ISSN: 2394-7659
IMPACT FACTOR- 2.789

IJERMS

International Journal of Engineering Researches and Management Studies

ANALYSIS OF THE GROUND WATER OF THE INDUSTRIAL ESTATE AT CHENNAI CITY

K.V.Parvathavarthini[*1] & Dr.T.Senthilnathan[2]
[*1]Asst. Prof. Dept. of S&H,, ArinarAnna Institute of Science and Technology, Chennai
[2]Prof., Dept. Of S&H, Ellammal Engg. College, Chennai

ABSTRACT
Water is in its natural form contains number of salts, microbes and alkalis. Due to industrialization the purity of water critically threatened. To investigate the water quality parameters of three places near Ford (India) Factory at the South of the Chennai City of the state of Tamil Nadu is estimated in the present study. The standard methods of sampling and estimation is done for the ground water samples. The quality of water shows high value of total hardness and total dissolved solids

Keywords: Physico –chemical parameters.

1. INTRODUCTION

In the late years, the expanding danger to the ground water quality because of human exercises has accepted of extraordinary significance. The antagonistic impacts on ground water quality are the aftereffects of man's movement on the ground surface, on account of agrarian, residential and mechanical effluents, and in addition sub-surface or surface transfer of sewage and modern squanders. (CPCB, 2007) The nature of ground water is of extraordinary significance in deciding the suitability of a specific ground water for a sure utilize (open water supply, watering system, modern applications, power era and so forth) (Mahananda et al., 2010). The nature of ground water is the resultant of the considerable number of procedures and responses that have followed up on the water from the minute it consolidated in the environment to the time it is released through a well. Along these lines, the nature of ground water shifts from spot to put, and from season to season with the profundity of the water table, and is basically represented by the degree and organization of the broke up solids.

Sources For Ground Water Pollution: The following table shows a list of the potential groundwater contamination sources:-

Place of origin	Potential groundwater contamination source			
	Municipal	**Industrial**	**Agricultural**	**Individual**
At or near the land surface	Air pollution, municipal waste land spreading salt for deicing streets & parking lots 	Air pollution chemicals: storage & spills fuels: storage & spills mine tailing piles 	Air pollution chemical spills fertilizers livestock waste storage facilities & lands spreading pesticides 	Air pollution fertilizers homes cleaners, detergents motor oil, paints and pesticides 

ISSN: 2394-7659
IMPACT FACTOR- 2.789

IJERMS

International Journal of Engineering Researches and Management Studies

Below the land surface	landfills, leaky sewer lines 	Pipelines underground storage tanks 	Underground, storage tanks, wells: poorly constructed or abandoned 	Septic systems, wells: poorly constructed or abandoned 

Groundwater contains a few polluting influences, regardless of the fact that it is unaffected by human exercises. The sorts and centralizations of characteristic pollutions rely on upon the way of the land material through which the groundwater moves, and the nature of the energize water. (CPCB, 2007) Groundwater traveling through sedimentary shakes and soils may get an extensive variety of mixes, for example, magnesium, calcium, and chlorides. A few aquifers have high regular convergences

Agricultural Sources: Pesticides, manures, herbicides and creature waste are farming wellsprings of groundwater tainting. The horticultural defilement sources are shifted and various: spillage of manures and pesticides amid taking care of, spillover from the stacking and washing of pesticide sprayers or other application gear, and utilizing chemicals tough from or inside of a couple of hundred feet of a well.

Industrial Sources: Assembling and administration businesses have levels of popularity for cooling water, preparing water and water for cleaning purposes. Groundwater contamination happens when utilized water is come back to the hydrological cycle. Current monetary movement requires the transportation and capacity of material utilized as a part of assembling, handling, and development. Along the route, some of this materials can be lost through spillage, spillage, or disgraceful taking care of. The transfer of squanders connected with the above exercises adds to another wellspring of groundwater defilement. A few organizations, more often than not without access to sewer frameworks, depend on shallow underground transfer. They utilize cesspools or dry openings, or send the wastewater into septic tanks.

