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**Study of Bathing STANDARDS of Western Yamuna Canal Water**

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**ABSTRACT**

Westrn Yamuna canal is one of the main canal constructed in medieval period to fulfill water requirement of DELHI. It is constructed by Firuz Shah Tughlaq in 1335 AD. Due to human settlement and industrial growth along its bank huge quantity of wastewater generated and discharged with or without treatment. For example Yamuna Nagar is one of the city in the state of Haryana. It is located south-east of the state capital Chandigarh. This town is known for the cluster of plywood units. It is also known for providing the country's finest timber to even larger industries. There are several cluster exist similar to Yamuna Nagar. CPCB established water quality monitoring stations along the canal under NWMP. As per the water quality data published in 2019 it is very essential to analyse these parameters to find suitability of canal water for bathing for those villagers who reside in the bank of canal. Cpcb already recommended the bathing water standard which is statutory adopted by government of India vide its gazette notification in 25 September 2000. This study is focused on compliance of statutory obligation of the act for Western Yamuna canal.

**Keywords:** Yamuna west bank canal; Effluents; Contaminants; NWMP, Primary water quality criteria for bathing water

**I. INTRODUCTION**

Water is one of the prime necessities of our daily life. The general survey reveals that the total surface area of earth is 51 crore km<sup>2</sup> out of which 36.1 crore km<sup>2</sup> is covered sea. In addition to this, we get water from rivers, lakes and tanks. We can hardly live for a few days without water. Average water consumption for different domestic activities of human being is varying from 90 to 200 litres per capita per day. The quality of water is of serious concern as it is seriously linked with human welfare. It must also meet very high standards of hygiene. In 2012, 89% of people had access to water suitable for drinking. The largest source of water pollution in India is untreated sewage [1]. Usually different installation related with house hygiene, bathing facility in one of them. But peoples along the village like to swim in water bodies like canal, river and pond etc. However, it is not safe always due to discharging wastewater obtained from communities or industries without treating it properly. The largest source of water pollution in

India is untreated and suitable for bathing. Central pollution control board of India issued guide lines to safeguard citizens of India by enforcing the law through gazette notification in 25 th September 2000. According to which water bodies having following standards[2] are suitable for bathing

| S. No | Parameter  | Desirable           | Max Permissible |
|-------|--|---------------------|-----------------|
| 1     | Fecal coliform in MPN/ 100 ml                            | 500                 | 2500            |
| 2     | Fecal streptococci in MPN/100 ml                         | 100                 | 500             |
| 3     | pH   | 6.5                 | 8.5             |
| 4     | Biochemical Oxygen Demand (BOD) 3 days 27 <sup>o</sup> C | 3 mg/ liter or less |                 |
| 5     | Dissolved Oxygen (DO)                                    | 5 mg/Liter or more  |                 |

In this study we are focused on bathing quality of water in different stretches of Western Yamuna Canal (WYV). It is interesting to know about WYC, the canal was in existence since Prithvi Raj Chauhan or before his dynasty. In 1335

AD[3] it is reconstructed by Firuz Shah Tuglak, The length of canal is about 86 KM and it passes through various cities of Uttar Pradesh, Haryana and Delhi. Again it is rebuilt and de silted in British period to make increase its flow. In present time its water is controlled from hathni Kund barrage. This cause water course pollutes. There are several rural settlements along its bank and peoples used its water for their domestic purposes including love to swim in water course.

Material and method Central Pollution Control Board in collaboration with State Pollution Control Boards in the States and Pollution Control Committees in Union Territories has established a National Water Quality Monitoring Network (NWMP) in order to assess status of water quality and its parameters Present water quality monitoring network under NWMP comprises 4111 stations on surface water in 28 States and 8 Union Territories.

Monitoring is carried out with a frequency on monthly, quarterly, half yearly and yearly basis. Parameters Monitored Water samples are analysed as per the Guidelines on Water Quality Monitoring, 2017 issued by Ministry of Environment, Forest and Climate Change. Under this programme Station no. 1109, 1110, 1111, 1112, 1113, 1114, 1115, 1116, 1886 and 2056 established to monitor water quality in YWC. The parameters published in cpcb web site for year 2019 are taken for consideration. The data at different monitoring standards are given below-

Table : Water Quality of Western Yamuna Canals Under NWMP (2019)

