

Title: **“SPATIAL MONITORING AND ASSESSMENT OF TRIHALOMETHANES (THMs) IN MUNICIPAL WATER SUPPLY SYSTEM”**

Candidate Name: **Mohd. Aamir Mazhar**

Supervisor's: **Prof. Azhar Husain** D/o Civil Engineering, F/o Engg. & Tech., JMI.

Prof. Sirajuddin Ahmed D/o Civil Engineering, F/o Engg. & Tech., JMI.

Dr. Rahisuddin D/o Chemistry, F/o Natural Science, JMI.

Department: **Civil Engineering**

Date of Submission: **30.12.2021**

SUMMARY

Disinfection by-products (DBPs) are formed during disinfection when chlorine reacts with natural organic matter (NOM) present in raw water.

Firstly, a brief literature review on the disinfection byproducts formation, their regulations, different exposure routes, research studies on trihalomethanes, removal strategies, challenges faced due to disinfection byproducts and alternate methods practiced for disinfection are discussed. Then the second part elaborates the sampling strategy adopted for the study, tools for data collection, sampling locations to collect the samples and their transportation to the laboratory for analysis. The third part comprises of extensive experimental work conducted on trihalomethanes in the study area and the fourth part consists of spatial and seasonal analyses, statistical data analysis, mathematical modelling, and health risk assessment of trihalomethanes.

Lastly general conclusion and overall conclusions of the study are presented along with recommendations and scope of further studies. The major findings of the study are:

- Among the THMs formed, chloroform had the maximum concentration (45% of TTHM) followed by BDCM (33% of TTHM), DBCM (20% of TTHM) and bromoform (2% of TTHM).
- The concentrations of each THM species in drinking water samples from the command areas of nine WTPCAs were exceeding the permissible limits.
- THM levels were found to generally increase with higher temperature in summers.
- From the Pearson correlation matrix, a very strong relationship was achieved between THM and TOC ($r = 0.914$) for the study period.
- A multiple linear regression model was developed as:
$$\text{THMs } (\mu\text{g/L}) = 46.476 - \text{pH}(2.490) - \text{temp}(0.730) (\text{°C}) + \text{TOC}(11.216) (\text{mg/L}) + \text{residual Cl}(2.575) (\text{mg/L})$$
- In our study model predictions seems to be precise having R^2 value of 0.86 for the study period.
- The females have higher cancer risk than the males for all the three exposure routes.
- Chloroform had the highest Health Index through all routes of exposure followed by BDCM, DBCM and bromoform.