Residential Sources: Private wastewater frameworks can be a wellspring of numerous classes of contaminants, including microbes, infections, nitrates from human waste, and natural mixes. Infusion wells utilized for local waste water transfer (septic frameworks, cesspools, seepage wells for tempest water overflow, and groundwater revive wells) are of specific worry to groundwater quality if found near drinking water wells. Shamefully putting away or discarding family unit chemicals, for example, paints, manufactured cleansers, solvents, oils, meds, disinfectants, pool chemicals, pesticides, batteries, gas and diesel fuel can prompt groundwater defilement.

Sea Water Intrusion

At the point when managing the abuse, rebuilding and administration of crisp groundwater in beach front aquifers, the key issue is ocean water interruption. Saltwater interruption is a kind of characteristic groundwater pollution, where the regular harmony in the middle of freshwater and saltwater in beach front aquifers is aggravated by groundwater withdrawals and other human exercises that lower the groundwater levels, lessen crisp groundwater stream to waterfront waters, and at last make saltwater interfere into the seaside aquifers, making those aquifers no more accessible for use.saltwater interruption along the coasts, the bringing down of the water table by waste waterways can likewise prompt saltwater interruption.

ISSN: 2394-7659
IMPACT FACTOR- 2.789

IJERMS

International Journal of Engineering Researches and Management Studies

Study Area

Chennai, earlier known as Madras, is the capital city of the condition of Tamilnadu, and India's fourth biggest metropolitan city. It is situated on the Coromandel bank of the Bay of Bengal. The scope of the city is 13.04o N and longitude 80.17o E. The city covers a zone of 174 Km2. It is 368 years of age and the 31st biggest metropolitan territory on the planet. There are three water bodies viz., Adayar waterway, Cooum stream and the Buckingham Canal. The Chennai Metropolitan region comprises of three areas, to be specific, Chennai city and the regions of Kancheepuram and Thiruvallur. The city is isolated on the premise of its sythesis into four noteworthy parts, North, South, West and Central Chennai.

Maraimalai Nagar Town

Maraimalai Nagar Town is arranged in the south at a separation of 40 km from Chennai city. It is the listen quarters of Maraimalai Nagar or Taluk in Kancheepuram area. It is arranged at 12'41'30" scope and 74'58'00: longitude and 28m lifted from M.S.L. This town is named as Maraimalai Nagar in memory of Maraimalai Adigalar and has no legacy back-ground. The Municipality involved Kattankulathur, Potheri and Thirukatchur, Peramanur Villages and was constituted as a Third Grade Municipality in 2004. According to the GO (MS) No.154 dated 19.08.2010 it was up reviewed as an uncommon evaluation Municipality. It is situated on the National Highway No : 45.

The town is isolated into 21 wards. The degree of the city range is 58.08 Sq.Km. There are around two hundred and twenty commercial ventures in the SIDCO Industrical Estate of the Town. The popular Ford (India) Ltd., and India Pistons, are arranged in the Industrial Estate. Eight Sampling stations were chosen from the study range, 1 each from diverse wards of the town. The number of inhabitants in the town is 81,361 as per 2011 registration.

2. MATERIALS AND METHODS

Sample collection and preservation

Criteria for the selection of Bore Wells / Tube Wells / Hand pumps

For the choice of the groundwater quality study area, the accompanying criteria were remembered:

Drinking water wells •ells closer to the contaminating sources, similar to commercial enterprises, urban wastewater channels, trash, dumpsites and so forth. •Wells associated with regular contaminants like fluoride, iron, arsenic or such toxins.

Test accumulation, transport, protection and examination
Tests were gathered from one of the follo0wing three sorts of wells

i. Open delved wells being used for household or watering system water supply,
ii. Tube wells fitted with a hand-pump or a force driven pump for local water supply or watering system
iii. Hand Pumps, utilized for drinking. (CPCB, 2007).

