

GROUND WATER QUALITY OF KHAIRPUR MIR'S SINDH: A CASE STUDY

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ABSTRACT

Groundwater contamination in rural sindh was big health concern for the living creatures. Many disaster diseases caused by the contaminated water. The research was conducted in Ranipur city of District Khairpur Mir's to determine the groundwater quality. The ten locations were selected for monitoring the water quality. The pH, temperature, electrical conductivity (EC) and total dissolved solids (TDS) were analyzed. The Arsenic was also monitored by Kit method. The results revealed that pH ranged from 6.16- 8.6, EC from 340-1940 $\mu\text{S}/\text{cm}$, TDS from 10-970 mg/L and Arsenic was 0.00001-2.14 $\mu\text{g}/\text{L}$. The temperature of underground water was found averagely 30.93 $^{\circ}\text{C}$. The overall quality of groundwater was found satisfactory except the EC of eight locations of Ranipur city of Kharpur Mirs.

Keys words: Ground water, Sample, Monitor, Conductivity

1. INTRODUCTION

Water is essential for life; no living thing survives without water. Human beings, animals and plants need specific amount of water for their various purposes. There were two main sources of water for use, the first one was groundwater and other was surface water. The groundwater is present below the water table in saturated zone, whereas the surface water at the surface of earth. Though the water exists in earth in large quantity but below 3% was the fresh water for use. Nearly 20% of the Global water withdrawals were concerned with groundwater approximately 1.5 billion peoples depended on ground water for their drinking purpose [1]. A Person needs approximately 01 gallon /day for hydration. In Pakistan each person uses 188 gallons of water in one day for drinking, washing and cooking and other purposes. Approximately one-sixth of total human population has no easy access to safe drinking water [2]. The unplanned urban development and human activities contaminated the groundwater reservoirs. The agrochemicals runoff, untreated effluent discharge and solid waste leaching was the main causes of groundwater contamination [3]. The water washed, water born and water related diseases were due to contaminated groundwater intake by community. The researchers reported that Anemia, Arsenicosis, Cholera, Diarrhea, Fluorosis, Guinea worm disease, Hepatitis, HIV/AIDS, Intestinal worms, Malaria, Schistosomiasis, Trachoma, Typhoidaa were the water born diseases [3-4]. The purpose of this study was to monitor the groundwater quality of Khairpur Mir's, Sindh and comparison with WHO standards.

2. EXPERIMENTAL WORK

The sampling was done from ten selected locations of

Ranipur city, Tehsil Sobhodero of District Khairpur Mir's. The Ranipur city situated at 2717'20.040"N and 6830'15.840"E with altitude of 49m. The samples were collected in pre sterilized polyethylene bottles. The standard method of sample collection was followed up [5-7]. The monitoring parameters were pH, TDS, EC, temperature and arsenic content. All the experimental work was conducted in Chemical Engineering Department, MUET Jamshoro.

3. RESULTS AND DISCUSSIONS:

The pH of water was the number of concentration of hydrogen ion in water. The pH recommended for drinking water by WHO is in between 6.5-8.5 [9]. All the samples showed the satisfactory limit of pH. Only location 8 and 10 showed bit lower and higher range respectively (Fig 1)

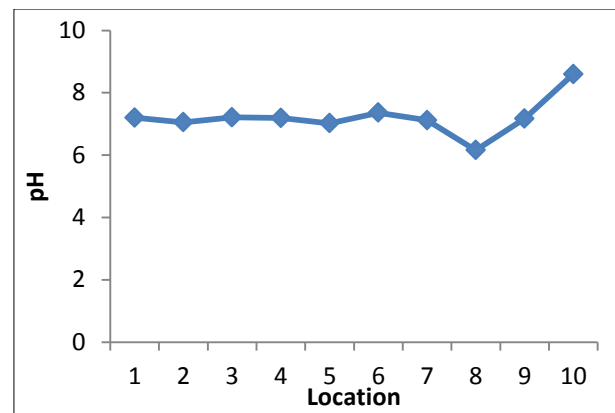


Figure-1: The pH of groundwater of Ranipur city of Khairpur Mir's

The temperature is important parameter in sense that it

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affects the fauna and flora. The higher temperature in groundwater is because of geochemical and geothermal reaction take place under the earth surface. Hence attempt was made to monitor the temperature and it was found in between 30.5- 31.7°C (Fig 2).

