

Groundwater Quality in Beed District of Maharashtra During Summer Season

A.V. GAIKWAD and S.R. MIRGANE

¹Department of Chemistry, V.M. Kaij Dist-beed (India).

²J.E.S.C. Jalna Dist. Jalna (India).

(Received: January 03, 2010; Accepted: March 10, 2010)

ABSTRACT

A systematic physico – chemical study of ground water in 16 different localities in Beed district of Maharashtra has been taken up to evaluate its suitability for drinking purpose in the year 2008-09. The physico – chemical parameters are such as pH, EC, TDS, TH, TA, Cl⁻, Ca⁺⁺, Mg⁺⁺, K⁺, Na⁺ of ground water were studied. In present study water samples were collected monthly for four months during summer from sixteen selected ground water sources i.e. Bore wells. The values of physico – chemical parameters are compared with standard values suggested by WHO. It is observed that values of TDS, TH, TA, Ca⁺⁺, Mg⁺⁺ and Na⁺ have high values than the permissible limit prescribed by WHO.

Key words: Ground water, Beed district, physico – chemical analysis.

INTRODUCTION

Water covers about 70% of the earth's surface. Although water on earth's surface is abundant, 97% water is salty, 2% is solid water and only 1% is available as a fresh water in which ground water accounts for 98%. Water has great importance in the life of living organisms. Economy and health of nation depends upon the quality and quantity of water. Generally urban and rural areas are using their own Bore-wells water for drinking and domestic purposes, because related authorities are unable to meet the ever increasing demand of potable water (V.K.Garh et al 2004)

But various studies carried out past have shown that ground water is also polluted due to dumping of waste, sewage disposal, industrial effluent disposal and septic tanks.

Beed district is one such urban and rural area where 90% population is using Bore well water for drinking and domestic purposes.

The physico – chemical parameters of ground water from Beed district were studied. The samples were as follows:

- | | | |
|-----|---|-------------------------------|
| S1 | - | Vasant College Kaij. |
| S2 | - | Shukrawar peth Kaij. |
| S3 | - | Adas common Bore well |
| S4 | - | Dhande galli Beed |
| S5 | - | Prashant nagar Ambajogai |
| S6 | - | Adas road Dharur |
| S7 | - | Police Colony Parali |
| S8 | - | Near Vaidyanath Mandir Parli |
| S9 | - | Near Mauli Mandir Chakarwadi. |
| S10 | - | Shivaji Chouk Telgaon |
| S11 | - | Chausala village, Beed |
| S12 | - | Near Bus stand Georai |
| S13 | - | Wida village Kaij |
| S14 | - | Moha village Majalgaon |
| S15 | - | Khadakpura Ambajogai |
| S16 | - | Sugarfactory Ambajogai |

These samples were accessed for water quality during summer season. The results obtained are compared with standard data prescribed by WHO.

METHODS

The samples were collected in middle of each month and parameters were measured using standard methods of analysis.

The pH of samples was measured with the help of digital pH – meter ELICO – 120 and conductivity was measured by digital conduct meter ELICO-667. TDS was measured with the help of digital TDS meter. Sodium and Potassium were measured with the help of ELICO-CL-220 Flame photometer. The remaining parameters were determined as usual.

RESULTS AND DISCUSSION

The physico – chemical parameters of different samples in February, March, April and May months are given in table no. 1, 2, 3 and 4.

The standard values prescribed by WHO for pH, EC, TDS, TA, Cl⁻, Ca⁺⁺, Mg⁺⁺, Na⁺, and K⁺ are 7.0 - 8.5, 750-2250 μ s, 500 ppm, 200 ppm, 200 ppm, 75 ppm, 30 ppm, 20 ppm and 12 ppm respectively.

Almost all the samples in February show acidic pH which is not in the permissible limit of standard data prescribed by WHO except sample S11. In March 50% samples show alkaline while 50% are slightly acidic in nature. In April and May all samples are alkaline in nature. Electrical conductivity of all samples in summer season was within permissible limit of WHO. All samples studied during summer season has higher values of TDS, these ranges from 190 ppm to 2800 ppm. The total hardness in the studied samples varies from 70 ppm to 1290 ppm. In summer total hardness increases from February to May. Total alkalinity of all the samples in summer is above the permissible limit prescribed by WHO. It varies from 251 ppm to 700 ppm. All samples show Cl⁻ within permissible limit except S2, S3 and S10. These are having high concentration prescribed by WHO. Cl⁻ concentration increases from February to May in summer. Ca⁺⁺ content is higher in all samples studied except few samples in different months. All samples studied during summer show higher concentration of Mg⁺⁺ than permissible limit prescribed WHO.