Open burrowed wells, which are not being used or have been surrendered, were not utilized for testing. For the accumulation of tests, a weighted specimen jug or sampler was utilized to gather the example from an open well. Tests from the creation tube were gathered subsequent to running the well for around 5 minutes. For bacteriological specimens, when gathered from tube wells/hand pump, the spout/outlet of the source was sanitized under fire by a soul light, before the accumulation of the example in the compartment. From open wells the specimens were gathered straightforwardly into pre-cleaned glass bottles. (Ranjana Agarwal, 2010). The specimens were transported to the research center. The specimens were dissected instantly for parameters like Coliform, BOD, COD and supplements. Different parameters were broke down inside of a week's chance. The water tests for the follow component investigation were gathered in corrosive filtered polyethylene bottles, and safeguarded by including ultra immaculate nitric corrosive (2 mL/lit.). Tests for the pesticides examination were gathered in glass bottles, while tests for bacteriological investigations were gathered in disinfected high-

ISSN: 2394-7659
IMPACT FACTOR- 2.789

IJERMS

International Journal of Engineering Researches and Management Studies

thickness polypropylene/Glass jugs secured with aluminum foils. Every one of the specimens were put away in inspecting units kept up at 4°C and conveyed to the lab for definite concoction and bacteriological examinations

Table:1 Methods Used For Estimation Of Physical Parameter

S.No	Parameter	Method
1	Colour	a. Visible Comparison Method (Only Potable water)
2	Electrical conductivity	Conductivity Meter
3	pH Value	pH Meter
4	Suspended solids (Total Number Filterable)	Gooch crucible
5	Temperature	Thermometer
6	Total Dissolved solids	Gravimetric
7	Turbidity	Nephelometric

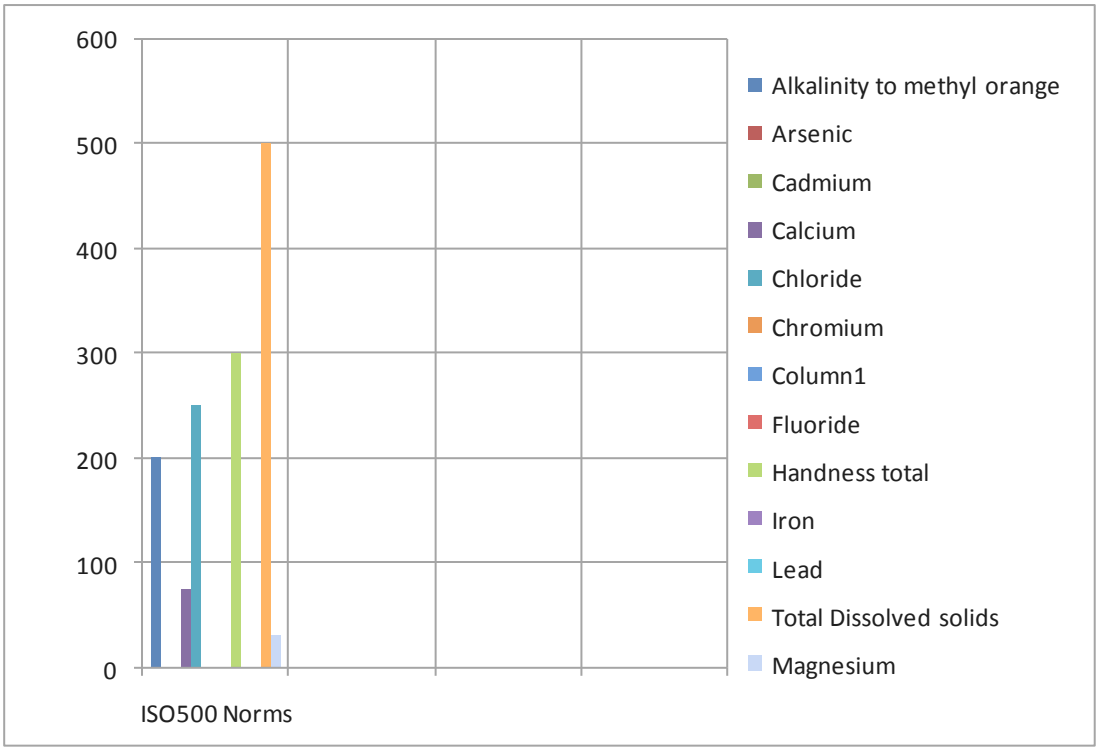
Table:2 Water Quality Standards As Per Is 10500

