ACTION PLAN FOR INDUSTRIAL CLUSTER IN CRITICALLY POLLUTED AREA

Monitoring, Sampling, Analysis of Stack, Ambient Air Quality, Surface Water, Ground Water, Waste Water

औरंगाबाद Aurangabad

Maharashtra Pollution Control Board
Kalptaru Point, Sion East, Mumbai - 400022
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Acknowledgement

We gratefully acknowledge **Dr. P. Anbalagan**, Member Secretary, Maharashtra Pollution Control Board, for entrusting this very important and prestigious project to us.

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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 analyzing 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
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
ND	Not Detected
PAH	Poly Aromatic Hydrocarbons
PCB	Poly Chlorinated Biphenyls
PCT	Poly Chlorinated Terphenyls
PM10	Particulate Matter (size less than 10 µm)
PM2.5	Particulate Matter (size less than 2.5 µm)
SO_2	Sulphur Dioxide
STAP	Short Term Action Plan
WHO	World Health Organization

1. Introduction

Rapid modernization and industrialization worldwide has not only uprooted to the economic development, but has increased pollution of land, air and water. This has also destroyed our habitat and environment too. Pollutants discharged from the industries have widespread implications and one of the unpleasant effects on water bodies and air. .Long term exposure to the polluted air and water causes chronic health problems, making the issue industrial pollution into severe one. So, scientists are exploring the quantum of pollution load as well as to device certain strategies and technologies so that our sustainable development would not be jeopardized otherwise our long cherished dream of establishing eco-socialism on this watery planet could not come true.

In view of this, Central Pollution Control Board (CPCB) has evolved the concept of Comprehensive Environmental Pollution Index (CEPI) 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. Hence, revised concept came into existence, which is termed as Revised CEPI Version 2016.

The present report is also based on the revised CEPI version 2016. 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.

Aurangabad city is located in the northern part of the state of Maharashtra, in the western region of India. It is 375 km from Mumbai. The city is surrounded by hills. Aurangabad is famous for the World Heritage Sites Ajanta and Ellora. Named after Aurangzeb, the last of the great Mughal Emperors, Aurangabad acquired plenty of monuments and a rich culture as its heritage from the middle ages. Aurangabad is also famous for its silk and cotton textiles. The Shendra, Chikalthana and Waluj MIDC Industrial Areas are prominent industrial zones on the outskirts of the city, with various major multinational groups having set up manufacturing or processing plant in and around the city. Many firms have their manufacturing bases in Aurangabad in the sectors of automotive and auto components, pharmaceuticals and breweries, consumer durables, plastic processing, aluminum processing, agriculture and biotech. Among Pharmaceutical there is Recombinant Insulin Manufacturing plant of Wockhardt (Wockhardt Biotech Park) in Aurangabad, which is Largest Biopharmaceutical plant in India.

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, Dombivali, 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 Aurangabad:

- The sampling was carried out in 7 days at various locations i.e. from 22nd February to 28th February, 2017 for 4 MIDCs namely: Chikalthana, Waluj, Shendra and Paithan Road.

- **MIDC Chikalthana**: It comprises of a total of 6 Stack Monitoring Samples, 3 Ambient Air Quality Monitoring Samples, 6 Waste Water Samples and 3 Ground Water Samples were collected and analyzed.

- **MIDC Waluj**: It includes of a total of 6 Stack Monitoring Samples, 3 Ambient Air Quality Monitoring Samples, 6 Waste Water Samples and 3 Ground Water Samples were collected and analyzed.

- **MIDC Shendra**: It comprises of a total of 6 Stack Monitoring Samples, 3 Ambient Air Quality Monitoring Samples, 6 Waste Water Samples and 3 Ground Water Samples were collected and analyzed.

- **MIDC Paithan Road**: It includes of a total of 6 Stack Monitoring Samples, 3 Ambient Air Quality Monitoring Samples, 6 Waste Water Samples and 3 Ground Water 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)

i. 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)

ii. 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

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.
- ND specifies that even though the sample was analysed for the parameter, it was not detected.
- BDL specifies that the result obtained is below detection limit.

Please Note: ***Industrial clusters observed with below detection limit parameters are NOT included into the graphs***

3.1 Stack Emission Monitoring:

Stack Emission Monitoring Results are compared against The Environment (Protection) Rules, 1986 General Emission Standard - Part D. The limits are represented on the graphical representation.

a) Chikalthana MIDC:

Sr.	Name of Industry	Included in
1.	Radiant Indus Chem Pvt. Ltd	Table No. I
2.	NRB Bearing Ltd.	Table No. I
3.	Wockhardt Ltd. L-1	Table No. I
4.	M/s Lupin Ltd.	Table No. I
5.	United Spirits Ltd.	Table No. I
6.	Harman Finochem Ltd.	Table No. I

Table No. I:

Name of Industry		Radient Indus Chem Pvt. Ltd	NRB Bearings Ltd.	Wockhardt Ltd L-1.	M/s Lupin Ltd.	United Spirits Ltd.	Harman Finochem Ltd.
Date of Sampling		03.06.17	04.06.17	05.06.17	05.06.17	05.06.17	07.06.17
Parameters	**Units**	**Results**					
Particulate Matter	mg/Nm^3	73.6	65.2	68.1	80.5	131.8	71.4
Std. Limit	**mg/Nm^3**	**150**	**100**	**150**	**150**	**150**	**150**
Sulphur Dioxide	mg/Nm^3	135.7	23.8	118.4	BDL	142.6	136.8

Name of Industry		**Radient Indus Chem Pvt. Ltd**	**NRB Bearings Ltd.**	**Wockhardt Ltd L-1.**	**M/s Lupin Ltd.**	**United Spirits Ltd.**	**Harman Finochem Ltd.**
Date of Sampling		**03.06.17**	**04.06.17**	**05.06.17**	**05.06.17**	**05.06.17**	**07.06.17**
Parameters	**Units**	**Results**					
(SO_2)	kg/day	235.47	11	103.35	BDL	117.25	109.73
Std. Limit	**kg/day**		**90**		**400**	**160**	**741**
Oxides of Nitrogen (NO_2)	mg/Nm^3	146.2	28.4	496.2	23.5	167.5	193.8
Std. Limit	**mg/m^3**					**150**	
Carbon Monoxide (CO)	mg/m^3	358	89	463	308	468	296
Oxygen (O_2)	%	12.1	14.6	12.8	13.8	11.2	13.8
Flouride (F)	mg/Nm^3	BDL	BDL	BDL	BDL	BDL	BDL
Polynuclear aromatic hydrocarbons (as PAH)	mg/Nm^3	ND	ND	ND	ND	ND	ND
Hydrogen Sulphide (as H_2S)	ppm	BDL	BDL	BDL	BDL	BDL	BDL
Acid Mist	mg/Nm^3	BDL	BDL	BDL	BDL	BDL	BDL
Ammonia	mg/Nm^3	BDL	BDL	BDL	BDL	BDL	BDL
Hydrogen Chloride (as HCl)	mg/Nm^3	ND	ND	ND	ND	ND	ND
Benzene	mg/Nm^3	ND	ND	ND	ND	ND	ND
Toluene	mg/Nm^3	ND	ND	ND	ND	ND	ND
Xylene	mg/Nm^3	ND	ND	ND	ND	ND	ND

b) Waluj MIDC:

Sr.	**Name of Industry**	**Included in**
1.	IPCA (Paschim Chem)	Table No. II
2.	BKT Tyre	Table No. II
3.	Carlsberg Ltd.	Table No. II
4.	Sab Miller I (I) Ltd. (Pals)	Table No. II
5.	Garware Polyester Ltd.	Table No. II
6.	Sterlite Tech	Table No. II

Table No. II

Name of Industry		**IPCA (Paschim Chem)**	**BKT Tyre**	**Carlsberg Ltd.**	**Sab Miller I (I) Ltd. (Pals)**	**Garware Polyester Ltd.**	**Sterlite Tech**
Date of Sampling		**10.06.17**	**11.06.17**	**11.06.17**	**11.06.17**	**12.06.17**	**12.06.17**
Parameters	**Units**	**Results**					
Particulate Matter	mg/Nm^3	106.3	78.3	89.6	95.7	44.9	53.5
Std. Limit	**mg/Nm^3**	**150**	**150**	**150**	**150**	**150**	**150**
Sulphur Dioxide (SO_2)	mg/Nm^3	58.7	103.5	119.4	22.8	6.5	12.6
	kg/day	24.05	78.54	96.27	86.47	5.72	6.52
Std. Limit	**kg/day**	**3070**		**336**	**50**	**33**	
Oxides of Nitrogen (NO_2)	mg/Nm^3	121.6	143.5	119.4	105.8	136.4	58.6
Std. Limit	**mg/Nm^3**				**50**		
Carbon Monoxide (CO)	mg/m^3	528	474	615	509	578	386
Oxygen (O_2)	%	10.6	11.9	9.8	10.2	10.9	14.3
Flouride (F)	mg/Nm^3	BDL	BDL	BDL	BDL	BDL	BDL
Polynuclear aromatic hydrocarbons (as PAH)	mg/Nm^3	432	363	549	477	536	129
Hydrogen Sulphide (as H_2S)	ppm	10.6	14.6	11.3	9.6	11.2	13.1
Acid Mist	mg/Nm^3	BDL	BDL	BDL	BDL	BDL	BDL
Ammonia		ND	ND	ND	ND	ND	ND
Hydrogen Chloride (as HCl)		BDL	BDL	BDL	BDL	BDL	BDL
Benzene		1.04	BDL	BDL	BDL	BDL	0.94
Toluene		BDL	BDL	BDL	BDL	BDL	BDL
Xylene		ND	ND	ND	ND	ND	ND

c) Shendra MIDC

Sr.	Name of Industry	Included in
1.	Glenmark Pharmaceuticals Lab	Table No. III
2.	Radico NV Distilleries Maharashtra Ltd.	Table No. III
3.	Wockhardt Ltd.	Table No. III
4.	Skoda Auto India Pvt. Ltd.	Table No. III
5.	NRB Bearings Ltd.	Table No. III
6.	Harman Finochem Ltd.	Table No. III

Table No. III

Name of Industry		**Glenmark Pharma-ceuticals Lab**	**Radico NV Distilleries Maharashtra Ltd.**	**Wockhardt Ltd.**	**Skoda Auto India Pvt. Ltd.**	**NRB Bearings Ltd.**	**Harman Finochem Ltd.**
Date of Sampling		**06.06.17**	**06.06.17**	**06.06.17**	**07.06.17**	**07.06.17**	**06.06.17**
Parameters	**Units**	**Results**					
Particulate Matter	mg/Nm^3	66.7	115.3	48.6	52.3	69.8	48.6
Std. Limit	**mg/Nm^3**	**150**	**150**	**150**	**150**	**150**	**150**
Sulphur Dioxide (SO_2)	mg/Nm^3	103.5	21.8	2.67	1.32	2.2	<5
	kg/day	106.78	179.58	0.71	0.048	0.052	<0.02
Std. Limit	**kg/day**		**1593**				
Oxides of Nitrogen (NO_2)	mg/Nm^3	529	467	532	430	491	396
Carbon Monoxide (CO)	mg/m^3	12.5	14.2	12.5	14.3	12.6	13.8

Name of Industry		**Glenmark Pharma-ceuticals Lab**	**Radico NV Distilleries Maharashtra Ltd.**	**Wockhardt Ltd.**	**Skoda Auto India Pvt. Ltd.**	**NRB Bearings Ltd.**	**Harman Finochem Ltd.**
Date of Sampling		**06.06.17**	**06.06.17**	**06.06.17**	**07.06.17**	**07.06.17**	**06.06.17**
Parameters	**Units**	**Results**					
Oxygen (O_2)	%	BDL	BDL	BDL	BDL	BDL	BDL
Fluoride (F)	mg/Nm^3	ND	ND	ND	ND	ND	ND
Polynuclear aromatic hydrocarbons (as PAH)	mg/Nm^3	BDL	BDL	BDL	BDL	BDL	BDL
Hydrogen Sulphide (as H_2S)	ppm	BDL	BDL	BDL	BDL	BDL	BDL
Acid Mist	mg/Nm^3	BDL	BDL	BDL	BDL	BDL	BDL
Ammonia	mg/Nm^3	ND	ND	ND	ND	ND	ND
Hydrogen Chloride (as HCl)	mg/Nm^3	ND	ND	ND	ND	ND	ND
Benzene	mg/Nm^3	ND	ND	ND	ND	ND	ND
Toluene	mg/Nm^3	ND	ND	ND	ND	ND	ND
Zylene	mg/Nm^3	ND	ND	ND	ND	ND	ND

d) Paithan Road MIDC:

Sr.	Name of Industry	Included in
1.	Jai Laxmi Casting Pvt. Ltd.	Table No. IV
2.	Pepsico India Ltd.	Table No. IV
3.	Ajantha Pharma	Table No. IV
4.	R.L. Steel Industries	Table No. IV
5.	Encore Laboratories	Table No. IV
6.	Ajanta Pharma	Table No. IV

Table No. IV

Name of Industry		Jai Laxmi Casting Pvt. Ltd.	Pepsico India Ltd.	Ajantha Pharma	R. L. Steel Industries	Encore Laboraories	Frigorifico Allana Ltd.
Date of Sampling		**08.06.17**	**08.06.17**	**09.06.17**	**08.06.17**	**10.06.17**	**10.06.17**
Parameters	**Units**	**Results**					
Particulate Matter	mg/Nm^3	114.7	129.3	41.2	64.9	51.6	47.2
Std. Limit	**mg/Nm^3**	**150**	**150**	**150**	**150**	**150**	**150**
Sulphur Dioxide (SO_2)	mg/Nm^3	BDL	21.4	84.7	12.2	137.6	121.8
	kg/day	BDL	12.78	9.43	6.44	28.9	170.38
Std. Limit	**kg/day**					**58.02**	**201**
Oxides of Nitrogen (NO_2)	mg/Nm^3	211.8	28.6	126.3	64.4	136.8	162.2
Carbon Monoxide (CO)	mg/m^3	453	289	376	273	307	592
Oxygen (O_2)	%	12.2	14.2	9.9	11.5	9.2	11.6

Name of Industry		Jai Laxmi Casting Pvt. Ltd.	Pepsico India Ltd.	Ajantha Pharma	R. L. Steel Industries	Encore Laboraories	Frigorifico Allana Ltd.
Date of Sampling		**08.06.17**	**08.06.17**	**09.06.17**	**08.06.17**	**10.06.17**	**10.06.17**
Parameters	**Units**	**Results**					
Fluoride (F)	mg/Nm^3	BDL	BDL	BDL	BDL	BDL	BDL
Polynuclear aromatic hydrocarbons (as PAH)	mg/Nm^3	ND	ND	ND	ND	ND	ND
Hydrogen Sulphide (as H_2S)	ppm	BDL	BDL	BDL	BDL	BDL	BDL
Acid Mist	mg/Nm^3	BDL	BDL	BDL	BDL	BDL	BDL
Ammonia	mg/Nm^3	BDL	BDL	BDL	BDL	BDL	BDL
Hydrogen Chloride (as HCl)	mg/Nm^3	ND	ND	ND	ND	ND	ND
Benzene	mg/Nm^3	ND	ND	ND	ND	ND	ND
Toluene	mg/Nm^3	ND	ND	ND	ND	ND	ND
Xylene	mg/Nm^3	ND	ND	ND	ND	ND	ND

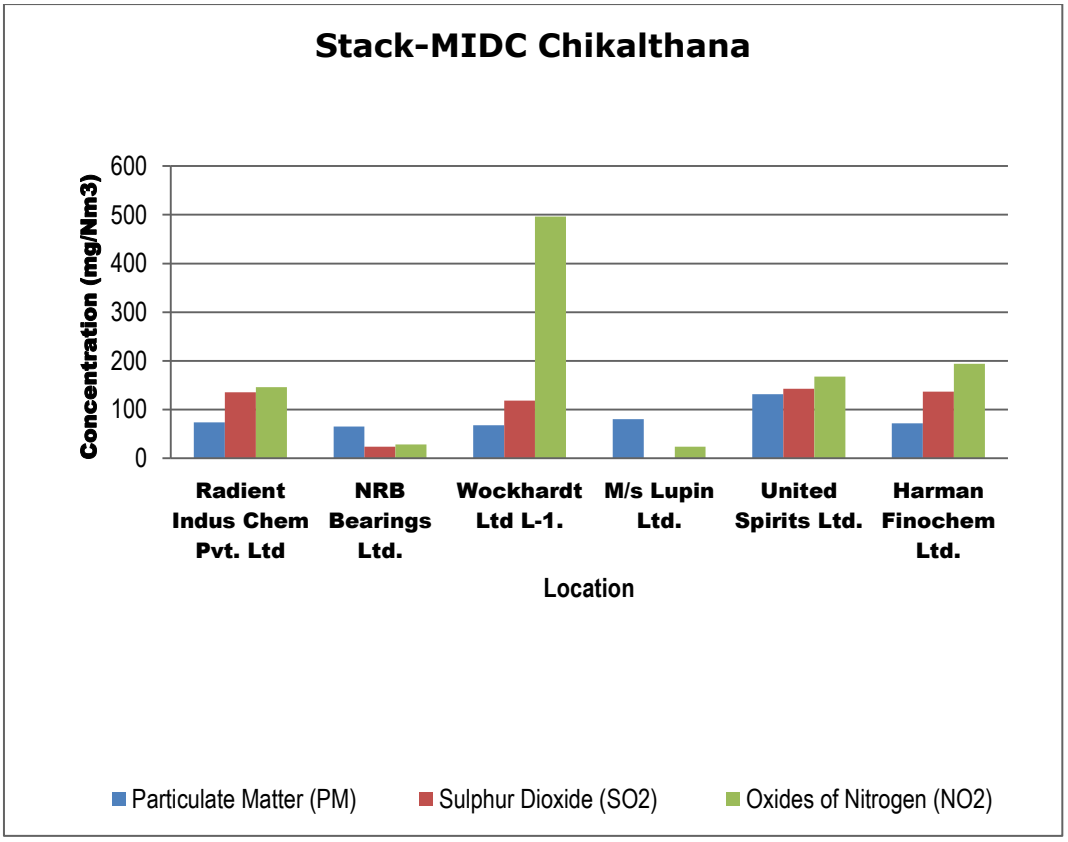
Table No. V

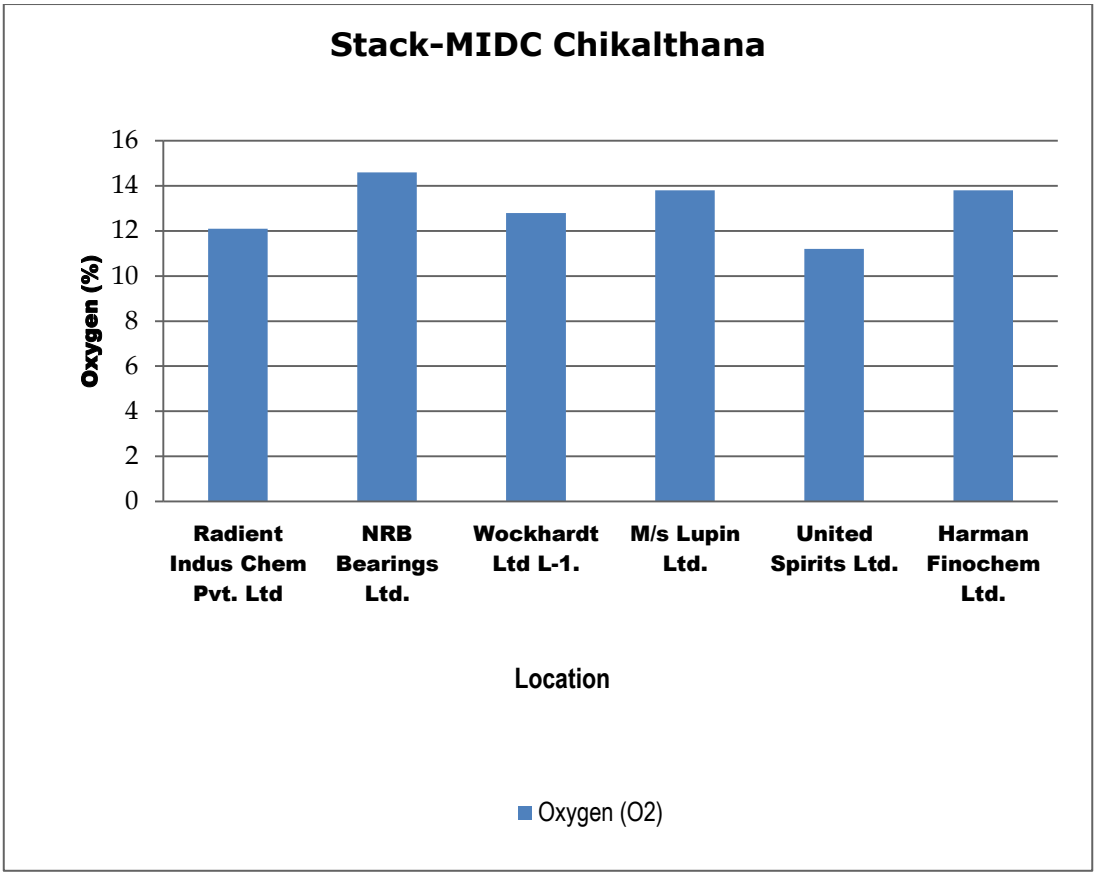
VOCs Results of Aurangabad								
MIDC	**Chikalthana**		**Shendra**		**Paithan Road**		**Waluj**	
Name of Industry	**Wockhardt Ltd. L-1**	**Harman Finochem.**	**Wockhardt Ltd.**	**Harman Finochem.**	**Apex Lab**	**Tooba Lab**	**IPCA**	**Carlsberg Ltd.**
Date of Sampling	**05.06.17**	**07.06.17**	**06.06.17**	**06.06.17**	**10.06.17**	**10.06.17**	**10.06.17**	**11.06.17**

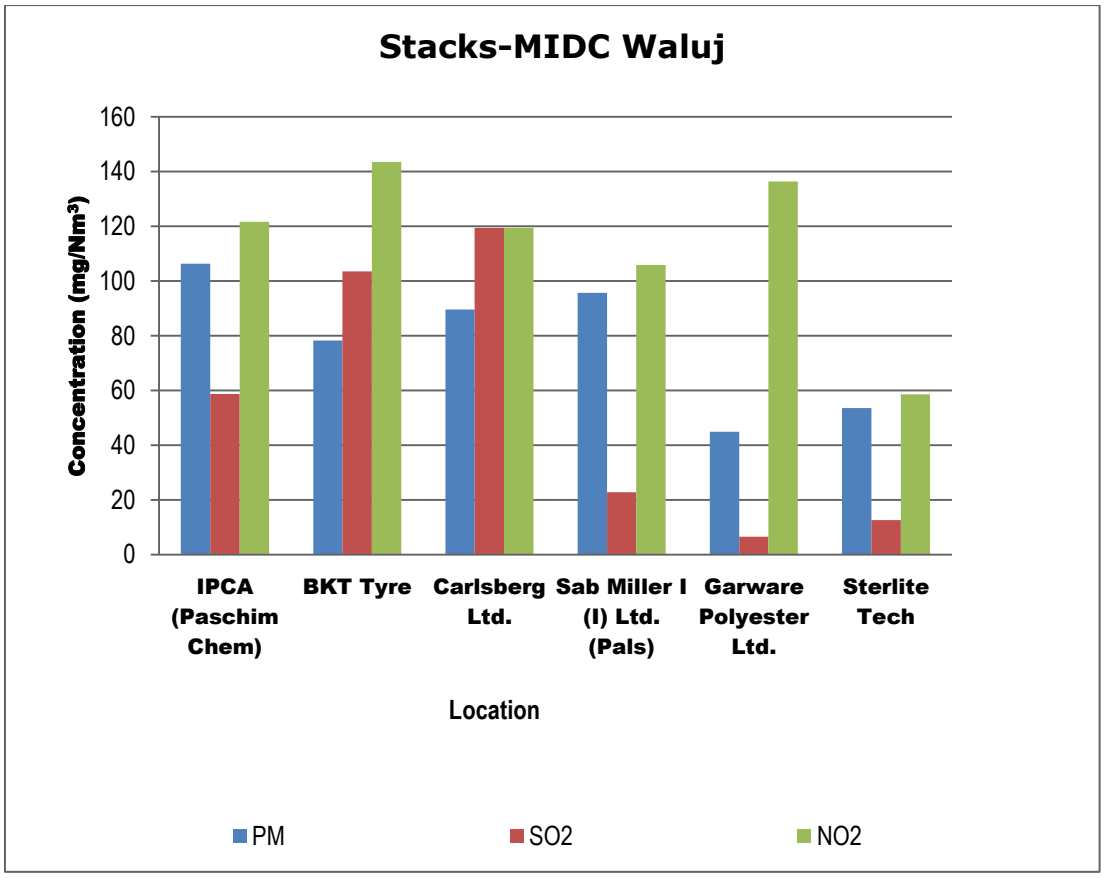
Parameter	Unit	Results						
MIBK	mg/N m^3	ND	ND	ND	ND	ND	ND	ND
Benzene	mg/N m^3	ND	ND	ND	ND	ND	ND	ND
Toluene	mg/N m^3	ND	ND	ND	ND	ND	ND	ND
Xylene	mg/N m^3	ND	ND	ND	ND	ND	ND	ND
Ethyl Benzene	mg/N m^3	ND	ND	ND	ND	ND	ND	ND
Ethyl Acetate	mg/N m^3	ND	ND	ND	ND	ND	ND	ND

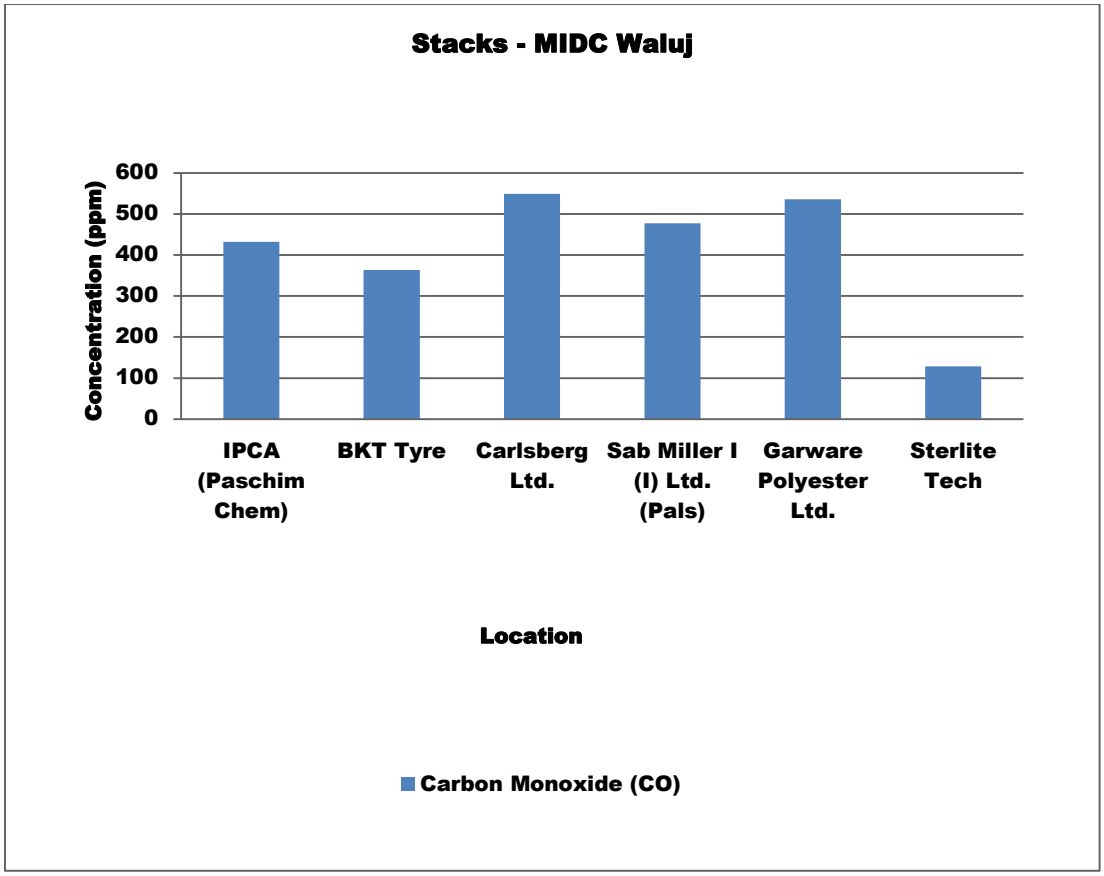
Graphs: Stack Emission Monitoring:

