

Legislative Council Panel on Environmental Affairs

Water Pollution Control Ordinance, Chapter 358

**Proposed Amendments to the Technical Memorandum on Effluent
Standards**

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Submission

by

Centre for Environmental Engineering Research

Faculty of Engineering

The University of Hong Kong

Members of the Centre for Environmental Engineering Research of Engineering Faculty at The University of Hong Kong would like to offer their views on some aspects of the proposed amendments to the Technical Memorandum on Effluent Standards. These views are based on a careful analysis of the briefing document as well as on our extensive local and international experience in academic research and consulting in environmental engineering.

1. Streamlining of flow bands

The simplification of the existing discharge flow bands is a positive step forward. However, it would be desirable to see that a minimum standard be set for all flows ≥ 1000 m³/day, in addition to the proposed two flow bands of ≤ 100 m³/day and 100-1000 m³/day. This minimum standard should not be less stringent than that for discharges of 100-1000 m³/day. The introduction of such minimum effluent standard should not preclude that effluent standards for discharges of ≥ 1000 m³/day could be set on a case-by-case basis when necessary.

A minimum standard for discharges of ≥ 1000 m³/day would eliminate any possible differences in effluent standards between the privately and publicly operated sewage treatment works by providing more equitability and transparency as most private sewage treatment works have capacity below 1000 m³/day, whilst the public sewage treatment works generally have a capacity greater than 1000 m³/day. A review of international practice showed that no upper flow limits exist elsewhere, for example in China (*Chinese Integrated Wastewater Discharge Standard GB8978-1996*) or in the countries of the European Union (*Urban Wastewater Treatment Directive 91/271/EEC*)

(see Attachment 1).

2. New groupings of inland and coastal waters

Again, the simplified groupings of inland and coastal waters are a positive step forward. However, there are substantial discrepancies between the revised effluent standards for marine (Group C) coastal waters and those for inshore (Group B) coastal waters. The proposed effluent standard for discharge to marine (Group C) coastal waters appears greatly relaxed when compared to the previous standard and permits to discharge wastewater with a composition similar to Hong Kong domestic sewage without any treatment required except for reduction in *E. coli* concentration. No rationale is given to justify these discrepancies, either in terms of science, water quality objectives, results of modelling studies, or field monitoring data.

3. Effluent standards on *E. coli*

The *E. coli* effluent standards for discharge to Groups A, B, and C coastal waters are set at 1000, 1000 and 4000 cfu per 100 mL, respectively. It should be noted that generally no *E. coli* standards are applied elsewhere, for example in China (*Chinese Integrated Wastewater Discharge Standard GB8978-1996*) or in the countries of the European Union (*Urban Wastewater Treatment Directive 91/271/EEC*). *E. coli* standards are set only in very special circumstances, in particular for direct discharges in proximity to bathing beaches, fish cultures, etc. Besides, most disinfection technologies cannot be applied effectively to sewage unless it has undergone secondary treatment or at least chemically enhanced primary treatment (CEPT). Hence the effluent standard of *E. coli* for marine (Group C) coastal waters is not practicable to implement. Since the effluent standards for discharge to semi-enclosed (Group A) and inshore (Group B) coastal waters already imply secondary treatment, it is suggested that *E. coli* effluent standards are set on a case-by-case basis when necessary. The same applies for discharges to marine (Group C) coastal waters.

4. Tightening of nutrient standards to semi-enclosed coastal waters (Group A)

The tightening of nutrient standards to semi-enclosed (Group A) coastal waters of limited hydraulic mixing capacity is very welcome. However, for the most sensitive Group A waters the N:P ratio for the maximum permissible concentrations (i.e. 15 mg/L for TN and 3 mg/L for TP) is set at 3, while the N:P ratio is set at 10 (i.e. 80 mg/L for TN and 8 mg/L for TP) for Groups B and C coastal waters. The reason for this low ratio for semi-enclosed (Group A) coastal water appears unclear.

The 5 mg/L effluent standard of TP for semi-enclosed (Group A) appears to be inconsistent with tightening effluent standards. It is therefore suggested to lower the effluent standard of TP for semi-enclosed (Group A) waters from 5 mg/L to 1.5 or 2 mg/L, particularly for discharges above 1000 m³/d, as being practice in China (*Chinese Integrated Wastewater Discharge Standard GB8978-1996*) and in the

European Union (*Urban Wastewater Treatment Directive 91/271/EEC*) (see Attachment 1).

