Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 9, Issue, 02, pp.46467-46469, February, 2017

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

EVALUATION OF MICROBIAL QUALITY OF PIPELINE WATER TREATED WITH CHLORINE IN SOME REGIONS OF BASRAH CITY

***Fadhil N.A.Alkanany**

Department of Biological Development of Shatt Al-Arab & N. Arabian Gulf, Marine Science Centre, University of Basrah, Basrah, Iraq

ARTICLE INFO

Article History:
Received 26th November, 2016
Received in revised form
09th December, 2016
Accepted 17th January, 2017
Published online 28th February, 2017

Key words:
Residual chlorine,
Total and fecal coliforms,
Pipeline water contamination.

ABSTRACT

The quality of human use water at the point of delivery to the peoples houses is related directly to the consumer's health. The current study assessed the changes in residual chlorine content with distance in water distribution system in Abu-Alkhaseeb district, Basrah city, South of Iraq. Collection of water samples have been done from the start point of the water treatment plants, mid distance and the taps at consumer households at an intervals of 1-2 km. Standard methods were used for determination of residual chlorine contents and present of total and fecal coliforms of 36 water samples collected from water pipeline distribution systems related to 12 water treatment plants. The mean concentration of the residual chlorine from all sampling stations was between (0-3.5). Total coliforms detected in the most water samples in the range of (0-34) cfu/100ml while fecal coliforms were in the range of (0-20) cfu/100ml. The chlorine concentration levels in the transported water were decreased with the time and distance. The results indicate strongly that the residual chlorine in most sampling locations is not sufficient to support the elimination of bacterial growth in the water distribution system unless the specialists repair the water pipe leakages and other damages which are the main source of the bacterial contamination and focus on careless of the responsible staff in order to treat the water with accurate chlorine concentrations.

Citation: Fadhil N.A.Alkanany, 2017. "Evaluation of microbial quality of pipeline water treated with chlorine in some regions of basrah city", *International Journal of Current Research*, 09, (02), 46467-46469.

INTRODUCTION

Pollution of water resources has been an essential issue in the world because of the increasing in pollution resources such as industrial, agricultural, and domestic (Eassa, 2012). In developing countries ,many water resources are not hygienic because they contain harmful physical, chemical and biological agents (WHO, 2011). Low cost and high effectiveness of chlorine against harmful microorganisms make it a chemical water treatment choice in many countries (Lee, 2004). In 2004, 1.1 billion people were lacking access to improved water sources, which is nearly 17% of the world's population (UNCED, 2012). Indicator organisms are used to assess public health risk in recreational waters, to highlight periods of challenge to drinking water treatment plants, and to determine the effectiveness of treatment and the quality of distributed water (Wu, 2011). The main target of public and environmental health protection is safe drinking water, which means that it must be free of pathogenic bacteria.

****Corresponding author: Fadhil N.A.Alkanany,***
Department of Biological Development of Shatt Al-Arab & N. Arabian Gulf, Marine Science Centre, University of Basrah, Basrah, Iraq.

The most pathogens in water sources are enteric pathogens. As a result, fecal pollution in water sources devoted to human activity must be strictly controlled (Rompré, 2002). To ensure the protection of public health and apply compliance with quality standards, the continuous microbiological monitoring of drinking water is essential. Total coliforms (TC) and fecal coliforms (FC) have traditionally been regarded as indicators of microbial contamination of waters (Rompré, 2002). The coliform group includes a wide variety in terms of genus and species, whether or not they belong to the Enterobacteriaceae family.Most definitions of coliforms are essentially based on common biochemical characteristics. In standard methods for the examination of water and wastewater (Part 9221 and 9222) (Apha, 1998), coliform group members are described as:

- All aerobic and facultative anaerobic, Gram negative, non-spore-forming, rod-shaped bacteria that ferment lactose with gas and acid formation within 48 h at 35˚ C (multiple-tube fermentation technique; Section 3.1) or
- All aerobic and many facultative anaerobic, Gram-negative, non-spore-forming, rod-shaped bacteria that develop a red colony with a metallic sheen within 24 h at 35˚ C on an Endo-type medium containing lactose (membrane filter technique; Section 3.2).

