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Microbiological Quality of Drinking Water Supplied by DWASA around Siddeswari Area

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ABSTRACT: The main source of water supplied by Dhaka Water Supply and Sewerage Authority is groundwater and it is extracted from ground through deep tube well and then sent into the pipe network. Unfortunately in Dhaka city, the pipe system is very old and most of the pipes are in poor condition. Leakage or breakage allows contaminants to affect the quality of supplied water especially at the users end. This study includes microbiological quality analysis of water supplied by DWASA around Siddeswari area. To assess the microbiological quality, sample were collected from two deep tube well of DWASA and two points including Stamford University and another residential building. Some results are good and safe. But some results are dangerous because the result of Total coliform and Fecal coliform is not zero. The main reason of this variation is may be for leakage of pipe. In that way soil can enter the pipe and the main part of Total coliform is the soil. Based on the above results conclusions are made and a few recommendations are made which would improve the quality.

KEYWORDS: Microbiological analysis, Total Coliform, Fecal Coliform, Media.

I. INTRODUCTION

Dhaka, the capital city of Bangladesh, has become a megacity with a population of nearly 12.5 million, which is increasing at an annual rate of over 5%. Dhaka city is the core center of all activities in -Bangladesh. Here Dhaka WASA supplies water to users end by a network of underground pipelines. 82% of the Dhaka city's water supply is abstracted from groundwater through 577 deep tube wells, while four relatively small surface water treatment plants provide the remaining 18%. Now, it is very important to know that the water entering the pipe is of good quality. In Dhaka city, the pipe system is very old and most of the pipes are in poor condition. There is leakage and breakage through which contaminants from outside the pipes may enter and breakage through which contaminates from outside the pipes may enter and get mixed with the supplied water. There is also an illegal practice of drawing water from pipes by suction. Both of phenomena make it easier for the contaminants to get in. Again, due to improper layout of water supply lines and sewer lines there might be crossing between them. This can cause fecal contamination. Thus it is very much possible that, even if the water, while entering the pipe, satisfies the specifications of drinking water quality, it is no longer potable and palatable at the users end. As the water quality at the users end is the main concern, it is very important to test water quality there. Water quality at the end should satisfy the Bangladesh Environment Conservation Rules (BECR) (1997) and preferably the World Health Organization (WHO) guidelines. So this study attempt to analysis of the microbiological quality of water supplied by DWASA on Siddeswari Area of Dhaka city.

II. RELATED WORK

Dhaka Water Supply and Sewerage Authority (DWASA) monitor the water quality of Dhaka city and reserve its information of deferent locations.

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Table 2.1: Water production scenario of DWASA (2010)

Source	Production Capacity	Actual Production		Source wise % of production	No. of Deep tube well and Surface water treatment plants
		Million Litre per day	% of Capacity		
Groundwater	1948.30	1821.20	93.99	87.72	560
Surface water	199.17	254.30	85.67	12.28	4
Total	2247.47	2087.50	92.88	100.00	

Water quality in pipeline network system had been also monitored during several studies. Institute of Water Modeling (IWM) had carried out the detail data campaign program during past years to assess the deterioration of water quality at the different intake point of different location of Dhaka city.

Total coliforms include bacteria that are found in the soil, in water that has been influenced by surface water, and in human or animal waste. Fecal coliforms are the group of the total coliforms that are considered to be present specifically in the gut and feces of warm-blooded animals. The standard safe values of these parameters are ruled out by the Environmental Conservation Rule 1997 (ECR).

III. METHODOLOGY

Water samples were collected from Siddeswari area and Stamford University.

Table 3.1: List of location for sampling

Sample number	Location	Number of collection
1	Pump-1: Viqarunnisa Noon School and College	3
2	Pump-2: Circuit House	3
3	Pump-3: Siddeswari Girls' School	3
4	Pump-4: Mouchak	3
5	Upper Reserve Tank of Stamford University	3
6	Lower Reserve Tank of Stamford University	3
7	Overhead Tank Upper of Stamford University	3
8	Over Tank Lower of Stamford University	3
9	Tap (6 th floor) of Stamford University	3

The samples were collected in cleaned plastic bottles. The collected samples were transported to laboratory as quickly as possible. In this study TC was measured using the chemical MacConkey Agar w/0.15% and it is Hi-Media. And FC was measured using the M-FC Agar base and it is also Hi-Media. Incubators were used with temperature 37°C and 44.5°C for TC and FC test respectively.

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IV. RESULTS AND DISCUSSION

The obtained results of total and fecal coliform concentrations are summarized in the following tables.

Table 4.1: TC Test Result by Membrane Filter Method

Media	Sample number	Location	Colony Characteristics
MAC	1	Pump-1: Viqarunnisa Noon School and College	01 pink colour colony
MAC	2	Pump-2: Circuit House	02 pink colour colony
MAC	3	Pump-3: Siddeswari Girls' School	No Growth
MAC	4	Pump-4: Mouchak	01 pink colour colony
MAC	5	Upper Reserve Tank of Stamford University	33 pink colour colony
MAC	6	Lower Reserve Tank of Stamford University	45 pink colour colony
MAC	7	Overhead Tank Upper of Stamford University	56 pink colour colony
MAC	8	Over Tank Lower of Stamford University	61 pink colour colony
MAC	9	Tap (6 th floor) of Stamford University	68 pink colour colony

Table 4.2: FC Test Result by Membrane Filter Method

Media	Sample number	Location	Colony Characteristics
MFC	1	Pump-1: Viqarunnisa Noon School and College	01 blue colour colony
MFC	2	Pump-2: Circuit House	02 blue colour colony
MFC	3	Pump-3: Siddeswari Girls' School	No Growth
MFC	4	Pump-4: Mouchak	No Growth
MFC	5	Upper Reserve Tank of Stamford University	21 blue colour colony
MFC	6	Lower Reserve Tank of Stamford University	25 blue colour colony
MFC	7	Overhead Tank Upper of Stamford University	30 blue colour colony
MFC	8	Over Tank Lower of Stamford University	37 blue colour colony
MFC	9	Tap (6 th floor) of Stamford University	45 blue colour colony