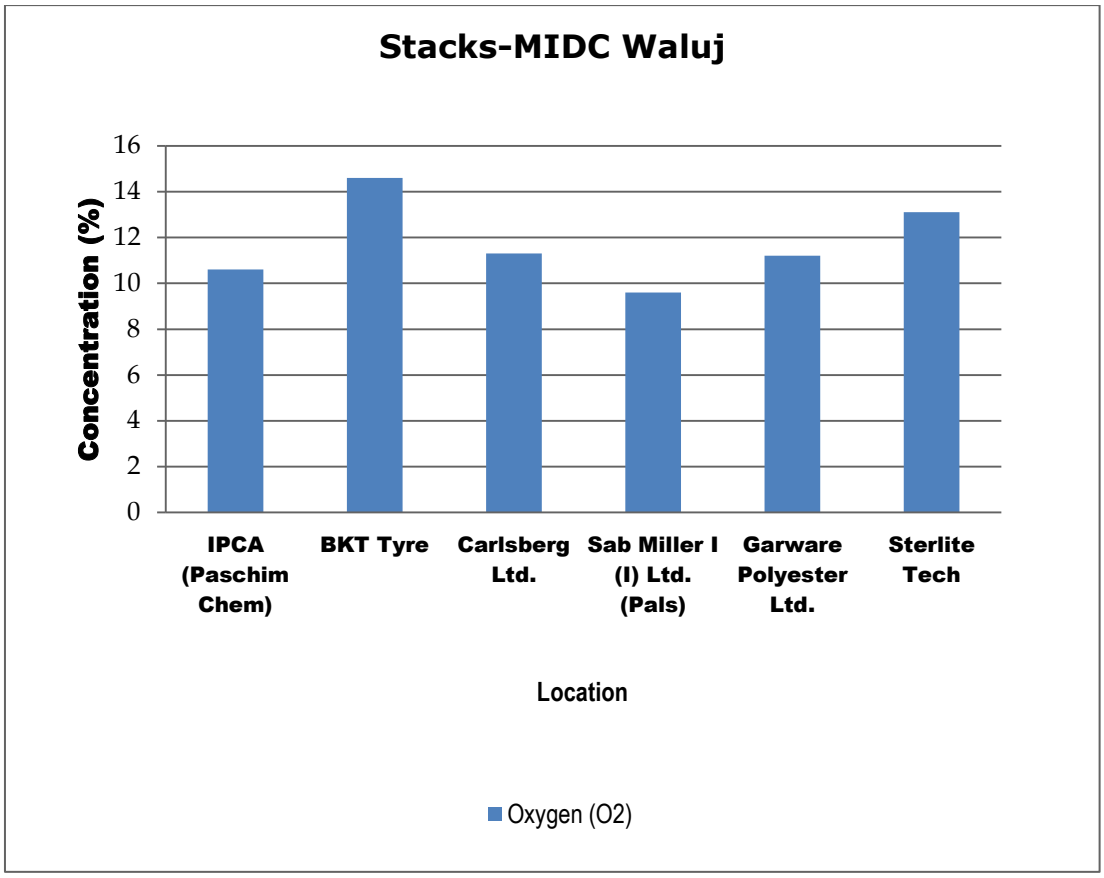
Please Note: *As per the results, parameters like Flouride, Poly Aromatic Hydrocarbon, Hydrogen sulphide, acid mist, ammonia, Hydogen Chloride, Benzene, Toluene, Xylene and Volatile Organic Carbons (VOCs) are found either Below detection limit or not detected, hence not included in the graphs below.*

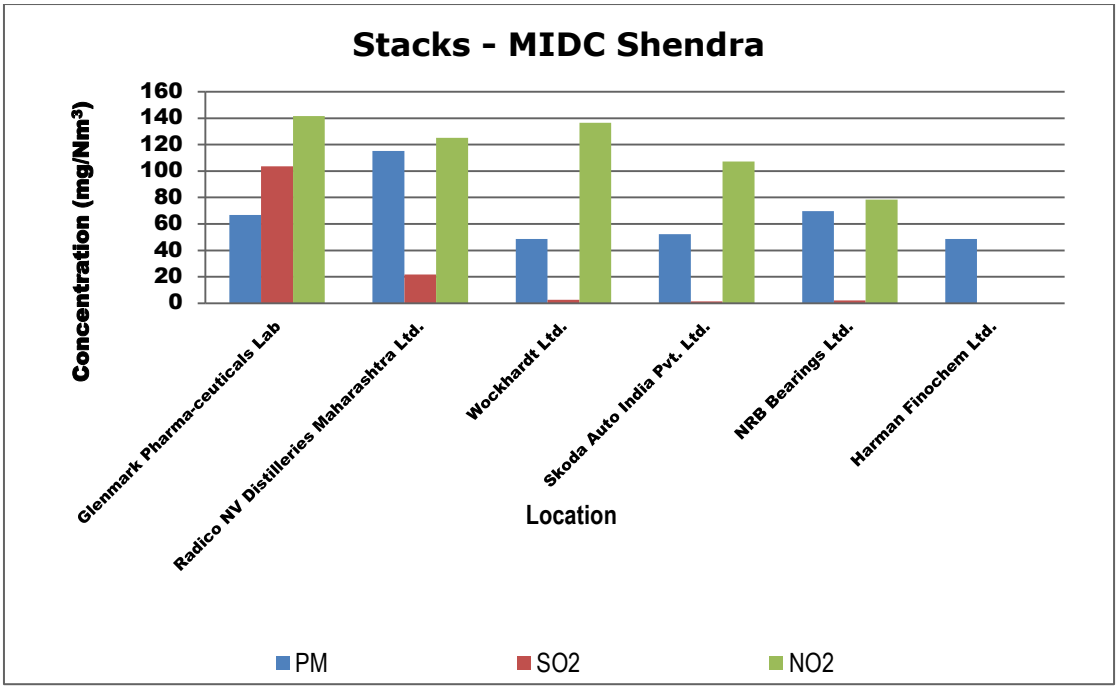


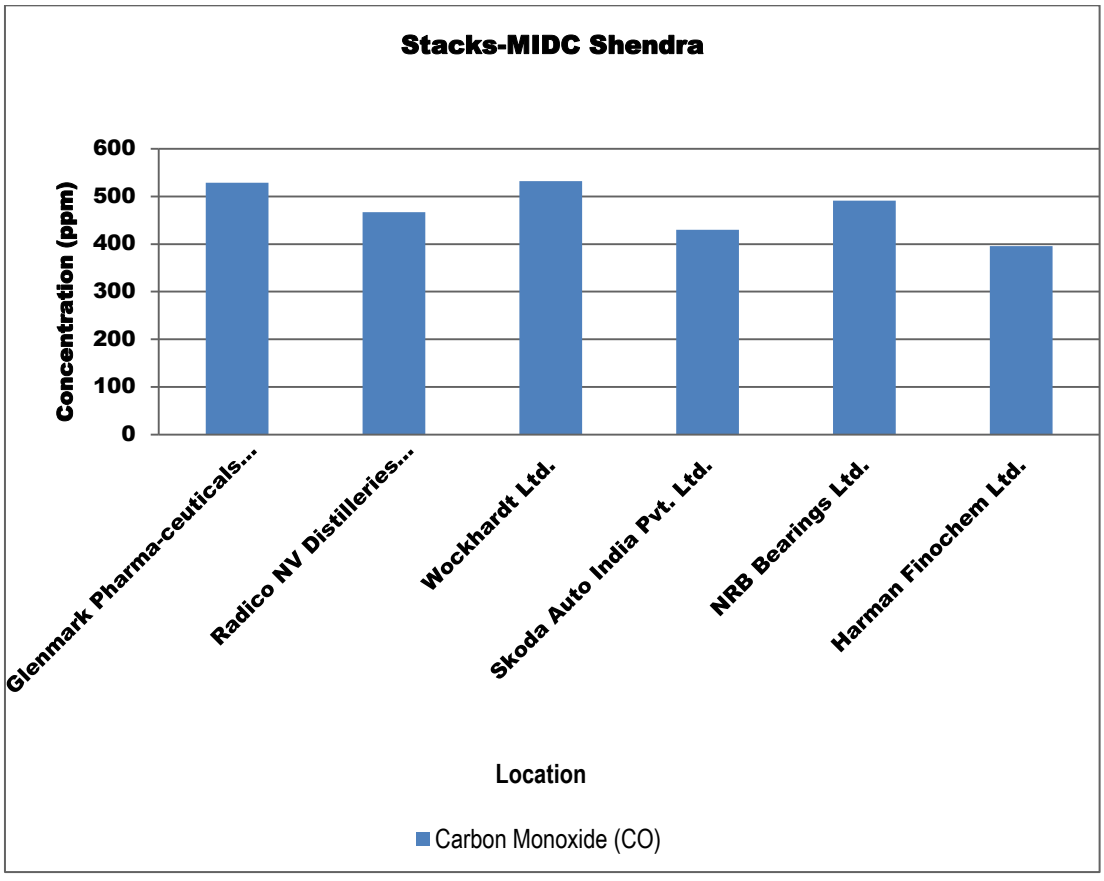

Stack-MIDC Chikalthana
Oxygen (%)
16
14
12
10
8
6
4
2
0
Radient Indus Chem Pvt. Ltd
NRB Bearings Ltd.
Wockhardt Ltd L-1.
M/s Lupin Ltd.
United Spirits Ltd.
Harman Finochem Ltd.
Location
Oxygen (O2)

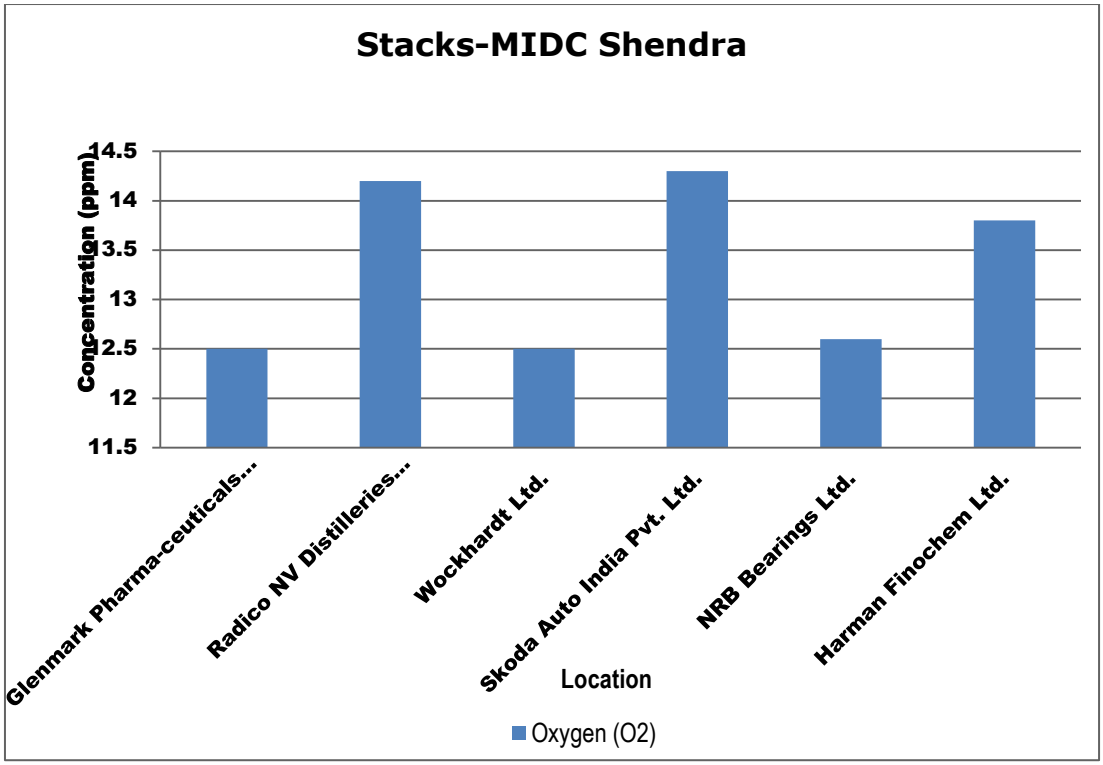

Stacks-MIDC Waluj
Concentration (mg/Nm³)
160
140
120
100
80
60
40
20
0
IPCA (Paschim Chem)
BKT Tyre
Carlsberg Ltd.
Sab Miller I (I) Ltd. (Pals)
Garware Polyester Ltd.
Sterlite Tech
Location
PM
SO2
NO2

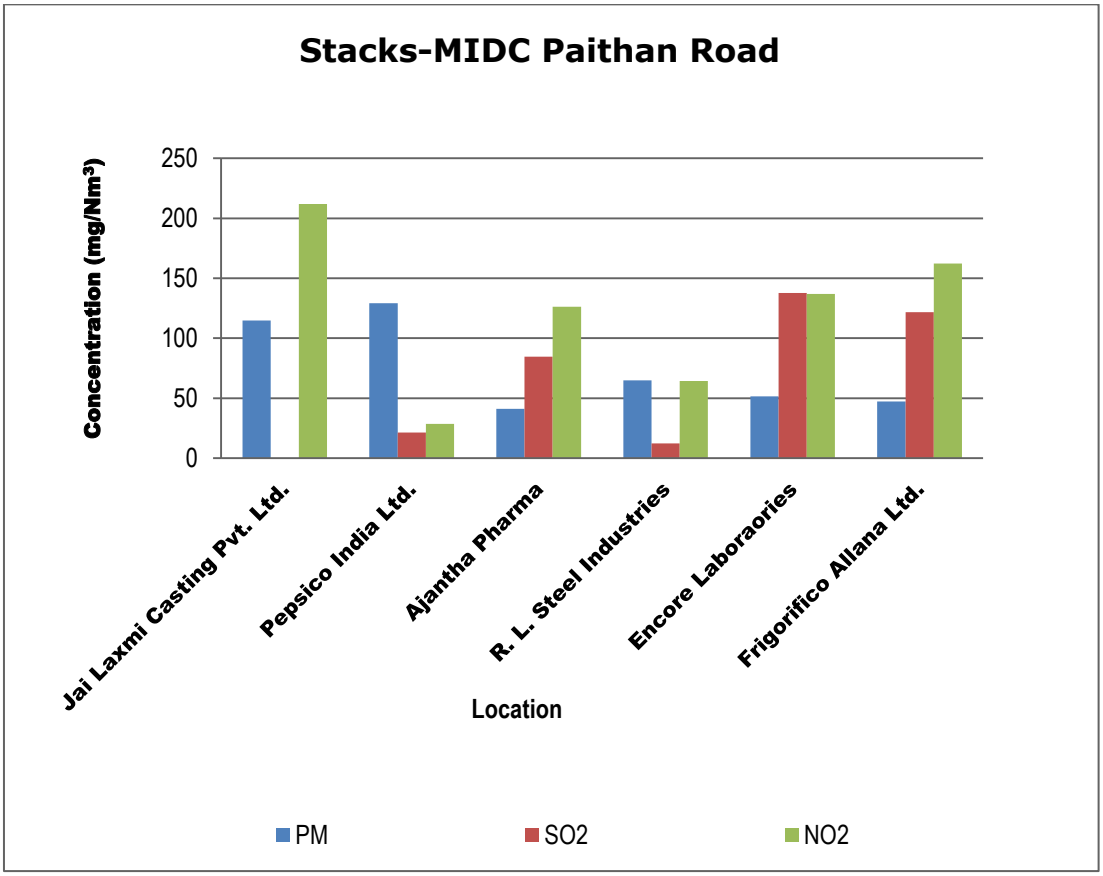

Stacks - MIDC Waluj
Concentration (ppm)
600
500
400
300
200
100
0
IPCA (Paschim Chem)
BKT Tyre
Carlsberg Ltd.
Sab Miller I (I) Ltd. (Pals)
Garware Polyester Ltd.
Sterlite Tech
Location
Carbon Monoxide (CO)

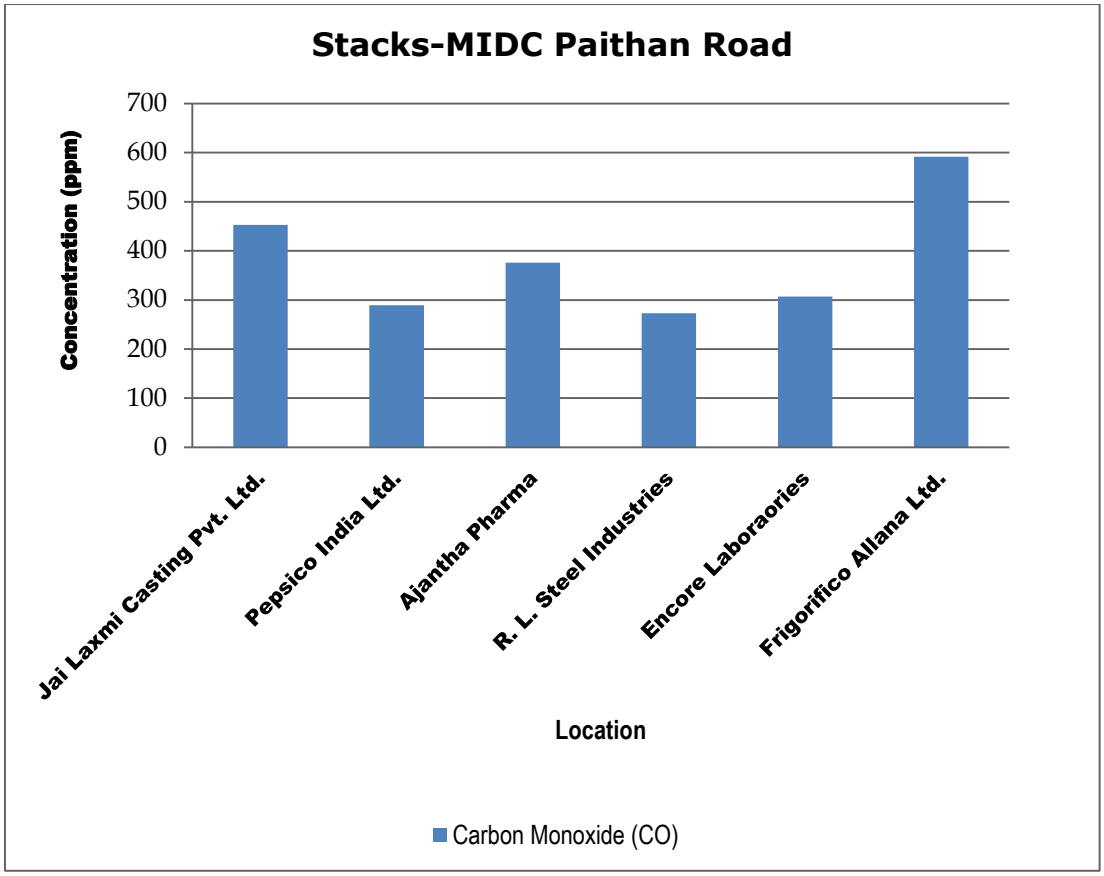

Stacks-MIDC Waluj
Concentration (%)
16
14
12
10
8
6
4
2
0
IPCA (Paschim Chem)
BKT Tyre
Carlsberg Ltd.
Sab Miller I (I) Ltd. (Pals)
Garware Polyester Ltd.
Sterlite Tech
Location
Oxygen (O2)

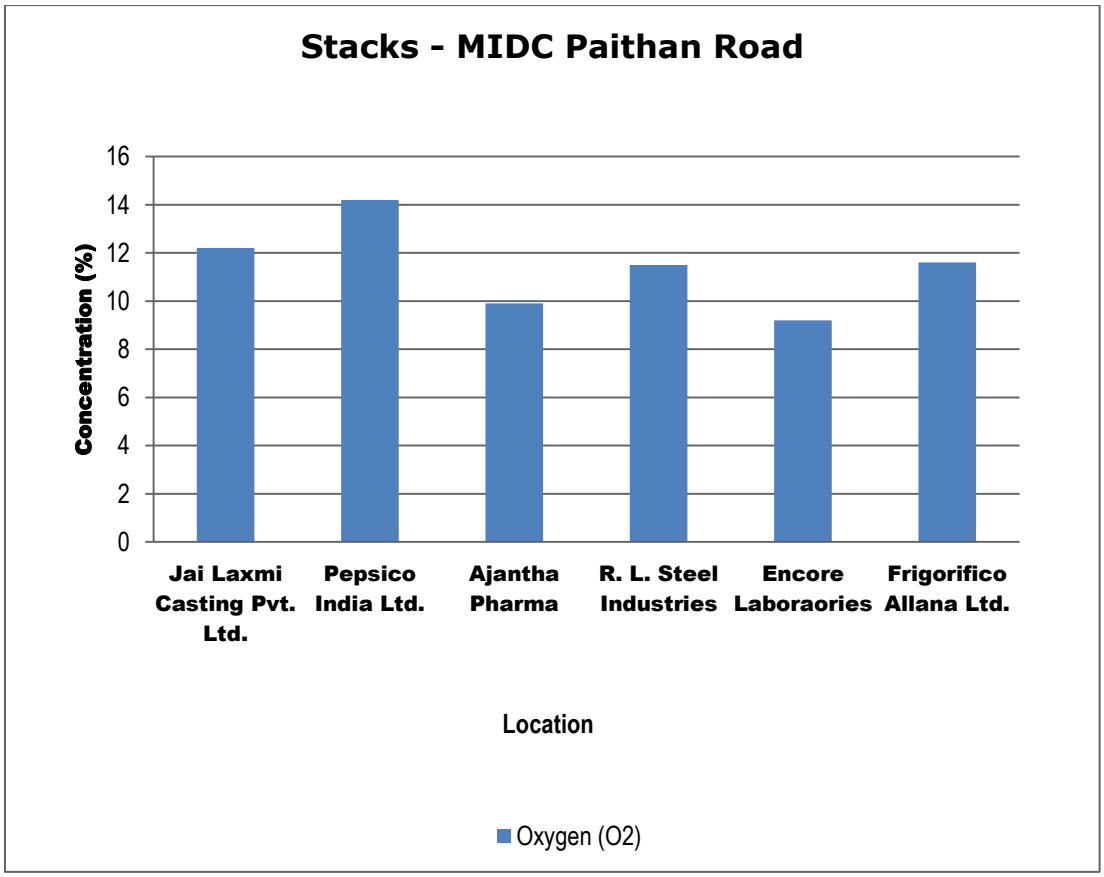

Stacks - MIDC Shendra
Concentration (mg/Nm³)
160
140
120
100
80
60
40
20
0
Glenmark Pharma-ceuticals Lab
Radico NV Distilleries Maharashtra Ltd.
Wockhardt Ltd.
Skoda Auto India Pvt. Ltd.
NRB Bearings Ltd.
Harman Finochem Ltd.
Location
PM
SO2
NO2


Stacks-MIDC Shendra
Concentration (ppm)
600
500
400
300
200
100
0
Glenmark Pharma-ceuticals...
Radico NV Distilleries...
Wockhardt Ltd.
Skoda Auto India Pvt. Ltd.
NRB Bearings Ltd.
Harman Finochem Ltd.
Location
Carbon Monoxide (CO)


Stacks-MIDC Shendra
Concentration (ppm)
14.5
14
13.5
13
12.5
12
11.5
Glenmark Pharma-ceuticals...
Radico NV Distilleries...
Wockhardt Ltd.
Skoda Auto India Pvt. Ltd.
NRB Bearings Ltd.
Harman Finochem Ltd.
Location
Oxygen (O2)


Stacks-MIDC Paithan Road
Concentration (mg/Nm³)
250
200
150
100
50
0
Jai Laxmi Casting Pvt. Ltd.
Pepsico India Ltd.
Ajantha Pharma
R. L. Steel Industries
Encore Laboraories
Frigorifico Allana Ltd.
Location
PM
SO2
NO2


Stacks-MIDC Paithan Road
Concentration (ppm)
700
600
500
400
300
200
100
0
Jai Laxmi Casting Pvt. Ltd.
Pepsico India Ltd.
Ajantha Pharma
R. L. Steel Industries
Encore Laboraories
Frigorifico Allana Ltd.
Location
Carbon Monoxide (CO)


Stacks - MIDC Paithan Road
Concentration (%)
16
14
12
10
8
6
4
2
0
Jai Laxmi Casting Pvt. Ltd.
Pepsico India Ltd.
Ajantha Pharma
R. L. Steel Industries
Encore Laboraories
Frigorifico Allana Ltd.
Location
Oxygen (O2)

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). The limits are represented on the graphical representation

A. MIDC Chikalthana and Waluj

Sr.	Name of Industry	MIDC	Included in
1.	Greaves Cotton Ltd.	Chikhalthana	Table No. I
2.	Exedy India Ltd.	Chikhalthana	Table No. I
3.	NRB Bearing Ltd.	Chikhalthana	Table No. I
4.	BKT Tyre	Waluj	Table No. I
5.	Sterlite Tech. Ltd.	Waluj	Table No. I
6.	Garware Polyster Ltd.	Waluj	Table No. I

Table No. I

Name of Industry				**Greaves Cotton Ltd.**	**Exedy India Ltd.**	**NRB Bearing Ltd.**	**BKT Tyre**	**Sterlite Tech Ltd.**	**Garware Polyester Ltd.**
Sr.	**Parameters**	**Units**	**Std. Limit**	**Results**					
1	Sulphur Dioxide (SO_2)	$\mu g/m^3$	**80**	4.2	5.5	4.7	6.1	5.7	6.5
2	Nitrogen Dioxide (NO_2)	$\mu g/m^3$	**80**	11.4	14.6	13.2	16.8	15.3	17.6
3	Particulate Matter (size less than 10 µm) or PM_{10}	$\mu g/m^3$	**100**	51.92	50.22	54.23	58.41	60.78	63.11
4	Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	$\mu g/m^3$	**60**	20.03	18.6	20.8	21.82	23.14	22.0
5	Ozone (O_3)	$\mu g/m^3$	**180**	20.6	23.1	21.7	23.3	26.1	27.8
6	Lead (Pb)	$\mu g/m^3$	**1**	BDL	BDL	BDL	BDL	BDL	BDL
7	Carbon Monoxide (CO)	mg/m^3	**04**	0.342	0.356	0.308	0.414	0.380	0.426
8	Ammonia (NH_3)	$\mu g/m^3$	**400**	BDL	BDL	BDL	BDL	BDL	BDL
9	Benzene (C_6H_6)	$\mu g/m^3$	**5**	BDL	BDL	BDL	BDL	BDL	BDL
10	Benzo (a) Pyrene (BaP) – particulate phase only	ng/m^3	**1**	BDL	BDL	BDL	BDL	BDL	BDL
11	Arsenic (As)	ng/m^3	**6**	BDL	BDL	BDL	BDL	BDL	BDL
12	Nickel (Ni)	ng/m^3	**20**	BDL	BDL	BDL	BDL	BDL	BDL

B. MIDC Shendra and Paithan Road

Sr.	Name of Industry	MIDC	Included in
1.	Radico NV Distilleries Maharashtra Ltd.	Shendra	Table II
2.	Metalyst Forgings Ltd.	Shendra	Table II
3.	Perkins India Pvt. Ltd.	Shendra	Table II
4.	Pepsico India Ltd.	Paithan Road	Table II
5.	Jailaksmi Casting & Alloy Ltd.	Paithan Road	Table II
6.	Value Industries	Paithan Road	Table II