S.No	Parameter	Unit	IS0500 Norms
1	Alkalinity to methyl orange	mg/l	200
2	Aluminium	mg/l	
3	Arsenic	mg/l	0.05
4	Barium	mg/l	-
5	Biochemical Oxygen Demand	mg/l	
6	Boron	mg/l	-
7	Cadmium	mg/l	0.01
8	Calcium	mg/l	75
9	Chloride	mg/l	250
10	Chromium	mg/l	0.05
11	Colour	Hazen units	10
12	Conductivity	µmhos/cm	-
13	Fluoride	mg/l	1.0
14	Handness total	mg/l	300
15	Iron	mg/l	0.3
16	Total Dissolved solids	mg/l	500
17	Magnesium	mg/l	30

ISSN: 2394-7659
IMPACT FACTOR- 2.789

IJERMS

International Journal of Engineering Researches and Management Studies



Graph:1 Water Quality Standards As Per Is 10500

X-Parameters with ISO 500 Norms
Y-units in mg/l

Table: 3 Methods Used For The Estimation Of Chemical Parameters

S.No	Parameter	Method
1	Alkalinity	Colour Indicator Titration
2	Aluminium	Atomic Absorption Spectrophotometer
3	Arsenic	Atomic Absorption Spectrophotometer
4	Barium	Atomic Absorption Spectrophotometer
5	Biochemical Oxygen Demand	Five day BOD at 20^{o}C, Three day BOD at 27^{o}C.
6	Boron	Colorimetric (Curcumine or Carmine)
7	Cadmium	Atomic Absorption Spectrophotometer
8	Calcium	Titrimetic (EDTA)
9	Chemical Oxygen Demand	Dichromate reflux
10	Chloride	Titrimetic (Argentomatric or Mercuric Nitrate)
11	Chromium	Colorimetric (Diphenyl Carbazide) (for hexavalent, trivalent and total)
13	Fluoride	Distillation followed by colorimetric
14	Handiness total	Titrimetic (EDTA)
15	Iron	Colorimetric (Phenanthroline)
16	Magnesium	By difference (between total hardness & calcium determined titrimetrically)

ISSN: 2394-7659
IMPACT FACTOR- 2.789

IJERMS

International Journal of Engineering Researches and Management Studies

Table:4 Observed Phycico-Chemical Parameters Of The Stations 1,2,3 & 4

S.No	Parameter	Unit	Station$_1$	Station$_2$	Station$_3$	Station$_4$
1	Alkalinity to methyl orange	mg/l	302	264	272	304
3	Arsenic (as As)	mg/l	<0.01	<0.01	<0.01	<0.01
4	Barium (as Ba)	mg/l	<0.01	<0.01	<0.01	<0.01
5	BOD - 3 days at 27^{o}C	mg/l	-	-	-	-
6	Calcium (as Ca)	mg/l	80	78	42 24	68
7	Chloride (as CI)	mg/l	180	228	110	126
8	Chromium (as Cr)	mg/l	<0.01	<0.01	<0.01	<0.01
9	COD	mg/l	15	16	12	12
10	Colour	Hazen Units	5	12	5	5
11	E-Coli	MPN/100ml	-0-	-0-	-0-	-0-
12	Electrical Conductivity	µmhos/cm	1124	1480	894	988
13	F Coli	MPN/100ml	-0-	-0-	-0-	-0-
14	Flouride (as F)	mg/l	0.10	0.10	0.02	0.12
15	Iron (as Fe)	mg/l	0.12	0.04	0.02	0.14
17	Magnesium (as Mg)	mg/l	21	22	34	21
18	Ph	-	6.74	7.44	7.02	7.80
19	Potassium (as K)	mg/l	74	28	18	24
20	Sodium,(as Na)	mg/l	108	110	72	84
21	Temperature	^{o}C	23.0	23.0	24.0	25.0
22	Total Coliform	MPN/100ml	-2-	-2-	-3-	-4-
23	Total dissolved solids	mg/l	822	988	604	704
24	Total Hardness	mg/l	288	288	248	256

