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# *Water Quality Analysis a case Study of Urun-Islampur City*

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***Abstract***

*Safe water and sanitation is a human need and right of People need to maintain their health and dignity. Better water and sanitation is essential in breaking the cycle of poverty. Water quality testing is very important. Water quality is determined in fourteen number of wards in the Urun- Islampur City. Where from each ward, three water samples were taken for test. In water quality test, various parameters are measured including pH, Total Hardness (TH), Chloride Content (Cl-), Electric Conductivity (EC), Residual Chlorine (RC) and Total Dissolved Solids (TDS), compared with WHO standards of water quality; also in present research paper classification of water samples of 14 wards was investigation on the basis of TDS, anions, cations and TH. The pH of all water samples were found almost neutral. The TDS, conductance, hardness increased towards the old water supply line, water as compared to new water supply line.*

*The results Water Quality Assessment done in Urun-Islampur city, all parameters were within the permissible limits as per WHO standards. The Water Quality Index (WQI) is in the range of 86 to 95 is also good, but it may affect by water distribution lines which was older than 30 years, so need of proper maintenance of distribution system and chlorination to avoid water borne diseases.*

***Keywords:*** *Water Samples, Physico-chemical analysis, pH, Hardness, Chloride Content, Electric Conductivity, Residual Chlorine, Total Dissolved Solids*

## I. INTRODUCTION

Water plays an important role in the human life. Near about 37% of urban and 64% of rural Indian were without access to safe drinking water as per the WHO report [1]. Fresh water is the most important for the survival of all the living beings. It is more important for the people as they depend upon it for industrial, food production, and waste disposal, and also for cultural requirement [2]. There are different sources of water. Ground water is one of the important resource and the use of that depending upon quality of water. The land use has an influence on watershed hydrology [3].

During the last decade, it is observed that ground water get polluted because of increased human activities, so number of cases of water borne diseases has been seen, to understanding the water chemistry, the bases of the knowledge of the multidimensional aspect of aquatic environmental chemistry which involves the composition, source and reactions transportation of water. The quality of water is important for the mankind because it is directly linked with human welfare.

India is most developed country in the world, with 127.423 Crores of population as per 28th January 2017. Cities accommodate nearly 31% of India's current population. Maharashtra is the state in western region of India and with 11.237 Crores of Population. Maharashtra is one of the wealthiest and the most developed state in India, contributing 25% of country’s industrial output and 23.2% of GDP as per the Census 2011. [20]

Urun-Islampur is a Municipal Council city in Sangli district from Maharashtra state shows in Fig no 1 which is located on 17° 2' 42.46" N and 74° 15' 42.97" E. As of 2011 India census, Islampur had a population of 67,391. As the population is forecasted by Incremental Increase Method for this year 2017 it will be 73965, for 2021 it will 74135 and for year 2030 it will 81438. From the fig no 2 it is observed that the population is slightly decrease from the year 1901 to

1921, it may because of the health and water for crops and some other parameters, afterwards from year 1931 it is observed that population growth is slightly increase up to year 1991to every decade, after that from 1991 the population growth percent is increase as compare to previous decade, it happens because of development of the city, industry area, infrastructure, facilities, lifestyle is improved, so people are attracted towards city also the education facility are increase etc.

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Urun-Islampur have favorable conditions for stabilized market, job opportunity, new business setup, able to fulfillment of requirement for citizens, to developing the entire urban eco-system and development of institutional, physical, social and economic infrastructure but due to these reasons, city has a prime importance and scope of development in various areas. Urun-Islampur city has piped water supply and source of the scheme is from Krishna River, year of establishment of the scheme was 1985, in 1985, 65 km was laid, after that in 2005 it is exceed to 125 km, as per the requirement 4 to 5 km pipeline expand in each year, In the city there are 8 number of ESR, water distribution lines which was older than 30 years, so need of proper maintenance of distribution system and chlorination to avoid water borne diseases. Hence we have decided the study and assessment of Urun-Islampur city for water quality. Aim of this project is to Study and Analysis of water quality of the Urun-Islampur city.