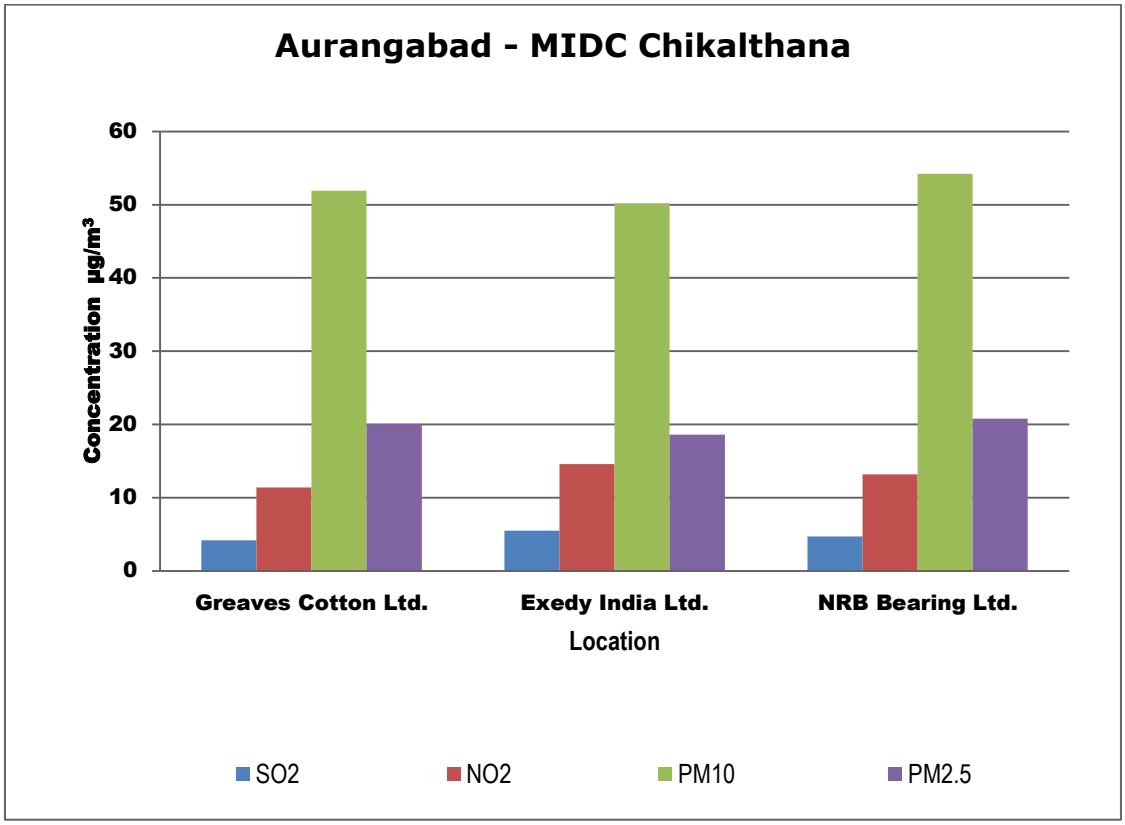
Table No. II

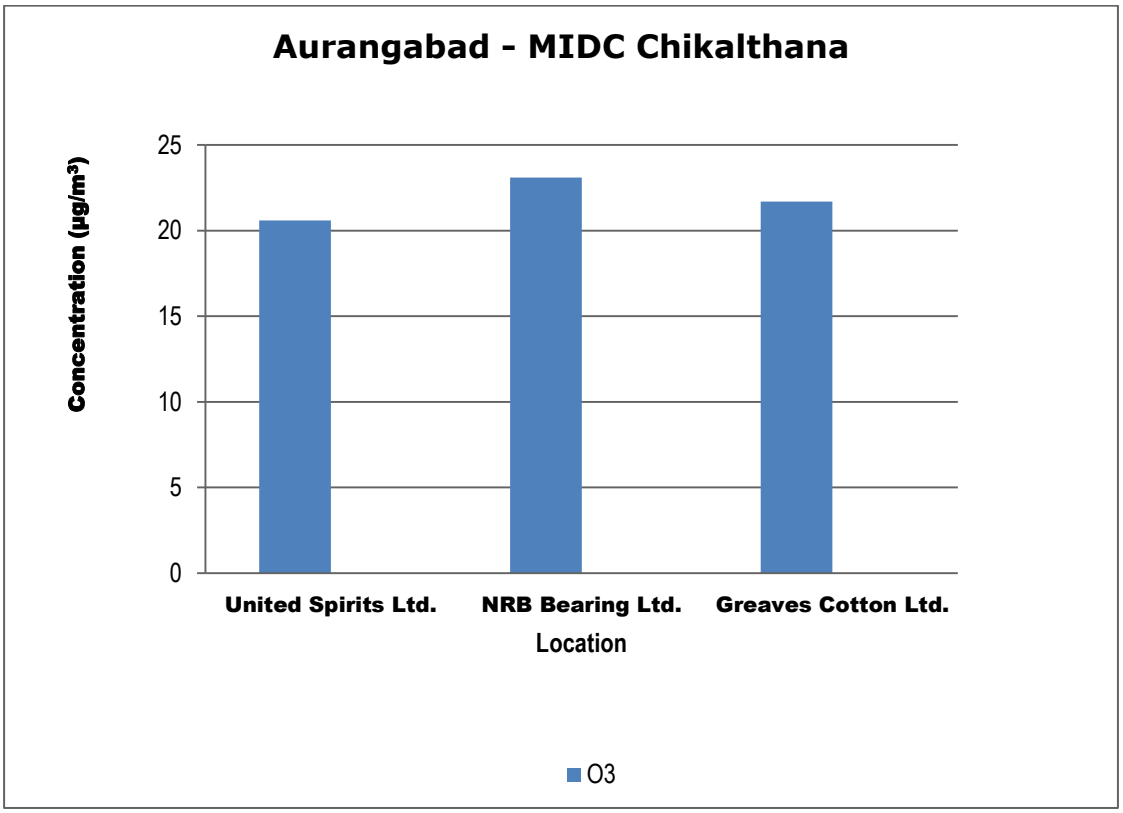
Name of Industry				Radico NV Distilleries	Metalyst Forgings Ltd.	Perkins India Pvt. Ltd.	Encore Laboratories	Pepsico India Ltd.	Videocon India Ltd.
Sr.	**Parameters**	**Units**	**Std. Limit**	**Results**					
1	Sulphur Dioxide (SO_2)	$\mu g/m^3$	**80**	6.4	5.1	4.9	5.4	5.8	4.7
2	Nitrogen Dioxide (NO_2)	$\mu g/m^3$	**80**	17.4	15.7	13.6	15.1	16.3	14.2
3	Particulate Matter (size less than 10 µm) or PM_{10}	$\mu g/m^3$	**100**	62.83	58.4	40.8	62.83	57.89	50.06
4	Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$	$\mu g/m^3$	**60**	22.46	19.78	16.8	21.43	23.27	20.07
5	Ozone (O_3)	$\mu g/m^3$	**180**	26.2	21.3	19.6	25.1	26.8	22.7
6	Lead (Pb)	$\mu g/m^3$	**1**	BDL	BDL	BDL	BDL	BDL	BDL

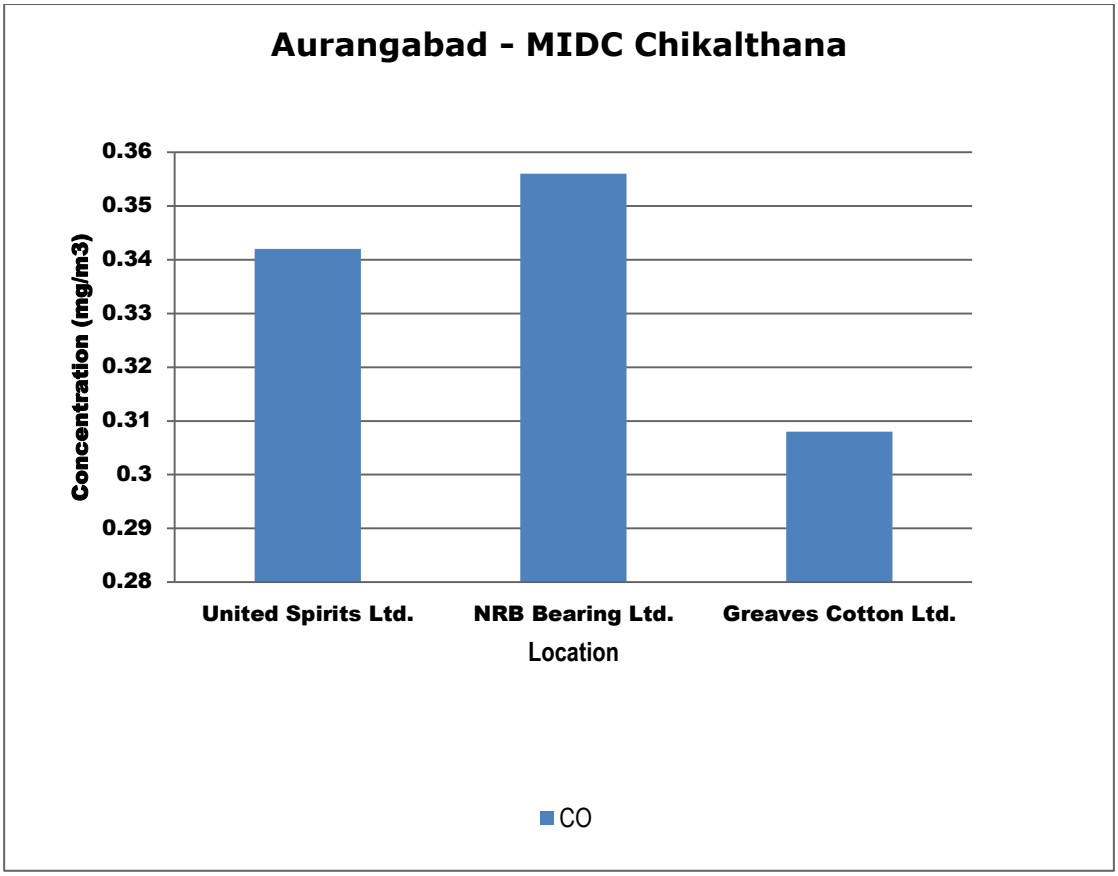
Name of Industry				**Radico NV Distilleries**	**Metalyst Forgings Ltd.**	**Perkins India Pvt. Ltd.**	**Encore Laboratories**	**Pepsico India Ltd.**	**Videocon India Ltd.**
Sr.	**Parameters**	**Units**	**Std. Limit**	**Results**					
7	Carbon Monoxide (CO)	mg/m^3	**04**	0.412	0.356	0.288	0.396	0.342	0.31
8	Ammonia (NH_3)	$\mu g/m^3$	**400**	BDL	BDL	BDL	BDL	BDL	BDL
9	Benzene (C_6H_6)	$\mu g/m^3$	**5**	BDL	BDL	BDL	BDL	BDL	BDL
10	Benzo (a) Pyrene (BaP) – particulate phase only,	ng/m^3	**1**	BDL	BDL	BDL	BDL	BDL	BDL
11	Arsenic (As)	ng/m^3	**6**	BDL	BDL	BDL	BDL	BDL	BDL
12	Nickel (Ni)	ng/m^3	**20**	BDL	BDL	BDL	BDL	BDL	BDL

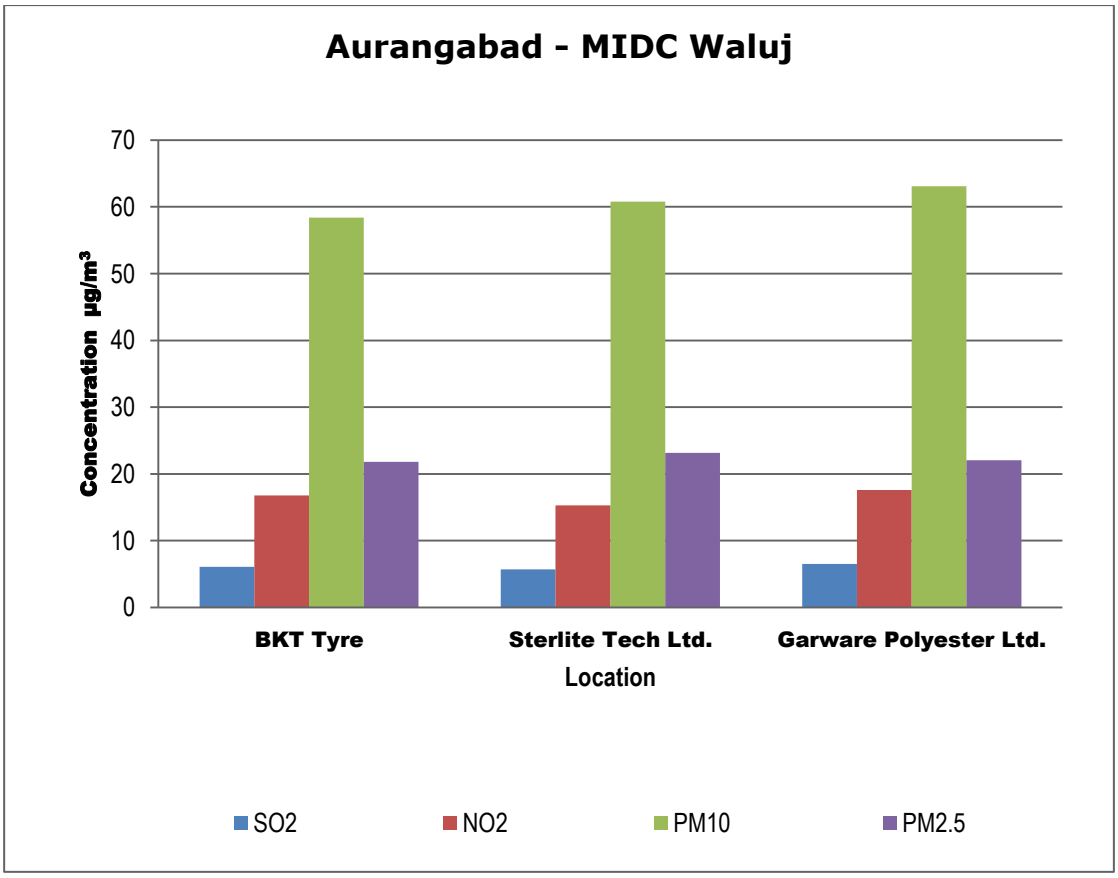
Graphs: Ambient Air Quality of Aurangabad

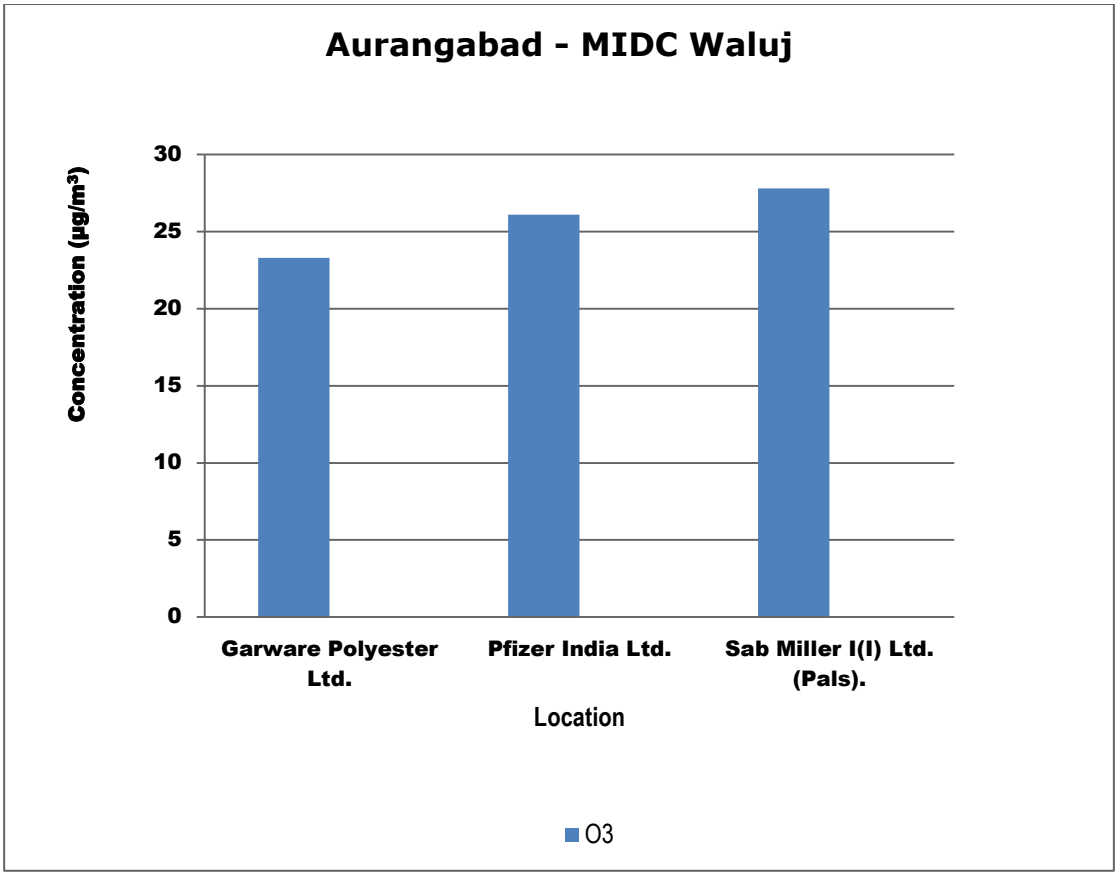
Please Note: *As per the results, parameters like Pb, C_6H_6, NH_4, Bap, As, Ni and Volatile Organic Carbons (VOCs) are found either Below detection limit or not detected, hence not included in the graphs below*

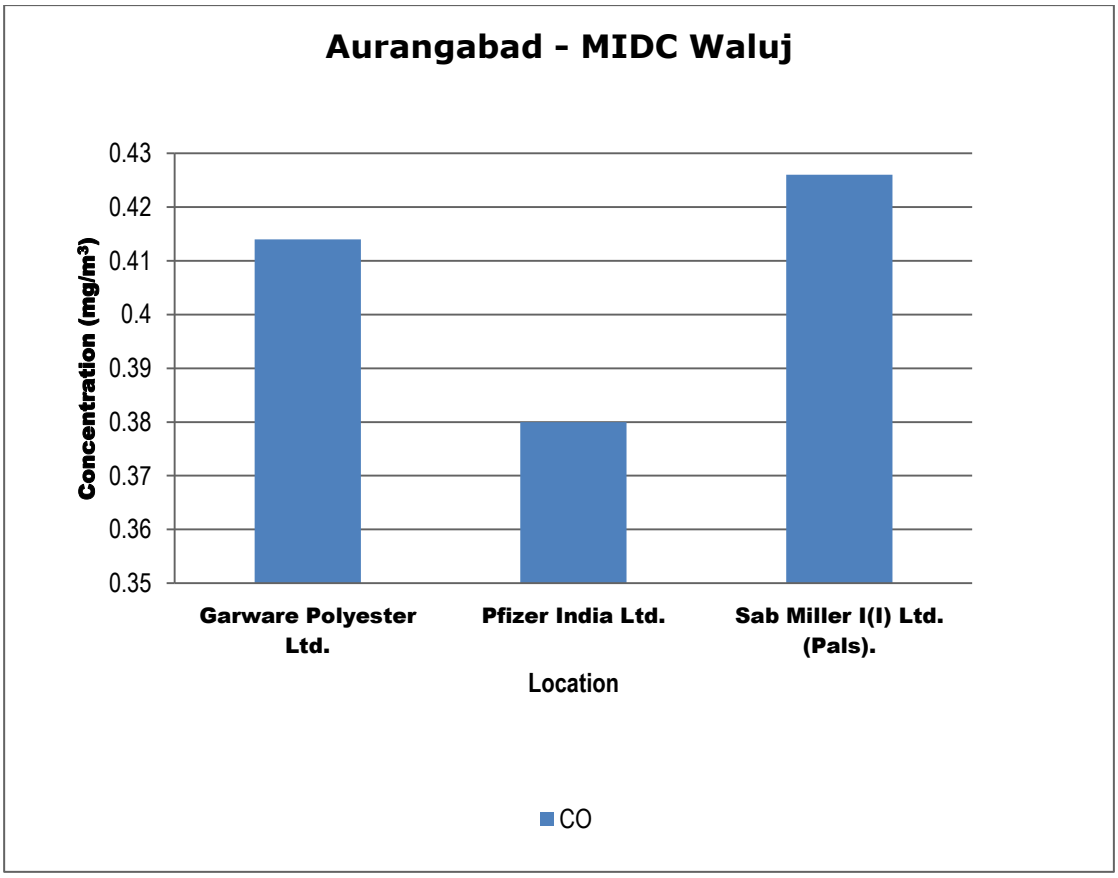


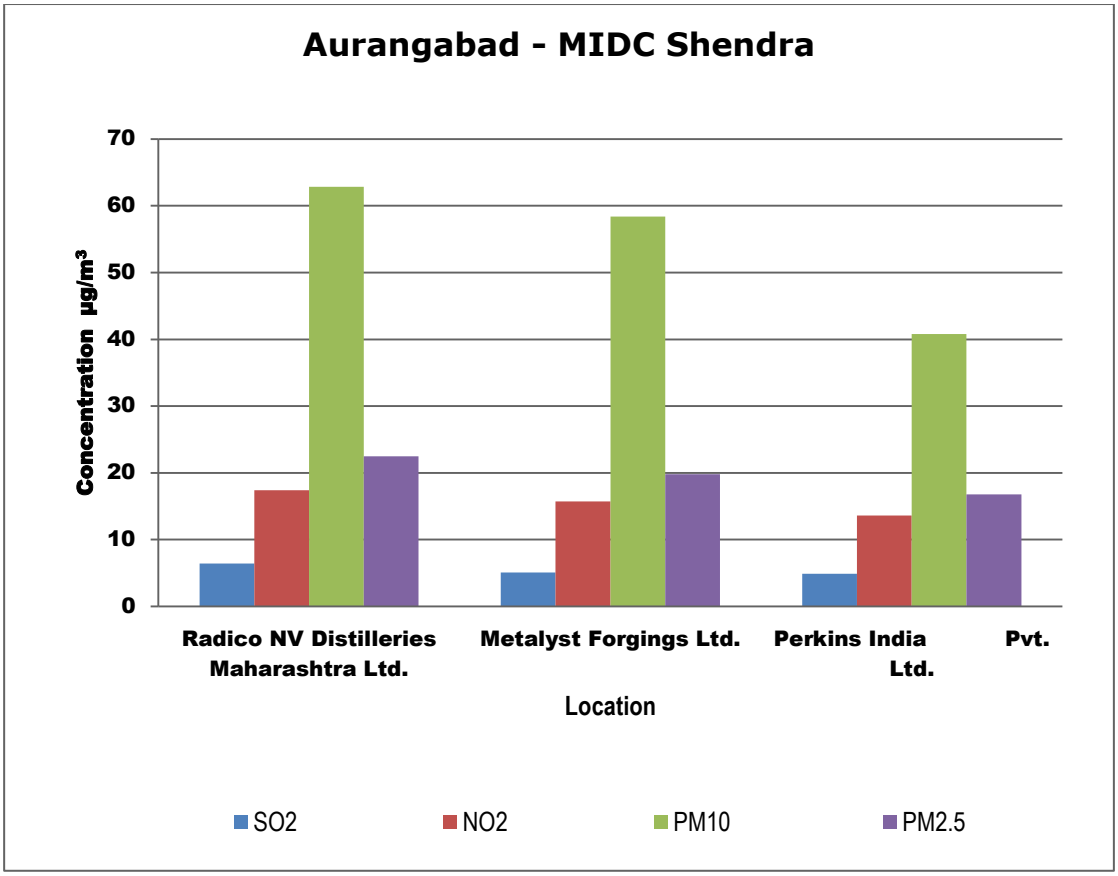


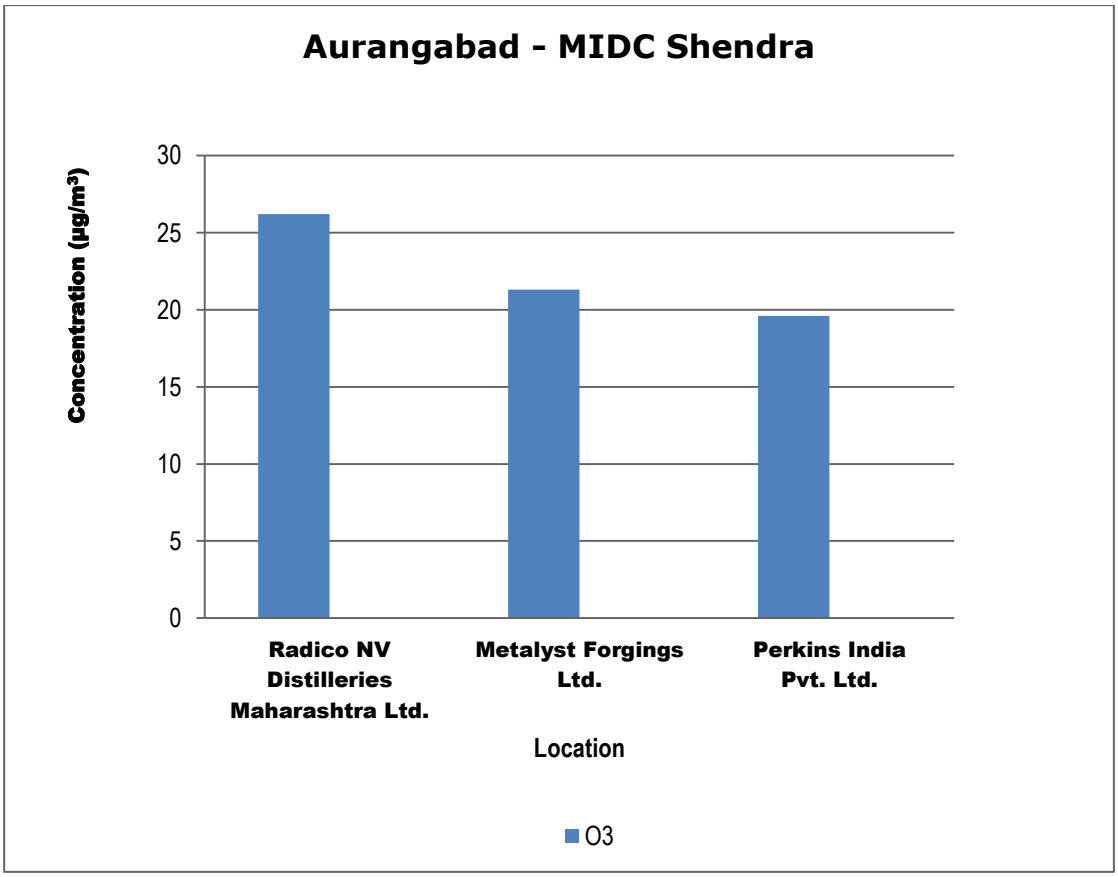

Aurangabad - MIDC Chikalthana
Concentration (mg/m3)
0.36
0.35
0.34
0.33
0.32
0.31
0.3
0.29
0.28
United Spirits Ltd.
NRB Bearing Ltd.
Greaves Cotton Ltd.
Location
CO

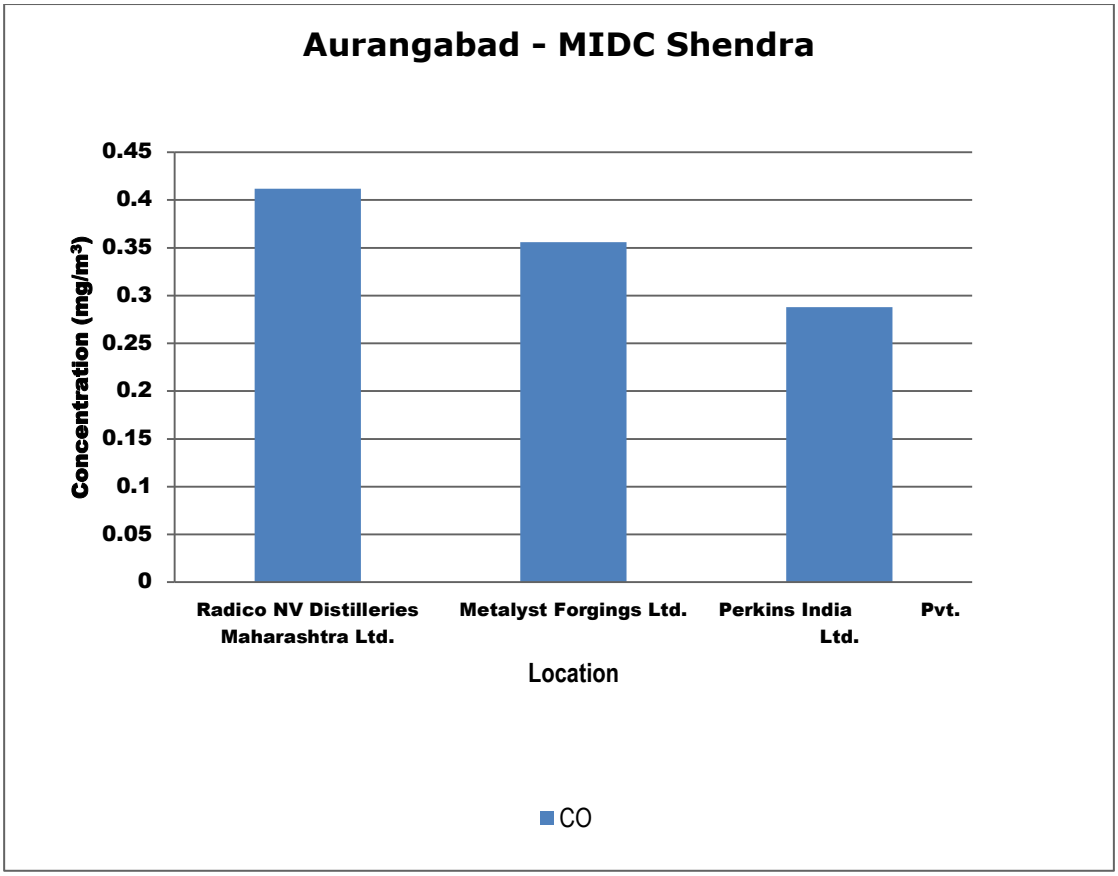

Aurangabad - MIDC Waluj
Concentration µg/m³
70
60
50
40
30
20
10
0
BKT Tyre
Sterlite Tech Ltd.
Garware Polyester Ltd.
Location
SO2
NO2
PM10
PM2.5

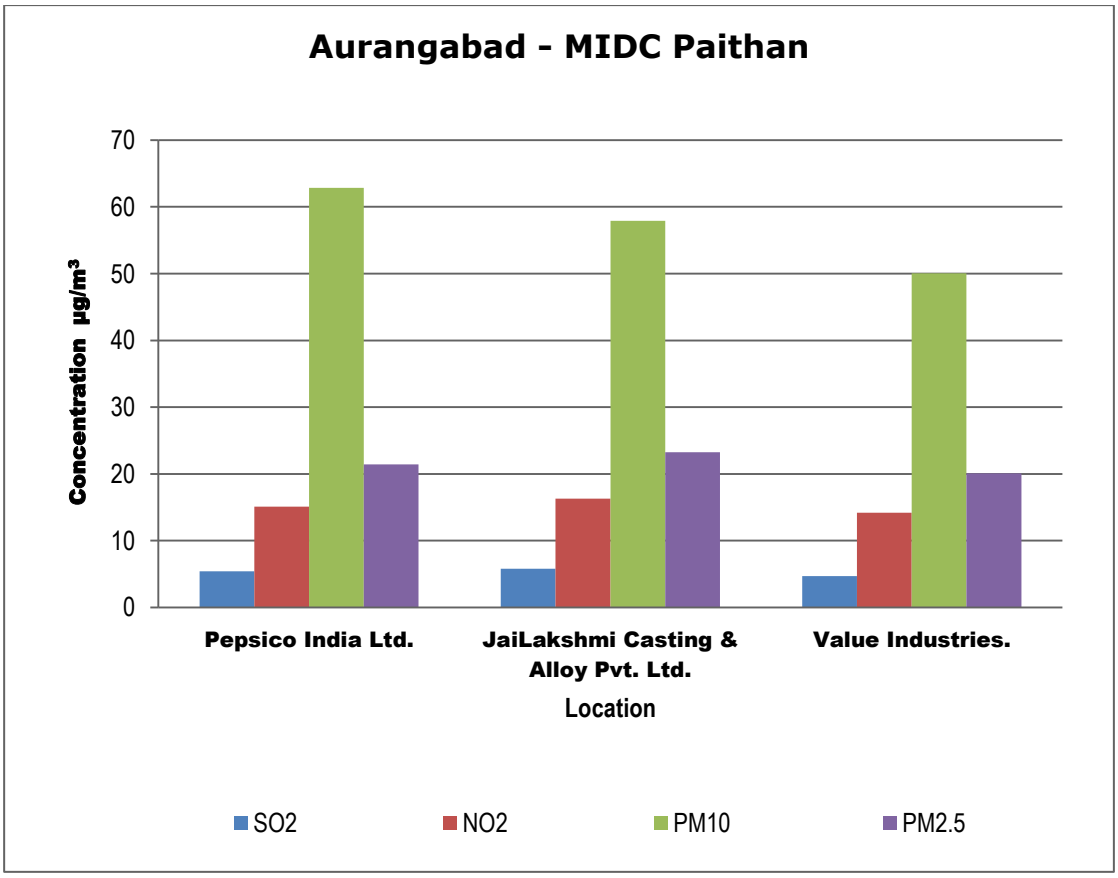

Aurangabad - MIDC Waluj
Concentration (µg/m³)
30
25
20
15
10
5
0
Garware Polyester Ltd.
Pfizer India Ltd.
Sab Miller I(I) Ltd. (Pals).
Location
O3