Table:5 Observed Phycico-Chemical Parameters Of The Stations 5,6,7 & 8

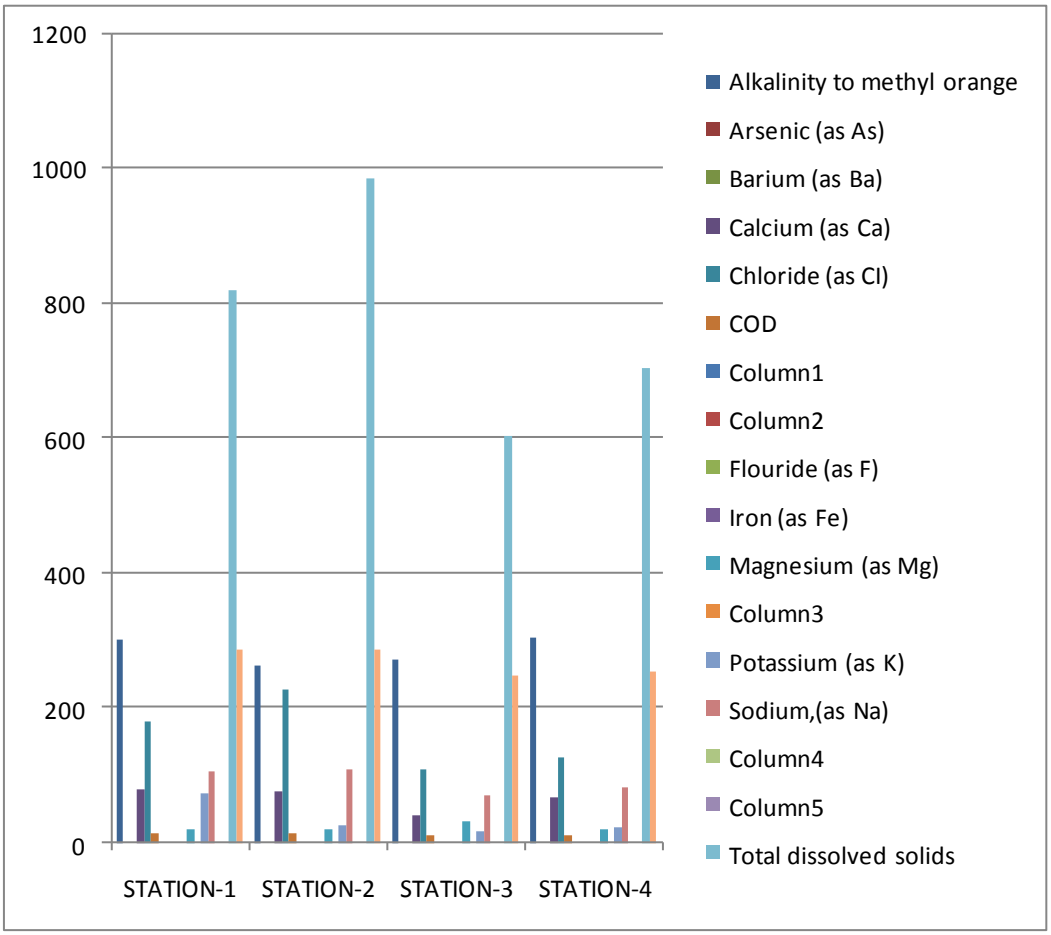
S.No	Parameter	Unit	Station$_5$	Station$_6$	Station$_7$	Station$_8$
1	Alkalinity to methyl orange	mg/l	272	362	274	232
3	Arsenic (as As)	mg/l	<0.01	<0.01	<0.01	<0.01
4	Barium (as Ba)	mg/l	<0.01	<0.01	<0.01	<0.01
5	BOD - 3 days at 27^{o}C	mg/l	-	-	-	-
6	Boron (as B)	mg/l	<0.01	<0.01	<0.01	<0.01
7	Cadmium	mg/l	<0.01	<0.01	<0.01	<0.01
8	Calcium (as Ca)	mg/l	96	96	104	65
9	Chloride (as CI)	mg/l	194	304	258	128
10	Chromium (as Cr)	mg/l	<0.01	<0.01	<0.01	<0.01
11	COD	mg/l	14	15	14	14
12	Colour	Hazen Units	7	5	6	6
13	E-Coli	MPN/100ml	-0-	-0-	-0-	-0-
14	Electrical Conductivity	µmhos/cm	1340	1500	1240	990