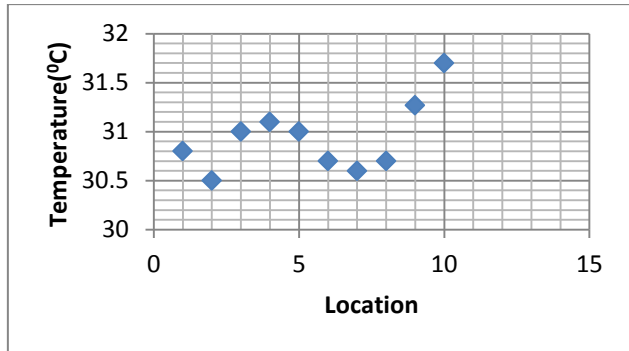


Figure-2: The Temperature of Ground water of Ranipur city of Khairpur Mir's

The quantity of dissolved solids were noted by water proof tester Hanna instruments and expressed in mg/L [12]. According to world health organization (WHO) and Pakistan drinking water standards the allowable limit was <1000mg/L [8-10]. The experimental results showed the TDS level in marked locations was in between 170 to 970mg/L (Fig 3). The results were within the allowable range.

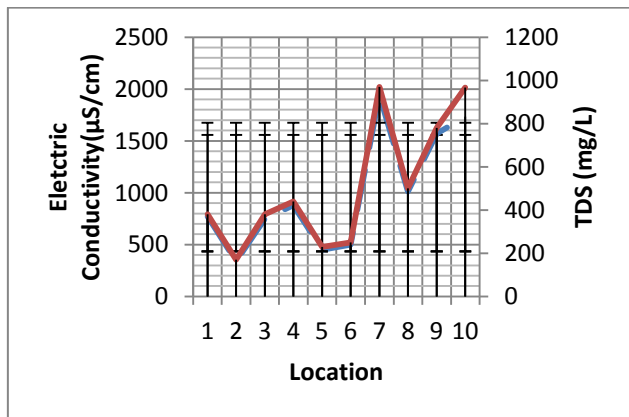


Figure-3: The total dissolved solids (mg/L) content in groundwater of Ranipur city of Khairpur Mir's

The location 7 exhibited the TDS contamination at boundary level. However the low range was found at location 2 and that was 170mg/L. The reason was the strength of population. The location 2 was not thickly populated. The TDS and EC were interrelated terms. According to WHO standards up to 400µS/cm were the recommended level for groundwater [11].The monitored ranged was 340-1940 µS/cm. it was observed that EC ranged was beyond the limit. Only two locations showed satisfactory level out of 10 locations.

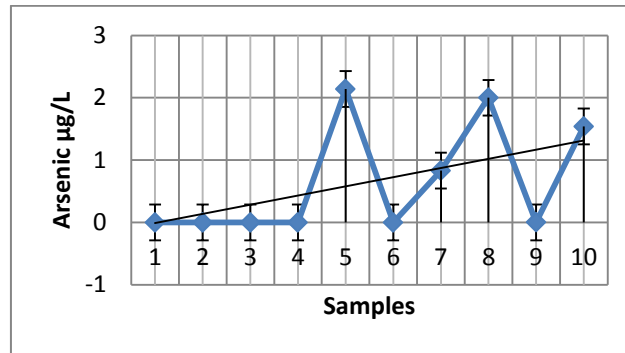


Figure-4. The Arsenic content (µg/L) in Ranipur city of Khairpur Mir's

The Arsenic contamination puts adverse health effect on human being. The Arsenic was determined by kit method (Mercokoquant Arsenic Test). The Kit measures the pentavalent and trivalent arsenic had range from 0.005-0.50mg/L. The ten locations were analyzed shown in Fig 4. The figure portrayed linear trendline with vertical error bars. The location 2 posses were low arsenic contamination that was 0.00001µg/L. The location 5 has high value that was 2.14. Location 1, 3 and 4 have same value. Locations 5, 6, 8, 10 were very high from WHO Standard. WHO Standards value is 0.01 µg/l and Pakistan standard for Arsenic is 50 µg [12].

4. CONCLUSION

The 10 selected locations of Ranipur city of Khairpur Mirs were monitored. It was concluded that TDS level were satisfactory while EC was higher in 8 location. The pH was within ranged however slightly increased in two locations. As for as Arsenic was concerned the range was higher in three location out of ten.

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