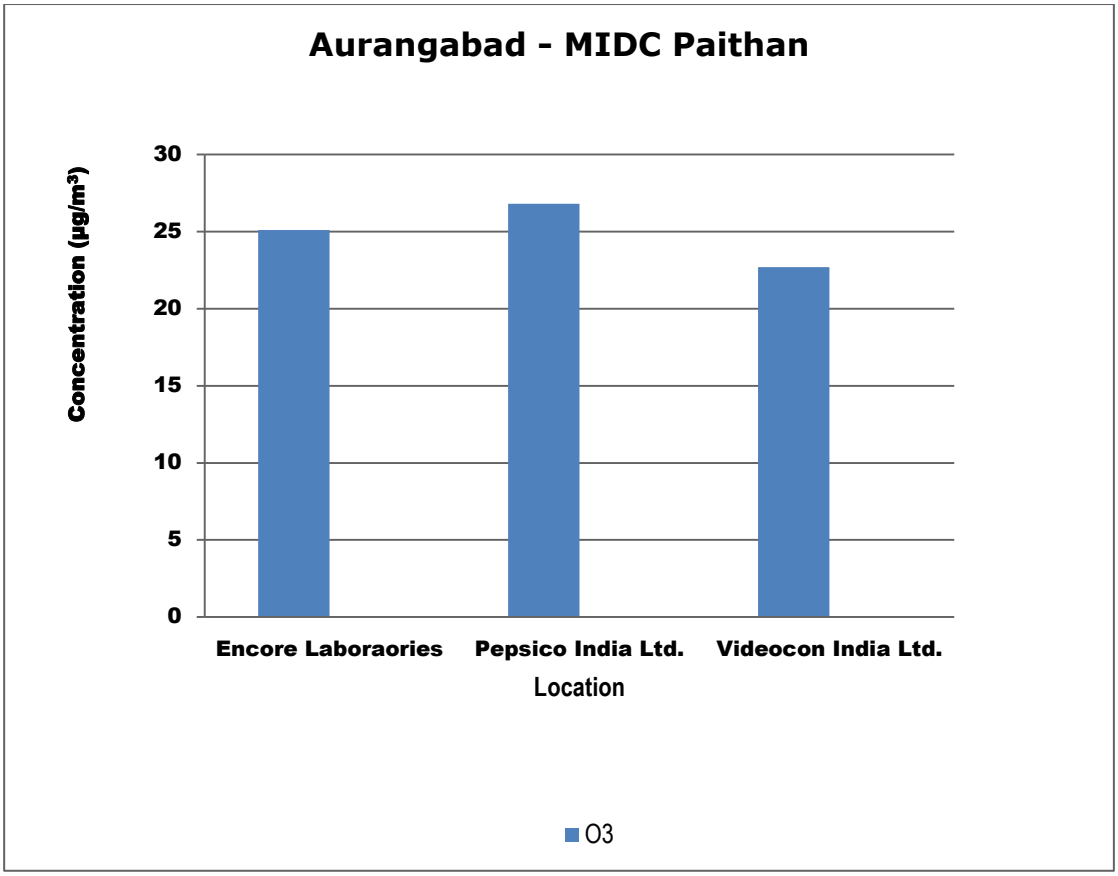

Aurangabad - MIDC Waluj
Concentration (mg/m³)
0.43
0.42
0.41
0.4
0.39
0.38
0.37
0.36
0.35
Garware Polyester Ltd.
Pfizer India Ltd.
Sab Miller I(I) Ltd. (Pals).
Location
CO

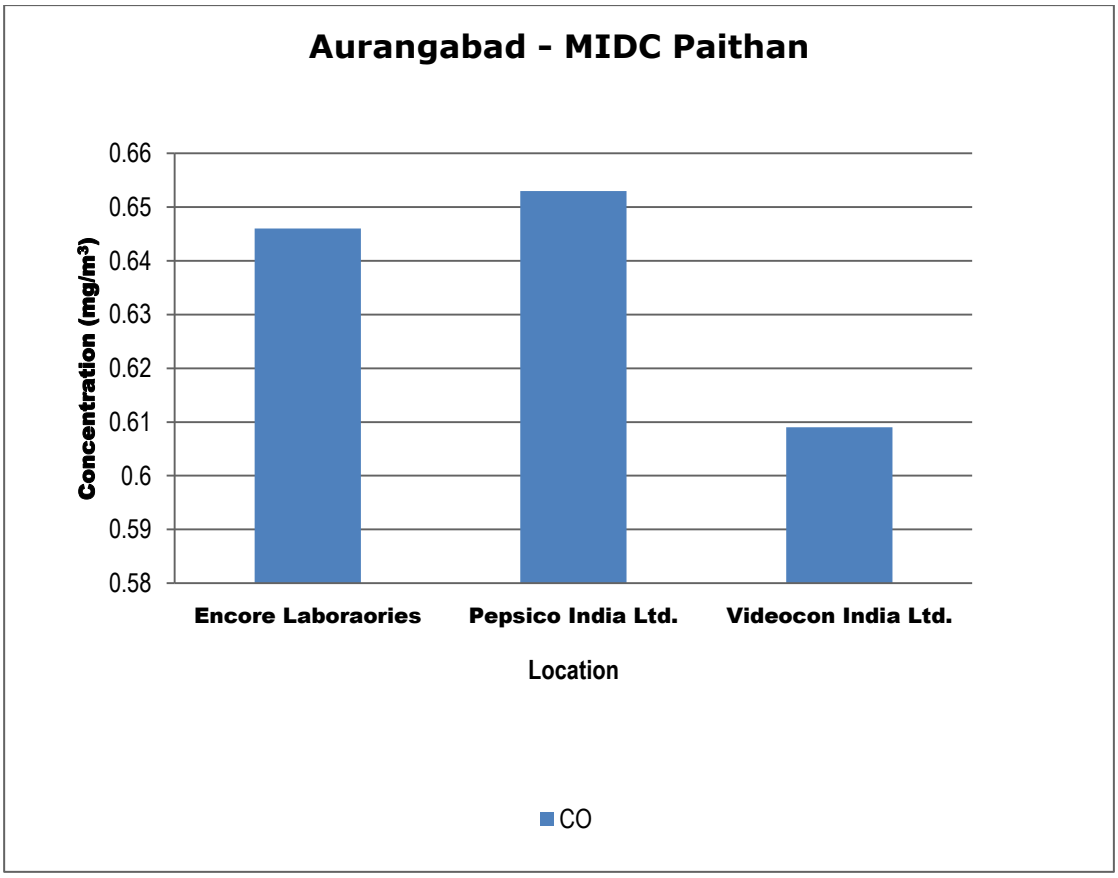

Aurangabad - MIDC Shendra
Concentration µg/m³
70
60
50
40
30
20
10
0
Radico NV Distilleries Maharashtra Ltd.
Metalyst Forgings Ltd.
Perkins India Pvt. Ltd.
Location
SO2
NO2
PM10
PM2.5


Aurangabad - MIDC Shendra
Concentration (µg/m³)
30
25
20
15
10
5
0
Radico NV Distilleries Maharashtra Ltd.
Metalyst Forgings Ltd.
Perkins India Pvt. Ltd.
Location
O3


Aurangabad - MIDC Shendra
Concentration (mg/m³)
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Radico NV Distilleries Maharashtra Ltd.
Metalyst Forgings Ltd.
Perkins India Pvt. Ltd.
Location
CO


Aurangabad - MIDC Paithan
Concentration µg/m³
70
60
50
40
30
20
10
0
Pepsico India Ltd.
JaiLakshmi Casting & Alloy Pvt. Ltd.
Value Industries.
Location
SO2
NO2
PM10
PM2.5


Aurangabad - MIDC Paithan
Concentration (µg/m³)
30
25
20
15
10
5
0
Encore Laboraories
Pepsico India Ltd.
Videocon India Ltd.
Location
O3


Aurangabad - MIDC Paithan
Concentration (mg/m³)
0.66
0.65
0.64
0.63
0.62
0.61
0.6
0.59
0.58
Encore Laboraories
Pepsico India Ltd.
Videocon India Ltd.
Location
CO

3.3 Water/Waste water Analysis Results:

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

3.3.1 Waste Water Analysis:

a) MIDC Chikalthana

Sr.	Name of Industry	Included in
1.	NRB Bearing Ltd.	Table No. I
2.	Exedy India Ltd.	Table No. I
3.	Radiant Induschem Pvt. Ltd.	Table No. I
4.	Wockhardt Ltd. L-1	Table No. I
5.	Lupin Ltd.	Table No. I
6.	Allied Blenders & Distillers Ltd.	Table No. I

Table No. I

Name of Industry				**NRB Bearing Ltd.**	**Exedy India Ltd.**	**Radient Indus Chem Pvt. Ltd**	**Wockhardt Ltd.**	**Lupin Laboratories**	**Allied Blenders & Distillers Ltd.**
Location				ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet
Date of Sampling				**04.06.17**	**05.06.17**	**04.06.17**	**05.06.17**	**05.06.17**	**05.06.17**
Sr.	**Parameters**	**Unit**	**Std.**	**Results**					
1.	Sanitary Survey	-		Moderate Clean	Clean	Moderate Clean	Clear	Moderate Clean	Moderate Clean
2.	General Appearance	-		Dark Colour	Dark Colour	Dark Brown Colour	Clear	Dark Colour	Dark Colour
3.	Colour	Hazen		>25	>25	>25	>25	>25	Colourless
4.	Smell	-		Disaggreable	Disaggreable	Disaggreable	Disaggreable	Disaggreable	Agreeable
5.	Transparency	-		Turbid	Turbid	Turbid	Turbid	Turbid	Transparant
6.	pH	-	**5.5 - 9.0**	9.39	7.02	7.78	7.53	7.06	7.83
7.	Oil & Grease	mg/L	**10.0**	BDL	BDL	20	17	BDL	BDL
8.	Suspended Solids	mg/L	**100.0**	210	18	12	18	20	BDL
9.	Dissolved Oxygen (%Saturation)	%		4.3	5.8	4.2	5.9	5.9	6.5
10.	Chemical Oxygen Demand	mg/L	**250.0**	277.44	73.44	995.52	48.96	51.84	<4
11.	Biochemical Oxygen Demand (3 days,27^{o}C)	mg/L	**30.0**	102.5	26.18	331.6	16.65	18.78	<2

Name of Industry				**NRB Bearing Ltd.**	**Exedy India Ltd.**	**Radient Indus Chem Pvt. Ltd**	**Wockhardt Ltd.**	**Lupin Laboratories**	**Allied Blenders & Distillers Ltd.**
Location				ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet
Date of Sampling				**04.06.17**	**05.06.17**	**04.06.17**	**05.06.17**	**05.06.17**	**05.06.17**
Sr.	**Parameters**	**Unit**	**Std.**	**Results**					
12.	Electrical Conductivity (at 25 °C)	µmho/ cm		4851	3464	18690	1371	1131	421.6
13.	Nitrite Nitrogen (as N)	mg/L		BDL	BDL	BDL	BDL	BDL	BDL
14.	$(NO_2 + NO_3)$-Nitrogen	mg/L	**10.0**	110	272.98	3249.27	117	141	BDL
15.	Nitrate Nitrogen (as N)	mg/L	**5.0**	110.32	272.98	3249.27	117.22	141.49	BDL
16.	Free Ammonia (as NH_3-N)	mg/L	**5.0**	BDL	BDL	BDL	BDL	BDL	BDL
17.	Total Residual Chlorine	mg/L	**1.0**	BDL	BDL	BDL	BDL	BDL	BDL
18.	Cyanide (as CN)	mg/L	**0.2**	BDL	BDL	BDL	BDL	BDL	BDL
19.	Fluoride (as F)	mg/L	**2.0**	0.58	2.49	0.331	0.452	0.24	0.21
20.	Sulphide (as S^{2-})	mg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL
21.	Dissolved Phosphate (as P)	mg/L	**5.0**						
22.	Sodium Absorption Ratio			38.75	18.09	50.7	3.46	2.91	6.4
23.	Total Coliforms	MPN index/ 100 mL	**100.0**	BDL	BDL	14	49	46	BDL

Name of Industry				**NRB Bearing Ltd.**	**Exedy India Ltd.**	**Radient Indus Chem Pvt. Ltd**	**Wockhardt Ltd.**	**Lupin Laboratories**	**Allied Blenders & Distillers Ltd.**
Location				ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet
Date of Sampling				**04.06.17**	**05.06.17**	**04.06.17**	**05.06.17**	**05.06.17**	**05.06.17**
Sr.	**Parameters**	**Unit**	**Std.**	**Results**					
24.	Faecal Coliforms	MPN index/ 100 mL	**1000.0**	Absent	Absent	Present	Present	Absent	Absent
25.	Total Phosphorous (as P)	mg/L	**1.0**	0.33	ND	0.41	0.27	1.23	ND
26.	Total Kjeldahl Nitrogen (as N)	mg/L	**100.0**	0.86	2.16	10.89	1.56	2.68	14.56
27.	Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	**5.0**	BDL	1.23	BDL	BDL	1.3	2.89
28.	Phenol (as C_6H_5OH)	mg/L	**3.0**	BDL	BDL	BDL	BDL	BDL	BDL
29.	Surface Active Agents (as MBAS)	mg/L	**3.0**	BDL	BDL	BDL	BDL	BDL	BDL
30.	Organo Chlorine Pesticides		**0.1**						
i.	Alachlor	µg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL
ii.	Atrazine	µg/L	**0.2**	BDL	BDL	BDL	BDL	BDL	BDL
iii.	Aldrin	µg/L	**0.1**	BDL	BDL	BDL	BDL	BDL	BDL
iv.	Dieldrin	µg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL
v.	Alpha HCH	µg/L	**0.01**	BDL	BDL	BDL	BDL	BDL	BDL
vi.	Beta HCH	µg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL
vii.	Butachlor	µg/L	**3.0**	BDL	BDL	BDL	BDL	BDL	BDL

Name of Industry				**NRB Bearing Ltd.**	**Exedy India Ltd.**	**Radient Indus Chem Pvt. Ltd**	**Wockhardt Ltd.**	**Lupin Laboratories**	**Allied Blenders & Distillers Ltd.**
Location				ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet
Date of Sampling				**04.06.17**	**05.06.17**	**04.06.17**	**05.06.17**	**05.06.17**	**05.06.17**
Sr.	**Parameters**	**Unit**	**Std.**	**Results**					
viii.	Chlorpyrifos	µg/L		BDL	BDL	BDL	BDL	BDL	BDL
ix.	Delta HCH	µg/L	**0.2**	BDL	BDL	BDL	BDL	BDL	BDL
x	p,p DDT	µg/L	**0.05**	BDL	BDL	BDL	BDL	BDL	BDL
xi.	o,p DDT	µg/L	**100.0**	BDL	BDL	BDL	BDL	BDL	BDL
xii.	p,p DDE	µg/L	**250.0**	BDL	BDL	BDL	BDL	BDL	BDL
xiii.	o,p DDE	µg/L	**30.0**	BDL	BDL	BDL	BDL	BDL	BDL
xiv.	p,p DDD	µg/L		BDL	BDL	BDL	BDL	BDL	BDL
xv.	o,p DDD	µg/L		BDL	BDL	BDL	BDL	BDL	BDL
xvi.	Alpha Endosulfan	µg/L	**10.0**	BDL	BDL	BDL	BDL	BDL	BDL
xvii.	Beta Endosulfan	µg/L		BDL	BDL	BDL	BDL	BDL	BDL
xviii.	EndosulfanSulphate	µg/L	**5.0**	BDL	BDL	BDL	BDL	BDL	BDL
xix	Y HCH (Lindane)	µg/L	**1.0**	BDL	BDL	BDL	BDL	BDL	BDL
31.	Polynuclear aromatic hydrocarbons (PAH)	µg/L	**0.2**	BDL	BDL	0.21	BDL	0.14	BDL
32.	Polychlorinated Biphenyls (PCB)	µg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL
33.	Zinc (Zn)	mg/L	**5.0**	BDL	BDL	BDL	BDL	BDL	BDL

Name of Industry				**NRB Bearing Ltd.**	**Exedy India Ltd.**	**Radient Indus Chem Pvt. Ltd**	**Wockhardt Ltd.**	**Lupin Laboratories**	**Allied Blenders & Distillers Ltd.**
Location				ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet
Date of Sampling				**04.06.17**	**05.06.17**	**04.06.17**	**05.06.17**	**05.06.17**	**05.06.17**
Sr.	**Parameters**	**Unit**	**Std.**	**Results**					
34.	Nickel (as Ni)	mg/L	**3.0**	BDL	BDL	BDL	BDL	0.25	BDL
35.	Copper (as Cu)	mg/L		BDL	BDL	BDL	BDL	BDL	BDL
36.	Hexavalent Chromium (as Cr^{6+})	mg/L	**0.1**	BDL	BDL	BDL	BDL	BDL	BDL
37.	Total Chromium (as Cr)	mg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL
38.	Total Arsenic (as As)	mg/L	**0.2**	BDL	BDL	BDL	BDL	BDL	BDL
39.	Lead (as Pb)	mg/L	**0.1**	BDL	BDL	BDL	BDL	BDL	BDL
40.	Cadmium (as Cd)	mg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL
41.	Mercury (as Hg)	mg/L	**0.01**	BDL	BDL	BDL	BDL	BDL	BDL
42.	Manganese (as Mn)	mg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL
43.	Iron (as Fe)	mg/L	**3.0**	BDL	BDL	BDL	BDL	BDL	BDL
44.	Vanadium (as V)	mg/L	**0.2**	0.62	0.52	0.17	0.39	0.68	0.02
45.	Selenium (as Se)	mg/L	**0.05**	BDL	BDL	BDL	BDL	BDL	BDL
46.	Boron (as B)	mg/L		BDL	BDL	BDL	BDL	BDL	BDL
47.	Bioassay Test on fish	% survival		70	90	50	100	100	100

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Sr.	Name of Industry	Included in
1.	IPCA (Paschim Chem)Bajaj Auto Ltd.	Table No. II
2.	Goodyear South Area	Table No. II
3.	SAB Miller I(I) Ltd. (Pals).	Table No. II
4.	Endurance Technology K-120	Table No. II
5.	Varvoc Ltd. L-4	Table No. II
6.	Wockhardt Biotech	Table No. II

Table No. II

Name of Industry				IPCA (Paschim Chem)	Good Year South Area	SAB Miller I(I) Ltd. (Pals).	Endurance Technology K-120	Varvoc Ltd. L-4	Wockhardt Biotech
Location				ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet
Date of Sampling				**10.06.17**	**11.06.17**	**11.06.17**	**12.06.17**	**12.06.17**	**12.06.17**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**					
1.	Sanitary Survey	-		Moderate Clean	Clean	Clean	Clean	Clean	Clean
2.	General Appearance	-		Clear colourless	Dark Colour	Colourless	Colourless with Sediment	Colourless with Sediment	Dark Colour
3.	Colour	Hazen		>25	>25	>25	>25	>25	5
4.	Smell	-		Aggreable	Aggreable	Disagreeable	Aggreable	Aggreable	Aggreable
5.	Transparency	-		Turbid	Turbid	Turbid	Turbid	Transparant	Turbid

Name of Industry				**IPCA (Paschim Chem)**	**Good Year South Area**	**SAB Miller I(I) Ltd. (Pals).**	**Endurance Technology K-120**	**Varvoc Ltd. L-4**	**Wockhardt Biotech**
Location				ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet
Date of Sampling				**10.06.17**	**11.06.17**	**11.06.17**	**12.06.17**	**12.06.17**	**12.06.17**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**					
6.	pH	-	**5.5 -9.0**	7.8	7.6	7.44	7.66	7.44	7.71
7.	Oil & Grease	mg/L	**10.0**	BDL	BDL	BDL	BDL	BDL	BDL
8.	Suspended Solids	mg/L	**100.0**	16	12	18	BDL	BDL	23
9.	Dissolved Oxygen (%Saturation)	%		5.9	5.9	5.9	6.1	5.9	6.2
10.	Chemical Oxygen Demand	mg/L	**250.0**	18.41	16.32	134.64	BDL	24.48	8.41
11.	Biochemical Oxygen Demand (3 days,27^{o}C)	mg/L	**30.0**	5.81	5.85	46.3	BDL	9.14	3.18
12.	Electrical Conductivity (at 25 ^{o}C)	µmho/ cm		526.4	1058	14370	529.1	5292	467.2
13.	Nitrite Nitrogen (as N)	mg/L		BDL	BDL	BDL	BDL	BDL	BDL
14.	(NO_2 + NO_3)-Nitrogen	mg/L	**10.0**	BDL	36.93	575.23	2.1	2.21	2.08
15.	Nitrate Nitrogen (as N)	mg/L	**5.0**	BDL	37	575	BDL	BDL	BDL
16.	Free Ammonia (as NH_3-N)	mg/L	**5.0**	BDL	BDL	BDL	BDL	BDL	BDL

Name of Industry				**IPCA (Paschim Chem)**	**Good Year South Area**	**SAB Miller I(I) Ltd. (Pals).**	**Endurance Technology K-120**	**Varvoc Ltd. L-4**	**Wockhardt Biotech**
Location				ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet
Date of Sampling				**10.06.17**	**11.06.17**	**11.06.17**	**12.06.17**	**12.06.17**	**12.06.17**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**					
17.	Total Residual Chlorine	mg/L	**1.0**	BDL	BDL	BDL	BDL	BDL	BDL
18.	Cyanide (as CN)	mg/L	**0.2**	BDL	BDL	BDL	BDL	BDL	BDL
19.	Fluoride (as F)	mg/L	**2.0**	0.426	0.204	0.465	0.251	0.246	0.253
20.	Sulphide (as S^{2-})	mg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL
21.	Dissolved Phosphate (as P)	mg/L	**5.0**	BDL	12.64	BDL	BDL	11.9	10.77
22.	Sodium Absorption Ratio			1.84	4.88	89.83	1.36	18.06	1.72
23.	Total Coliforms	MPN index/ 100 mL	**100.0**	70	63	49	23	BDL	BDL
24.	Faecal Coliforms	MPN index/ 100 mL	**1000.0**	Present	Present	Present	Present	Absent	Absent
25.	Total Phosphorous (as P)	mg/L	**1.0**	0.26	0.57	55.43	ND	ND	0.39
26.	Total Kjeldahl Nitrogen (as N)	mg/L	**100.0**	0.16	0.52	0.13	11	37	1.63

Name of Industry				**IPCA (Paschim Chem)**	**Good Year South Area**	**SAB Miller I(I) Ltd. (Pals).**	**Endurance Technology K-120**	**Varvoc Ltd. L-4**	**Wockhardt Biotech**
Location				ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet
Date of Sampling				**10.06.17**	**11.06.17**	**11.06.17**	**12.06.17**	**12.06.17**	**12.06.17**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**					
27.	Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	**5.0**	BDL	BDL	BDL	0.36	0.37	2.1
28.	Phenol (as C_6H_5OH)	mg/L	**3.0**	BDL	BDL	BDL	BDL	BDL	BDL
29.	Surface Active Agents (as MBAS)	mg/L	**3.0**	BDL	BDL	BDL	BDL	BDL	BDL
30.	Organo Chlorine Pesticides		**0.1**						
i.	Alachlor	µg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL
ii.	Atrazine	µg/L	**0.2**	BDL	BDL	BDL	BDL	BDL	BDL
iii.	Aldrin	µg/L	**0.1**	BDL	BDL	BDL	BDL	BDL	BDL
iv.	Dieldrin	µg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL
v.	Alpha HCH	µg/L	**0.01**	BDL	BDL	BDL	BDL	BDL	BDL
vi.	Beta HCH	µg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL
vii.	Butachlor	µg/L	**3.0**	BDL	BDL	BDL	BDL	BDL	BDL
viii.	Chloropyrifos	µg/L		BDL	BDL	BDL	BDL	BDL	BDL
ix.	Delta HCH	µg/L	**0.2**	BDL	BDL	BDL	BDL	BDL	BDL
x	p,p DDT	µg/L	**0.05**	BDL	BDL	BDL	BDL	BDL	BDL

Name of Industry				**IPCA (Paschim Chem)**	**Good Year South Area**	**SAB Miller I(I) Ltd. (Pals).**	**Endurance Technology K-120**	**Varvoc Ltd. L-4**	**Wockhardt Biotech**
Location				ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet
Date of Sampling				**10.06.17**	**11.06.17**	**11.06.17**	**12.06.17**	**12.06.17**	**12.06.17**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**					
xi.	o,p DDT	µg/L	**100.0**	BDL	BDL	BDL	BDL	BDL	BDL
xii.	p,p DDE	µg/L	**250.0**	BDL	BDL	BDL	BDL	BDL	BDL
xiii.	o,p DDE	µg/L	**30.0**	BDL	BDL	BDL	BDL	BDL	BDL
xiv.	p,p DDD	µg/L		BDL	BDL	BDL	BDL	BDL	BDL
xv.	o,p DDD	µg/L		BDL	BDL	BDL	BDL	BDL	BDL
xvi.	Alpha Endosulfan	µg/L	**10.0**	BDL	BDL	BDL	BDL	BDL	BDL
xvii.	Beta Endosulfan	µg/L		BDL	BDL	BDL	BDL	BDL	BDL
xviii.	EndosulfanSulphate	µg/L	**5.0**	BDL	BDL	BDL	BDL	BDL	BDL
xix.	Y HCH (Lindane)	µg/L	**1.0**	BDL	BDL	BDL	BDL	BDL	BDL
31.	Polynuclear aromatic hydrocarbons (PAH)	µg/L	**0.2**	0.25	BDL	0.33	0.18	BDL	BDL
32.	Polychlorinated Biphenyls (PCB)	µg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL
33.	Zinc (Zn)	mg/L	**5.0**	BDL	BDL	BDL	BDL	BDL	BDL
34.	Nickel (as Ni)	mg/L	**3.0**	BDL	BDL	0.18	BDL	BDL	BDL

Name of Industry				**IPCA (Paschim Chem)**	**Good Year South Area**	**SAB Miller I(I) Ltd. (Pals).**	**Endurance Technology K-120**	**Varvoc Ltd. L-4**	**Wockhardt Biotech**
Location				ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet
Date of Sampling				**10.06.17**	**11.06.17**	**11.06.17**	**12.06.17**	**12.06.17**	**12.06.17**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**					
35.	Copper (as Cu)	mg/L		BDL	BDL	BDL	BDL	BDL	BDL
36.	Hexavalent Chromium (as Cr^{6+})	mg/L	**0.1**	BDL	BDL	0.04	BDL	BDL	BDL
37.	Total Chromium (as Cr)	mg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL
38.	Total Arsenic (as As)	mg/L	**0.2**	BDL	BDL	BDL	BDL	BDL	BDL
39.	Lead (as Pb)	mg/L	**0.1**	BDL	BDL	BDL	BDL	BDL	BDL
40.	Cadmium (as Cd)	mg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	0.02
41.	Mercury (as Hg)	mg/L	**0.01**	BDL	BDL	BDL	BDL	BDL	BDL
42.	Manganese (as Mn)	mg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL
43.	Iron (as Fe)	mg/L	**3.0**	BDL	BDL	BDL	BDL	BDL	BDL
44.	Vanadium (as V)	mg/L	**0.2**	0.47	0.6	0.87	0.1	0.37	0.02
45.	Selenium (as Se)	mg/L	**0.05**	BDL	BDL	BDL	BDL	BDL	BDL
46.	Boron (as B)	mg/L		BDL	BDL	BDL	BDL	BDL	BDL

Name of Industry				**IPCA (Paschim Chem)**	**Good Year South Area**	**SAB Miller I(I) Ltd. (Pals).**	**Endurance Technology K-120**	**Varvoc Ltd. L-4**	**Wockhardt Biotech**
Location				ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet
Date of Sampling				**10.06.17**	**11.06.17**	**11.06.17**	**12.06.17**	**12.06.17**	**12.06.17**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**					
47.	Bioassay Test on fish	% survival		100	100	70	100	100	100

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Sr.	**Name of Industry**	**Included in**
1.	Glenmark Pharmaceuticals Lab.	Table No. III
2.	Skoda Auto India Pvt. Ltd.	Table No. III
3.	NRB Bearings Ltd	Table No. III
4.	Wockhardt Infrastructure Development Ltd	Table No. III
5.	Harman Finochem Ltd.	Table No. III
6.	Perkins India Pvt. Ltd.	Table No. III

