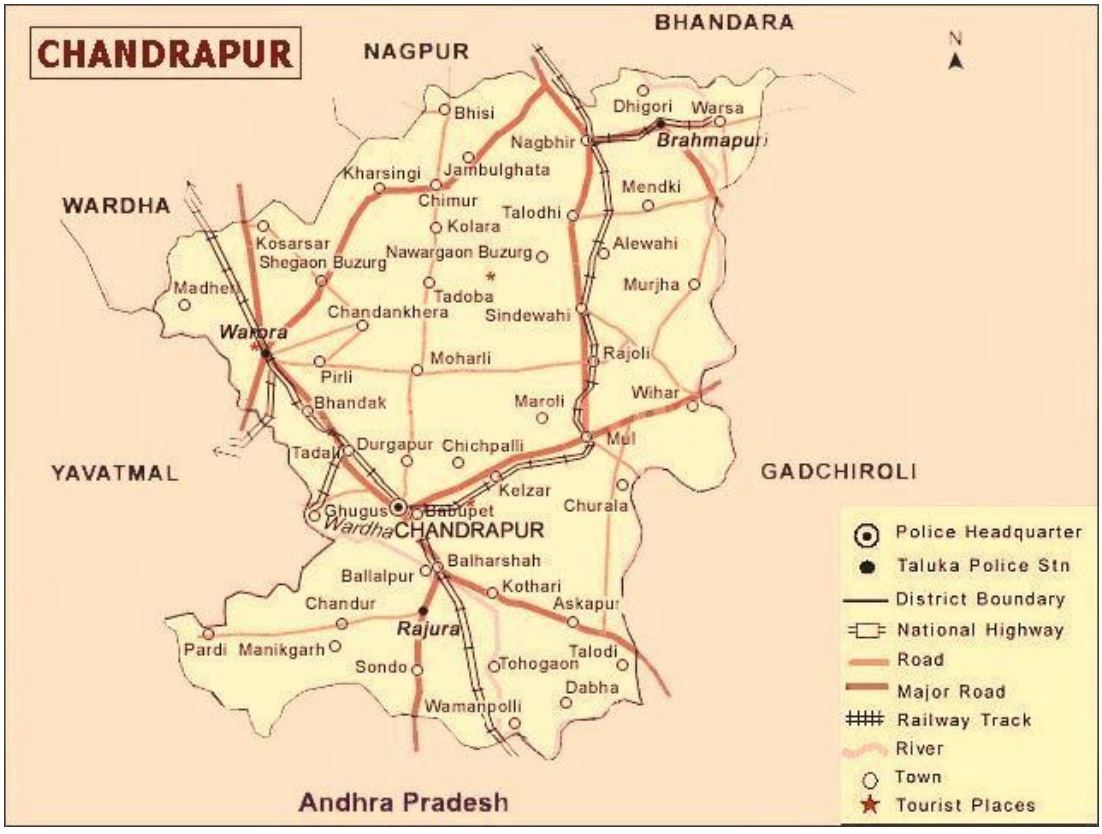
ACTION PLAN FOR INDUSTRIAL CLUSTER IN CRITICALLY POLLUTED AREA

Monitoring, sampling, analysis of Stack, Ambient Air Quality, Surface Water, Ground Water, Waste Water

चंद्रपूर Chandrapur



Maharashtra Pollution Control Board

Kalptaru Point, Sion East, Mumbai - 400022

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Our special thanks are to Regional and Sub Regional Officer of the concerned areas, for guidance during the sampling. The contribution of Shri V M Motghare (Joint director APC) is appreciated.

By undertaking this project and completing in schedule time, we consider ourselves very lucky since we have helped the mankind by giving the data on pollution load and further action by the Board, to bring down the pollution level.

We also thank our associates for working on this project for making the write up, making graphs and feeding the data on computer.

This acknowledgement will be incomplete if we do not thank our laboratory analysts and others who made this project a success by timely analysing the samples.

We also thank our sampling team members for conducting the sampling in this vast area.

Abbreviations:

APHA	American Public Health Association
BDL	Below Detection Limit
BOD	Biochemical Oxygen Demand
CEPI	Comprehensive Environmental Pollution Index
CETP	Common Effluent Treatment Plant
COD	Chemical Oxygen Demand
CPA	Critically Polluted Areas
SPA	Severely Polluted Areas
DO	Dissolved Oxygen
ETP	Effluent Treatment Plant
MIBK	Methyl Isobutyl Ketone
MPCB	Maharashtra Pollution Control Board
NAAQS	National Ambient Air Quality Standards
NO_x	Oxides of Nitrogen
BDL	Not Detected
PAH	Poly Aromatic Hydrocarbons
PCB	Poly Chlorinated Biphenyls
PCT	Poly Chlorinated Terphenyls
PM_{10}	Particulate Matter (size less than 10 µm)
$PM_{2.5}$	Particulate Matter (size less than 2.5 µm)
SO_2	Sulphur Dioxide
STAP	Short Term Action Plan
WHO	World Health Organization

1. Introduction:

Industrial pollution is the contamination of the environment by businesses, particularly plants and factories that dump waste products into the air and water. Industrial waste is one of the largest contributors to the global pollution problem endangering people and the environment. The Central Pollution Control Board (CPCB) has developed a Comprehensive Environmental Pollution Index (CEPI). The main objective of the study is to identify polluted industrial clusters or areas in order to take concerted action and to centrally monitor them at the national level to improve the current status of their environmental components such as air and water quality data, ecological damage, and visual environmental conditions.

The concept of Comprehensive Environmental Pollution Index (CEPI) was evolved by Central Pollution Control Board (CPCB) during 2009-10 as a tool for comprehensive environmental assessment of prominent industrial clusters and formulation of remedial Action Plans for the identified critically polluted areas. Later-on proposals were received from the SPCBs, State Governments, and Industrial Associations and concerned Stake-holders for revisiting the criteria of assessment under CEPI concept. After careful examination and consideration of the suggestions of concerned stake-holders, it was decided to prepare the revised concept of CEPI by eliminating the subjective factors but retaining the factors which can be measured precisely.

The results of the application of the Comprehensive Environmental Pollution Index (CEPI) to selected industrial clusters or areas are presented in this report. The main objective of the study is to identify polluted industrial clusters or areas in order to take concerted action and to centrally monitor them at the national level to improve the current status of their environmental components such as air and water quality data, ecological damage, and visual environmental conditions. A total of 88 industrial areas or clusters have been selected by the Central Pollution Control Board (CPCB) in consultation with the Ministry of Environment & Forests Government of India for the study. The Index captures the various dimensions of environment including air, water and land. Comprehensive Environmental Pollution Index (CEPI), which is a rational number to characterize the environmental quality at a given location following the algorithm of source, pathway and receptor have been developed.

About 6000 small, medium and large scale industries are located at Chandrapur district. Chandrapur has large deposits of coal and lime stone. The mammoth coal mines around the city also contribute to the heavy industrialization of the city. Western Coalfields Limited (WCL), a subsidiary of Coal India, has many mines here. Chandrapur Super Thermal Power Station by Maharashtra State Power Generation Company Limited is its biggest pit head thermal power station. The city houses various cement factories in its vicinity. They are Manikgarh Cement, a division of Century Textile and Industries, part of the BK Birla group of companies, UltraTech Cement (formerly L&T Cement), a division of Grasim Industries, part of the Aditya Birla Group; Chandrapur Cement Works, a division of Associated Cement Companies, part of Holcim Group; and Maratha Cement Works, part of Ambuja Cements Limited. The district also boasts of having Ballarpur Industries Limited, the largest manufacturer and exporter of paper in India. Other major industries include a Chandrapur ferro alloy plant (formerly Maharashtra Elektrosmelt Ltd), a ferro-manganese plant, and a silico-manganese plant of Steel Authority of India Limited. Chandrapur's ferro alloy plant is the largest manganese-based ferro alloy producer in the country.

2. Scope of Work

The Scope of Work consisted of the following:

Monitoring, Sampling, Analysis for Stack, Ambient Air Quality, Surface Water, Waste Water, and Ground Water Quality for identified five Critically Polluted areas (CPAs) in Maharashtra i.e. **Chandrapur, Dombivli, Aurangabad, Navi Mumbai,** and **Tarapur** and 3 Severely Polluted areas (SPAs) in Maharashtra i.e. **Chembur, Pimpri-Chinchwad and Nashik** as per standard methods.

- At each of the 5 CPAs and 3 SPAs, 24 hourly ambient air quality monitoring to be carried out.
- Representative samples for surface water quality, waste water quality and Ground Water quality to be collected from prominent surface and Ground Water bodies located in and around the clusters/areas.
- Submission of complete monitoring, sampling and analysis reports including the summary of the parameters exceeding the prescribed standards/norms for all the 5 CPAs and 3 SPAs.
- Submission of 3 copies of final report with photographs at prominent locations and the CD (soft copy) on completion of the project for every critically polluted and severely polluted area separately.

Monitoring, Sampling, Analysis for Stack, Ambient Air Quality, Surface Water, Waste Water and Ground Water Quality for Chandrapur:

- The sampling was carried out in 4 days i.e. on 23rd, 24th, 27th, and 28th February 2017 for MIDC Tadali, MIDC Ghuggus, MIDC Chandrapur and MIDC Ballarpur respectively.
- In MIDC Tadali, a total of 6 Stack Monitoring Samples, 3 Ambient Air Quality Monitoring Samples, 5 Waste Water Samples, 4 Ground Water Samples and 2 VOC Samples were collected and analyzed.
- In MIDC Ghuggus, a total of 6 Stack Monitoring Samples, 3 Ambient Air Quality Monitoring Samples, 6 Waste Water Samples, 3 Ground Water Samples and 2 VOC Samples were collected and analyzed.
- In MIDC Chandrapur, a total of 7 Stack Monitoring Samples, 3 Ambient Air Quality Monitoring Samples, 6 Waste Water Samples, 3 Ground Water Samples and 2 VOC Samples were collected and analyzed.
- In MIDC Ballarpur, a total of 6 Stack Monitoring Samples, 3 Ambient Air Quality Monitoring Samples, 6 Waste Water Samples, 3 Ground Water Samples and 2 VOC Samples were collected and analyzed.

2.1 Stack Emission Parameters

The Stack Emissions were analyzed with the following parameters:

1. Acid Mist
2. Ammonia

3. Carbon Monoxide
4. Chlorine
5. Fluoride(gaseous)
6. Fluoride (particulate)
7. Hydrogen Chloride
8. Hydrogen Sulphide
9. Oxides of Nitrogen
10. Oxygen
11. Polyaromatic Hydrocarbons (Particulate)
12. Suspended Particulate Matter
13. Sulphur Dioxide
14. Benzene
15. Toluene
16. Xylene
17. Volatile Organic Compounds (VOCs)

2.2 Ambient Air Quality Parameters

The Ambient Air Quality was analyzed with the following parameters:

1. Sulphur Dioxide (SO_2)
2. Nitrogen Dioxide (NO_2)
3. Particulate Matter (PM10)
4. Particulate Matter (PM2.5)
5. Ozone (O_3)
6. Lead (Pb)
7. Carbon Monoxide (CO)
8. Ammonia (NH_3)
9. Benzene (C_6H_6)
10. Benzo (a) Pyrene (BaP) (Particulate Phase Only)
11. Arsenic (As)

12. Nickel (Ni)

2.3 Water/Waste Water Parameters

The Water/Waste Water was analyzed with the following parameters:

a. Prominent Surface Water bodies such as outfalls of CETPs, ETPs, treated effluent drainage, river, canal, ponds, lakes and other such water supply resources flowing through the area or flowing adjoining the CPA.

b. Ground Water Quality data of prominent Ground Water resources such as observation wells of Central Ground Water Board, drinking water wells, hand pumps, bore wells, hand pumps, bore wells and other such water supply resources located in the industrial cluster/area under consideration or in the peripheral areas.

Basic water quality parameters for surface water and Ground Water both are as follows:

i. Simple Parameters:

1. Sanitary Survey
2. General Appearance
3. Colour
4. Smell
5. Transparency
6. Ecological(Presence of animals like fish, insects) (Applicable to only surface water)

ii. Regular Monitoring Parameters:

7. pH
8. Oil & Grease
9. Suspended Solids
10. Dissolved Oxygen (% saturation) (Not applicable for Ground Waters)
11. Chemical Oxygen Demand
12. Biochemical Oxygen Demand
13. Electrical Conductivity
14. Nitrite-Nitrogen

15. Nitrate-Nitrogen
16. (NO_2 + NO_3)-Nitrogen
17. Free Ammonia
18. Total Residual Chlorine
19. Cyanide
20. Fluoride
21. Sulphide
22. Dissolved Phosphate
23. Sodium Absorption Ratio (SAR)
24. Total Coliforms (MPN/100 ml)
25. Faecal Coliforms (MPN/100 ml)

iii. Special Parameters:

26. Total Phosphorous
27. Total Kjeldahl Nitrogen(TKN)
28. Total Ammonia (NH_4 +NH_3)-Nitrogen
29. Phenols
30. Surface Active Agents
31. Organo Chlorine Pesticides
32. Polynuclear aromatic hydrocarbons (PAH)
33. Polychlorinated Biphenyls (PCB)and Polychlorinated Terphenyls (PCT)
34. Zinc
35. Nickel
36. Copper

37. Hexavalent Chromium
38. Chromium (Total)
39. Arsenic (Total)
40. Lead
41. Cadmium
42. Mercury
43. Manganese
44. Iron
45. Vanadium
46. Selenium
47. Boron

iv. Bioassay (Zebra Fish) Test: For specified samples only.

2.4 Methodology followed in Sampling and Analysis

Industries, places and locations that have been chosen for the sampling are representative of the city/area. Sampling has been done at the potential polluted areas so as to arrive at the CEPI. This will further help the authorities to monitor the areas in order to improve the current status of their environmental components such as air and water quality data, ecological damage and visual environmental conditions. Methodology for sampling, preservation and analysis have been done according to the references incorporated. Methodology of various types of parameters is presented under following annexure:

1. Stack Emission Sampling and Analysis Methodology – **Annexure I**
2. Ambient Air Sampling and Analysis Methodology **- Annexure II**
3. Water/Wastewater Sampling and Analysis Methodology - **Annexure III**

3. Result of Analysis:

Results of Analysis are tabulated below for Stack Emission Monitoring, Ambient Air Quality Monitoring, Waste Water Analysis and Water Analysis. These are followed by their respective graphical representation.

***Kindly note:**

- NA specifies the sample is not analysed for the specific parameter.
- BDL specifies that the result obtained is below detectable limit.

3.1 Stack Emission:

Stack Emission Monitoring Results are compared against The Environment (Protection) Rules, 1986 General Emission Standard - Part D.

Sr.	Name of Industries	Stack Identity	MIDC	Table No.
1.	Gopani Iron & Power (India) Pvt. Ltd	100 TPD Kiln 1 & 2-ESP Outlet	Tadali	**I**
2.	Gopani Iron & Power (India) Pvt. Ltd	100 TPD Kiln 3 & 4 -ESP Outlet	Tadali	**I**
3.	Gopani Iron & Power (India) Pvt. Ltd	DES-1 100 TPD -Bag Filter	Tadali	**I**
4.	Gopani Iron & Power (India) Pvt. Ltd	SMS (Furnace) 3 & 4	Tadali	**II**
5.	Grace Industries Ltd.	WHRBs Kiln 3 & 4	Tadali	**II**
6.	Dhariwal Infrastructure Ltd.	Unit -2, 300 MW Power Plant	Tadali	**II**
7.	ACC Cement Ltd	Boiler Stack 25 MW	Ghuggus	**III**
8.	ACC Cement Ltd	Boiler Stack 15 MW	Ghuggus	**III**
9.	ACC Cement Ltd	Kiln RABH -ESP Outlet	Ghuggus	**III**
10.	ACC Cement Ltd	Coal Mill	Ghuggus	**IV**
11.	Lloyds Metal & Energy Ltd.	100 TPD Kiln III & IV	Ghuggus	**IV**
12.	Lloyds Metal & Energy Ltd.	500 TPD Kiln	Ghuggus	**IV**
13.	Multi Organics Ltd.	Boiler B-2604	Chandrapur	**V**
14.	Multi Organics Ltd.	Boiler B-2605	Chandrapur	**V**
15.	Superb Hygienic Ltd.	Incinerator	Chandrapur	**V**
16.	Maharashtra Carbon Pvt. Ltd.	Heater with Bag Filter	Chandrapur	**VI**

Sr.	Name of Industries	Stack Identity	MIDC	Table No.
17.	Sourav Oil & Mill	Boiler	Chandrapur	**VI**
18.	Vinar Ispat Ltd.	Reheating Furnace	Chandrapur	**VI**
19.	BILT Graphic PPL	Recovery Stack Boiler No. 3	Ballarpur	**VII**
20.	BILT Graphic PPL	Coal Fired Boiler No. 8	Ballarpur	**VII**
21.	BILT Graphic PPL	Coal Fired Boiler No. 9	Ballarpur	**VII**
22.	BILT Graphic PPL	Lime Kiln II-ESP Outlet	Ballarpur	**VIII**
23.	Bamni Proteins	Boiler Stack-Dust Collector	Ballarpur	**VIII**
24.	Bamni Proteins	Calcium Chloride Stack--Dust Collector	Ballarpur	**VIII**
25.	Multiorganics Ltd.	Process Stack-Fusion Point	Chandrapur	**x**

*** The VOC result of stack emission is provided in Table No. IX & x**

Table No. I

Name of Industries			**Gopani Iron & Power (India) Pvt. Ltd**	**Gopani Iron & Power (India) Pvt. Ltd**	**Gopani Iron & Power (India) Pvt. Ltd**
Date of Sampling **(XX/02/2017)**			**22**	**22**	**22**
1.	Particulate Matter (as PM)	mg/Nm^3	48	44	49
	Std. Limit	**mg/Nm^3**	**100**	**100**	**100**
2.	Sulphur Dioxide (as SO_2)	mg/Nm^3	215	274	BDL
		kg/day	434.9	561.3	BDL
	Std. Limit	**mg/Nm^3**	**200**	**200**	**200**
3.	Nitrogen Dioxide (NO_2)	mg/Nm^3	16	18.2	BDL

Name of Industries			**Gopani Iron & Power (India) Pvt. Ltd**	**Gopani Iron & Power (India) Pvt. Ltd**	**Gopani Iron & Power (India) Pvt. Ltd**
Date of Sampling **(XX/02/2017)**			**22**	**22**	**22**
	Std. Limit	**mg/Nm^3**	**150**	**150**	**150**
4.	Carbon Monoxide (CO)	mg/Nm^3	20	42	BDL

Table No. II

Name of Industries			**Gopani Iron & Power (India) Pvt. Ltd**	**Grace Industries Ltd.**	**Dhariwal Infrastructure Ltd.**
Date of Sampling **(XX/02/2017)**			**22**	**22**	**23**
1.	Particulate Matter (as PM)	mg/Nm^3	10	64	45
	Std. Limit	**mg/Nm^3**	**100**	**130**	**50**
2.	Sulphur Dioxide (as SO_2)	mg/Nm^3	BDL	426	622
		kg/day	BDL	1944.5	19942.2
	Std. Limit	**mg/Nm^3**	**200**	**200**	**200**
3.	Nitrogen Dioxide (NO_2)	mg/Nm^3	BDL	33.6	154
	Std. Limit	**mg/Nm^3**	**150**	**150**	**300**
4.	Carbon Monoxide (CO)	mg/Nm^3	BDL	44	6.5

Table No. III

Name of Industries			**ACC Cement Ltd**	**ACC Cement Ltd**	**ACC Cement Ltd**
Date of Sampling **(XX/02/2017)**			**22**	**22**	**22**
1.	Particulate Matter (as PM)	mg/Nm^3	18	16	19
	Std. Limit	**mg/Nm^3**	**50**	**50**	**50**

Name of Industries			**ACC Cement Ltd**	**ACC Cement Ltd**	**ACC Cement Ltd**
Date of Sampling **(XX/02/2017)**			**22**	**22**	**22**
2.	Sulphur Dioxide (as SO_2)	mg/Nm^3	263	329	108
		kg/day	1034.7	1172.15	1731.4
	Std. Limit	**mg/Nm^3**	**100**	**100**	**100**
3.	Nitrogen Dioxide (NO_2)	mg/Nm^3	84.9	105	100
	Std. Limit	**mg/Nm^3**	**200**	**200**	**200**
4.	Carbon Monoxide (CO)	mg/Nm^3	28	46.3	85

Table No. IV

Name of Industries			**ACC Cement Ltd**	**Lloyds Metal & Energy Ltd.**	**Lloyds Metal & Energy Ltd.**
Date of Sampling **(XX/02/2017)**			**22**	**22**	**23**
1.	Particulate Matter (as PM)	mg/Nm^3	11	44	47
	Std. Limit	**mg/Nm^3**	**50**	**100**	**100**
2.	Sulphur Dioxide (as SO_2)	mg/Nm^3	BDL	254	187
		kg/day	BDL	466	622
	Std. Limit	**mg/Nm^3**	**100**	**200**	**200**
3.	Nitrogen Dioxide (NO_2)	mg/Nm^3	BDL	64.6	68.6
	Std. Limit	**mg/Nm^3**	**200**	**150**	**150**
4.	Carbon Monoxide (CO)	mg/Nm^3	BDL	49.7	68

Table No. V

Name of Industries			**Multi Organics Ltd.**	**Multi Organics Ltd.**	**Superb Hygienic Ltd.**
Date of Sampling **(XX/02/2017)**			**22**	**22**	**23**
1.	Particulate Matter (as PM)	mg/Nm^3	62	50	37
	Std. Limit	**mg/Nm^3**	**100**	**100**	**150**
2.	Sulphur Dioxide (as SO_2)	mg/Nm^3	249	288	37.3
		kg/day	68.5	82.2	2.54
	Std. Limit	**mg/Nm^3**	**200**	**200**	**100**
3.	Nitrogen Dioxide (NO_2)	mg/Nm^3	71.5	80.9	23
	Std. Limit	**mg/Nm^3**	**150**	**150**	**50**
4.	Carbon Monoxide (CO)	mg/Nm^3	30.2	56	15.9

Table No. VI

Name of Industries			**Maharashtra Carbon Pvt. Ltd.**	**Sourav Oil & Mill**	**Vinar Ispat Ltd.**
Date of Sampling **(XX/02/2017)**			**27**	**28**	**28**
1.	Particulate Matter (as PM)	mg/Nm^3	51	27	20
	Std. Limit	**mg/Nm^3**	**150**	**150**	**150**
2.	Sulphur Dioxide (as SO_2)	mg/Nm^3	107	175	54
		kg/day	5.46	3.99	81.2
	Std. Limit	**mg/Nm^3**	**100**	**100**	**100**
3.	Nitrogen Dioxide (NO_2)	mg/Nm^3	19.7	25	18.2
	Std. Limit	**mg/Nm^3**	**50**	**50**	**50**
4.	Carbon Monoxide (CO)	mg/Nm^3	77	47	48.6

Table No. VII

Name of Industries			**BILT Graphic PPL**	**BILT Graphic PPL**	**BILT Graphic PPL**
Date of Sampling **(XX/02/2017)**			**27**	**28**	**28**
1.	Particulate Matter (as PM)	mg/Nm^3	16	41	47
	Std. Limit	**mg/Nm^3**	**250**	**250**	**250**
2.	Sulphur Dioxide (as SO_2)	mg/Nm^3	103	265	339
		kg/day	1519	1720	3895.4
	Std. Limit	**mg/Nm^3**	**100**	**100**	**100**
3.	Nitrogen Dioxide (NO_2)	mg/Nm^3	92.3	89.7	103
	Std. Limit	**mg/Nm^3**	**50**	**50**	**50**
4.	Carbon Monoxide (CO)	mg/Nm^3	37	23.9	32.5

Table No. VIII

Name of Industries			**BILT Graphic PPL**	**Bamni Proteins**	**Bamni Proteins**
Date of Sampling **(XX/02/2017)**			**27**	**28**	**28**
1.	Particulate Matter (as PM)	mg/Nm^3	17	84	46
	Std. Limit	**mg/Nm^3**	**250**	**100**	**100**
2.	Sulphur Dioxide (as SO_2)	mg/Nm^3	54.1	77.3	41.4
		kg/day	139	17.7	9.05
	Std. Limit	**mg/Nm^3**	**100**	**200**	**200**
3.	Nitrogen Dioxide (NO_2)	mg/Nm^3	35	20.2	19.9
	Std. Limit	**mg/Nm^3**	**50**	**50**	**50**
4.	Carbon Monoxide (CO)	mg/Nm^3	8.7	122.5	24.4

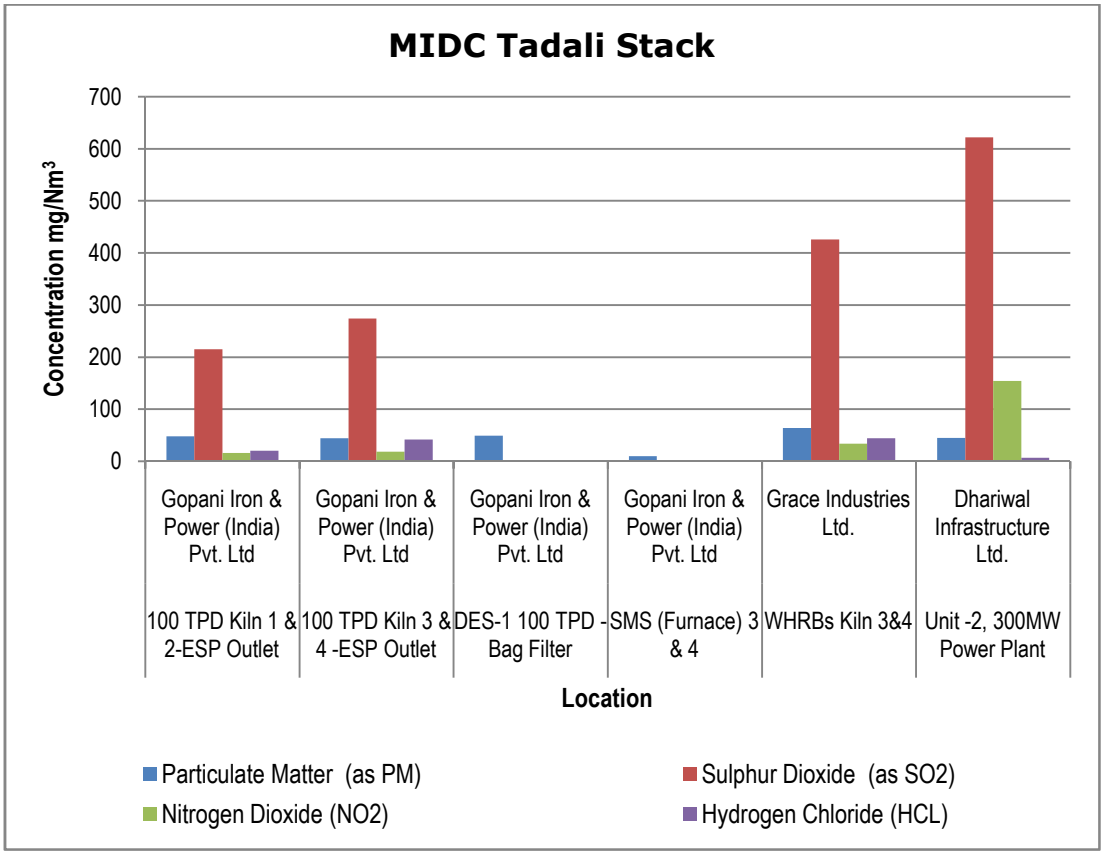
Table No. IX

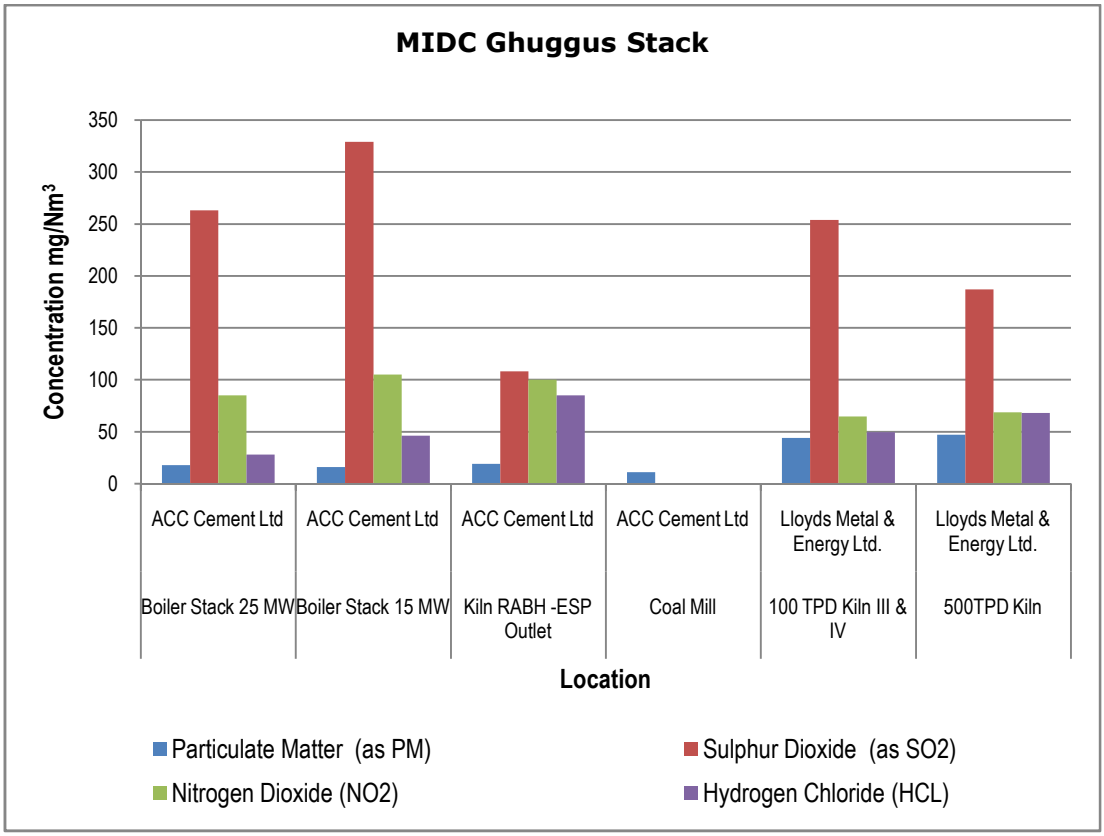
Name of Industries			**Gopani Iron & Power (India) Pvt. Ltd**	**Gopani Iron & Power (India) Pvt. Ltd**	**Lloyds Metal & Energy Ltd.**	**Lloyds Metal & Energy Ltd.**
Date of Sampling **(XX/02/2017)**			**22**	**22**	**22**	**23**
Sr.	**Parameter**	**Unit**	**Results**			
1.	VOC					
I.	Methyl Isobutyl Ketone	mg/Nm^3	BDL	BDL	BDL	BDL
II.	Benzene	mg/Nm^3	0.59	0.59	9.98	2.46
III.	Toulene	mg/Nm^3	0.55	0.14	9.47	2.71
IV.	Xylene	mg/Nm^3	BDL	0.16	0.31	BDL
V.	Ethyl Benzene	mg/Nm^3	BDL	BDL	0.41	BDL
VI.	Ethyl Acetate	mg/Nm^3	BDL	BDL	0.70	BDL