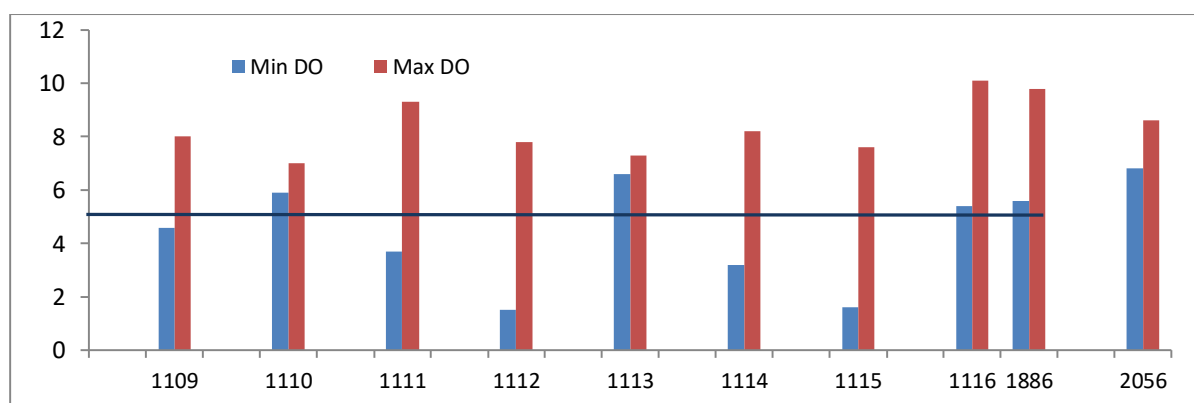
| Stn Code | Station Name  | Temperature (°C) |     | Dissolved Oxygen (mg/L) |      | pH  |     | BOD (mg/L) |      | Fecal Coliform (MPN/100 ML) |       |
|----------|---|------------------|-----|-------------------------|------|-----|-----|------------|------|-----------------------------|-------|
|          |   | Min              | Max | Min                     | Max  | Min | Max | Min        | Max  | Min                         | Max   |
| 1109     | WC-1(Y.NAGAR)100M D/S AFTER RECEIVING, IND. & SEW.EFFL                  | 19               | 27  | 4.6                     | 8.0  | 7.0 | 8.1 | 1.8        | 4.0  | 500                         | 4000  |
| 1110     | WC-2 (NEAR KARNA LAKE)G.T.ROAD KARNAL                                   | 26               | 26  | 5.9                     | 7.0  | 7.6 | 7.8 | 2.4        | 2.6  | 700                         | 4800  |
| 1111     | WESTERN YAMUNA CANAL, C-3 DELHI, BRANCH AT .D.245250                    | 19               | 29  | 3.7                     | 9.3  | 6.8 | 8.0 | 1.2        | 2.4  | 400                         | 3300  |
| 1112     | WESTERN YAMUNA, CANAL C-4 BEFORE ENTER INTO DELHI BRANCH, R.D.282628    | 21               | 29  | 1.5                     | 7.8  | 7.4 | 7.9 | 1.2        | 2.8  | 200                         | 1700  |
| 1113     | WESTERN YAMUNA CANAL, WC-5 SIRSA BRANCH AT ROAD BRIDGE, KARNAL          | 25               | 25  | 6.6                     | 7.3  | 7.6 | 7.6 | 1.2        | 2.5  | 1700                        | 1700  |
| 1114     | WESTERN YAMUNA CANAL WC-6 SIRSA BRANCH AT RD.BRIDGE JIND KAITHAL ROAD   | 21               | 23  | 3.2                     | 8.2  | 7.2 | 8.6 | 2.4        | 24.0 | 200                         | 3910  |
| 1115     | WESTERN YAMUNA CANAL C-7 DELHI PARALLEL BRANCH AT KHUBRU FALL RD-145250 | 20               | 29  | 1.6                     | 7.6  | 7.5 | 7.9 | 1.5        | 2.6  | 400                         | 9200  |
| 1116     | WESTERN YAMUNA CANAL, WC-4 DELHI PARALLEL BRANCH AT                     | 14               | 30  | 5.4                     | 10.1 | 7.4 | 8.0 | 0.8        | 2.6  | 25                          | 21000 |

| PANIPAT |   |    |    |     |     |     |     |     |     |     |       |
|---------|---|----|----|-----|-----|-----|-----|-----|-----|-----|-------|
| 1886    | WESTERN YAMUNA CANAL AT TAJEWALA                  | 20 | 27 | 5.6 | 9.8 | 7.6 | 8.1 | 0.6 | 3.5 | 200 | 13000 |
| 2056    | WESTERN YAMUNA CANAL AT DAMLA D/S OF YAMUNA NAGAR | 24 | 26 | 6.8 | 8.6 | 7.6 | 8.0 | 1.5 | 3.5 | 200 | 1400  |