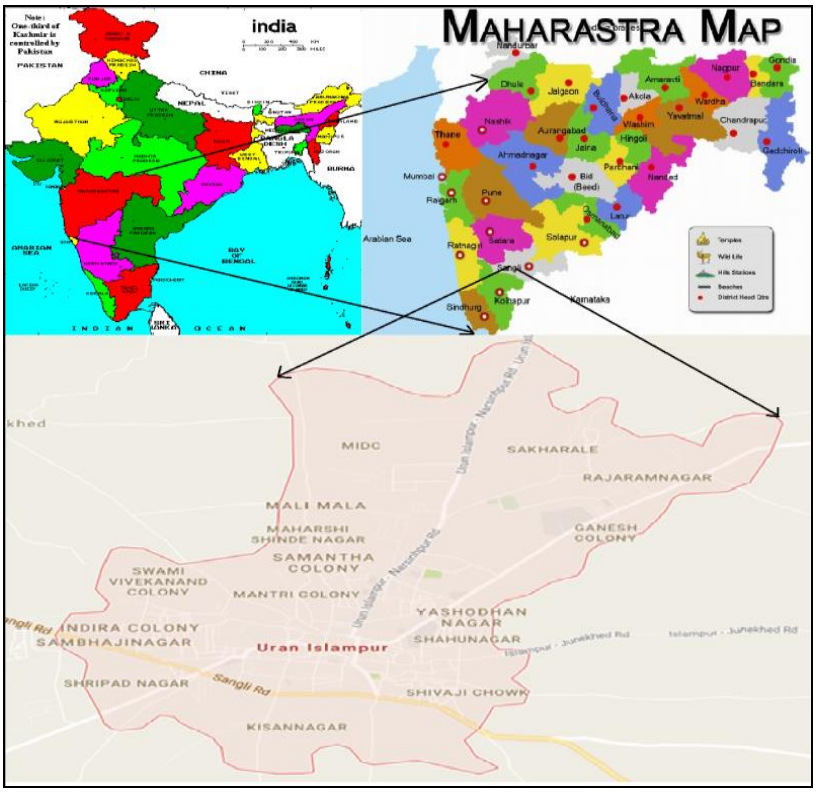



*Fig no 1 Study Area Sources: Google Maps*

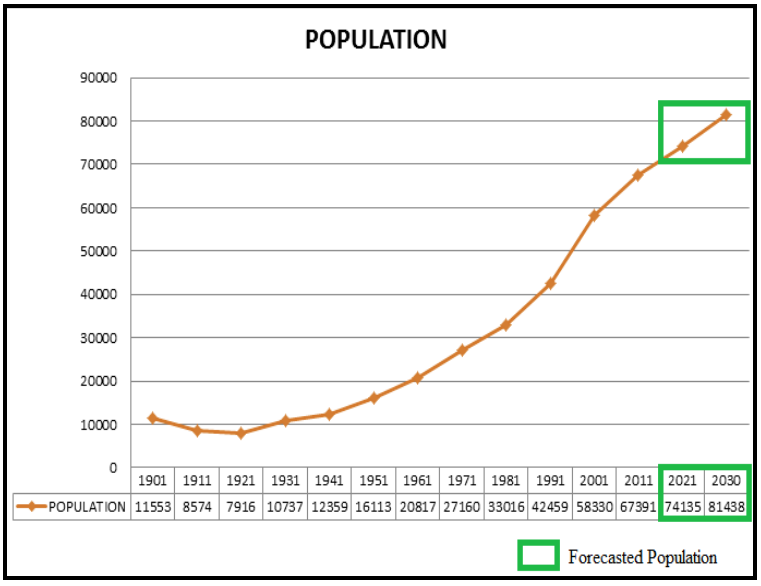



*Fig no 2 Population of Urun-Islampur Source: Census India*

## II. MATERIALS AND METHODS

Methodology include, Visit to Urun-Islampur city and understanding the wards, Household survey for understand the quality of water, Collection of three water samples from each wards, Testing the water samples, Collection of secondary data, Validation of secondary data, etc.