Table No. III

Name of Industry				**Glenmark Pharma-ceuticals Lab**	**Skoda Auto India Pvt. Ltd.**	**NRB Bearings Ltd.**	**Wockhardt Ltd.**	**Harman Finochem Ltd.**	**Perkins India Pvt. Ltd.**
Location				ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet
Date of Sampling				**06.06.17**	**07.06.17**	**07.06.17**	**06.06.17**	**06.06.17**	**06.06.17**
Sr.	**Parameters**	**Unit**	**Std.**	**Results**					
1.	Sanitary Survey	-							
2.	General Appearance	-		Clear colourless	Clear colourless	Turbid liquid	Turbid liquid	Turbid liquid	Dark Colour
3.	Colour	Hazen		>25	colour less	colour less	>25	colour less	2
4.	Smell	-		Disagreeable	Aggreable	Aggreable	disagreeable	Aggreable	Aggreable
5.	Transparency	-		Turbid	Transparent	Transparent	Turbid liquid	transparant	Transparant
6.	pH	-	**5.5 - 9.0**	7.12	8.13	7.05	7.29	8.52	7.02
7.	Oil & Grease	mg/L	**10.0**	BDL	BDL	BDL	BDL	BDL	BDL
8.	Suspended Solids	mg/L	**100.0**	28	BDL	BDL	38	BDL	BDL
9.	Dissolved Oxygen (%Saturation)	%		5.8	6.5	6.5	6.1	6.5	5.9
10.	Chemical Oxygen Demand	mg/L	**250.0**	38.88	BDL	BDL	8.64	BDL	18.42
11.	Biochemical Oxygen Demand (3 days,27^{o}C)	mg/L	**30.0**	13.41	2	10	3.34	2	9.64

Name of Industry				**Glenmark Pharma-ceuticals Lab**	**Skoda Auto India Pvt. Ltd.**	**NRB Bearings Ltd.**	**Wockhardt Ltd.**	**Harman Finochem Ltd.**	**Perkins India Pvt. Ltd.**
Location				ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet
Date of Sampling				**06.06.17**	**07.06.17**	**07.06.17**	**06.06.17**	**06.06.17**	**06.06.17**
Sr.	**Parameters**	**Unit**	**Std.**	**Results**					
12.	Electrical Conductivity (at 25°C)	µmho / cm		1392	807.4	3063	931.2	1348	814.9
13.	Nitrite Nitrogen (as N)	mg/L		BDL	BDL	BDL	BDL	BDL	BDL
14.	Nitrate Nitrogen (as N)	mg/L	**10.0**	57.9	3.53	369.32	24.24	1341.27	BDL
15.	$(NO_2 + NO_3)$-Nitrogen	mg/L	**5.0**	57	3	369	24	1341	BDL
16.	Free Ammonia (as NH_3-N)	mg/L	**5.0**	BDL	BDL	BDL	BDL	BDL	BDL
17.	Total Residual Chlorine	mg/L	**1.0**	BDL	BDL	BDL	BDL	BDL	BDL
18.	Cyanide (as CN)	mg/L	**0.2**	BDL	BDL	BDL	BDL	BDL	BDL
19.	Fluoride (as F)	mg/L	**2.0**	0.6	0.3	0.41	0.37	<0.1	0.2
20.	Sulphide (as S^{2-})	mg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL
21.	Dissolved Phosphate (as P)	mg/L	**5.0**				BDL	1.07	0.67
22.	Sodium Absorption Ratio			6.81	6.13	1.71	4.96	6.7	2.3
23.	Total Coliforms	MPN index / 100 mL	**100.0**	70	BDL	BDL	17	BDL	17

Name of Industry				**Glenmark Pharma-ceuticals Lab**	**Skoda Auto India Pvt. Ltd.**	**NRB Bearings Ltd.**	**Wockhardt Ltd.**	**Harman Finochem Ltd.**	**Perkins India Pvt. Ltd.**
Location				ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet
Date of Sampling				**06.06.17**	**07.06.17**	**07.06.17**	**06.06.17**	**06.06.17**	**06.06.17**
Sr.	**Parameters**	**Unit**	**Std.**	**Results**					
24.	Faecal Coliforms	MPN index / 100 mL	**1000.0**	Absent	Absent	Absent	Absent	Absent	Present
25.	Total Phosphorous (as P)	mg/L	**1.0**	13.4	0.75	0.27	2.99	0.44	3.53
26.	Total Kjeldahl Nitrogen (as N)	mg/L	**100.0**	13.56	3.08	1.08	3.09	3.11	10.98
27.	Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	**5.0**	BDL	BDL	BDL	0.7	BDL	0.53
28.	Phenol (as C_6H_5OH)	mg/L	**3.0**	BDL	BDL	BDL	BDL	BDL	BDL
29.	Surface Active Agents (as MBAS)	mg/L	**3.0**	BDL	BDL	BDL	BDL	BDL	BDL
30.	Organo Chlorine Pesticides		**0.1**						
i.	Alachlor	µg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL
ii.	Atrazine	µg/L	**0.2**	BDL	BDL	BDL	BDL	BDL	BDL
iii.	Aldrin	µg/L	**0.1**	BDL	BDL	BDL	BDL	BDL	BDL
iv.	Dieldrin	µg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL
v.	Alpha HCH	µg/L	**0.01**	BDL	BDL	BDL	BDL	BDL	BDL
vi.	Beta HCH	µg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL

Name of Industry				**Glenmark Pharma-ceuticals Lab**	**Skoda Auto India Pvt. Ltd.**	**NRB Bearings Ltd.**	**Wockhardt Ltd.**	**Harman Finochem Ltd.**	**Perkins India Pvt. Ltd.**
Location				ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet
Date of Sampling				**06.06.17**	**07.06.17**	**07.06.17**	**06.06.17**	**06.06.17**	**06.06.17**
Sr.	**Parameters**	**Unit**	**Std.**	**Results**					
vii.	Butachlor	µg/L	**3.0**	BDL	BDL	BDL	BDL	BDL	BDL
viii.	Chloropryifos	µg/L		BDL	BDL	BDL	BDL	BDL	BDL
ix.	Delta HCH	µg/L	**0.2**	BDL	BDL	BDL	BDL	BDL	BDL
x	p,p DDT	µg/L	**0.05**	BDL	BDL	BDL	BDL	BDL	BDL
xi.	o,p DDT	µg/L	**100.0**	BDL	BDL	BDL	BDL	BDL	BDL
xii.	p,p DDE	µg/L	**250.0**	BDL	BDL	BDL	BDL	BDL	BDL
xiii.	o,p DDE	µg/L	**30.0**	BDL	BDL	BDL	BDL	BDL	BDL
xiv.	p,p DDD	µg/L		BDL	BDL	BDL	BDL	BDL	BDL
xv.	o,p DDD	µg/L		BDL	BDL	BDL	BDL	BDL	BDL
xvi.	Alpha Endosulfan	µg/L	**10.0**	BDL	BDL	BDL	BDL	BDL	BDL
xvii.	Beta Endosulfan	µg/L		BDL	BDL	BDL	BDL	BDL	BDL
xviii.	EndosulfanSulphate	µg/L	**5.0**	BDL	BDL	BDL	BDL	BDL	BDL
xix.	Y HCH (Lindane)	µg/L	**1.0**	BDL	BDL	BDL	BDL	BDL	BDL
31.	Polynuclear aromatic hydrocarbons (PAH)	µg/L	**0.2**	0.16	BDL	BDL	BDL	BDL	BDL

Name of Industry				**Glenmark Pharma-ceuticals Lab**	**Skoda Auto India Pvt. Ltd.**	**NRB Bearings Ltd.**	**Wockhardt Ltd.**	**Harman Finochem Ltd.**	**Perkins India Pvt. Ltd.**
Location				ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet
Date of Sampling				**06.06.17**	**07.06.17**	**07.06.17**	**06.06.17**	**06.06.17**	**06.06.17**
Sr.	**Parameters**	**Unit**	**Std.**	**Results**					
32.	Polychlorinated Biphenyls (PCB)	µg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL
33.	Zinc (Zn)	mg/L	**5.0**	BDL	BDL	BDL	BDL	BDL	BDL
34.	Nickel (as Ni)	mg/L	**3.0**	0.32	BDL	11.36	0.4	BDL	BDL
35.	Copper (as Cu)	mg/L		BDL	BDL	BDL	BDL	BDL	BDL
36.	Hexavalent Chromium (as Cr^{6+})	mg/L	**0.1**	BDL	BDL	BDL	BDL	BDL	BDL
37.	Total Chromium (as Cr)	mg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL
38.	Total Arsenic (as As)	mg/L	**0.2**	BDL	BDL	BDL	BDL	BDL	BDL
39.	Lead (as Pb)	mg/L	**0.1**	BDL	BDL	BDL	BDL	BDL	BDL
40.	Cadmium (as Cd)	mg/L	**2.0**	0.03	BDL	0.12	0.02	BDL	BDL
41.	Mercury (as Hg)	mg/L	**0.01**	BDL	BDL	BDL	BDL	BDL	BDL
42.	Manganese (as Mn)	mg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL
43.	Iron (as Fe)	mg/L	**3.0**	0.09	BDL	BDL	0.08	BDL	BDL
44.	Vanadium (as V)	mg/L	**0.2**	1.11	0.09	1.88	0.78	0.02	0.09
45.	Selenium (as Se)	mg/L	**0.05**	BDL	BDL	BDL	BDL	BDL	BDL
46.	Boron (as B)	mg/L		BDL	BDL	BDL	BDL	BDL	BDL

Name of Industry				**Glenmark Pharma-ceuticals Lab**	**Skoda Auto India Pvt. Ltd.**	**NRB Bearings Ltd.**	**Wockhardt Ltd.**	**Harman Finochem Ltd.**	**Perkins India Pvt. Ltd.**
Location				ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet	ETP Outlet
Date of Sampling				**06.06.17**	**07.06.17**	**07.06.17**	**06.06.17**	**06.06.17**	**06.06.17**
Sr.	**Parameters**	**Unit**	**Std.**	**Results**					
47.	Bioassay Test on fish	% survival		100	100	100	100	100	100

d) MIDC Paithan Road:

Sr.	**Name of Industry**	**Included in**
1.	Pepsico India Pvt. Ltd.	Table No. IV
2.	Ajantha Pharma	Table No. IV
3.	Frogorifico Allan Ltd	Table No. IV
4.	Videocon India Ltd.	Table No. IV
5.	Value Industries	Table No. IV
6.	Badve Engineering	Table No. IV

Table No. IV

Name of Industry				**Pepsico India Pvt. Ltd.**	**Ajantha Pharma**	**Frogorifico Allan Ltd**	**Videocon India Ltd.**	**Value Industries**	**Badve Engineering**
Location				CETP Outlet	Khane River Upstream	Khane River Down Stream	ETP Outlet	ETP Outlet	ETP Outlet
Date of Sampling				**08.06.17**	**09.06.17**	**10.06.17**	**10.06.17**	**10.06.17**	**10.06.17**
Sr.	**Parameters**	**Unit**	**Std.**	**Results**					
1.	Sanitary Survey	-		Moderate Clean	Clean	Clean	Clean	Clean	Clean
2.	General Appearance	-		Dark Colour	Dark Colour	Light coloured with sediment	Clear colourless	Colourless with Sediment	Clear colourless
3.	Colour	Hazen		>25	>25	>25	1	>25	>25
4.	Smell	-		Disaggreable	Disaggreable	Disaggreable	Agreeable	Disaggreable	Disaggreable
5.	Transparency	-		Turbid	Turbid	Transparant	Transparent	Turbid	Turbid
6.	pH	-	**5.5 - 9.0**	8	6.64	8.1	7.74	6.7	6
7.	Oil & Grease	mg/L	**10.0**	BDL	BDL	BDL	BDL	18	BDL
8.	Suspended Solids	mg/L	**100.0**	18	BDL	30	BDL	41	34
9.	Dissolved Oxygen (%Saturation)	%		6.1	5.6	6.5	6.5	6.5	5.3
10.	Chemical Oxygen Demand	mg/L	**250.0**	12.46	77.76	25.62	BDL	BDL	198.78
11.	Biochemical Oxygen Demand (3 days,27^{o}C)	mg/L	**30.0**	4.55	27.6	7.42	BDL	BDL	68.35

Name of Industry				**Pepsico India Pvt. Ltd.**	**Ajantha Pharma**	**Frogorifico Allan Ltd**	**Videocon India Ltd.**	**Value Industries**	**Badve Engineering**
Location				CETP Outlet	Khane River Upstream	Khane River Down Stream	ETP Outlet	ETP Outlet	ETP Outlet
Date of Sampling				**08.06.17**	**09.06.17**	**10.06.17**	**10.06.17**	**10.06.17**	**10.06.17**
Sr.	**Parameters**	**Unit**	**Std.**	**Results**					
12.	Electrical Conductivity (at 25 ^{o}C)	µmho / cm		2816	613.4	3847	430	1258	8502
13.	Nitrite Nitrogen (as N)	mg/L		BDL	BDL	BDL	BDL	BDL	BDL
14.	Nitrate Nitrogen (as N)	mg/L	**10.0**	144.33	2.95	30.79	BDL	180.59	89.73
15.	(NO_2 + NO_3)-Nitrogen	mg/L	**5.0**	144	3	31	2	180	89
16.	Free Ammonia (as NH_3-N)	mg/L	**5.0**	BDL	BDL	BDL	BDL	BDL	BDL
17.	Total Residual Chlorine	mg/L	**1.0**	BDL	BDL	BDL	BDL	BDL	BDL
18.	Cyanide (as CN)	mg/L	**0.2**	BDL	BDL	BDL	BDL	BDL	BDL
19.	Fluoride (as F)	mg/L	**2.0**	0.13	0.255	0.542	0.203	2.66	2.04
20.	Sulphide (as S^{2-})	mg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL
21.	Dissolved Phosphate (as P)	mg/L	**5.0**	BDL	5.26	4.92	BDL	0.37	BDL
22.	Sodium Absorption Ratio			2.55	2.33	10.23	1.23	3.69	14.85

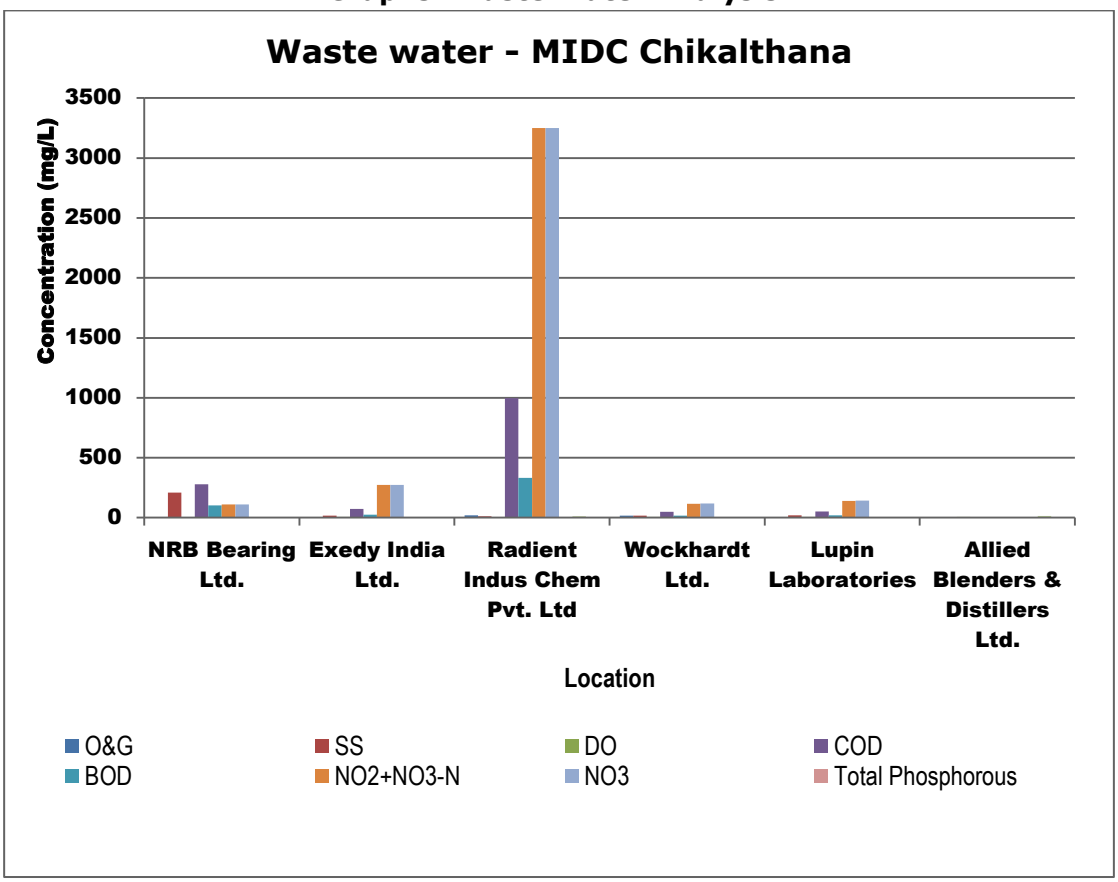
Name of Industry				**Pepsico India Pvt. Ltd.**	**Ajantha Pharma**	**Frogorifico Allan Ltd**	**Videocon India Ltd.**	**Value Industries**	**Badve Engineering**
Location				CETP Outlet	Khane River Upstream	Khane River Down Stream	ETP Outlet	ETP Outlet	ETP Outlet
Date of Sampling				**08.06.17**	**09.06.17**	**10.06.17**	**10.06.17**	**10.06.17**	**10.06.17**
Sr.	**Parameters**	**Unit**	**Std.**	**Results**					
23.	Total Coliforms	MPN index/ 100 mL	**100.0**	14	BDL	49	23	11	BDL
24.	Faecal Coliforms	MPN index/ 100 mL	**1000.0**	Present	Absent	Present	Absent	Present	Absent
25.	Total Phosphorous (as P)	mg/L	**1.0**	9.11	0.29	0.08	0.33	62.68	0.13
26.	Total Kjeldahl Nitrogen (as N)	mg/L	**100.0**	7.79	5.83	1.68	33.65	1.9	28.68
27.	Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	**5.0**	1.39	0.2	1.65	0.6	<0.1	0.15
28.	Phenol (as C_6H_5OH)	mg/L	**3.0**	BDL	BDL	BDL	BDL	BDL	BDL
29.	Surface Active Agents (as MBAS)	mg/L	**3.0**	BDL	BDL	BDL	BDL	BDL	BDL
30.	Organo Chlorine Pesticides		**0.1**						
i.	Alachlor	µg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL
ii.	Atrazine	µg/L	**0.2**	BDL	BDL	BDL	BDL	BDL	BDL
iii.	Aldrin	µg/L	**0.1**	BDL	BDL	BDL	BDL	BDL	BDL
iv.	Dieldrin	µg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL

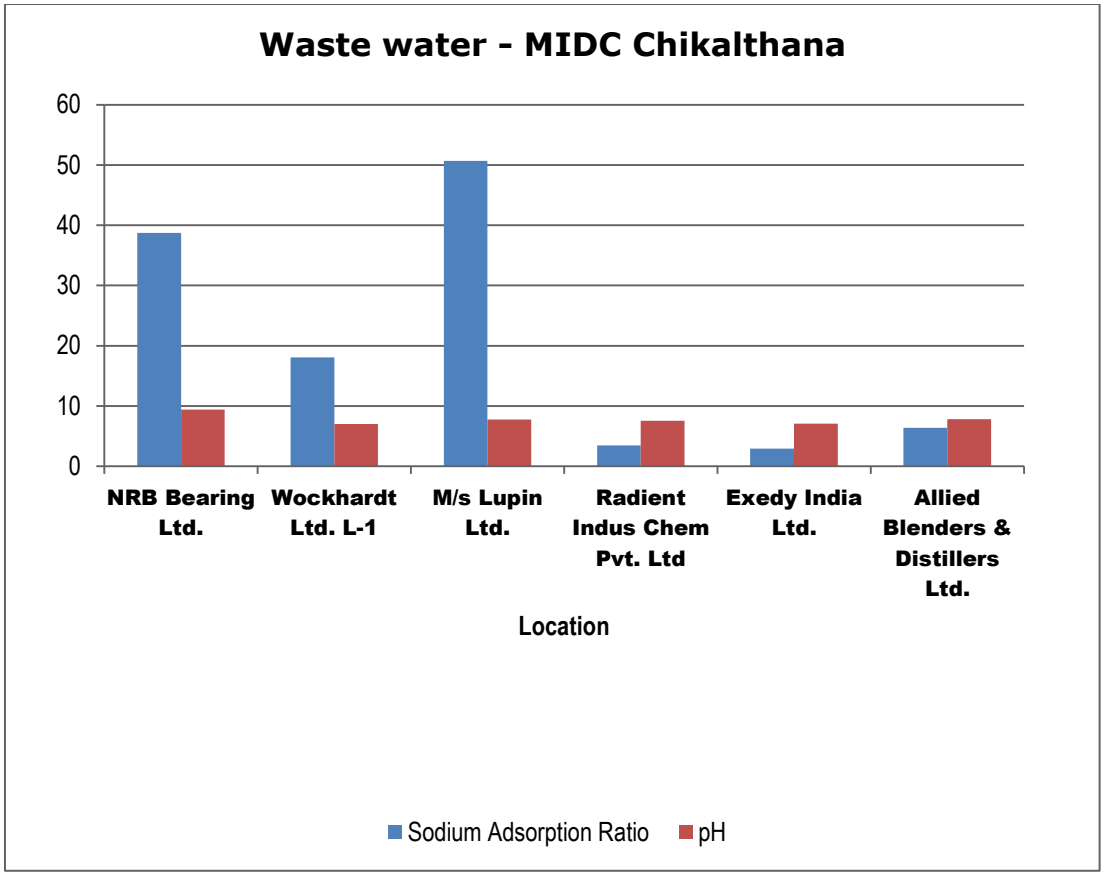
Name of Industry				**Pepsico India Pvt. Ltd.**	**Ajantha Pharma**	**Frogorifico Allan Ltd**	**Videocon India Ltd.**	**Value Industries**	**Badve Engineering**
Location				CETP Outlet	Khane River Upstream	Khane River Down Stream	ETP Outlet	ETP Outlet	ETP Outlet
Date of Sampling				**08.06.17**	**09.06.17**	**10.06.17**	**10.06.17**	**10.06.17**	**10.06.17**
Sr.	**Parameters**	**Unit**	**Std.**	**Results**					
v.	Alpha HCH	µg/L	**0.01**	BDL	BDL	BDL	BDL	BDL	BDL
vi.	Beta HCH	µg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL
vii.	Butachlor	µg/L	**3.0**	BDL	BDL	BDL	BDL	BDL	BDL
viii.	Chlorpyrifos	µg/L		BDL	BDL	BDL	BDL	BDL	BDL
ix.	Delta HCH	µg/L	**0.2**	BDL	BDL	BDL	BDL	BDL	BDL
X	p,p DDT	µg/L	**0.05**	BDL	BDL	BDL	BDL	BDL	BDL
xi.	o,p DDT	µg/L	**100.0**	BDL	BDL	BDL	BDL	BDL	BDL
xii.	p,p DDE	µg/L	**250.0**	BDL	BDL	BDL	BDL	BDL	BDL
xiii.	o,p DDE	µg/L	**30.0**	BDL	BDL	BDL	BDL	BDL	BDL
xiv.	p,p DDD	µg/L		BDL	BDL	BDL	BDL	BDL	BDL
xv.	o,p DDD	µg/L		BDL	BDL	BDL	BDL	BDL	BDL
xvi.	Alpha Endosulfan	µg/L	**10.0**	BDL	BDL	BDL	BDL	BDL	BDL
xvii.	Beta Endosulfan	µg/L		BDL	BDL	BDL	BDL	BDL	BDL
xviii.	EndosulfanSulphate	µg/L	**5.0**	BDL	BDL	BDL	BDL	BDL	BDL
xix.	Y HCH (Lindane)	µg/L	**1.0**	BDL	BDL	BDL	BDL	BDL	BDL
31.	Polynuclear aromatic hydrocarbons (PAH)	µg/L	**0.2**	BDL	BDL	BDL	0.41	BDL	0.288

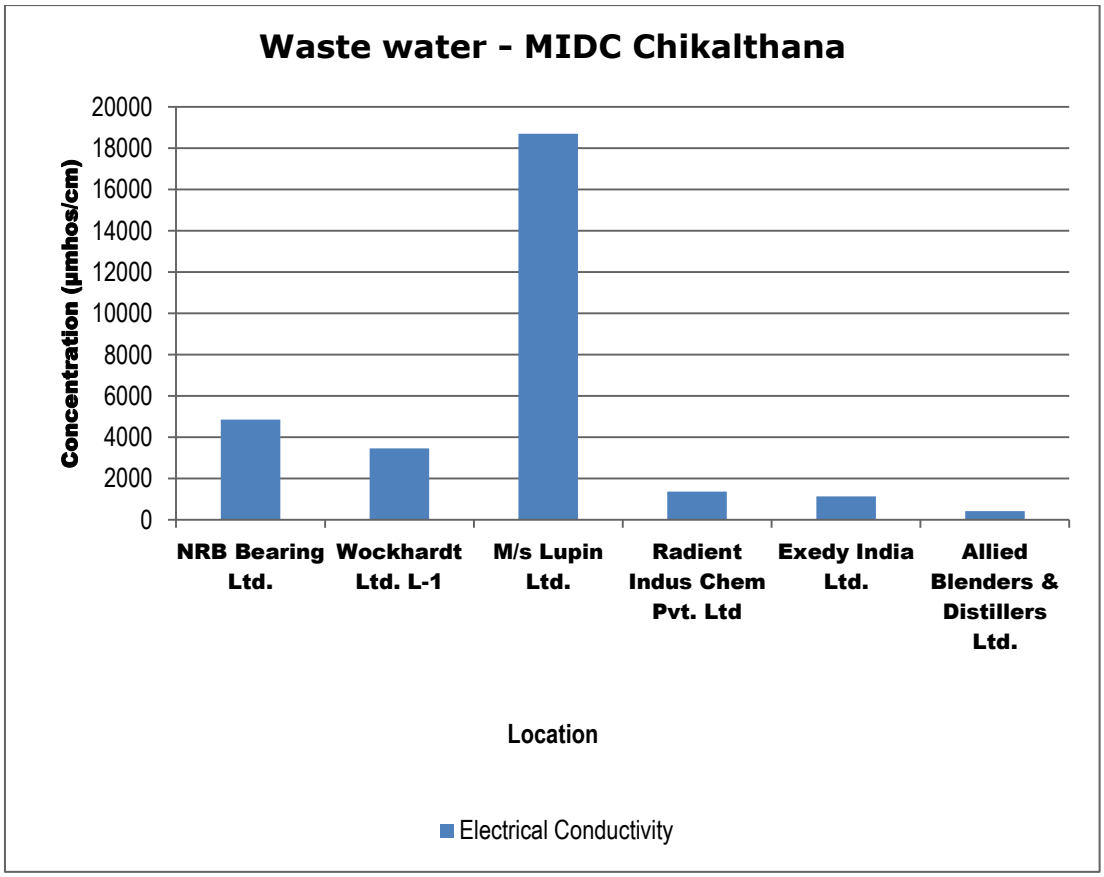
Name of Industry				**Pepsico India Pvt. Ltd.**	**Ajantha Pharma**	**Frogorifico Allan Ltd**	**Videocon India Ltd.**	**Value Industries**	**Badve Engineering**
Location				CETP Outlet	Khane River Upstream	Khane River Down Stream	ETP Outlet	ETP Outlet	ETP Outlet
Date of Sampling				**08.06.17**	**09.06.17**	**10.06.17**	**10.06.17**	**10.06.17**	**10.06.17**
Sr.	**Parameters**	**Unit**	**Std.**	**Results**					
32.	Polychlorinated Biphenyls (PCB)	µg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL
33.	Zinc (Zn)	mg/L	**5.0**	BDL	BDL	BDL	BDL	0.42	1.45
34.	Nickel (as Ni)	mg/L	**3.0**	BDL	BDL	BDL	BDL	0.05	0.31
35.	Copper (as Cu)	mg/L		BDL	BDL	BDL	BDL	BDL	BDL
36.	Hexavalent Chromium (as Cr^{6+})	mg/L	**0.1**	BDL	BDL	BDL	BDL	BDL	BDL
37.	Total Chromium (as Cr)	mg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL
38.	Total Arsenic (as As)	mg/L	**0.2**	BDL	BDL	BDL	BDL	BDL	BDL
39.	Lead (as Pb)	mg/L	**0.1**	BDL	0.03	0.04	<0.001	0.01	0.2
40.	Cadmium (as Cd)	mg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL
41.	Mercury (as Hg)	mg/L	**0.01**	BDL	BDL	BDL	BDL	BDL	BDL
42.	Manganese (as Mn)	mg/L	**2.0**	BDL	BDL	BDL	BDL	0.41	0.49
43.	Iron (as Fe)	mg/L	**3.0**	0.21	0.64	0.28	0.07	1.19	0.95
44.	Vanadium (as V)	mg/L	**0.2**	BDL	BDL	BDL	BDL	BDL	BDL
45.	Selenium (as Se)	mg/L	**0.05**	BDL	BDL	BDL	BDL	BDL	BDL
46.	Boron (as B)	mg/L		BDL	BDL	BDL	BDL	0.42	1.45