The current work was interested in the determination of residual chlorine concentrations in water via pipeline distributionnetworks related to 12 water treatment plants and it is related to the presence of total and fecal coliforms at Abu-Alkhaseeb district, Basrah city, South of Iraq.

MATERIALS AND METHODS

Study area

Abu - Alkhaseeb district was the selected study area which is an agricultural district located in Basrah city, south of Iraq. There are 12 water treatment plants distributed nearby the main raw water source; Shatt Al-Arab river (Figure 1) as the GPS presented in the (Table 1).

Table 1. Sampling location coordinations

No.	Water treatment plants (WTP)	E	N
1	Auesian	775247.00	3376901.00
2	Mehegran-near the bridge	776774.00	3374738.00
3	Mehegran-near Baladmehzam	775886.00	3373330.00
4	Hamdan-near the bridge	778723.00	3373833.00
5	Hamdan-Albalad	778351.00	3372665.00
6	Mehela-Said Hamed road	780721.00	3373187.00
7	Jekoor/1-near the bridge	788027.00	3373178.00
8	Jekoor/2-near Albarak harbour	213279.00	3373434.00
9	Aboflous/1- near the bridge	213286.00	3371606.00
10	Aboflous/2-near the fertilizer plant	214076.00	3372456.00
11	Sehaan	230221.00	3358277.00
12	Al-Labany	785958.00	3373931.00

