Journal of Science and Technology
ISSN: 2456-5660 Volume 8, Issue 1 (January2023)
www.jst.org.in *DOI:https://doi.org/10.46243/jst.2023.v8.i01.pp01-05*

ASSESSMENT OF GROUND WATER QUALITY AROUND SOLID WASTE DUMPING YARD, AMRAVATI, VIDARBHA REGION, INDIA

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To Cite this Article

Kirtidhvaj. J. Gawai and S. K. Gudadhe *"***ASSESSMENT OF GROUND WATER QUALITY AROUND SOLID WASTE DUMPING YARD, AMRAVATI, VIDARBHA REGION, INDIA***", Journal of Science and Technology, Vol. 08, Issue 1-January 2023, pp01-5*

Article Info

Received: 19-1-2023 *Revised: 17-1-2023* *Accepted: 20-1-2023* *Published: 3-2-2023*

ABSTRACT:

Water is one of the abundantly available substance in nature. It is essential constituent of all animal and vegetable matter and forms about 75% of the matter of Earth's Crust. The present research work is based on assessment of ground water quality around solid waste dumping yard in Amravati, Vidarbha region of India. In this work ground water quality assessment was done with the help of physico-chemical parameters like pH, temperature, turbidity, total dissolved solids, conductivity, total alkalinity, total hardness, chlorides, sulphate, total phosphate, dissolved oxygen, nitrate and fluoride. The all parameters are analysed with the help of NEERI standards water and waste water manual methods and obtained results ware compared with BIS and WHO standards. The results shows that the quality of underground water around solids waste dumping yards villages are not so good and not for suitable to directly drinking purpose. It is caused due to water percolated through solid waste dumping area and it contaminated the ground water. The treatment of ground water is essential in the study area.

Keywords: Assessment, Ground Water, Solid Waste Dumping Yard, Amravati

INTRODUCTION:

Water also an essential ingredient of animal and plant life. Water is distributed in nature in different forms, such as rain water, river water, spring water and mineral water. Water is mostly used for industrial and municipal purposes. In India once waste has been collected, the majority of MSW is sent to unsanitary landfills or open dumps where waste is disposed of and bulldozed over or cover with debris. (Abazeri Mariam, 2014). Over 98% of the fresh water on the lies below its surface. The remaining 2% is what we see in lakes, rivers, streams and reservoirs. Of the fresh water below the surface, about 90% satisfies the description of ground water, that is, water which occurs in saturated materials below the water table. About 2% water occurs as soil moisture in the unsaturated zone above the water table and is essential for plant growth. Ground water acts as reservoir by virtue of large pore space in earth materials, as a conduit which can transport water over long distances and

as a mechanical filter which improves water quality by removing suspended solids and bacterial contamination. it is the source of water for wells and springs, that is the recommended source of rural domestic use. Ground water supplies drinking water for 51% of the total population and 99% of the rural population. Ground water helps grow our food 64% of groundwater is used for irrigation to grow crops. Groundwater is an important component in many industrial processes. Groundwater is a vital water supply for humanity. Groundwater provides drinking water entirely or in part for as much as 50% of the global population and accounts for 43% of all of water used for irrigation.

Solid waste is inextricably linked to urbanization and economic development. As countries urbanize, their economic wealth increases. As standards of living and disposable incomes increase, consumption of products and services increases, which ends up during a corresponding increase within the amount of waste generated. (World Bank, 2012).

The term "Municipal Solid Wastes" applies to those Solid Wastes generated by households and to solid wastes of similar character derived from Shops, Offices and other Commercial Units. (Cointreau, 1982). Ground water has been considered as reliable and safe source of water, protected by surface contamination by geological filters that remove pollutants from water which percolate through soil. Still ground water is not absolutely free from these pollutants (Tiwari *et al.*, 1986; Prasad and Bhat, 2011). Due to degradation of Environment and adverse impact on public health and life style, solid waste management has become top priority. Solid waste management has emerged as one of the greatest challenges facing municipal authorities worldwide especially in developing countries. (Babatunde B.B. *et al.* 2013). Disposal of municipal solid waste without taking proper scientific methods is a major environmental problem. (Mor *et al.,*2006) Lack of data of treatment systems by authorities is reported together factor affecting the treatment of waste (Chung and Lo, 2008). One of the greatest consequences of landfills and open dumps is the contamination of ground and surface water due to leachate which contains nutrients, metals, salts and other soluble or suspended components and products from the decomposition of waste. (Australian Environmental Protection Agency, 2009). The usual and the most neglected cause of water pollution are uncontrolled dumping of municipal solid waste. Infiltration of water by rainfall, water already present in the waste, or water generated by biodegradation, cause the leachate to leave the dumping ground laterally or vertically and find its way into the groundwater thereby causing contamination. (Kumaravel *et. al.,* 2003).