Potassium and Sodium are naturally occurring elements in ground water. Sodium is with

Table 1: Month - February 2009

Sampling Sites	T	pH	EC	TDS	TA	TH	Cl ⁻	SO ₄ ²⁻	Ca ²⁺	Mg ²⁺	Na ⁺	K ⁺	DO
S1	26	6.6	1094	360	313	415	97	30	150	265	72	7.2	6.64
S2	26.2	6.3	2089	850	470	675	259	37	186	489	89	7.6	6.2
S3	26.1	6.5	1528	500	360	415	170	15	150	265	92	9.2	5.96
S4	26	6.7	1868	630	649	335	139	102	60	275	66	4.4	6.2
S5	26	6.7	1205	420	432	275	139	22	123	152	72	4.8	7.12
S6	25.9	6.6	1109	370	423	410	134	17	112	298	95	17.6	6.64
S7	25.8	6.8	817	260	313	330	110	2	100	230	89	10.4	6.96
S8	26	6.7	691	220	329	305	73	28	100	205	72	6	6.42
S9	26	6.6	789	250	263	310	135	7	81	229	69	7.2	6.86
S10	25.8	6.7	1647	590	251	295	298	68	136	169	59	4.4	6.44
S11	28.9	7.2	503	180	238	70	70	3	58	12	72	7.2	6.08
S12	25.8	6.8	996	350	357	410	156	17	100	310	95	49.6	6.12
S13	26.1	6.7	778	250	276	195	44	3	48	147	93	26.8	6.42
S14	25.9	6.6	801	290	401	350	39	3	110	240	72	6	5.88
S15	26	6.7	1020	390	351	390	79	17	146	244	90	6.8	6.12
S16	26.2	6.8	1054	380	351	345	94	60	74	271	93	8.8	6.92

All parameters are in ppm, excluding E.C. μ -mhos/cm, Temperature $^{\circ}$ C and pH

Table 2: Month - March 2009

Sampling Sites	T	pH	EC	TDS	TA	TH	Cl ⁻	SO ₄ ²⁻	Ca ²⁺	Mg ²⁺	Na ⁺	K ⁺	DO
S1	27	6.8	851	350	313	310	197	30	118	192	66	4.4	5.28
S2	27.2	7.3	532	190	138	120	255	10	32	88	73	7.2	5.86
S3	27.1	6.5	1915	1700	338	475	280	58	168	306	69	6.4	7.2
S4	27	6.7	2006	730	671	320	164	104	186	134	73	6	5.8
S5	27	7.1	1476	500	476	275	184	48	108	167	93	12.4	5.12
S6	27.1	6.6	1211	390	389	425	133	31	78	347	66	4.8	4.96
S7	26.9	6.9	827	310	313	340	126	13	98	242	72	4.8	5.2
S8	27	7.1	738	520	345	325	93	4	80	245	69	6.8	5.86
S9	27	7.6	1103	390	276	410	235	33	118	292	72	8.4	5.42
S10	26.8	7.2	1152	480	299	305	257	40	105	200	72	3.6	5.88
S11	26.9	7.5	535	200	257	75	42	3	38	67	58	4.4	5.96
S12	26.8	7.3	767	375	352	420	225	33	115	305	74	8.8	4.42
S13	27.1	7	1125	390	269	410	122	27	136	274	72	9.2	5.64
S14	26.9	7.1	816	310	420	380	80	3	90	290	90	10.4	5.26
S15	27.1	6.5	1042	380	389	350	165	38	82	268	68	7.2	5.96
S16	27.2	6.9	1125	400	363	315	131	61	80	235	68	9.2	6.12