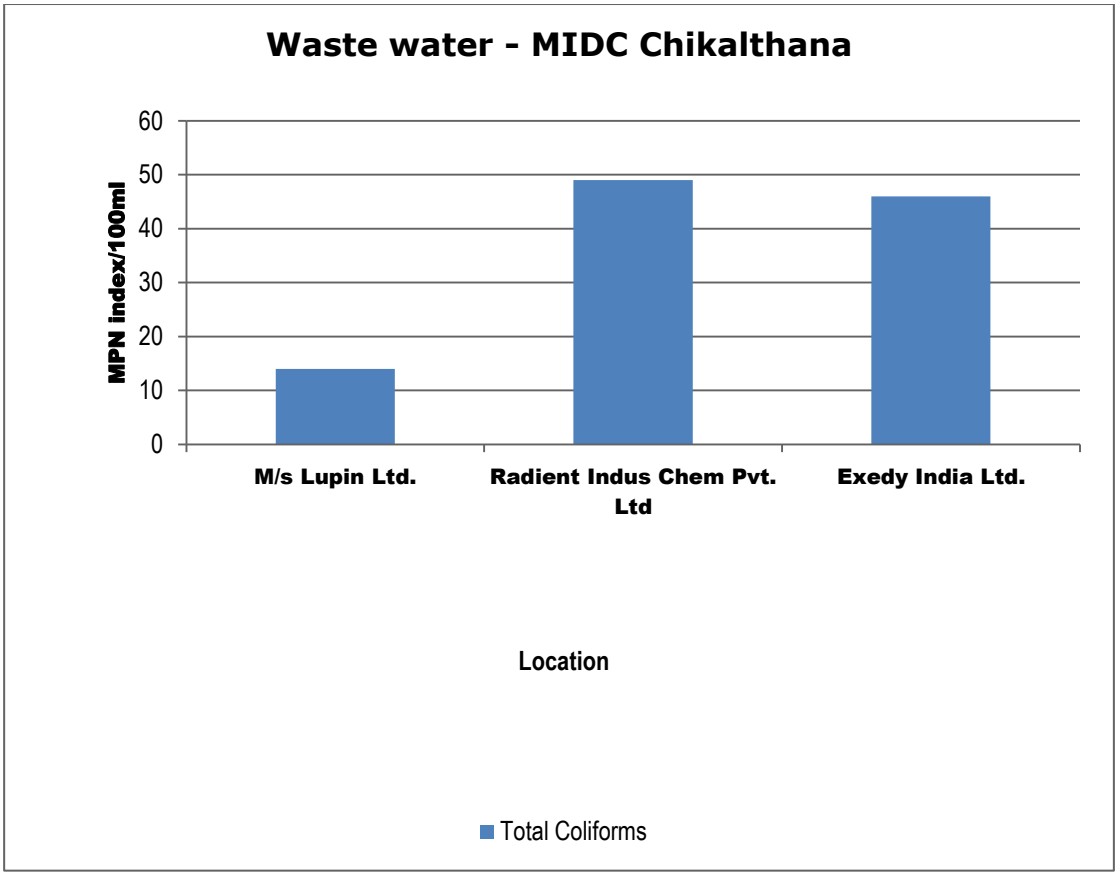
Name of Industry				Pepsico India Pvt. Ltd.	Ajantha Pharma	Frogorifico Allan Ltd	Videocon India Ltd.	Value Industries	Badve Engineering
Location				CETP Outlet	Khane River Upstream	Khane River Down Stream	ETP Outlet	ETP Outlet	ETP Outlet
Date of Sampling				08.06.17	09.06.17	10.06.17	10.06.17	10.06.17	10.06.17
Sr.	Parameters	Unit	Std.	Results					
47.	Bioassay Test on fish	% survival		100	90	100	100	100	70

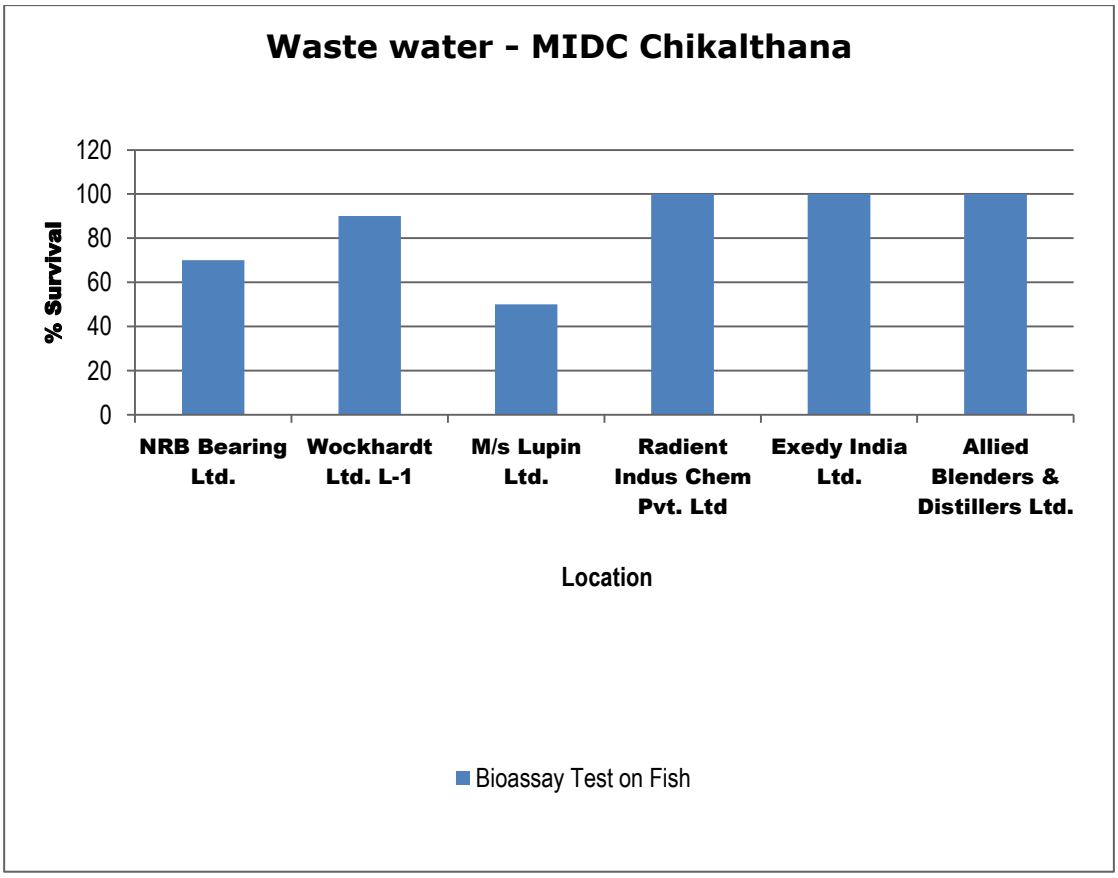
Graphs: Waste Water Analysis:

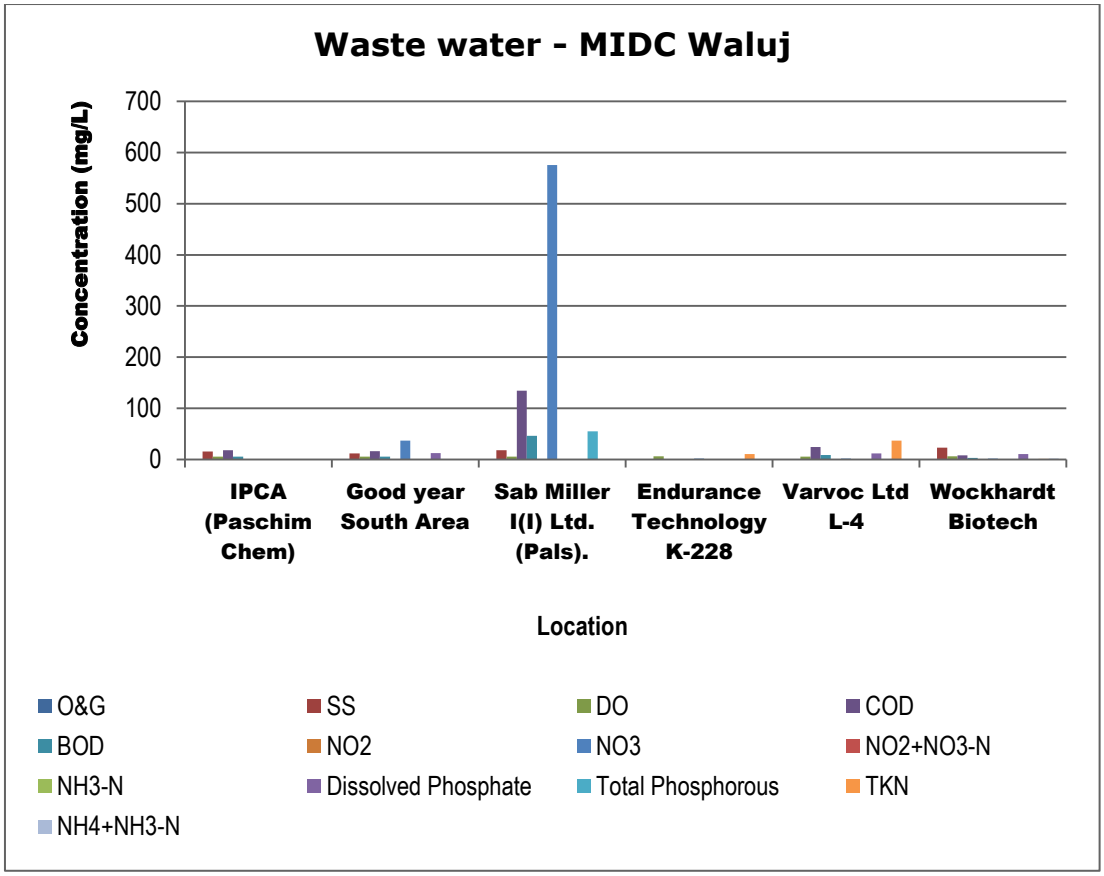


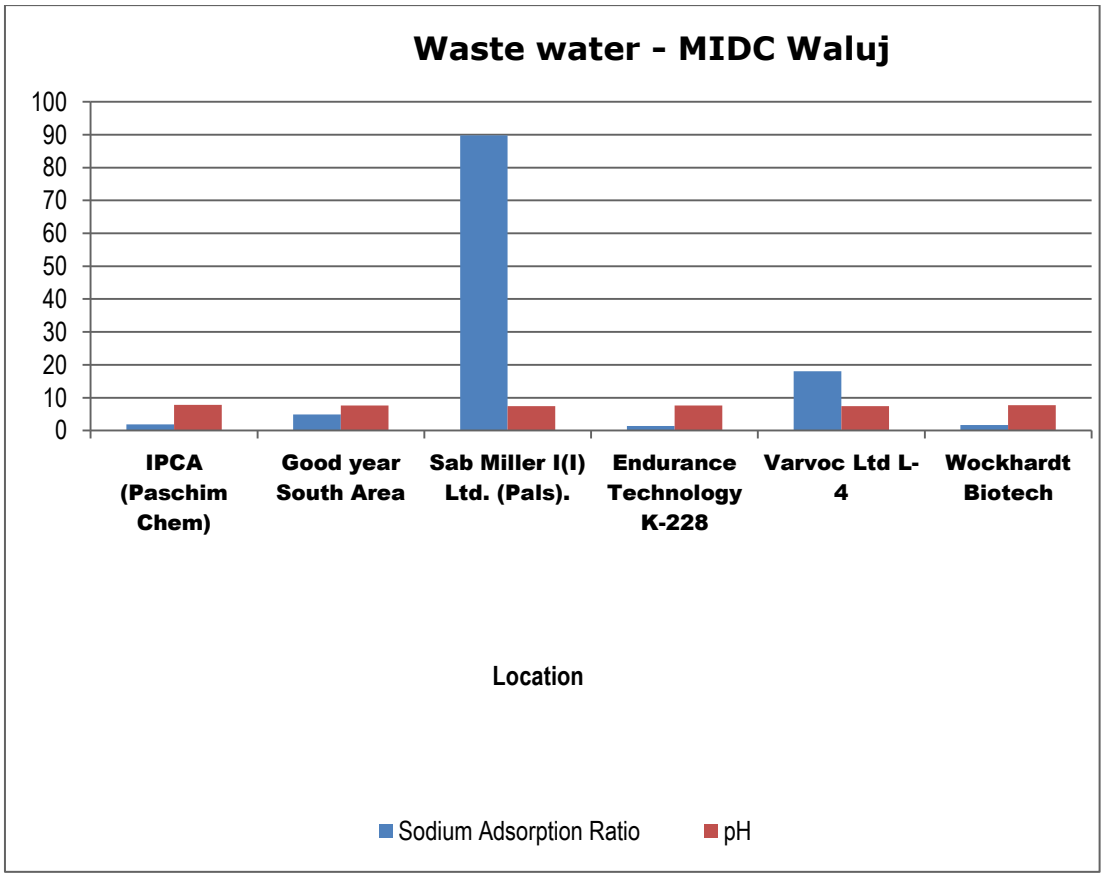

Waste water - MIDC Chikalthana
60
50
40
30
20
10
0
NRB Bearing Ltd.
Wockhardt Ltd. L-1
M/s Lupin Ltd.
Radient Indus Chem Pvt. Ltd
Exedy India Ltd.
Allied Blenders & Distillers Ltd.
Location
Sodium Adsorption Ratio
pH

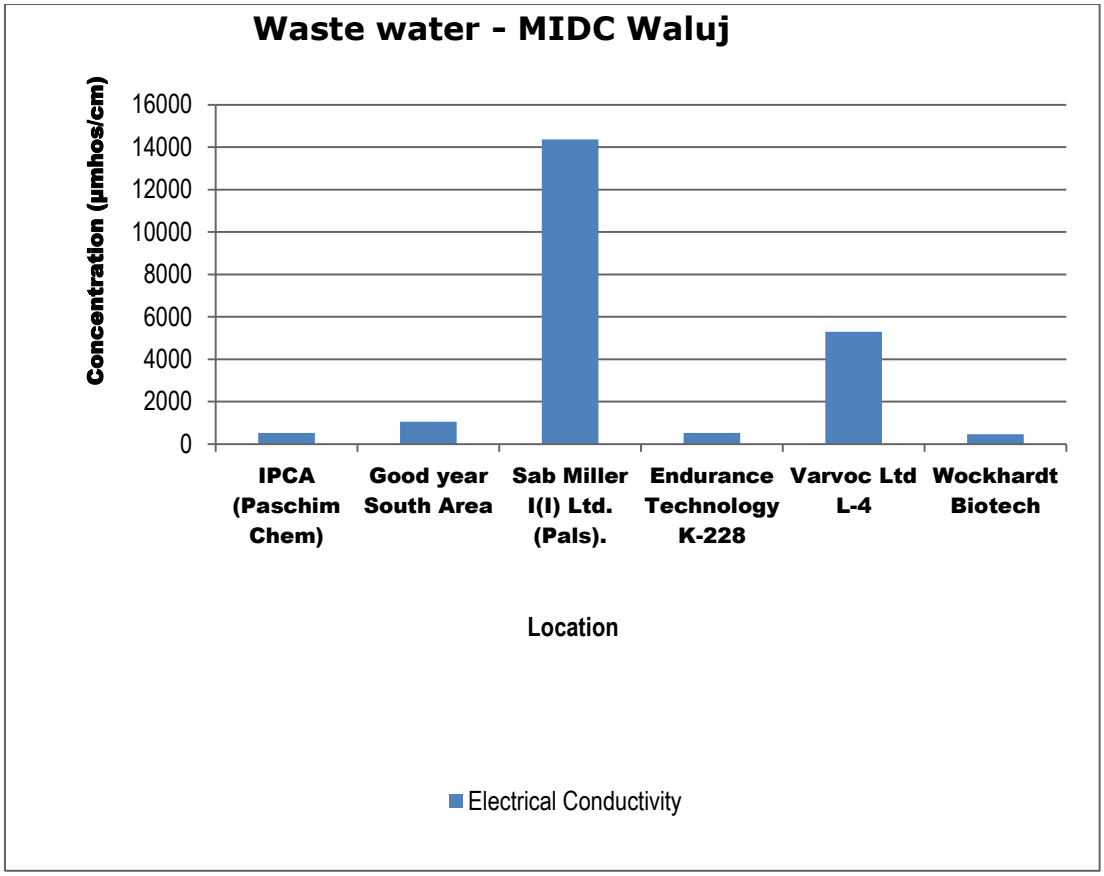

Waste water - MIDC Chikalthana
Concentration (µmhos/cm)
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
NRB Bearing Ltd.
Wockhardt Ltd. L-1
M/s Lupin Ltd.
Radient Indus Chem Pvt. Ltd
Exedy India Ltd.
Allied Blenders & Distillers Ltd.
Location
Electrical Conductivity

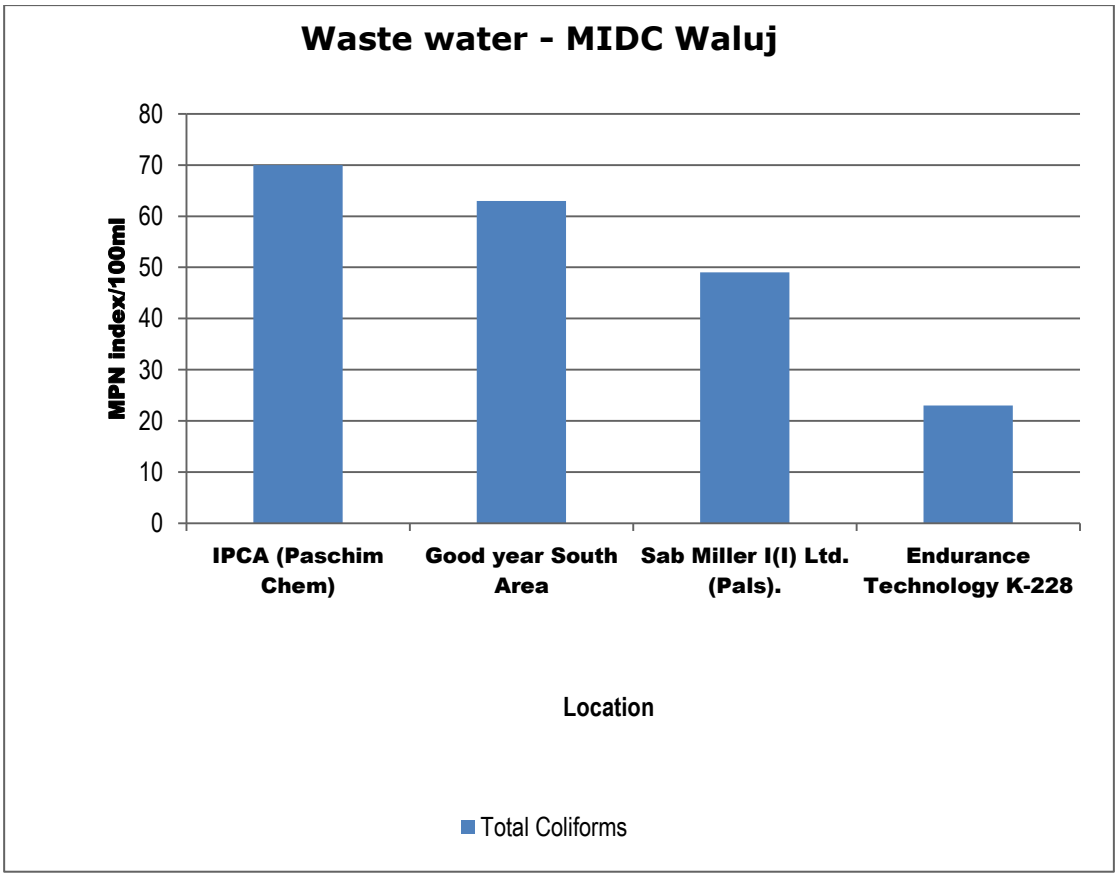

Waste water - MIDC Chikalthana
MPN index/100ml
60
50
40
30
20
10
0
M/s Lupin Ltd.
Radient Indus Chem Pvt. Ltd
Exedy India Ltd.
Location
Total Coliforms

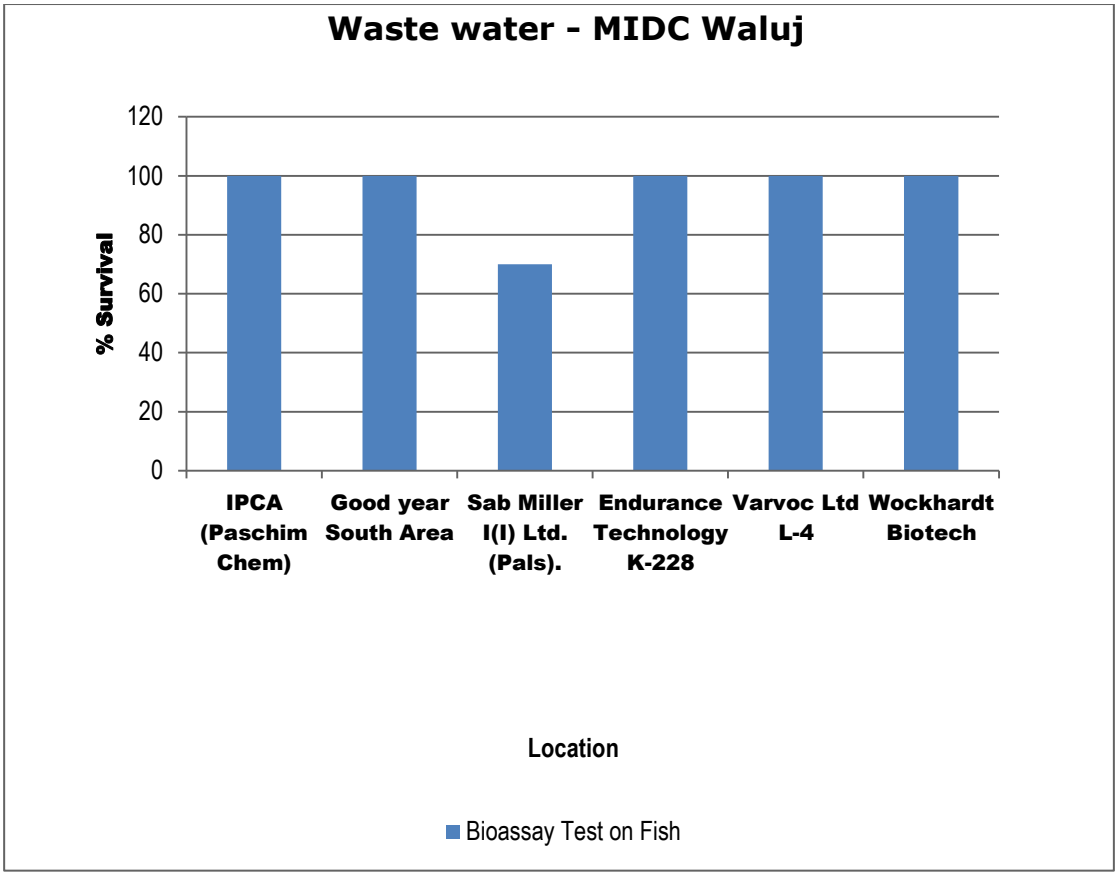

Waste water - MIDC Chikalthana
% Survival
120
100
80
60
40
20
0
NRB Bearing Ltd.
Wockhardt Ltd. L-1
M/s Lupin Ltd.
Radient Indus Chem Pvt. Ltd
Exedy India Ltd.
Allied Blenders & Distillers Ltd.
Location
Bioassay Test on Fish

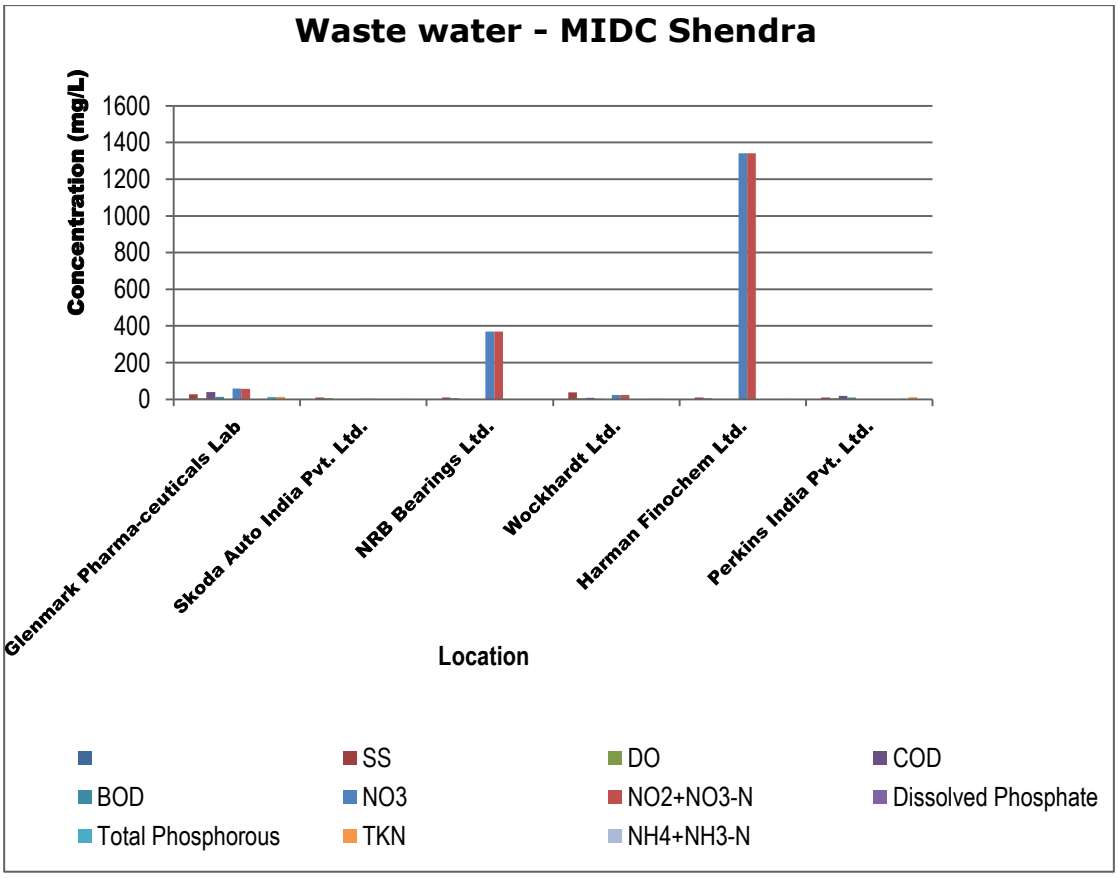

Waste water - MIDC Waluj
Concentration (mg/L)
700
600
500
400
300
200
100
0
IPCA (Paschim Chem)
Good year South Area
Sab Miller I(I) Ltd. (Pals).
Endurance Technology K-228
Varvoc Ltd L-4
Wockhardt Biotech
Location
O&G
SS
DO
COD
BOD
NO2
NO3
NO2+NO3-N
NH3-N
Dissolved Phosphate
Total Phosphorous
TKN
NH4+NH3-N

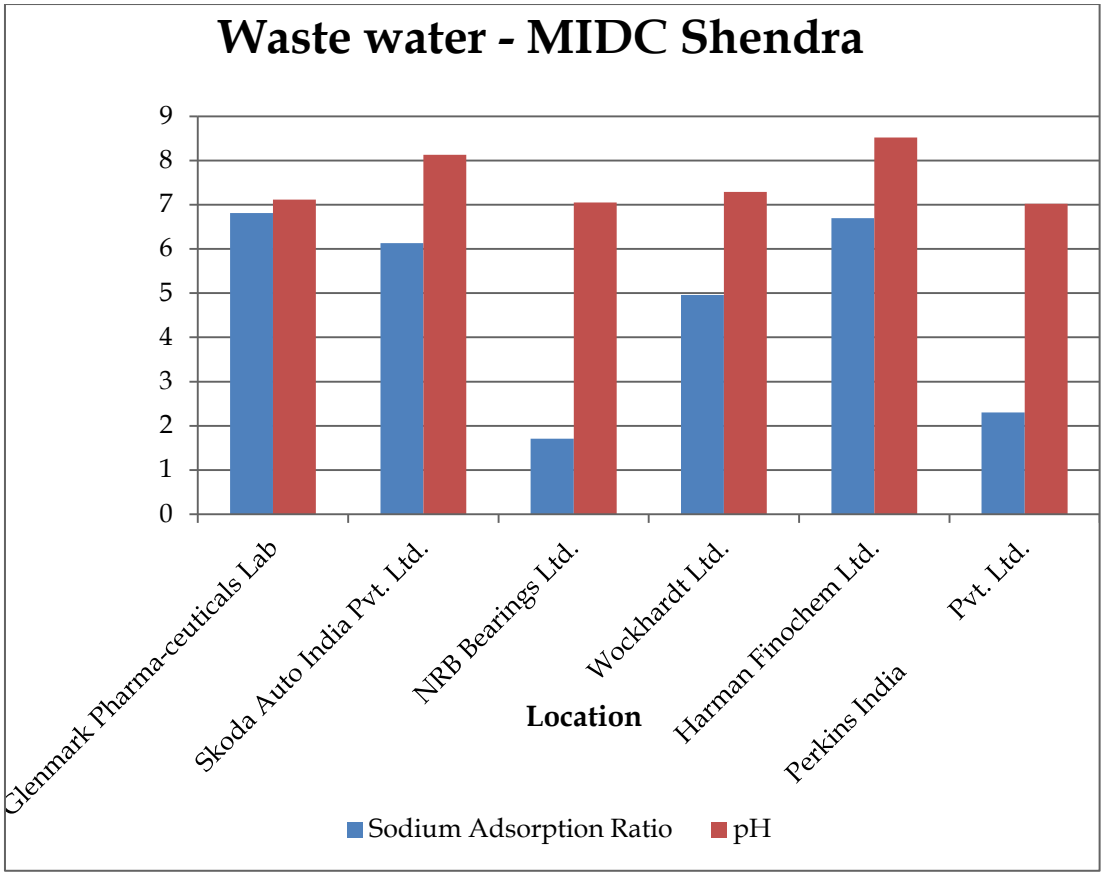

Waste water - MIDC Waluj
100
90
80
70
60
50
40
30
20
10
0
IPCA (Paschim Chem)
Good year South Area
Sab Miller I(I) Ltd. (Pals).
Endurance Technology K-228
Varvoc Ltd L-4
Wockhardt Biotech
Location
Sodium Adsorption Ratio
pH