ISSN: 2394-7659
IMPACT FACTOR- 2.789

IJERMS

International Journal of Engineering Researches and Management Studies

15	F Coli	MPN/ 100ml	-0-	-0-	-0-	-0-
16	Flouride (as F)	mg/l	0.11	0.04	0.14	0.04
17	Iron	mg/l	0.08	0.09	0.07	0.11
17	Magnesium (as Mg)	mg/l	17	15	28	20
18	Ph	-	6.94	7.44	6.88	7.18
19	Potassium (as K)	mg/l	48	34	28	26
20	Sodium,(as Na)	mg/l	92	90	94	74
21	Temperature	^{o}C	24.0	24.0	25.0	25.0
22	Total dissolved solids	mg/l	896	1100	896	688
23	Total Hardness	mg/l	312	304	368	258



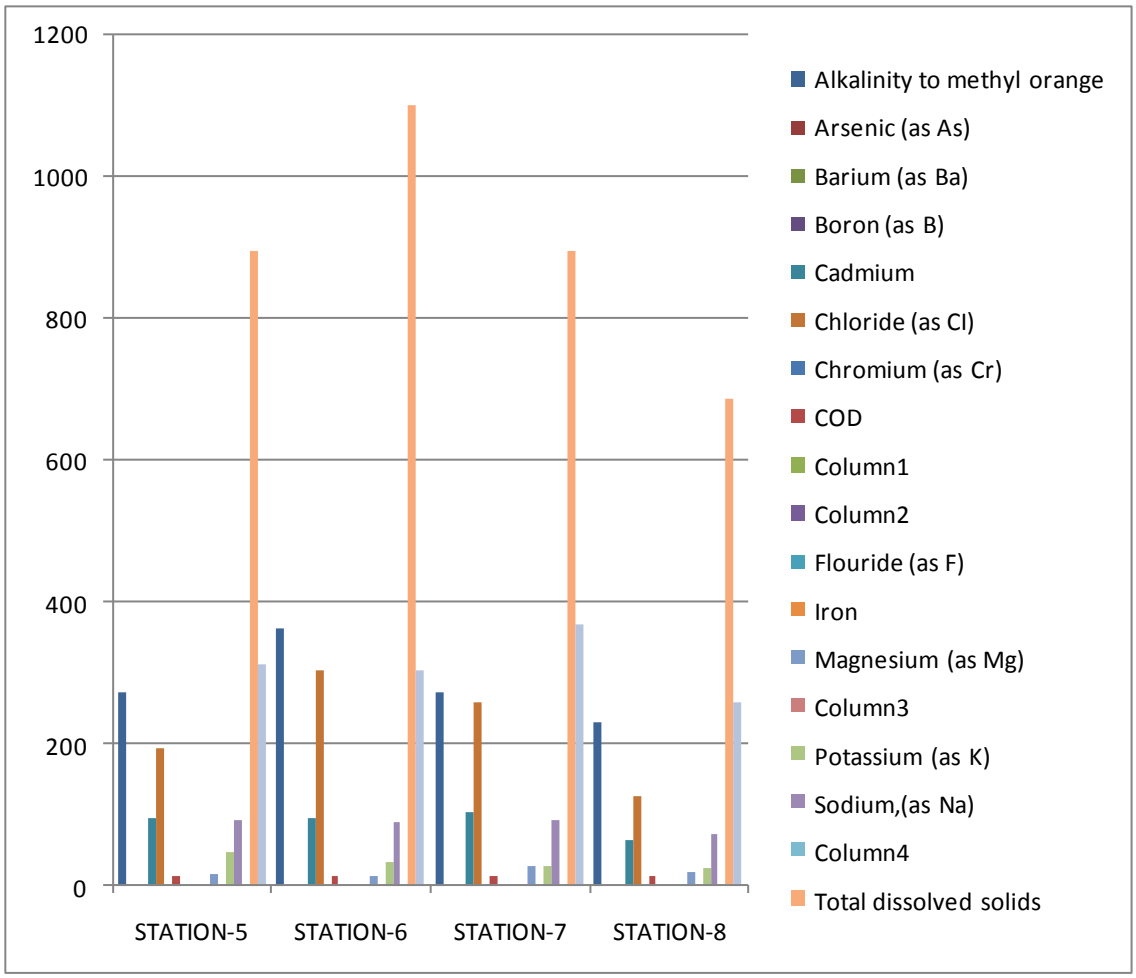
Grpah: 3 Observed Phycico-Chemical Parameters Of Stations-1,2,3 & 4

