

# Annex

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## National Water Quality Standards For Malaysia

PARAMETER	UNIT	CLASS				
		I	IIA/IIB	III <sup>#</sup>	IV	V
Al	mg/l	▲	-	(0.06)	0.5	▲
As	mg/l		0.05	0.4 (0.05)	0.1	
Ba	mg/l		1	-	-	
Cd	mg/l		0.01	0.01* (0.001)	0.01	
Cr (IV)	mg/l		0.05	1.4 (0.05)	0.1	
Cr (III)	mg/l		-	2.5	-	
Cu	mg/l		0.02	-	0.2	
Hardness	mg/l		250	-	-	
Ca	mg/l		-	-	-	
Mg	mg/l		-	-	-	
Na	mg/l		-	-	3 SAR	
K	mg/l		-	-	-	
Fe	mg/l		1	1	1 (Leaf) 5 (Others)	
Pb	mg/l		0.05	0.02* (0.01)	5	
Mn	mg/l		0.1	0.1	0.2	
Hg	mg/l	N	0.001	0.004 (0.0001)	0.002	
Ni	mg/l	A	0.05	0.9*	0.2	
Se	mg/l	T	0.01	0.25 (0.04)	0.02	
Ag	mg/l	U	0.05	0.0002	-	
Sn	mg/l	R	-	0.004	-	
U	mg/l	A	-	-	-	
Zn	mg/l	L	5	0.4*	2	
B	mg/l		1	(3.4)	0.8	
Cl	mg/l	L	200	-	80	
Cl <sub>2</sub>	mg/l	E	-	(0.02)	-	
CN	mg/l	V	0.02	0.06 (0.02)	-	
F	mg/l	E	1.5	10	1	
NO <sub>2</sub>	mg/l	L	0.4	0.4 (0.03)	-	
NO <sub>3</sub>	mg/l	S	7	-	5	
P	mg/l		0.2	0.1	-	
Silica	mg/l	O	50	-	-	
SO <sub>4</sub>	mg/l	R	250	-	-	
S	mg/l		0.05	(0.001)	-	
CO <sub>2</sub>	mg/l	A	-	-	-	
Gross-α	Bq/l	B	0.1	-	-	
Gross-β	Bq/l	S	1	-	-	
Ra-226	Bq/l	E	< 0.1	-	-	
Sr-90	Bq/l	N	< 1	-	-	
CCE	µg/l	T	500	-	-	
MBAS/BAS	µg/l		500	5000 (200)	-	
O & G (Mineral)	µg/l		40; N	N	-	
O & G (Emulsified Edible)	µg/l		7000; N	N	-	
PCB	µg/l		0.1	6 (0.05)	-	
Phenol	µg/l		10	-	-	
Aldrin/Dieldrin	µg/l		0.02	0.2 (0.01)	-	
BHC	µg/l		2	9 (0.1)	-	
Chlordane	µg/l		0.08	2 (0.02)	-	
t-DDT	µg/l		0.1	(1)	-	
Endosulfan	µg/l		10	-	-	
Heptachlor/Epoxide	µg/l		0.05	0.9 (0.06)	-	
Lindane	µg/l		2	3 (0.4)	-	
2,4-D	µg/l		70	450	-	
2,4,5-T	µg/l		10	160	-	
2,4,5-TP	µg/l		4	850	-	
Paraquat	µg/l	▼	10	1800	-	

## Notes :

\* = At hardness 50 mg/l CaCO<sub>3</sub>

# = Maximum (unbracketed) and 24-hour average (bracketed) concentrations

N = Free from visible film sheen, discolouration and deposits

### National Water Quality Standards For Malaysia

PARAMETER	UNIT	CLASS					
		I	IIA	IIB	III	IV	V
Ammoniacal Nitrogen	mg/l	0.1	0.3	0.3	0.9	2.7	> 2.7
Biochemical Oxygen Demand	mg/l	1	3	3	6	12	> 12
Chemical Oxygen Demand	mg/l	10	25	25	50	100	> 100
Dissolved Oxygen	mg/l	7	5 - 7	5 - 7	3 - 5	< 3	< 1
pH	-	6.5 - 8.5	6 - 9	6 - 9	5 - 9	5 - 9	-
Colour	TCU	15	150	150	-	-	-
Electrical Conductivity*	µS/cm	1000	1000	-	-	6000	-
Floatables	-	N	N	N	-	-	-
Odour	-	N	N	N	-	-	-
Salinity	%	0.5	1	-	-	2	-
Taste	-	N	N	N	-	-	-
Total Dissolved Solid	mg/l	500	1000	-	-	4000	-
Total Suspended Solid	mg/l	25	50	50	150	300	300
Temperature	°C	-	Normal + 2 °C	-	Normal + 2 °C	-	-
Turbidity	NTU	5	50	50	-	-	-
Faecal Coliform**	count/100 ml	10	100	400	5000 (20000) <sup>a</sup>	5000 (20000) <sup>a</sup>	-
Total Coliform	count/100 ml	100	5000	5000	50000	50000	> 50000