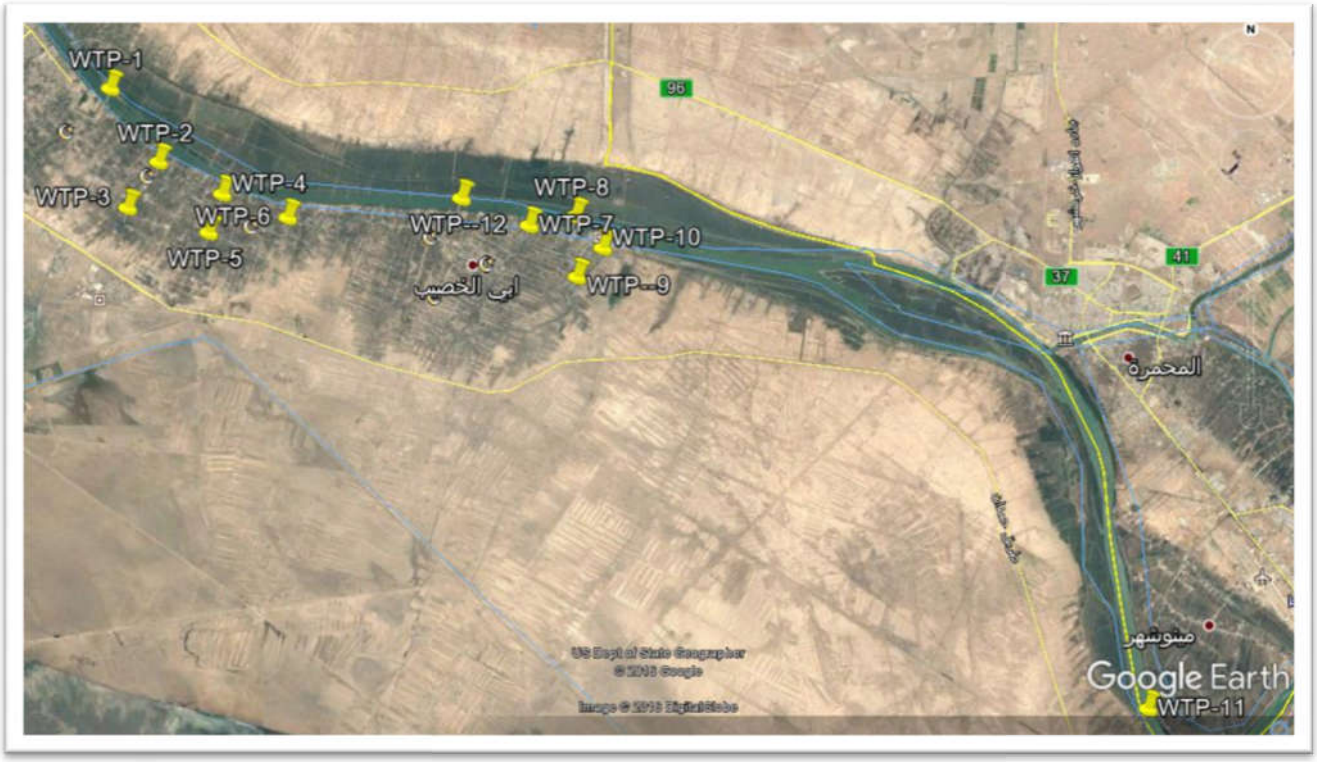

Figure 1. Sampling map (WTP: water treatment plant)

Sample collection &Analysis

Three water samples were collected from each 12 water treatment plants (1st sample of the treatment plant, 2nd one from the mid distance of the distribution system while the 3rd sample from the final point near the consumer) at a uniform distance of 1-2 km (Apha, 2005). Standard methods which described by (Apha, 2005), were conducted to assessment of bacterial contamination in the collected water samples. Filtration technique (SM9222B for total coliforms and SM9222D for fecal coliforms), the results were expressed in terms of colony forming units per 100 ml of sample (cfu/100ml). Residual chlorine was determined by DPD1 tablets (N, N-diethyl-p-phenylene diamine) using chlorine meter (Checkit Direct, Lovibond) (Association, 1915).

RESULTS AND DISCUSSION

Figure 2 shows the average residual chlorine concentrations in the study area, it ranged from 0.23 to 2.37 mg/l,the maximum value was recorded at Aboflous/2 water treatment plant with a value of 0.23mg/l while the minimum value 0.23mg/l was observed at Mehegran-near the bridge water treatment plant. The residual chlorine level was at maximum at the start point of pipelines closely to the water treatment plants, this level descending gradually to increase the distance of sampling locations far away from the treatment plant (Figure 2). Chlorine treatment of water is so important step to ensure the safety of water .Water residual chlorine with 2 to 3 mg/l people can smell it and it has irritant odor. High concentrations of chloride can make the water undesirable and therefore, not recommended for drinking (Sehar, 2011; WHO, 2006 and IQS, 2011), recommended the residual chlorine level of 0.6mg/l as standard, this level was below 0.6 mg/l at the most sampling stations especially in Auesian station. Concentration below 0.6 mg/l is inadequate for disinfection and this might result in pathogenic bacterial growth in the distribution system (Olivieri, 1986 and kareem Al-Saimary, 2006), found that the drinking water collected from a water supply plant of some districts in Basrah city was contaminated with fecal coliforms bacteria .The current study shows the probable reason of rapid decline in the residual chlorine levels is the presence of many leakages in the underground water pipelines that lead to contamination of water with organic pollutants which degrade

the residual chlorine and consume it ,that's deals with (Lee, 2005), who suggested that the chlorine disinfection effectiveness is enhanced compared with non-filtered water.

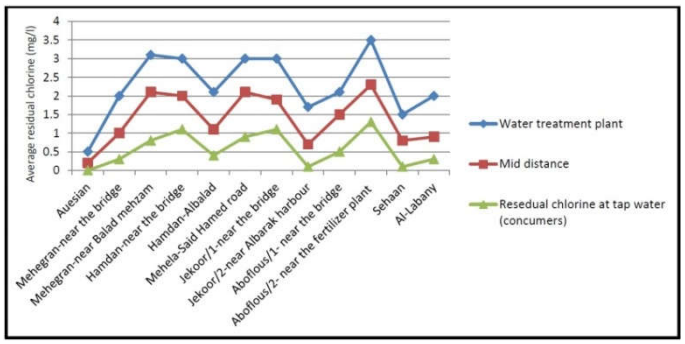

Figure 2. Relation between the average residual chlorine at three sampling points in each location site

