

Appendix 9.1 Water Quality Guidelines

Appendix 9.1 – Water Quality Guidelines

(A) Surface Water Regulations 2009 – Thermal Conditions

Thermal Conditions	All Surface Waters
Temperature °C	Not greater than a 1.5°C rise in ambient temperature outside the mixing zone.

(B) Surface Water Regulations 2009 – Biochemical Oxygen Demand

Oxygenation Conditions	Units	River / Lake Water Body	Transitional Water Body	Coastal Water Body
Biological Oxygen Demand (BOD)	mg/l O ₂	High Status ≤ 1.3 (mean ¹) or ≤ 2.2 (95%ile) Good status ≤ 1.5 (mean ¹) or ≤ 2.5 (95%ile)	≤ 4.0 (95%ile)	

(1) The calculation of the arithmetic mean and the analytical method used must be in accordance with the technical specifications for chemical monitoring and quality of analytical results to be adopted in accordance with Directive 2000/60/EC of the European Parliament and of the Council, including how to apply an Environmental Quality Standard where there is no appropriate analytical method meeting the minimum performance criteria.

(C) Surface Water Regulations 2009 – Dissolved Oxygen

Oxygen Conditions	Units	River / Lake Water Body	Transitional Water Body (Summer)	Coastal Water Body (Summer)
Dissolved Oxygen Lower Limit	% Saturation O ₂	95%ile > 80%	(0 psu ²) 95%ile > 70% (35 psu ²) 95%ile > 80%	(35 psu ²) 95%ile > 80%
Dissolved Oxygen Upper Limit			(0 psu ²) 95%ile < 130% (35 psu ²) 95%ile < 120%	(35 psu ²) 95%ile < 120%

(2) psu: The Practical Salinity Unit defines salinity in terms of a conductivity ratio of a sample to that of a solution of 32.4356 g of KCL at 15°C in 1 kg of solution. A sample of seawater at 15°C with conductivity equal to this KCL solution has a salinity of exactly 35 practical salinity units.

(D) Surface Water Regulations 2009 – Acidification Status

Acidification Status	River / Lake Water Body	Transitional Water Body	Coastal Water Body
pH (Individual Values)	Soft ⁽¹⁾ Water 4.5 < pH < 9.0 Hard ⁽³⁾ Water 6.0 < pH < 9.0		

(1) Water hardness ≤ 100 mg/l CaCO₃

(2) Water hardness > 100 mg/l CaCO₃

(E) Surface Water Regulations 2009 – Nutrient Conditions

Nutrient Conditions	Units	River Water Body	Lake Water Body ⁽³⁾	Transitional Water Body	Coastal Water Body
Total Ammonia	mg/l N	High Status ≤ 0.040 (mean) or ≤ 0.090 (95%ile) Good Status ≤ 0.065 (mean) or ≤ 0.140 (95%ile)			
Dissolved Inorganic Nitrogen	mg/l N				Good Status (0 psu ⁽⁴⁾) ≤ 2.6 (34.5 psu ⁽⁴⁾) ≤ 0.25 High Status (34.5 psu ⁽⁴⁾) ≤ 0.17
Molybdate Reactive Phosphorous (MRP)	mg/l P	High Status ≤ 0.025 (mean) or ≤ 0.045 (95%ile) Good Status ≤ 0.035 (mean) or ≤ 0.075 (95%ile)		(0 – 17 psu) ≤ 0.06 (median) (17 psu) ≤ 0.04 (median)	

(3) Total phosphorus (TP) is an important measure of lake trophic status and TP measurements are included as part of the lakes monitoring programme; TP boundary conditions are yet to be established for lakes.

(4) Linear interpolation to be used to establish the limit value for water bodies between these salinity levels based on the median salinity of the water body being assessed.

(F) Surface Water Regulations 2009 – Specific PollutantsAA = Annual Average, MAC = Maximum Allowable Concentration (µg/l), EQS = Environmental Quality Standard⁽¹⁾.

