WATER QUALITY CHARACTERSTICS OF VARIOUS SOURCES FROM SHIMLA TO SOLAN

Project Report submitted in partial fulfillment of the degree of

Bachelor of Technology

In

Civil Engineering

Under the Supervision of

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To

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CERTIFICATE

This is to certify that the work titled "Water Quality Characteristics of Various Sources from Shimla to Solan" submitted by "Avijeet Rathee, Ayush Sikand" in partial fulfillment for the award of degree of B. Tech. Civil Engineering of Jaypee University of Information Technology; Waknaghat has been carried out under my supervision. This work has not been submitted partially or wholly to any other University or Institute for the award of this or any other degree or diploma.

Signature of Supervisor ..... 31/5/2013.

Name of Supervisor Dr. Veeresh Gali

Project Guide Mr. Mudit Mishra

Date .....

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We wish to gratefully acknowledge the library staff for their support and cooperation.

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1. ABSTRACT

Water is the essence of life. The water which comes for both industrial and domestic purposes is highly contaminated and hence causing various problems. We have scrutinized our project to check and acknowledge various parameters of water from different sources. The project is broadly grouped in two phases. In Phase-1, we have collected and tested different water samples from Shimla to Solan during summer season. For this water was collected in the month of August. Phase-2 was accomplished by collecting and testing same water samples during winters. Sampling was dune in February for phase-2.

2. INTRODUCTION

Pure water is a chemical compound with each of its molecule containing two hydrogen atoms and one oxygen atom, and nothing else. However pure water can never be available in nature. Even a man made drop of water, prepared in a laboratory by lighting the hydrogen and oxygen gases in a test tube, may not be perfectly pure, because the water drop so formed will dissolve the glass of test tube although a very little bit.

The impurities which water dissolve or picks up as suspended matter may sometimes make it more useful and portable for public uses and especially for drinking and sometimes it may render it harmful and unfit.

To ensure safety to public health, economy and utility in industries and other uses, it, therefore, becomes imperative upon the planners and designers of the public water supply schemes, to thoroughly check and analyze and treat the raw available water to safe and permissible limits, before supplying to the public. This is truer and must be strictly adhered to, when water is supplied for municipal uses, such as drinking, bathing, washing etc. When water is required solely for industries or for irrigation, the quality standards may vary depending upon the requirement of each industry or farming and irrigation.

3. SOURCES OF WATER

The various sources of water available on the earth can be classified into the following two categories.

3.1. Surface sources

- Ponds and lakes
- Streams and rivers
- Storage reservoirs
- Oceans

3.2. Sub-surface sources

- Springs
- Infiltration galleries
- Infiltration wells
- Wells and tube-wells

4. SOURCE SELECTION

Factors governing the particular source of water if sufficient quantity of water:-

4.1. The Quantity of available water

The Quantity of water available at the source must be sufficient to meet the various demands during the entire design period of the scheme. If sufficient quantity of water is not available in the vicinity of the area, we may have to think of bringing water from distant sources.

4.2. The Quality of Available Water

The water available at the source must not be toxic, poisonous or in any other way injurious to health. The impurities present in water should be as less as possible, and should be such as to be removed easily and economically by normal treatment methods.

4.3. Distance of the source of supply

The source of water must be situated as near the city as possible. Because when the distance between the source and the city is less, lesser length of pipe conduits and fewer number of associated appurtenances are required, thereby reducing the cost.

4.4. General Topography of Intervening Area

The area or land between the source and the city should not be highly uneven.

4.5. Elevation of the Source of Supply

The source of water must be on a high contour, lying sufficiently higher than the city or town to be supplied with the water, so as to make gravity flow possible.

5. Types of Water Demands

5.1 Domestic water Demand

This includes the water required in private buildings for drinking, cooking, bathing lawn sprinkling, gardening, sanitary purposes, etc. The minimum domestic consumption for a town or a city with full flushing system should be taken at 200l/h/d; although it can be reduced to 135l/h/d for economically weaker sections.

5.2 Industrial Water Demand

The 'industrial water demand' represents the water demands of industries, which are either existing or are likely to be started in future, in the city for which water supply is being planned. The ordinary per capita consumption on account of industrial needs a city is generally taken as 50l/p/d. In industrial cities, the per capita water requirement may finally be computed to be as high as 450l/p/d or so, as compared to the normal industrial requirement of 50l/p/d.

5.3 Institutional and Commercial Water Demand

Water requirements of institutions, such as hospitals, hotels, restraints, schools and colleges, railway stations, offices, factories, etc. On an average, a per capita demand of 20l/h/d is usually considered to be enough to meet such commercial and institutional water requirements, although of course, this demand may be as high as 50l/h/d for highly commercialized cities.

5.4 Demand for Public Uses

This includes the quantity of water required for public utility purposes, such as watering of public parks, gardening, washing and sprinkling on roads use in public fountains, etc. A figure of 10l/h/d is usually added on this account while computing total water requirement.

5.5 Fire Demand

In thickly populated and industrial areas, fires generally break out and may lead to serious damages, if not controlled effectively. The minimum water pressure available at fire hydrants should be order of 100 to 150kN/m^2.

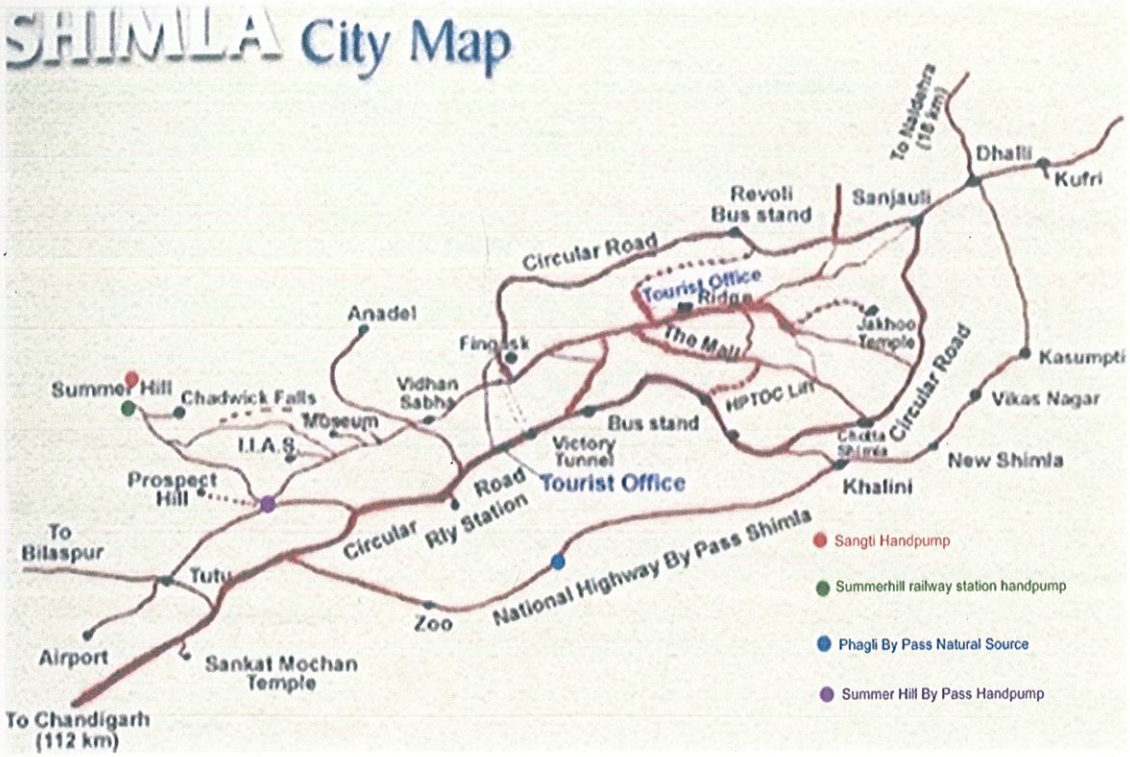
5.6 Water Required to compensate Losses in Thefts And Wastes