Urun-Islampur city has piped water supply and source of the scheme is from Krishna River, year of establishment of the scheme was 1985, in 1985, 65 km was laid, after that in 2005 it is exceed to 125 km, as per the requirement 4 to 5 km pipeline expand in each year, In the city there are 8 number of ESR, capacity of ESR is given in Table no. 1, also 6 ESR are proposed, capacity of WTP, daily hours of operation is 2 hours, 1 hour at morning and 1 hour at evening in all wards, minimum water tax collected per household is Rs 750, no of public stand posts, no of private connections is 12,000

The Water Samples were collected from fourteen Different wards one liter Bottles. The Water samples were immediately brought in to laboratory for the estimation of various Physico-chemical Parameters like Water Temperature, pH were recorded by using Thermometer and Digital pH Meter. Specific conductivities were measured by using digital conductivity meter. The TDS values were measured by using TDS meter. While other Parameter Such as Hardness were Estimated in the Laboratory by using Standard laboratory methods. Present Study involves the Analysis of Water Quality in Terms of Physico-chemical methods. [4]

***Table no. 1 ESR location and their capacity***

| Sr. No | Name of Area | Location | | Capacity Lakh Liter |
|---|---|---|---|---|
| | | Latitude | Longitude | |
| 1 | Jantavidhalaya | 17° 2'54.43"N | 74°15'32.28"E | 7 |
| 2 | Nagarpalika | 17° 3'5.04"N | 74°16'10.96"E | 7.5 |
| 3 | Nagarpalika Old | 17° 3'4.38"N | 74°16'7.62"E | 4 |
| 4 | Nagarpalika New | 17° 3'3.62"N | 74°16'8.45"E | 6.5 |

| | | | | |
|---|---|---|---|---|
| 5 | Ambedkarnagar | 17° 2'42.38"N | 74°16'30.04"E | 3.5 |
| 6 | Khadi ESR | 17° 3'2.18"N | 74°15'40.36"E | 7 |
| 7 | PWD Office | 17° 2'50.03"N | 74°15'11.51"E | 7.5 |
| 8 | Shivnagar | 17° 3'6.06"N | 74°15'37.88"E | 7.5 |