The effluent standard of total nitrogen (TN) for discharge to semi-enclosed and inshore (Groups B and C) coastal waters is set at 80 mg/L. This concentration greatly exceeds the nitrogen concentration in domestic sewage and appears to be superfluous. The same applies to the TP effluent standards of 8 mg/L. The inclusion of these standards appears therefore unnecessary.

SUMMARY:

The proposed amendments greatly improve the current system of effluent standards. However, the following changes are suggested to achieve more equitability and more effective water protection:

- 1. Introduction of minimum effluent standards for flows greater than 1000 m³/d;**
- 2. Tightening of effluent standards to marine (Group C) coastal waters, preferably equal to secondary treatment with nitrification;**
- 3. Setting *E. coli* standards on a case-by-case basis when necessary, instead of the current mandatory basis; and**
- 4. Possible tightening of the effluent standard to semi-enclosed (Group A) coastal waters for total phosphorus (TP) from 5 mg/L to 1.5 or 2 mg/L.**

Water Quality Objectives

New Standards for Effluents, 100-1000 m³/d
Existing Standards for Effluents, 5000-6000 m³/d (in brackets)

			Water Quality Objectives		DO mg/L	E.coli cfu/100mL	TIN mg/L	NH ₃ -N mg/L	Chl-a µg/L	New Standards for Effluents, 100-1000 m ³ /d Existing Standards for Effluents, 5000-6000 m ³ /d (in brackets)							
			Bottom	Column						BOD ₅	COD	TSS mg/L	NH ₃ -N	TN	TP	E.coli cfu/100 mL	
Group A waters	Group I	Tolo Harbour								20 (10)	80 (50)	30 (15-25)	5 -	15 (10-50)	5 (5)	1000 (1000)	
		Harbour Subzone	>2	>4		<610			<20								
		Buffer Subzone	>3	>4		<610			<10								
			Channel Subzone	>4	>4		<610		<6								
	Group II	Port Shelter	>2	>4		<610		<0.1	<0.021								
		Deep Bay															
Inner Subzone			>4 (S)				<0.7	<0.021									
		Outer Subzone	>2	>4			<0.5	<0.021									
Group B waters	Group IIIa	Victoria Harbour inshore	>2	>4			<0.4	<0.021		20 (20)	80 (80)	30 (30)	5 -	80 (30-50)	8 5	1000 (1000-5000)	
	Group IVa	Southern	>2	>4		<610	<0.1	<0.021									
		Mirs Bay	>2	>4		<610	<0.3	<0.021									
			Western Buffer	>2	>4			<0.4	<0.021								
			Eastern Buffer	>2	>4			<0.4	<0.021								
			Junk Bay	>2	>4			<0.3	<0.021								
			North Western inshore	>2	>4			<0.5	<0.021								
Group C waters	Group IIIb	Victoria Harbour marine	>2	>4			<0.4	<0.021		300 (30-40)	600 (80-85)	300 (30-40)	20 -	80 (50)	8 (5)	4000 (4000-5000)	
	Group IVb	Southern	>2	>4		<610	<0.1	<0.021									
		Mirs Bay	>2	>4		<610	<0.3	<0.021									
			Western Buffer	>2	>4			<0.4	<0.021								
			Eastern Buffer	>2	>4			<0.4	<0.021								
			Junk Bay	>2	>4			<0.3	<0.021								
		North Western marine	>2	>4			<0.5	<0.021									
Foul sewers										800 (800)	2000 (2000)	800 (800)	- -	200 (100)	50 (25)	- (-)	
Typical Hong Kong sewage										250	500	300	25	50	6	15000000	
Urban Wastewater Treatment Directive (91/271/EEC)																	
<10,000 – 100,000 PE (~2,000 – 20,000 m ³ /d)										25	125	35	-	15*	2*	-	
> 100,000 PE (> 20,000 m ³ /d)										25	125	35	-	10*	1*	-	
* for sensitive areas only																	
Chinese Integrated Wastewater Discharge Standard (GB 8978-1996)																	
Class A (for discharge into Class D surface water area in GB3838 and Class 2 sea area [recreational with body contact] in GB3097)										20	60	20	15	-	0.5*	-	
Class B (for discharge into Class D and E surface water areas in GB 3838 and Class 3 sea area [coastal scenic sites] in GB3097)										30	120	30	25	-	1.0*	-	
Class C (for discharge to sewers)										-	-	-	-	-	-	-	
*Phosphate (as P)																	

Attachment 1