Substance	AA-EQS Inland Surface Waters ⁽⁴⁾	AA-EQS Other Surface Waters	MAC-EQS Inland Surface Waters ⁽⁵⁾	MAC-EQS Other Surface Waters
Arsenic	25	20	-	-
Chromium III	4.7	-	32	-
Chromium VI	3.4	0.6	-	32
Copper ⁽²⁾	5 or 30	5	-	-
Cyanide	10	10	-	-
Diazinon	0.01	0.01	0.02	0.26
Dimethoate	0.8	0.8	4	4
Fluoride	500	1500	-	-
Glyphosate	60	-	-	-
Linuron	0.7	0.7	0.7	0.7
Mancozeb	2	2	7.3	7.3
Monochlorobenzene	1.5	25	-	-
Phenol	8	8	46	46
Toluene	10	10	-	-
Xylenes	10	10	-	-
Zinc ⁽³⁾	8 or 50 or 100	40	-	-

(1) Standards for compounds other than metals refer to total concentrations in the whole water sample.

(2) In the case of Copper the value 5 applies where the water hardness measured in mg/l CaCO₃ is less than or equal to 100; the value 30 applies where the water hardness exceeds 100 mg/l CaCO₃.(3) In the case of Zinc, the standard shall be 8 µg/l for water hardness with annual average values less than or equal to 10 mg/l CaCO₃, 50 µg/l for water hardness greater than 10 mg/l CaCO₃ and less than or equal to 100 mg/l CaCO₃ and 100 µg/l elsewhere.

(4) AA-EQS means that for each representative monitoring point within the waterbody, the arithmetic mean of the concentrations measured over a twelve month monitoring period does not exceed the standard.

(5) MAC-EQS means that for each representative monitoring point within the waterbody no measured concentration exceeds the standard.

(G) Surface Water Regulations 2009 – Priority SubstancesAA = Annual Average⁽¹⁾, MAC = Maximum Allowable Concentration (µg/l).

Substance	AA-EQS ⁽²⁾ Inland Surface Waters ⁽³⁾	AA-EQS ⁽²⁾ Other Surface Waters ⁽³⁾	MAC-EQS ⁽⁴⁾ Inland Surface Waters ⁽³⁾	MAC-EQS ⁽⁴⁾ Other Surface Waters
Alachlor	0.3	0.3	0.7	0.7
Atrazine	0.6	0.6	2.0	2.0
Benzene	10	8	50	50
Carbon-tetrachloride ⁽⁵⁾	12	12	n/a	n/a
Chlorfenvinphos	0.1	0.1	0.3	0.3
Chlorpyrifos-ethyl	0.03	0.03	0.1	0.1
Cyclodiene pesticides; Aldrin ⁽⁵⁾ Dieldrin ⁽⁵⁾ Endrin ⁽⁵⁾ Isodrin ⁽⁵⁾	Σ=0.01	Σ=0.005	n/a	n/a
DDT Total ^{(5) (6)}	0.025	0.025	n/a	n/a
para-para DDT ⁽⁵⁾	0.01	0.01	n/a	n/a
1,2-Dichloroethane	10	10	n/a	n/a
Dichloromethane	20	20	n/a	n/a
Di(2-ethylhexyl)-phthalate (DEHP)	1.3	1.3	n/a	n/a
Diuron	0.2	0.2	1.8	1.8
Fluoranthene	0.1	0.1	1.0	1.0
Isoproturon	0.3	0.3	1.0	1.0
Lead and its compounds	7.2	7.2	n/a	n/a
Napthalene	2.4	1.2	n/a	n/a
Nickel and its compounds	20	20	n/a	n/a
Octylphenol ((4-(1,1',3,3'-tetramethylbutyl)-phenol))	0.1	0.01	n/a	n/a
Pentachloro-phenol	0.4	0.4	1	1

Substance	AA-EQS ⁽²⁾ Inland Surface Waters ⁽³⁾	AA-EQS ⁽²⁾ Other Surface Waters ⁽³⁾	MAC-EQS ⁽⁴⁾ Inland Surface Waters ⁽³⁾	MAC-EQS ⁽⁴⁾ Other Surface Waters
Simazine	1	1	4	4
Tetrachloro-ethylene ⁽⁵⁾	10	10	n/a	n/a
Trichloro-ethylene ⁽⁵⁾	10	10	n/a	n/a
Trichloro-benzenes	0.4	0.4	n/a	n/a
Trichloro-methane	2.5	2.5	n/a	n/a

(1) The calculation of the arithmetic mean and the analytical method used must be in accordance with the technical specifications to be adopted for chemical monitoring and quality of analytical results in accordance with Directive 2000/60/EC of the European Parliament and of the Council, including how to apply an EQS where there is no appropriate analytical method meeting the minimum performance criteria.

(2) This parameter is the Environmental Quality Standard expressed as an annual average value (EQS-AA). Unless otherwise specified, it applies to the total concentration of all isomers.