***Fig no 3 Water Metering for Private and public connections***

***Fig no 4 Hand Pump for public use***


***Fig no. 5 Water Quality Test***

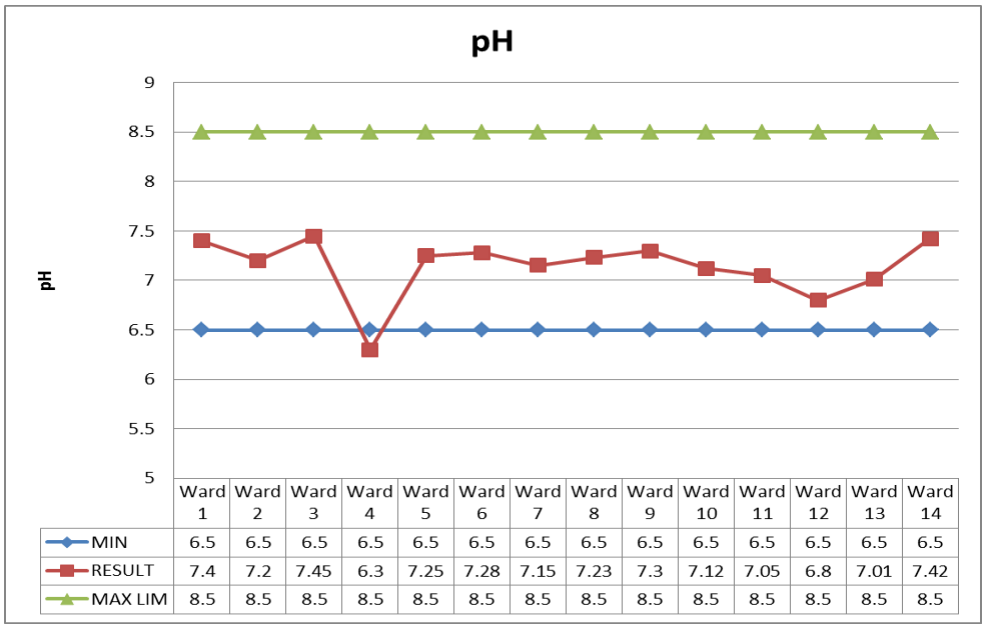
## III. RESULT AND DISCUSSION

As the Urun-Islampur have fourteen numbers of wards, so from each ward three samples are taken and test it for the assessment for the quality of water. The tests conducted are pH, Conductivity, TDS, Residual Chlorine, Chloride and Hardness. Result shows that the water quality is good in the city but the water distribution system is too old so the quality may affect.

### *A. Water sample test results*

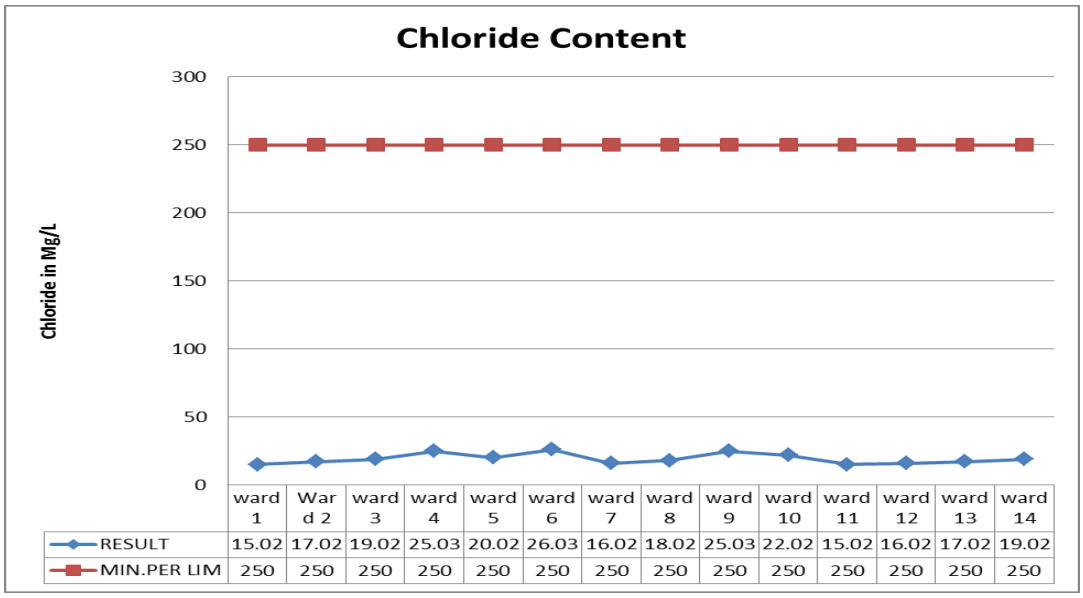
Following tests are conducted on water samples collected from different wards.

1. pH
2. Hardness
3. Chloride content
4. Electrical conductivity
5. Residual chlorine
6. Turbidity Units




| | Ward 1 | Ward 2 | Ward 3 | Ward 4 | Ward 5 | Ward 6 | Ward 7 | Ward 8 | Ward 9 | Ward 10 | Ward 11 | Ward 12 | Ward 13 | Ward 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MIN | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 |
| RESULT | 7.4 | 7.2 | 7.45 | 6.3 | 7.25 | 7.28 | 7.15 | 7.23 | 7.3 | 7.12 | 7.05 | 6.8 | 7.01 | 7.42 |
| MAX LIM | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 |