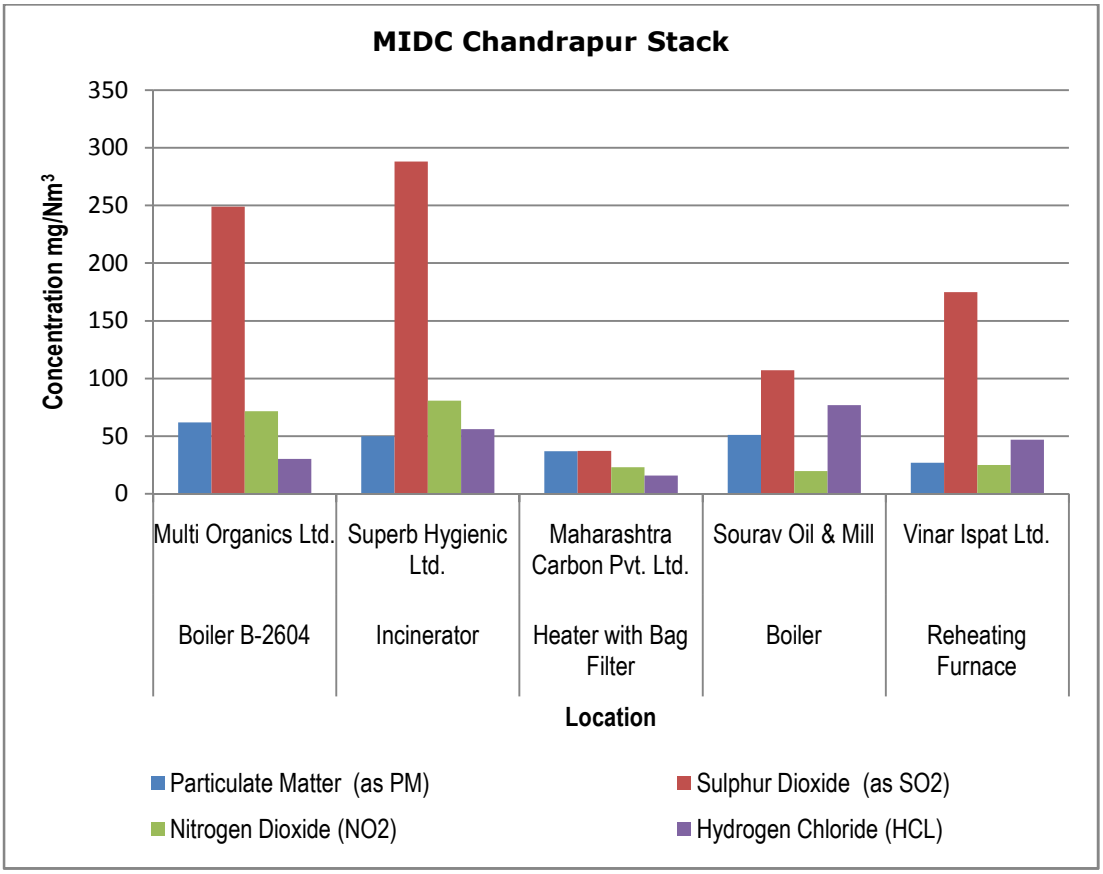
Table No. X

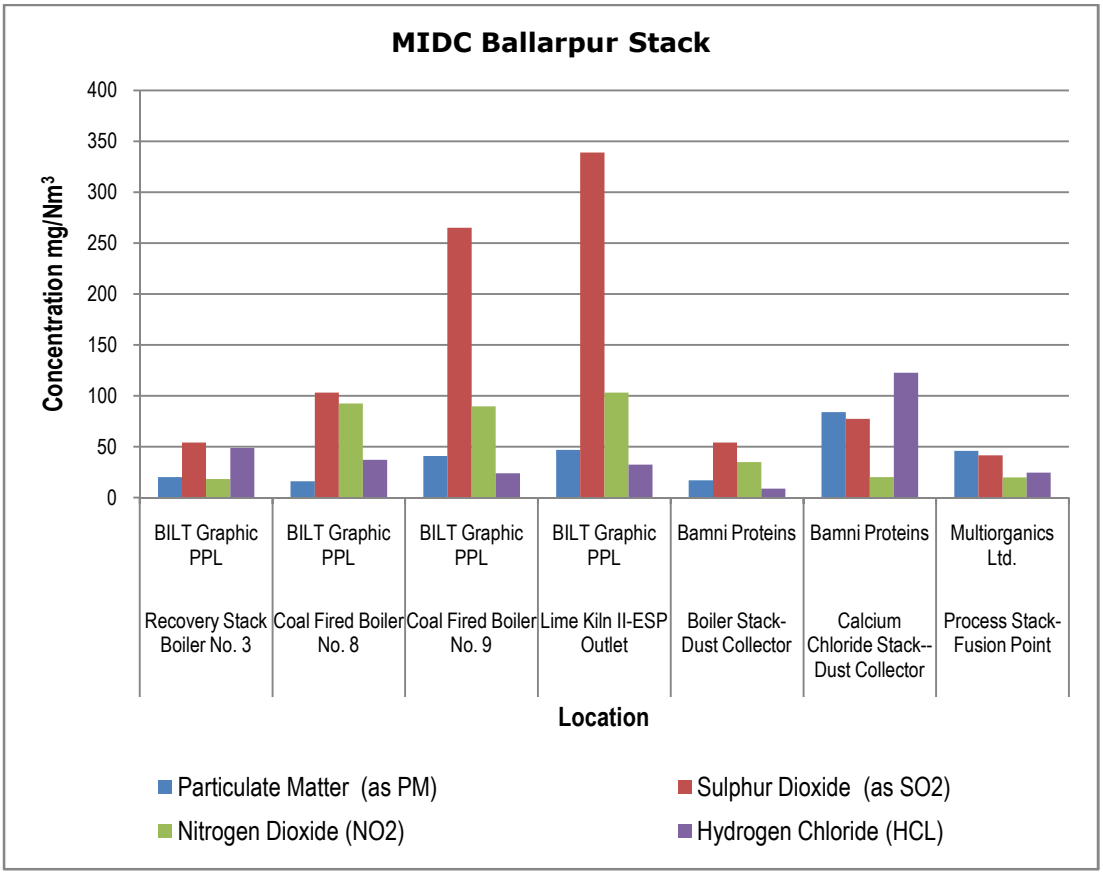
Name of Industries			**Multi organics Ltd.**	**BILT Graphic PPL**	**Superb Hygienic Ltd.**	**Bamni Proteins**
Date of Sampling **(XX/02/2017)**			**27**	**27**	**27**	**28**
Sr.	**Parameter**	**Unit**	**Results**			
1.	VOC					
I.	Methyl Isobutyl Ketone	mg/Nm^3	BDL	BDL	BDL	BDL
II.	Benzene	mg/Nm^3	0.11	NA	BDL	NA
III.	Toulene	mg/Nm^3	0.07	0.04	0.04	0.19
IV.	Xylene	mg/Nm^3	BDL	BDL	BDL	0.18
V.	Ethyl Benzene	mg/Nm^3	BDL	BDL	BDL	0.18
VI.	Ethyl Acetate	mg/Nm^3	BDL	BDL	BDL	BDL

Graphs: Stack Monitoring for Chandrapur MIDC:






MIDC Chandrapur Stack
Concentration mg/Nm3
350
300
250
200
150
100
50
0
Multi Organics Ltd.
Boiler B-2604
Superb Hygienic Ltd.
Incinerator
Maharashtra Carbon Pvt. Ltd.
Heater with Bag Filter
Sourav Oil & Mill
Boiler
Vinar Ispat Ltd.
Reheating Furnace
Location
Particulate Matter (as PM)
Sulphur Dioxide (as SO2)
Nitrogen Dioxide (NO2)
Hydrogen Chloride (HCL)


MIDC Ballarpur Stack
Concentration mg/Nm3
400
350
300
250
200
150
100
50
0
BILT Graphic PPL
Recovery Stack Boiler No. 3
BILT Graphic PPL
Coal Fired Boiler No. 8
BILT Graphic PPL
Coal Fired Boiler No. 9
BILT Graphic PPL
Lime Kiln II-ESP Outlet
Bamni Proteins
Boiler Stack-Dust Collector
Bamni Proteins
Calcium Chloride Stack--Dust Collector
Multiorganics Ltd.
Process Stack-Fusion Point
Location
Particulate Matter (as PM)
Sulphur Dioxide (as SO2)
Nitrogen Dioxide (NO2)
Hydrogen Chloride (HCL)

3.2 Ambient Air Quality:

In order to arrive at conclusions, the Ambient Air Quality Monitoring Results are compared against National Ambient Air Quality Standards, 2009 (**Annexure IV**).

Sr.	Location	Location detail	MIDC	Table No.
1.	MIDC Water Treatment Plant	Near WTP	Tadali	**I**
2.	Grace Industries Ltd.	Terrace	Tadali	**I**
3.	Dhariwal Infrastructure Ltd.	Main Gate	Tadali	**I**
4.	Lloyds Colony	Mathardevi Village	Ghuggus	**II**
5.	Transit Hostel Rajiv Colony WCL	Terrace	Ghuggus	**II**
6.	Lloyds Metal	New CAAQMS Station	Ghuggus	**II**
7.	Green Tech	Main Gate	Chandrapur	**III**
8.	MIDC Office	Premises	Chandrapur	**III**
9.	HPCL	Main Gate	Chandrapur	**III**
10.	Ram Mandir	Near Mangal Karyalaya	Ballarpur	**IV**
11.	BILT Colony	Near Guest House	Ballarpur	**IV**
12.	WCL	OCM Office	Ballarpur	**IV**

Table No. I

Location				**MIDC Water Treatment Plant**	**Grace Industries Ltd.**	**Dhariwal Infrastructure Ltd.**
Date of Sampling **(XX/02/2017)**				**24**	**24**	**26**
Sr.	**Parameters**	**Unit**	**Std. Limit (NAAQS 2009)**	**Results**		
1.	Sulphur Dioxide (SO_2)	$\mu g/m^3$	**80**	8.2	10.9	6.4
2.	Nitrogen Dioxide (NO_2)	$\mu g/m^3$	**80**	11.5	9.4	12.5
3.	Particulate Matter (size less than 10 µm) or PM_{10}	$\mu g/m^3$	**100**	107	96.4	106
4.	Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	$\mu g/m^3$	**60**	45.0	42.0	63
5.	Ozone (O_3)	$\mu g/m^3$	**180**	9.0	8.1	13.4
6.	Lead (Pb)	$\mu g/m^3$	**1**	0.03	BDL	0.02
7.	Carbon Monoxide (CO)	mg/m^3	**4**	0.9	0.7	0.9
8.	Ammonia (NH_3)	$\mu g/m^3$	**400**	58.4	31.1	3.5
9.	Benzene (C_6H_6)	$\mu g/m^3$	**5**	BDL	4.0	3.6
10.	Benzo (a) Pyrene (BaP) – particulate phase only	ng/m^3	**1**	BDL	0.2	0.3
11.	Arsenic (As)	ng/m^3	**6**	1.6	2.2	BDL
12.	Nickel (Ni)	ng/m^3	**20**	16.6	11.5	7.2

Table No. II

Location				**Lloyds Colony**	**Transit Hostel Rajiv Colony WCL**	**Lloyds Metal**
Date of Sampling **(XX/02/2017)**				**22**	**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit (NAAQS 2009)**	**Results**		
1.	Sulphur Dioxide (SO_2)	$\mu g/m^3$	**80**	12.1	66.9	51.1
2.	Nitrogen Dioxide (NO_2)	$\mu g/m^3$	**80**	17.4	29.3	31.4
3.	Particulate Matter (size less than 10 µm) or PM_{10}	$\mu g/m^3$	**100**	111	122	119
4.	Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	$\mu g/m^3$	**60**	57	60	51
5.	Ozone (O_3)	$\mu g/m^3$	**180**	19.2	24.3	35.9
6.	Lead (Pb)	$\mu g/m^3$	**1**	0.004	0.04	0.03
7.	Carbon Monoxide (CO)	mg/m^3	**4**	0.9	0.8	0.9
8.	Ammonia (NH_3)	$\mu g/m^3$	**400**	13.1	18.3	23.3
9.	Benzene (C_6H_6)	$\mu g/m^3$	**5**	7.1	6.6	7.2
10.	Benzo (a) Pyrene (BaP) – particulate phase only	ng/m^3	**1**	N.D	N.D	0.3
11.	Arsenic (As)	ng/m^3	**6**	1.3	1.9	1.7
12.	Nickel (Ni)	ng/m^3	**20**	12.4	14.5	20.3

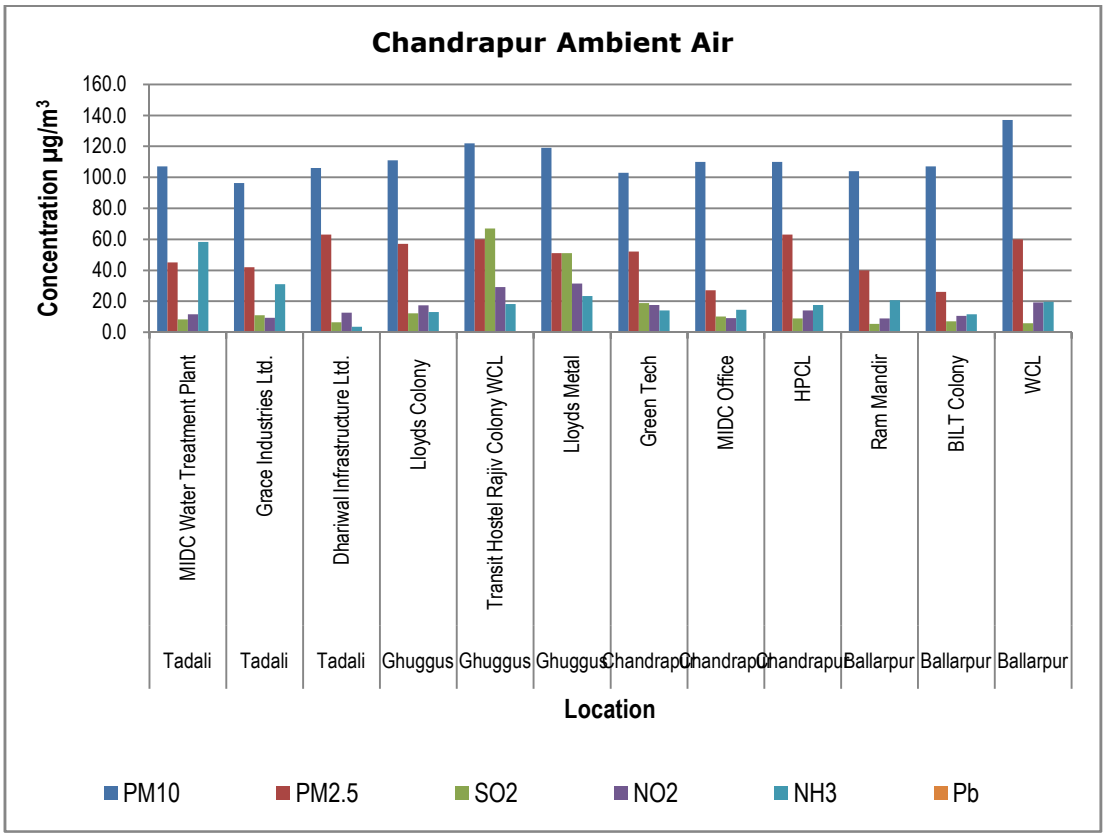
Table No. III

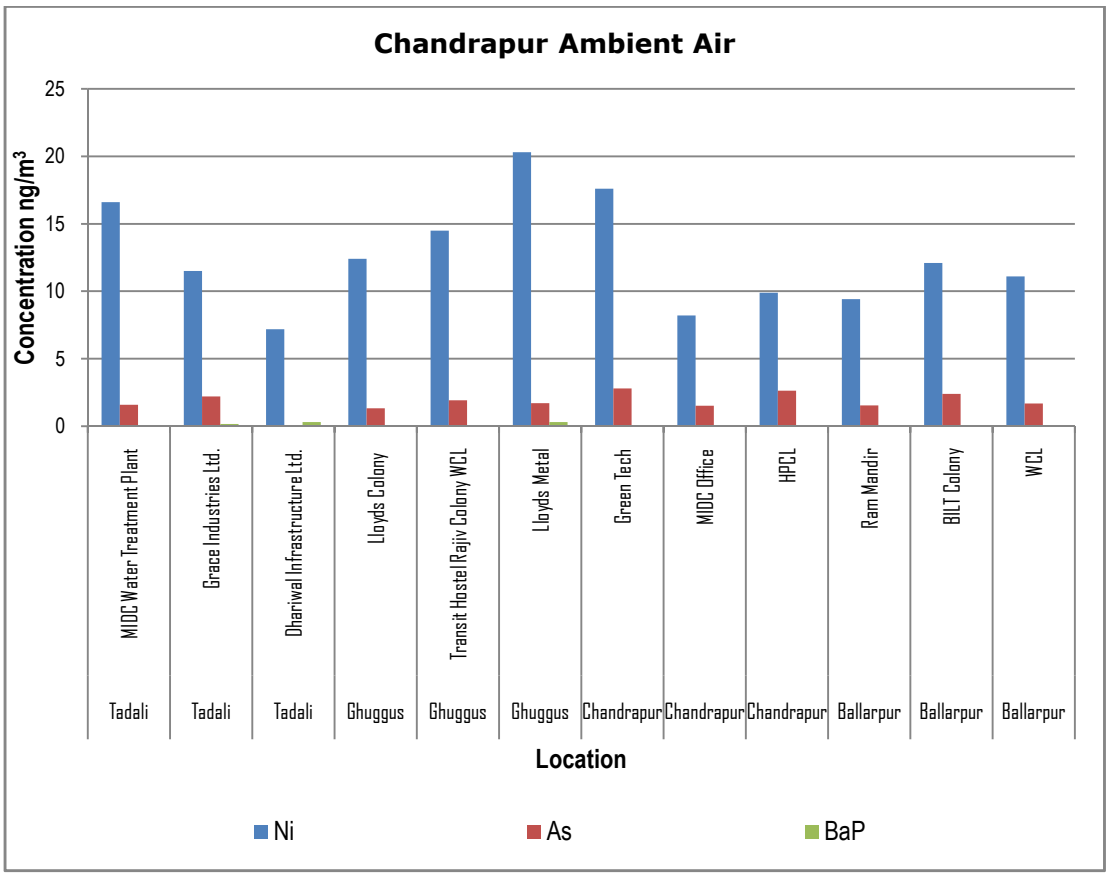
Location				**Green Tech**	**MIDC Office**	**HPCL**
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit (NAAQS 2009)**	**Results**		
1.	Sulphur Dioxide (SO_2)	$\mu g/m^3$	**80**	18.8	10.1	8.9
2.	Nitrogen Dioxide (NO_2)	$\mu g/m^3$	**80**	17.5	9	14
3.	Particulate Matter (size less than 10 µm) or PM_{10}	$\mu g/m^3$	**100**	103	110	110
4.	Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	$\mu g/m^3$	**60**	52	27	63
5.	Ozone (O_3)	$\mu g/m^3$	**180**	19.1	25.3	24.5
6.	Lead (Pb)	$\mu g/m^3$	**1**	0.02	0.02	BDL
7.	Carbon Monoxide (CO)	mg/m^3	**4**	0.8	0.8	0.6
8.	Ammonia (NH_3)	$\mu g/m^3$	**400**	14	14.5	17.5
9.	Benzene (C_6H_6)	$\mu g/m^3$	**5**	5.4	N.D	7.5
10.	Benzo (a) Pyrene (BaP) – particulate phase only	ng/m^3	**1**	N.D	N.D	N.D
11.	Arsenic (As)	ng/m^3	**6**	2.8	1.5	2.6
12.	Nickel (Ni)	ng/m^3	**20**	17.6	8.2	9.9

Table No. IV

Location				**Ram Mandir**	**BILT Colony**	**WCL**
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit (NAAQS 2009)**	**Results**		
1.	Sulphur Dioxide (SO_2)	$\mu g/m^3$	**80**	5.3	7.1	5.9
2.	Nitrogen Dioxide (NO_2)	$\mu g/m^3$	**80**	8.9	10.6	19.3
3.	Particulate Matter (size less than 10 µm) or PM_{10}	$\mu g/m^3$	**100**	104	107	137
4.	Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	$\mu g/m^3$	**60**	40	26	60
5.	Ozone (O_3)	$\mu g/m^3$	**180**	29.4	33.6	33.8
6.	Lead (Pb)	$\mu g/m^3$	**1**	BDL	BDL	BDL
7.	Carbon Monoxide (CO)	mg/m^3	**4**	0.6	0.6	0.6
8.	Ammonia (NH_3)	$\mu g/m^3$	**400**	20.7	11.5	19.6
9.	Benzene (C_6H_6)	$\mu g/m^3$	**5**	3.3	13.8	12.8
10.	Benzo (a) Pyrene (BaP) – particulate phase only	ng/m^3	**1**	N.D	N.D	N.D
11.	Arsenic (As)	ng/m^3	**6**	1.6	2.4	1.7
12.	Nickel (Ni)	ng/m^3	**20**	9.4	12.1	11.1

Graphs: Ambient Air Quality Monitoring for Chandrapur:





3.3 Water/ Waste Water Quality:

Water Analysis Results are compared against CPCB document on criteria for Comprehensive Environmental Assessment of Industrial Clusters-Water Quality Parameters Requirement and Classification (Annexure VI), CPCB Water Quality Criteria (Annexure V) and Drinking Water Specification, IS 10500:2012 (Annexure IV), Wastewater Analysis Results are compared with General Standards for Discharge of Environmental Pollutants Part A: Effluents, The Environment (Protection) Rules, 1986, Schedule VI.

Sr.	Location	MIDC	Table No.
1.	GIPL Nallah	Tadali	**I**
2.	Tadali Village Lake	Tadali	**I**
3.	Gopani Iron & Power (I) Pvt. Ltd., Colony	Tadali	**I**
4.	Nallah Adjacent to Grace Industries	Tadali	**II**
5.	Raw Water of MIDC WTP (Tank)	Tadali	**II**
6.	Wardha river near WTP of WCL Ghugus opencast mine	Ghuggus	**III**
7.	Domestic Effluent Nallah near Lokhandi Bridge at WTP of Ghugus opencast mine	Ghuggus	**III**
8.	WCL Ghugus opencast mine discharge	Ghuggus	**III**
9.	Wardha River Behind ACC Plant (Mungoli Coal Mine Road)	Ghuggus	**IV**
10.	Nallah at Usgaon, Shengaon Road (Behind Gupta Energy Power Ltd)	Ghuggus	**IV**
11.	Nallah water domestic effluent of ACC LTD., Colony & Ghugus village	Ghuggus	**IV**
12.	Nallha Opposite Manidhari Industries, Plot No. c-2	Chandrapur	**V**
13.	Surface water taken from Gagangiri Village Bridge	Chandrapur	**V**
14.	Surface water taken from Dhanora Bridge	Chandrapur	**V**
15.	Multi Organic Ltd.	Chandrapur	**VI**
16.	Super Hygienic (Bio Medical waste disposal unit)	Chandrapur	**VI**
17.	Multiorganics Pvt. Ltd.	Chandrapur	**VI**
18.	Super Hygienic (BMW disposal Unit)	Chandrapur	**VII**

Sr.	Location	MIDC	Table No.
19.	HPCL	Chandrapur	**VII**
20.	BILT RCC	Ballarpur	**VIII**
21.	Bhagirathi Nallah Bridge, GoBDLpipri Road	Ballarpur	**VIII**
22.	Wardha River	Ballarpur	**VIII**
23.	Nallah Near MSW Municipal Corporation	Ballarpur	**IX**
24.	Ballarpur Open Cast Mine Discharge	Ballarpur	**IX**
25.	Nallah of Municipal Council Ballarpur, Besides HP Petrol Pump	Ballarpur	**IX**

Table No. I

Location				**GIPL Nallah**	**Tadali Village Lake**	**Gopani Iron & Power (I) Pvt. Ltd., Colony**
Date of Sampling **(XX/02/2017)**				**22**	**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
1.	Colour	Hazen		15	4	BDL
2.	Smell	-		Disagreeable	Disagreeable	Agreeable
3.	pH	-	**5.5 -9.0**	7.8	8.3	7.9
4.	Oil & Grease	mg/L	**10.0**	BDL	BDL	BDL
5.	Suspended Solids	mg/L	**100.0**	26	14	BDL
6.	Dissolved Oxygen (% Saturation)	%		67.9	85.5	80.3
7.	Chemical Oxygen Demand	mg/L	**250.0**	28	28	8

Location				**GIPL Nallah**	**Tadali Village Lake**	**Gopani Iron & Power (I) Pvt. Ltd., Colony**
Date of Sampling **(XX/02/2017)**				**22**	**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
8.	Biochemical Oxygen Demand (3 days,27° C)	mg/L	**30.0**	7.9	7.6	2.1
9.	Electrical Conductivity (at 25° C)	µmho/cm		4081	378	1560
10.	Nitrite Nitrogen (as NO_2)	mg/L		0.018	0.007	0.007
11.	Nitrate Nitrogen (as NO_3)	mg/L	**10.0**	0.72	0.035	3.89
12.	(NO_2 + NO_3)-Nitrogen	mg/L	**5.0**	0.04	3.90	0.33
13.	Free Ammonia (as NH_3-N)	mg/L	**5.0**	0.14	BDL	BDL
14.	Total Residual Chlorine	mg/L	**1.0**	0.114	BDL	0.12
15.	Cyanide (as CN)	mg/L	**0.2**	BDL	BDL	BDL
16.	Fluoride (as F)	mg/L	**2.0**	0.545	0.25	0.36
17.	Sulphide (as S^{2-})	mg/L	**2.0**	BDL	BDL	BDL
18.	Dissolved Phosphate (as P)	mg/L	**5.0**	0.04	0.022	0.031

Location				**GIPL Nallah**	**Tadali Village Lake**	**Gopani Iron & Power (I) Pvt. Ltd., Colony**
Date of Sampling **(XX/02/2017)**				**22**	**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
19.	Sodium Absorption Ratio	mg/L		5.13	0.666	2.2
20.	Total Coliforms	MPN Index/ 100 ml	**100.0**	120	1700	9.3
21.	Faecal Coliforms	MPN Index/ 100 ml	**1000.0**	93	1400	6.8
22.	Total Phosphorous (as P)	mg/L	**1.0**	0.107	0.014	0.025
23.	Total Kjeldahl Nitrogen (as TKN)	mg/L	**100.0**	0.952	0.896	0.84
24.	Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	**5.0**	0.22	BDL	BDL
25.	Phenols (as C_6H_5OH)	mg/L	**3.0**	BDL	BDL	BDL
26.	Surface Active Agents (as MBAS)	mg/L	**3.0**	0.061	0.077	BDL
27.	Organo Chlorine Pesticides					
I.	Alachlor	µg/L	**2.0**	BDL	BDL	BDL
II.	Atrazine	µg/L	**0.2**	BDL	BDL	BDL
III.	Aldrin	µg/L	**0.1**	BDL	BDL	BDL
IV.	Dieldrin	µg/L	**2.0**	BDL	BDL	BDL

Location				GIPL Nallah	Tadali Village Lake	Gopani Iron & Power (I) Pvt. Ltd., Colony
Date of Sampling **(XX/02/2017)**				**22**	**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
V.	Alpha HCH	µg/L	**0.01**	BDL	BDL	BDL
VI.	Beta HCH	µg/L	**2.0**	BDL	BDL	BDL
VII.	Delta HCH	µg/L	**3.0**	BDL	BDL	BDL
VIII.	Butachlor	µg/L	**0.2**	BDL	BDL	BDL
IX.	p,p DDT	µg/L	**0.05**	BDL	BDL	BDL
X.	o,p DDT	µg/L	**100.0**	BDL	BDL	BDL
XI.	p,p DDE	µg/L	**250.0**	BDL	BDL	BDL
XII.	o,p DDE	µg/L	**30.0**	BDL	BDL	BDL
XIII.	p,p DDD	µg/L		BDL	BDL	BDL
XIV.	o,p DDD	µg/L		BDL	BDL	BDL
XV.	Alpha EBDLosulfan	µg/L	**10.0**	BDL	BDL	BDL
XVI.	Beta EBDLosulfan	µg/L		BDL	BDL	BDL
XVII.	EBDLosulfan Sulphate	µg/L	**5.0**	BDL	BDL	BDL
VIII.	Y HCH (LiBDLane)	µg/L	**1.0**	BDL	BDL	BDL
28.	Polynuclear aromatic hydrocarbons (as PAH)	mg/L	**0.2**	BDL	BDL	BDL
29.	Polychlorinated Biphenyls (PCB)	mg/L	**2.0**	BDL	BDL	BDL
30.	Zinc (as Zn)	mg/L	**5.0**	BDL	BDL	BDL
31.	Nickel (as Ni)	mg/L	**3.0**	0.021	0.024	0.02

Location				**GIPL Nallah**	**Tadali Village Lake**	**Gopani Iron & Power (I) Pvt. Ltd., Colony**
Date of Sampling **(XX/02/2017)**				**22**	**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
32.	Copper (as Cu)	mg/L		BDL	BDL	BDL
33.	Hexavalent Chromium (as Cr6+)	mg/L	**0.1**	BDL	BDL	BDL
34.	Total Chromium (as Cr)	mg/L	**2.0**	0.032	0.033	0.033
35.	Total Arsenic (as As)	mg/L	**0.2**	0.01	BDL	BDL
36.	Lead (as Pb)	mg/L	**0.1**	0.1	0.107	0.11
37.	Cadmium (as Cd)	mg/L	**2.0**	BDL	BDL	BDL
38.	Mercury (as Hg)	mg/L	**0.01**	0.003	BDL	BDL
39.	Manganese (as Mn)	mg/L	**2.0**	0.162	0.063	BDL
40.	Iron (as Fe)	mg/L	**3.0**	0.71	0.25	BDL
41.	Vanadium (as V)	mg/L	**0.2**	0.011	BDL	BDL
42.	Selenium (as Se)	mg/L	**0.05**	0.01	BDL	BDL
43.	Boron (as B)	mg/L		0.301	0.099	0.284
44.	Bioassay Test on fish	% survival	**90% survival after 96h in 100%effluent**	100%	100%	100%

Table No. II

Location				**Nallah Adjacent to Grace Industries**	**Raw Water of MIDC WTP (Tank)**
Date of Sampling **(XX/02/2017)**				**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**	
1.	Colour	Hazen		8	2
2.	Smell	-		Disagreeable	Agreeable
3.	pH	-	**5.5 -9.0**	7.0	8.1
4.	Oil & Grease	mg/L	**10.0**	BDL	BDL
5.	Suspended Solids	mg/L	**100.0**	22	14
6.	Dissolved Oxygen (% Saturation)	%		52.0	74
7.	Chemical Oxygen Demand	mg/L	**250.0**	72	24
8.	Biochemical Oxygen Demand (3 days,27° C)	mg/L	**30.0**	22	6.1
9.	Electrical Conductivity (at 25° C)	µmho/cm		4299	486
10.	Nitrite Nitrogen (as NO_2)	mg/L		0.026	0.008
11.	Nitrate Nitrogen (as NO_3)	mg/L	**10.0**	0.305	0.659
12.	(NO_2 + NO_3)-Nitrogen	mg/L	**5.0**	0.67	1.18
13.	Free Ammonia (as NH_3-N)	mg/L	**5.0**	0.1	BDL
14.	Total Residual Chlorine	mg/L	**1.0**	0.221	BDL
15.	Cyanide (as CN)	mg/L	**0.2**	BDL	BDL

Location				**Nallah Adjacent to Grace Industries**	**Raw Water of MIDC WTP (Tank)**
Date of Sampling **(XX/02/2017)**				**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**	
16.	Fluoride (as F)	mg/L	**2.0**	1.04	0.25
17.	Sulphide (as S^{2-})	mg/L	**2.0**	BDL	BDL
18.	Dissolved Phosphate (as P)	mg/L	**5.0**	0.285	0.042
19.	Sodium Absorption Ratio	mg/L		9.5	1.04
20.	Total Coliforms	MPN Index/ 100 ml	**100.0**	2400	230
21.	Faecal Coliforms	MPN Index/ 100 ml	**1000.0**	1300	130
22.	Total Phosphorous (as P)	mg/L	**1.0**	0.35	0.056
23.	Total Kjeldahl Nitrogen (as TKN)	mg/L	**100.0**	0.952	0.448
24.	Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	**5.0**	0.150	BDL
25.	Phenols (as C_6H_5OH)	mg/L	**3.0**	0.001	BDL
26.	Surface Active Agents (as MBAS)	mg/L	**3.0**	0.03	BDL
27.	Organo Chlorine Pesticides				
I.	Alachlor	µg/L	**2.0**	BDL	BDL
II.	Atrazine	µg/L	**0.2**	BDL	BDL
III.	Aldrin	µg/L	**0.1**	BDL	BDL

Location				**Nallah Adjacent to Grace Industries**	**Raw Water of MIDC WTP (Tank)**
Date of Sampling **(XX/02/2017)**				**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**	
IV.	Dieldrin	µg/L	**2.0**	BDL	BDL
V.	Alpha HCH	µg/L	**0.01**	BDL	BDL
VI.	Beta HCH	µg/L	**2.0**	BDL	BDL
VII.	Delta HCH	µg/L	**3.0**	BDL	BDL
VIII.	Butachlor	µg/L	**0.2**	BDL	BDL
IX.	p,p DDT	µg/L	**0.05**	BDL	BDL
X.	o,p DDT	µg/L	**100.0**	BDL	BDL
XI.	p,p DDE	µg/L	**250.0**	BDL	BDL
XII.	o,p DDE	µg/L	**30.0**	BDL	BDL
XIII.	p,p DDD	µg/L		BDL	BDL
XIV.	o,p DDD	µg/L		BDL	BDL
XV.	Alpha EBDLosulfan	µg/L	**10.0**	BDL	BDL
XVI.	Beta EBDLosulfan	µg/L		BDL	BDL
XVII.	EBDLosulfan Sulphate	µg/L	**5.0**	BDL	BDL
VIII.	Y HCH (LiBDLane)	µg/L	**1.0**	BDL	BDL
28.	Polynuclear aromatic hydrocarbons (as PAH)	mg/L	**0.2**	BDL	BDL
29.	Polychlorinated Biphenyls (PCB)	mg/L	**2.0**	BDL	BDL
30.	Zinc (as Zn)	mg/L	**5.0**	BDL	BDL
31.	Nickel (as Ni)	mg/L	**3.0**	0.022	0.025
32.	Copper (as Cu)	mg/L		BDL	BDL

Location				**Nallah Adjacent to Grace Industries**	**Raw Water of MIDC WTP (Tank)**
Date of Sampling **(XX/02/2017)**				**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**	
33.	Hexavalent Chromium (as Cr6+)	mg/L	**0.1**	BDL	BDL
34.	Total Chromium (as Cr)	mg/L	**2.0**	0.031	0.034
35.	Total Arsenic (as As)	mg/L	**0.2**	0.005	BDL
36.	Lead (as Pb)	mg/L	**0.1**	0.1	0.11
37.	Cadmium (as Cd)	mg/L	**2.0**	BDL	BDL
38.	Mercury (as Hg)	mg/L	**0.01**	0.0015	BDL
39.	Manganese (as Mn)	mg/L	**2.0**	0.093	0.038
40.	Iron (as Fe)	mg/L	**3.0**	0.26	0.82
41.	Vanadium (as V)	mg/L	**0.2**	0.022	BDL
42.	Selenium (as Se)	mg/L	**0.05**	BDL	BDL
43.	Boron (as B)	mg/L		0.395	0.121
44.	Bioassay Test on fish	% survival	**90% survival after 96h in 100%effluent**	100%	100%

Table No. III

Location				**Wardha river near WTP of WCL Ghugus opencast mine**	**Domestic Effluent Nallah near Lokhandi Bridge at WTP of Ghugus opencast mine**	**WCL Ghugus opencast mine discharge**
Date of Sampling **(XX/02/2017)**				**22**	**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
1.	Colour	Hazen		3	8	5
2.	Smell	-		Agreeable	Disagreeable	Disagreeable
3.	pH	-	**5.5 -9.0**	8.4	7.6	5.6
4.	Oil & Grease	mg/L	**10.0**	BDL	BDL	BDL
5.	Suspended Solids	mg/L	**100.0**	12	71	57
6.	Dissolved Oxygen (% Saturation)	%		89	79.2	75.4
7.	Chemical Oxygen Demand	mg/L	**250.0**	4	32	8
8.	Biochemical Oxygen Demand (3 days,27^{o} C)	mg/L	**30.0**	1.1	8.5	2.1
9.	Electrical Conductivity (at 25^{o} C)	µmho/cm		454	671	4326
10.	Nitrite Nitrogen (as NO_2)	mg/L		0.002	0.333	0.005
11.	Nitrate Nitrogen (as NO_3)	mg/L	**10.0**	0.239	2.45	1.22