This includes the water lost in leakage due to bad plumbing or damaged meters, stolen water due to unauthorized water connections, and other losses and wastes. These losses can be reduced by careful maintenance and universal metering. Even in best damaged water works, this amount may, however may, however, work to be as high as 15% of total consumption.

6. SAMPLING

Sampling was done from various water sources including handpumps, spring wells and municipal tap water. Water was collected from the following locations:-

1) Shoghi Market
2) Shoghi housing colony
3) College mid-way
4) Thankyou gate
5) Kathleeghat mandir
6) Sangti
7) Summer hill byepass
8) Bemloi
9) Hotel Himland
10) 2 kms from Shoghi
11) Shalaghat
12) Dhairighat
13) Kathleeghat
14) Ravlighat
15) Dumehar Bani
16) Bururi
17) Solan byepass petrol pump
18) Dedraghat
19) Before Destination
20) Salogra NR
21) Court road Kandaghat
22) Kyaarighat
23) Kandaghat bazaar
24) Salogra market
25) Railway crossing Chambaghat
26) 1 km from Kandaghat
27) DAV School
28) Near petrol pump Solan byepass
29) Phagli byepass
30) Nabha


SHIMLA City Map
To Naldehra (16 km)
Dhalli
Kufri
Revoli Bus stand
Sanjauli
Circular Road
Tourist Office
Ridge
Anadel
Finglask
The Mall
Jakhoo Temple
Kasumpti
Summer Hill
Chadwick Falls
Vidhan Sabha
HPTDC Lift
Vikas Nagar
Museum
Bus stand
Circular Road
I.I.A.S.
Victory Tunnel
New Shimla
Prospect Hill
Road
Tourist Office
Khalini
To Bilaspur
Circular
Rly Station
National Highway By Pass Shimla
Sangti Handpump
Tutu
Summerhill railway station handpump
Zoo
Phagli By Pass Natural Source
Airport
Sankat Mochan Temple
Summer Hill By Pass Handpump
To Chandigarh (112 km)


Kandaghat
Court road Kandaghat
Kandaghat
Kandaghat bazaar
Dedraghat
Dedgharat
Parotha
22
Salogra
Basal
Salogra
Solan Brewery
22
MDR 6
Solan byepass (NR)
Solan byepass (HP)
Solan Railway
Nauni
DAV School


Shogi Market
Shoghi Railway
Industrial Area Shoghi
Shogi Housing Colony
22
2km from Shogi
Shalaghat
Kathlighat Mandir
Kathlighat
Kathleeghat
22
Ravlighat
College midway
22
Waknaghat
22
Bahra University
Before Destination
1km from Kandaghat

7. TESTS CONDUCTED

1. Temperature
2. Turbidity
3. Acidity
4. Alkalinity
5. Sulphates
6. Hardness
7. PH
8. Electrical Conductivity
9. Total dissolved solids
10. Silver
11. Arsenic
12. Cadmium
13. Copper
14. Cobalt
15. Chromium
16. Magnesium
17. Manganese
18. Sodium
19. Nickel
20. Phosphorus
21. Lead
22. Sulphur
23. Zinc
24. Iron
25. Potassium
26. Calcium
27. Chloride
28. Flouride
29. Nitrate
30. Carbonate
31. Bi-Carbonate

8. PERMISSIBLE LIMITS

8.1 W.H.O 1984 guidelines as modified in 1993

S.No	Organism	Unit	Guideline values	Remarks
1	pH		Preferably < 8	6.5 - 8.5
2	TDS	mg/l	1000	
3	Hardness	mg/l	500	
4	Turbidity	NTU	5	preferably < 1
5	Chloride	mg/l	250	
6	Arsenic	mg/l	0.01	
7	Cadmium	mg/l	0.003	
8	Chromium	mg/l	0.05	
9	Flouride	mg/l	1.5	Natural or deliberately added
10	Lead	mg/l	0.01	
11	Nickel	mg/l	0.02	
12	Nitrate	mg/l	11.3	
13	Silver		No guideline value set	
14	Sodium		No guideline value set	
15	Copper	mg/l	1	
16	Iron	mg/l	0.3	
17	Manganese	mg/l	0.1	
18	Sodium	mg/l	200	

19	Zinc	mg/l	3	
20	Calcium	mg/l	75	
21	Magnesium	mg/l	30	

8.2 Indian Standard Drinking Water Specifications (IS 10500 : 1991)

S.No	Substance	Unit	Desirable Limits	Undesirable Effect Outside the Desirable Limit	Permissible Limit
1	pH		6.5 - 8.5	Beyond this range water will affect mucous membrane.	No relaxation
2	Turbidity	NTU	5	Above 5, consumers acceptance decreses.	10
3	Hardness	mg/l	300	Encrustation in water supply.	600
4	Chlorides	mg/l	250	Beyond this limit taste and corrosion are affected.	1000
5	Dissolved Solids	mg/l	500	Palatability decreases and may cause gastro intestinal irritation.	2000
6	Alkalinity	mg/l	200	Beyond this limit , taste becomes unpleasant.	600
7	Iron	mg/l	0.3	Taste and appearance are affected and promotes iron bacteria.	1
8	Magnesium	mg/l	30	Encrustation in water supply structure and adverse affects on domestic use.	100
9	Calcium	mg/l	75	Encrustation in water supply structure and adverse affects on domestic use.	200
10	Copper	mg/l	0.05	Discolouration and corrosion of pipes.	1.5
11	Magnesium	mg/l	0.1	Taste and appearance are affected.	0.3
12	Sulphate	mg/l	200	Causes gastro intenstinal irritation.	400