***Fig no 6 pH***




| | ward 1 | War d 2 | ward 3 | ward 4 | ward 5 | ward 6 | ward 7 | ward 8 | ward 9 | ward 10 | ward 11 | ward 12 | ward 13 | ward 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RESULT | 15.02 | 17.02 | 19.02 | 25.03 | 20.02 | 26.03 | 16.02 | 18.02 | 25.03 | 22.02 | 15.02 | 16.02 | 17.02 | 19.02 |
| MIN.PER LIM | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |

***Fig no 7 Chloride contents***

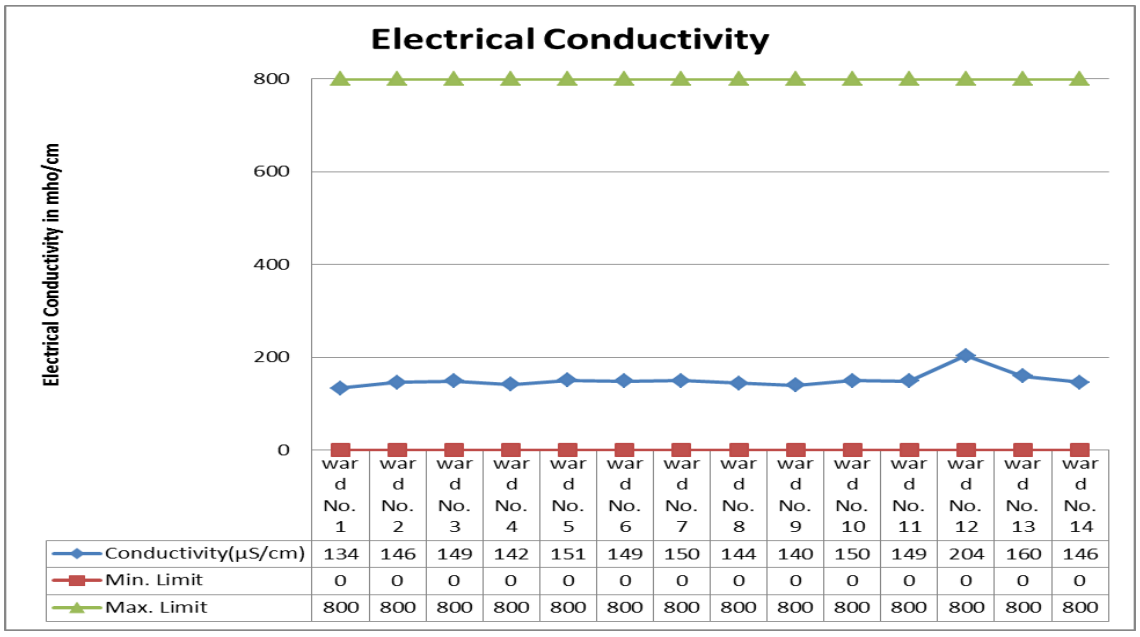



***Fig no 8 Electric conductivity***

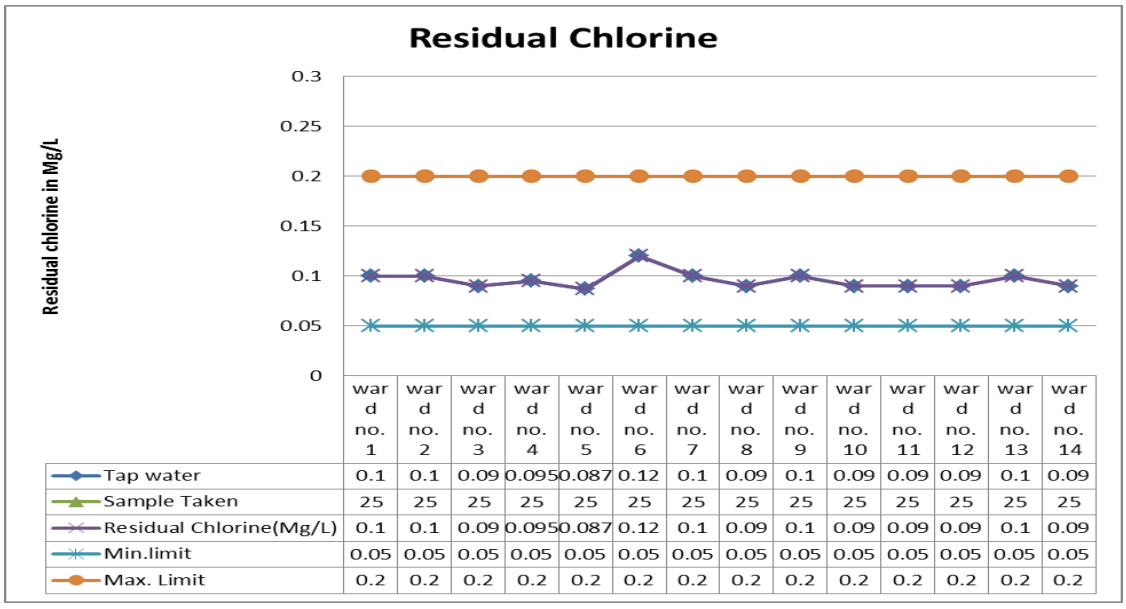



***Fig no 9 Residual chlorine***

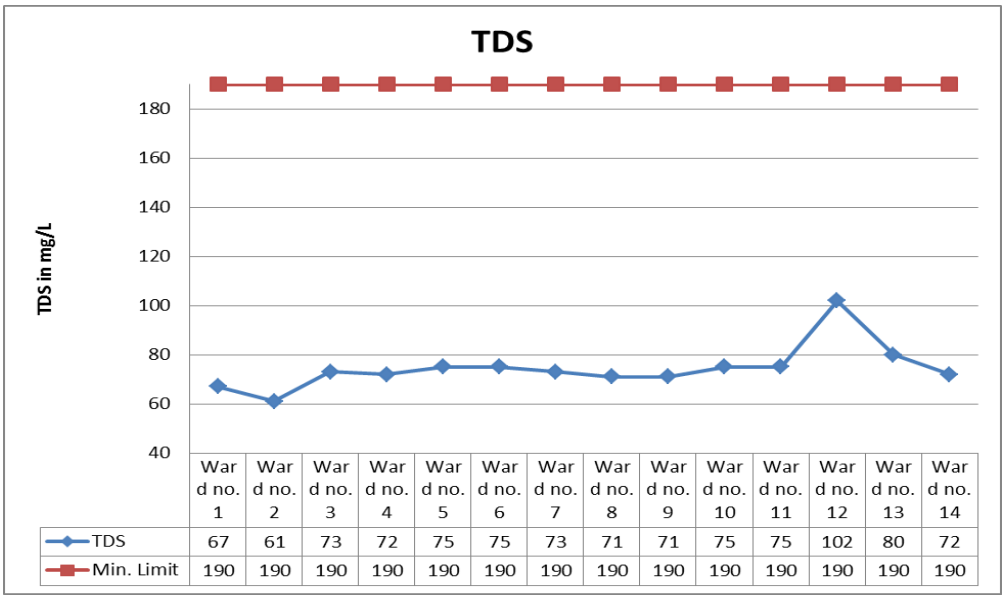



***Fig no 10 TDS***

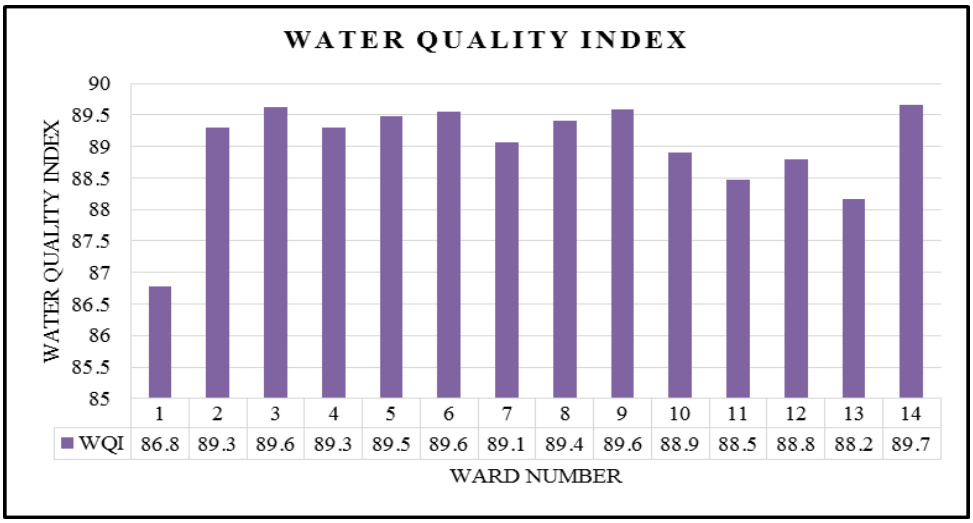



***Fig no 11 Water Quality Index***

***Table no 2 Inclusive Results of Water Samples***

| Sr. No | Ward No. | pH | Conductivity (µMho/cm) | TDS (ppm) | Residual Chlorine (mg/L) | Choride (mg/L) |
|---|---|---|---|---|---|---|
| 1 | 1 | 7.4 | 134 | 67 | 0.1 | 15.01 |
| 2 | 2 | 7.2 | 146 | 61 | 0.1 | 17.01 |