Location				**Wardha river near WTP of WCL Ghugus opencast mine**	**Domestic Effluent Nallah near Lokhandi Bridge at WTP of Ghugus opencast mine**	**WCL Ghugus opencast mine discharge**
Date of Sampling **(XX/02/2017)**				**22**	**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
12.	$(NO_2 + NO_3)$-Nitrogen	mg/L	**5.0**	0.24	2.78	1.23
13.	Free Ammonia (as NH_3-N)	mg/L	**5.0**	BDL	BDL	6.4
14.	Total Residual Chlorine	mg/L	**1.0**	BDL	0.189	BDL
15.	Cyanide (as CN)	mg/L	**0.2**	BDL	BDL	BDL
16.	Fluoride (as F)	mg/L	**2.0**	0.385	0.41	0.628
17.	Sulphide (as S^{2-})	mg/L	**2.0**	BDL	BDL	BDL
18.	Dissolved Phosphate (as P)	mg/L	**5.0**	0.014	0.240	0.014
19.	Sodium Absorption Ratio	mg/L		1.15	2.19	0.389
20.	Total Coliforms	MPN Index/ 100 ml	**100.0**	330	2400	490
21.	Faecal Coliforms	MPN Index/ 100 ml	**1000.0**	230	1300	68
22.	Total Phosphorous (as P)	mg/L	**1.0**	0.039	0.339	0.02

Location				**Wardha river near WTP of WCL Ghugus opencast mine**	**Domestic Effluent Nallah near Lokhandi Bridge at WTP of Ghugus opencast mine**	**WCL Ghugus opencast mine discharge**
Date of Sampling **(XX/02/2017)**				**22**	**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
23.	Total Kjeldahl Nitrogen (as TKN)	mg/L	**100.0**	1.01	1.4	27.4
24.	Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	**5.0**	<0.1	0.560	11.000
25.	Phenols (as C_6H_5OH)	mg/L	**3.0**	BDL	BDL	BDL
26.	Surface Active Agents (as MBAS)	mg/L	**3.0**	0.154	0.177	0.315
27.	Organo Chlorine Pesticides					
I.	Alachlor	µg/L	**2.0**	BDL	BDL	BDL
II.	Atrazine	µg/L	**0.2**	BDL	BDL	BDL
III.	Aldrin	µg/L	**0.1**	BDL	BDL	BDL
IV.	Dieldrin	µg/L	**2.0**	BDL	BDL	BDL
V.	Alpha HCH	µg/L	**0.01**	BDL	BDL	BDL
VI.	Beta HCH	µg/L	**2.0**	BDL	BDL	BDL
VII.	Delta HCH	µg/L	**3.0**	BDL	BDL	BDL
VIII.	Butachlor	µg/L	**0.2**	BDL	BDL	BDL
IX.	p,p DDT	µg/L	**0.05**	BDL	BDL	BDL
X.	o,p DDT	µg/L	**100.0**	BDL	BDL	BDL

Location				Wardha river near WTP of WCL Ghugus opencast mine	Domestic Effluent Nallah near Lokhandi Bridge at WTP of Ghugus opencast mine	WCL Ghugus opencast mine discharge
Date of Sampling **(XX/02/2017)**				**22**	**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
XI.	p,p DDE	µg/L	**250.0**	BDL	BDL	BDL
XII.	o,p DDE	µg/L	**30.0**	BDL	BDL	BDL
XIII.	p,p DDD	µg/L		BDL	BDL	BDL
XIV.	o,p DDD	µg/L		BDL	BDL	BDL
XV.	Alpha EBDLosulfan	µg/L	**10.0**	BDL	BDL	BDL
XVI.	Beta EBDLosulfan	µg/L		BDL	BDL	BDL
XVII.	EBDLosulfan Sulphate	µg/L	**5.0**	BDL	BDL	BDL
VIII.	Y HCH (LiBDLane)	µg/L	**1.0**	BDL	BDL	BDL
28.	Polynuclear aromatic hydrocarbons (as PAH)	mg/L	**0.2**	BDL	BDL	BDL
29.	Polychlorinated Biphenyls (PCB)	mg/L	**2.0**	BDL	BDL	BDL
30.	Zinc (as Zn)	mg/L	**5.0**	0.21	BDL	0.87
31.	Nickel (as Ni)	mg/L	**3.0**	0.017	0.027	0.47
32.	Copper (as Cu)	mg/L		BDL	BDL	BDL
33.	Hexavalent Chromium (as Cr6+)	mg/L	**0.1**	BDL	BDL	BDL

Location				**Wardha river near WTP of WCL Ghugus opencast mine**	**Domestic Effluent Nallah near Lokhandi Bridge at WTP of Ghugus opencast mine**	**WCL Ghugus opencast mine discharge**
Date of Sampling **(XX/02/2017)**				**22**	**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
34.	Total Chromium (as Cr)	mg/L	**2.0**	0.059	0.038	0.033
35.	Total Arsenic (as As)	mg/L	**0.2**	BDL	BDL	0.01
36.	Lead (as Pb)	mg/L	**0.1**	0.098	0.11	0.096
37.	Cadmium (as Cd)	mg/L	**2.0**	BDL	BDL	BDL
38.	Mercury (as Hg)	mg/L	**0.01**	BDL	BDL	BDL
39.	Manganese (as Mn)	mg/L	**2.0**	0.042	0.12	8.64
40.	Iron (as Fe)	mg/L	**3.0**	4.12	1.93	16.2
41.	Vanadium (as V)	mg/L	**0.2**	BDL	0.01	BDL
42.	Selenium (as Se)	mg/L	**0.05**	BDL	BDL	BDL
43.	Boron (as B)	mg/L		0.13	0.155	0.649
44.	Bioassay Test on fish	% survival	**90% survival after 96h in 100%effluent**	100%	100%	100%

Table No. IV

Location				**Wardha River Behind ACC Plant (Mungoli Coal Mine Road)**	**Nallah at Usgaon, Shengaon Road (Behind Gupta Energy Power Ltd)**	**Nallah water domestic effluent of ACC LTD., Colony & Ghugus village**
Date of Sampling **(XX/02/2017)**				**22**	**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
1.	Colour	Hazen		3	8	4
2.	Smell	-		Agreeable	Disagreeable	Disagreeable
3.	pH	-	**5.5 -9.0**	8.1	7.9	7.3
4.	Oil & Grease	mg/L	**10.0**	BDL	BDL	BDL
5.	Suspended Solids	mg/L	**100.0**	8	19	55
6.	Dissolved Oxygen (% Saturation)	%		89	67.2	0
7.	Chemical Oxygen Demand	mg/L	**250.0**	8	44	112
8.	Biochemical Oxygen Demand (3 days,27^{o} C)	mg/L	**30.0**	2.1	11	32
9.	Electrical Conductivity (at 25^{o} C)	µmho/cm		502	2235	1394
10.	Nitrite Nitrogen (as NO_2)	mg/L		0.013	0.005	0.025
11.	Nitrate Nitrogen (as NO_3)	mg/L	**10.0**	0.98	0.398	0.312

Location				**Wardha River Behind ACC Plant (Mungoli Coal Mine Road)**	**Nallah at Usgaon, Shengaon Road (Behind Gupta Energy Power Ltd)**	**Nallah water domestic effluent of ACC LTD., Colony & Ghugus village**
Date of Sampling **(XX/02/2017)**				**22**	**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
12.	$(NO_2 + NO_3)$-Nitrogen	mg/L	**5.0**	0.99	0.40	0.34
13.	Free Ammonia (as NH_3-N)	mg/L	**5.0**	0.26	0.11	1.64
14.	Total Residual Chlorine	mg/L	**1.0**	BDL	0.120	0.29
15.	Cyanide (as CN)	mg/L	**0.2**	BDL	BDL	BDL
16.	Fluoride (as F)	mg/L	**2.0**	0.128	0.756	0.654
17.	Sulphide (as S^{2-})	mg/L	**2.0**	BDL	BDL	BDL
18.	Dissolved Phosphate (as P)	mg/L	**5.0**	0.025	0.229	1.540
19.	Sodium Absorption Ratio	mg/L		1.05	2.26	1.11
20.	Total Coliforms	MPN Index/ 100 ml	**100.0**	1100	2400	16000
21.	Faecal Coliforms	MPN Index/ 100 ml	**1000.0**	700	1300	5400
22.	Total Phosphorous (as P)	mg/L	**1.0**	0.045	0.28	1.890

Location				**Wardha River Behind ACC Plant (Mungoli Coal Mine Road)**	**Nallah at Usgaon, Shengaon Road (Behind Gupta Energy Power Ltd)**	**Nallah water domestic effluent of ACC LTD., Colony & Ghugus village**
Date of Sampling **(XX/02/2017)**				**22**	**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
23.	Total Kjeldahl Nitrogen (as TKN)	mg/L	**100.0**	1.01	1.2	19.00
24.	Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	**5.0**	0.280	0.15	12.70
25.	Phenols (as C_6H_5OH)	mg/L	**3.0**	BDL	BDL	0.008
26.	Surface Active Agents (as MBAS)	mg/L	**3.0**	0.154	0.108	0.642
27.	Organo Chlorine Pesticides					
I.	Alachlor	µg/L	**2.0**	BDL	BDL	BDL
II.	Atrazine	µg/L	**0.2**	BDL	BDL	BDL
III.	Aldrin	µg/L	**0.1**	BDL	BDL	BDL
IV.	Dieldrin	µg/L	**2.0**	BDL	BDL	BDL
V.	Alpha HCH	µg/L	**0.01**	BDL	BDL	BDL
VI.	Beta HCH	µg/L	**2.0**	BDL	BDL	BDL
VII.	Delta HCH	µg/L	**3.0**	BDL	BDL	BDL
VIII.	Butachlor	µg/L	**0.2**	BDL	BDL	BDL
IX.	p,p DDT	µg/L	**0.05**	BDL	BDL	BDL
X.	o,p DDT	µg/L	**100.0**	BDL	BDL	BDL

Location				**Wardha River Behind ACC Plant (Mungoli Coal Mine Road)**	**Nallah at Usgaon, Shengaon Road (Behind Gupta Energy Power Ltd)**	**Nallah water domestic effluent of ACC LTD., Colony & Ghugus village**
Date of Sampling **(XX/02/2017)**				**22**	**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
XI.	p,p DDE	µg/L	**250.0**	BDL	BDL	BDL
XII.	o,p DDE	µg/L	**30.0**	BDL	BDL	BDL
XIII.	p,p DDD	µg/L		BDL	BDL	BDL
XIV.	o,p DDD	µg/L		BDL	BDL	BDL
XV.	Alpha EBDLosulfan	µg/L	**10.0**	BDL	BDL	BDL
XVI.	Beta EBDLosulfan	µg/L		BDL	BDL	BDL
XVII.	EBDLosulfan Sulphate	µg/L	**5.0**	BDL	BDL	BDL
VIII.	Y HCH (LiBDLane)	µg/L	**1.0**	BDL	BDL	BDL
28.	Polynuclear aromatic hydrocarbons (as PAH)	mg/L	**0.2**	BDL	BDL	BDL
29.	Polychlorinated Biphenyls (PCB)	mg/L	**2.0**	BDL	BDL	BDL
30.	Zinc (as Zn)	mg/L	**5.0**	BDL	BDL	BDL
31.	Nickel (as Ni)	mg/L	**3.0**	0.032	0.021	0.022
32.	Copper (as Cu)	mg/L		BDL	BDL	BDL
33.	Hexavalent Chromium (as Cr6+)	mg/L	**0.1**	BDL	BDL	0.084

Location				**Wardha River Behind ACC Plant (Mungoli Coal Mine Road)**	**Nallah at Usgaon, Shengaon Road (Behind Gupta Energy Power Ltd)**	**Nallah water domestic effluent of ACC LTD., Colony & Ghugus village**
Date of Sampling **(XX/02/2017)**				**22**	**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
34.	Total Chromium (as Cr)	mg/L	**2.0**	0.032	0.031	0.033
35.	Total Arsenic (as As)	mg/L	**0.2**	BDL	BDL	0.01
36.	Lead (as Pb)	mg/L	**0.1**	0.11	0.094	0.11
37.	Cadmium (as Cd)	mg/L	**2.0**	BDL	BDL	BDL
38.	Mercury (as Hg)	mg/L	**0.01**	BDL	BDL	0.0009
39.	Manganese (as Mn)	mg/L	**2.0**	0.18	0.099	0.054
40.	Iron (as Fe)	mg/L	**3.0**	0.44	0.41	BDL
41.	Vanadium (as V)	mg/L	**0.2**	0.012	BDL	BDL
42.	Selenium (as Se)	mg/L	**0.05**	BDL	BDL	BDL
43.	Boron (as B)	mg/L		0.108	0.4	0.119
44.	Bioassay Test on fish	% survival	**90% survival after 96h in 100%effluent**	100%	100%	0%

Table No. V

Location				**Nallah Opposite Manidhari Industries, Plot No. c-2**	**Surface water taken from Gagangiri Village Bridge**	**Surface water taken from Dhanora Bridge**
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
1.	Colour	Hazen		75	8	5
2.	Smell	-		Disagreeable	Agreeable	Disagreeable
3.	pH	-	**5.5 -9.0**	7.4	7.9	8.1
4.	Oil & Grease	mg/L	**10.0**	BDL	BDL	BDL
5.	Suspended Solids	mg/L	**100.0**	52	BDL	55
6.	Dissolved Oxygen (%Saturation)	%		BDL	77	74
7.	Chemical Oxygen Demand	mg/L	**250.0**	300	16	44
8.	Biochemical Oxygen Demand (3 days,27^{o} C)	mg/L	**30.0**	97	4.2	12.0
9.	Electrical Conductivity (at 25^{o} C)	µmho/cm		8873	1309	1539
10.	Nitrite Nitrogen (as NO_2)	mg/L		0.02	0.02	0.053
11.	Nitrate Nitrogen (as NO_3)	mg/L	**10.0**	0.228	0.311	1.42

Location				**Nallah Opposite Manidhari Industries, Plot No. c-2**	**Surface water taken from Gagangiri Village Bridge**	**Surface water taken from Dhanora Bridge**
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
12.	(NO_2 + NO_3)-Nitrogen	mg/L	**5.0**	0.25	0.33	1.47
13.	Free Ammonia (as NH_3-N)	mg/L	**5.0**	4.23	1.21	0.50
14.	Total Residual Chlorine	mg/L	**1.0**	BDL	BDL	BDL
15.	Cyanide (as CN)	mg/L	**0.2**	0.003	BDL	BDL
16.	Fluoride (as F)	mg/L	**2.0**	0.487	0.481	0.199
17.	Sulphide (as S^{2-})	mg/L	**2.0**	0.08	0.16	0.08
18.	Dissolved Phosphate (as P)	mg/L	**5.0**	1.720	0.147	0.245
19.	Sodium Absorption Ratio	mg/L		7.53	3.03	6.04
20.	Total Coliforms	MPN Index/ 100 ml	**100.0**	>160000	5400	160000
21.	Faecal Coliforms	MPN Index/ 100 ml	**1000.0**	160000	1300	92000
22.	Total Phosphorous (as P)	mg/L	**1.0**	1.81	0.203	0.271

Location				**Nallah Opposite Manidhari Industries, Plot No. c-2**	**Surface water taken from Gagangiri Village Bridge**	**Surface water taken from Dhanora Bridge**
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
23.	Total Kjeldahl Nitrogen (as TKN)	mg/L	**100.0**	26.4	2.41	1.34
24.	Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	**5.0**	22.6	2.13	1.06
25.	Phenols (as C_6H_5OH)	mg/L	**3.0**	0.0054	BDL	BDL
26.	Surface Active Agents (as MBAS)	mg/L	**3.0**	0.53	BDL	BDL
27.	Organo Chlorine Pesticides					
I.	Alachlor	µg/L	**2.0**	BDL	BDL	BDL
II.	Atrazine	µg/L	**0.2**	BDL	BDL	BDL
III.	Aldrin	µg/L	**0.1**	BDL	BDL	BDL
IV.	Dieldrin	µg/L	**2.0**	BDL	BDL	BDL
V.	Alpha HCH	µg/L	**0.01**	BDL	BDL	BDL
VI.	Beta HCH	µg/L	**2.0**	BDL	BDL	BDL
VII.	Delta HCH	µg/L	**3.0**	BDL	BDL	BDL
VIII.	Butachlor	µg/L	**0.2**	BDL	BDL	BDL
IX.	p,p DDT	µg/L	**0.05**	BDL	BDL	BDL
X.	o,p DDT	µg/L	**100.0**	BDL	BDL	BDL

Location				**Nallah Opposite Manidhari Industries, Plot No. c-2**	**Surface water taken from Gagangiri Village Bridge**	**Surface water taken from Dhanora Bridge**
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
XI.	p,p DDE	µg/L	**250.0**	BDL	BDL	BDL
XII.	o,p DDE	µg/L	**30.0**	BDL	BDL	BDL
XIII.	p,p DDD	µg/L		BDL	BDL	BDL
XIV.	o,p DDD	µg/L		BDL	BDL	BDL
XV.	Alpha EBDLosulfan	µg/L	**10.0**	BDL	BDL	BDL
XVI.	Beta EBDLosulfan	µg/L		BDL	BDL	BDL
XVII.	EBDLosulfan Sulphate	µg/L	**5.0**	BDL	BDL	BDL
XVIII.	Y HCH (LiBDLane)	µg/L	**1.0**	BDL	BDL	BDL
28.	Polynuclear aromatic hydrocarbons (as PAH)	mg/L	**0.2**	BDL	BDL	BDL
29.	Polychlorinated Biphenyls (PCB)	mg/L	**2.0**	BDL	BDL	BDL
30.	Zinc (as Zn)	mg/L	**5.0**	BDL	BDL	BDL
31.	Nickel (as Ni)	mg/L	**3.0**	0.023	0.022	0.032
32.	Copper (as Cu)	mg/L		0.026	BDL	BDL
33.	Hexavalent Chromium (as Cr6+)	mg/L	**0.1**	BDL	BDL	BDL

Location				**Nallah Opposite Manidhari Industries, Plot No. c-2**	**Surface water taken from Gagangiri Village Bridge**	**Surface water taken from Dhanora Bridge**
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
34.	Total Chromium (as Cr)	mg/L	**2.0**	0.028	0.094	0.033
35.	Total Arsenic (as As)	mg/L	**0.2**	0.01	BDL	BDL
36.	Lead (as Pb)	mg/L	**0.1**	0.085	0.1	0.11
37.	Cadmium (as Cd)	mg/L	**2.0**	BDL	BDL	BDL
38.	Mercury (as Hg)	mg/L	**0.01**	0.0007	BDL	BDL
39.	Manganese (as Mn)	mg/L	**2.0**	0.16	0.053	0.69
40.	Iron (as Fe)	mg/L	**3.0**	0.28	BDL	BDL
41.	Vanadium (as V)	mg/L	**0.2**	BDL	BDL	0.024
42.	Selenium (as Se)	mg/L	**0.05**	0.01	BDL	BDL
43.	Boron (as B)	mg/L		0.291	0.129	0.126
44.	Bioassay Test on fish	% survival	**90% survival after 96h in 100%effluent**	100%	100%	100%

Table No. VI

Location				**Multi Organic Ltd.**	**Super Hygienic (Bio Medical waste disposal unit)**	**Multiorganics Pvt. Ltd.**
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
1.	Colour	Hazen		3	20	50
2.	Smell	-		Disagreeable	Disagreeable	Disagreeable
3.	pH	-	**5.5 -9.0**	8.2	7.3	7.4
4.	Oil & Grease	mg/L	**10.0**	BDL	BDL	BDL
5.	Suspended Solids	mg/L	**100.0**	BDL	23	19
6.	Dissolved Oxygen (%Saturation)	%		90	10.0	38
7.	Chemical Oxygen Demand	mg/L	**250.0**	8	96	28
8.	Biochemical Oxygen Demand (3 days,27^{o} C)	mg/L	**30.0**	2.0	29	6.8
9.	Electrical Conductivity (at 25^{o} C)	µmho/cm		89	2113	1562
10.	Nitrite Nitrogen (as NO_2)	mg/L		0.018	0.006	0.016
11.	Nitrate Nitrogen (as NO_3)	mg/L	**10.0**	0.84	0.309	0.325

Location				**Multi Organic Ltd.**	**Super Hygienic (Bio Medical waste disposal unit)**	**Multiorganics Pvt. Ltd.**
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
12.	(NO_2 + NO_3)-Nitrogen	mg/L	**5.0**	0.86	0.32	0.34
13.	Free Ammonia (as NH_3-N)	mg/L	**5.0**	BDL	3.380	1.68
14.	Total Residual Chlorine	mg/L	**1.0**	BDL	BDL	BDL
15.	Cyanide (as CN)	mg/L	**0.2**	BDL	0.005	BDL
16.	Fluoride (as F)	mg/L	**2.0**	0.224	1.38	0.82
17.	Sulphide (as S^{2-})	mg/L	**2.0**	BDL	0.08	0.16
18.	Dissolved Phosphate (as P)	mg/L	**5.0**	0.031	0.155	0.022
19.	Sodium Absorption Ratio	mg/L		0.615	2.36	9.77
20.	Total Coliforms	MPN Index/ 100 ml	**100.0**	230	230	230
21.	Faecal Coliforms	MPN Index/ 100 ml	**1000.0**	78	130	78
22.	Total Phosphorous (as P)	mg/L	**1.0**	0.037	0.181	0.034

Location				**Multi Organic Ltd.**	**Super Hygienic (Bio Medical waste disposal unit)**	**Multiorganics Pvt. Ltd.**
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
23.	Total Kjeldahl Nitrogen (as TKN)	mg/L	**100.0**	0.56	58.7	3.19
24.	Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	**5.0**	BDL	45.8	2.98
25.	Phenols (as C_6H_5OH)	mg/L	**3.0**	BDL	0.03	BDL
26.	Surface Active Agents (as MBAS)	mg/L	**3.0**	BDL	BDL	BDL
27.	Organo Chlorine Pesticides					
I.	Alachlor	µg/L	**2.0**	BDL	BDL	BDL
II.	Atrazine	µg/L	**0.2**	BDL	BDL	BDL
III.	Aldrin	µg/L	**0.1**	BDL	BDL	BDL
IV.	Dieldrin	µg/L	**2.0**	BDL	BDL	BDL
V.	Alpha HCH	µg/L	**0.01**	BDL	BDL	BDL
VI.	Beta HCH	µg/L	**2.0**	BDL	BDL	BDL
VII.	Delta HCH	µg/L	**3.0**	BDL	BDL	BDL
VIII.	Butachlor	µg/L	**0.2**	BDL	BDL	BDL
IX.	p,p DDT	µg/L	**0.05**	BDL	BDL	BDL
X.	o,p DDT	µg/L	**100.0**	BDL	BDL	BDL
XI.	p,p DDE	µg/L	**250.0**	BDL	BDL	BDL

Location				**Multi Organic Ltd.**	**Super Hygienic (Bio Medical waste disposal unit)**	**Multiorganics Pvt. Ltd.**
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
XII.	o,p DDE	µg/L	**30.0**	BDL	BDL	BDL
XIII.	p,p DDD	µg/L		BDL	BDL	BDL
XIV.	o,p DDD	µg/L		BDL	BDL	BDL
XV.	Alpha EBDLosulfan	µg/L	**10.0**	BDL	BDL	BDL
XVI.	Beta EBDLosulfan	µg/L		BDL	BDL	BDL
XVII.	EBDLosulfan Sulphate	µg/L	**5.0**	BDL	BDL	BDL
VIII.	Y HCH (LiBDLane)	µg/L	**1.0**	BDL	BDL	BDL
28.	Polynuclear aromatic hydrocarbons (as PAH)	mg/L	**0.2**	BDL	BDL	BDL
29.	Polychlorinated Biphenyls (PCB)	mg/L	**2.0**	BDL	BDL	BDL
30.	Zinc (as Zn)	mg/L	**5.0**	BDL	BDL	BDL
31.	Nickel (as Ni)	mg/L	**3.0**	0.024	0.032	0.021
32.	Copper (as Cu)	mg/L		BDL	BDL	BDL
33.	Hexavalent Chromium (as Cr6+)	mg/L	**0.1**	BDL	BDL	BDL
34.	Total Chromium (as Cr)	mg/L	**2.0**	BDL	0.031	0.027

Location				**Multi Organic Ltd.**	**Super Hygienic (Bio Medical waste disposal unit)**	**Multiorganics Pvt. Ltd.**
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
35.	Total Arsenic (as As)	mg/L	**0.2**	BDL	BDL	BDL
36.	Lead (as Pb)	mg/L	**0.1**	0.11	0.11	0.1
37.	Cadmium (as Cd)	mg/L	**2.0**	BDL	BDL	BDL
38.	Mercury (as Hg)	mg/L	**0.01**	BDL	BDL	BDL
39.	Manganese (as Mn)	mg/L	**2.0**	BDL	0.39	0.83
40.	Iron (as Fe)	mg/L	**3.0**	0.076	1.24	3.64
41.	Vanadium (as V)	mg/L	**0.2**	BDL	BDL	BDL
42.	Selenium (as Se)	mg/L	**0.05**	BDL	BDL	BDL
43.	Boron (as B)	mg/L		0.214	0.225	0.154
44.	Bioassay Test on fish	% survival	**90% survival after 96h in 100%effluent**	100%	0%	100%

Table No. VII

Location				**Super Hygienic (BMW disposal Unit)**	**HPCL**
Date of Sampling **(XX/02/2017)**				**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**	
1.	Colour	Hazen		30	15
2.	Smell	-		Disagreeable	Disagreeable
3.	pH	-	**5.5 -9.0**	7.0	6.5
4.	Oil & Grease	mg/L	**10.0**	BDL	BDL
5.	Suspended Solids	mg/L	**100.0**	12	139
6.	Dissolved Oxygen (%Saturation)	%		61.2	55.5
7.	Chemical Oxygen Demand	mg/L	**250.0**	92	76
8.	Biochemical Oxygen Demand (3 days,27^{o} C)	mg/L	**30.0**	28	22
9.	Electrical Conductivity (at 25^{o} C)	µmho/cm		1602	4371
10.	Nitrite Nitrogen (as NO_2)	mg/L		BDL	BDL
11.	Nitrate Nitrogen (as NO_3)	mg/L	**10.0**	0.145	0.273
12.	(NO_2 + NO_3)-Nitrogen	mg/L	**5.0**	0.15	0.27
13.	Free Ammonia (as NH_3-N)	mg/L	**5.0**	0.231	BDL
14.	Total Residual Chlorine	mg/L	**1.0**	0.055	BDL

Location				**Super Hygienic (BMW disposal Unit)**	**HPCL**
Date of Sampling **(XX/02/2017)**				**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**	
15.	Cyanide (as CN)	mg/L	**0.2**	0.001	BDL
16.	Fluoride (as F)	mg/L	**2.0**	0.288	0.545
17.	Sulphide (as S^{2-})	mg/L	**2.0**	0.08	1.36
18.	Dissolved Phosphate (as P)	mg/L	**5.0**	0.062	0.223
19.	Sodium Absorption Ratio	mg/L		3.59	1.60
20.	Total Coliforms	MPN Index/ 100 ml	**100.0**	16000	9200
21.	Faecal Coliforms	MPN Index/ 100 ml	**1000.0**	1700	1100
22.	Total Phosphorous (as P)	mg/L	**1.0**	0.322	0.455
23.	Total Kjeldahl Nitrogen (as TKN)	mg/L	**100.0**	1.23	35.2
24.	Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	**5.0**	0.841	27.8
25.	Phenols (as C_6H_5OH)	mg/L	**3.0**	0.0172	0.003
26.	Surface Active Agents (as MBAS)	mg/L	**3.0**	BDL	BDL
27.	Organo Chlorine Pesticides				
I.	Alachlor	µg/L	**2.0**	BDL	BDL

Location				Super Hygienic (BMW disposal Unit)	HPCL
Date of Sampling **(XX/02/2017)**				**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**	
II.	Atrazine	µg/L	**0.2**	BDL	BDL
III.	Aldrin	µg/L	**0.1**	BDL	BDL
IV.	Dieldrin	µg/L	**2.0**	BDL	BDL
V.	Alpha HCH	µg/L	**0.01**	BDL	BDL
VI.	Beta HCH	µg/L	**2.0**	BDL	BDL
VII.	Delta HCH	µg/L	**3.0**	BDL	BDL
VIII.	Butachlor	µg/L	**0.2**	BDL	BDL
IX.	p,p DDT	µg/L	**0.05**	BDL	BDL
X.	o,p DDT	µg/L	**100.0**	BDL	BDL
XI.	p,p DDE	µg/L	**250.0**	BDL	BDL
XII.	o,p DDE	µg/L	**30.0**	BDL	BDL
XIII.	p,p DDD	µg/L		BDL	BDL
XIV.	o,p DDD	µg/L		BDL	BDL
XV.	Alpha EBDLosulfan	µg/L	**10.0**	BDL	BDL
XVI.	Beta EBDLosulfan	µg/L		BDL	BDL
XVII.	EBDLosulfan Sulphate	µg/L	**5.0**	BDL	BDL
(VIII.	Y HCH (LiBDLane)	µg/L	**1.0**	BDL	BDL
28.	Polynuclear aromatic hydrocarbons (as PAH)	mg/L	**0.2**	BDL	BDL
29.	Polychlorinated Biphenyls (PCB)	mg/L	**2.0**	BDL	BDL
30.	Zinc (as Zn)	mg/L	**5.0**	BDL	BDL
31.	Nickel (as Ni)	mg/L	**3.0**	BDL	0.026

Location				**Super Hygienic (BMW disposal Unit)**	**HPCL**
Date of Sampling **(XX/02/2017)**				**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**	
32.	Copper (as Cu)	mg/L		BDL	BDL
33.	Hexavalent Chromium (as Cr6+)	mg/L	**0.1**	BDL	BDL
34.	Total Chromium (as Cr)	mg/L	**2.0**	0.033	0.027
35.	Total Arsenic (as As)	mg/L	**0.2**	BDL	BDL
36.	Lead (as Pb)	mg/L	**0.1**	0.1	0.086
37.	Cadmium (as Cd)	mg/L	**2.0**	BDL	0.002
38.	Mercury (as Hg)	mg/L	**0.01**	BDL	BDL
39.	Manganese (as Mn)	mg/L	**2.0**	0.24	0.3
40.	Iron (as Fe)	mg/L	**3.0**	BDL	0.26
41.	Vanadium (as V)	mg/L	**0.2**	BDL	BDL
42.	Selenium (as Se)	mg/L	**0.05**	BDL	BDL
43.	Boron (as B)	mg/L		0.159	0.217
44.	Bioassay Test on fish	% survival	**90% survival after 96h in 100%effluent**	100%	100%

Table No. VIII

Location				**BILT RCC**	**Bhagirathi Nallah Bridge, Gondpipri Road**	**Wardha River**
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
1.	Colour	Hazen		3	20	3
2.	Smell	-		Agreeable	Disagreeable	Disagreeable
3.	pH	-	**5.5 -9.0**	8.9	7.2	7.8
4.	Oil & Grease	mg/L	**10.0**	BDL	BDL	BDL
5.	Suspended Solids	mg/L	**100.0**	6	28	11
6.	Dissolved Oxygen (%Saturation)	%		89	18.1	82.8
7.	Chemical Oxygen Demand	mg/L	**250.0**	12	120	8
8.	Biochemical Oxygen Demand (3 days,27^{o} C)	mg/L	**30.0**	2.9	35	2.1
9.	Electrical Conductivity (at 25^{o} C)	µmho/cm		577	2479	1536
10.	Nitrite Nitrogen (as NO_2)	mg/L		BDL	0.002	0.004
11.	Nitrate Nitrogen (as NO_3)	mg/L	**10.0**	0.481	0.16	0.850
12.	(NO_2 + NO_3)-Nitrogen	mg/L	**5.0**	0.48	0.16	0.85

Location				**BILT RCC**	**Bhagirathi Nallah Bridge, Gondpipri Road**	**Wardha River**
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
13.	Free Ammonia (as NH_3-N)	mg/L	**5.0**	BDL	0.7	0.414
14.	Total Residual Chlorine	mg/L	**1.0**	BDL	0.180	BDL
15.	Cyanide (as CN)	mg/L	**0.2**	BDL	BDL	BDL
16.	Fluoride (as F)	mg/L	**2.0**	0.276	0.218	0.372
17.	Sulphide (as S^{2-})	mg/L	**2.0**	BDL	0.08	BDL
18.	Dissolved Phosphate (as P)	mg/L	**5.0**	0.088	0.198	0.215
19.	Sodium Absorption Ratio	mg/L		1.35	4.89	0.983
20.	Total Coliforms	MPN Index/ 100 ml	**100.0**	170	9200	1100
21.	Faecal Coliforms	MPN Index/ 100 ml	**1000.0**	45	2200	170
22.	Total Phosphorous (as P)	mg/L	**1.0**	0.133	0.26	0.268
23.	Total Kjeldahl Nitrogen (as TKN)	mg/L	**100.0**	0.728	1.68	2.0