13	Nitrate	mg/l	45	Beyond this methaemoglobinemia takes place.	100
14	Cadmium	mg/l	0.01	Beyond this water becomes toxic.	No relaxation
15	Arsenic	mg/l	0.01	Beyond this water becomes toxic.	No relaxation
16	Lead	mg/l	0.05	Beyond this water becomes toxic.	No relaxation
17	Zinc	mg/l	5	Beyond this limit it can cause astringent taste and opalescence in water.	15
18	Chromiun	mg/l	0.05	May be carcinogenic above this limit.	No relaxation
19	Nickel	mg/l	0.02	Chronic bronchitis and lung and nasal sinas cancers.	No relaxation
20	Fluoride	mg/l	1	High fluoride may cause fluorosis.	No relaxation

9. Harmful Effects of various substances

S.No	Substance	Harmful effects
1	Arsenic	Acute or chronic toxicity to humans. Toxic to all life.
2	Cadmium	Highly toxic in humans. Affects all life. Protects other metals against oxidation.
3	Chloride	Is strong oxidant not found naturally. Chloride salts are harmless.
4	Chromium	Natural Cr is rare . Is toxic for humans and plants. Varying tolerance to Cr salts in Aquatic life.
5	Cobalt	Low toxicity to humans, essential in trace amount.
6	Copper	Essential to humans in small daily amounts. Upper limits not determoned but water is very distastefull at 1-5 mg/l.
7	Fluoride	Fluoride has been shown to reduce dental caries. Natural fluoride concentration are generally low but white fluctuation occur.
8	Lead	Cumulative in humans and life stock. Human absorption of injested led is small, single large dozage are not a problem.
9	Mercury	Toxic to all foems of life. Mercury is very slowly excreted from human body. Methyl mercury is 50 times more toxic than inorganic mercury.
10	Nickel	Low oral toxicity to humans . Toxic to plants and marine life.
11	Nitrate	Toxic to infants at high concentrations.
12	Silver	Cumulative in human tissues resulting in blue-grey discolouration of skin. Toxic to aquatic organisms.
13	Sodium	Harmful to some persons with cardiac problems . Distruction to soils.
14	Zinc	Relatively non toxic to humans and animals. Essential nutrient for life.
15	Nickel	Chronic bronchitis and lung and nasal sinas cancers.
16	Iron	Excess of iron may affect taste/appearance of water.
17	Magnesium	Encrustation to water supply.
18	Calcium	Necessary for human body. It may prevent osteoporosis, hypertension, and cardiovascular disorders.
19	Manganese	People with kidney disease, however, may suffer from hypertension, confusion, muscle weakness, and coma.
20	Sulphate	Causes gastro intenstinal irritation.

10. RESULTS

Project Part - I

Analysis report of Water samples(all values are in PPM otherwise specified)

S. No	ID No	pH	EC(umhos)	TDS	Ag(ppm)	As	Cd	Co	Cr	Cu
1	Shoghi Market Place	7.4	410	275	0.001	0.1847	0	0.0068	0.0566	0.0144
2	Shoghi Housing Colony	7.8	390	261	0.001	0.6475	0	0.0001	0.002	0.0203
3	College Mid Way	7.7	110	74	0.001	0.256	0.0002	0	0.001	0.0114
4	Thankyou Gate	7.7	316	212	0.001	0	0	0.0001	0.0006	0.0122
5	Kathleeghat Mandir	7.6	242	162	0.001	0.5194	0.0001	0	0.0002	0.0066
6	Sangti	7.8	1936	1297	0.001	0.3942	0	0	0.0001	0.0065
7	Summer Hill Byepass	7.1	394	264	0.002	0	0.0008	0	0.0005	0.0105
8	Bemloi	7.7	388	260	0.001	0	0.0001	0.0004	0.0007	0.024
9	Hotel Himland	7.9	439	294	0.001	0	0	0.0001	0.0001	0.006
10	2km From Shoghi	7.9	160	107	0.001	1.868	0.0002	0.0003	0.0099	0.0167
11	Shalaghat	7.8	264	177	0.001	0	0	0	0.0086	0.0153
12	Dhaiarighat	7.4	572	383	0.001	0	0.0001	0.0003	0.001	0.0116
13	Kathleeghat	7.8	152	102	0.001	0.0028	0	0.0001	0.0008	0.0158

14	Ravlighat	7.7	250	168	0.001	1.455	0	0	0.0011	0.0077
15	Dumehar Bani	7.7	240	161	0.001	0	0	0.0004	0.011	0.016
16	Buriri	7.4	1220	817	0.001	0	0.0001	0.0001	0.0009	0.007
17	Solan Byepass Petrolpump	7.3	949	636	0.001	0.2502	0.0002	0.0004	0.0033	0.0201
18	Dedraghat	7.7	663	444	0.001	0.7828	0.0002	0.0005	0.001	0.0106
19	Before Destination	7.7	240	161	0.001	0	0	0	0.0039	0.0125
20	Salogra NR	7.7	660	442	0.001	0	0.0003	0.0001	0.0042	0.0224
21	Court Road Kandaghat	8	731	490	0.002	1.016	0	0.0003	0.0025	0.0138
22	Kyaarighat	8.2	300	201	0.001	0	0.0001	0.0006	0.0025	0.0246
23	Kandaghat Bazaar	7.7	433	290	0.001	1.778	0.0005	0.0002	0.0007	0.0107
24	Salogra Market	7.7	477	320	0.001	1.374	0	0	0.0015	0.0141
25	Railway Crossing Chambaghat	7.5	1740	1166	0.002	0	0	0.0674	0.0011	0.0183
26	1km Before Kandaghat	7.6	348	233	0.001	0.8396	0	0.0006	0.0007	0.0143
27	D.A.V School	7.5	896	600	0.001	0	0.0002	0	0.0024	0.0106
28	Near Petrolpump Solan Byepass	7.4	675	452	0.001	0	0.0003	0.0007	0.0006	0.0087
29	Phagli Byepass NR	7.2	485	325	0.001	0	0	0	0.0008	0.0104
30	Nabha	7.6	345	231	0.001	0.3491	0	0.0001	0.0001	0.0067