X-Parameter
Y-Units in mg/l

ISSN: 2394-7659
IMPACT FACTOR- 2.789

IJERMS

International Journal of Engineering Researches and Management Studies



Graph: 4 Observed Phycico-Chemical Parameters Of Stations-5,6,7 & 8

X-Parameter
Y-Units in mg/l

3. RESULTS AND DISCUSSION

pH:

Every one of the estimations of pH lie beneath as far as possible.

Shade of the water:

The water is drab, unscented the stations.

Temperature:

The temperature of the station 1 is 24^{o}C and whatever is left of alternate stations is 23^{o}C, 25^{o}C

Aggregate broke up solids:

The estimations of Total Dissolved Solids in all the stations are above the normal values

Electrical conductivity:

The conductivity of water is lowest in stations 3

ISSN: 2394-7659
IMPACT FACTOR- 2.789

IJERMS
International Journal of Engineering Researches and Management Studies

Cadmium:
The convergence of cadmium in every one of the stations is beneath as far as possible.

Calcium:
The estimation of calcium is very low in station3.

Chloride:
The centralization of chloride is higher in station 6.

Chromium:
The estimations of chromium in every one of the stations are beneath as far as possible

Substance Oxygen Demand:
The estimations of Chemical Oxygen Demand are normal.

Fluoride:
Every one of the estimations of fluoride are beneath the cutoff.

Total Hardness:
The estimations of aggregate hardness is over as far as possible in station 6 and 2

Iron:
every one of the qualities are beneath as far as possible.

Magnesium:
The convergence of magnesium is most noteworthy in station 3.

Potassium:
The estimations of potassium is within the limit

Sodium:
The estimations of sodium is highest in station2

coliform
There is a nonattendance of aggregate coliform in every one of the stations and no bug sprays or pesticides in the testing station.

4. CONCLUSION

The values of TDS is highest gives skin irritation to the users and hence proper treatment is required.

Re**commendations of the central pollution control board for water quality management**
The CPCB has given the accompanying suggestions to forestall ground water contamination, after a point by point overview in different metros in India. All the ground water extraction structures ought to be enlisted and directed to maintain a strategic distance from over misuse and weakening of ground water quality. The water got starting from the earliest stage structures ought to be tried and examined to guarantee the suitability of ground water for human utilization.

The ground water deliberation sources and their environment ought to be legitimately kept up to guarantee hygienic conditions and no sewage or dirtied water ought to be permitted to permeate specifically to the ground water aquifer. Proper concrete stages ought to be developed encompassing the ground water reflection sources to dodge direct well head contamination.

