Environmental Impact Assessment Ordinance (EIAO), Cap.499
Application for Approval of an Environmental Impact Assessment Report
Harbour Area Treatment Scheme (HATS) - Provision of Disinfection Facilities
At Stonecutter Island Sewage Treatment Works
Request for Further Information under Section 8(1)
(Application No. EIA – 134/2007)

Responses to Comments

No.	Comments	Responses
	Environmental Protection Department, letter ref. F(16) in EP2/G/F/134 II date 24 October 2007	
1.	I refer to your application received on 1 June 2007 for approval of the EIA report wader section 6(2) of the EIA Ordinance.	
2.	Pursuant to section 8(1) of the EIA Ordinance, and further to our letter dated 18 October 2007 supplying you one set of written comments received from members of the public and the Advisory Council on the Environment (ACE), you are asked to give us information related to the following:	
3.	**Point 1** Clarification of whether the fish eggs and larvae would be adversely impacted by the chlorinated/dechlorinated (C/D) effluent discharge, when the response of fish eggs and larvae are likely to be different from the 5 marine species adopted in the whole effluent toxicity test.	Fish eggs and larvae would not be adversely impacted by the C/D effluent discharge. This conclusion was made not in the context of whole effluent toxicity but in the context of impact on fishery resources. This conclusion was derived from the following: 1) Total residual chlorine (TRC) discharge standard (0.2 mg/l) will be less than the TRC concentration of 0.31-0.38 mg/l reported in literature that could cause abnormal development of fish eggs and larvae. Actual TRC concentration at the edge of ZID after initial dilution of 34 times minimum would be considerably less than the discharge standard. (Sections 9.36 and 9.37) 2) The nearest spawning ground is over 14 km from the SCISTW outfall. (Section 9.25) 3) The nearest nursery ground is over 40 km from the SCISTW outfall. (Section 9.26) 4) Dichloroacetic acid would have the largest mixing zone among all chlorination by-products (CBP) detected, with a size of 1,685 m x 2,450 m in the wet season of year 2020 (Table 5.42). At the edge of this mixing zone, all CBPs detected would be at background levels. The CBP impacted area is therefore inside this

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		mixing zone, which is more than 10 km from the nearest spawning ground and more than 35 km from the nearest nursery ground.
	Point 2 Clarification of why the adopted acute to chronic ratio of 10 is directly applicable to Hong Kong waters, and whether any adjustment of ACR is needed in order to come up with potentially more accurate calculations for the chronic toxicity.	The direct use of available chronic toxicity results is usually preferred over the conversion of acute toxicity to chronic toxicity using ACR as the conversion factor. In Hong Kong, standard methodology for chronic toxicity test is only available for diatom. No standard methodology for assessing the chronic toxicity of other species has been developed. In the absence of chronic toxicity results, the application of an ACR value of 10 to convert acute toxicity to chronic toxicity is acceptable to the USEPA and was considered applicable to our current study. The ACR of "10" is the upper 90th percentile of all the acute-to-chronic data obtained from experiments quoted in USEPA (1991), which gives a conservative estimate for the extrapolated chronic toxicity. It should also provide ample protection against chronic in-stream impacts. In our EIA study, we directly used the chronic toxicity results (No Observable Effect Concentration) of diatoms to calculate the chronic toxicity unit, which was 3.68 (Table 5.43b). We also used the ACR ratio of 10 to convert the acute toxicity of barnacle larvae to chronic toxicity, and the resulting chronic toxicity unit was 24.9 (Section 7.25). Although it would be preferable to use chronic toxicity test results directly, we actually took a more prudent and conservative approach by using the chronic toxicity of barnacle larvae derived from ACR conversion. Using a chronic toxicity unit of 24.9 for the C/D effluent and a dilution of 127 times at the edge of the mixing zone, the chronic toxicity unit at the edge of the mixing zone is 0.196 (Table 7.8), which is 4 times below the USEPA criterion of 1.0 (Section 7.40). In view of the very conservative approach taken and the large margin of compliance, no adjustment is considered needed.
	Point 3 Clarification and information of the long term	Chlorination by-products are principally a

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	monitoring results on the by-products from C/D from other sewage treatment works using similar technology for this project.	drinking water issue and not a sewage discharge issue. We are not aware of any environmental monitoring program specifically for chlorination by-products by any sewage treatment works anywhere in the world. With a 1.8 million m^3/day treatment capacity, the Deer Island STW was one which has a treatment process and capacity that is comparable with those of the SCISTW (1.7 million m^3/d). When conducting the disinfection technology survey, we had checked with the authorities of the surveyed STWs on the environmental impacts due to discharge of chlorinated/de-chlorinated effluent to marine environment. We were advised that no unacceptable environmental impacts on receiving waters arising from discharge of chlorinated/de-chlorinated effluent were observed based on their experiences. In the US, discharge of effluent from a sewage treatment works (STW) to receiving waters is regulated under the National Pollution Discharge Elimination System (NPDES). All discharge permits specify effluent limitations and monitoring requirements. Generally, the monitoring parameters for effluent discharge include the following 10 groups: • conventional parameters e.g. BOD_5 • nutrients • metals • cyanide • oil & grease, surfactants, petroleum hydrocarbons • semi-volatile organics • volatile organics • organochlorine pesticides and PCBs • polycyclic aromatic hydrocarbons • acute & chronic toxicity The above monitoring parameters are applied to all sewage treatment works with or without disinfection and mainly for monitoring industrial discharge. When chlorination is adopted for effluent disinfection, limit for total chlorine residual (TCR) is required for controlling the acute impact on marine environment. No particular monitoring for by-products from chlorination/dechlorination disinfection of wastewater is currently required in the US.

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	Point 4 Clarification of whether the ecological risks posed by chloroacetic acid and bromoacetic acid will be affected by salinity of the testing medium. Whether any adjustment need to be made to the reference value used, and whether uncertainty factors would need to be incorporated during the derivation of the toxicity reference value of these two chemicals.	The first page of Annex B of the EIA report lists our criteria adopted in deriving the TRV, which shows our preference of marine species over fresh water species. Since no marine species data was available from literature on chloroacetic acid and dibromoacetic acid, their TRV's were therefore derived from freshwater species. Uncertainty factor is generally not applied for conversion of TRV for risk assessment in the marine environment from freshwater species toxicity data, as reviewed in previous relevant studies and USEPA assessment protocol. Please note that bromoacetic acid was not selected as a Contaminant of Concern (COC) in the risk assessment. The rules of COC selection are detailed in paragraph 1.17 of Appendix 7-1 of the EIA report. Also, the Hazard Quotients (HQ) of the chloroacetic acid (7.0×10^{-7} to 1.2×10^{-6}) and dibromoacetic acid (3.4×10^{-5} to 1.4×10^{-4}) are very low. Application of an uncertainty factor of as high as 100 would not result in considerable increase to HQ and HI level. An increase of HQ / HI level up to only 0.014 would result if an uncertainty factor of 100 were applied to the above two chemicals.