S. No.	ID No	Mg	Mn	Na	Ni	P	Pb	S_	Zn
1	Shoghi Market Place	7.96	0.086	14.4	0	0.046	0.0004	45.4	0.533
2	Shoghi Housing Colony	8.37	0.03	12.3	0	0.067	0	79.8	0.041
3	College Mid Way	3.43	0.009	10.8	0	0.085	0.0007	3.13	0.106
4	Thankyou Gate	6.56	0.037	19.2	0	0.032	0	24.6	0.04
5	Kathleeghat Mandir	4.59	0.09	10.8	0	0.042	0.0024	5.68	0.282
6	Sangti	4.53	0.011	10.2	0	0.021	0	4.16	0.013
7	Summer Hill Byepass	6.73	0.03	12.9	0	0.083	0	14.7	1.832
8	Bemloi	6.26	0.078	10.7	0	0.121	0.01	20.8	0.084
9	Hotel Himland	6.45	0.046	14.2	0	0.022	0	14.4	1.217
10	2km From Shoghi	4.61	0.02	12.4	0	0.235	0.0019	9.34	0.042
11	Shalaghat	7.03	0.03	11.5	0	0.066	0.0013	10.1	2.085
12	Dhaiarighat	10.9	0.069	59.9	0	0.143	0.0007	13.6	3.661
13	Kathleeghat	4.67	0.013	12	0	0.075	0.003	5.61	0.062
14	Ravlighat	4.89	0.022	12.5	0	0.022	0	15.3	0.743
15	Dumehar Bani	6.06	0.019	11.1	0	0.847	0.002	9.7	0.059

16	Buriri	13.3	0.017	9.45	0	0.067	0	149	0.116
17	Solan Byepass Petrolpump	11.1	0.027	9.63	0	4.236	0.0017	26.5	0.029
18	Dedraghat	12.4	0.019	11.1	0	0.284	0	47.7	0.011
19	Before Destination	4.54	0.017	10.1	0	0.115	0.0002	5.03	0.103
20	Salogra NR	11.6	0.019	9.62	0	0.13	0.0042	11.3	0.021
21	Court Road Kandaghat	10.5	0.045	11.8	0	0.107	0.001	18.2	0.033
22	Kyaarighat	4.56	0.02	13.1	0	0.149	0.0064	9.23	0.018
23	Kandaghat Bazaar	5.29	0.027	12.7	0	0.098	0.0028	5.03	0.031
24	Salogra Market	9.79	0.057	10.5	0	0.488	0.0037	21.3	0.084
25	Railway Crossing Chambaghat	12.7	2.03	12.6	0	0.095	0.0013	158	0.385
26	1km Before Kandaghat	7.28	0.018	12.8	0	0.119	0	14.1	0.012
27	D.A.V School	5.1	0.011	25.6	0	0.037	0	17	0.006
28	Near Petrolpump Solan Byepass	9.16	0.041	78.9	0	0.198	0.0031	19.1	0.014
29	Phagli Byepass NR	6.79	0.017	68	0	0.253	0	18.2	0.008
30	Nabha	5.58	0.009	6.26	0	0.037	0	12.2	0.02

S.No	ID No	Temp.	Turbidity	Acidity	Alkalinity	Sulphates	Permanent Hardness	Temporary Hardness	Total Hardness
1	Shoghi Market Place	21	0	20	30	261	140	260	400
2	Shoghi Housing Colony	22.5	1	20	110	257	220	10	230
3	College Mid Way	23	5	50	70	15	34	6	40
4	Thankyou Gate	24.5	1	40	140	180	70	40	110
5	Kathleeghat Mandir	21	52	10	200	37	40	10	50
6	Sangti	19	0	40	180	17	60	10	70
7	Summer Hill Byepass	21.5	2	150	40	168	240	20	260
8	Bemloi	22	2	30	90	54	200	30	230
9	Hotel Himland	21	4	54	120	73	110	80	190
10	2km From Shoghi	23	1	35	50	90	110	40	150
11	Shalaghat	22.5	0	68	100	43	9	101	110
12	Dhaiarighat	26.5	31	98	180	100	170	10	180
13	Kathleeghat	26	2	105	100	16	50	10	60
14	Ravlighat	26.5	4	35	70	54	5	55	60
15	Dumehar Bani	24	2	40	70	45	90	40	130
16	Bururi	25	0	20	250	485	120	55	175

17	Solan Byepas Petrolpump	26	0	120	200	102	250	120	370
18	Dedraghat	20.5	0	15	180	272	70	20	90
19	Before Destination	24	2	30	110	12	210	80	290
20	Salogra NR	18.5	2	40	180	65	150	40	190
21	Court Road Kandaghat	20.5	33	5	160	99	120	150	270
22	Kyaarighat	19	1	35	100	33	110	75	185
23	Kandaghat Bazaar	23	1	30	60	11	120	20	140
24	Salogra Market	22	46	40	110	101	230	40	270
25	Railway Crossing Chambaghat	23	18	340	30	435	80	20	100
26	1km Before Kandaghat	21	2	40	120	53	180	30	210
27	D.A.V School	21	9	30	140	160	90	90	180
28	Near Petrolpump Solan Byepass	27	0	120	200	139	160	120	280
29	Phagli Byepass NR	26	1	50	200	95	200	20	220
30	Nabha	19	1	15	150	75	130	40	170

S. No	ID No	Fe	K_	Ca	Cl	F	NO3-N	CO3(meq/l)	HCO3
1	Shoghi Market Place	0	2.996	80.73	17.75	0.3	2.0	0	1.0
2	Shoghi Housing Colony	0	3.284	114.05	24.85	0.2	3.1	0	1.0
3	College Mid Way	0.6195	0.7676	14.28	24.85	0.06	5.5	0	1.0
4	Thankyou Gate	0.0548	1.735	59.075	21.3	0.5	2.9	0	5.0
5	Kathleeghat Mandir	0.1209	1.448	92.35833	24.85	0.01	16.0	0	1.0
6	Sangti	0.0072	1.165	42.45333	24.85	0.01	3.4	0	1.5
7	Summer Hill Byepass	0.0014	3.206	32.77833	28.4	0.02	2.5	0	1.0
8	Bemloi	0.1159	3.034	59.57333	31.95	0.01	3.8	0	1.5
9	Hotel Himland	0.0034	3.056	49.25333	35.5	0.03	1.2	0	1.0
10	2km From Shoghi	0.0093	1.318	2.323333	21.3	0.01	5.8	0	1.0
11	Shalaghat	0.0028	2.003	34.28833	24.85	0	1.1	0	1.0
12	Dhaiarighat	0.0473	4.883	75.78333	28.4	0	1.6	0.1	1.0
13	Kathleeghat	0.0757	1.064	222.2217	28.4	0	1.8	0	1.0
14	Ravlighat	0.0151	1.26	221.8433	28.4	0	4.6	0	1.0
15	Dumehar Bani	0.0737	1.464	41.89667	31.95	0	6.4	0.2	1.0
16	Bururi	0	2.96	277.85	21.3	0.72	10.6	0.1	5.0