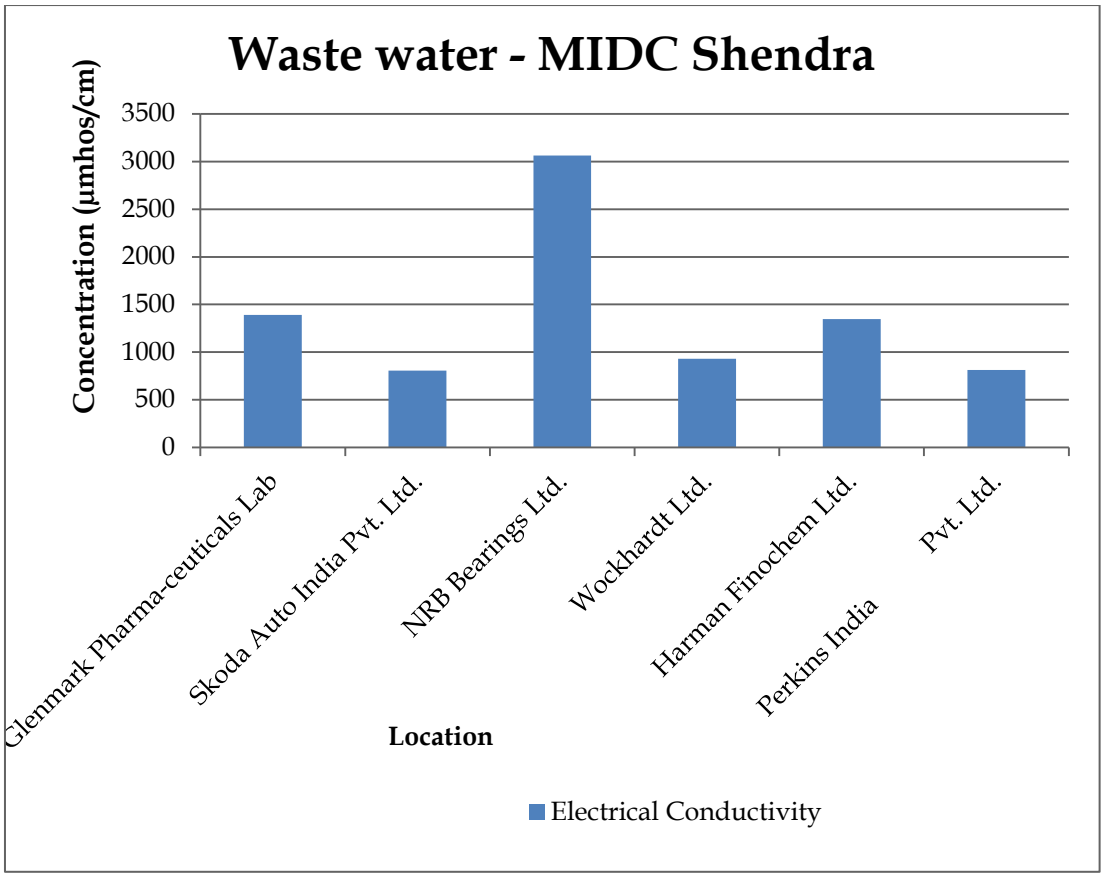

Waste water - MIDC Waluj
Concentration (µmhos/cm)
16000
14000
12000
10000
8000
6000
4000
2000
0
IPCA (Paschim Chem)
Good year South Area
Sab Miller I(I) Ltd. (Pals).
Endurance Technology K-228
Varvoc Ltd L-4
Wockhardt Biotech
Location
Electrical Conductivity

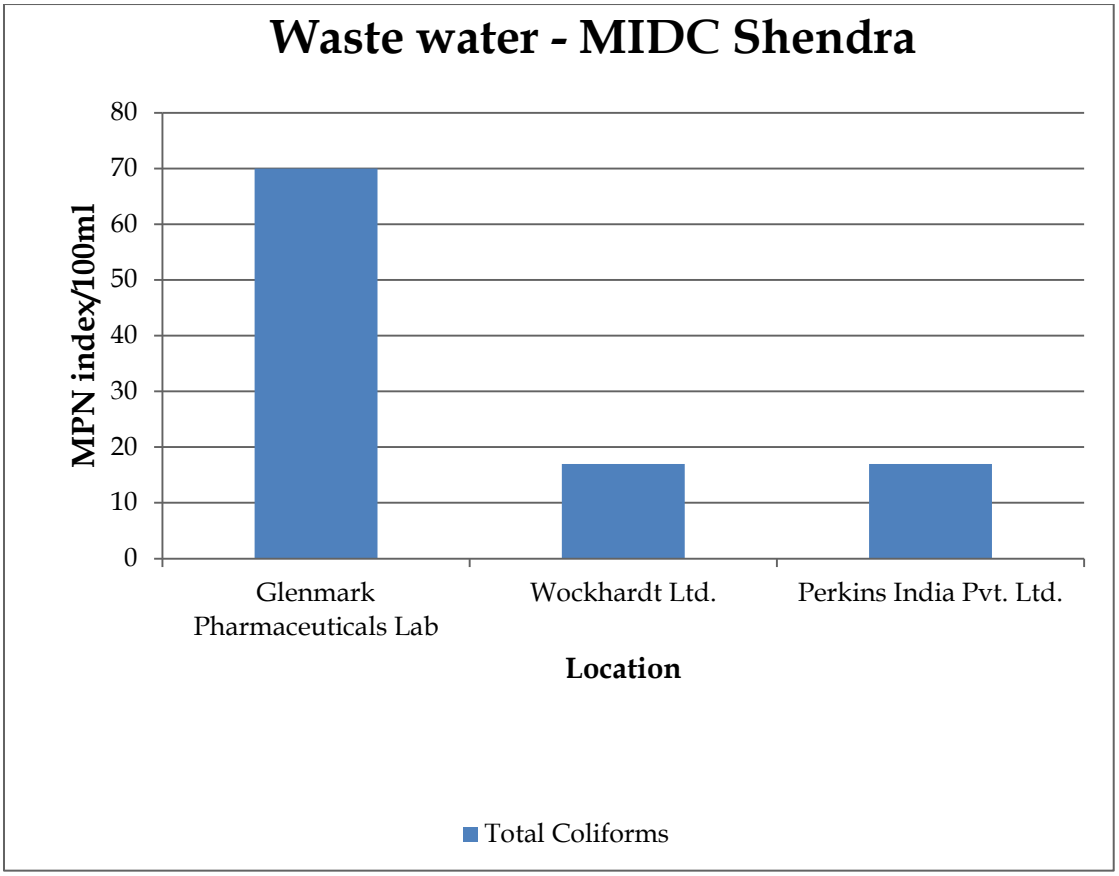

Waste water - MIDC Waluj
MPN index/100ml
80
70
60
50
40
30
20
10
0
IPCA (Paschim Chem)
Good year South Area
Sab Miller I(I) Ltd. (Pals).
Endurance Technology K-228
Location
Total Coliforms

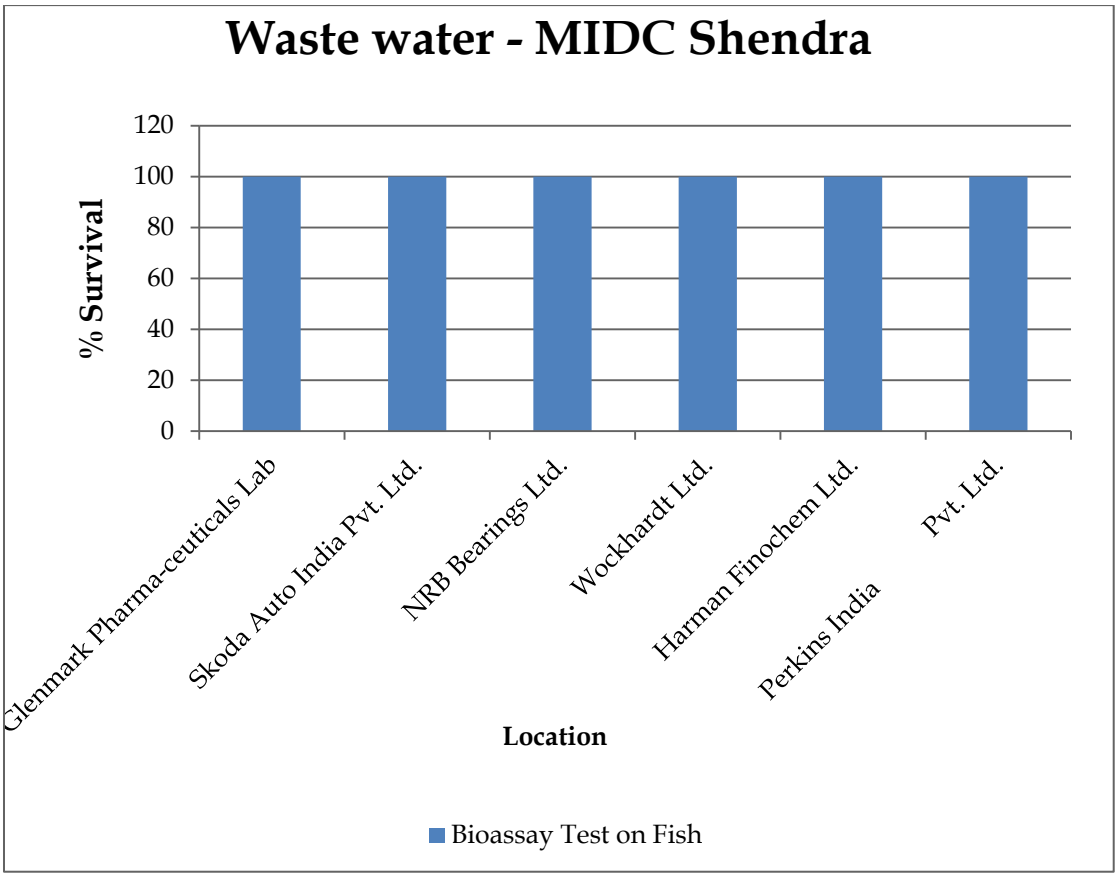

Waste water - MIDC Waluj
120
100
80
60
40
20
0
% Survival
IPCA (Paschim Chem)
Good year South Area
Sab Miller I(I) Ltd. (Pals).
Endurance Technology K-228
Varvoc Ltd L-4
Wockhardt Biotech
Location
Bioassay Test on Fish

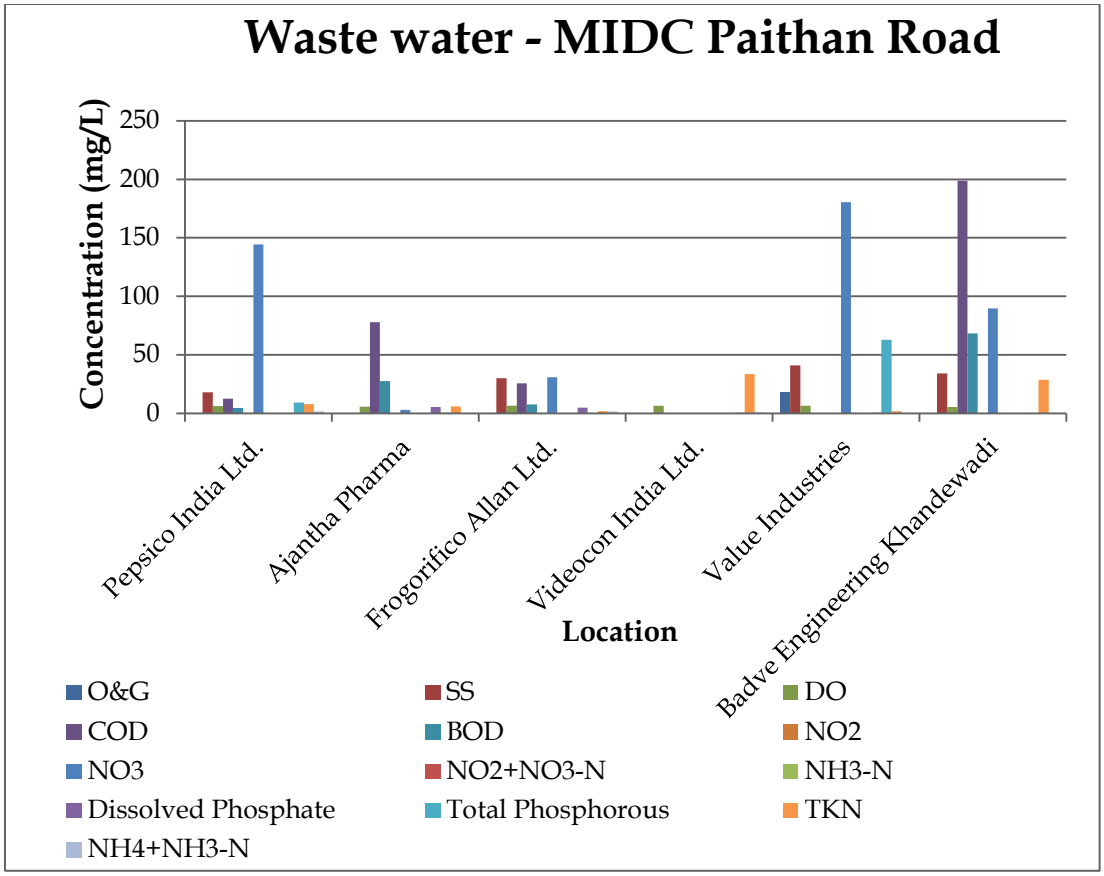

Waste water - MIDC Shendra
Concentration (mg/L)
1600
1400
1200
1000
800
600
400
200
0
Glenmark Pharma-ceuticals Lab
Skoda Auto India Pvt. Ltd.
NRB Bearings Ltd.
Wockhardt Ltd.
Harman Finochem Ltd.
Perkins India Pvt. Ltd.
Location
SS
DO
COD
BOD
NO3
NO2+NO3-N
Dissolved Phosphate
Total Phosphorous
TKN
NH4+NH3-N

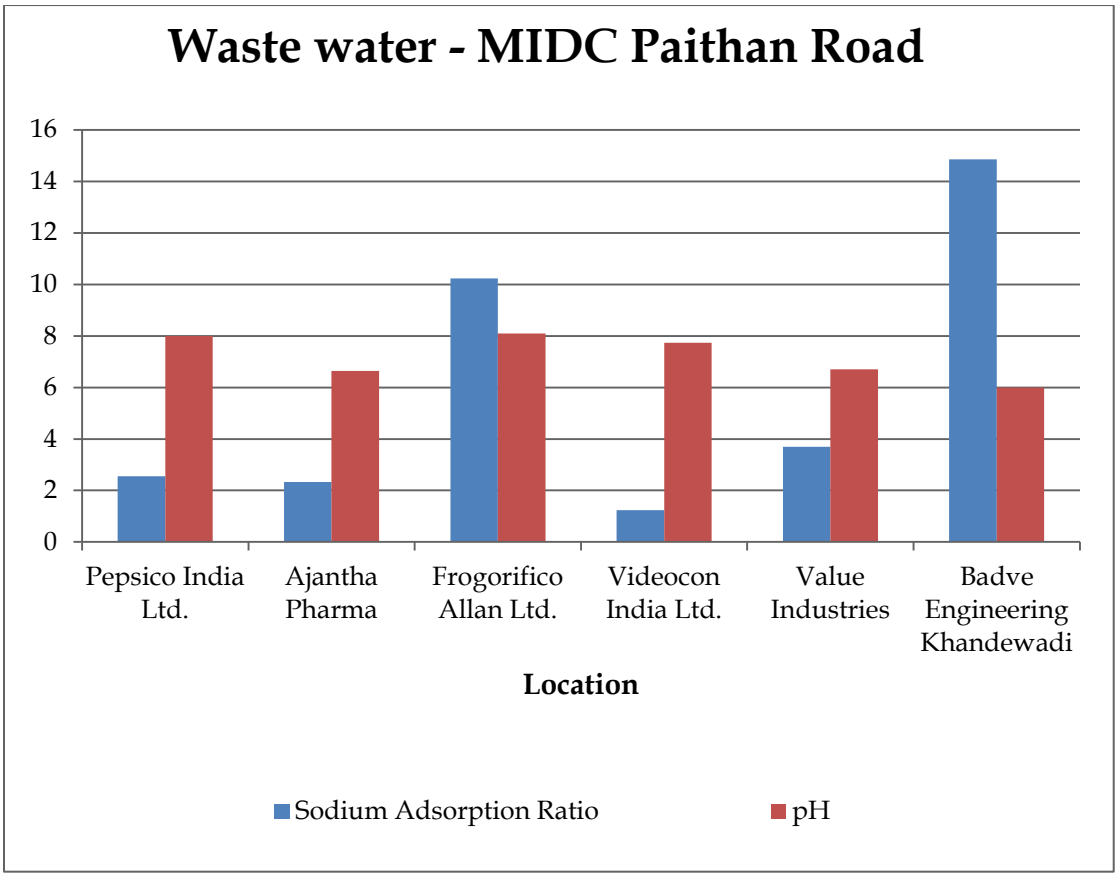

Waste water - MIDC Shendra
9
8
7
6
5
4
3
2
1
0
Glenmark Pharma-ceuticals Lab
Skoda Auto India Pvt. Ltd.
NRB Bearings Ltd.
Wockhardt Ltd.
Harman Finochem Ltd.
Perkins India
Pvt. Ltd.
Location
Sodium Adsorption Ratio
pH

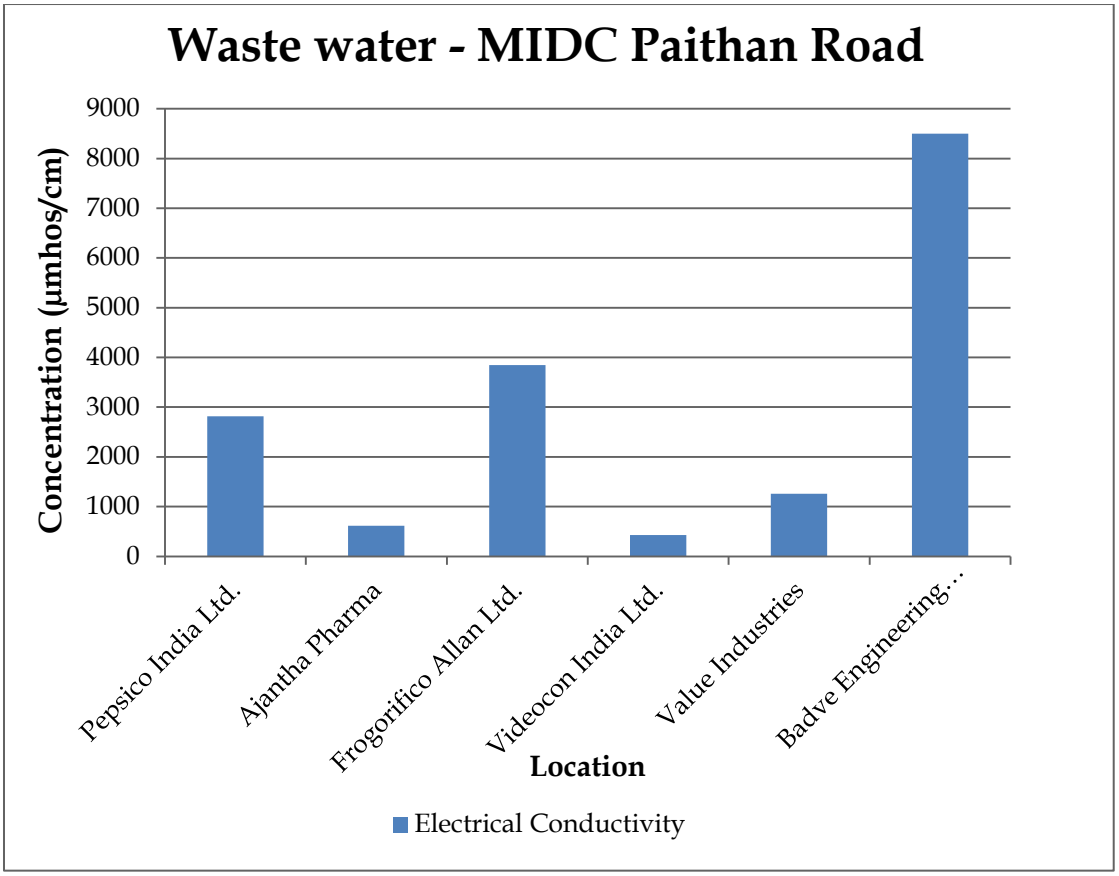

Waste water - MIDC Shendra
Concentration (µmhos/cm)
3500
3000
2500
2000
1500
1000
500
0
Glenmark Pharma-ceuticals Lab
Skoda Auto India Pvt. Ltd.
NRB Bearings Ltd.
Wockhardt Ltd.
Harman Finochem Ltd.
Perkins India
Pvt. Ltd.
Location
Electrical Conductivity

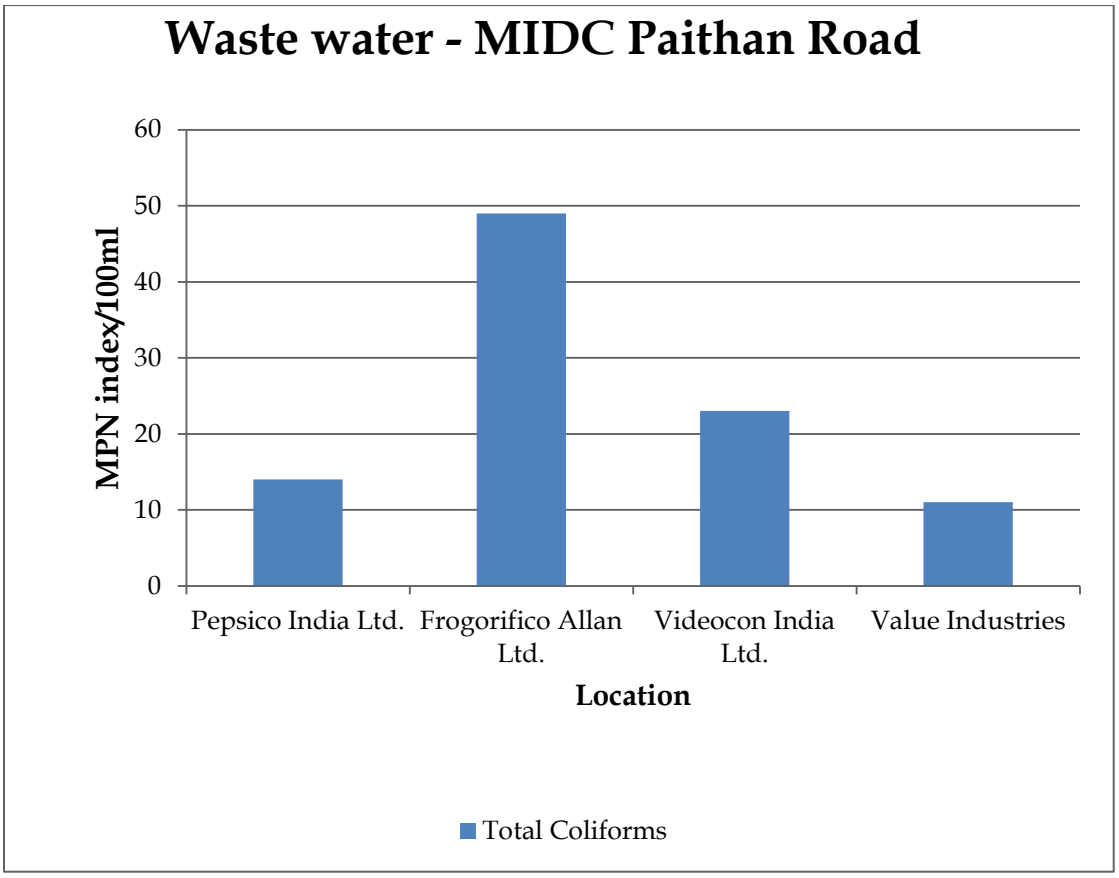

Waste water - MIDC Shendra
MPN index/100ml
80
70
60
50
40
30
20
10
0
Glenmark Pharmaceuticals Lab
Wockhardt Ltd.
Perkins India Pvt. Ltd.
Location
Total Coliforms

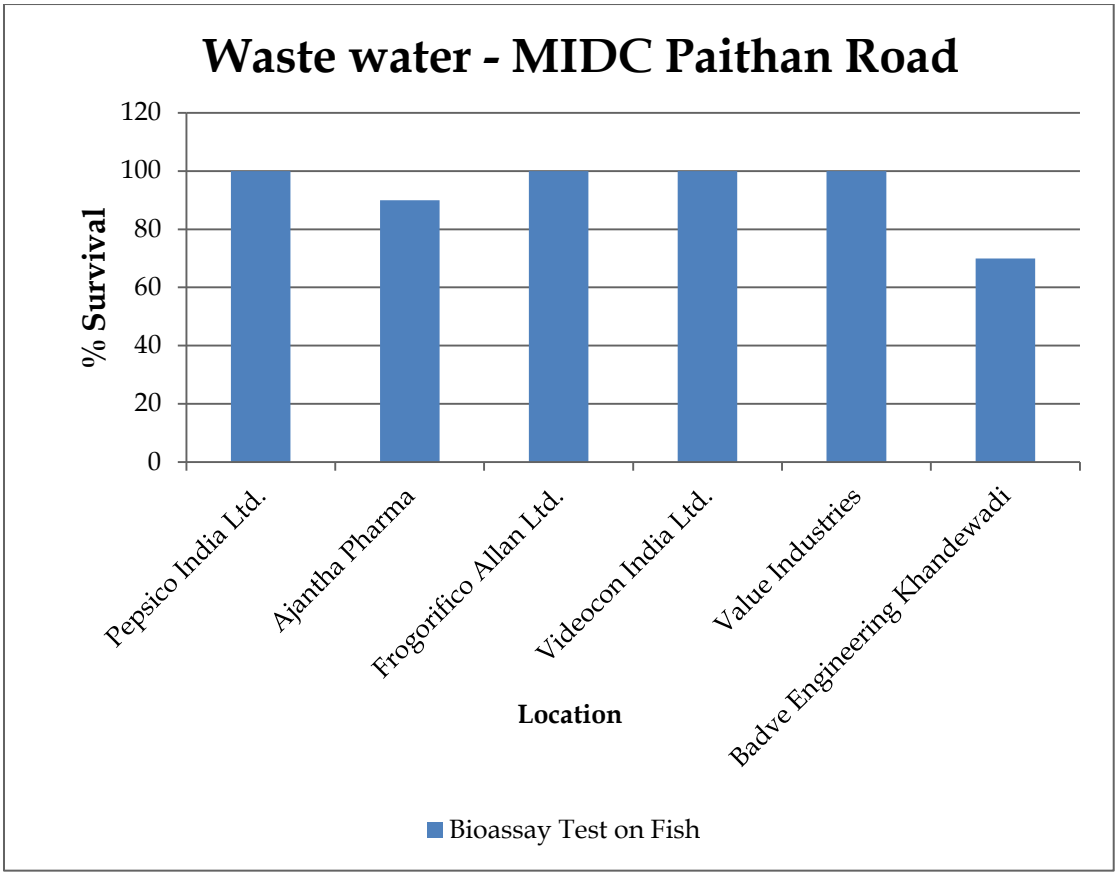

Waste water - MIDC Shendra
% Survival
120
100
80
60
40
20
0
Glenmark Pharma-ceuticals Lab
Skoda Auto India Pvt. Ltd.
NRB Bearings Ltd.
Wockhardt Ltd.
Harman Finochem Ltd.
Pvt. Ltd.
Perkins India
Location
Bioassay Test on Fish


Waste water - MIDC Paithan Road
Concentration (mg/L)
250
200
150
100
50
0
Pepsico India Ltd.
Ajantha Pharma
Frogorifico Allan Ltd.
Videocon India Ltd.
Value Industries
Badve Engineering Khandewadi
Location
O&G
SS
DO
COD
BOD
NO2
NO3
NO2+NO3-N
NH3-N
Dissolved Phosphate
Total Phosphorous
TKN
NH4+NH3-N


Waste water - MIDC Paithan Road
16
14
12
10
8
6
4
2
0
Pepsico India Ltd.
Ajantha Pharma
Frogorifico Allan Ltd.
Videocon India Ltd.
Value Industries
Badve Engineering Khandewadi
Location
Sodium Adsorption Ratio
pH


Waste water - MIDC Paithan Road
Concentration (µmhos/cm)
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Pepsico India Ltd.
Ajantha Pharma
Frogorifico Allan Ltd.
Videocon India Ltd.
Value Industries
Badve Engineering…
Location
Electrical Conductivity


Waste water - MIDC Paithan Road
MPN index/100ml
60
50
40
30
20
10
0
Pepsico India Ltd.
Frogorifico Allan Ltd.
Videocon India Ltd.
Value Industries
Location
Total Coliforms


Waste water - MIDC Paithan Road
120
100
80
60
40
20
0
% Survival
Pepsico India Ltd.
Ajantha Pharma
Frogorifico Allan Ltd.
Videocon India Ltd.
Value Industries
Badve Engineering Khandewadi
Location
Bioassay Test on Fish

3.3.2 Ground Water Analysis

a) MIDC Chikalthana and Waluj

Sr.	Name of Industry	MIDC	Included in
1.	Naregaon Village	Chikalthana	Table No. V
2.	Nr. Compost yard of United Spirits Ltd.	Chikalthana	Table No. V
3.	Mhada Colony	Chikalthana	Table No. V
4.	Ranjangaon	Waluj	Table No. V
5.	Bharat Nagar	Waluj	Table No. V
6.	Giriraj Society	Waluj	Table No. V

Table No. V

Name of Industry				**Nr. Compost yard of United Spirits Ltd.**	**Naregaon Village**	**Mhada Colony**	**Ranjangaon**	**Bharat Nagar**	**Giriraj Society**
Location				Bore Well	Bore Water	Bore Well	Ground Water	Ground Water	Well Water
Date of Sampling				**05.06.17**	**05.06.17**	**07.06.17**	**11.06.17**	**11.06.17**	**12.06.17**
Sr.	**Parameters**	**Unit**	**Std.**	**Results**					
1.	Sanitary Survey	-	**Very Clean neighborhood and catchment**	Moderate Clean	Clean	Moderate Clean	Moderate Clean	Clean	
2.	General Appearance	-	**No floating matter**	Clear	Clear	Clear liq	Turbid	Clear	Clear

