5. HUMAN HEALTH RISK

Introduction

5.1 The Human Health Risk Assessment (HHRA) in the EIA Report, which focused on assessing the potential risks/impacts to human health due to chronic exposure to the contaminants produced in the disinfection process (i.e. disinfectant residual and chlorination by-products, CBPs) in the SCISTW effluent discharge, predicted that the potential total residual chlorine (TRC) and CBPs present in the chlorinated/dechlorinated SCISTW CEPT effluent discharge would not induce unacceptable risk/impact to human health.

5.2 A monitoring programme for the concentration of TRC and CBPs in SCISTW effluent and seawater is recommended and detailed in **Section 4**. The monitoring programme aims to achieve the following objectives:

- To check whether the Project would cause an increase in TRC and CBP concentrations in seawater
- To verify the predictions of the HHRA; and
- To verify the predictions of the Ecological Risk Assessment

Scope

5.3 Although the HHRA conducted for the EIA Study has covered the potential human health impact due to TRC and CBPs discharged during ADF Stage, Stage 2A and Stage 2B of the HATS operation as well as the cumulative risk impact due to other pollutants present in the HATS effluent, the scope of this monitoring programme for the Project shall be limited to the TRC and CBPs. The proposed monitoring programme shall be conducted one year before and after the commissioning of the Project for baseline monitoring and operation phase monitoring respectively.

CBPs Monitoring Programme

5.4 The scope, requirements, methodology, equipment, monitoring locations and schedule of the CBPs monitoring programme (both baseline and operation phase monitoring) as well as the statistical analysis of monitoring data have been detailed in **Section 4** of the EM&A Manual.

Human Health Risk Assessment

5.5 If statistical analysis of baseline and operation phase monitoring data reveals that seawater concentration of TRC and/or CBPs (one or more) increases after operation of the Project, the monitoring data collected in effluent quality monitoring shall be used to provide information to investigate whether such increase is due to the effluent discharged by the Project. If such increase is found to be due to the Project operation, HHRA using the operation phase monitoring data should be conducted to verify if the human health risk due to TRC and CBPs discharged from SCISTW effluent is acceptable.

5.6 The HHRA shall follow the approach and methodology adopted in the EIA Study which has been presented in **Appendix 6.1** of the EIA Report. The HHRA will consist of the following 5 stages:

- Problem Formulation
- Hazard Identification
- Exposure Assessment
- Dose-response Assessment
- Risk/hazard Characterization

5.7 Apart from the chemical analysis data obtained from the monitoring programme, the following data are needed in the HHRA:

- Human receptor parameter values including seafood consumption rate and frequency
- Parameters related to CBPs including bioconcentration factor, food chain multiplier and dermal exposure related parameters
- Health benchmarks (i.e. cancer slope factor and reference dose) of CBPs

5.8 The above data items used in the EIA Study should be reviewed and updated by the Environmental

Consultant (if more up-to-date data is available) when performing the HHRA. Should the HHRA results reveal that there is potential occurrence of unacceptable human health risk, a review of HHRA shall be conducted, which shall involve:

- Identifying major exposure pathway[1] to potential CBPs contributing to the calculated health risk
- Reviewing and using more realistic exposure assumptions related to the identified major exposure pathway to refine the HHRA results
- If potential occurrence of unacceptable human health risk is still found in the refined HHRA, measures to prevent potential CBPs exposure (e.g. restriction of water related activities at location near SCISTW effluent diffuser, restriction of fisheries activities within the ZID of the HATS effluent[2]) shall be considered
- Extension of CBPs monitoring programme (in terms of location[3] and duration) may be considered to obtain data for more realistic risk estimation

[1] Note: HHRA conducted in the EIA Study revealed that seawater ingestion and dermal contact during swimming activity would be the major exposure pathways contributing to the estimated health risk.
[2] Restriction of fisheries activities within the ZID of the HATS effluent has been currently exercised.
[3] Bathing beaches and fish cultural zones near the HATS effluent diffuser.