The encompassing surface zone of the ground water reflection structures ought to be every now and again chlorinated by the utilization of blanching force. Possibilities of development of manufactured energize

ISSN: 2394-7659
IMPACT FACTOR- 2.789

IJERMS

International Journal of Engineering Researches and Management Studies

structures ought to be investigated to increase the ground water revive. Hand pumps, which have been distinguished as having suspected water quality ought to be painted red to demonstrate and caution the general population that the water drawn from the source is not fit for human utilization.

REFERENCES

1. *Sarma.C.,D.K. Deka and K.G. Bhattacharyya,Quality of water in few urban drinking water sources, IJEP 22:173-183(2002)*
2. *Senthilnathan .T and Parvathavarthini .K.V "Assessment of water quality in Chennai city, Tamilnadu", International Conference on Environment Challenges" A Global concern, Kanya Maha Vidyalaya 15th October - 16th October 2010.*
3. *Senthilnathan .T. and Parvathavarthini .K.V. "Assessment of ground water quality of Maraimalai Nagar Town" in International Congress of Environmental Research, 16th – 18th Sep 2010, Mauritius.*
4. *Senthilnathan and Parvathavarthini.K.V "Analysis of water quality characteristics in selected areas of Chennai city", National Conference on Green Chemistry (NCGC), September 2010.*
5. *Senthilnathan T and Parthavarthinin.K.V and Shanthi M.George "Assessment of ground water quality of Maraimalai Nagar Town, near Chennai, India", Journal of Environment Research and Development, Vol.5 No.4, Apr – June 2011, PP 943-947.*
6. *Senthilnathan. T, Parthavarthini K.V. and Shanthi M.George "Analysis of water quality in Chennai City – A statistical approach", 8th Indian Science Congress, 3rd to 7th Jan 2011 SRM University, Chennai .*
7. *Shivkar M.M., C.L.Patil and Varsha Waikole, "Assessment of Well Water Quality in and around Dombivili region (Thane, India)" Poll.Res.28(2),301-304(2009)*
8. *Sidharth Kulkarni,Dashrath Chavan,Santwana Shukla, "Biochemical and microbiological analysis of water of Khandala Tahsil and adjoining areas", J.Chem.Pharm Res:2010,2(6):1-6*
9. *Sulabha.V. and V.R.Prakasam, LimnologicalFeatures of Anandavalleeswaram Temple pond of Kollam, IJEP 27(2):168-175(2007)*
10. *Telpalliwar N.G. and B.B. Shende, Analysis of some physico-chemical parameters of groundwater in Gonpipri Region, Chandrapur District (Maharashtra),J.Chem-Phar.Res.2011,3(1):176-179.*
11. *Tyagi.P. A correlation among physico-chemical parameters of ground water in and around Pitampur Industrial Area, IJEP 23(1):1276-1282(2003)*
12. *Umamaheswari S. and N.Anbu Saravanan, Water Quality of Cauvery River Basin, Trichirappalli, India, International Journal of Lakes and Rivers, Vol.2,Bo.1(2009),pp1-20.*
13. *Vasanthavigar M., K.Srinivasamoorthy, K.Vijayaragavan, R.Rajiv Gandhi, S.Chidambaram, P.anandhan, R.Manivannan, S.Vasudevan, Application for water quality index for ground water quality assessment; Thirumanimuttar Sub-basin, Tamil Nadu,India, Environ.Monit.Assess, DOI 10.1007/810661-009-1302-1,Jan 2010*
14. *Venteswaralu.P., Suman .M and Narasimha Rao.C., "Evaluation of physico-chemical parameters of ground water of Renigunta,Andhra Pradesh,India,Research Journal of Pharamaceutial,Biological and Chemical Sciences,april-June 2011,Vol 2,Issue 2,Page No.464*
15. *Yadav, S.S. Rajesh Kumar, "Assessment of ground water pollution due to fluoride content and water quality in and around Tanda Taluka of Rampur district, Utrapradesh,India, Journal of Chemical and Pharmaceutial Research, 2010,2(4):564-568..*