**Notes :**

*N* : No visible floatable materials or debris, no objectional odour or no objectional taste

*\** : Related parameters, only one recommended for use

*\*\** : Geometric mean

*a* : Maximum not to be exceeded

### Water Classes And Uses

CLASS	USES
Class I	Conservation of natural environment. Water Supply I – Practically no treatment necessary. Fishery I – Very sensitive aquatic species.
Class IIA	Water Supply II – Conventional treatment required. Fishery II – Sensitive aquatic species.
Class IIB	Recreational use with body contact.
Class III	Water Supply III – Extensive treatment required. Fishery III – Common, of economic value and tolerant species; livestock drinking.
Class IV	Irrigation
Class V	None of the above.

DOE Water Quality Classification Based On Water Quality Index

SUB INDEX & WATER QUALITY INDEX	INDEX RANGE		
	CLEAN	SLIGHTLY POLLUTED	POLLUTED
Biochemical Oxygen Demand (BOD)	91 - 100	80 - 90	0 - 79
Ammoniacal Nitrogen (NH <sub>3</sub> -N)	92 - 100	71 - 91	0 - 70
Suspended Solids (SS)	76 - 100	70 - 75	0 - 69
Water Quality Index (WQI)	81 - 100	60 - 80	0 - 59

DOE Water Quality Index Classification

PARAMETER	UNIT	CLASS				
		I	II	III	IV	V
Ammoniacal Nitrogen	mg/l	< 0.1	0.1 – 0.3	0.3 – 0.9	0.9 – 2.7	> 2.7
Biochemical Oxygen Demand	mg/l	< 1	1 – 3	3 – 6	6 – 12	> 12
Chemical Oxygen Demand	mg/l	< 10	10 – 25	25 – 50	50 – 100	> 100
Dissolved Oxygen	mg/l	> 7	5 – 7	3 – 5	1 – 3	< 1
pH	-	> 7.0	6.0 – 7.0	5.0 – 6.0	< 5.0	> 5.0
Total Suspended Solid	mg/l	< 25	25 – 50	50 – 150	150 – 300	> 300
Water Quality Index (WQI)		> 92.7	76.5 – 92.7	51.9 – 76.5	31.0 – 51.9	< 31.0

WQI FORMULA AND CALCULATION

FORMULA

WQI = (0.22 \* SIDO) + (0.19 \* SIBOD) + (0.16 \* SICOD) + (0.15 \* SIAN) + (0.16 \* SISS) + (0.12 \* SlpH)  
 where;

- SIDO = Subindex DO (% saturation)
- SIBOD = Subindex BOD
- SICOD = Subindex COD
- SIAN = Subindex NH<sub>3</sub>-N
- SISS = Subindex SS
- SlpH = Subindex pH
- 0 ≤ WQI ≤ 100

BEST FIT EQUATIONS FOR THE ESTIMATION OF VARIOUS SUBINDEX VALUES

Subindex for DO (in % saturation)

- SIDO = 0 for x ≤ 8
- SIDO = 100 for x ≥ 92
- SIDO = -0.395 + 0.030x<sup>2</sup> - 0.00020x<sup>3</sup> for 8 < x < 92

Subindex for BOD

- SIBOD = 100.4 - 4.23x for x ≤ 5
- SIBOD = 108 \* exp(-0.055x) - 0.1x for x > 5

Subindex for COD

- SICOD = -1.33x + 99.1 for x ≤ 20
- SICOD = 103 \* exp(-0.0157x) - 0.04x for x > 20

Subindex for NH<sub>3</sub>-N

- SIAN = 100.5 - 105x for x ≤ 0.3
- SIAN = 94 \* exp(-0.573x) - 5 \* | x - 2 | for 0.3 < x < 4
- SIAN = 0 for x ≥ 4

Subindex for SS

- SISS = 97.5 \* exp(-0.00676x) + 0.05x for x ≤ 100
- SISS = 71 \* exp(-0.0061x) - 0.015x for 100 < x < 1000
- SISS = 0 for x ≥ 1000

Subindex for pH

- SlpH = 17.2 - 17.2x + 5.02x<sup>2</sup> for x < 5.5
- SlpH = -242 + 95.5x - 6.67x<sup>2</sup> for 5.5 ≤ x < 7
- SlpH = -181 + 82.4x - 6.05x<sup>2</sup> for 7 ≤ x < 8.75
- SlpH = 536 - 77.0x + 2.76x<sup>2</sup> for x ≥ 8.75

Note: \* means multiply with

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