17	Solan Byepass Petrolpump	0.0116	5.089	113.5	21.3	0.1	3.1	0	5.0
18	Dedraghat	0	1.25	135.4	24.85	0.04	5.2	0.1	5.0
19	Before Destination	0.0372	1.161	26.44	28.4	0	4.5	0	1.0
20	Salogra NR	0.0687	2.484	150.6667	21.3	0.02	3.0	0	5.0
21	Court Road Kandaghat	0.0515	4.256	96.55	21.3	0.86	1.0	0	5.0
22	Kyaarighat	0.1689	1.058	22.39833	17.75	0	3.9	0	1.0
23	Kandaghat Bazaar	0	1.277	47.18667	28.4	0.14	2.2	0.1	2.5
24	Salogra Market	0.042	1.96	109.69	28.4	0.18	5.1	0.1	5.0
25	Railway Crossing Chambaghat	2.384	10.05	178.7667	17.75	0.52	5.4	0	0
26	1km Before Kandaghat	0.004	0.6325	57.87	21.3	0.1	1.7	0.2	5.0
27	D.A.V School	0.0109	5.823	21.505	28.4	0.97	1.3	0	6.0
28	Near Petrolpump Solan Byepass	0	5.607	44.73167	46.15	0.17	1.2	0	2.5
29	Phagli Byepass NR	0	2.98	58.68	35.5	0.1	5.2	0	5.0
30	Nabha	0	1.239	58.70667	17.75	0.14	4.1	0	2.5

Project Part - II

Analysis report of Water samples(all values are in PPM otherwise specified)

S. No	ID No	Ph	EC(umhos)	TDS	Ag(ppm)	As	Cd	Co	Cr	Cu
1	Shoghi Market Place	7.2	390	290	0.001	0.14	0	0.007	0.04	0.01
2	Shoghi Housing Colony	7.6	370	250	0.001	0.435	0	0.0001	0.002	0.02
3	College Mid Way	7.8	110	75	0.001	0.25	0.0001	0	0.001	0.014
4	Thankyou Gate	7.7	320	210	0.001	0	0	0.0001	0.0005	0.011
5	Kathleeghat Mandir	7.6	250	165	0.001	0.5	0.0001	0	0.0002	0.0065
6	Sangti	7.1	1870	1240	0.001	0.21	0	0	0.0001	0.0065
7	Summer Hill Byepass	7.5	400	250	0.002	0	0.0006	0	0.0004	0.01
8	Bemloi	7.7	390	260	0.001	0	0.0001	0.0002	0.0007	0.024
9	Hotel Himland	7.7	440	294	0.001	0	0	0.0001	0.0001	0.004
10	2km From Shoghi	7.8	180	101	0.001	1.6	0.0002	0.0002	0.008	0.01
11	Shalaghat	7.8	270	174	0.001	0	0	0	0.0086	0.0153
12	Dhaiarighat	7.4	610	383	0.001	0	0.0001	0.0003	0.001	0.0116
13	Kathleeghat	7.3	140	90	0.001	0.002	0	0.0002	0.0008	0.015
14	Ravlighat	7.7	250	170	0.001	1.4	0	0	0.0011	0.007

15	Dumehar Bani	7.5	240	161	0.001	0	0	0.0004	0.011	0.016
16	Buriri	7.4	1220	820	0.001	0	0.0001	0.0001	0.0008	0.007
17	Solan Byepass Petrolpump	7.1	910	640	0.001	0.2502	0.0002	0.0004	0.004	0.0202
18	Dedraghat	7.7	665	444	0.001	0.8	0.0002	0.0005	0.001	0.0105
19	Before Destination	7.7	240	161	0.001	0	0	0	0.0039	0.0125
20	Salogra NR	7.9	660	390	0.001	0	0.0003	0.0001	0.004	0.0225
21	Court Road Kandaghat	7.8	752	490	0.002	0.45	0	0.0003	0.0025	0.0138
22	Kyaarighat	8.4	300	190	0.001	0	0.0001	0.0005	0.0025	0.0246
23	Kandaghat Bazaar	7.7	474	290	0.001	1.7	0.0004	0.0002	0.0006	0.0107
24	Salogra Market	7.1	477	320	0.001	1.343	0	0	0.0025	0.0141
25	Railway Crossing Chambaghat	7.4	1720	1150	0.002	0	0	0.0674	0.0011	0.0185
26	1km Before Kandaghat	7.6	348	233	0.001	0.8	0	0.0004	0.0007	0.0143
27	D.A.V School	7.5	860	600	0.001	0	0.0002	0	0.0024	0.0106
28	Near Petrolpump Solan Byepass	7.4	675	452	0.001	0	0.0003	0.0007	0.0006	0.008
29	Phagli Byepass NR	7.1	475	340	0.001	0	0	0	0.0008	0.0102
30	Nabha	7.4	345	230	0.001	0.432	0	0.0001	0.0001	0.0067

S. No.	ID No	Mg	Mn	Na	Ni	P	Pb	S_	Zn
1	Shoghi Market Place	7.8	0.09	14.5	0	0.05	0.0002	45.5	0.5
2	Shoghi Housing Colony	8.4	0.03	12.5	0	0.06	0	82.5	0.04
3	College Mid Way	3.4	0.005	12.5	0	0.08	0.0005	3.1	0.1
4	Thankyou Gate	7	0.03	19.2	0	0.03	0	28.5	0.02
5	Kathleeghat Mandir	4.55	0.08	10.89	0	0.042	0.0024	5.7	0.2
6	Sangti	4.5	0.011	10.2	0	0.02	0	4.1	0.01
7	Summer Hill Byepass	6.7	0.03	12.7	0	0.08	0	14.7	1.8
8	Bemloi	6.5	0.08	10.5	0	0.12	0.02	20.9	0.08
9	Hotel Himland	6.45	0.04	15.5	0	0.02	0	14.4	1.5
10	2km From Shoghi	4.61	0.01	12.4	0	0.3	0.001	9.3	0.04
11	Shalaghat	7.25	0.03	11.5	0	0.04	0.001	10.5	2.08
12	Dhaiarighat	10	0.06	61.4	0	0.1	0.0002	15.6	3.6
13	Kathleeghat	4.65	0.013	16	0	0.075	0.003	5.6	0.06
14	Ravlighat	4.89	0.02	12.5	0	0.02	0	15.3	0.743
15	Dumehar Bani	6.05	0.01	11.1	0	0.9	0.001	9.5	0.05
16	Buriri	13.5	0.02	9.45	0	0.06	0	165	0.1