## II. RESULT AND DISCUSSION

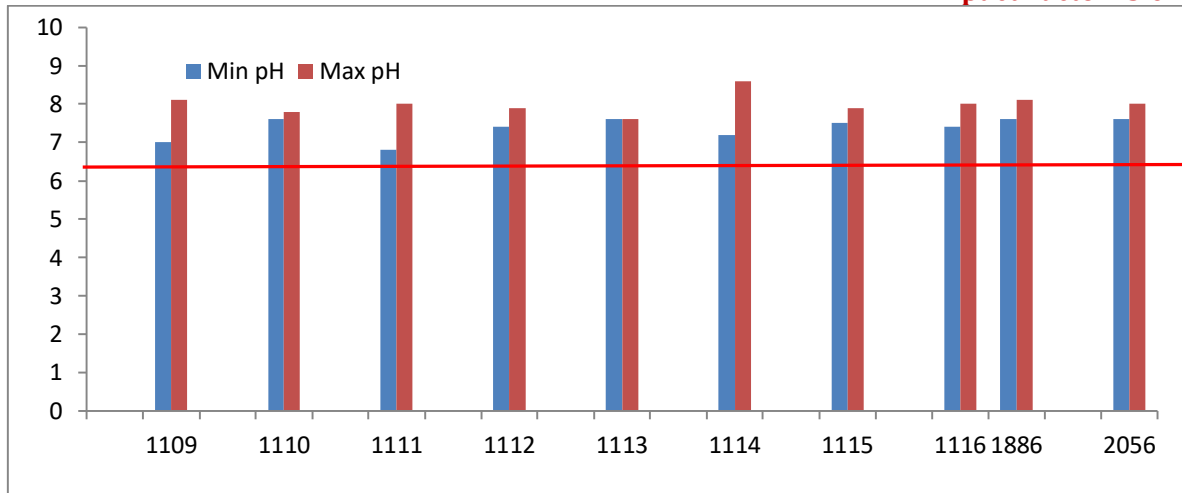
### Dissolved Oxygen

Dissolved oxygen gets into the water by diffusion from the atmosphere, aeration of the water as it tumbles over falls and rapids, and as a waste product of photosynthesis. Dissolved oxygen criteria for bathing water should be 5 mg/L minimum for aquatic life. It is observed from data minimum concentration of dissolved oxygen found at station 1109, 1111, 1112 and 1114 and at Station 1115. Lesser than 5 mg/liter concentration indicates the absence of aquatic life and also it is not fit for bathing at canal bank or not suitable for swimming.



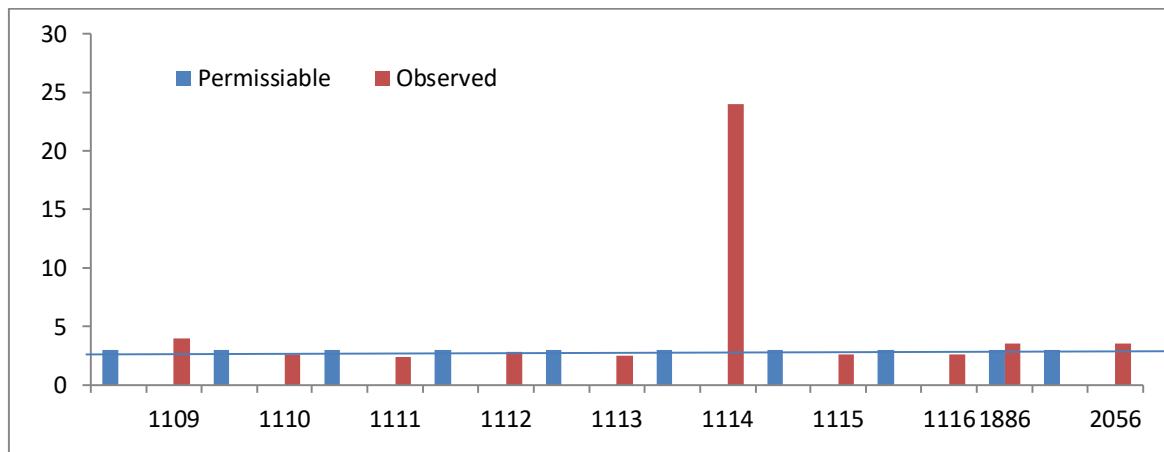
### pH Concentration

pH is an important limiting chemical factor for human domestic activities and aquatic life. If the water in a stream is too acidic or basic, the  $H^+$  or  $OH^-$  ion activity may cause human skin adversely and disrupt aquatic organism's biochemical reactions by either harming or killing the stream organisms. It is also an indicator whether industrial waste water discharged into water body. Bathing standards issued by CPCB is from 6.5 to 8.5 pH range. It is observed that excluding station no. 1116 canal water reflects good pH range. Therefore it is suitable for bathing.