Location				BILT RCC	Bhagirathi Nallah Bridge, Gondpipri Road	Wardha River
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
24.	Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	**5.0**	BDL	0.962	1.68
25.	Phenols (as C_6H_5OH)	mg/L	**3.0**	BDL	BDL	BDL
26.	Surface Active Agents (as MBAS)	mg/L	**3.0**	BDL	BDL	BDL
27.	Organo Chlorine Pesticides					
I.	Alachlor	µg/L	**2.0**	BDL	BDL	BDL
II.	Atrazine	µg/L	**0.2**	BDL	BDL	BDL
III.	Aldrin	µg/L	**0.1**	BDL	BDL	BDL
IV.	Dieldrin	µg/L	**2.0**	BDL	BDL	BDL
V.	Alpha HCH	µg/L	**0.01**	BDL	BDL	BDL
VI.	Beta HCH	µg/L	**2.0**	BDL	BDL	BDL
VII.	Delta HCH	µg/L	**3.0**	BDL	BDL	BDL
VIII.	Butachlor	µg/L	**0.2**	BDL	BDL	BDL
IX.	p,p DDT	µg/L	**0.05**	BDL	BDL	BDL
X.	o,p DDT	µg/L	**100.0**	BDL	BDL	BDL
XI.	p,p DDE	µg/L	**250.0**	BDL	BDL	BDL
XII.	o,p DDE	µg/L	**30.0**	BDL	BDL	BDL
XIII.	p,p DDD	µg/L		BDL	BDL	BDL
XIV.	o,p DDD	µg/L		BDL	BDL	BDL

Location				BILT RCC	Bhagirathi Nallah Bridge, Gondpipri Road	Wardha River
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
XV.	Alpha EBDLosulfan	µg/L	**10.0**	BDL	0.13	BDL
XVI.	Beta EBDLosulfan	µg/L		BDL	BDL	BDL
XVII.	EBDLosulfan Sulphate	µg/L	**5.0**	BDL	BDL	BDL
VIII.	Y HCH (LiBDLane)	µg/L	**1.0**	BDL	BDL	BDL
28.	Polynuclear aromatic hydrocarbons (as PAH)	mg/L	**0.2**	BDL	BDL	BDL
29.	Polychlorinated Biphenyls (PCB)	mg/L	**2.0**	BDL	BDL	BDL
30.	Zinc (as Zn)	mg/L	**5.0**	BDL	0.084	BDL
31.	Nickel (as Ni)	mg/L	**3.0**	0.023	BDL	0.22
32.	Copper (as Cu)	mg/L		BDL	BDL	BDL
33.	Hexavalent Chromium (as Cr6+)	mg/L	**0.1**	BDL	BDL	BDL
34.	Total Chromium (as Cr)	mg/L	**2.0**	0.032	0.035	0.03
35.	Total Arsenic (as As)	mg/L	**0.2**	BDL	BDL	BDL
36.	Lead (as Pb)	mg/L	**0.1**	0.1	0.1	0.098
37.	Cadmium (as Cd)	mg/L	**2.0**	0.002	BDL	BDL

Location				**BILT RCC**	**Bhagirathi Nallah Bridge, Gondpipri Road**	**Wardha River**
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
38.	Mercury (as Hg)	mg/L	**0.01**	BDL	BDL	BDL
39.	Manganese (as Mn)	mg/L	**2.0**	BDL	0.4	0.39
40.	Iron (as Fe)	mg/L	**3.0**	BDL	BDL	BDL
41.	Vanadium (as V)	mg/L	**0.2**	0.012	0.014	BDL
42.	Selenium (as Se)	mg/L	**0.05**	BDL	BDL	BDL
43.	Boron (as B)	mg/L		0.162	0.187	0.242
44.	Bioassay Test on fish	% survival	**90% survival after 96h in 100%effluent**	0%	100%	100%

Table No. IX

Location				**Nallah Near MSW Municipal Corporation**	**Ballarpur Open Cast Mine Discharge**	**Nallah of Municipal Council Ballarpur, Besides HP Petrol Pump**
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
1.	Colour	Hazen		10	3	10
2.	Smell	-		Disagreeable	Disagreeable	Disagreeable

Location				**Nallah Near MSW Municipal Corporation**	**Ballarpur Open Cast Mine Discharge**	**Nallah of Municipal Council Ballarpur, Besides HP Petrol Pump**
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
3.	pH	-	**5.5 -9.0**	7.6	7.8	7.6
4.	Oil & Grease	mg/L	**10.0**	BDL	N.D.	N.D.
5.	Suspended Solids	mg/L	**100.0**	113	11	113
6.	Dissolved Oxygen (%Saturation)	%		0.00	82.8	0.00
7.	Chemical Oxygen Demand	mg/L	**250.0**	156	8	156
8.	Biochemical Oxygen Demand (3 days,27^{o} C)	mg/L	**30.0**	48	2.1	48
9.	Electrical Conductivity (at 25^{o} C)	µmho/cm		908	1536	908
10.	Nitrite Nitrogen (as NO_2)	mg/L		0.005	0.004	0.005
11.	Nitrate Nitrogen (as NO_3)	mg/L	**10.0**	0.081	0.850	0.081
12.	(NO_2 + NO_3)-Nitrogen	mg/L	**5.0**	0.09	0.85	0.09
13.	Free Ammonia (as NH_3-N)	mg/L	**5.0**	0.3	0.414	0.3

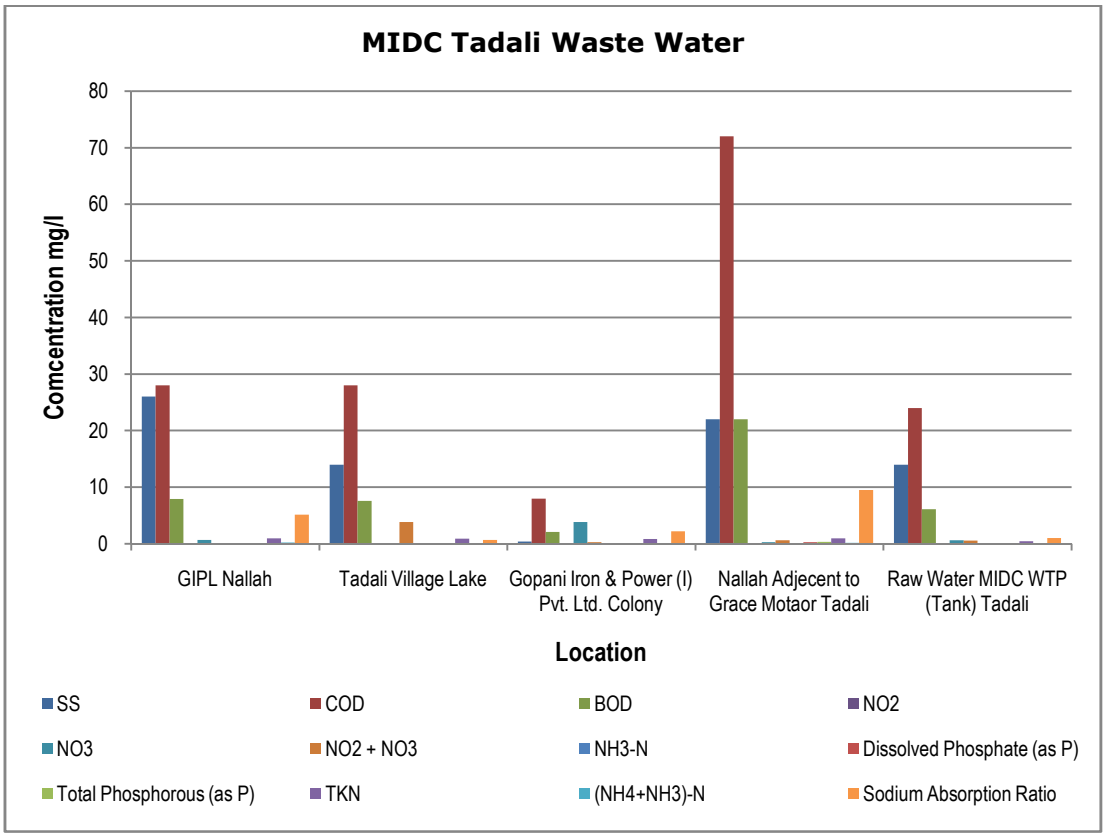
Location				**Nallah Near MSW Municipal Corporation**	**Ballarpur Open Cast Mine Discharge**	**Nallah of Municipal Council Ballarpur, Besides HP Petrol Pump**
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
14.	Total Residual Chlorine	mg/L	**1.0**	0.171	<0.05	0.171
15.	Cyanide (as CN)	mg/L	**0.2**	BDL	N.D.	<0.001
16.	Fluoride (as F)	mg/L	**2.0**	0.474	0.372	0.474
17.	Sulphide (as S^{2-})	mg/L	**2.0**	0.88	N.D.	0.88
18.	Dissolved Phosphate (as P)	mg/L	**5.0**	0.658	0.215	0.658
19.	Sodium Absorption Ratio	mg/L		2.13	0.983	2.13
20.	Total Coliforms	MPN Index/ 100 ml	**100.0**	16000	1100	16000
21.	Faecal Coliforms	MPN Index/ 100 ml	**1000.0**	2800	170	2800
22.	Total Phosphorous (as P)	mg/L	**1.0**	1.828	0.268	1.828
23.	Total Kjeldahl Nitrogen (as TKN)	mg/L	**100.0**	2.240	2.0	2.240
24.	Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	**5.0**	0.579	1.68	0.579

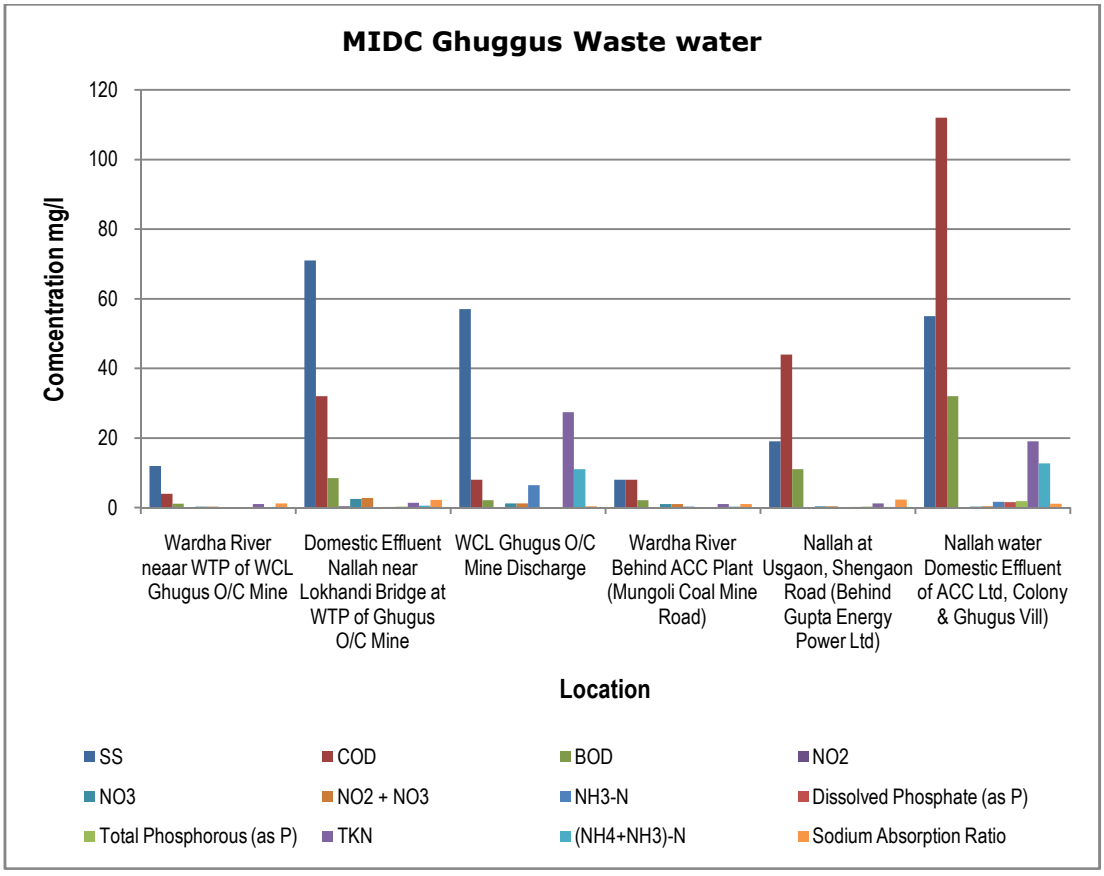
Location				**Nallah Near MSW Municipal Corporation**	**Ballarpur Open Cast Mine Discharge**	**Nallah of Municipal Council Ballarpur, Besides HP Petrol Pump**
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
25.	Phenols (as C_6H_5OH)	mg/L	**3.0**	0.0036	N.D.	0.0036
26.	Surface Active Agents (as MBAS)	mg/L	**3.0**	1.88	N.D.	1.88
27.	Organo Chlorine Pesticides					
I.	Alachlor	µg/L	**2.0**	BDL	<0.01	<0.01
II.	Atrazine	µg/L	**0.2**	BDL	<0.01	<0.01
III.	Aldrin	µg/L	**0.1**	BDL	<0.01	<0.01
IV.	Dieldrin	µg/L	**2.0**	BDL	<0.01	<0.01
V.	Alpha HCH	µg/L	**0.01**	BDL	<0.01	<0.01
VI.	Beta HCH	µg/L	**2.0**	BDL	<0.01	<0.01
VII.	Delta HCH	µg/L	**3.0**	BDL	<0.01	<0.01
VIII.	Butachlor	µg/L	**0.2**	BDL	<0.01	<0.01
IX.	p,p DDT	µg/L	**0.05**	BDL	<0.01	<0.01
X.	o,p DDT	µg/L	**100.0**	BDL	<0.01	<0.01
XI.	p,p DDE	µg/L	**250.0**	BDL	<0.01	<0.01
XII.	o,p DDE	µg/L	**30.0**	BDL	<0.01	<0.01
XIII.	p,p DDD	µg/L		BDL	<0.01	<0.01
XIV.	o,p DDD	µg/L		BDL	<0.01	<0.01
XV.	Alpha EBDLosulfan	µg/L	**10.0**	BDL	<0.01	<0.01

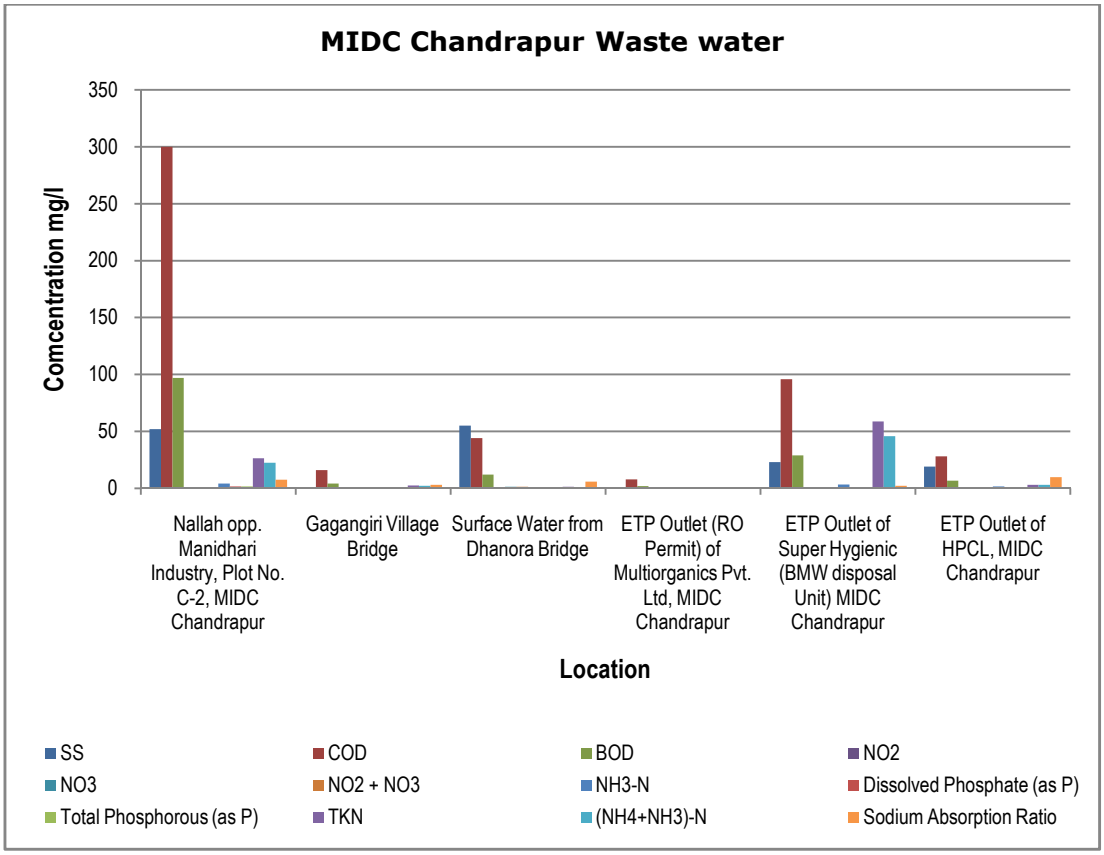
Location				**Nallah Near MSW Municipal Corporation**	**Ballarpur Open Cast Mine Discharge**	**Nallah of Municipal Council Ballarpur, Besides HP Petrol Pump**
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
XVI.	Beta EBDLosulfan	µg/L		BDL	<0.01	<0.01
XVII.	EBDLosulfan Sulphate	µg/L	**5.0**	BDL	<0.01	<0.01
VIII.	Y HCH (LiBDLane)	µg/L	**1.0**	BDL	<0.01	<0.01
28.	Polynuclear aromatic hydrocarbons (as PAH)	mg/L	**0.2**	BDL	<0.1	<0.1
29.	Polychlorinated Biphenyls (PCB)	mg/L	**2.0**	BDL	<0.07	<0.07
30.	Zinc (as Zn)	mg/L	**5.0**	BDL	<0.05	<0.05
31.	Nickel (as Ni)	mg/L	**3.0**	0.024	0.22	0.024
32.	Copper (as Cu)	mg/L		BDL	<0.02	<0.02
33.	Hexavalent Chromium (as Cr6+)	mg/L	**0.1**	BDL	<0.02	N.D.
34.	Total Chromium (as Cr)	mg/L	**2.0**	0.036	0.03	0.036
35.	Total Arsenic (as As)	mg/L	**0.2**	BDL	N.D.	N.D.
36.	Lead (as Pb)	mg/L	**0.1**	0.11	0.098	0.11
37.	Cadmium (as Cd)	mg/L	**2.0**	BDL	<0.002	<0.002

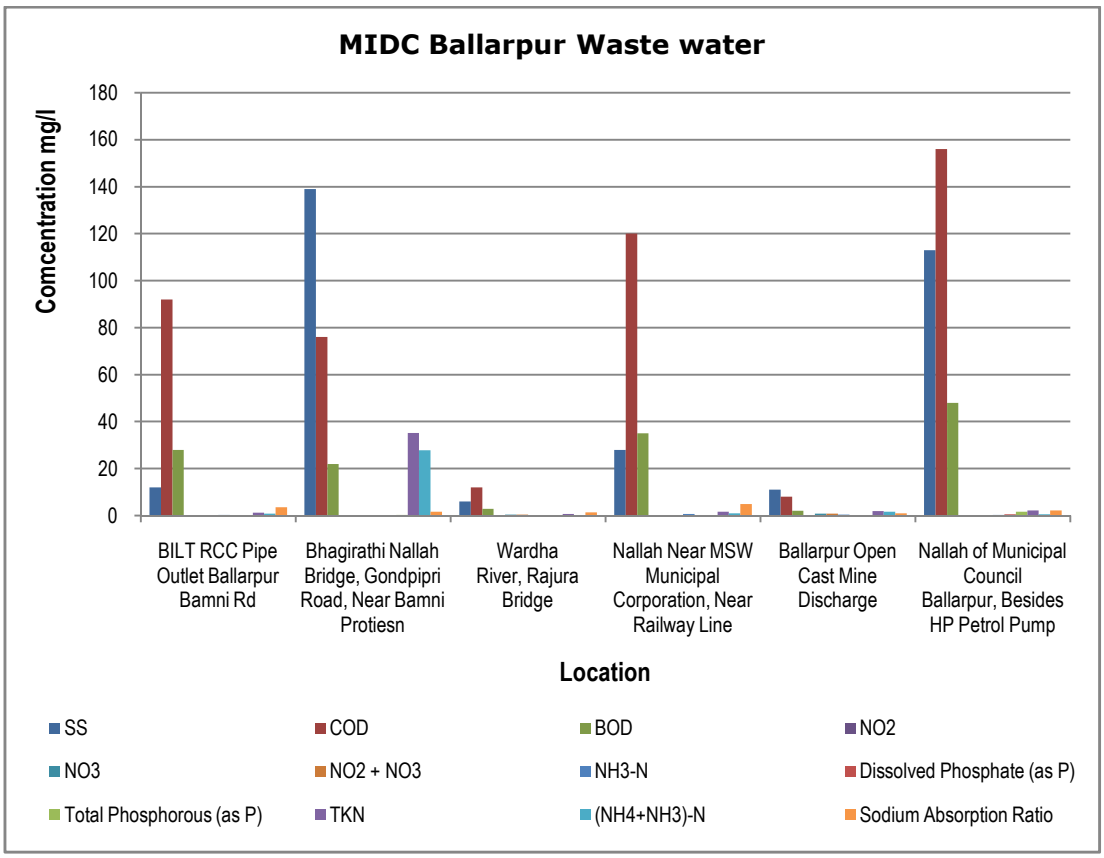
Location				**Nallah Near MSW Municipal Corporation**	**Ballarpur Open Cast Mine Discharge**	**Nallah of Municipal Council Ballarpur, Besides HP Petrol Pump**
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
38.	Mercury (as Hg)	mg/L	**0.01**	BDL	N.D.	<0.0005
39.	Manganese (as Mn)	mg/L	**2.0**	0.086	0.39	0.086
40.	Iron (as Fe)	mg/L	**3.0**	0.465	<0.06	0.465
41.	Vanadium (as V)	mg/L	**0.2**	BDL	<0.01	<0.01
42.	Selenium (as Se)	mg/L	**0.05**	BDL	N.D.	N.D.
43.	Boron (as B)	mg/L		0.225	0.242	0.225
44.	Bioassay Test on fish	% survival	**90% survival after 96h in 100% effluent**	0%	100%	0%

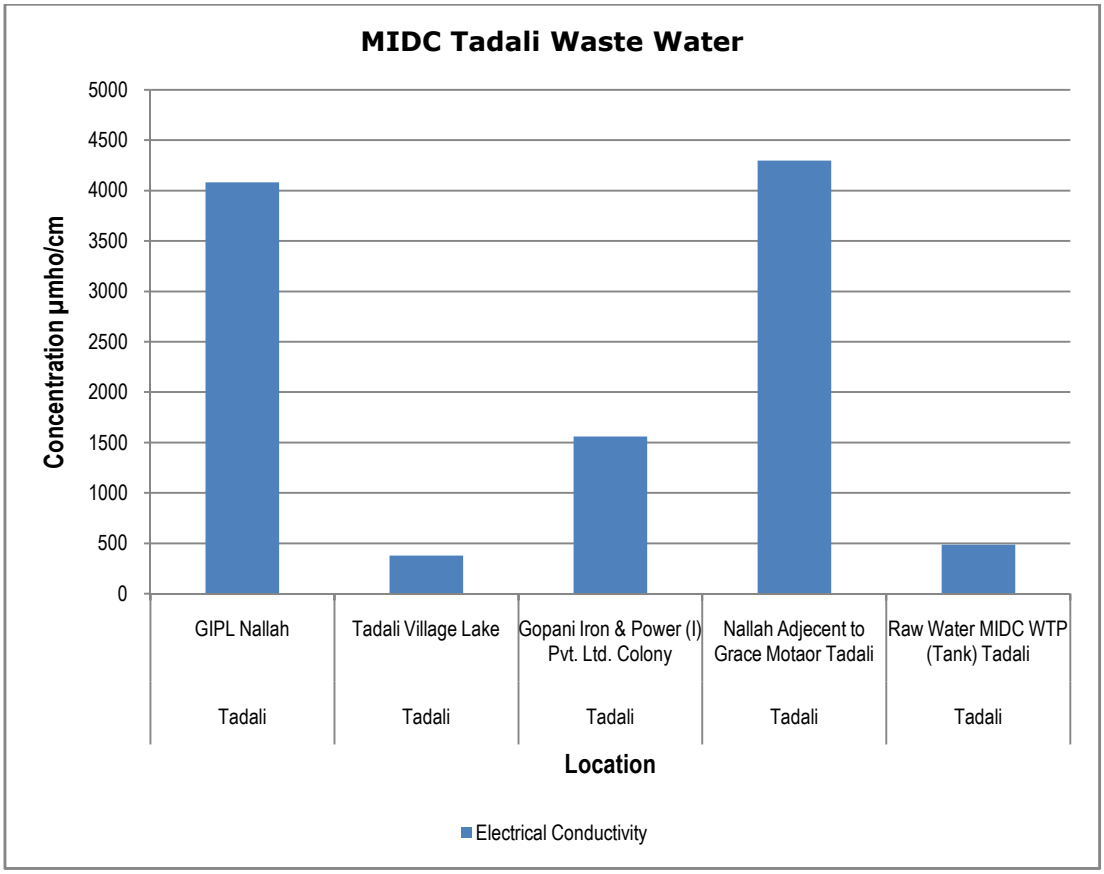
Graphs: Water/Waste Water Quality Monitoring for Chandrapur:

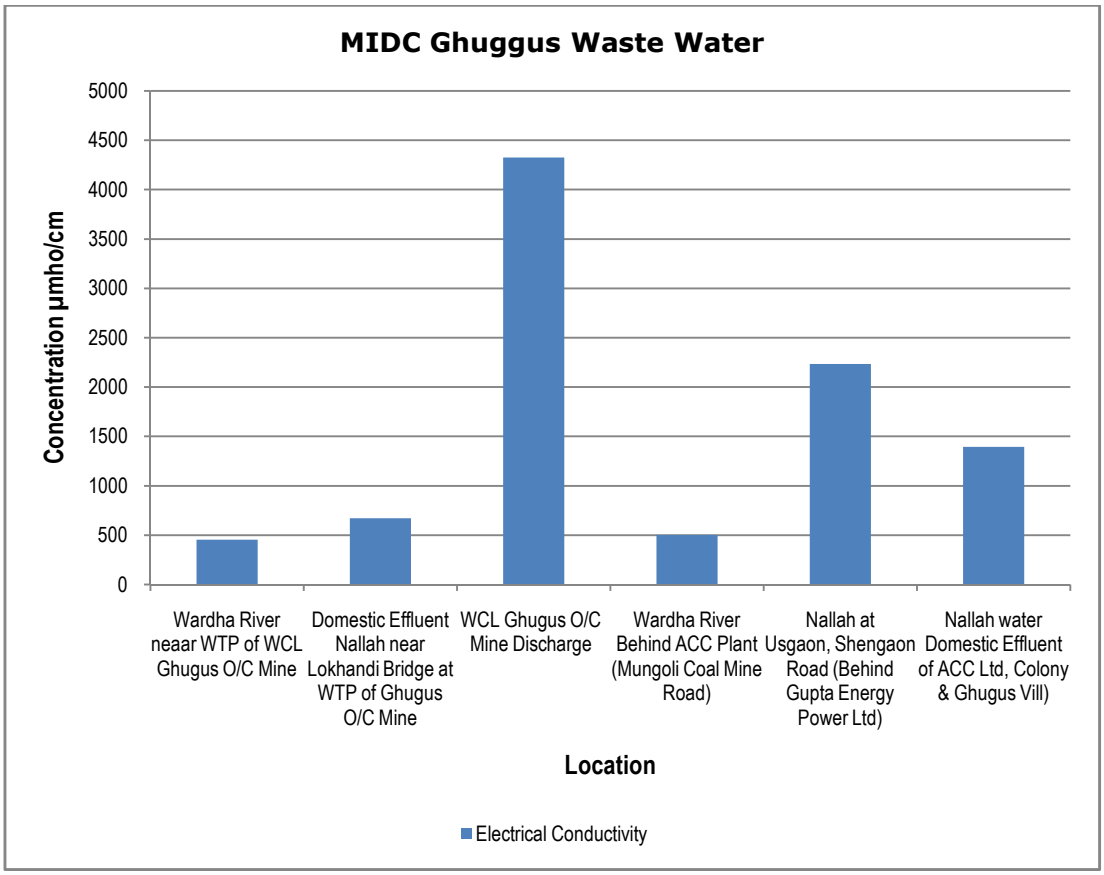


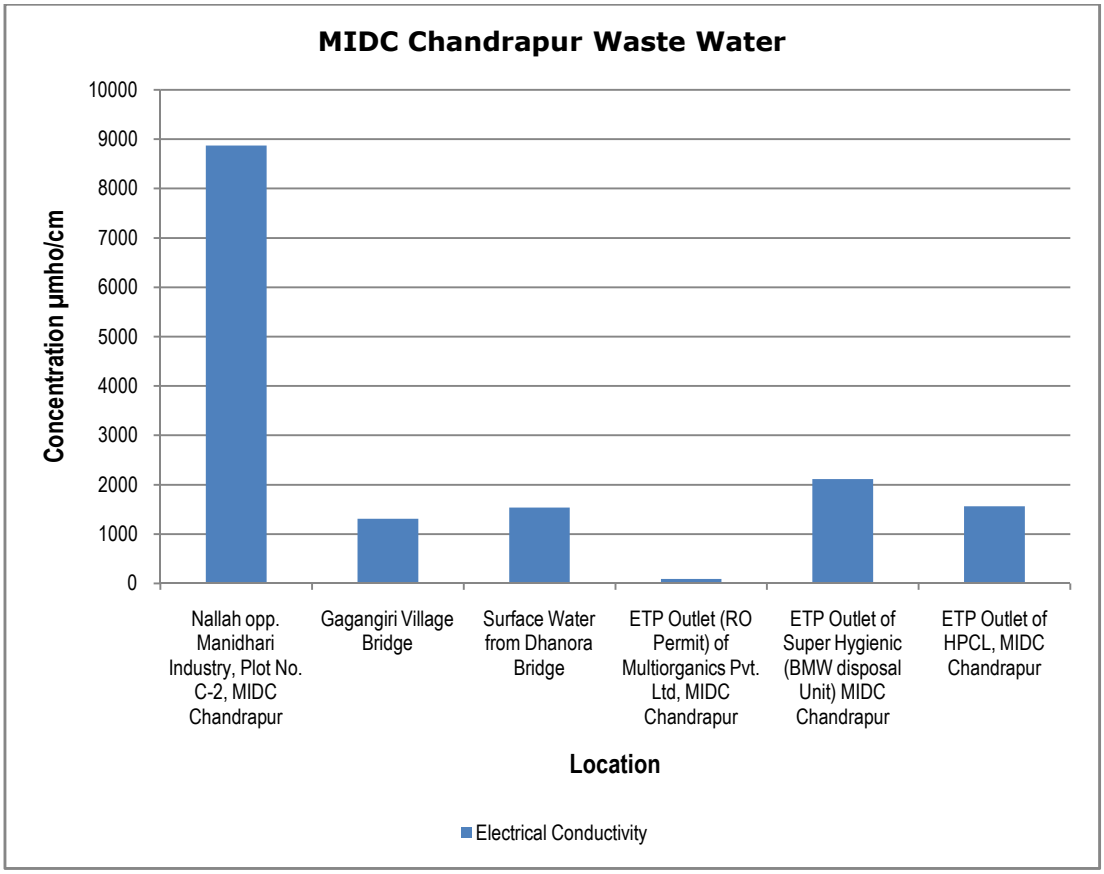


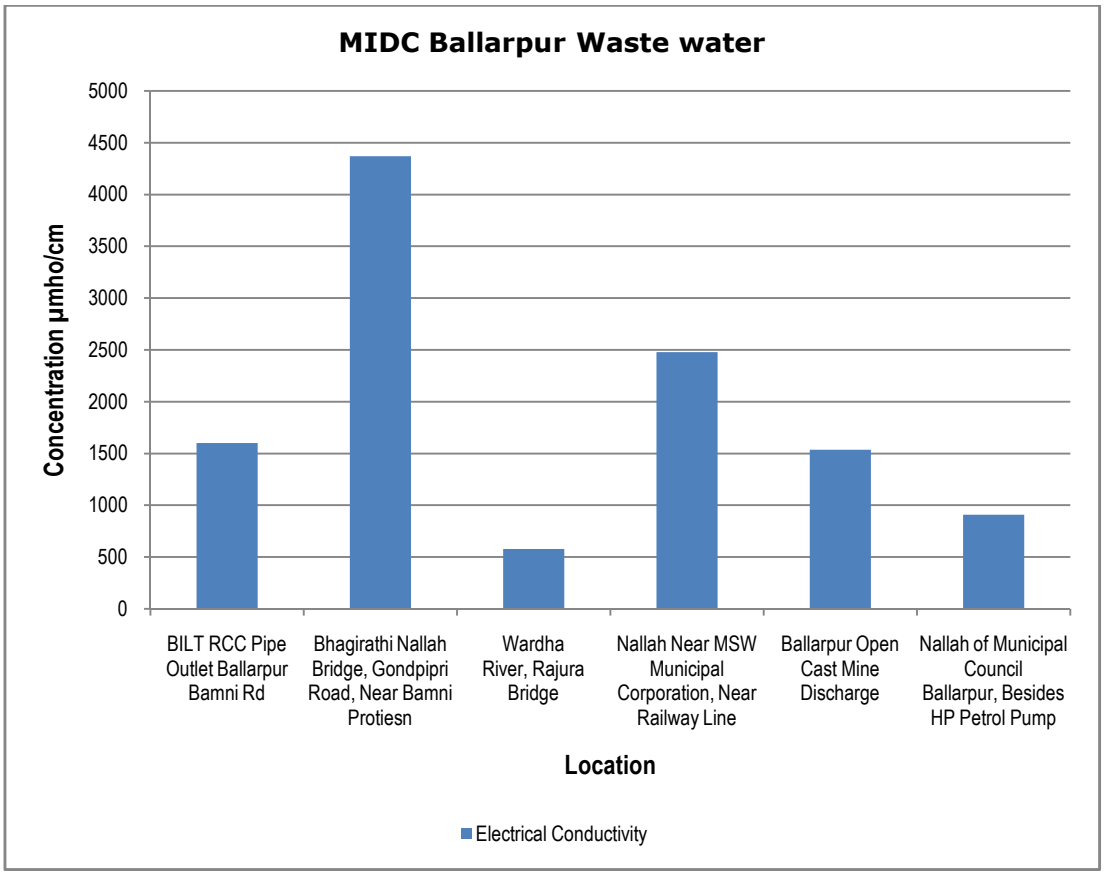

MIDC Chandrapur Waste water
Comcentration mg/l
350
300
250
200
150
100
50
0
Nallah opp. Manidhari Industry, Plot No. C-2, MIDC Chandrapur
Gagangiri Village Bridge
Surface Water from Dhanora Bridge
ETP Outlet (RO Permit) of Multiorganics Pvt. Ltd, MIDC Chandrapur
ETP Outlet of Super Hygienic (BMW disposal Unit) MIDC Chandrapur
ETP Outlet of HPCL, MIDC Chandrapur
Location
SS
COD
BOD
NO2
NO3
NO2 + NO3
NH3-N
Dissolved Phosphate (as P)
Total Phosphorous (as P)
TKN
(NH4+NH3)-N
Sodium Absorption Ratio