17	Solan Byepass Petrolpump	11	0.02	9.65	0	4.5	0.001	26.5	0.02
18	Dedraghat	12.5	0.01	11.1	0	0.2	0	47.5	0.01
19	Before Destination	4.54	0.017	10	0	0.11	0.0001	5.05	0.1
20	Salogra NR	11.6	0.019	9.65	0	0.1	0.003	11.7	0.02
21	Court Road Kandaghat	10.5	0.05	11.8	0	0.1	0.001	18.5	0.03
22	Kyaarighat	6.5	0.02	13.1	0	0.1	0.006	9.2	0.01
23	Kandaghat Bazaar	5.3	0.02	12.2	0	0.09	0.002	7	0.03
24	Salogra Market	9.9	0.057	10.5	0	0.4	0.003	21.7	0.08
25	Railway Crossing Chambaghat	12.7	0.01	12.6	0	0.09	0.001	160	0.5
26	1km Before Kandaghat	7.45	0.01	12.9	0	0.12	0	14.1	0.01
27	D.A.V School	5.5	0.01	25.6	0	0.033	0	14	0.005
28	Near Petrolpump Solan Byepass	10.2	0.05	82	0	0.19	0.0041	19.5	0.01
29	Phagli Byepass NR	6.79	0.017	70	0	0.23	0	18.5	0.005
30	Nabha	5.5	0.008	6.5	0	0.03	0	12	0.02

S.No	ID No	Temp.	Turbidity	Acidity	Alkalinity	Sulphates	Permanent Hardness	Temporary Hardness	Total Hardness
1	Shoghi Market Place	25	0	20	25	255	120	245	365
2	Shoghi Housing Colony	20.5	1	20	110	254	210	5	215
3	College Mid Way	24	2	40	60	17	34	11	45
4	Thankyou Gate	24.5	5	50	150	140	80	40	120
5	Kathleeghat Mandir	19	40	20	190	35	50	20	70
6	Sangti	19	0	40	170	15	60	10	70
7	Summer Hill Byepass	17.5	2	160	40	160	210	20	230
8	Bemloi	20	2	25	90	45	190	30	220
9	Hotel Himland	20	3	50	100	70	110	90	200
10	2km From Shoghi	19	0	20	40	80	110	40	150
11	Shalaghat	20.5	0	70	110	45	9	106	115
12	Dhaiarighat	23.5	25	85	180	95	170	10	180
13	Kathleeghat	21	1	100	100	18	50	10	60
14	Ravlighat	22.5	3	35	70	55	5	50	55
15	Dumehar Bani	20	2	40	70	35	90	40	130
16	Bururi	19	0	20	240	370	120	55	175

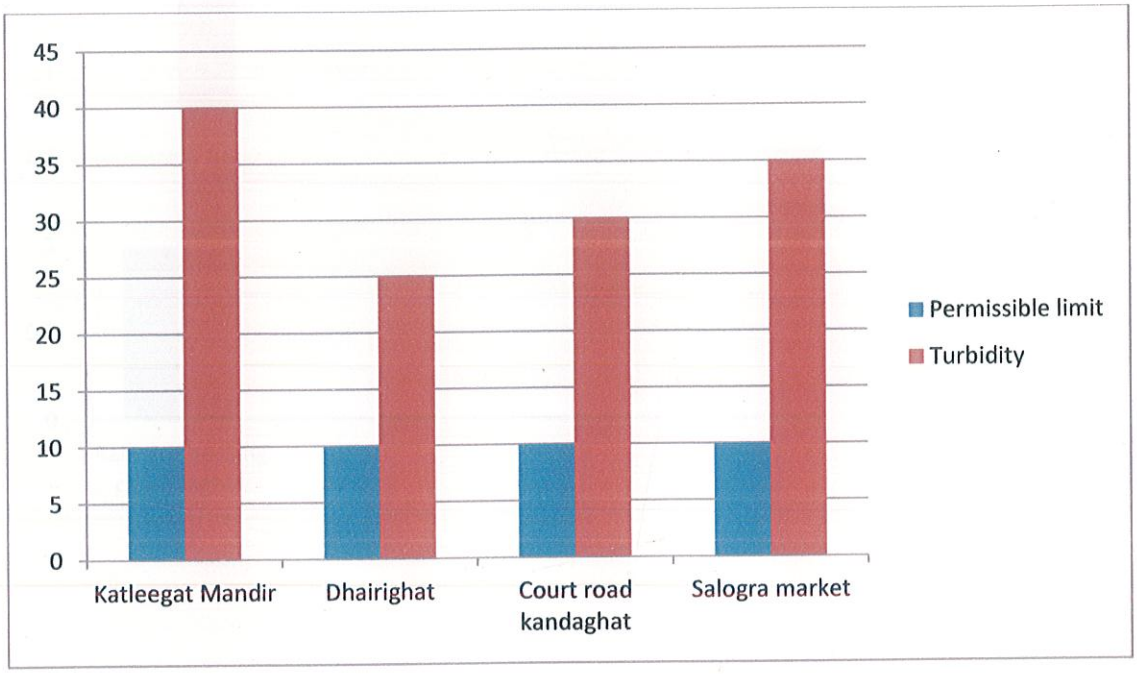
17	Solan Byepas Petrolpump	21	0	130	200	100	250	100	350
18	Dedraghat	18.5	0	15	180	270	60	20	80
19	Before Destination	21	2	30	100	15	210	90	300
20	Salogra NR	16.5	2	40	170	65	150	40	190
21	Court Road Kandaghat	20.5	30	4	160	85	120	130	250
22	Kyaarighat	18	1	35	100	35	110	75	185
23	Kandaghat Bazaar	23	1	30	60	10	125	15	140
24	Salogra Market	22	35	65	110	95	230	45	275
25	Railway Crossing Chambaghat	23	3	350	30	435	80	20	100
26	1km Before Kandaghat	21	2	40	140	55	180	30	210
27	D.A.V School	21	2	30	140	150	95	90	185
28	Near Petrolpump Solan Byepass	22	0	120	200	140	160	120	280
29	Phagli Byepass NR	21	1	30	210	95	200	20	220
30	Nabha	19	0	15	140	75	130	40	170