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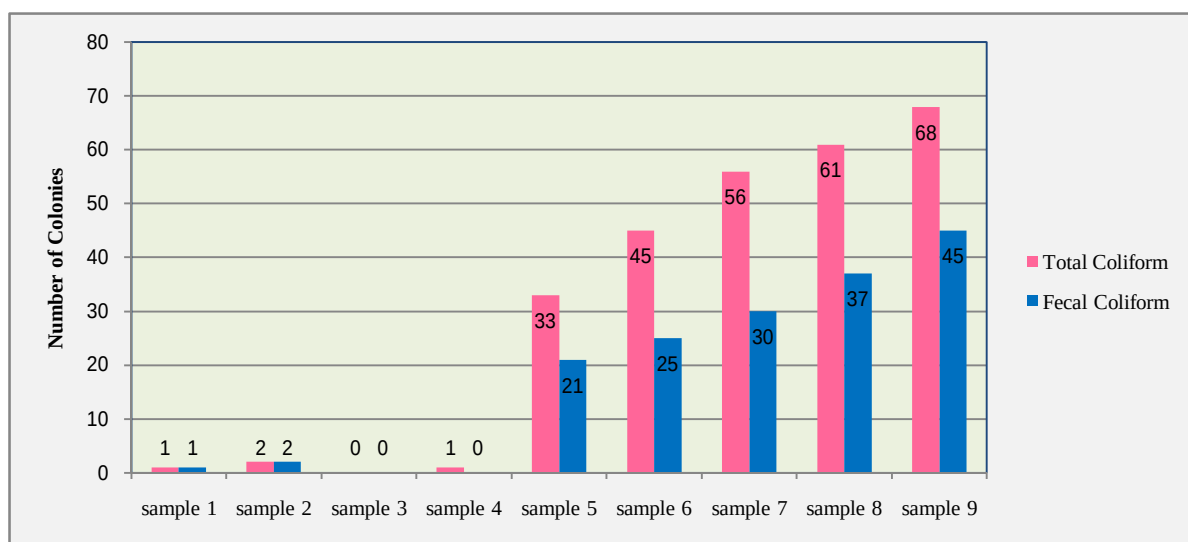


Figure 4.1: Total and Fecal Coliform Concentration of Different Samples

The test results reveals that TC and FC values of water collected from the pumps are very or tends to zero. Numbers of colony of TC and FC increases subsequently as the water passes through the pipe lines. Values of TC and FC of water entering into the underground reservoir and the outlet of the underground reservoir also vary a lot. Similar condition prevails in case of inlet and outlet of over head reservoir. Among all the study points TC and FC values are found highest in the tap water. According to environmental Conservation Rules-1997(ECR'97) acceptable limit for TC and FC is 0 CFU/100 ml for drinking water. All the samples except the water collected from the pump houses exceeded the limit set by ECR 97.

V. CONCLUSION

From the above study it can be concluded that water is almost pure at the source but it becomes contaminated as it passes through the distribution line. It is also observed that contamination increases abruptly when water enters into the different occupancies. In this particular study values of TC and FC increases after water leaving the underground reservoir and over head water tank which is the result of in house contamination. Regular monitoring and maintenance of the pipes and Joints, leak detection and rectification is required to control in-house contamination. Result of our study can lead to possible leak detection in underground pipe network. All in all water quality needs to be monitored over a large period of time to assess the pattern of change in water quality with time. Variation of the water quality with temperature and seasonal variation needs to be studied.

REFERENCES

- [1] M. A. Aziz, "Water Supply Engineering", 1975
- [2] Ahmed, Feroze and Rahman, M. M., "Water Supply and Sanitation: Rural and Low Income Urban Communities", 2000
- [3] Chow T. J., "Water Pollution Control Federation", 40: 399-411, 1968
- [4] Data S. S., "A Text Book of Environmental Chemistry and Pollution", 2002
- [5] Kabir, E. S., Kabir M., Islam, M. S., Mia, C. M., Begum N., Chowdhury, D. A., Sultana, S. M., Rahman, S. M., "Assessment of Effluent Quality of Dhaka Export Processing Zone with Special Emphasis to the Textile and Dying Industries", Jahangirnagar Uni. J. Sci., 25: 137-138, 2002
- [6] Karn, S.K. and Harada H., "Surface water pollution in three urban territories of Nepal, India, and Bangladesh", Environ. Manage, 28(4):483-96, 2001
- [7] Fourth Dhaka Water Supply Project, Dhaka Water Resource Management Programme, DoE/BEMP, 2003
- [8] Environmental Quality Standards Bangladesh, Department of Environment, 1991 & 1997



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- [9] Water Quality Criteria, Environmental Studies Board, National Academy, 1972
- [10] Rahman, S. M., "Assessment of effluent quality of Dhaka export processing zone with special emphasis to the textile and dying industries", Jahangirnagar University Journal of Science, Vol.31(1), pp.19-32, 2002.
- [11] Haigh, M. J., "Sustainable Management of Headwater Resources: The Nairobi 'Headwater' Declaration (2002) and Beyond", Asian Journal of Water, Environment and Pollution, Vol.1, No. 1& 2, pp.17-28,2004.
- [12] Schuettepelz, D. H., "Fecal and Total Coliform Tests in Water Quality Evaluation", Research Report 42, Department of Natural Resources, Madison, Wisconsin, 1969.