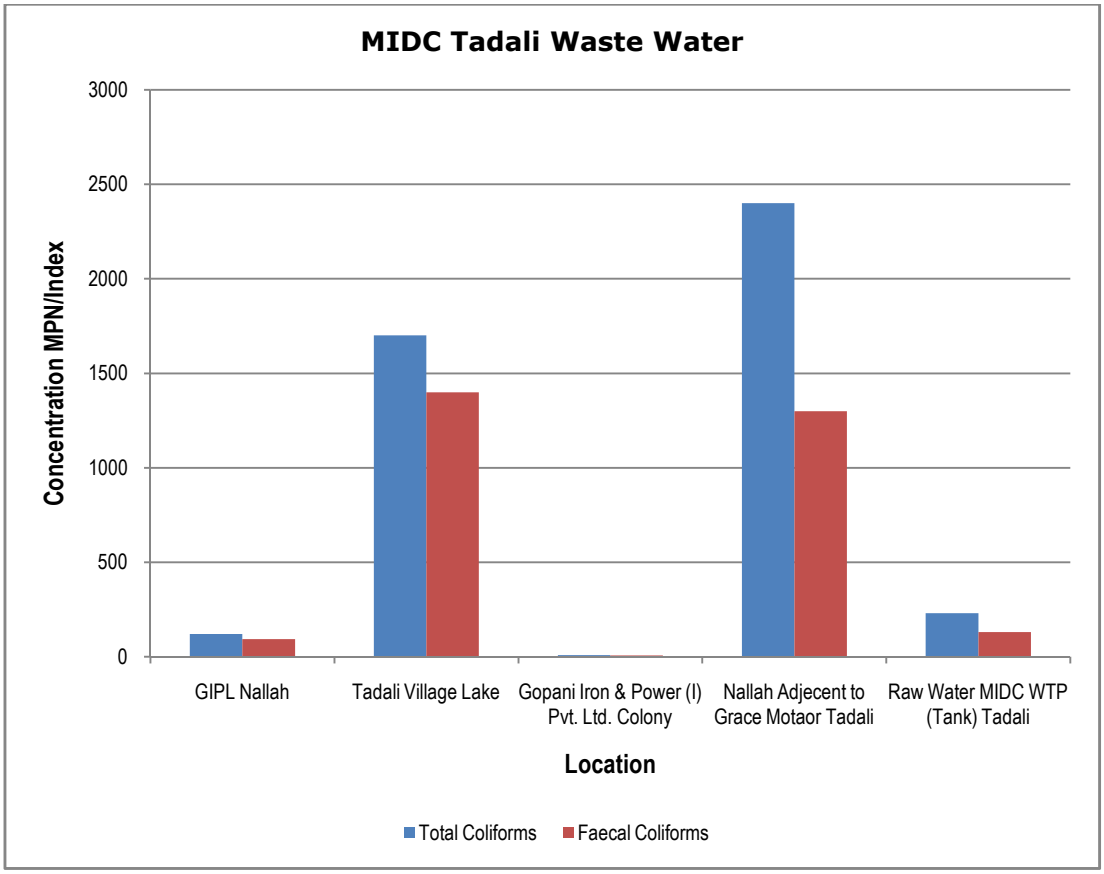

MIDC Ballarpur Waste water
Comcentration mg/l
180
160
140
120
100
80
60
40
20
0
BILT RCC Pipe Outlet Ballarpur Bamni Rd
Bhagirathi Nallah Bridge, Gondpipri Road, Near Bamni Protiesn
Wardha River, Rajura Bridge
Nallah Near MSW Municipal Corporation, Near Railway Line
Ballarpur Open Cast Mine Discharge
Nallah of Municipal Council Ballarpur, Besides HP Petrol Pump
Location
SS
COD
BOD
NO2
NO3
NO2 + NO3
NH3-N
Dissolved Phosphate (as P)
Total Phosphorous (as P)
TKN
(NH4+NH3)-N
Sodium Absorption Ratio

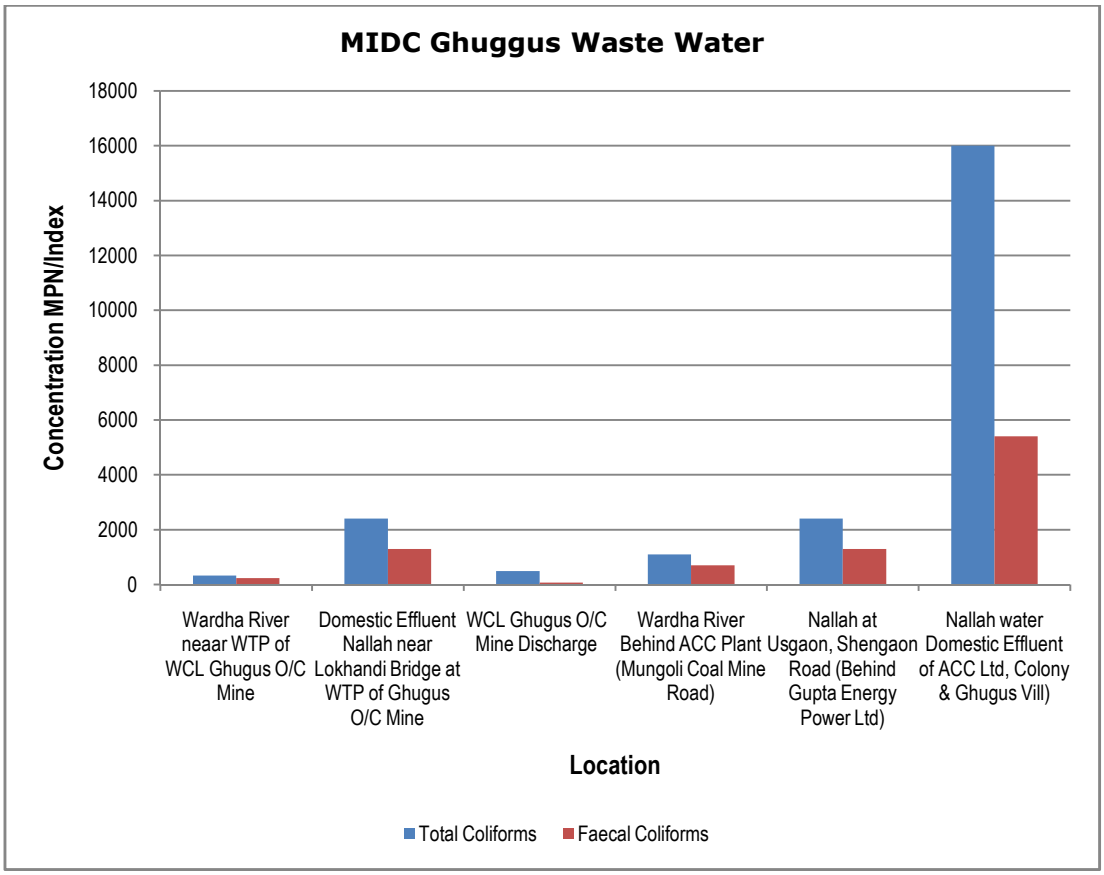

MIDC Tadali Waste Water
Concentration µmho/cm
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
GIPL Nallah
Tadali Village Lake
Gopani Iron & Power (I) Pvt. Ltd. Colony
Nallah Adjecent to Grace Motaor Tadali
Raw Water MIDC WTP (Tank) Tadali
Tadali
Tadali
Tadali
Tadali
Tadali
Location
Electrical Conductivity

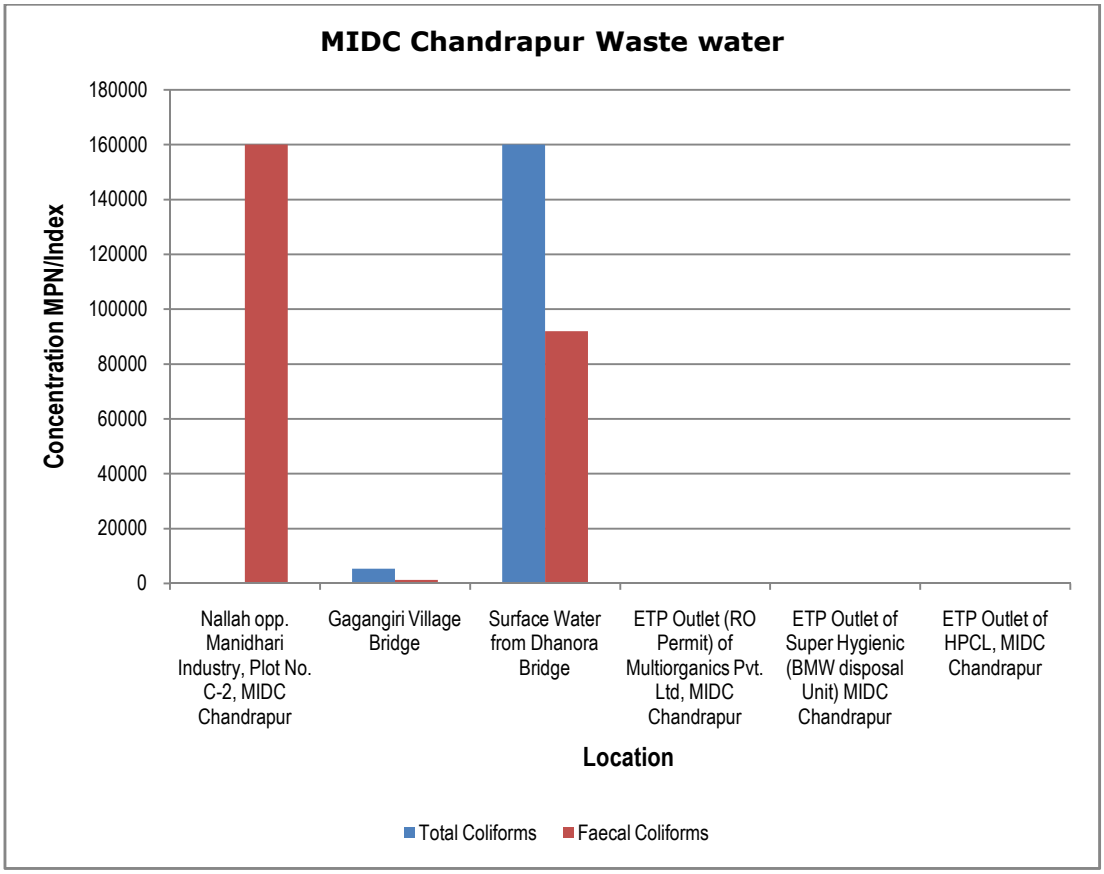

MIDC Ghuggus Waste Water
Concentration µmho/cm
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Wardha River neaar WTP of WCL Ghugus O/C Mine
Domestic Effluent Nallah near Lokhandi Bridge at WTP of Ghugus O/C Mine
WCL Ghugus O/C Mine Discharge
Wardha River Behind ACC Plant (Mungoli Coal Mine Road)
Nallah at Usgaon, Shengaon Road (Behind Gupta Energy Power Ltd)
Nallah water Domestic Effluent of ACC Ltd, Colony & Ghugus Vill)
Location
Electrical Conductivity

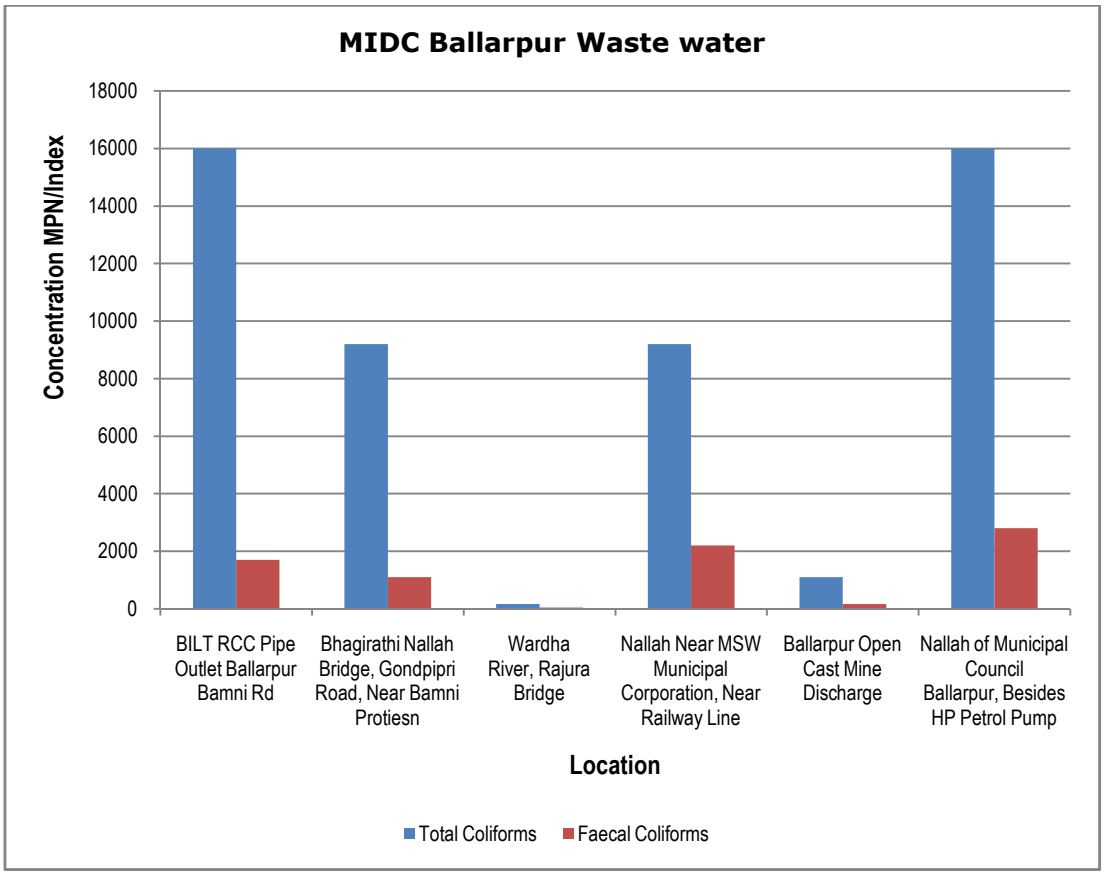

MIDC Chandrapur Waste Water
Concentration µmho/cm
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Nallah opp. Manidhari Industry, Plot No. C-2, MIDC Chandrapur
Gagangiri Village Bridge
Surface Water from Dhanora Bridge
ETP Outlet (RO Permit) of Multiorganics Pvt. Ltd, MIDC Chandrapur
ETP Outlet of Super Hygienic (BMW disposal Unit) MIDC Chandrapur
ETP Outlet of HPCL, MIDC Chandrapur
Location
Electrical Conductivity

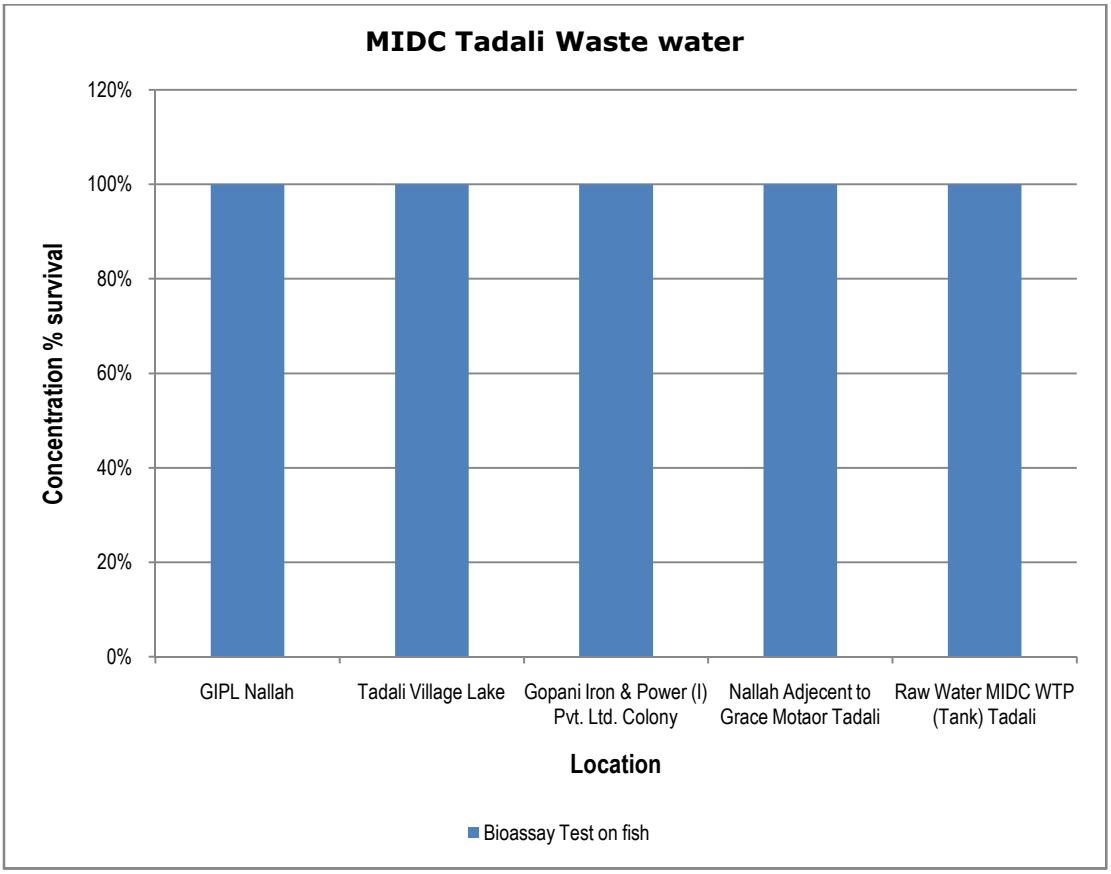

MIDC Ballarpur Waste water
Concentration µmho/cm
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
BILT RCC Pipe Outlet Ballarpur Bamni Rd
Bhagirathi Nallah Bridge, Gondpipri Road, Near Bamni Protiesn
Wardha River, Rajura Bridge
Nallah Near MSW Municipal Corporation, Near Railway Line
Ballarpur Open Cast Mine Discharge
Nallah of Municipal Council Ballarpur, Besides HP Petrol Pump
Location
Electrical Conductivity

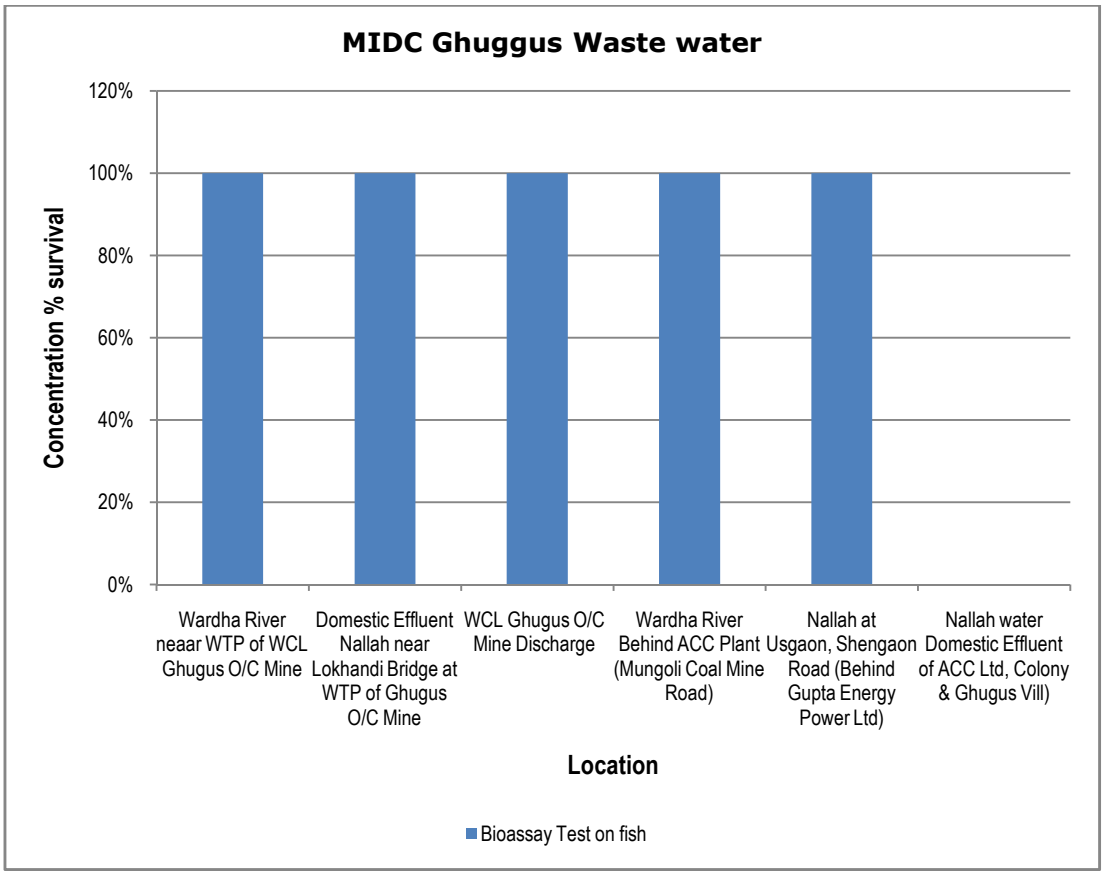

MIDC Tadali Waste Water
Concentration MPN/Index
3000
2500
2000
1500
1000
500
0
GIPL Nallah
Tadali Village Lake
Gopani Iron & Power (I) Pvt. Ltd. Colony
Nallah Adjecent to Grace Motaor Tadali
Raw Water MIDC WTP (Tank) Tadali
Location
Total Coliforms
Faecal Coliforms

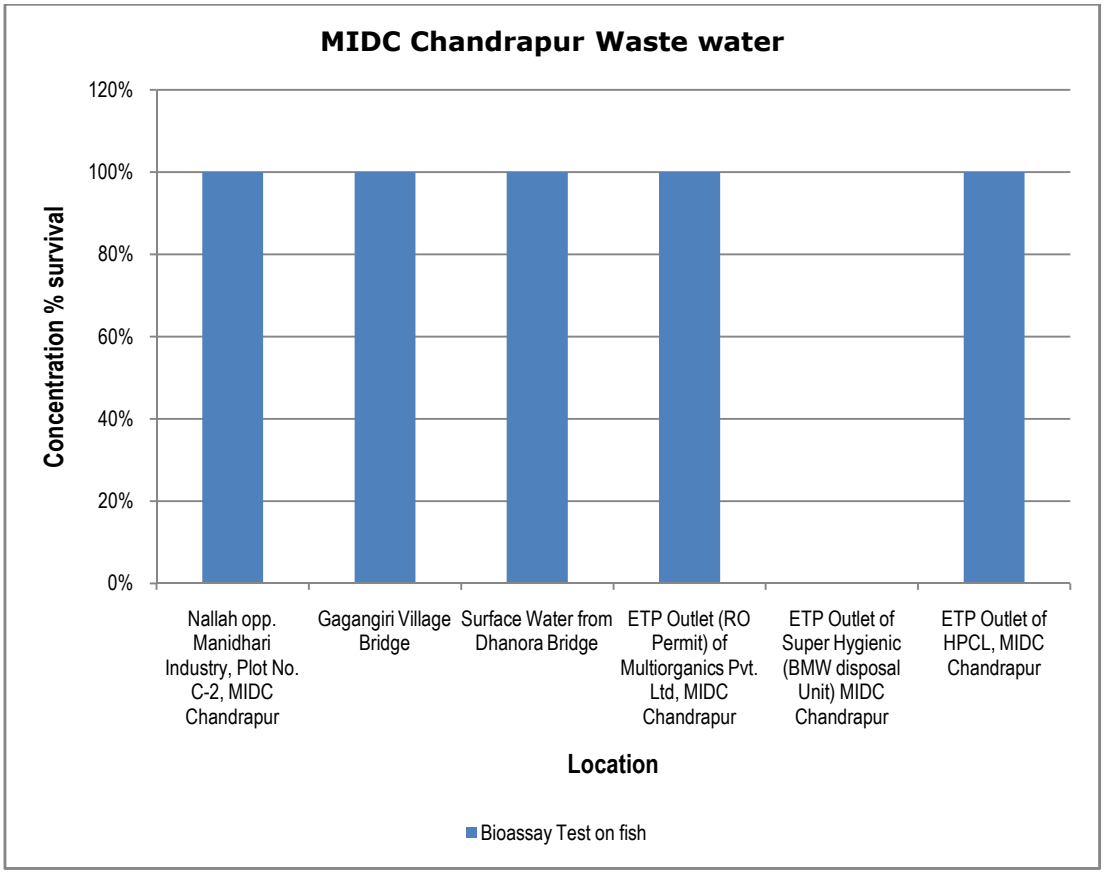

MIDC Ghuggus Waste Water
Concentration MPN/Index
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
Wardha River neaar WTP of WCL Ghugus O/C Mine
Domestic Effluent Nallah near Lokhandi Bridge at WTP of Ghugus O/C Mine
WCL Ghugus O/C Mine Discharge
Wardha River Behind ACC Plant (Mungoli Coal Mine Road)
Nallah at Usgaon, Shengaon Road (Behind Gupta Energy Power Ltd)
Nallah water Domestic Effluent of ACC Ltd, Colony & Ghugus Vill)
Location
Total Coliforms
Faecal Coliforms

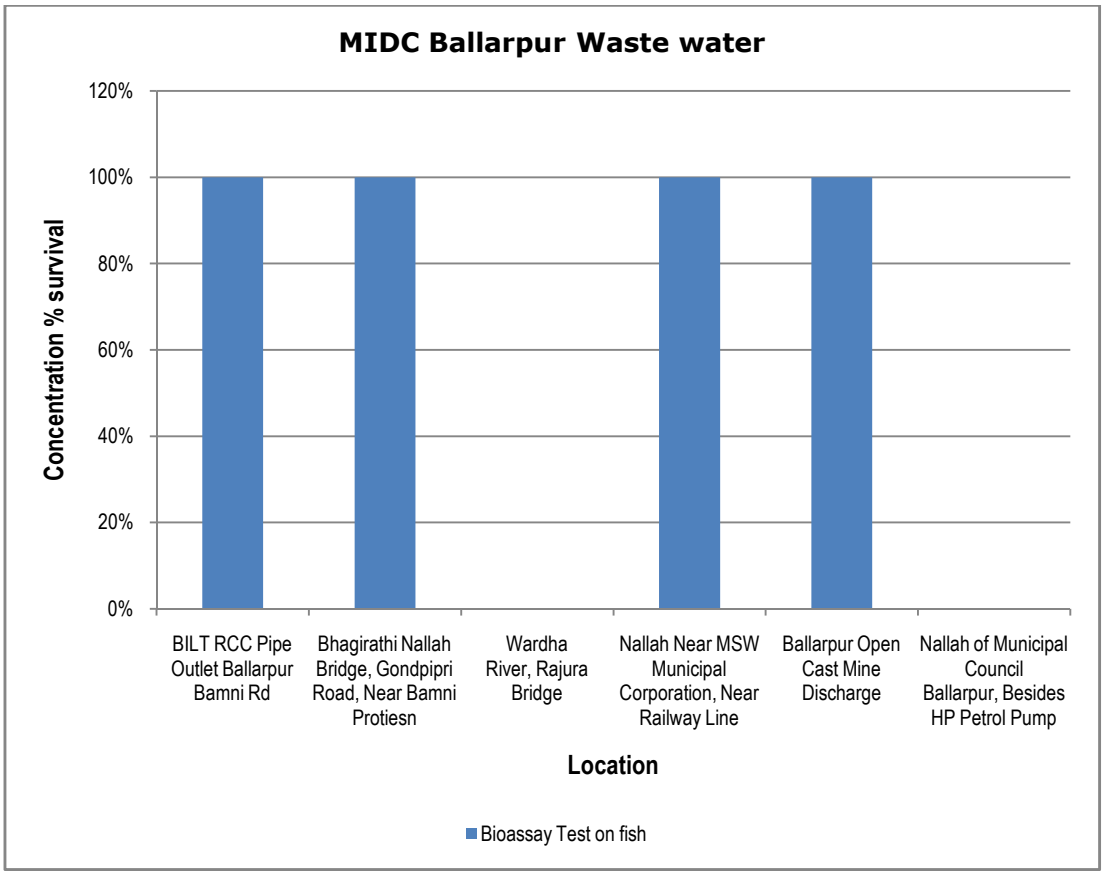

MIDC Chandrapur Waste water
Concentration MPN/Index
180000
160000
140000
120000
100000
80000
60000
40000
20000
0
Nallah opp. Manidhari Industry, Plot No. C-2, MIDC Chandrapur
Gagangiri Village Bridge
Surface Water from Dhanora Bridge
ETP Outlet (RO Permit) of Multiorganics Pvt. Ltd, MIDC Chandrapur
ETP Outlet of Super Hygienic (BMW disposal Unit) MIDC Chandrapur
ETP Outlet of HPCL, MIDC Chandrapur
Location
Total Coliforms
Faecal Coliforms


MIDC Ballarpur Waste water
Concentration MPN/Index
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
BILT RCC Pipe Outlet Ballarpur Bamni Rd
Bhagirathi Nallah Bridge, Gondpipri Road, Near Bamni Protiesn
Wardha River, Rajura Bridge
Nallah Near MSW Municipal Corporation, Near Railway Line
Ballarpur Open Cast Mine Discharge
Nallah of Municipal Council Ballarpur, Besides HP Petrol Pump
Location
Total Coliforms
Faecal Coliforms


MIDC Tadali Waste water
120%
100%
80%
60%
40%
20%
0%
Concentration % survival
GIPL Nallah
Tadali Village Lake
Gopani Iron & Power (I) Pvt. Ltd. Colony
Nallah Adjecent to Grace Motaor Tadali
Raw Water MIDC WTP (Tank) Tadali
Location
Bioassay Test on fish


MIDC Ghuggus Waste water
120%
100%
80%
60%
40%
20%
0%
Concentration % survival
Wardha River neaar WTP of WCL Ghugus O/C Mine
Domestic Effluent Nallah near Lokhandi Bridge at WTP of Ghugus O/C Mine
WCL Ghugus O/C Mine Discharge
Wardha River Behind ACC Plant (Mungoli Coal Mine Road)
Nallah at Usgaon, Shengaon Road (Behind Gupta Energy Power Ltd)
Nallah water Domestic Effluent of ACC Ltd, Colony & Ghugus Vill)
Location
Bioassay Test on fish


MIDC Chandrapur Waste water
120%
100%
80%
60%
40%
20%
0%
Concentration % survival
Nallah opp. Manidhari Industry, Plot No. C-2, MIDC Chandrapur
Gagangiri Village Bridge
Surface Water from Dhanora Bridge
ETP Outlet (RO Permit) of Multiorganics Pvt. Ltd, MIDC Chandrapur
ETP Outlet of Super Hygienic (BMW disposal Unit) MIDC Chandrapur
ETP Outlet of HPCL, MIDC Chandrapur
Location
Bioassay Test on fish


MIDC Ballarpur Waste water
120%
100%
80%
60%
40%
20%
0%
Concentration % survival
BILT RCC Pipe Outlet Ballarpur Bamni Rd
Bhagirathi Nallah Bridge, Gondpipri Road, Near Bamni Protiesn
Wardha River, Rajura Bridge
Nallah Near MSW Municipal Corporation, Near Railway Line
Ballarpur Open Cast Mine Discharge
Nallah of Municipal Council Ballarpur, Besides HP Petrol Pump
Location
Bioassay Test on fish

4 Ground Water Quality:

Sr.	Location	MIDC	Table No.
1.	Dugwell of Tadali Village Near Primary School	Tadali	**I**
2.	Borewell of Yerur Village	Tadali	**I**
3.	Dugwell near Tadali Lake & Janata School	Tadali	**I**
4.	Dugwell of Yerur Village	Tadali	**I**
5.	Borewell water taken of Tukdoji Nagar Ghugus Village	Ghuggus	**II**
6.	Borewell Water taken from Nakoda Village	Ghuggus	**II**
7.	Dugwell water from Usgaon Village	Ghuggus	**II**
8.	Well Water Gagangiri Village	Chandrapur	**III**
9.	Borewell Water from Mhada Colony	Chandrapur	**III**
10.	Borewell Water from Datala Gram Panchayat	Chandrapur	**III**
11.	Borewell water at Gramin Rugnalaya Ballarpur	Ballarpur	**IV**
12.	Borewell Water at Nagar Parishad Near New Fire Station Ballarpur	Ballarpur	**IV**
13.	Borewell Water at Visapur Vill	Ballarpur	**IV**

Table No. I

Location				**Dug well of Tadali Village Near Primary School**	**Bore well of Yerur Village**	**Dug well near Tadali Lake s& Janata School**	**Dug well of Yerur Village**
Date of Sampling **(XX/02/2017)**				**22**	**22**	**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**			
1.	Colour	Hazen		1	1	1	1
2.	Smell	-	**Agreeable**	Agreeable	Agreeable	Agreeable	Agreeable