S. No	ID No	Fe	K_	Ca	Cl	F	NO3-N	CO3(meq/l)	HCO3
1	Shoghi Market Place	0	2.9	75.5	17.5	0.2	2.0	0	1.0
2	Shoghi Housing Colony	0	3.5	116.5	25	0.1	3.0	0	1.0
3	College Mid Way	0.7	0.7	17.28	24.5	0.05	5.5	0	1.0
4	Thankyou Gate	0.05	1.7	62.5	26.3	0.5	3.0	0	5.0
5	Kathleeghat Mandir	0.12	1.5	92.33	20.5	0.02	14.0	0	1.0
6	Sangti	0.007	1.2	42.33	24.5	0.01	3.5	0	1.5
7	Summer Hill Byepass	0.001	3.2	33.3	25.4	0.02	2.5	0	1.0
8	Bemloi	0.11	3.03	65.53	31.5	0.01	3.8	0	1.5
9	Hotel Himland	0.0024	3.05	49.3	30.5	0.03	1.2	0	1.0
10	2km From Shoghi	0.0073	1.3	2.4	21.3	0.01	5.8	0	1.0
11	Shalaghat	0.002	2.002	35.23	24.5	0	1.1	0	1.0
12	Dhaiarighat	0.04	4.9	79.3	28.4	0	1.5	0.1	1.0
13	Kathleeghat	0.077	1.06	216.2	28.4	0	1.8	0	1.0
14	Ravlighat	0.011	1.2	220	28.4	0	4.5	0	1.0
15	Dumehar Bani	0.07	1.5	41.7	31.5	0	6.4	0.2	1.0
16	Bururi	0	2.85	270.85	21.3	0.5	10.6	0.1	5.0

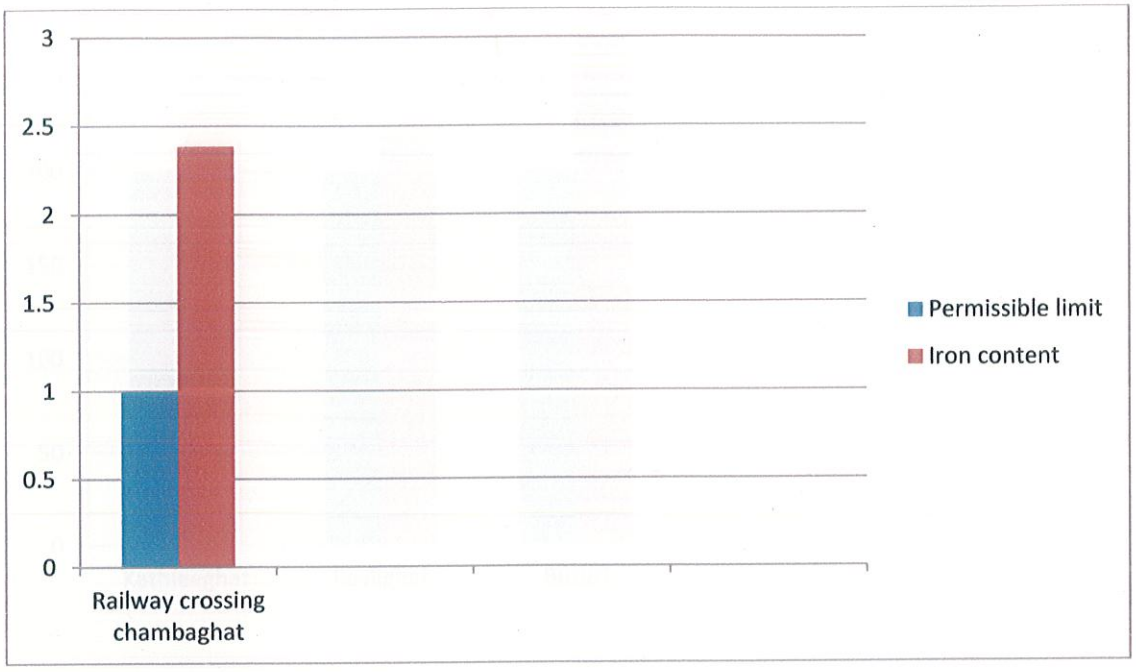
17	Solan Byepass Petrolpump	0.011	5.07	115.5	21.3	0.1	3.1	0	5.0
18	Dedraghat	0	1.25	135.4	24.85	0.03	5.2	0.1	5.0
19	Before Destination	0.02	1.16	26.44	28.4	0	4.5	0	1.0
20	Salogra NR	0.06	2.4	150	17.3	0.02	3.0	0	5.0
21	Court Road Kandaghat	0.0425	4.4	96.5	20.3	0.9	1.0	0	5.0
22	Kyaarighat	0.16	1.05	25.3	17.5	0	3.6	0	1.0
23	Kandaghat Bazaar	0	1.2	47.7	28.5	0.14	2.0	0.1	2.5
24	Salogra Market	0.04	1.8	110	28.4	0.18	5.0	0.1	5.0
25	Railway Crossing Chambaghat	2.5	4.7	180.7	17.5	0.52	5.4	0	0
26	1km Before Kandaghat	0.003	0.6	57.9	21.3	0.1	1.7	0.2	5.0
27	D.A.V School	0.01	5.9	21.5	28.4	0.9	1.3	0	6.0
28	Near Petrolpump Solan Byepass	0	5.6	44.7	45.5	0.2	1.2	0	2.5
29	Phagli Byepass NR	0	2.9	58.9	35.5	0.1	5.2	0	5.0
30	Nabha	0	1.2	60.2	17.75	0.14	4.4	0	2.5

11. CONCLUSION

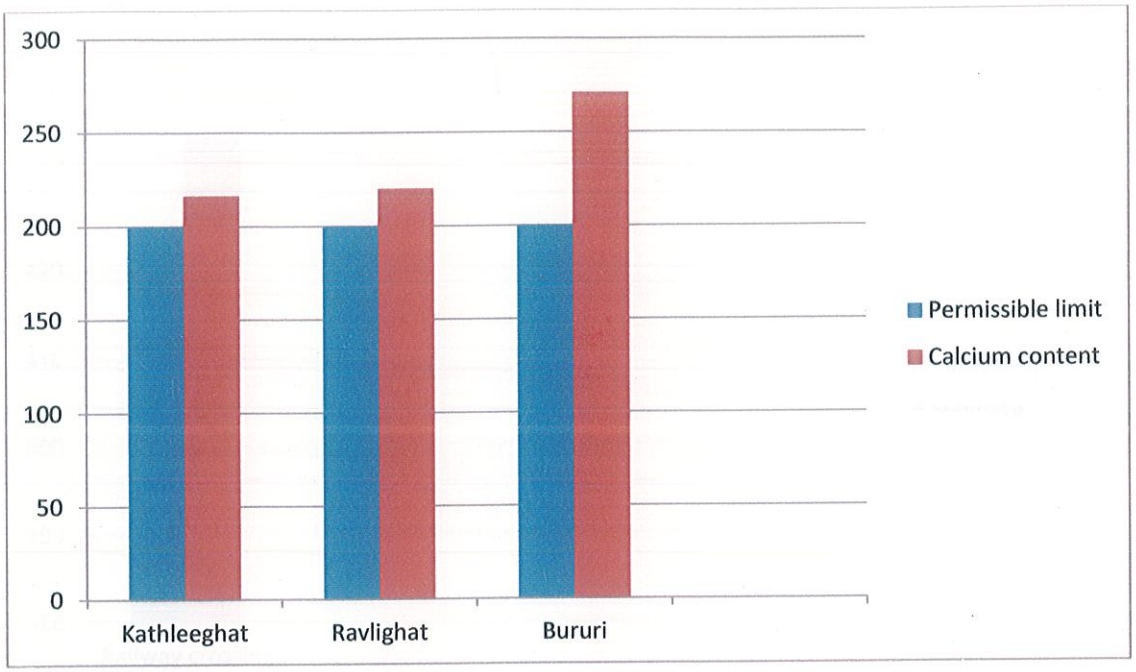
1. The water collected from Dhairighat, Kathleeghat, Court Road Kandaghat and Salogra Market were found to be highly turbid.