All parameters are in ppm, excluding E.C.µ-mhos/cm, Temperature °C and pH

Table 3: Month - April 2009

Sampling Sites	T	pH	EC	TDS	TA	TH	Cl ⁻	SO ₄ ²⁻	Ca ²⁺	Mg ²⁺	Na ⁺	K ⁺	DO
S1	32	8.9	1150	1360	410	625	273	203	180	325	72	6.4	4.96
S2	32.1	7.2	2410	2280	530	360	252	54	109	670	74	6	5.12
S3	32	7.8	1057	1900	301	520	390	172	172	352	81	8.4	4.86
S4	32.2	7.8	1940	640	882	340	319	172	60	280	89	8	4.02
S5	32	8.1	592	650	470	380	230	182	64	316	69	10.8	4.64
S6	32	7.8	1140	700	414	720	337	178	166	412	72	7.6	4.44
S7	32.1	8.4	890	700	323	710	330	50	70	235	81	10.4	4.96
S8	32	8.3	820	520	360	390	98	160	184	236	81	7.6	5.12
S9	31.9	7.9	1000	900	354	635	340	185	172	463	58	7.2	5.08
S10	31.8	7.7	1940	1780	420	950	216	32	140	810	73	3.6	4.86
S11	31.1	7.8	870	1578	440	740	110	35	300	440	20	6	4.72
S12	31.9	7.9	538	590	348	430	305	50	130	300	74	10.8	4.12
S13	32	9.3	612	1520	425	400	209	35	128	320	82	11.6	4.46
S14	32.2	8.4	478	350	376	844	195	4	243	601	26	9.6	4.92
S15	31.1	7.6	1660	900	389	760	248	55	195	565	72	11.6	4.83
S16	32.2	8	1790	945	700	1290	262	63	310	980	69	10.8	5.16

All parameters are in ppm, excluding E.C.µ-mhos/cm, Temperature °C and pH

Table 4: Month - May 2009

Sampling Sites	T	pH	EC	TDS	TA	TH	Cl ⁻	SO ₄ ²⁻	Ca ²⁺	Mg ²⁺	Na ⁺	K ⁺	DO
S1	35	8.2	1120	1260	385	735	140	47	154	481	69	7.2	4.48
S2	34.8	7.1	2230	2800	510	1000	307	97	226	774	72	6.4	4.26
S3	34.9	7.4	2280	2500	363	845	326	87	298	547	72	7.2	4.12
S4	35.2	7.3	1880	1700	876	375	161	98	64	390	72	8.4	3.98
S5	35	7.4	1190	1000	437	460	124	97	118	342	82	7.6	4.14
S6	35.1	7.1	1150	1000	515	610	204	57	195	430	72	6	4.2
S7	34.9	7.9	850	750	345	380	105	48	100	305	77	8.4	4.12
S8	35.1	8.2	865	1000	389	505	85	60	166	339	61	3.6	4.46
S9	35.1	7.8	1346	1200	354	600	203	48	190	417	87	6.4	4.52
S10	34.9	7.8	2090	2300	410	940	304	35	340	770	61	4.4	4.38
S11	35	7.9	1124	1438	408	730	98	35	260	470	61	5.2	4.08
S12	35.1	7.9	1018	1580	388	555	106	60	162	419	65	5.5	4.12
S13	35.1	7.5	1233	1545	410	475	119	53	200	285	49	8.8	4.64
S14	35.2	7.6	956	1200	420	822	95	20	224	596	72	4.4	5.1
S15	34.8	7.2	1640	1000	390	685	98	62	180	505	81	12	4.48
S16	34.9	7.3	2390	1380	675	1245	112	63	295	1033	83	60.2	3.96

All parameters are in ppm, excluding E.C.µ-mhos/cm, Temperature °C and pH

high concentration but Potassium is within permissible limit given by WHO. The concentration of Sodium in the studied samples varied from 58 ppm to 95 ppm. The concentration of Potassium varied from 3.60 ppm to 60.20 ppm. Sample S12 and S13 have higher values in February while sample S16 have higher values in May.

CONCLUSION

Finally above results show that ground waters of all samples during summer also show higher values of 90 % parameters of common Bore-wells. This is because of large depth of Bore-wells. Variation in nature of rock , nature of Earth crust etc. Solid waste material deposition, improper drainage systems also changes the nature of ground water. Hence these are chemically unfit for drinking purposes and should not be used without pretreatment .

REFERENCES

1. APHA 1995 : Standard methods for examination of water waste 19th edition .
2. Trivedy R.K. and Goel P.K., Chemical and Biological methods for water pollution studies (1984).
3. N. Manivaskam, Physico – chemical examination of water , sewage and industrial effluents (2005).
4. V.K. Garg *et al.*, Hydrochemistry of underground water in southern zone of Hisar City Poll. Res. **23**(3): 461 (2004). Enviromedia.