METHODOLOGY:

The selected study area is the Underground water from Vanarashi, Rasulpur and Sukali village compost depot located near the Amravati city. Sukali is large village located in Amravati district, Maharashtra with total 504 families residing. The village has population of 2128 of which 1146 are males while 982 are females as per population. The sample collected from near and around to solid waste dumping yard. The sampling locations are as follows:

Sr. No.	Sample	Sampling Location
1	Sample - I	Vanarashi
2	Sample – II	
3	Sample – III	Sukali
4	Sample – IV	
5	Sample – V	
6	Sample - VI	Rasulpur
7	Sample – VII	
8	Sample - VIII	

In samples were collected from villages near and around solid waste dumping yard and analysed with the help of NEERI standard water and waste water manual. The physico-chemical parameters like pH, temperature, turbidity, total dissolved solids, conductivity, total alkalinity, total hardness, chlorides, sulphate, total phosphate, dissolved oxygen, nitrate and fluoride were analysed by referring NEERI standard water and wastewater manual for the assessment of ground water quality around solid waste dumping yard of decided location.

OBSERVATION AND RESULT:

The observation of analysis is built up in table format as differences can be observed, and also the comparison with water standard of B.I.S and W.H.O. The comparison is important with the standard given by the different governmental agencies is shows the better result.

Sr. No.	Parameters	Sampling Location							
		I	II	III	IV	V	VI	VII	VIII
1	pH	7.4	7.9	7.4	7.7	7.5	7.5	7.8	7.4
2	Temperature (^{0}C)	21	20	22	20	20	19	18	19
3	Turbidity (NTU)	4	4	1	4	2	1	1	1
4	Total Dissolved Solids (mg/l)	820	890	675	745	750	865	1220	950
5	Conductivity (µS/cm)	2246	1920	950	900	456	450	2160	1681
6	Total Alkalinity (mg/l)	800	460	280	352	412	300	324	356
7	Total Hardness (mg/l)	610	700	480	580	420	650	270	620
8	Chloride (mg/l)	284	734	127	184	106	319	284	539
9	Sulphate (mg/l)	42	45	38	12	18	40	56	52
10	Total Phosphate (mg/l)	0.61	0.68	0.61	0.58	0.30	0.65	0.56	0.27
11	Dissolved Oxygen (mg/l)	5.06	4.21	4.12	4.26	3.21	5.2	6.01	5.23
12	Nitrate (mg/l)	79	50	51	80	67	24	26	39
13	Fluoride (mg/l)	0.7	0.6	0.4	1.2	0.8	0.6	0.5	0.9

pH: The pH examined for different samples between 7.4 to 7.9, it shows the water is neutral in nature.

Temperature: Temperature examination revealed a little fluctuation in results between 18°C to 22°C. The highest value was determined in water sample III, while lowest was found in water sample VII. This result of temperature is normal.

Turbidity: The turbidity examined for different samples between 1.0 to 4.0.

Total Dissolved Solid: The values of total dissolved solids in between 675mg/l to 1220mg/l. The highest value was determined in water sample VII, while lowest was found in water sample III. The all samples are above permissible limit.

Conductivity: EC values examined for different water samples fluctuated in between 450 µS/cm to 2246 µS/cm. sample I, II, VII and VIII are above permissible limit respectively.

Total Alkalinity: The alkalinity in water sample are between in 280mg/lit to 800 mg/lit. The alkalinity of all samples is above permissible limit.

Total Hardness: The hardness of water sample is between 270 mg/lit to 700 mg/lit. The hardness presence in all samples is above permissible limit. The hardness is due to the presence of cations and anions. There are two types of hardness, temporary and permanent hardness respectively.

*Chlorides***:** The chlorides in examined water samples are between 106 mg/lit to 734 mg/lit. sample I, II, VI, VII and VIII are above permissible limit.

*Sulphate***:** The Sulphate in examined water samples is between in 12 mg/lit to 56 mg/lit. The Sulphate is nontoxic anion. The Sulphate in water represent agriculture pollution. But all samples are in permissible limit.

*Total Phosphate***:** The phosphate in water samples are between in 0.27 mg/lit to 0.68 mg/lit. the phosphates in all water samples are above permissible limit.

*Dissolved Oxygen***:** The dissolved oxygen content of ground water ranged from 3.21 mg/lit to

6.01 mg/lit. it is fluctuated due to temperature increased or decreases. All samples are in normal condition.

*Nitrate***:** The nitrate in water sample are between in 24 mg/lit to 80 mg/lit. The exceeds the permissible limit but it shows high concentration have also reported increases in nitrate concentration in ground water due to waste water dumped at the disposal site and likely indicate the impact of leachate.

*Fluoride***:** The fluoride in water sample are between in 0.4 mg/lit to 1.2 mg/lit. It is in permissible limit.

CONCLUSION:

The study was conducted of underground water quality by taking water sample for various sampling site. Samples were collected from around solid waste dumping yard. It was concluded that some physico-chemical parameter i.e. total dissolved solids, conductivity, hardness, alkalinity, phosphate and nitrate of some samples are under desirable/permissible limits of given standard and other parameters are in permissible limit. The quality of underground water around solids waste dumping yards villages are not so good and not for suitable to directly drinking purpose. It is caused due to water percolated through solid waste dumping area and it contaminated the ground water. The treatment of ground water is essential in study area for drinking purpose, otherwise it causes the minor and major health problems and savers effects to human health.

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