(3) Inland surface waters encompass rivers and lakes and related artificial or heavily modified water bodies.

(4) This parameter is the Environmental Quality Standard expressed as a maximum allowable concentration (MAC-EQS). Where the MAC-EQS are marked as "not applicable", the AA-EQS values are considered protective against short-term pollution peaks in continuous discharges since they are significantly lower than the values derived on the basis of acute toxicity.

(5) This substance is not a priority substance but one of the other pollutants for which the EQS are identical to those laid down in community legislation that applied prior to Directive 2008/105/EC of the European Parliament and Council on environmental quality standards in the field of water policy.

(6) DDT total comprises the sum of the isomers 1,1,1-trichloro-2,2 bis (p-chlorophenyl) ethane (CAS number 50-29-3; EU number 200-024-3); 1,1,1-trichloro-2 (o-chlorophenyl)-2-(p-chlorophenyl) ethane (CAS number 789-02-6; EU Number 212-332-5); 1,1-dichloro-2,2 bis (p-chlorophenyl) ethylene (CAS number 72- 55-9; EU Number 200-784-6); and 1,1-dichloro-2,2 bis (p-chlorophenyl) ethane (CAS number 72- 54-8; EUNumber 200-783-0).

(H) Surface Water Regulations 2009 – Priority Hazardous Substances

AA = Annual Average⁽¹⁾, MAC = Maximum Allowable Concentration (µg/l).

Substance	AA-EQS ⁽²⁾ Inland Surface Waters ⁽³⁾	AA-EQS ⁽²⁾ Other Surface Waters ⁽³⁾	MAC-EQS ⁽⁴⁾ Inland Surface Waters ⁽³⁾	MAC-EQS ⁽⁴⁾ Other Surface Waters
Anthracene	0.1	0.1	0.4	0.4
Brominated diphenylether ⁽⁵⁾	0.0005	0.0002	n/a	n/a
Cadmium and its compounds (depending on water hardness) ⁽⁶⁾	≤0.08(Class 1) 0.08 (Class 2) 0.09 (Class3) 0.15 (Class 4) 0.25 (Class 5)	0.2	≤0.45(Class 1) 0.45 (Class 2) 0.6 (Class3) 0.9 (Class 4) 1.5 (Class 5)	≤0.45(Class 1) 0.45 (Class 2) 0.6 (Class3) 0.9 (Class 4) 1.5 (Class 5)
C10-13 Chloroalkanes	0.4	0.4	1.4	1.4
Endosulfan	0.005	0.0005	0.01	0.004
Hexachlorobenzene	0.01	0.01	0.05	0.05

Substance	AA-EQS ⁽²⁾ Inland Surface Waters ⁽³⁾	AA-EQS ⁽²⁾ Other Surface Waters ⁽³⁾	MAC-EQS ⁽⁴⁾ Inland Surface Waters ⁽³⁾	MAC-EQS ⁽⁴⁾ Other Surface Waters
Hexachlorbutadiene	0.1	0.1	0.6	0.6
Hexachlorocyclohexane	0.02	0.002	0.04	0.02
Mercury and its compounds	0.05	0.05	0.07	0.07
Nonylphenol (4-nonylphenol)	0.3	0.3	2.0	2.0
Pentachlorobenzene	0.007	0.0007	n/a	n/a
Polycyclic Aromatic Hydrocarbons (PAH) ⁽⁷⁾	n/a	n/a	n/a	n/a
Benzo(a)pyrene	0.05	0.05	0.1	0.1
Benzo(b)fluoranthene	Σ=0.03	Σ=0.03	n/a	n/a
Benzo(k)fluoranthene				
Benzo(g,h,i)-perylene	Σ=0.002	Σ=0.002	n/a	n/a
Indeno(1,2,3-cd)-pyrene				
Tributyltin Compounds (Tributyltin cations)	0.0002	0.0002	0.0015	0.0015

(1) The calculation of the arithmetic mean and the analytical method used must be in accordance with the technical specifications for chemical monitoring and quality of analytical results to be adopted in accordance with Directive 2000/60/EC of the European Parliament and of the Council, including how to apply an EQS where there is no appropriate analytical method meeting the minimum performance criteria.

(2) This parameter is the Environmental Quality Standard expressed as an annual average value (EQS-AA). Unless otherwise specified, it applies to the total concentration of all isomers.

(3) Inland surface waters encompass rivers and lakes and related artificial or heavily modified water bodies.