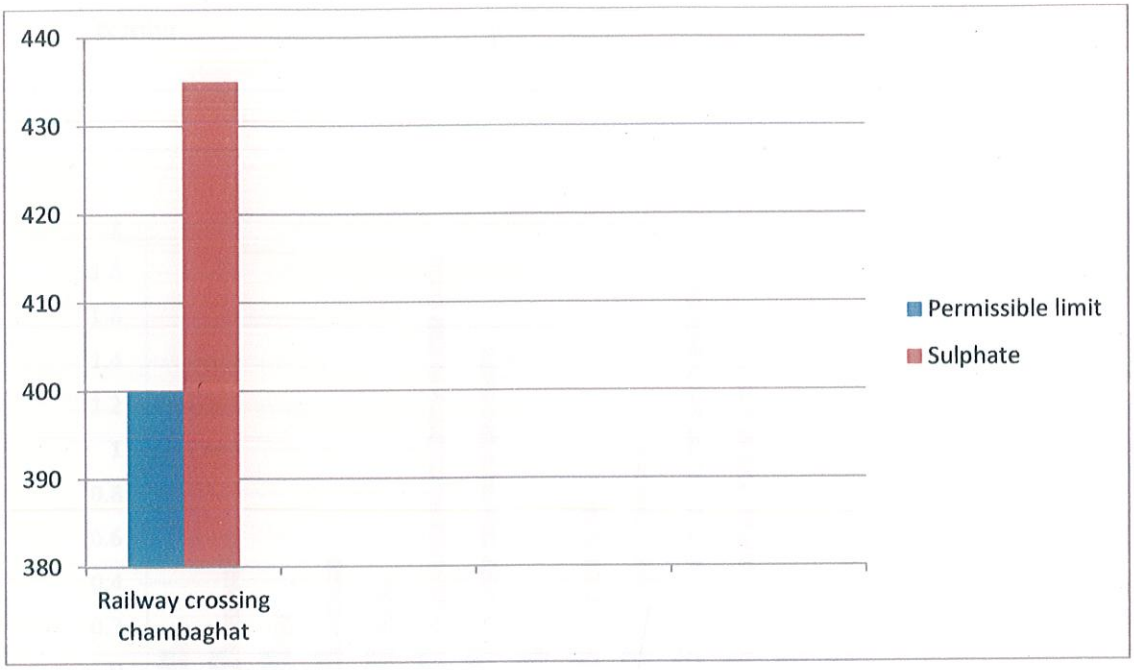
2. Iron content in water sample collected from Railway crossing Chambaghat was found to be exceeding the permissible limits.



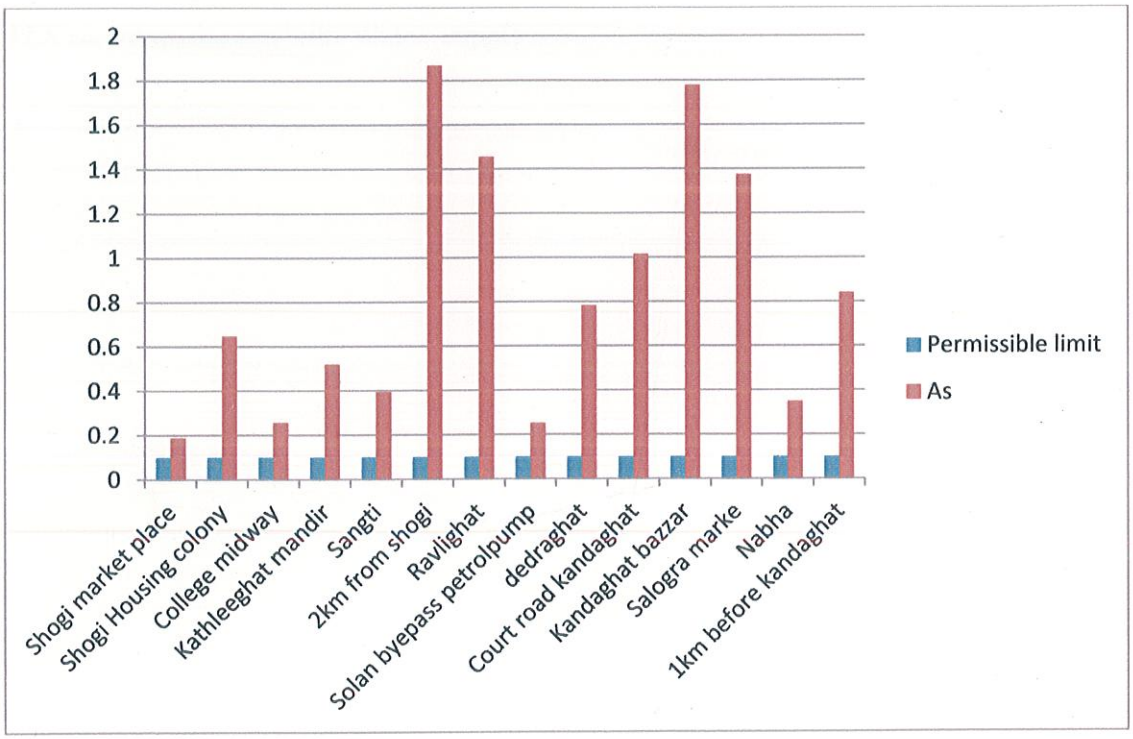
3. Calcium content was high in water samples of Ravlighat, Kathleeghat and Bururi.



4. The Sulphate content of water samples of Railway crossing Chambaghat were more than the permissible limits.



5. The Arsenic content was found to be exceeding thye permissible limits in samples of Shoghi housing colony, college mid-way, Katleeghat mandir, Sangti, NR 2 kms from Shoghi, Ravlighat, Dedrighat, Before Destination, Court road Kandaghat, Kandaghat bazaar, Solan bye-pass Petrolpump, Salogra market and Nabha.



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