| 3 | 3 | 7.45 | 149 | 73 | 0.1 | 19.02 |
| 4 | 4 | 7.2 | 142 | 72 | 0.1 | 25.02 |
| 5 | 5 | 7.25 | 151 | 75 | 0.1 | 20.02 |
| 6 | 6 | 7.28 | 149 | 75 | 0.1 | 26.02 |
| 7 | 7 | 7.15 | 150 | 73 | 0.1 | 16.01 |
| 8 | 8 | 7.23 | 144 | 71 | 0.1 | 18.01 |
| 9 | 9 | 7.3 | 140 | 71 | 0.1 | 25.02 |
| 10 | 10 | 7.12 | 150 | 75 | 0.1 | 22.02 |
| 11 | 11 | 7.05 | 149 | 75 | 0.1 | 15.01 |
| 12 | 12 | 7.1 | 204 | 102 | 0.1 | 16.01 |
| 13 | 13 | 7.01 | 160 | 80 | 0.1 | 17.01 |
| 14 | 14 | 7.42 | 146 | 72 | 0.1 | 19.02 |

Above Fig no 6 to Fig no 11 shows the results of water samples and Table no 2 shows the inclusive results of water samples. From the result it is observe that pH, Total Hardness (TH), Chloride Content (Cl-), Electric Conductivity (EC), Residual Chlorine (RC) and Total Dissolved Solids (TDS) were in the permissible limits as per WHO standards of water quality. Also the

Water Quality Index (WQI) is in the range of 86 to 95 also good.

## CONCLUSION

The Results of water samples collected form all fourteen wards and tested in laboratory as per WHO standard indicates that quality of water is within the permissible limit. Hence water quality is satisfactory in all the wards for the domestic purpose also the Water Quality Index (WQI) is in the range of 86 to 95 also good, But still there is a need regarding the water distribution system, as Urun-Islampur city has piped water supply and source of the scheme is from Krishna River, water distribution system was laid in 1985 which is of 65 km in a main city area and after in 2005 it is exceed to 125 km, as per the requirement 4 to 5 km pipeline expand in each year, as the distribution system is 31 years old and prone to corrosion and may get affected by sewage and other waste in the nearby region, so need of proper maintenance of distribution system and chlorination to avoid water borne diseases to improve the health and quality of people.

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