### Biological Oxygen Demand

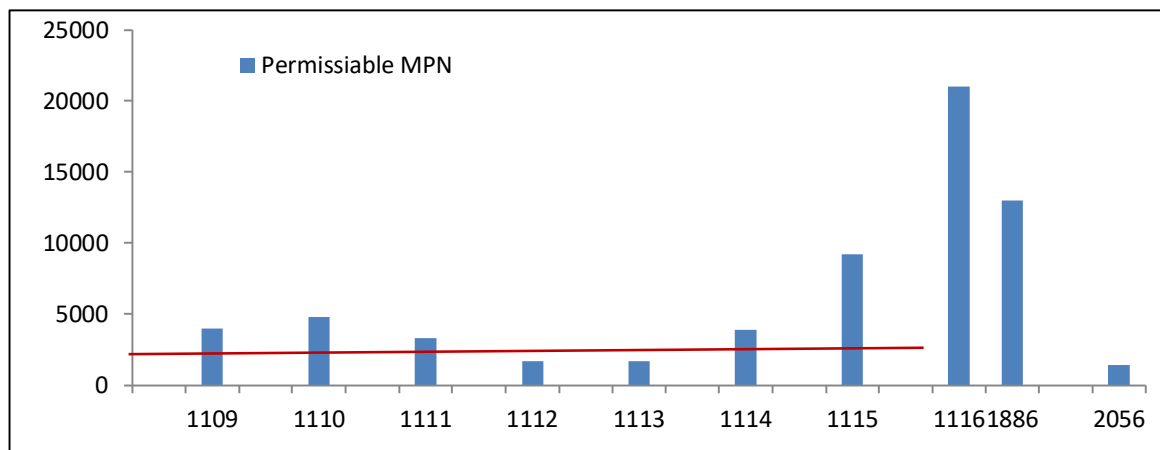
Biological Oxygen Demand, or BOD, is the amount of oxygen present in wastewater or water consumed by bacteria in the decomposition of organic material. It also includes the oxygen required for the oxidation of various chemical impurities present in the water, such as sulphides, ferrous iron and ammonia. While a dissolved oxygen test tells you how much oxygen is available, a BOD test tells us how much oxygen is being consumed. BOD is determined by measuring the dissolved oxygen level in a fresh sample and comparing it to the dissolved oxygen level in a sample that was simultaneously but incubated under specific conditions for a period of three days at 27<sup>0</sup> C. The difference in the oxygen between the two samples in the BOD is recorded in units of mg/L. As per CPCB guide line it BOD of water course to be used for bathing should not more than 3 mg/ litre. It is observed that Station no 1109, 1114, 1886 and 2056 reflecting higher BOD than permissible range. Out of which station no 1114 reflecting very high BOD. Therefore, these sites are not suitable for bathing or swimming.



### Fecal coliform

The contaminated water samples have also shown the presence of a number of viruses and bacteria like *Salmonella* group (typhoid) *Shigella* (Bacillary dysentery) *Mycobacterium* (tuberculosis and virrio cholera which causes diseases like gastroenteritis, diarrhea, respiratory illness, heart diseases, liver diseases etc.). These diseases are severely affecting the health of residents of these colonies. The permissible level of MPN of fecal coli form should be less than 500 but never to exceed 2500 per 100 ml in raw water. The high MPN values and BOD values also indicates organic

pollution from the agriculture and housing, it is recommended to all have to stop imitating practices that are already being phased out in the developed world.



The few ways to prevent water pollution are sewage treatments; prevent canal water to get polluted. It is observed at all the station Fecal coliform are above the desirable limit by given by CPCB for bathing. It is also noticed at station no 1109, 1110, 1111, 1114, 1115, 1116 and 1886 are poorly loaded with coliform.

### III. CONCLUSION

Every drop of water is essential. Water pollution throughout the world is affecting food chains and food webs. WYC under the observation station is reflecting moderate to high level pollution and therefore not recommended to use the raw water of canal for bathing or for swimming. Water such as lakes, rivers, streams, creeks, and oceans become polluted in many different ways. One main way is the dumping of trash, or littering. Many creeks, rivers, and even oceans have been polluted by manmade items such as trash. Today there is widespread realization that there can be no readymade solutions that technology cannot alone solve problems. Urbanization, industrial growth, agriculture, housing all have to stop imitating practices, since they are already being phased out in the developed world. The few ways to prevent water pollution [8] are sewage treatments, prevent river water to get polluted, treatment of wastes before discharge, strict enforcement of water laws, treatment of drainage water, treatment plants, keep the pond water clean and safe, routine cleaning, sanitation, public awareness. Public should be aware about the effect of water pollution and related health issues. Voluntary organization should go to educate the people about environmental problems. They should run environmental education programme. The lives of plants, animals, and human beings are not possible without clean water. It is duty of all of us to try over to make proper use of water, as drop of water speaks “Be A part of the solution, not the pollution”. It is soul and hope of future.

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