. If necessary, identification by gasification.	Sterilized glass

(A)	(B)	(C)	(D)	(E)	(F)	(G)
	Parameter	Limit of detection	Precision ±	Accuracy ±	Reference method of measurement	Materials recommended for the container
		2 (⁶) 200 (⁷)			— Method of dilution with fermentation in liquid substrates in at least three tubes in three dilutions. Sub-culturing of the positive tubes on a confirmation medium. Count according to MPN (most probable number). Incubation temperature 44 °C ± 0,5 °C.	
45	Faecal strepto-cocci /100 ml	2 (⁶) 200 (⁷)			— Culture at 37 °C on an appropriate solid medium (such as sodium azide) with filtration (²) or without filtration (³) and colony count. Samples must be diluted or, where appropriate, concentrated in such a way as to contain between 10 and 100 colonies.	Sterilized glass
		2 (⁶) 200 (⁷)			— Method of dilution in sodium azide broth in at least three tubes with three dilutions. Count according to MPN (most probable number)	
46	Salmonella (¹²)	1/5 000 ml 1/1 000 ml			— Concentraion by filtration (on membrane or appropriate filter). — Innoculation into pre-enrichment medium. Enrichment and transfer into isolating gelese — Identification.	Sterilized glass

(¹) Surface water samples taken at the abstraction point are analysed and measured after sieving (wire mesh sieve) to remove any floating debris such as wood or plastic.
(²) For waters of Category A1, G value.
(³) For waters of Categories A2 and A3.
(⁴) For waters of Category A3.
(⁵) For waters of Categories A1, A2, and A3, I value.
(⁶) For waters of Categories A2, I value and A3.
(⁷) For waters of Categories A2 and A3, G value.
(⁸) Mixture of six standard substances all of the same concentration to be taken into consideration: fluoranthene; 3,4 benzofluoranthene: 11, 12-benzofluoranthene; 3, 4-benzopyrene; 1, 12-benzoperylene; indano /1, 2, 3 - cd/pyrene.
(⁹) Mixture of three substances all of the same concentration to be taken into consideration: parathion, hexachlorocyclohexane, dieldrin.
(¹⁰) If the samples contain so much suspended matter as to require special preliminary treatment, the accuracy values shown in column E in this Annex may as an exception be exceeded and will be regarded as a target. These samples must be treated so as to ensure that the analysis covers the largest quantity of substances to be measured.
(¹¹) As this method is not in current use in all the Member States, it is not certain that the limit of detection required for checking the values in Directive 75/440/EEC can be attained.
(¹²) Absence in 5 000 ml (A1, G) and absence in 1 000 ml (A2, G).

ANNEX II

Minimum annual frequency of sampling and analysis for each parameter in Directive 75/440/EEC

Population served	A1 (*)			A2 (*)			A3 (*)		
	I (**)	II (**)	III (**)	I (**)	II (**)	III (**)	I (**)	II (**)	III(**)
≤ 10 000	(***)	(***)	(***)	(***)	(***)	(***)			(***) (¹)
> 10 000 to ≤ 30 000	1	1	(***)	2	1	(***)	3	1	1
> 30 000 to ≤ 100 000	2	1	(***)	4	2	1	6	2	1
> 100 000	3	2	(***)	8	4	1	12	4	1

(*)   Quality of surface waters, Annex II Directive 75/440/EEC.
(**)   Classification of parameters according to frequency.
(***)   Frequency to be determined by the competent national authorities.
(¹)   Assuming that such surface water is intended for the abstraction of drinking water, the Member States are recommended to carry out at least annual sampling of this category of water (A3, III, ≤ 10 000).

CATEGORIES

	I		II		III	
	Parameter		Parameter		Parameter	
1	pH	10	Dissolved iron	8	Fluorides	
2	Coloration	11	Manganese	14	Boron	
3	Total suspended solids	12	Copper	19	Arsenic	
4	Temperature	13	Zinc	20	Cadmium	
5	Conductivity	27	Sulphates	21	Total chromium	
6	Odour	29	Surfactants	22	Lead	
7	Nitrates	31	Phenols	23	Selenium	
28	Chlorides	38	Nitrogen by Kjeldahl method	24	Mercury	
30	Phosphates	43	Total coliforms	25	Barium	

	I		II		III
	Parameter		Parameter		Parameter
35	Chemical oxygen demand (COD)	44	Faecal coliforms	26	Cyanide
36	Dissolved oxygen saturation rate			32	Dissolved or emulsified hydrocarbons
37	Biochemical oxygen demand (BOD$_5$)			33	Polycyclic aromatic hydrocarbons
39	Ammonium			34	Total pesticides
				40	Substances extractables with chloroform
				45	Faecal streptococci
				46	Salmonella