Location				**Dug well of Tadali Village Near Primary School**	**Bore well of Yerur Village**	**Dug well near Tadali Lakes& Janata School**	**Dug well of Yerur Village**
Date of Sampling **(XX/02/2017)**				**22**	**22**	**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**			
3.	pH	-	**6.5-8.5**	7.4	7	7.4	7.7
4.	Oil & Grease	mg/L		BDL	BDL	BDL	BDL
5.	Suspended Solids	mg/L	**100**	1	0	2	1
6.	Dissolved Oxygen (%Saturation)	%		NA	NA-	NA	NA
7.	Chemical Oxygen Demand	mg/L	**500**	20	16	8	24
8.	Biochemical Oxygen Demand (3 days,27^{o}C)	mg/L	**10 (WHO, 1993)**	4.9	4.4	1.9	6.1
9.	Electrical Conductivity (at 25oC)	µmho/cm	**6 (WHO, 1993)**	1425	2271	817	2271
10.	Nitrite Nitrogen (as NO_2)	mg/L	**0.3 (WHO, 1993)**	0.022	0.087	0.016	0.002
11.	Nitrate Nitrogen (as NO_3)	mg/L		18.6	22.50	4.25	12.1
12.	(NO_2 + NO_3)-Nitrogen	mg/L	**45**	18.62	4.27	12.10	0.74
13.	Free Ammonia (as NH_3-N)	mg/L	**1.0**	BDL	0.11	BDL	BDL

Location				**Dug well of Tadali Village Near Primary School**	**Bore well of Yerur Village**	**Dug well near Tadali Lakes& Janata School**	**Dug well of Yerur Village**
Date of Sampling **(XX/02/2017)**				**22**	**22**	**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**			
14.	Total Residual Chlorine	mg/L	**0.5**	0.051	BDL	0.138	0.111
15.	Cyanide (as CN)	mg/L	**0.2**	BDL	BDL	BDL	BDL
16.	Fluoride (as F)	mg/L		0.724	0.788	0.686	0.481
17.	Sulphide (as S2-)	mg/L	**1**	BDL	BDL	BDL	BDL
18.	Dissolved Phosphate (as P)	mg/L	**0.05**	0.048	0.017	0.02	0.065
19.	Sodium Absorption Ratio	mg/L		1.33	3.3	0.752	4.14
20.	Total Coliforms	MPN Index/ 100 ml		23	23	16	BDL
21.	Faecal Coliforms	MPN Index/ 100 ml	**BDL**	6.9	16	12	BDL
22.	Total Phosphorous (as P)	mg/L	**BDL**	0.051	0.025	0.025	0.071
23.	Total Kjeldahl Nitrogen	mg/L	**0.5**	0.896	0.448	0.784	0.784
24.	Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	**0.001**	BDL	0.12	BDL	BDL

Location				**Dug well of Tadali Village Near Primary School**	**Bore well of Yerur Village**	**Dug well near Tadali Lakes& Janata School**	**Dug well of Yerur Village**
Date of Sampling **(XX/02/2017)**				**22**	**22**	**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**			
25.	Phenols (as C_6H_5OH)	mg/L	**0.5**	BDL	BDL	BDL	BDL
26.	Surface Active Agents (as MBAS)	mg/L	**0.001**	BDL	BDL	BDL	BDL
27.	Organo Chlorine Pesticides						
I.	Alachlor	µg/L	**0.05**	BDL	BDL	BDL	BDL
II.	Atrazine	µg/L	**20**	BDL	BDL	BDL	BDL
III.	Aldrin	µg/L	**2**	BDL	BDL	BDL	BDL
IV.	Dieldrin	µg/L	**0.03**	BDL	BDL	BDL	BDL
V.	Alpha HCH	µg/L	**0.03**	BDL	BDL	BDL	BDL
VI.	Beta HCH	µg/L	**0.01**	BDL	BDL	BDL	BDL
VII.	Delta HCH	µg/L	**0.04**	BDL	BDL	BDL	BDL
VIII.	Butachlor	µg/L	**125**	BDL	BDL	BDL	BDL
IX.	p,p DDT	µg/L	**0.04**	BDL	BDL	BDL	BDL
X.	o,p DDT	µg/L	**1**	BDL	BDL	BDL	BDL
XI.	p,p DDE	µg/L	**1**	BDL	BDL	BDL	BDL
XII.	o,p DDE	µg/L	**1**	BDL	BDL	BDL	BDL
XIII.	p,p DDD	µg/L	**1**	BDL	BDL	BDL	BDL
XIV.	o,p DDD	µg/L	**1**	BDL	BDL	BDL	BDL
XV.	Alpha EBDLosulfan	µg/L	**1**	BDL	BDL	BDL	BDL

Location				**Dug well of Tadali Village Near Primary School**	**Bore well of Yerur Village**	**Dug well near Tadali Lakes& Janata School**	**Dug well of Yerur Village**
Date of Sampling **(XX/02/2017)**				**22**	**22**	**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**			
XVI.	Beta EBDLosulfan	µg/L	**0.4**	BDL	BDL	BDL	BDL
XVII.	EBDLosulfan Sulphate	µg/L	**0.4**	BDL	BDL	BDL	BDL
XVIII.	Y HCH (LiBDLane)	µg/L	**0.4**	BDL	BDL	BDL	BDL
28.	Polynuclear aromatic hydrocarbons (as PAH)	mg/L	**2.0**	BDL	BDL	BDL	BDL
29.	Polychlorinated Biphenyls (PCB)	mg/L	**0.0001**	BDL	BDL	BDL	BDL
30.	Zinc (as Zn)	mg/L	**0.0005**	BDL	0.0885	BDL	BDL
31.	Nickel (as Ni)	mg/L	**5.0**	0.019	0.0168	0.022	0.018
32.	Copper (as Cu)	mg/L	**0.02**	BDL	BDL	BDL	BDL
33.	Hexavalent Chromium (as Cr6+)	mg/L	**0.05**	BDL	BDL	BDL	BDL
34.	Total Chromium (as Cr)	mg/L	**1**	0.0308	BDL	0.033	0.03
35.	Total Arsenic (as As)	mg/L	**0.05**	BDL	BDL	BDL	BDL
36.	Lead (as Pb)	mg/L	**0.01**	0.1006	0.1004	0.1	0.095

Location				**Dug well of Tadali Village Near Primary School**	**Bore well of Yerur Village**	**Dug well near Tadali Lakes& Janata School**	**Dug well of Yerur Village**
Date of Sampling **(XX/02/2017)**				**22**	**22**	**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**			
37.	Cadmium (as Cd)	mg/L	**0.01**	BDL	BDL	BDL	BDL
38.	Mercury (as Hg)	mg/L	**0.003**	BDL	BDL	BDL	BDL
39.	Manganese (as Mn)	mg/L	**0.001**	BDL	BDL	BDL	BDL
40.	Iron (as Fe)	mg/L	**0.1**	BDL	BDL	BDL	BDL
41.	Vanadium (as V)	mg/L	**0.3**	BDL	BDL	BDL	BDL
42.	Selenium (as Se)	mg/L		BDL	BDL	BDL	0.01
43.	Boron (as B)	mg/L	**0.01**	0.32	0.616	0.643	0.367
44.	Bioassay Test on fish	% survival		100%	100%	100%	100%

Table No. II

Location				**Bore well water taken of Tukdoji Nagar Ghugus Village**	**Bore well Water taken from Nakoda Village**	**Dug well water from Usgaon Village**
Date of Sampling **(XX/02/2017)**				**22**	**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
1.	Colour	Hazen		BDL	5	BDL
2.	Smell	-	**Agreeable**	Agreeable	Agreeable	Agreeable
3.	pH	-	**6.5-8.5**	8.1	7	7.4
4.	Oil & Grease	mg/L		BDL	BDL	BDL
5.	Suspended Solids	mg/L	**100**	1	16	BDL
6.	Dissolved Oxygen (%Saturation)	%		BDL	BDL	BDL
7.	Chemical Oxygen Demand	mg/L	**500**	4	4	12
8.	Biochemical Oxygen Demand (3 days,27°C)	mg/L	**10 (WHO, 1993)**	1.2	BDL	3.6
9.	Electrical Conductivity (at 25oC)	µmho/cm	**6 (WHO, 1993)**	1222	665	1702
10.	Nitrite Nitrogen (as NO_2)	mg/L	**0.3 (WHO, 1993)**	0.34	0.01	0.009
11.	Nitrate Nitrogen (as NO_3)	mg/L		0.836	0.149	18.9
12.	(NO_2 + NO_3)-Nitrogen	mg/L	**45**	0.16	0.16	18.91

Location				**Bore well water taken of Tukdoji Nagar Ghugus Village**	**Bore well Water taken from Nakoda Village**	**Dug well water from Usgaon Village**
Date of Sampling **(XX/02/2017)**				**22**	**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
13.	Free Ammonia (as NH_3-N)	mg/L	**1.0**	BDL	BDL	BDL
14.	Total Residual Chlorine	mg/L	**0.5**	BDL	BDL	BDL
15.	Cyanide (as CN)	mg/L	**0.2**	BDL	BDL	BDL
16.	Fluoride (as F)	mg/L		0.929	0.327	0.34
17.	Sulphide (as S2-)	mg/L	**1**	BDL	BDL	BDL
18.	Dissolved Phosphate (as P)	mg/L	**0.05**	0.014	0.034	0.02
19.	Sodium Absorption Ratio	mg/L		8.19	1.6	3.37
20.	Total Coliforms	MPN Index/ 100 ml		23	16	16
21.	Faecal Coliforms	MPN Index/ 100 ml	**BDL**	12	12	12
22.	Total Phosphorous (as P)	mg/L	**BDL**	0.022	0.022	0.034
23.	Total Kjeldahl Nitrogen	mg/L	**0.5**	0.336	0.672	1.18
24.	Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	**0.001**	BDL	BDL	BDL

Location				**Bore well water taken of Tukdoji Nagar Ghugus Village**	**Bore well Water taken from Nakoda Village**	**Dug well water from Usgaon Village**
Date of Sampling **(XX/02/2017)**				**22**	**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
25.	Phenols (as C_6H_5OH)	mg/L	**0.5**	BDL	BDL	BDL
26.	Surface Active Agents (as MBAS)	mg/L	**0.001**	BDL	BDL	BDL
27.	Organo Chlorine Pesticides					
I.	Alachlor	µg/L	**0.05**	BDL	BDL	BDL
II.	Atrazine	µg/L	**20**	BDL	BDL	BDL
III.	Aldrin	µg/L	**2**	BDL	BDL	BDL
IV.	Dieldrin	µg/L	**0.03**	BDL	BDL	BDL
V.	Alpha HCH	µg/L	**0.03**	BDL	BDL	BDL
VI.	Beta HCH	µg/L	**0.01**	BDL	BDL	BDL
VII.	Delta HCH	µg/L	**0.04**	BDL	BDL	BDL
VIII.	Butachlor	µg/L	**125**	BDL	BDL	BDL
IX.	p,p DDT	µg/L	**0.04**	BDL	BDL	BDL
X.	o,p DDT	µg/L	**1**	BDL	BDL	BDL
XI.	p,p DDE	µg/L	**1**	BDL	BDL	BDL
XII.	o,p DDE	µg/L	**1**	BDL	BDL	BDL
XIII.	p,p DDD	µg/L	**1**	BDL	BDL	BDL
XIV.	o,p DDD	µg/L	**1**	BDL	BDL	BDL
XV.	Alpha EBDLosulfan	µg/L	**1**	BDL	BDL	BDL

Location				**Bore well water taken of Tukdoji Nagar Ghugus Village**	**Bore well Water taken from Nakoda Village**	**Dug well water from Usgaon Village**
Date of Sampling **(XX/02/2017)**				**22**	**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
XVI.	Beta EBDLosulfan	µg/L	**0.4**	BDL	BDL	BDL
XVII.	EBDLosulfan Sulphate	µg/L	**0.4**	BDL	BDL	BDL
VIII.	Y HCH (LiBDLane)	µg/L	**0.4**	BDL	BDL	BDL
28.	Polynuclear aromatic hydrocarbons (as PAH)	mg/L	**2.0**	BDL	BDL	BDL
29.	Polychlorinated Biphenyls (PCB)	mg/L	**0.0001**	BDL	BDL	BDL
30.	Zinc (as Zn)	mg/L	**0.0005**	0.18	0.23	BDL
31.	Nickel (as Ni)	mg/L	**5.0**	0.018	0.019	0.019
32.	Copper (as Cu)	mg/L	**0.02**	BDL	BDL	BDL
33.	Hexavalent Chromium (as Cr6+)	mg/L	**0.05**	BDL	BDL	BDL
34.	Total Chromium (as Cr)	mg/L	**1**	0.029	0.028	0.04
35.	Total Arsenic (as As)	mg/L	**0.05**	BDL	BDL	BDL
36.	Lead (as Pb)	mg/L	**0.01**	0.099	0.092	0.11
37.	Cadmium (as Cd)	mg/L	**0.01**	BDL	BDL	BDL

Location				**Bore well water taken of Tukdoji Nagar Ghugus Village**	**Bore well Water taken from Nakoda Village**	**Dug well water from Usgaon Village**
Date of Sampling **(XX/02/2017)**				**22**	**22**	**22**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
38.	Mercury (as Hg)	mg/L	**0.003**	BDL	BDL	BDL
39.	Manganese (as Mn)	mg/L	**0.001**	BDL	0.041	BDL
40.	Iron (as Fe)	mg/L	**0.1**	BDL	4.09	BDL
41.	Vanadium (as V)	mg/L	**0.3**	BDL	BDL	BDL
42.	Selenium (as Se)	mg/L		BDL	BDL	BDL
43.	Boron (as B)	mg/L	**0.01**	0.32	0.119	0.362
44.	Bioassay Test on fish	% survival		100	100	100

Table No. III

Location				**Well Water Gagangiri Village**	**Bore well Water from Mhada Colony**	**Bore well Water from Datala Gram Panchayat**
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
1.	Colour	Hazen		1	1	1
2.	Smell	-	**Agreeable**	Agreeable	Agreeable	Agreeable
3.	pH	-	**6.5-8.5**	7.5	8.1	7.6
4.	Oil & Grease	mg/L		BDL	BDL	BDL

Location				**Well Water Gagangiri Village**	**Bore well Water from Mhada Colony**	**Bore well Water from Datala Gram Panchayat**
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
5.	Suspended Solids	mg/L	**100**	BDL	BDL	BDL
6.	Dissolved Oxygen (%Saturation)	%		-	-	-
7.	Chemical Oxygen Demand	mg/L	**500**	4	8	4
8.	Biochemical Oxygen Demand (3 days,27°C)	mg/L	**10 (WHO, 1993)**	1.2	1.6	BDL
9.	Electrical Conductivity (at 25°C)	µmho/cm	**6 (WHO, 1993)**	841	1672	978
10.	Nitrite Nitrogen (as NO_2)	mg/L	**0.3 (WHO, 1993)**	0.052	0.056	0.02
11.	Nitrate Nitrogen (as NO_3)	mg/L		1.21	0.408	3.48
12.	(NO_2 + NO_3)-Nitrogen	mg/L	**45**	1.26	0.46	3.50
13.	Free Ammonia (as NH_3-N)	mg/L	**1.0**	BDL	BDL	BDL
14.	Total Residual Chlorine	mg/L	**0.5**	BDL	BDL	BDL
15.	Cyanide (as CN)	mg/L	**0.2**	BDL	BDL	BDL
16.	Fluoride (as F)	mg/L		0.41	1.4	0.859

Location				Well Water Gagangiri Village	Bore well Water from Mhada Colony	Bore well Water from Datala Gram Panchayat
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
17.	Sulphide (as S2-)	mg/L	**1**	BDL	BDL	BDL
18.	Dissolved Phosphate (as P)	mg/L	**0.05**	0.24	0.017	0.195
19.	Sodium Absorption Ratio	mg/L		2.00	15.7	3.88
20.	Total Coliforms	MPN Index/ 100 ml		23	16	1.1
21.	Faecal Coliforms	MPN Index/ 100 ml	**BDL**	12	12	BDL
22.	Total Phosphorous (as P)	mg/L	**BDL**	0.285	0.028	0.246
23.	Total Kjeldahl Nitrogen	mg/L	**0.5**	1.23	0.952	0.90
24.	Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	**0.001**	BDL	BDL	BDL
25.	Phenols (as C_6H_5OH)	mg/L	**0.5**	BDL	BDL	BDL
26.	Surface Active Agents (as MBAS)	mg/L	**0.001**	BDL	BDL	BDL
27.	Organo Chlorine Pesticides					
I.	Alachlor	µg/L	**0.05**	BDL	BDL	BDL

Location				Well Water Gagangiri Village	Bore well Water from Mhada Colony	Bore well Water from Datala Gram Panchayat
Date of Sampling **(XX/02/2017)**				27	27	27
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
II.	Atrazine	µg/L	**20**	BDL	BDL	BDL
III.	Aldrin	µg/L	**2**	0.048	BDL	BDL
IV.	Dieldrin	µg/L	**0.03**	BDL	BDL	BDL
V.	Alpha HCH	µg/L	**0.03**	BDL	BDL	BDL
VI.	Beta HCH	µg/L	**0.01**	0.01	BDL	BDL
VII.	Delta HCH	µg/L	**0.04**	0.024	BDL	BDL
VIII.	Butachlor	µg/L	**125**	BDL	BDL	BDL
IX.	p,p DDT	µg/L	**0.04**	BDL	BDL	BDL
X.	o,p DDT	µg/L	**1**	BDL	BDL	BDL
XI.	p,p DDE	µg/L	**1**	0.049	BDL	BDL
XII.	o,p DDE	µg/L	**1**	0.049	BDL	BDL
XIII.	p,p DDD	µg/L	**1**	0.069	BDL	BDL
XIV.	o,p DDD	µg/L	**1**	0.069	BDL	BDL
XV.	Alpha EBDLosulfan	µg/L	**1**	BDL	BDL	BDL
XVI.	Beta EBDLosulfan	µg/L	**0.4**	0.05	BDL	BDL
XVII.	EBDLosulfan Sulphate	µg/L	**0.4**	0.049	BDL	BDL
VIII.	Y HCH (LiBDLane)	µg/L	**0.4**	0.022	BDL	BDL
28.	Polynuclear aromatic hydrocarbons (as PAH)	mg/L	**2.0**	BDL	BDL	BDL

Location				**Well Water Gagangiri Village**	**Bore well Water from Mhada Colony**	**Bore well Water from Datala Gram Panchayat**
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
29.	Polychlorinated Biphenyls (PCB)	mg/L	**0.0001**	BDL	BDL	BDL
30.	Zinc (as Zn)	mg/L	**0.0005**	BDL	BDL	BDL
31.	Nickel (as Ni)	mg/L	**5.0**	BDL	0.019	BDL
32.	Copper (as Cu)	mg/L	**0.02**	BDL	BDL	BDL
33.	Hexavalent Chromium (as Cr6+)	mg/L	**0.05**	BDL	BDL	BDL
34.	Total Chromium (as Cr)	mg/L	**1**	0.038	0.046	0.026
35.	Total Arsenic (as As)	mg/L	**0.05**	BDL	BDL	BDL
36.	Lead (as Pb)	mg/L	**0.01**	0.12	0.095	0.088
37.	Cadmium (as Cd)	mg/L	**0.01**	BDL	BDL	BDL
38.	Mercury (as Hg)	mg/L	**0.003**	BDL	BDL	BDL
39.	Manganese (as Mn)	mg/L	**0.001**	0.027	BDL	BDL
40.	Iron (as Fe)	mg/L	**0.1**	BDL	BDL	BDL
41.	Vanadium (as V)	mg/L	**0.3**	BDL	BDL	BDL
42.	Selenium (as Se)	mg/L		BDL	BDL	BDL

Location				**Well Water Gagangiri Village**	**Bore well Water from Mhada Colony**	**Bore well Water from Datala Gram Panchayat**
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
43.	Boron (as B)	mg/L	**0.01**	0.143	0.42	0.42
44.	Bioassay Test on fish	% survival		100	100	100

Table No. IV

Location				**Borewell water at Gramin Rugnalaya Ballarpur**	**Borewell Water at Nagar Parishad Near New Fire Station Ballarpur**	**Borewell Water at Visapur Vill**
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
1.	Colour	Hazen		1	1	1
2.	Smell	-	**Agreeable**	Agreeable	Agreeable	Agreeable
3.	pH	-	**6.5-8.5**	6.8	7.0	6.8
4.	Oil & Grease	mg/L		BDL	BDL	BDL
5.	Suspended Solids	mg/L	**100**	BDL	BDL	BDL
6.	Dissolved Oxygen (%Saturation)	%		BDL	BDL	BDL
7.	Chemical Oxygen Demand	mg/L	**500**	4	6	12

Location				**Borewell water at Gramin Rugnalaya Ballarpur**	**Borewell Water at Nagar Parishad Near New Fire Station Ballarpur**	**Borewell Water at Visapur Vill**
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
8.	Biochemical Oxygen Demand (3 days,27°C)	mg/L	**10 (WHO, 1993)**	1.1	1.8	2.9
9.	Electrical Conductivity (at 25oC)	µmho/cm	**6 (WHO, 1993)**	537	900	922
10.	Nitrite Nitrogen (as NO_2)	mg/L	**0.3 (WHO, 1993)**	0.0	0.013	0.02
11.	Nitrate Nitrogen (as NO_3)	mg/L		4.300	8.76	3.46
12.	(NO_2 + NO_3)-Nitrogen	mg/L	**45**	4.32	8.77	3.48
13.	Free Ammonia (as NH_3-N)	mg/L	**1.0**	BDL	BDL	BDL
14.	Total Residual Chlorine	mg/L	**0.5**	BDL	BDL	BDL
15.	Cyanide (as CN)	mg/L	**0.2**	BDL	BDL	BDL
16.	Fluoride (as F)	mg/L		0.404	0.417	0.564
17.	Sulphide (as S2-)	mg/L	**1**	BDL	BDL	BDL
18.	Dissolved Phosphate (as P)	mg/L	**0.05**	0.059	0.152	0.158

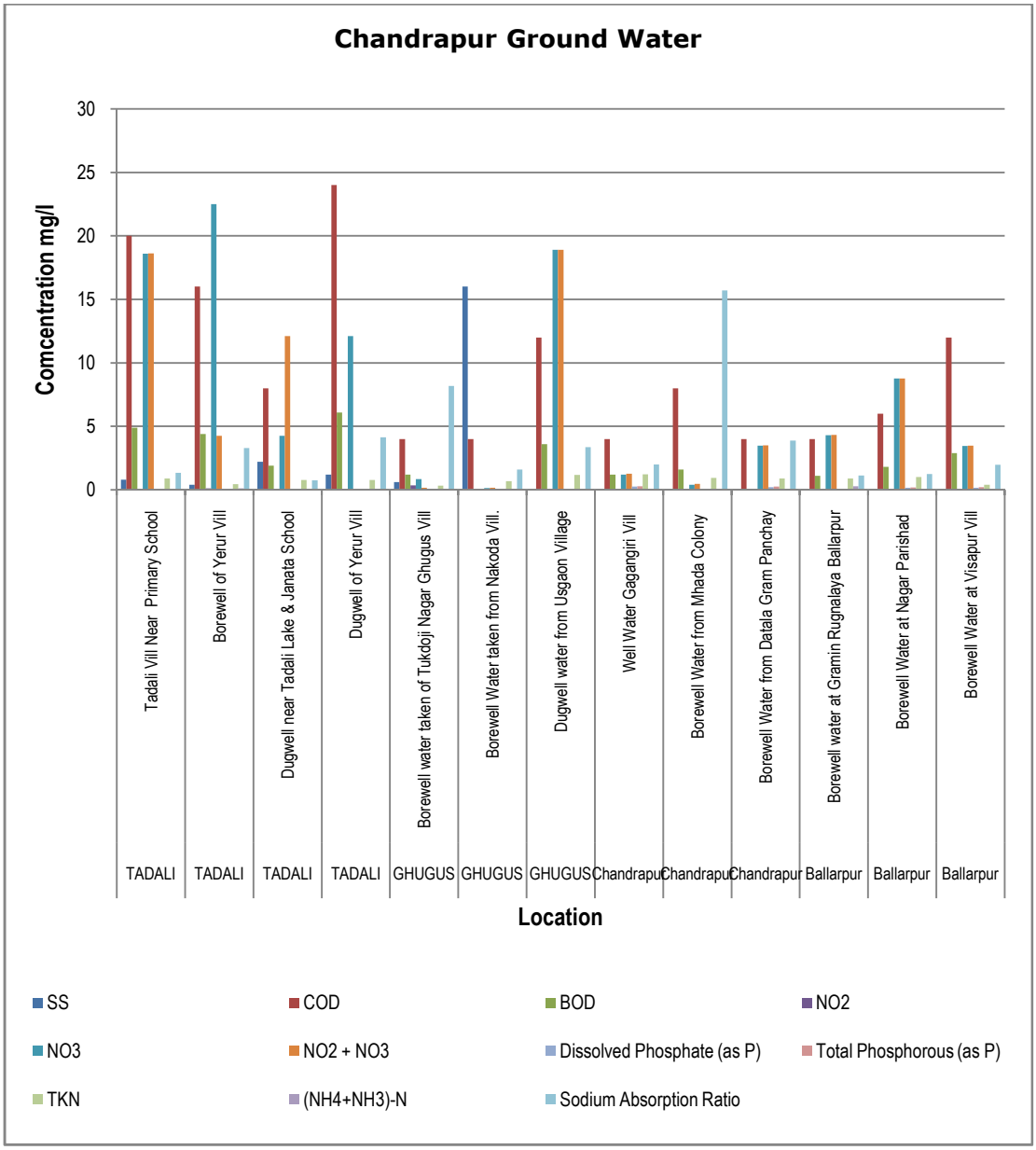
Location				**Borewell water at Gramin Rugnalaya Ballarpur**	**Borewell Water at Nagar Parishad Near New Fire Station Ballarpur**	**Borewell Water at Visapur Vill**
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
19.	Sodium Absorption Ratio	mg/L		1.12	1.25	1.97
20.	Total Coliforms	MPN Index/ 100 ml		6.9	BDL	12
21.	Faecal Coliforms	MPN Index/ 100 ml	**BDL**	3.6	BDL	6.9
22.	Total Phosphorous (as P)	mg/L	**BDL**	0.076	0.189	0.206
23.	Total Kjeldahl Nitrogen	mg/L	**0.5**	0.90	1.01	0.39
24.	Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	**0.001**	0.279	BDL	BDL
25.	Phenols (as C_6H_5OH)	mg/L	**0.5**	BDL	BDL	BDL
26.	Surface Active Agents (as MBAS)	mg/L	**0.001**	BDL	BDL	BDL
27.	Organo Chlorine Pesticides					
I.	Alachlor	µg/L	**0.05**	BDL	BDL	BDL
II.	Atrazine	µg/L	**20**	BDL	BDL	BDL
III.	Aldrin	µg/L	**2**	BDL	BDL	BDL
IV.	Dieldrin	µg/L	**0.03**	BDL	BDL	BDL

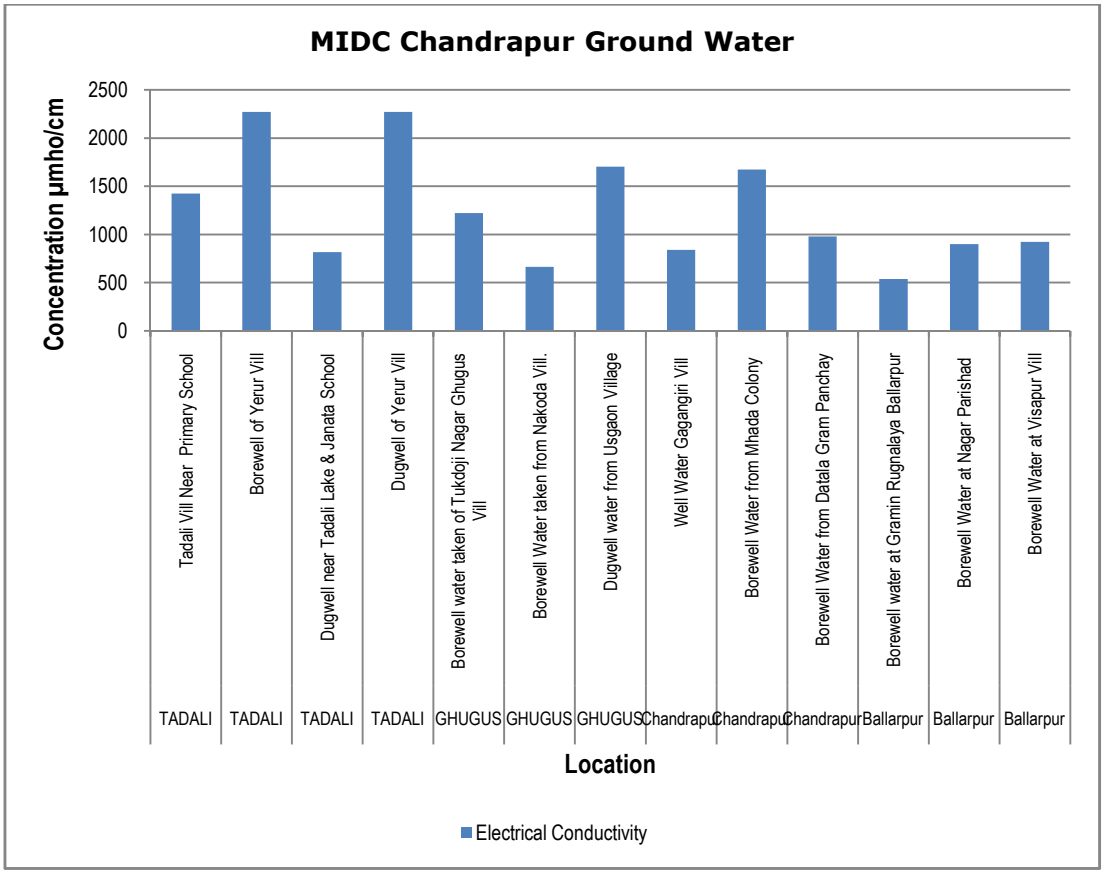
Location				Borewell water at Gramin Rugnalaya Ballarpur	Borewell Water at Nagar Parishad Near New Fire Station Ballarpur	Borewell Water at Visapur Vill
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
V.	Alpha HCH	µg/L	**0.03**	BDL	BDL	BDL
VI.	Beta HCH	µg/L	**0.01**	BDL	BDL	BDL
VII.	Delta HCH	µg/L	**0.04**	BDL	BDL	BDL
VIII.	Butachlor	µg/L	**125**	BDL	BDL	BDL
IX.	p,p DDT	µg/L	**0.04**	BDL	BDL	BDL
X.	o,p DDT	µg/L	**1**	BDL	BDL	BDL
XI.	p,p DDE	µg/L	**1**	BDL	BDL	BDL
XII.	o,p DDE	µg/L	**1**	BDL	BDL	BDL
XIII.	p,p DDD	µg/L	**1**	BDL	0.015	BDL
XIV.	o,p DDD	µg/L	**1**	BDL	0.015	BDL
XV.	Alpha EBDLosulfan	µg/L	**1**	BDL	BDL	BDL
XVI.	Beta EBDLosulfan	µg/L	**0.4**	BDL	BDL	BDL
XVII.	EBDLosulfan Sulphate	µg/L	**0.4**	BDL	BDL	BDL
VIII.	Y HCH (LiBDLane)	µg/L	**0.4**	BDL	BDL	BDL
28.	Polynuclear aromatic hydrocarbons (as PAH)	mg/L	**2.0**	BDL	BDL	BDL
29.	Polychlorinated Biphenyls (PCB)	mg/L	**0.0001**	BDL	BDL	BDL
30.	Zinc (as Zn)	mg/L	**0.0005**	0.36	BDL	BDL

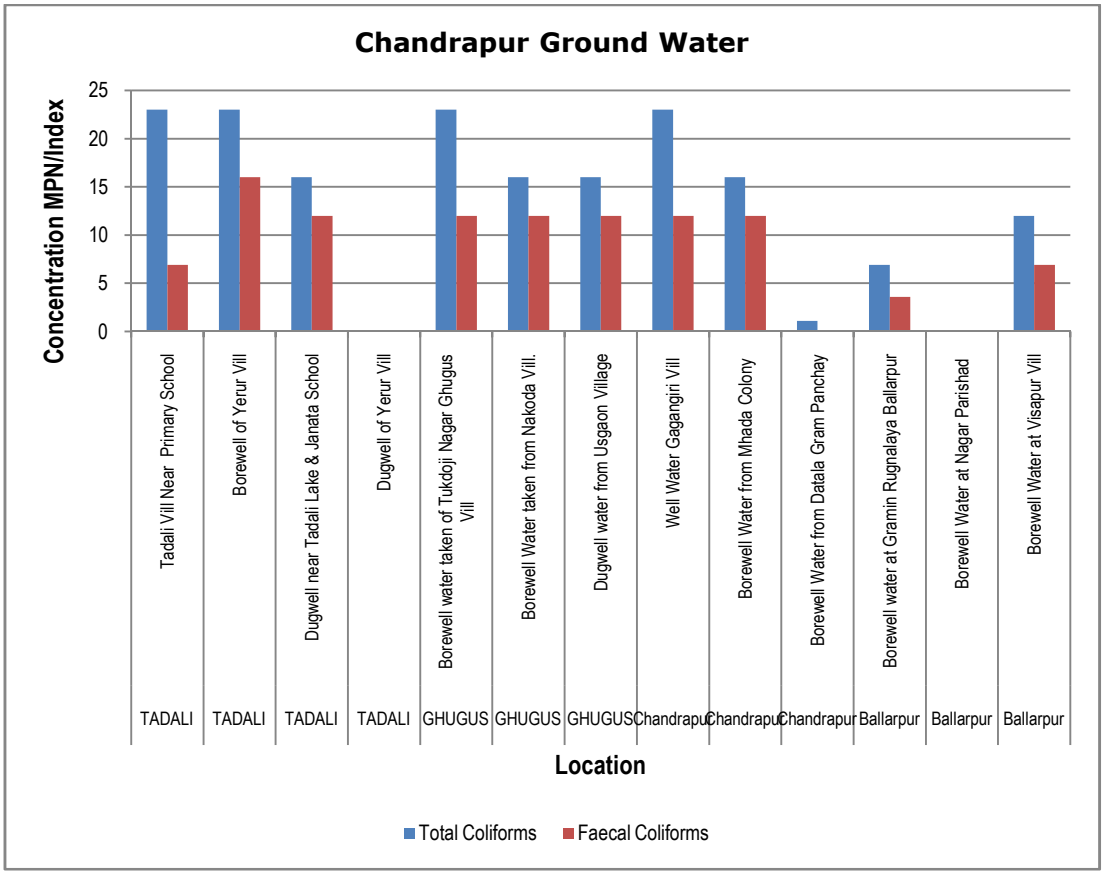
Location				**Borewell water at Gramin Rugnalaya Ballarpur**	**Borewell Water at Nagar Parishad Near New Fire Station Ballarpur**	**Borewell Water at Visapur Vill**
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
31.	Nickel (as Ni)	mg/L	**5.0**	0.021	0.025	0.017
32.	Copper (as Cu)	mg/L	**0.02**	BDL	BDL	BDL
33.	Hexavalent Chromium (as Cr6+)	mg/L	**0.05**	BDL	BDL	BDL
34.	Total Chromium (as Cr)	mg/L	**1**	0.032	0.029	0.024
35.	Total Arsenic (as As)	mg/L	**0.05**	BDL	BDL	BDL
36.	Lead (as Pb)	mg/L	**0.01**	0.11	0.094	0.082
37.	Cadmium (as Cd)	mg/L	**0.01**	BDL	0.003	BDL
38.	Mercury (as Hg)	mg/L	**0.003**	BDL	BDL	BDL
39.	Manganese (as Mn)	mg/L	**0.001**	0.052	BDL	BDL
40.	Iron (as Fe)	mg/L	**0.1**	BDL	0.14	0.073
41.	Vanadium (as V)	mg/L	**0.3**	BDL	BDL	BDL
42.	Selenium (as Se)	mg/L		BDL	BDL	BDL
43.	Boron (as B)	mg/L	**0.01**	0.181	0.173	0.228

Location				Borewell water at Gramin Rugnalaya Ballarpur	Borewell Water at Nagar Parishad Near New Fire Station Ballarpur	Borewell Water at Visapur Vill
Date of Sampling **(XX/02/2017)**				**27**	**27**	**27**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**		
44.	Bioassay Test on fish	% survival		100	100	100

Graphs: Water/Waste Water Quality Monitoring for Chandrapur:




MIDC Chandrapur Ground Water
Concentration µmho/cm
2500
2000
1500
1000
500
0
Tadali Vill Near Primary School
Borewell of Yerur Vill
Dugwell near Tadali Lake & Janata School
Dugwell of Yerur Vill
Borewell water taken of Tukdoji Nagar Ghugus Vill
Borewell Water taken from Nakoda Vill.
Dugwell water from Usgaon Village
Well Water Gagangiri Vill
Borewell Water from Mhada Colony
Borewell Water from Datala Gram Panchay
Borewell water at Gramin Rugnalaya Ballarpur
Borewell Water at Nagar Parishad
Borewell Water at Visapur Vill
TADALI
TADALI
TADALI
TADALI
GHUGUS
GHUGUS
GHUGUS
Chandrapur
Chandrapur
Chandrapur
Ballarpur
Ballarpur
Ballarpur
Location
Electrical Conductivity


Chandrapur Ground Water
Concentration MPN/Index
25
20
15
10
5
0
Tadali Vill Near Primary School
Borewell of Yerur Vill
Dugwell near Tadali Lake & Janata School
Dugwell of Yerur Vill
Borewell water taken of Tukdoji Nagar Ghugus Vill
Borewell Water taken from Nakoda Vill.
Dugwell water from Usgaon Village
Well Water Gagangiri Vill
Borewell Water from Mhada Colony
Borewell Water from Datala Gram Panchay
Borewell water at Gramin Rugnalaya Ballarpur
Borewell Water at Nagar Parishad
Borewell Water at Visapur Vill
TADALI
TADALI
TADALI
TADALI
GHUGUS
GHUGUS
GHUGUS
Chandrapur
Chandrapur
Chandrapur
Ballarpur
Ballarpur
Ballarpur
Location
Total Coliforms
Faecal Coliforms

4. Summary of the results

Based on the study done, the results are summarised and concluded as follows:

4.1 Stack Emission Monitoring:

A) Tadali MIDC

At Tadali MIDC, four samples were collected from different industries.