(4) This parameter is the Environmental Quality Standard expressed as a maximum allowable concentration (EQS-MAC). Where the MAC-EQS are marked as "not applicable", the AA-EQS values are considered protective against short-term pollution peaks in continuous discharges since they are significantly lower than the values derived on the basis of acute toxicity.

(5) For the group of priority substances covered by brominated diphenylethers listed in Decision 2455/2001/EC, an EQS is established only for congener numbers 28, 47, 99, 100, 153 and 154.

(6) For Cadmium and its compounds the EQS values vary dependent upon the hardness of the water as specified in five class categories (Class 1: < 40 mg CaCO₃/l, Class 2: 40 to < 50 mg CaCO₃/l, Class 3: 50 to <100 mg CaCO₃/l, Class 4: 100 to <200 mg CaCO₃/l and Class 5: ≥ 200 mg CaCO₃/l).

(7) For the group of substances polyaromatic hydrocarbons (PAH) each individual EQS is applicable, i.e. the EQS for Benzo(a)pyrene, the EQS for the sum of Benzo(b)fluoranthene and Benzo(k)fluoranthene and the EQS for the sum of Benzo(g,h,i)perylene and Indeno(1,2,3-cd)pyrene must be met.

(I) Drinking Water**S.I. No. 294 of 1984. European Community (Quality of Surface Water Intended for Human Consumption) Regulations**

Parameters	Unit Of Measurement	Standard for Categories		
		A1	A2	A3
pH	pH Unit	5.5-8.5	5.5-9.0	5.5-9.0
Temperature	°C	25*	25*	25*
Phosphates	mg/l P ₂ O ₅	0.5	0.7	0.7
Dissolved Oxygen saturation rate	% Saturation O ₂	>60%	>50%	>30%
Biochemical Oxygen Demand	mg/l O ₂	5	5	7
Ammonium	mg/l NH ₄	0.2	1.5	4*

*excepting climatic or geographical conditions.

(J) Salmonid Water**S.I. No. 293 of 1988. European Communities (Quality of Salmonid Waters) Regulations**

Parameter	Units	Standard	Sampling Frequency	Conformance to standard
Temperature	°C	Downstream of thermal discharge. Discharge > 1.5°C, temperature of receiving water >21.5°C May-Oct > 10°C Nov-April	Weekly upstream and downstream	98% of time
Dissolved Oxygen (DO)	mg/l O ₂	> 9 danger at 6, Local Authority to prove no harm to fish populations E.U. Directive –guidance limits > 7	Monthly representative of low O ₂ conditions	50% of time 100% of time
pH		≥ 6 ≤ 9 not exceeded ±0.5 change in the receiving water	Monthly	95% of monthly samples 100% when less frequent monitoring
BOD ₅	mg/l O ₂	≤ 5 EU Directive guidance limit <3	Monthly	95% of monthly samples, 100% when less frequently monitored
Total Ammonium	mg/l NH ₄	≤ 1	Monthly	95% of monthly samples, 100% when less frequently monitored
Non-ionized Ammonia	mg/l NH ₃	≤ 0.02	Monthly	95% of monthly samples, 100% when less frequently monitored
Nitrites	mg/l NO ₂	≤ 0.05	Monthly	95% of monthly samples, 100% when less frequently monitored
Total Residual Chlorine	mg/l HOC1	≤ 0.005	Monthly	95% of monthly samples, 100% when less frequently monitored
Total Suspended Solids	mg/l	≤ 25	Monthly	Annual Average
Total Zinc	mg/l Zn	≤ 0.03 (10mg/l CaCO ₃) ≤ 0.2 (50mg/l CaCO ₃) ≤ 0.3 (100mg/l CaCO ₃) ≤ 0.5 (500mg/l CaCO ₃)	Monthly	95% of monthly samples, 100% when less frequently monitored
Dissolved Copper	mg/l Cu	≤ 0.005 (10mg/l CaCO ₃) ≤ 0.022 (50mg/l CaCO ₃) ≤ 0.04 (100mg/l CaCO ₃) ≤ 0.112 (300mg/l CaCO ₃)	Monthly	95% of monthly samples, 100% when less frequently monitored

(K) Shellfish Water

S.I. No. 459 of 2001. Quality of Shellfish Waters (Amendment) Regulations, 2001.