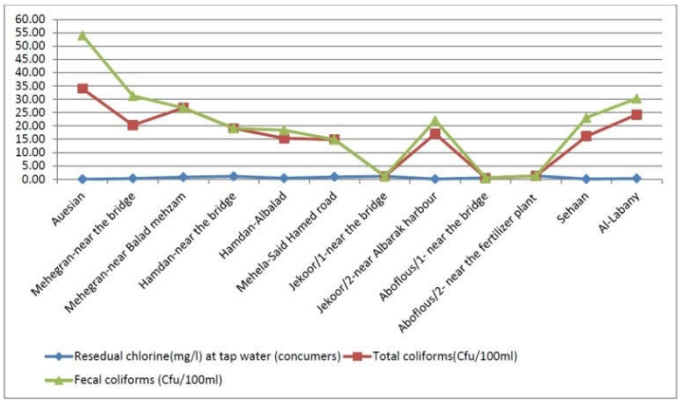

Figure 3. Relation of total coliform, fecal coliform count with residual chlorine recorded at tap water (consumers)

Less chlorine was consumed in the filtered samples, indicating that the particulate phase had a significant chlorine demand. Consequently, disinfection was dependent on the effectiveness of filtration. Depending on these levels of residual chlorine, total and fecal coliforms counts were fluctuating, that deals with (Egorov, 2002), which find that a decline in residual chlorine concentration in water of distribution system lead to microbiological contamination results a gastrointestinal illness. Because of bad underground sewage pipelines system founds near the water distribution system and the little maintains that lead to actual health hazard to the water consumers.

REFERENCES

Apha, A., WEF, 2005. Standard methods for the examination of water and wastewater, 21: p. 258-259.

Apha, A., Wpcf. Standard methods for the examination of water and wastewater, 1998. 20.

Association, A.P.H., *et al*., Standard methods for the examination of water and wastewater. Vol. 2. 1915: American Public Health Association.

Eassa, A.M. and A.A. Mahmood, 2012. An Assessment of the treated water quality for some drinking water supplies at Basrah. *Journal of Basrah Researches ((Sciences)) Volume*, 38(3).

Egorov, A., *et al*., Deterioration of drinking water quality in the distribution system and gastrointestinal morbidity in a Russian city. *International Journal of Environmental Health Research,* 2002. 12(3): p. 221-233.

IQS, D.-W.S., Central Organization for Quality Control and Standardization, Council of Ministers, Republic of Iraq. 2011. 417.

Kareem Al-Saimary, I.E.A. 2006. Evaluation of the bacterial quality of water collected from various stations in basrah city. The *Internet Journal of Third World Medicine,* 5(2).

Lee, L., C. Lu, and S.-L. Kung, Spatial diversity of chlorine residual in a drinking water distribution system. *Journal of Environmental Engineering*, 2004. 130(11): p. 1263-1268.

Lee, Y. and S. Nam, Comparative Study of Chemical Disinfection in Drinking Water Supply. Proceedings of the Water Environment Federation, 2005. 2005(1): p. 556-581.

Olivieri, V.P., *et al*., Stability and effectiveness of chlorine disinfectants in water distribution systems. *Environmental Health Perspectives,* 1986. 69: p. 15.

Rompré, A., *et al*., Detection and enumeration of coliforms in drinking water: current methods and emerging approaches. *Journal of microbiological methods*, 2002. 49(1): p. 31-54.

Sehar, S., *et al*., Monitoring of Physico-Chemical and Microbiological Analysis of Under Ground Water Samples of District Kallar Syedan, Rawalpindi-Pakistan. *Research Journal of Chemical Sciences*, 2011. 2231: p. 606X.

UNCED, Protection of the Quality and Supply of Freshwater Resources: Application of Integrated Approaches to the Development, Management and Use of Water Resources. . The United Nations Conference on Environment and Development. Chapter 18, Agenda 21, 2012.

WHO, Guidelines for Drinking-water Quality. 1st Addendum Vl.1.Recommendations., 2006. 1.

WHO, Manganese in drinking water. Background document for development of WHO guidelines for drinking water quality. WHO/SDE/WSH/03.04/104/REV/1, 2011.

Wu, J. *et al*. 2011. Are microbial indicators and pathogens correlated? A statistical analysis of 40 years of research. *Journal of Water and Health,* 2011. 9(2): p. 265-278.

****