1. **Particulate Matter**: At all locations monitored, particulate matter was within the limit.

2. **Sulphur Dioxide:** The concentration of sulfur dioxide varied between minimum of 221 mg/Nm^3 to 1280 mg/Nm^3. This however, will depend on the fuel used and load allotted in the consent. Maximum concentration was found at Dhariwal Infra.

3. **Nitrogen Dioxide**: Values range between 17.2 mg/Nm^3 to 25.1 mg/Nm^3.

4. **Carbon Monoxide**: At Gopani Iron Pvt. Ltd. Highest range of 12.8 mg/Nm^3 was observed.

5. **Oxygen**: Varied between 12.5 % at Gopani Iron Pvt. Ltd. and maximum of 19.2 %.

6. **Volatile Organic Compounds:** Stacks in the Chandrapur area were also monitored for Volatile organic compounds. Their presence has been described in stacks at industry.

At Tadali MIDC, VOCs were monitored in following stacks of following industries.

a) **Gopani Iron Pvt. Ltd**.: Four different VOCs were found namely MIBK(0.49 mg/Nm^3),Benzene(1.66 mg/Nm^3) and Ethyl acetate has the maximum concentration i.e.21.4 mg/Nm^3.Total quantity of VOCs at Gopani Iron Pvt.Ltd.was 23.8 mg/Nm^3.Other two VOCs namely Xylene and Ethyl benzene were not detected.

b) **Sidhbali Ispat**: Stack Emission Analysis at Sidhbali Ispat, registered total of 4.41 mg/Nm^3.Concentration of VOC's were in the range of minimum of 0.039 mg/Nm^{3}of Ethyl bezene and maximum of 3.06 mg/Nm^3 of Ethyl acetate.

c) **Multiorganic Industries Pvt. Ltd:** Total concentration of VOCs in these industries was 19.2 mg/Nm^3 with the maximum of 17.04mg/Nm^{3}and maximum of 0.036mg/Nm^{3}of Ethyl benzene. All other VOCs were also present with varying concentration.

d) **Maharashtra Carbon:** Total concentration of VOC's was 1.06 mg/Nm^3 with the highest concentration of Ethyl acetate of 0.657mg/Nm^{3}was found. All other VOCs were also found.

B) Chandrapur MIDC:

At Chandrapur MIDC, Super Hygenic and one of the Multiorganic Stacks, particulate matter exceeded giving the concentration of 287 mg/Nm^3 and 296 mg/Nm^3 respectively.

1. **Sulphur Dioxide**: At the Stack of Super Hygenic, Sulfur dioxide was not detectable and at other two stacks the values were 320 mg/Nm^3 and 218 mg/Nm^3.

2. **Nitrogen Dioxide:**. Stack where sulfur dioxide was not detectable level, NO_X concentration was 25.8 mg/Nm^3 while at other two places it was 112 and 132 mg/Nm^3.

3. **Carbon Monoxide:** Values varied between minimum of 9.1 mg/Nm^3 and maximum of 129 mg/Nm^3.

4. **Oxygen**: Varied between 9.9% and 19.6%.

5. **Volatile Organic Compounds**: Super Hygenic showed total concentration of 0.28 mg/Nm^3. Three VOCs namely MIBK, Benzene and Toluene were found.

C) Ghugus MIDC:

Six different industries were selected for stack monitoring. Three stacks were monitored for Lloyds Metal and Energy Ltd and two stacks of ACC Cement Ltd and one of Gupta Energy Ltd.

1. **Sulphur Dioxide**: Emission level of Sulphur Dioxide concentration was high at all places ranging between 220 mg/Nm^3 and 1088 mg/Nm^3. The emission level however may depend upon fuel and allotted load.

2. **Nitrogen Dioxide**: Except at ACC Cement, emission level of Nitrogen dioxide was quite below as compared to highest value of 579 mg/Nm^3 at ACC cement.

3. **Carbon Monoxide**: It was of highest concentration at Lloyds Metal and Energy of 1605 mg/Nm^3.

4. **Oxygen:** Varied between 9.1% and 19.1%.

5. **Volatile Organic Compounds:**

a) **Gupta Energy Pvt. Ltd:** Total concentration of VOCs found was 0.98 mg/Nm^3. MIBK had the highest concentration and ethyl benzene had the lowest concentration of 0.019 mg/Nm^3.

b) **ACC Cement Ltd.**: No VOCs were detected in the stack.

c) **ACC Cement Ltd.:**In another stack of ACC Cement total concentration recorded was 0.017 mg/Nm^3. Others were not detected at all.

d) **Lloyds Metals and Energy Ltd.:** All VOCs except Ethyl acetate were found with the concentration of 2.14 mg/Nm^3.

D) Ballarpur MIDC:

Six different stacks of Ballarpur Paper industries were monitored for the aforesaid parameters.

1. **Particulate Matter:** Concentration of Particulate matter was well within the range not exceeding at any one of the stacks.

2. **Sulphur Dioxide:** Out of six stacks monitored of Ballarpur Paper Mill , three stacks displayed value between 400 and 500 mg/Nm^3 and remaining three stacks had sulfur dioxide values between 10.1 mg/Nm^3 and 37.7 mg/Nm^3.

3. **Nitrogen Dioxide:** Emission level varied between 28.8 mg/Nm^3 and 220 mg/Nm^3.

4. **Carbon Monoxide:** Very high values of Carbon Monoxide were emitted from three stacks of Ballarpur Paper Industries. At other three stacks, emission level was between 37 mg/Nm^3 and 191 mg/Nm^3.

5. **Oxygen**: Varied between lowest of 4.1% and 20%.

6. **Volatile Organic Compounds:** Two stacks of Ballarpur Paper Industries were monitored for VOCs. In one stack, total concentration of 7.18 mg/Nm^3 was found while in other it was 0.52 mg/Nm^3.

Comparing the values of Particulate matter emission at Tadali, Ghugus and Ballarpur MIDC area, appear to be cleaner, although one or two industries have high emission level. Sulfur dioxide emission level appears to be high at all stacks.

4.2 Ambient Air Quality Monitoring:

A) MIDC Tadali: In this industrial cluster the following locations were monitored namely Grace Industries Ltd, MIDC Growth Centre, Sidhballi, ISPAT Growth Centre. Each location was monitored for 12 parameters as per NAAQS.

1. **Sulphur Dioxide (SO_2):** Concentration of Sulphur dioxide in Tadali MIDC Area varied between lowest of 7.4 µg/m^3 to maximum of 9.3 µg/m^3. This area displaced a clear picture of Sulfur Dioxide concentration.

2. **Nitrogen Dioxide (NOx):** Concentration varied between 11.30 µg/m^3 and 14.8 µg/m^3 which is well below the standard laid down by CPCB.

3. **Particulate Matter (PM10)**: Particulate matter in this area has exceeded at two locations namely Grace Industries showing 35.4 µg/m^3 concentration and at Sidhbali ISPAT Growth Centre (Om Shree Rolling Mill) 175 µg/m^3.

4. **Particulate Matter (PM2.5):** Concentration of PM 2.5 at Grace Industries Ltd. and at MIDC Growth Centre were below NAAQS. However at Sidhbali ISPAT Growth Centre it was just on the standard value.

5. **Ozone (O_3)**: Ozone concentration was nearly 70% below the standard limit.

6. **Lead (Pb):** Concentration of Lead was also below the limit varying between 0.02 and 0.34 µg/m^3.

7. **Carbon Monoxide (CO):** Concentration of Carbon Monoxide ranges between maximum of 2.5 mg/m^3 and 1.4 mg/m^3 highest value being obtained at Grace Industries.

8. **Ammonia (NH_3):** Concentration of Ammonia was lower than the limit.

9. **Benzene (C_6H_6):** Sampling and analysis at these location show, Benzene value has exceeded at places namely Grace Industries (7.8 µg/m^3) and at Sidhbali ISPAT Growth Centre (38 µg/m^3)

10. **Benzo (a) Pyrene (BaP):** BaP displayed a similar situation like Benzene, being higher at Sidhbali ISPAT Growth Centre and Grace Industries.

11. **Arsenic (As):** Concentration of Arsenic was well below the standard prescribed by CPCB.

12. **Nickel (Ni):** Nickel exceeded at Grace Industries 31.34 ng/$m^{3.}$

B) MIDC Chandrapur: At Chandrapur MIDC, following locations were monitored namely MIDC Office, Datala Village and Hindustan Petroleum. Following are the findings based on the analytical values:

1. **Sulphur Dioxide (SO_2):** Values ranged between minimum of 10.3µg/m^3 at MIDC Office and 16.1µg/m^3at HP Gas.

2. **Nitrogen Dioxide (NOx):** More or less displayed same values with little variation at three places.

3. **Particulate Matter (PM10):** Similar to Tadali Area, PM 10 values were ranging between 117µg/m^3at Datala village and 161µg/m^3 at Hindustan Petroleum.

4. **Particulate Matter (PM2.5):** PM2.5 values exceeded at one place i.e. MIDC Office.

5. **Ozone (O_3):** Ozone value exceeded at one place by nearly 45µg/m^3 at Datala village.

6. **Lead (Pb):** Value of Lead was well below the standard and ranged between 0.03 to 0.09µg/m^3.

7. **Carbon Monoxide (CO):** Two values of Carbon monoxide were as per the standard value or very near to the standard i.e. 2 mg/m^3 at Datala village and 1.7mg/m^3.

8. **Ammonia (NH_3):** Values are below standard value.

9. **Benzene (C_6H_6)**: At one location i.e. Hindustan Petroleum, value exceeded exhibiting 13.6µg/m^3 as against 5.0µg/m^3 standard value.

10. **Benzo (a) Pyrene** (**BaP):** Except at one station BaP values exceeded.

11. **Arsenic (As):** Concentration in the ambient air at all the four locations of Chandrapur MIDC is within the stipulated limits.

12. **Nickel (Ni):** Concentration in the ambient air at all the four locations of Chandrapur MIDC is within the stipulated limits.

C) MIDC Ghugus: At MIDC Ghugus three locations of ambient air quality were monitored.

1. **Sulphur Dioixide (SO_2):** Values were well within the range, highest being 19.3 µg/m^3 at Transit Hostel WCL and lowest being at Lloyds Metal Colony i.e. 5.9 µg/m^3.

2. **Nitrogen Dioxide (NOx):** Values of Nitrogen dioxide ranged between 16.6 µg/m^3 and 34.7 µg/m^3at Lloyd Metal Colony and at Transit Hostel WLC respectively.

3. **Particulate Matter (PM10):** With reference to the concentration of PM10 values, it seems Transit Hostel WCL and Tukdoji Nagar values are above 700µg/$m^3$where as at Lloyds Metal Colony concentration of PM 10 is 235µg/m^3

4. **Particulate Matter (PM 2.5):** At one place i.e. Tukdoji Nagar, value slightly exceeds the limit i.e. 101 µg/m^3.

5. **Ozone (O_3):** Concentration of Ozone ranged between 28.2µg/m^3 at Tukdoiji Nagar and 70.8µg/m^3 at Lloyd Metal Colony.

6. **Lead (Pb)**: Values are between below detectable level and 0.13 µg/m^3.

7. **Carbon Monoxide (CO):** Values at Transit Hostel and Tukdoji Nagar, exceeded the standard value.

8. **Ammonia (NH_3)**: Values are well within the range lowest being 6.3 µg/m^3 and highest being 25.6 µg/m^3.

9. **Benzene (C_6H_6)**. Values are either near to the standard value or have exceeded as seen clearly at Transit Hostel WLC.

10. **Benzo (a) Pyrene (BaP):** At Tukdoji Nagar, value is lower than the standard value. Two values are above the limit.

11. **Arsenic (As) and Nickel (As):** Values of both metals are below the standard values although one value of Arsenic exceeded Transit Hostel WCL.

D) MIDC Ballarpur: MIDC Ballarpur area was monitored at three following locations (i) Main Gate Bamni Proteins Ltd (ii) Ballarpur Paper Mill Guest house and (iii) Mangal Karyalaya near lime dumping.

1. **Sulphur Dioxide (SO_2)**: Values are below the standard values.

2. **Nitrogen Dioxide (NO_x)**: All the values are within limit.

3. **Particulate Matter (PM10):** As generally observed PM10 values also exceed in the area, ranging between 96 µg/m^3 and 272 µg/m^3.

4. **Particulate Matter (PM 2.5):**At Ballarpur Paper Mill Guest house area, values of PM 2.5 exceeded (73µg/m^3). Whereas at other two places they were below the standards.

5. **Ozone (O_3):** At one location i.e., Ballarpur Paper Mill guest house, value is as low as 22.6µg/m^3 whereas at two places either it is near the limit or exceeded the limit.

6. **Lead (Pb):** Very low values are observed.

7. **Carbon Monoxide(CO):** Values are below the standard value ranging between 1.3 mg/$m^3$and 1.9 µg/m^3.

8. **Ammonia (NH_3)**: Values of ammonia are below the standard value ranging between 5.7µg/m^3 at Ballarpur Paper Mills Guest house and 21.0µg/m^3 at Bamni Proteins Ltd.

9. **Benzene(C_6H_6)**: Concentration of Benzene exceeds at one place i.e. near Mangal Karyalaya.

10. **Benzo (a) Pyrene (BaP):** At two locations BaP values exceeded the standard limit of ng/m^3.

11. **Arsenic(As)**: Values are below the standard values.

12. **Nickel (Ni)**:At Ballarpur Paper Mill guest house and Mangal Karyalaya, values are on the higher side ranging between 23.80 ng/m^3 and 33.90 ng/m^3.

If 4 MIDC areas in Chandrapur district are compared with NAAQS, 2009 the following conclusion can be drawn.

At Ghugus area they are the highest. There is a large variation in PM 2.5, but higher value PM10 is above limit at all the locations of Ghugus MIDC and Ballarpur. Other parameter which appears to be culprit are the Benzene, BaP with respect to other parameters. District appears to be clearer.

4.3 Waste Water Quality Monitoring:

(i) Shreesurya Dairy - MIDC Chandrapur (ii) Superhygenic (BMW) (iii) HPCL Bottling Plant MIDC Chandrapur (iv) Borewell Water at Gramin Rugnalaya - Ballarpur (v) Multiorganic Ltd Chandrapur.

- **Suspended solids:** At two industries namely Shreesurya Dairy and Super Hygenic (BMW) have exceeded the limits of 100 mg/L max.
- **pH:** pH Value in case of Shreesurya Daily has exceeded the value beyond the general standard.
- **Oil & Grease**: Oil and Grease in case of Shree Suraya Dairy is 23 mg/L which is beyond the standard discharge limit.
- **Total Residual Chlorine:** It is well below the standard discharge limit.
- **Total Ammonia**: Exceeds the limit of Super Hygenic, having the concentration of 30.3 mg/L.
- **Total Kjeldhal Nitrogen**: It is well within the limit.
- **Free Ammonia**: In case of Super Hygenic (BMW) the concentration is 7.11 mg/L as against 5.0 mg/L of standard discharge value.
- **Biochemical Oxygen Demand**: Exceeding at all places.
- **Chemical Oxygen Demand:** Exceeding the limit of 250 mg/L at all places expect HPCL Bottling Plant.
- **Mercury:** Concentration of Mercury is well below the limit at all places.
- **Lead:** Lead exceeds the value of 0.1 mg/L at Super Hygenic.
- **Cadmium Chromium Hexa and Total Chromium**: Values are below the prescribed limit.
- **Copper & Zinc:** Values of both metals are below the standard limit.

- **Nickel:** Concentration of Nickel is below the limit and ranges between 0.06 mg/L and 1.08 mg/L
- **Cyanide:** Values of Cyanide are either above or below the detection limit.
- **Fluoride**: Value of fluoride exceeds at Super Hygenic.
- **Dissolved Phosphorus**: Values are well below the standard limits.
- **Sulphide:** At all places sulfide is not detectable.
- **Manganese:** Well within the limits at all places.

Iron: At two places, namely Shreesuraya Dairy and HPCL Bottling Plant, concentration of Iron is within the range, however at Super Hygienic and at Bore well water at Gramin Rugnalaya the values have exceeded.Apart samples of ETP outlet effluent, surface water samples were also collected.

Each MIDC area has been segregated for collection of surface and bore well water samples. They are as follows:

A) Tadali MIDC:

1. **Colour**: Colour in the range 1 to 15 Hazen units, maximum being at Nalla near railway crossing and at well water near Primary School Tadali.
2. **pH**: Is in the range of 7 and 8.2. As per IS 10500-2012, it is acceptable.
3. **Suspended Solids**. Values range between less than 5 mg/L and maximum of 124 mg/L in case of Lake water, Tadali Village.
4. **COD**: Chemical oxygen demand varies between minimum of 13 mg/L in case of well water at Tadali village and maximum of 32 mg/L at Wardha river.
5. **BOD:** Values range between 3.9 mg/L at well water near Primary school, Tadali.
6. **Nitrates:** Within the acceptable standard of drinking water IS 10500:2012.
7. **Surface Active Agent:** Well below the acceptable value as per IS 10500:2012.
8. **Residual Chlorine:** It is below the detectable level (DL 0.1 mg/L)
9. **Sulphide**: Less than 0.08 mg/L
10. **Metals**: All metals like Zinc, Nickel, Copper, Hexavalent Chromium, Total Chromium, Lead, Cadmium, Mercury are below the prescribed limits.
11. **Cyanide and Phenol**: Are all within the prescribed limits.
12. **Pesticides:** All analysed pesticides concentration are below the standards.
13. **PAH & PCBs:** Also lie below the standard.

B) Chandrapur MIDC:

All analytical values are compared with General standards for discharge of Environment pollutants.

- **Suspended Solids**: Values range between, minimum of 19 mg/L at Nalla on Yeur road and maximum of 32mg/L at Nalla on backside of Gopani Iron.
- **pH**: pH Values lie between 6.5 at Nalla outside Grace Industry and maximum of 7.9 at Nalla near Madhuban Board mill.
- **Oil and Grease**: Values are at below detectable level BDL (1.0 mg/L).
- **Residual Chlorine**: Values are at BDL Level (0.1 mg/L).
- **Biochemical Oxygen Demand**: Varies between minimum of 19 mg/L at Nalla outside Grace Industry and maximum of 438 mg/L. Except two values of BOD, all are beyond the standard value.
- **Chemical Oxygen Demand:** Values are as high as 1320 mg/L at Nalla near Madhuban Board and 1152 mg/L at Dhanora Bridge River.
- **Metals:** Metals like Arsenic, Mercury, Lead, Cadmium, Hexavalent Chromium, Copper, and Zinc all within the acceptable range. Cyanide, Fluoride and Phenol are within the acceptable range.
- **Sulphide:** Values range between 0.08 mg/L at Nallah at Yeur village and 2.2 mg/L at Nallah at backside of Gopani Iron.
- **Iron:** Values range between 0.08 mg/L at Nalla on Yeur village road 1.641 at Nalla at Grace Industry.
- **PAH & PCB**: Below the standard limit.
- **Pesticides**: All pesticides analysed, individually below the general standards.

C) Ghugus MIDC

- **Suspended Solids**: Values range between minimum of 8 mg/L at River water near intake well WCL OCM and maximum of 54 mg/L at Nalla water.
- **pH**: Variation of pH range is within the narrow range between 7 and 8. At all places pH is within the acceptable range.
- **Oil and Grease:** Values are below the detectable level of 1.0 mg/L.
- **Total Residual Chlorine:** It is below 0.1 mg/L as against the acceptable standard of 0.1 mg/L.
- **Ammonical Nitrogen, Total Kjeldhal Nitrogen and Free Ammonia:** All Values are within the acceptable limits.
- **Chemical Oxygen Demand:** Values lie between minimum of 16 mg/L at River water near intake well WCL OCM and maximum of 168 mg/L at Nallah water
- **Biochemical Oxygen Demand**: Values are between 6.5 mg/L at Wardha River near AC Ltd, Coal Mines Road.

- **Metals**: All values of metals are within the acceptable range.
- **Cyanide and Fluoride**: Values of these two parameters are within the acceptable standards.
- **Phenol**: Meets the requirement of standard.
- **Dissolved Phosphate:** All the values of dissolved phosphate at all locations are within the acceptable standards.
- **PAH and PCB:** are within the acceptable range of standard values.
- **Pesticides**: analysed show their analytical values within the range.

D) Ballarpur MIDC

- **Suspended Solids**: Values range between minimum of 0.5 mg/L at Bore well water near Nagar Parishad and maximum of 482 mg/L at Bore well water, Visapur village. Thus there is wide variation in the values.
- **pH**: At all the locations pH is in the range of 5.6 and 8 lowest value being observed at Bore well water at Visapur village Bore well while the maximum at Wardha river, Rajura bridge. This pH variation fits into the standard for discharge of Environment pollutants.
- **Oil and Grease**: All values are below the detection limit of 1.0 mg/L.
- **Total Residual Chlorine**: Values are below the detection limit of 0.1 mg/L.
- **Ammonical Nitrogen, Total Kjeldhal Nitrogen and free ammonia**: Values are within the acceptable concentrations.
- **Biochemical Oxygen Demand:** It exceeds at Nalla near MSW, Municipal Corporation. At other places, it is in acceptable range.
- **Chemical Oxygen Demand:** Values range between minimum of 12 mg/L at Bore well water near Nagar Parishad water supply and maximum of 236 mg/L at Nalla near MSW, Municipal Corporation.
- **Metals**: Metals like Arsenic, Mercury, Lead, Cadmium, Chromium hexavalent, Total Chromium, Copper, Zinc all within the acceptable range.
- **Cyanide, Fluoride and Phenol:** All are within the acceptable values.
- **Dissolved Phosphate**:Values are within the acceptable range.
- **Nitrate**: Values of Nitrates are below the standard discharge values.

5. CEPI Score

Comprehensive Environmental Pollution Index (CEPI) is intended to act as early warning tool which helps in categorization of industrial clusters/areas in terms of priority of needing attention. CPCB had evolved certain methodology to calculate CEPI, in which a score has been fixed for different environmental components based on the level of pollution. The scoring system involves an algorithm that takes into account the basic

selection criteria. This approach is based on the basic hazard assessment logic that can be summarized as below.

Hazard = pollutant source, pathways, and receptor

CPCB has calculated CEPI for the identified critically polluted industrial clusters in 2009. It is calculated separately for air, water, and land. The basic framework and scoring system of the CEPI – based on three factors namely pollutant, pathway, and receptor – has been described below.

Based on Sub-Index Score (score of individual environmental component like air, water etc.):

- **Score more than 63:** A Critical Level of Pollution in the respective level of environmental component
- **Score between 51-63:** Severe to critical level of pollution with reference to respective environmental component

Cut-off Score

- **Score 50:** Severely Polluted Industrial Clusters/areas
- **Score 60:** Critically Polluted Industrial Clusters/areas

Based on Aggregated CEPI Score (score includes sub-index score of all individual environmental components together):

- **Aggregated CEPI score >70:** Critically polluted areas
- **Aggregated CEPI score between 60-70:** Severely polluted areas

Since the inception of the programme, MPCB has also formulated Action Plans to mitigate the environmental pollution problems for each of the 8 Critically Polluted Areas (CPAs) in Maharashtra. Based on available information, parameters selected and monitored in continuation with this, CEPI has been calculated and Short Term Action Plan (STAP) as well as Long Term Action Plan (LTAP) was prepared in 2010.

Subsequently NAAQS 2009 came in force. List of parameters to be considered increased and expanded including more critical and hazardous pollutants like benzene, BaP, Metals, etc. existing in the environment. There was revision of standards (limiting values) as well. In this present report of 2017 prepared by MPCB, CEPI is calculated considering all these revised standards' limiting values, list of parameters and complete scope of monitoring.

Below given Table shows aggregated CEPI of present report in comparison with the CEPI Score 2013 and CPCB report (2009).

1. CEPI score by CPCB in 2009

2. CEPI score 2013

(considering all revised standards, scope and limiting values of 2013)

3. CEPI score MPCB 2016, (considering all parameters)
4. CEPI score MPCB 2017, this report (considering all parameters)

The result shows that CEPI score of present report is 62.3, which is higher than the CEPI score of 2016 studies (58.62). The main reason behind the variation in the result is because the sampling of CEPI 2016 was carried out in monsoon season (July month. During monsoon, pollutants load gets decreased in air as well as in water bodies due to dilution, which results in lower concentration of pollutants in a particular sample. However, the present study was carried out in post monsoon (February month), which again increased the concentration of pollutants in the environment and hence resulted in higher CEPI score as compared to August, 2016 score.

However, it should also be noticed over here that MPCB's efforts through the formulation of action plans decreased the overall concentration of pollutants in all aspects i.e. air, land and water in Chandrapur area in past three years. This has also resulted in decreased score of CEPI now.

5.1 Comparison of CEPI scores:

Results show that present CEPI score (62.3) of Chandrapur considering all revised standards is lesser tan the CEPI Score of 2013 (85.56) report.

Detailed results of Air, Water and Land are given below:

Air

	A1	**A2**	**A**	**B1**	**B2**	**B3**	**B**	**C1**	**C2**	**C3**	**C**	**D**	**CEPI**
Present Report 2017	3	2	6	6	0	2	8	4	3.8	0	15.2	15	**44.2**
CEPI score 2016	3	2	6	2.3	3	3	8.3	5	5	0	25	10	**49.3**
CEPI score 2013	2	5	10	6	3	3	12	5	3	0	15	10	**47**
CPCB Report 2009	5.75	5	28.75	6	3	3	12	5	4	0	20	10	**70.75**

Water:

	A1	A2	A	B1	B2	B3	B	C1	C2	C3	C	D	CEPI
Present Report 2017	3	4.8	14.4	1.6	0	3	4.6	5	5	2.3	27.3	10	**56.3**
CEPI score 2016	3	3.8	7.6	5	0	3	8	5	2	4	14	10	**39.6**
CEPI score 2013	1	5	5	6	0	3	9	5	1.5	4	11.5	3	**28.5**
CPCB Report 2009	3	5	15	8	1.5	3	12.5	5	4	5	25	15	**67.5**

Land:

	A1	A2	A	B1	B2	B3	B	C1	C2	C3	C	D	CEPI
Present Report 2017	3	4.8	14.4	1.6	0	3	4.6	5	5	2.3	26.5	10	**57.5**
CEPI score 2016	4	2.9	11.6	3.8	0	3	6.8	5	5	0	25	10	**46.4**
CEPI score 2013	1	5	5	8	0	3	11	5	5	4	29	10	**55**
CPCB Report 2009	3	5	15	4	3	4.5	11.5	5	4	5	25	15	**66.5**

Aggregated CEPI:

	Air Index	Water Index	Land Index	CEPI
Present Report 2017	44.2	56.3	57.5	**62.3**
CEPI Score 2016	49.3	39.6	46.34	**58.62**
CEPI score 2013	77	62	60	**85.56**
CPCB Report 2009	70.75	67.5	66.5	**83.88**

6. Conclusion

Hazardous pollution that has earned dubious distinction for Chandrapur is on decline. Chandrapur, which was under industrial moratorium for last five years, has slid to sixth position from second position on the comprehensive environmental pollution index (CEPI) prepared by the CPCB recently. With fall in pollution levels, officials are optimistic that Chandrapur might escape from clutches of industrial moratorium. The efforts by the State Pollution Control Board and by the Regional Pollution Control Board are the reason behind the good image of Environment in Chandrapur.

In the 25 stack emission monitored, few of them had higher concentration of SO_2. All other parameters monitored were well within the standard provided to specific industries.

Only PM_{10} is few locations and $PM_{2.5}$ is lesser location was observed with higher concentration of emission as per NAAQS. This is due to the increase in the vehicles and vehicular emissions.

Out of the 25 waste water samples, few samples were detected with higher concentration of Total coliform and Faecal coliform. This will be complied as already the specified industry have been notified and asked to take necessary action.

12 Ground water samples were collected from different Dug well, well and Bore well in the region. In the ground water samples collected, Electrical Conductivity, Nitrogen, Total coliform and Faecal coliform was found in higher concentration.

Collective efforts of MPCB, administration and environmental organizations have finally paid off and pollution levels in Chandrapur are on the decline. Cumulative CEPI score which was initially 88.83 in 2009 has declined to 81.90 by 2013. In this report the CEPI score have even more reduced to 62.3.

	A1	A2	A	B1	B2	B3	B	C1	C2	C3	C	D	CEPI
Air Index	3	2	6	6	0	2	8	4	3.8	0	15.2	15	**44.2**
Water Index	3	4.8	14.4	1.6	0	3	4.6	5	5	2.3	27.3	10	**56.3**
Land Index	3	4.8	14.4	1.6	0	3	4.6	5	5	2.3	26.5	10	**57.5**
Aggregated CEPI													**62.3**

7. Efforts taken for the reduction in pollution:

The regional office of Maharashtra pollution control board has taken various initiatives in reducing the CEPI Score of 85.56 of 2013 to 79.07 of 2017. Below mentioned are some of the efforts:

- A monitoring committee was formed under the Chairman of District Collector for effective implementation of the Action Plan.

- M/s. BILT Graphics paper products Ltd., a pulp and paper mill has adopted new environmental friendly technology based on ECF i.e. Elemental Chlorine Free technology and Board has granted consent to establish Plant is under stabilization since May- 2013.

- The Thermal Power plant is the single largest contributor in the air pollution in Chandrapur. The MAHAGENCO, which operates this plant, has taken steps to control air emissions from this coal based power plant and the efficiency of the air pollution control equipment is rated to be good. There is need for improvement. In spite of the air pollution prevention and control measures in place, sporadic complaints of the air emissions are received by the Board.

