



Review and Development of Marine Water Quality Objectives

First Stage Public Engagement

Technical Note

Review of Local Conditions and Overseas Practices

Table of Contents

	Page
1. <u>Introduction</u>	1
2. Characterization of marine waters in Hong Kong	1
2.1 Beneficial uses and sensitive receivers	1
2.2 General hydrography, water quality and major biological communities	7
2.3 Characterization of pollution sources and levels	18
3. Existing Water Quality Objectives	24
3.1 Areas of improvement, and changes identified	24
4. Review of overseas practices for marine Water Quality Objectives	27
4.1 Nutrients and physical characteristics	28
4.2 Toxic substances	29
4.3 Biological criteria	30
4.4 Microbiological WQOs for bathing waters	33
4.5 Water quality guidelines relating to bioaccumulation and mariculture	36
4.6 Summary of the Mainland and overseas practices for WQOs	42
5. <u>References</u>	45
6. Appendices	53
A1 List of water quality parameters and indicators to be investigated	54
A2 – A6 The Mainland and overseas WQOs	56

List of Tables		<u>Page</u>
Table 2.1	Summary on present beneficial uses and sensitive receivers in the 7 water bodies of Hong Kong.	4
Table 2.2	Summary on physical characteristics and water quality of the 7 water bodies of Hong Kong.	10
Table 4.1	Summary of bacterial water guidelines/standards for bathing waters.	35
Table 4.2	Summary of approaches, legislative framework and policies, methods of derivation of WQOs, practices of review and compliance for marine waters amongst the Mainland and overseas jurisdictions.	43
List of Figures		
Figure 2.1	Seven water bodies for characterization of marine waters of Hong Kong	2
Figure 2.2	Different habitats for aquatic life and various beneficial uses in the marine waters of Hong Kong	3
Figure 2.3	Water Quality Changes in Hong Kong, 1986 – 2008	13
Figure 2.4	Water Quality Changes in the Deep Bay Water Control Zone, 1986 – 2008	14
Figure 2.5	Water Quality Changes in the Tolo Harbour and Channel Water Control Zone, $1986-2008$	15
Figure 2.6	Water Quality Changes in the Victoria Harbour Water Control Zone, 1986 – 2008	16
Figure 2.7	Red Tide Incidents and WQO Compliance in Hong Kong Waters, 1986 - 2008	17
Figure 2.8	Influence of Pearl Estuary Flow on Deep Bay Water Quality	19
Figure 2.9	Sampling Locations for the Marine Environment under EPD's Toxic Substances Monitoring Programme	20
Figure 2.10	Levels of Toxic Substances in Hong Kong's Marine Water	21
Figure 2.11	Levels of Trace Organic Compounds in Hong Kong's Marine Sediments	21
Figure 2.12	Levels of Organic Compounds in Hong Kong's Marine Sediments	22
Figure 2.13	Levels of Metal and Inorganic Compounds in Hong Kong's Marine Sediments	22
Figure 2.14	Levels of Trace Organic Compounds in Marine Biota collected from Hong Kong	23
Figure 2.15	Levels of Metal and Metallic Compounds in Marine Biota collected from Hong Kong	23

List of Abbreviations/Acronyms

% percent

% part(s) per thousand

°C degree Celsius AA Annual Average

ADI Acceptable Daily Intake
AF Assessment Factor

AFCD Agriculture, Fisheries and Conservation Department

AFRI Acute Febrile Respiratory Illness

Ag Silver Al Aluminum

ANZECC Australian and New Zealand Environment and Conservation Council

APEC Asia Pacific Economic Cooperation

ARMCANZ Agriculture and Resource Management Council of Australian and New

Zealand

As Arsenic

ASEAN Association of Southern Asian Nations

BAF Bioaccumulation factor

BC British Columbia

BCF Bioconcentration factor
BMF Biomagnification factor
BOD Biological Oxygen Demand

BU Beneficial Use bw body weight

C_b Background concentration

CCC Criterion Continuous Concentration

CCME Canadian Council of Ministers of the Environment CCPC Centre for Coastal Pollution and Conservation

CCREM Canadian Council of Resource and Environment Ministers

Cd Cadmium

CEPT Chemically Enhanced Primary Treatment

cfu colony-forming unit(s)

