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Assessment of potable Municipal water quality with respect to Total Trihalomethanes (TTHMs) in Colombo & Gampaha Districts using a Risk Index

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Chlorine is used as disinfectant to destroy microorganisms in drinking water. Chlorine reacts with humic acid and fulvic acid to form disinfection by- products (DBPs) including Trihalomethanes (THMs).

$OCl^- + Br^- \longrightarrow OBr^-$; Humic acid, Fulvic acid $+ OCl^- + OBr^- \longrightarrow$ DBPs

The main objective of this study is to determine the THMs, supplied to Colombo & Gampaha and determination of their risk.

A Risk index of potable municipal water is defined as a composite influence of a number of individual water quality determinants with respect to TTHMs. They are Tri Chloromethane ($CHCl_3$), Bromo Dichloromethane ($CHBrCl_2$), Dibromo Chloromethane ($CHBr_2Cl$) & Tri Bromomethane ($CHBr_3$).

All treatment plants observed at least two compounds out of four THM compounds. Therefore it is very significant to consider the sum of the concentration of each to its respective guideline value rather than considering the guideline value of a single compound. World Health Organization (WHO) recommends the following approach. For the assessment of overall risk of TTHMs.

$$\frac{C_{Bromoform}}{GV_{Bromoform}} + \frac{C_{BDCM}}{GV_{BDCM}} + \frac{C_{DBCM}}{GV_{DBCM}} + \frac{C_{Chloroform}}{GV_{Chloroform}} \leq 1$$

$C_{Bromoform}$ = concentration of $CHBr_3$, C_{DBCM} = concentration $CHBr_2Cl$,
C_{BDCM} = concentration of $CHBrCl_2$, $C_{Chloroform}$ = concentration of $CHCl_3$
GV = guide line value of particular compound

Samples were collected regularly from Ambathale (8 times) & from Labugama & Kalatuwawa (10 times) over period of 11 months in year 2007 and from Gampaha, Yakkala, Veyangoda, Pugoda, Ranpokunawatte, Nittambuwa & Bambukuliya samples were collected (10 times) weekly over period of 3 months in year 2008.

The investigation reveals that Total Tri Halo Methanes (TTHM) are present in the drinking water with variable quantities of individual compounds in different treatment plants. Summation of all these four compounds are evaluated by the Risk Index and is below the permissible level (value) with respect to WHO expression mentioned above.

Reference: Back ground document for development of WHO guide lines for drinking water quality. WHO/ SDE/WSH/05/08/64

Key words: Trihalomethane, Disifection by products, Risk Index., Total Trihalomethanes.

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