Parameter	Units	Standard	Sampling Frequency	Conformance to standard
Temperature	°C	Discharge affecting shellfish waters should not cause receiving waters to exceed by more than 3 °C the temperature of waters not so affected.	Quarterly	75% of samples over 12 months where sampling is carried out once per quarter
pH	pH unit	> 7 pH < 9	Quarterly	75% of samples over 12 months where sampling is carried out once per quarter
Dissolved Oxygen	% Saturation _{O₂}	≥70% and not < 60% unless not harmful effects on shellfish colonies can be proven	Monthly	

S.I. No. 268 of 2006. Quality of Shellfish Waters (Amendment) Regulations, 2006.

Parameter	Units of Measurement	Standard/Value	Reference Method of analysis or inspection	Frequency of sampling
pH	pH unit	Not less than 7 nor greater than 9	Electrometry	Quarterly Measured in situ at the time of sampling.
Temperature	°C		Thermometry	Quarterly Measured in situ at the time of sampling.
Dissolved Oxygen	% Saturation _{O₂}	(a) equal to or greater than 70 per cent (average value) (b) no individual measurement to indicate a value less than 60 per cent unless it can be established that there are no harmful consequences for the development of shellfish colonies. Should an individual measurement indicate a value less than 70 per cent, measurements must be repeated.	Winkler's method or electrochemical method	Monthly, with a minimum of one sample representative of low oxygen conditions on the day of sampling. However, where major daily variations are suspected, a minimum of two samples in one day must be taken.

(L) Bathing Water

S.I. No. 155 of 1992. Quality of Bathing Waters Regulations, 1992.

Parameter	Unit	Standard
pH		≥6 and ≤9 (To be conformed with by 95% of samples. No two consecutive samples to fall outside the range.)
Dissolved Oxygen	% saturation _{O₂}	≥70 and ≤120 (To be conformed with by 95% of samples. No two consecutive samples to fall outside the range.)

(M) Phosphorus Standards (Largely Superseded by 2009 Regulations)

S.I. No 258 of 1998. Local Government (Water Pollution) Act, 1977 (Water Quality Standards for Phosphorus) Regulations, 1998.

Rivers			
Existing Biological Quality Rating		MRP Median Concentration µg P/l	Minimum Target Biological Quality Target (Q) Rating
5	Unpolluted	15	5
4-5		20	4-5
4		30	4
3-4	Slightly Polluted	30	4
3	Moderately polluted	50	3-4
2-3		70	3
<2	Seriously Polluted	70	3

Lakes			
Existing Trophic Status		Minimum Target Trophic Status	Total Phosphorus Average Concentration (µg P/l)
Ultra-Oligotrophic	Satisfactory	Ultra-Oligotrophic	>5
Oligotrophic		Oligotrophic	>5 - 10
Mesotrophic		Mesotrophic	>10 - 20
Eutrophic	Unsatisfactory	Mesotrophic	>10 - 20
Hypertrophic		Eutrophic	>20 - 50

(N) Supplementary Water Quality Standards

Parameter	Measurement	Standard
Total Coliforms ^a	No. /100ml	(a) ≤ 5,000; (b) ≤ 10,000 (To be conformed with, in the case of (a), by 80% or more of samples and, in the case of (b), by 95% or more of samples. Standard not to be exceeded by any two consecutive samples in any case.)
Faecal Coliforms ^a	No. /100ml	(a) ≤ 1,000; ≤ (b)2,000 (To be conformed with, in the case of (a), by 80% or more of samples and, in the case of (b), by 95% or more of samples. Standard not to be exceeded in any case by any two consecutive samples.)
pH ^a		≥ 6 and ≤ 9 (To be conformed with by 95% or more of samples. No two consecutive samples to fall outside the range.)
Dissolved Oxygen ^a	% Saturation	≤ 70 and ≤ 120 (To be conformed with by 95% or more of samples. No two consecutive samples to fall outside the range.)
Conductivity ^b	µS / cm ²	<1000 @ 20°C
Suspended Solids ^b	mg / L	<35
Nitrate N ^b	mg / L	<0.8
Nitrite N ^b	mg / L	<0.016
Ammonia NH ₃ ^b	mg / L	<0.02
Molybdate Reactive Phosphate P ^b	mg / L	<0.03 = good, >0.1 = Poor
BOD ₅ ^c	mg/l O ₂	≤ 5 EU Directive guidance limit <3

A - Bathing Water Regulations 1992 (SI 155/1992)

B – Local Government Water Pollution Act 1988 (SI 258/1988)

C – European Communities (Quality of Salmonid Waters) Regulations (SI 293/1988)