CITYU City University of Hong Kong
CMC Criterion Maximum Concentration

Co Cobalt

COD Chemical oxygen demand

Cr Chromium
Cu Copper

DDD Dichlorodiphenyldichloroethane
DDE Dichlorodiphenyldichloroethylene

DDT Dichlorodiphenyltrichloroethane

DO Dissolved Oxygen

dw Dry weight

EC European Commission

EC₅₀ Half maximal effective concentration EPA Environmental Protection Agency EPD Environmental Protection Department

EQG Environmental quality guideline EQS Environmental quality standard

ERL Environmental risk limit

ERM Environmental Resources Management

EU European Union

FAO Food and Agriculture Organization of the United Nations

FAV Final Acute Value FCV Final Chronic Value

FI Fish Intake

FSANZ Food Safety Authority of Australia and New Zealand

g gram(s) ha hectare(s)

HATS Harbour Area Treatment Scheme

HC₅ Concentration that protects 95% of the species in the species sensitivity

distribution of NOEC or EC10 data

HCB Hexachlorobenzene HCH Hexachlorocyclohexane

Hg Mercury

HKSAR Hong Kong Special Administrative Region

HU Hazen Unit(s) kg kilogram(s)

km² Square kilometer(s)

K_{ow} Octanol-water partition coefficient

L liter(s)

LC₅₀ Lethal concentration to 50% of test species LOEC Lowest Observable Effect Concentration

LOEL Lowest Observable Effects Level

m meter(s)

MAC Maximum Allowable Concentration

MAC_{eco} Maximum Acceptable Concentration for ecosystems

MAC-EQS Maximum Allowable Concentration in water for protection against

short-term, direct and acute ecotoxic effects

MEP Ministry of Environment

mg milligram(s)
Mg Magnesium

mL milliliter(s)

MPC Maximum permissible concentration

N Nitrogen

NA Negligible addition from the maximum permissible level

NC Negligible Concentration

ng nanogram(s)

NGO Non-Governmental Organization

NH₃ Ammonia

NH₃-N Ammonia nitrogen

NHMRC National Health & Medical Research Council

Ni Nickel NO₂ Nitrite NO₃ Nitrate

NOAEL No Observed Adverse Effect Level NOEC No Observed Effect Concentration

NO_x Nitrogen oxide (nitrate and nitrite compounds)

NTU Nephelometric Turbidity unit(s)

O₂ Oxygen

OECD Organization for Economic Co-operation and Development

P Phosphorus

PAH Polyaromatic hydrocarbon

Pb Lead

PBDE Polybrominated diphenyl ethers

PCB Polychlorinated biphenyl

PCDDs Polychlorinated dibenzo-p-dioxins PCDFs Polychlorinate dibenzofurans

Pg picogram(s)

PNEC Predicted Non-Effect Concentration

PNEC_{oral} Predicted No Effect Concentration from oral intake

POPs Persistent organic pollutants

PRD Pearl River Delta

Pt Platinum

QS Quality Standard

RC Reference Concentration

RfD Reference Dose

RIVM National Institute of Public Health and the Environment

s second(s)

SCTEE Scientific Committee on Toxicity, Ecotoxicology and the Environment

SF Safety Factor

spb secondary poisoning of biota SRC Serious Risk Concentration SS Suspended Solids

SSD Species Sensitivity Distribution
SSDS Strategic Sewage Disposal Scheme
SSSI Site of Special Scientific Interest

STW Sewage Treatment Work

TBT Tributyltin

TDI Tolerable Daily Intake
 TDS Total Dissolved Ssolids
 TEQ Toxicity Equivalent
 TIN Total Inorganic Nitrogen

TL Threshold Level TN Total Nitrogen

TON Threshold Odour Number

TP Total Phosphorus

TRC Tissue Residue Criterion
TRG Tissue Residue Guideline

UK United Kingdom

UKTAG United Kingdom's Technical Advisory Group

US United States

USA United States of America

USEPA United States Environmental Protection Agency

V Vanadium

VROM Ministry of Housing, Spatial Planning and the Environment

WCZ Water Control Zone

WHO World Health Organization
WQC Water Quality Criteria
WQG Water Quality Guideline
WQO Water Quality Objective
WQS Water Quality Standard

ww Wet weight

Zn Zinc

μg microgram(s)