- MPCB is operating three stations under National Air Monitoring Programe (NAMP) at Chandrapur and nearby industrial area. Automatic Continuous ambient air quality monitoring station is also operational at Chandrapur. Board has initiated steps to set up additional ambient air quality monitoring (AAQM) stations under NAMP and State air monitoring program (SAMP) particularly at the coal mine sites.

- The generation of mine discharge, excavation of top soil during the mining activities is an example of degradation of natural resources. It is necessary to initiate serious attempts to conserve these natural resources while the exploitation of minerals on a sustainable basis. Generation of fly ash from the power station is also a similar example. There are incidences of air and water pollution due to improper handling of fly ash. Maximum utilization of the fly ash in brick making, construction and cement industry is considered as priority. The efforts of the Board to generate awareness about the fly ash utilization by various stake holders have yielded positive results. However, there is a more potential to utilise fly ash for the reclamation of the coal mines and also use it as a micronutrient supplement for crops.

8. Photographs

WCL OCM Office, Ballarpur

Borewell Water of Visapur Village

Ballarpur Open Cast MIne Discharge

Multi Organic

Green Tech

Super Hygenic

ACC Plant

Wardha River Near WTP of WCL Ghugus OCM

9. References

1) Criteria for Comprehensive Environmental Assessment of Industrial Clusters, December 2009,CPCB, EIAS/4/2009-10

2) Comprehensive Environmental Assessment of Industrial Clusters, December 2009,CPCB, EIAS/5/2009-10

3) Action Plan for Industrial Cluster: Chandrapur, November 2010,MPCB

4) Action Plan for Industrial Cluster: Dombivli, November 2010,MPCB

5) Action Plan for Industrial Cluster: Aurangabad, November 2010,MPCB

6) Action Plan for Industrial Cluster: NaviMumbai, November 2010,MPCB

7) Action Plan for Industrial Cluster: Navi Mumbai, November 2010,MPCB

8) Standard Methods for the Examination of Water and Waste Water, American Public Health Association, 22BDL Edition, 2012.

9) IS 3025 (various parts)

10) www.mpcb.gov.in

11) www.cpcb.gov.in

10. Annexure

Annexure I: Stack Emission Sampling and Analysis Methodology

Sr.	Parameters	Method References	Techniques	Detection Limit
1.	Acid Mist (as Sulphuric Acid)	US EPA Method no.m-8	Barium thorine titration Method	0.6 mg/Nm^3
2.	Ammonia	IS 11255 (Part 6):1999, Reaffirmed 2003	Titration/Nessler Reagent / Spectrophotometric Method	1 mg/Nm^3
3.	Carbon Monoxide	USEPA Method 10B	GC-FID Method	0.2 mg/Nm^3
4.	Chlorine	US EPA Method 26 for sampling	Titrimetric	0.001 mg/Nm^3
5.	Fluoride (Gaseous)	US EPA Method 13 A	SPADNS Zirconium Lake Spectrophotometric Method	0.025 mg/Nm^3
6.	Fluoride (Particulate)	US EPA Method 13 A	SPADNS Zirconium Lake Spectrophotometric Method	0.005 mg/Nm^3
7.	Hydrogen Chloride	US EPA Method 26 for sampling	Titrimetric	0.25 mg/Nm^3
8.	Hydrogen Sulphide	IS 11255 (Part 4):1985	Titrimetric	1 mg/Nm^3
9.	Oxides of Nitrogen	IS 11255 (Part 7): 2005	PDSA Colorimetric Method	10 mg/Nm^3
10.	Oxygen	IS 13270 : 1992	ORSAT Apparatus	1 %
11.	Poly Aromatic Hydrocarbons (Particulate)	IS 5182 (Part 12) : 2004, Reaffirmed 2009 CPCB Guidelines, May 2011, Page No.39	GC-FID Method	0.25 mg/Nm^3
12.	Suspended Particulate Matter	IS 11255 (Part 1):1985, Reaffirmed 2003	Gravimetric Method	10 mg/Nm^3

Sr.	Parameters	Method References	Techniques	Detection Limit
13.	Sulphur Dioxide	IS 11255 (Part 2): 1985, Reaffirmed 2003	Titrimetric IPA thorine Method	5.0mg/Nm^3
				0.02kg/day
14.	BTX (Benzene, Toluene, Xylene)	NIOSH (NMAM) 1501	Adsorption and Desorption followed by GC-FID analysis	0.001 mg/Nm^3
15.	VOC (Volatile Organic Compounds)	NIOSH (NMAM) 1501 for sampling	Adsorption and Desorption followed by GC-FID or GC/MS analysis	-
i	Methyl Isobutyl Ketone	-	-	0.001 mg/Nm^3
ii	Benzene	-	-	0.001 mg/Nm^3
iii	Toluene	-	-	0.001 mg/Nm^3
iv	Xylene	-	-	0.001 mg/Nm^3
v	Ethyl Benzene	-	-	0.001 mg/Nm^3
vi	Ethyl Acetate	-	-	0.001 mg/Nm^3

Annexure II: Ambient Air Sampling and Analysis Methodology

Sr.	Parameters	Method References	Techniques	Detection Limit
1.	Sulphur Dioxide (SO_2)	CPCB Guidelines for the Measurement of Ambient Air Pollutants, Volume I, May 2011, Page No.1	Improved West & Gaeke Method	4 µg/m^3
2.	Nitrogen Dioxide (NO_2)	CPCB Guidelines for the Measurement of Ambient Air Pollutants, Volume I, May 2011, Page No.7	Modified Jacob & Hochheiser Method	3 µg/m^3
3.	Particulate Matter (size less than 10 µm) or PM_{10}	CPCB Guidelines for the Measurement of Ambient Air Pollutants, Volume I, May 2011, Page No.11	Gravimetric Method	2 µg/m^3
4.	Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	CPCB Guidelines for the Measurement of Ambient Air Pollutants, Volume I, May 2011, Page No. 15	Gravimetric Method	0.4 µg/m^3
5.	Ozone (O_3)	APHA, Method No. 820, Page no. 836	Chemical Method	19.6 µg/m^3
6.	Lead (Pb)	CPCB Guidelines for the Measurement of Ambient Air Pollutants, Volume I, May 2011, Page No. 47	AAS Method	0.02 µg/m^3
7.	Carbon Monoxide (CO)	CPCB Guidelines for the Measurement of Ambient Air Pollutants, Volume II, May 2011, Page No. 16	Non Dispersive Infra Red (BDLIR) spectroscopy	0.05 mg/m^3
8.	Ammonia (NH_3)	CPCB Guidelines for the Measurement of Ambient Air Pollutants, Volume I, May 2011, Page No. 35	IBDLophenol Blue Method	4.0µg/m^3
9.	Benzene (C_6H_6)	IS 5182 (Part 11):2006	Adsorption and Desorption followed by GC-FID analysis	1.0 µg/m^3
10.	Benzo (a) Pyrene (BaP) – particulate phase only,	CPCB Guidelines for the Measurement of Ambient Air Pollutants, Volume I, May 2011, Page No. 39	Solvent extraction followed by GC-FID analysis	0.2 ng/m^3

Sr.	Parameters	Method References	Techniques	Detection Limit
11.	Arsenic (As)	CPCB Guidelines for the Measurement of Ambient Air Pollutants, Volume I, May 2011, Page No. 47	AAS Method	0.3ng/m^3
12.	Nickel (Ni)	CPCB Guidelines for the Measurement of Ambient Air Pollutants, Volume I, May 2011, Page No. 47	AAS Method	3.0ng/m^3

Annexure III: Water/Wastewater Sampling and Analysis Methodology

Sr.	Parameters	Methods References	Techniques	Detection Limit
1.	Sampling Procedure for Chemical Parameters	IS 3025 (Part 1): 1987, Reaffirmed 1998, Amds.1& APHA, 22^{BDL} Ed., 2012, 1060 B, 1-39	-	-
2.	Sampling Procedure for Microbiological Parameters	APHA, 22BDL Ed., 2012,1060 B, 1-39, 9040, 9-17, and 9060B, 9-35	-	-
3.	Temperature	APHA, 22^{BDL} Ed., 2012, 2550-B, 2-69	By Thermometer	-
4.	Colour	APHA, 22^{BDL} Ed., 2012 , 2120-B, 2-26	Visible Comparison Method	1 Hazen Unit
5.	Odour	IS 3025 (Part 5): 1983, Reaffirmed 2006	Qualitative Method	-
6.	pH	APHA, 22^{BDL} Ed., 2012, 4500-H^+- B, 4-92	By pH Meter	1
7.	Oil & Grease	APHA, 22^{BDL} Ed., 2012, 5520-B, 5-40	Liquid -liquid Partition-Gravimetric Method	1.0 mg/L
8.	Suspended Solids	IS 3025(Part 17): 1984, Reaffirmed 2006,Amds.1	Filtration /Gravimetric Method	5.0 mg/L
9.	Dissolved Oxygen	IS 3025(Part 38): 1989, Reaffirmed 2009	Iodometric Method-Azide modification	0.05 mg/L
10.	Chemical Oxygen Demand	APHA,22^{BDL} Ed., 2012 , 5220-B, 5-17	Open Reflux Method	5.0 mg/L
11.	Biochemical Oxygen Demand	IS 3025(Part 44): 1993,Reaffirmed 2009,Amds.1	Iodometric Method	5.0 mg/L
12.	Electrical Conductivity	APHA, 22^{BDL} Ed., 2012, 2510- B, 2-54	By Conductivity Meter	0.1 µmho/cm
13.	Nitrite-Nitrogen	APHA, 22^{BDL} Ed., 2012, 4500-NO_2-B, 4-120	Colorimetric Method	0.006 mg/L

Sr.	Parameters	Methods References	Techniques	Detection Limit
14.	Nitrate-Nitrogen	APHA,22^{BDL} Ed.,2012 ,4500-NO_3,B-4-122	UV Spectrophotometer Screening Method	0.2 mg/L
15.	(NO_2 + NO_3)-Nitrogen	APHA, 22^{BDL} Ed., 2012, 4500-NO_2-B, 4-120 APHA,22^{BDL} Ed.,2012,4500-NO_3,B-4-122	Colorimetric Method V Spectrophotometer Screening Method	0.2 mg/L
16.	Free Ammonia	APHA, 22^{BDL} Ed., 2012 , 4500 NH_3, F, 4 -115	Colorimetric Method	0.006 mg/L
17.	Total Residual Chlorine	IS 3025 (Part 26) :1986 , Reaffirmed 2009, Ed. 2.1(2004-02)	Iodometric Method	0.1 mg/L
18.	Cyanide (CN)	APHA, 22^{BDL} Ed., 2012 ,4500-CN, C & E, 4-41 & 4-43	Colorimetric Method	0.001 mg/L
19.	Fluoride (F)	APHA, 22^{BDL} Ed., 2012, 4500-F^-, D, 4-87	SPADNS Method	0.05 mg/L
20.	Sulphide (S^{2-})	APHA, 22^{BDL} Ed., 2012, 4500 –S^2 , C-4-175, F-4-178	IodometricMethod	0.08 mg/L
21.	Dissolved Phosphate (P)	APHA,22^{BDL} Ed., 2012 , 4500 P,E, 4-155	Ascorbic Acid Method	0.03 mg/L
22.	Sodium Absorption Ratio	IS11624 :1986, Reaffirmed 2006	By Calculation	0.3
23.	Total Phosphorous (P)	APHA,22^{BDL} Ed., 2012 , 4500 P,E, 4-155	Ascorbic Acid Method	0.03 mg/L
24.	Total Kjeldahl Nitrogen	APHA, 22^{BDL} Ed., 2012, 4500 NH_3, B & C, 4 -110, 4-112	Titrimetric Method	0.1 mg/L
25.	Total Ammonia (NH_4 +NH_3)-Nitrogen	APHA,22^{d} Ed., 2012 , 4500 NH_3, F, 4 -115	Colorimetric Method	0.001 mg/L
26.	Phenols (C_6H_5OH)	APHA,22^{BDL} Ed., 2012 , 5530- B & C,	Chloroform Extraction Method	0.001 mg/L

Sr.	Parameters	Methods References	Techniques	Detection Limit
		5-44 & 5-47		
27.	Surface Active Agents	APHA,22^{BDL} Ed., 2012 , 5540-B & C,5-50	Methylene Blue Extraction Method	0.1 mg/L
28.	Organo Chlorine Pesticides	APHA, 22^{BDL} Ed., 2012,6410B,6-74	GC MS-MS Method	0.01 µg/L
29.	Polynuclear aromatic hydrocarbons (PAH)	APHA, 22^{BDL} Ed., 2012,6410B,6-74	GC MS-MS Method	0.01 µg/L
30.	Polychlorinated Biphenyls (PCB)	APHA, 22^{BDL} Ed., 2012,6410B,6-74	GC MS-MS Method	0.01 µg/L
31.	Zinc (Zn)	IS 3025(Part 2): 2004	ICP Method	0.1 mg/L
32.	Nickel (Ni)	IS 3025(Part 2): 2004	ICP Method	0.05 mg/L
33.	Copper (Cu)	IS 3025(Part 2): 2004	ICP Method	0.03 mg/L
34.	Hexavalent Chromium (Cr^{6+})	APHA, 22^{BDL}Ed., 2012,3500-Cr,B,3-69	Colorimetric Method	0.02 mg/L
35.	Total Chromium (Cr)	IS 3025(Part 2): 2004	ICP Method	0.02 mg/L
36.	Total Arsenic (As)	IS 3025(Part 2): 2004	ICP Method	0.005 mg/L
37.	Lead (Pb)	IS 3025(Part 2): 2004	ICP Method	0.008 mg/L
38.	Cadmium (Cd)	IS 3025(Part 2): 2004	ICP Method	0.002 mg/L
39.	Mercury (Hg)	IS 3025(Part 2): 2004	ICP Method	0.0008 mg/L
40.	Manganese (Mn)	IS 3025(Part 2): 2004	ICP Method	0.02 mg/L
41.	Iron (Fe)	IS 3025(Part 2): 2004	ICP Method	0.06 mg/L
42.	Vanadium (V)	IS 3025(Part 2):	ICP Method	0.05 mg/L

Sr.	Parameters	Methods References	Techniques	Detection Limit
		2004		
43.	Selenium (Se)	IS 3025(Part 2): 2004	ICP Method	0.005 mg/L
44.	Boron (B)	IS 3025(Part 2): 2004	ICP Method	0.1 mg/L
45.	Total Coliforms	APHA, 22^{BDL} Ed., 2012,9221-B, 9-66	Multiple tube fermentation technique (MPN/100ml)	1.1 MPN/100ml
46.	Faecal Coliforms	APHA, 22^{BDL} Ed., 2012,9221-E, 9-74	Multiple tube fermentation technique (MPN/100ml)	1.1 MPN/100ml
47.	Bioassay (Zebra Fish) Test	IS 6582, 1971, Reaffirmed 1987	Static Technique	-

Annexure IV: National Ambient Air Quality Standards, 2009

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National Ambient Air Quality Standards: Central Pollution Control Board

In exercise of the powers conferred by Sub-section (2) (h) of section 16 of the Air (Prevntion and Control of Pollution) Act, 1981 (Act No.14 of 1981), and in suppression of the Notification No(s). S.O.384(E), dated 11th April, 1994 and S.O.935(E), dated 14th October, 1998, the Central Pollution Control Board hereby notify the National Ambient Air Quality Standards **with immediate effect**, namely:

Sr. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial, Residential, Rural and Other Areas	Ecologically Sensitive Areas (Notified by Central Government)	Methods of Measurement
(1)	(2)	(3)	(4)	(5)	(6)
1	Sulphur Dioxide (SO_2) µg/m³	Annual *	50	20	– Improved West and Gaeke – Ultraviolet fluorescence
		24 hours **	80	80	
2	Nitrogen Dioxide (NO_2) µg/m³	Annual *	40	30	– Modified Jacob & Hochheiser (Na-Arsenite) – Chemilminescence
		24 hours **	80	80	
3	Particulate Matter (size less than 10 µm) or PM_{10} µg/m³	Annual *	60	60	– Gravimetric – TOEM – Beta attenuation
		24 hours **	100	100	
4	Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$ µg/m³	Annual *	40	40	– Gravimetric – TOEM – Beta attenuation
		24 hours **	60	60	
5	Ozone (O_3) µg/m³	8 hours **	100	100	– UV photometric – Chemiluminescence – Chemical Method
		1 hour **	180	180	
6	Lead (Pb) µg/m³	Annual *	0.50	0.50	– AAS/ICP method after sampling on EPM 2000 or equivalent filter paper – EDXRF using Teflon filter
		24 hours **	1.0	1.0	
7	Carbon Monoxide (CO) mg/m³	8 hours **	02	02	– Non Dispersive Infra Red (NDIR) spectroscopy
		1 hour **	04	04	
8	Ammonia (NH_3) µg/m³	Annual *	100	100	– Chemiluminescence – Indophenol blue method
		24 hours **	400	400	
9	Benzene (C_6H_6) µg/m³	Annual *	05	05	– Gas Chromatography based continuous analyzer – Adsorption and Desorption followed by GC analysis
10	Benzo (a) Pyrene (BaP) – particulate phase only, ng/m³	Annual *	01	01	– Solvent extraction followed by HPLC/GC analysis
11	Arsenic (As) ng/m³	Annual *	06	06	– AAS/ICP method after sampling on EPM 2000 or equivalent filter paper.
12	Nickel (Ni) ng/m³	Annual *	20	20	– AAS/ICP method after sampling on EPM 2000 or equivalent filter paper.

* Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals.

** 24 hourly or 08 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2 % of the time, they may exceed the limits but not on two consecutive days of monitoring.

Note: Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category, it shall be considered adequate reason to institute regular or continuous monitoring and further investigation.

SANT PRASAD GAUTAM, Chairman, Central Pollution Control Board [ADVT-III/4/184/09/Exty.]

Note: The notifications on National Ambient Air Quality Standards were published by the Central Pollution Control Board in the Gazette of India. Extraordinary vide notification No(s). S.O. 384(E), dated 11th April, 1994 and S.O. 935(E), dated 14th October,1998.

µg/m³: micro-gram/m³ i.e. 10^{-6}gm/m³ ng/m³ : nano-gram/m³ i.e. 10^{-9}gm/m³

Annexure V: General Standards for Discharge of Environmental Pollutants, Part A: Effluents (The Environment (Protection) Rules, 1986, Schedule VI)

Sr.	Parameter	Standards			
		Inland surface Water	**Public Sewers**	**Land for Irrigation**	**Marine Coastal Areas**
1.	Colour and Odour	See Note 1	--	See Note I	See Note 1
2.	Suspended solids, mg/L, Max.	100	600	200	a. For process waste water - 100 b. For cooling water effluent- 10 percent above total Suspended mailer of influent cooling water.
3.	Particle size of Suspended solids	Shall pass 850 micron IS Sieve			a. Floatable solids, Max 3 mm b. Settleable solids Max 850 microns
4.	Dissolved solids (Inorganic), mg/L, Max.	2100	2100	2100	--
5.	pH value	5.5 -9.0	5.5 -9.0	5.5 -9.0	5.5-9.0

Sr.	Parameter	Standards			
		Inland surface Water	**Public Sewers**	**Land for Irrigation**	**Marine Coastal Areas**
6.	Temperature °C, Max	Shall not exceed 40 in any section of the stream within 15 mts. Downstream from the effluent outlet	45 at the point of discharge	--	45 at the point of discharge
7.	Oil and Grease, mg/L, Max	10	20	10	20
8.,	Total Residual chlorine, mg/L, Max	1.0	--	--	1.0
9.	Ammonical Nitrogen (as N), mg/L, Max	50	50	--	50
10.	Total Kjeldahl Nitrogen (as N), mg/L, Max.	100	--	--	100
11.	Free Ammonia (as NH_3), mg/L, Max	5.0	--	--	5.0
12.	Biochemical oxygen demand (5 days, at 20° c) mg/L, Max	30	350	100	100
13.	Chemical oxygen demand, mg/L, Max	250	--	--	250
14.	Arsenic (as As), mg/l, Max	0.2	0.2	0.2	0.2
15.	Mercury (as Hg). Mg/L, Max	0.01	0.01	--	0.01
16.	Lead (as Pb), mg/L, Max	0.1	1.0	-	1.0
17.	Cadmium (as Cd), mg/L,	2.0	1.0	--	2.0

Sr.	Parameter	Standards			
		Inland surface Water	**Public Sewers**	**Land for Irrigation**	**Marine Coastal Areas**
18.	Hexavalent Chromium (as Cr^{+6}) mg/L, Max	.1	2.0	--	1.0
19.	Total Chromium (as Cr), mg/L, Max	2.0	2.0	--	2.0
20.	Copper (as Cu), mg/L, Max.	3.0	3.0	--	3.0
21.	Zinc (as Zn), mg/L, Max.	5.0	15	0--	15
22	Selenium (as Se), mg/l, Max.	0.05	0.05	--	0.05
23	Nickel (as Ni), mg/l, Max.	3.0	3.0	--	5.0
24	Boron (as B), mg/l, Max.	2.0	2.0	2.0	--
25.	Percent Sodium, Max.	--	60	60	--
26.	Residual Sodium carbonate, mg/l, Max.	--	--	5.0	--
27.	Cyanide (as Cn), mg/L, Max.	0.2	2.0	0.2	0.2
28.	Chloride (as Cl), mg/L, Max.	1000	1000	600	--
29.	Fluoride (as F), mg/IL, Max.	2.0	15	--	15
30.	Dissolved Phosphate (as P), mg/L, Max.	5.0	--	--	--
31.	Sulphate (as SO_4), mg/L, Max.	1000	1000	1000	--
32.	Sulphide (as S), mg/L, Max.	2.0	--	--	5.0

Sr.	Parameter	Standards			
		Inland surface Water	**Public Sewers**	**Land for Irrigation**	**Marine Coastal Areas**
33.	Pesticides	Absent	Absent	Absent	Absent
34.	Phenolic Compounds (as C_6H_5OH), mg/L, Max.	1.0	5.0	--	5.0
35.	Radioactive materials:				
	a. Alpha emitters MC/ml., Max.	10^{-7}	10^{-7}	10^{-8}	10^{-7}
	b. Beta emitters µc/ml., Max	10^{-6}	10^{-6}	10^{-7}	10^{-6}

Annexure VI: Drinking Water Specification-IS 10500:2012

Sr.	Characteristic	Unit	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source
Table 1	**Organoleptic and Physical Parameters**			
1.	Colour	Hazen units	Max 5	Max 15
2.	Odour	-	Agreeable	Agreeable
3.	pH value	-	6.5-8.5	No relaxation
4.	Taste	-	Agreeable	Agreeable
5.	Turbidity	NTU	Max 1	Max 5
6.	Total dissolved solids	mg/L	Max 500	Max 2000
Table 2	**General parameters concerning substances uBDLesirable in excessive amounts**			
7.	Aluminium (as Al)	mg/L	Max 0.03	Max 0.2
8.	Ammonia (as total ammonia-N)	mg/L	Max 0.5	No relaxation
9.	Anionic detergents (as MBAS)	mg/L	Max 0.2	Max 1.0
10.	Barium (as Ba)	mg/L	Max 0.7	No relaxation
11.	Boron (as B)	mg/L	Max 0.5	Max 1.0
12.	Calcium (as Ca)	mg/L	Max 75	Max 200
13.	Chloramines (as $C1_2$)	mg/L	Max 4.0	No relaxation
14.	Chlorides (as Cl)	mg/L	Max 250	Max 1000
15.	Copper (as Cu)	mg/L	Max 0.05	Max 1.5
16.	Fluoride (as F)	mg/L	Max 1.0	Max 1.5
17.	Free residual chlorine	mg/L	Min 0.2	Min 1

Sr.	Characteristic	Unit	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source
18.	Iron (as Fe)	mg/L	Max 0.3	No relaxation
19.	Magnesium (as Mg)	mg/L	Max 30	Max100
20.	Manganese (as Mn)	mg/L	Max 0.1	Max 0.3
21.	Mineral Oil	mg/L	Max 0.5	No relaxation
22.	Nitrate (as NO_3)	mg/L	Max 45	No relaxation
23.	Phenolic Compounds (as C_6H_5OH)	mg/L	Max 0.001	Max 0.002
24.	Selenium (as Se)	mg/L	Max 0.01	No relaxation
25.	Silver (as Ag)	mg/L	Max 0.1	No relaxation
26.	Sulphate (as SO_4)	mg/L	Max 200	Max 400
27.	Sulphide (as H_2S)	mg/L	Max 0.05	No relaxation
28.	Total Alkalinity as calcium carbonate	mg/L	Max 200	Max600
29.	Total hardness (as $CaCO_3$)	mg/L	Max 200	Max 600
30.	Zinc (as Zn)	mg/L	Max 5	Max15
Table 3	**Parameters Concerning Toxic Substances**			
31.	Cadmium (asCd)	mg/L	Max 0.003	No relaxation
32.	Cyanide (asCN)	mg/L	Max 0.05	No relaxation
33.	Lead (as Pb)	mg/L	Max 0.01	No relaxation
34.	Mercury (asHg)	mg/L	Max 0.001	No relaxation
35.	Molybdenum (as Mo)	mg/L	Max 0.07	No relaxation
36.	Nickel (as Ni)	mg/L	Max 0.02	No relaxation
37.	Pesticides	mg/L	See Table 5	No relaxation
38.	Polychlorinatedbiphenyls	mg/L	Max 0.0005	No relaxation

Sr.	Characteristic	Unit	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source
39.	Poly nuclear aromatic Hydrocarbons (as PAH)	mg/L	Max 0.0001	No relaxation
40.	Total Arsenic(as As)	mg/L	Max 0.01	Max0.05
41.	Total Chromium (as Cr)	mg/L	Max 0.05	No relaxation
42.	Trihalomethanes			
a)	Bromoform	mg/L	Max 0.1	No relaxation
b)	DibromochloroMethane	mg/L	Max 0.1	No relaxation
c)	Bromodichloromethane	mg/L	Max 0.06	No relaxation
d)	Chloroform	mg/L	Max 0.2	No relaxation
Table 4	**Parameters Concerning Radioactive Substances**			
43.	Radioactive Materials			
a)	Alpha emitters	Bq/L	Max 0.1	No relaxation
b)	Beta emitters	Bq/L	Max 1.0	No relaxation
Table 5	**Pesticide Residues Limits and Test Method**			
i)	Alachor	µg/L	20	No relaxation
ii)	Atrazine	µg/L	2	No relaxation
iii)	Aldrin/ Dieldrin	µg/L	0.03	No relaxation
iv)	Alpha HCH	µg/L	0.01	No relaxation
v)	Beta HCH	µg/L	0.04	No relaxation
vi)	Butachlor	µg/L	125	No relaxation
vii)	Chlorpyriphos	µg/L	30	No relaxation
viii)	Delta HCH	µg/L	0.04	No relaxation
ix)	2,4- Dichlorophenoxyacetic acid	µg/L	30	No relaxation

Sr.	Characteristic	Unit	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source
x)	DDT (o,p&p,p — Isomers of DDT, DDE and DDD)	µg/L	1	No relaxation
xi)	EBDLosulfan (α,β & sulphate)	µg/L	0.4	No relaxation
xii)	Ethion	µg/L	3	No relaxation
xiii)	Gamma - HCH (LiBDLane)	µg/L	2	No relaxation
xiv)	Isoproturon	µg/L	9	No relaxation
xv)	Malathion	µg/L	190	No relaxation
xvi)	Methyl parathion	µg/L	0.3	No relaxation
xvii)	Monocrotophos	µg/L	1	No relaxation
xviii)	Phorate	µg/L	2	No relaxation
Table 6	**Bacteriological Quality of Drinking Water**			
44.	E.coli or thermotolerant coliform bacteria	/100	Not detectable	-
45.	Total coliform bacteria	/100 mL	Not detectable	-
	Virological Requirements			
46.	MS2 phage	/1 L	Absent	-
	Biological Requirements			
47.	Cryptosporidium	/10 L	Absent	-
48.	Giardia	/10 L	Absent	-
49.	Microscopic organisms such as algae,zooplanktons,flagellates,parasites and toxin producing organisms		Free from microscopic organisms	-

Annexure VII: CPCB Water Quality Criteria:

Designated best use	Quality Class	Primary Water Quality Criteria
Drinking water source without conventional treatment but with chlorination	A	➢ Total coliform organisms (MPN*/100 ml) shall be 50 or less ➢ pH between 6.5 and 8.5 ➢ Dissolved Oxygen 6 mg/Lor more, and ➢ Biochemical Oxygen Demand 2 mg/Lor less
Outdoor bathing (organized)	B	➢ Total coliform organisms (MPN/100 ml) shall be 500 or less ➢ pH between 6.5 and 8.5 ➢ Dissolved Oxygen 5 mg/Lor more, and ➢ Biochemical Oxygen Demand 3 mg/Lor less
Drinking water source with conventional treatment	C	➢ Total coliform organisms (MPN/100ml) shall be 5000 or less ➢ pH between 6 and 9 ➢ Dissolved Oxygen 4 mg/Lor more, and ➢ Biochemical Oxygen Demand 3 mg/Lor less
Propagation of wildlife and fisheries	D	➢ pH between 6.5 and 8.5 ➢ Dissolved Oxygen 4 mg/Lor more, and ➢ Free ammonia (as N) 1.2 mg/Lor less
Irrigation, industrial cooling, and controlled disposal	E	➢ pH between 6.0 and 8.5 ➢ Electrical Conductivity less than 2250 micro mhos/cm, ➢ Sodium Absorption Ratio less than 26, ➢ and Boron less than 2 mg/l.
	Below E	➢ Not Meeting A, B, C, D & E Criteria

Annexure VIII: Water Quality Parameters Requirements and Classification

Water quality parameters are classified into three categories, given in Table (i), (ii) and (iii) (Source: CPCB, 2002, "Water Quality Criteria and Goals", Monitoring of IBDLian National aquatic Resources Series: MINARS/17/2001-2002).

Table: Basic Water Quality Requirement and Classification (Surface Water + Ground Water)

i) Simple Parameters:

Sr.	Parameters	Requirement for Waters of Class		
		A-Excellent	**B-Desirable**	**C-Acceptable**
(i)	Sanitary Survey	Very Clean neighborhood and catchment	Reasonably clean neighborhood	Generally clean neighborhood
(ii)	General Appearance	No floating matter	No floating matter	No floating matter
(iii)	Colour	Absolutely Colourless	Almost colourless, very light shade if any	No colour of anthropogenic origin
(iv)	Smell	Odourless	Almost odourless	No unpleasant odour
(v)	Transparency	>1.0 depth	>0.5 to 0.1m depth	>0.2 to 0.5 m depth
(vi)	Ecological* (Presence of Animals)	Fish & Insects	Fish & Insects	Fish & Insects

* Applicable to only surface water

ii) Regular Monitoring Parameters:

Sr.	Parameters	Requirement for Waters of Class		
		A Excellent	**B-Desirable**	**C-Acceptable**
(i)	pH	7.0 to 8.5	6.5 to 9.0	6.5 to 9.0
(ii)	DO (% Saturation)	90-110	80-120	60-140
(iii)	BOD, mg/l	Below 2	Below 5	Below 8
(iv)	EC, µmhos/cm	<1000	<2250	<4000
(v)	(NO_2+NO_3)-Nitrogen, mg/l	<5	<10	<15
(vi)	Suspended solid, mg/l	<25	<50	<100

Sr.	Parameters	Requirement for Waters of Class		
		A Excellent	B-Desirable	C-Acceptable
(vii)	Fecal Coliform, MPN/ 100 ml	<20 per 100 ml	<200 per 100 ml	<2000 per 100 ml
(viii)	Bio-assay (Zebra Fish)	No death in 5 days	No death in 3 days	No death in 2 days

Note:

1. Dissolved Oxygen (DO) not applicable for Ground Waters.
2. Dissolved Oxygen in eutrophicated waters should include measurement for diurnal variation.
3. Suspended solid limit is applicable only during non-monsoon period.
4. Faecal Coliform values should meet for 90% times.
5. Static Bio-Assay method may be adopted.

iii) Specific Parameters: (Only in case of need/apprehensions)

Sr.	Parameters	Requirement for Waters of Class		
		A- Excellent	B-Desirable	C-Acceptable
(i)	Total Phosphorous	<0.1 mg/l	< 0.2 mg/l	< 0.3 mg/l
(ii)	T.K.N	< 1.0 mg/l	<2.0 mg/l	<3.0 mg/l
(iii)	Total Ammonia (NH4 + NH3)-Nitrogen	< 0.5 mg/l	< 1.0 mg/l	< 1.5 mg/l
(iv)	Phenols	< 2µg/l	< 5µg/l	<10 µg/l
(v)	Surface Active Agents	<20 µg/l	<100µg/l	< 200µg/l
(vi)	Organo Chlorine Pesticides	< 0.05µg/l	< 0.1µg/l	< 0.2µg/l
(vii)	PAH	< 0.05µg/l	<0.1 µg/l	<0.2 µg/l
(viii)	PCB and PCT	< 0.01µg/l	< 0.01µg/l	< 0.02µg/l
(ix)	Zinc	< 100µg/l	< 200µg/l	<300 µg/l
(x)	Nickel	< 50µg/l	< 100µg/l	< 200µg/l
(xi)	Copper	< 20µg/l	< 50µg/l	<100µg/l

Sr.	Parameters	Requirement for Waters of Class		
		A- Excellent	B-Desirable	C-Acceptable
(xii)	Chromium (Total)	< 20µg/l	< 50µg/l	< 100µg/l
(xiii)	Arsenic (Total)	< 20µg/l	<50 µg/l	<100 µg/l
(xiv)	Lead	< 20µg/l	< 50µg/l	< 100µg/l
(xv)	Cadmium	< 1.0µg/l	<2.5 µg/l	< 5.0µg/l
(xvi)	Mercury	< 0.2µg/l	< 0.5µg/l	< 1.0µg/l

v.