Name of Industry				**Nr. Compost yard of United Spirits Ltd.**	**Naregaon Village**	**Mhada Colony**	**Ranjangaon**	**Bharat Nagar**	**Giriraj Society**
Location				Bore Well	Bore Water	Bore Well	Ground Water	Ground Water	Well Water
Date of Sampling				**05.06.17**	**05.06.17**	**07.06.17**	**11.06.17**	**11.06.17**	**12.06.17**
Sr.	**Parameters**	**Unit**	**Std.**	**Results**					
3.	Colour	Hazen	**5**	2	0.5	Brownish	>25	2	3
4.	Smell	-	**Agreeable**	Aggreable	Aggreable	Aggreable	Aggreable	Aggreable	Aggreable
5.	Transparency	m	**unobjectionable**	Transparent	Transparent	Transparent	Turbid	Transparent	Transparent
6.	pH	-	**6.5-8.5**	7.02	7.73	7.32	7.42	7.11	7.2
7.	Oil & Grease	mg/L	**100**	BDL	BDL	BDL	BDL	BDL	BDL
8.	Suspended Solids	mg/L	**500**	BDL	BDL	18	12	BDL	BDL
9.	Chemical Oxygen Demand	mg/L	**10 (WHO, 1993)**	BDL	BDL	28.42	56.18	BDL	BDL
10.	Biochemical Oxygen Demand (3 days,27^{o}C)	mg/L	**6 (WHO, 1993)**	BDL	BDL	9.56	16.26	BDL	BDL
11.	Electrical Conductivity (at 25 ^{o}C)	µmho/ cm	**750**	2041	387.6	1398	2243	1910	2095
12.	Nitrite Nitrogen (as N)	mg/L		BDL	BDL	BDL	BDL	BDL	BDL

Name of Industry				**Nr. Compost yard of United Spirits Ltd.**	**Naregaon Village**	**Mhada Colony**	**Ranjangaon**	**Bharat Nagar**	**Giriraj Society**
Location				Bore Well	Bore Water	Bore Well	Ground Water	Ground Water	Well Water
Date of Sampling				**05.06.17**	**05.06.17**	**07.06.17**	**11.06.17**	**11.06.17**	**12.06.17**
Sr.	**Parameters**	**Unit**	**Std.**	**Results**					
13.	$(NO_2 + NO_3)$-Nitrogen	mg/L	**45**	70.46	BDL	48	24.41	141.87	BDL
14.	Nitrate Nitrogen (as N)	mg/L	**1.0**	70.46	BDL	48.08	25	142	2
15.	Free Ammonia (as NH_3-N)	mg/L	**0.5**	BDL	BDL	BDL	BDL	BDL	BDL
16.	Total Residual Chlorine	mg/L	**0.2**	BDL	BDL	BDL	BDL	BDL	BDL
17.	Cyanide (as CN)	mg/L	**1.5**				BDL	BDL	BDL
18.	Fluoride (as F)	mg/L	**1**	0.435	0.211	0.45	0.27	0.32	0.2
19.	Sulphide (as S^{2-})	mg/L	**0.05**	BDL	BDL	BDL	BDL	BDL	BDL
20.	Dissolved Phosphate (as P)	mg/L		BDL	BDL	BDL	BDL	BDL	BDL
21.	Sodium Absorption Ratio			2.467	1.11	1	3.135	5.105	8.05
22.	Total Coliforms	MPN index/ 100 mL	**ND**	BDL	BDL	14	23	14	22
23.	Faecal Coliforms	MPN index/ 100 mL	**ND**	Absent	Absent	Present	Absent	Absent	Present

Name of Industry				**Nr. Compost yard of United Spirits Ltd.**	**Nareg aon Village**	**Mhada Colony**	**Ranjan gaon**	**Bharat Nagar**	**Giriraj Society**
Location				Bore Well	Bore Water	Bore Well	Ground Water	Ground Water	Well Water
Date of Sampling				**05.06.17**	**05.06.17**	**07.06.17**	**11.06.17**	**11.06.17**	**12.06.17**
Sr.	**Parameters**	**Unit**	**Std.**	**Results**					
24.	Total Phosphorous (as P)	mg/L	**0.5**	0.22	0.29	0.24	0.28	0.35	0.22
25.	Total Kjeldahl Nitrogen (as N)	mg/L	**0.001**		0.46	1.2	1.51	1.28	0.95
26.	Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	**0.5**	BDL	BDL	BDL	BDL	BDL	BDL
27.	Phenol (as C_6H_5OH)	mg/L	**0.001**	BDL	BDL	BDL	BDL	BDL	BDL
28.	Surface Active Agents (as MBAS)	mg/L	**0.02**	BDL	BDL	BDL	BDL	BDL	BDL
29.	Organo Chlorine Pesticides	µg/L	**0.05**						
i.	Alachlor	µg/L	**20**	BDL	BDL	BDL	BDL	BDL	BDL
ii.	Atrazine	µg/L	**2**	BDL	BDL	BDL	BDL	BDL	BDL
iii.	Aldrin	µg/L	**0.03**	BDL	BDL	BDL	BDL	BDL	BDL
iv.	Dieldrin	µg/L	**0.03**	BDL	BDL	BDL	BDL	BDL	BDL
v.	Alpha HCH	µg/L	**0.01**	BDL	BDL	BDL	BDL	BDL	BDL
vi.	Beta HCH	µg/L	**0.04**	BDL	BDL	BDL	BDL	BDL	BDL
vii.	Butachlor	µg/L	**125**	BDL	BDL	BDL	BDL	BDL	BDL
viii.	Chlorpyrifos	µg/L		BDL	BDL	BDL	BDL	BDL	BDL

Name of Industry				**Nr. Compost yard of United Spirits Ltd.**	**Naregaon Village**	**Mhada Colony**	**Ranjangaon**	**Bharat Nagar**	**Giriraj Society**
Location				Bore Well	Bore Water	Bore Well	Ground Water	Ground Water	Well Water
Date of Sampling				**05.06.17**	**05.06.17**	**07.06.17**	**11.06.17**	**11.06.17**	**12.06.17**
Sr.	**Parameters**	**Unit**	**Std.**	**Results**					
ix.	Delta HCH	µg/L	**0.04**	BDL	BDL	BDL	BDL	BDL	BDL
x	p,p DDT	µg/L	**1**	BDL	BDL	BDL	BDL	BDL	BDL
xi.	o,p DDT	µg/L	**1**	BDL	BDL	BDL	BDL	BDL	BDL
xii.	p,p DDE	µg/L	**1**	BDL	BDL	BDL	BDL	BDL	BDL
xiii.	o,p DDE	µg/L	**1**	BDL	BDL	BDL	BDL	BDL	BDL
xiv.	p,p DDD	µg/L	**1**	BDL	BDL	BDL	BDL	BDL	BDL
xv.	o,p DDD	µg/L	**1**	BDL	BDL	BDL	BDL	BDL	BDL
xvi.	Alpha Endosulfan	µg/L	**0.4**	BDL	BDL	BDL	BDL	BDL	BDL
xvii.	Beta Endosulfan	µg/L	**0.4**	BDL	BDL	BDL	BDL	BDL	BDL
xviii.	Endosulfan Sulphate	µg/L	**0.4**	BDL	BDL	BDL	BDL	BDL	BDL
xix.	Y HCH (Lindane)	µg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL
30.	Polynuclear aromatic hydrocarbons (as PAH)	µg/L	**0.0001**	BDL	BDL	BDL	BDL	BDL	BDL
31.	Polychlorinated Biphenyls (PCB)	µg/L	**0.0005**	BDL	BDL	BDL	BDL	BDL	BDL

Name of Industry				**Nr. Compost yard of United Spirits Ltd.**	**Nareg aon Village**	**Mhada Colony**	**Ranjan gaon**	**Bharat Nagar**	**Giriraj Society**
Location				Bore Well	Bore Water	Bore Well	Ground Water	Ground Water	Well Water
Date of Sampling				**05.06.17**	**05.06.17**	**07.06.17**	**11.06.17**	**11.06.17**	**12.06.17**
Sr.	**Parameters**	**Unit**	**Std.**	**Results**					
32.	Polychlorinated terphenyls (PCT)	µg/L		BDL	BDL	BDL	BDL	BDL	BDL
33.	Zinc (Zn)	mg/L	**5.0**	BDL	0.13	1.11	0.47	BDL	0.42
34.	Nickel (as Ni)	mg/L	**0.02**	BDL	BDL	BDL	BDL	BDL	BDL
35.	Copper (as Cu)	mg/L	**0.05**	BDL	BDL	0.07	0.05	BDL	BDL
36.	Hexavalent Chromium (as Cr^{6+})	mg/L	**1**	BDL	BDL	BDL	BDL	BDL	BDL
37.	Total Chromium (as Cr)	mg/L	**0.05**	BDL	BDL	BDL	BDL	BDL	BDL
38.	Total Arsenic (as As)	mg/L	**0.01**	BDL	BDL	BDL	BDL	BDL	BDL
39.	Lead (as Pb)	mg/L	**0.01**	0.06	0.02	0.08	0.09	0.02	0.06
40.	Cadmium (as Cd)	mg/L	**0.003**	BDL	BDL	BDL	BDL	BDL	BDL
41.	Mercury (as Hg)	mg/L	**0.001**	BDL	BDL	BDL	BDL	BDL	BDL
42.	Manganese (as Mn)	mg/L	**0.1**	BDL	BDL	0.08	BDL	BDL	BDL
43.	Iron (as Fe)	mg/L	**0.3**	0.17	0.02	0.86	0.78	0.47	0.09
44.	Vanadium (as V)	mg/L					BDL	BDL	BDL
45.	Selenium (as Se)	mg/L	**0.01**	BDL	BDL	BDL	BDL	BDL	BDL

Name of Industry				**Nr. Compost yard of United Spirits Ltd.**	**Nareg aon Village**	**Mhada Colony**	**Ranjan gaon**	**Bharat Nagar**	**Giriraj Society**
Location				Bore Well	Bore Water	Bore Well	Ground Water	Ground Water	Well Water
Date of Sampling				**05.06.17**	**05.06.17**	**07.06.17**	**11.06.17**	**11.06.17**	**12.06.17**
Sr.	**Parameters**	**Unit**	**Std.**	**Results**					
46.	Boron (as B)	mg/L		0.51	BDL	0.16	2.92	BDL	0.66
47.	Bioassay Test on fish	% survival		100	100	100	70	100	100

b) MIDC Shendra and Paithan Road

Sr.	Name of Industry	MIDC	Included in
1.	Wockhardt Infrastructure development Ltd.	Shendra	Table No. VI
2.	Shendra Village	Shendra	Table No. VI
3.	Radico Distilleries	Shendra	Table No. VI
4.	Allana Ltd. Backside	Paithan Road	Table No. VI
5.	Chitegaon Jailaxmi Carting Well	Paithan Road	Table No. VI
6.	Ganesh Nagar	Paithan Road	Table No. VI

Table No. VI

Name of Industry				**Radico Distilleries**	**Wockhardt Infrastructure development Ltd.**	**Shendra Village**	**Frigorifico Allana Ltd. Backside**	**Chitegaon Jailaxmi Carting Well**	**Ganesh Nagar**
Location				Ground Water	Well Water	Bore Well	Bore Well	Bore Well	Bore Well
Date of Sampling				**06.06.17**	**07.06.17**	**06.06.17**	**10.06.17**	**10.06.17**	**09.06.17**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**					
1.	General Appearance		**No floating matter**	Turbid	Clear	Clear	Turbid	Clear	Clear
2.	Colour	Hazen	**5**	8	1	1	8	1	2
3.	Smell		**Agreeable**	Aggreable	Aggreable	Aggreable	Aggreable	Aggreable	Aggreable

Name of Industry				**Radico Distilleries**	**Wockhardt Infrastructure development Ltd.**	**Shendra Village**	**Frigorifico Allana Ltd. Backside**	**Chitegaon Jailaxmi Carting Well**	**Ganesh Nagar**
Location				Ground Water	Well Water	Bore Well	Bore Well	Bore Well	Bore Well
Date of Sampling				**06.06.17**	**07.06.17**	**06.06.17**	**10.06.17**	**10.06.17**	**09.06.17**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**					
4.	Transparency	m	**unobjectionable**	Turbid	Transparent	Transparent	turbid	Transparent	Transparent
5.	pH		**6.5-8.5**	7.82	7.54	7.75	7.12	8.01	7.21
6.	Oil & Grease	mg/L	**100**	BDL	BDL	BDL	BDL	BDL	BDL
7.	Suspended Solids	mg/L	**500**	BDL	BDL	BDL	12	BDL	BDL
8.	Chemical Oxygen Demand	mg/L	**10 (WHO, 1993)**	8.18	BDL	BDL	12.16	BDL	BDL
9.	Biochemical Oxygen Demand (3 days,27^{o}C)	mg/L	**6 (WHO, 1993)**	3.24	BDL	BDL	4.3	BDL	BDL
10.	Electrical Conductivity (at 25 ^{o}C)	µmho/ cm	**750**	875.5	1351	203.2	226.7	297.1	1546
11.	Nitrite Nitrogen (as N)	mg/L		BDL	BDL	BDL	BDL	BDL	BDL
12.	Nitrate Nitrogen (as N)	mg/L	**45**	24.59	141.49	BDL	6.86	3.09	2.45
13.	(NO_2 + NO_3)-Nitrogen	mg/L	**1.0**	24	142	BDL	7	3	BDL

Name of Industry				**Radico Distilleries**	**Wockhardt Infrastructure development Ltd.**	**Shendra Village**	**Frigorifico Allana Ltd. Backside**	**Chitegaon Jailaxmi Carting Well**	**Ganesh Nagar**
Location				Ground Water	Well Water	Bore Well	Bore Well	Bore Well	Bore Well
Date of Sampling				**06.06.17**	**07.06.17**	**06.06.17**	**10.06.17**	**10.06.17**	**09.06.17**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**					
14.	Free Ammonia (as NH_3-N)	mg/L	**0.5**	BDL	BDL	BDL	BDL	BDL	BDL
15.	Total Residual Chlorine	mg/L	**0.2**	BDL	BDL	BDL	BDL	BDL	BDL
16.	Cyanide (as CN)	mg/L	**1.5**	BDL	BDL	BDL	BDL	BDL	BDL
17.	Fluoride (as F)	mg/L	**1**	0.435	0.702	0.134	0.12	BDL	0.28
18.	Sulphide (as S^{2-})	mg/L	**0.05**	BDL	BDL	BDL	BDL	BDL	BDL
19.	Dissolved Phosphate (as P)	mg/L		BDL	0.75	BDL	BDL	BDL	BDL
20.	Sodium Absorption Ratio			6.34	2.03	1	3.141	4.55	1.68
21.	Total Coliforms	MPN index/ 100 mL	**ND**	49	46	BDL	70	BDL	23
22.	Faecal Coliforms	MPN index/ 100 mL	**ND**	Present	Absent	Absent	Absent	Absent	Absent
23.	Total Phosphorous (as P)	mg/L	**0.5**	BDL	0.25	0.33	0.55	0.24	0.21

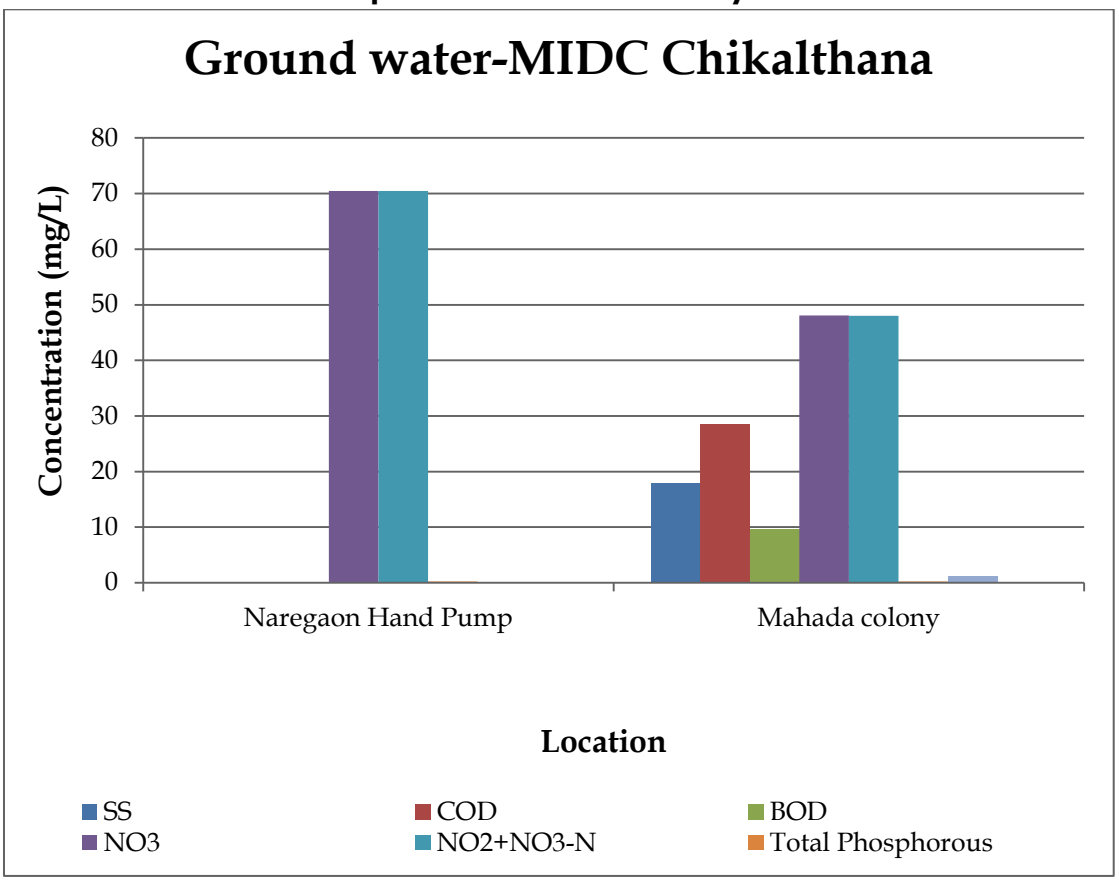
Name of Industry				**Radico Distilleries**	**Wockhardt Infrastructure development Ltd.**	**Shendra Village**	**Frigorifico Allana Ltd. Backside**	**Chitegaon Jailaxmi Carting Well**	**Ganesh Nagar**
Location				Ground Water	Well Water	Bore Well	Bore Well	Bore Well	Bore Well
Date of Sampling				**06.06.17**	**07.06.17**	**06.06.17**	**10.06.17**	**10.06.17**	**09.06.17**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**					
24.	Total Kjeldahl Nitrogen (as N)	mg/L	**0.001**	BDL	0.93	1.36	1.16	0.81	0.96
25.	Total Ammonia (NH_4+NH_3)-Nitrogen	mg/L	**0.5**	0.73	0.68	0.4	BDL	BDL	BDL
26.	Phenol (as C_6H_5OH)	mg/L	**0.001**	BDL	BDL	BDL	BDL	BDL	BDL
27.	Surface Active Agents (as MBAS)	mg/L	**0.02**	BDL	BDL	BDL	BDL	BDL	BDL
28.	Organo Chlorine Pesticides		**0.05**						
i.	Alachlor	µg/L	**20**	BDL	BDL	BDL	BDL	BDL	BDL
ii.	Atrazine	µg/L	**2**	BDL	BDL	BDL	BDL	BDL	BDL
iii.	Aldrin	µg/L	**0.03**	BDL	BDL	BDL	BDL	BDL	BDL
iv.	Dieldrin	µg/L	**0.03**	BDL	BDL	BDL	BDL	BDL	BDL
v.	Alpha HCH	µg/L	**0.01**	BDL	BDL	BDL	BDL	BDL	BDL
vi.	Beta HCH	µg/L	**0.04**	BDL	BDL	BDL	BDL	BDL	BDL
vii.	Butachlor	µg/L	**125**	BDL	BDL	BDL	BDL	BDL	BDL
viii.	Chlorpyrifos	µg/L		BDL	BDL	BDL	BDL	BDL	BDL

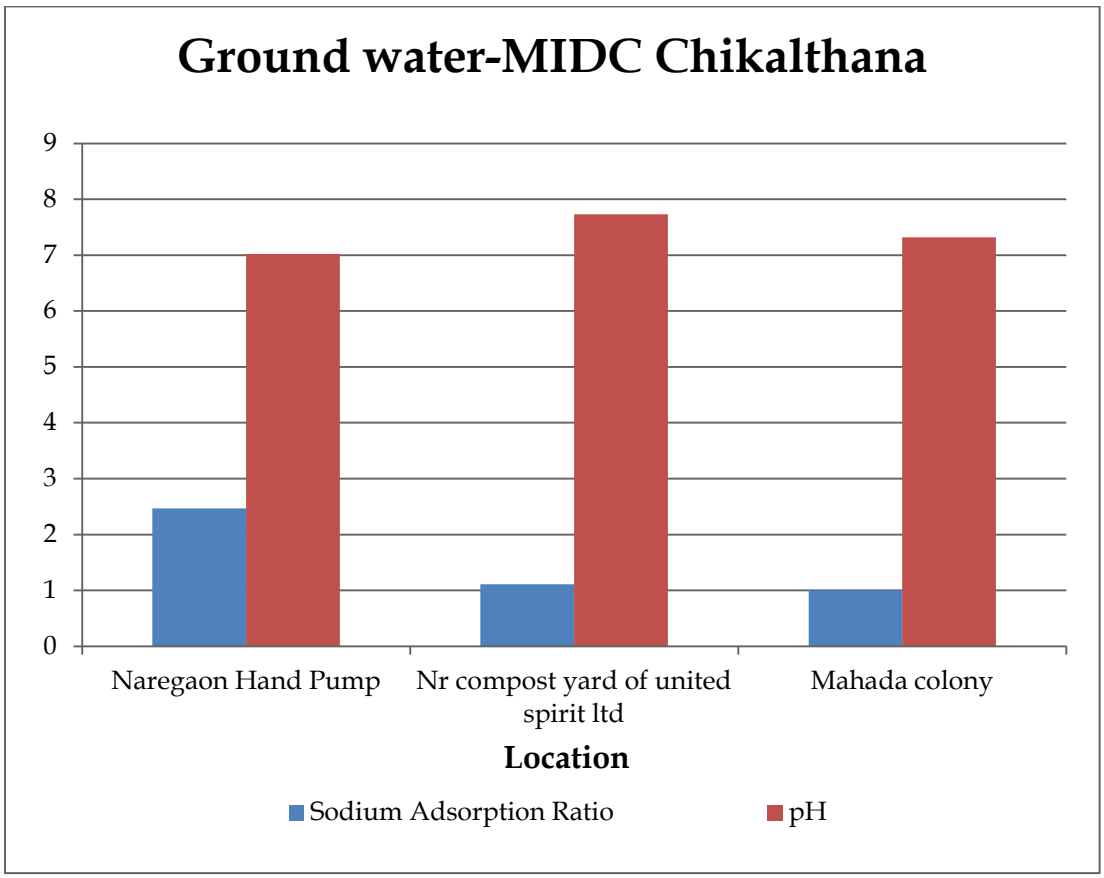
Name of Industry				**Radico Distilleries**	**Wockhardt Infrastructure development Ltd.**	**Shendra Village**	**Frigorifico Allana Ltd. Backside**	**Chitegaon Jailaxmi Carting Well**	**Ganesh Nagar**
Location				Ground Water	Well Water	Bore Well	Bore Well	Bore Well	Bore Well
Date of Sampling				**06.06.17**	**07.06.17**	**06.06.17**	**10.06.17**	**10.06.17**	**09.06.17**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**					
ix.	Delta HCH	µg/L	**0.04**	BDL	BDL	BDL	BDL	BDL	BDL
x	p,p DDT	µg/L	**1**	BDL	BDL	BDL	BDL	BDL	BDL
xi.	o,p DDT	µg/L	**1**	BDL	BDL	BDL	BDL	BDL	BDL
xii.	p,p DDE	µg/L	**1**	BDL	BDL	BDL	BDL	BDL	BDL
xiii.	o,p DDE	µg/L	**1**	BDL	BDL	BDL	BDL	BDL	BDL
xiv.	p,p DDD	µg/L	**1**	BDL	BDL	BDL	BDL	BDL	BDL
xv.	o,p DDD	µg/L	**1**	BDL	BDL	BDL	BDL	BDL	BDL
xvi.	Alpha Endosulfan	µg/L	**0.4**	BDL	BDL	BDL	BDL	BDL	BDL
xvii.	Beta Endosulfan	µg/L	**0.4**	BDL	BDL	BDL	BDL	BDL	BDL
xviii.	EndosulfanSulphate	µg/L	**0.4**	BDL	BDL	BDL	BDL	BDL	BDL
xix.	Y HCH (Lindane)	µg/L	**2.0**	BDL	BDL	BDL	BDL	BDL	BDL
29.	Polynuclear aromatic hydrocarbons (PAH)	µg/L	**0.0001**	BDL	BDL	BDL	0.17	BDL	BDL
30.	Polychlorinated Biphenyls (PCB)	µg/L	**0.0005**	BDL	BDL	BDL	BDL	BDL	BDL

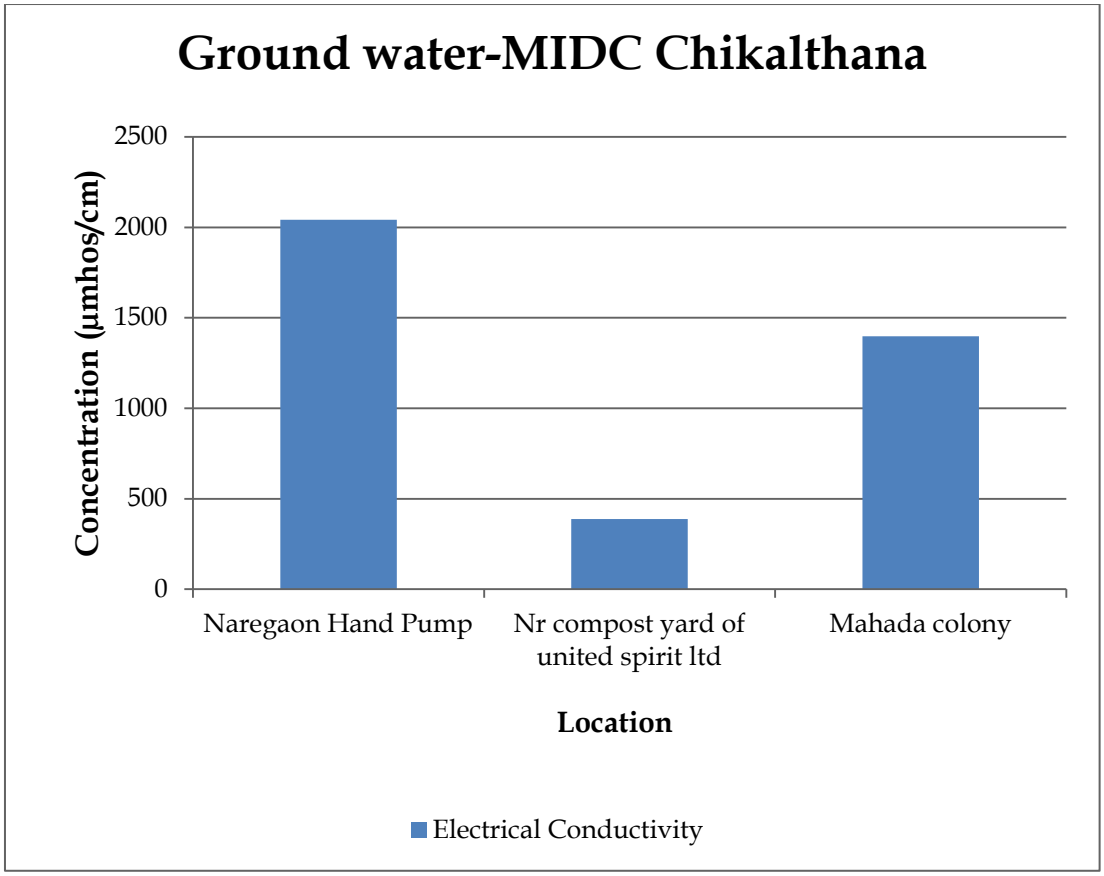
Name of Industry				**Radico Distilleries**	**Wockhardt Infrastructure development Ltd.**	**Shendra Village**	**Frigorifico Allana Ltd. Backside**	**Chitegaon Jailaxmi Carting Well**	**Ganesh Nagar**
Location				Ground Water	Well Water	Bore Well	Bore Well	Bore Well	Bore Well
Date of Sampling				**06.06.17**	**07.06.17**	**06.06.17**	**10.06.17**	**10.06.17**	**09.06.17**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**					
31.	Zinc (Zn)	mg/L	**5.0**	BDL	BDL	BDL	BDL	BDL	BDL
32.	Nickel (as Ni)	mg/L	**0.02**	BDL	BDL	BDL	0.13	BDL	BDL
33.	Copper (as Cu)	mg/L	**0.05**	BDL	BDL	BDL	BDL	BDL	BDL
34.	Hexavalent Chromium (as Cr^{6+})	mg/L	**1**	BDL	BDL	BDL	BDL	BDL	BDL
35.	Total Chromium (as Cr)	mg/L	**0.05**	BDL	BDL	BDL	BDL	BDL	BDL
36.	Total Arsenic (as As)	mg/L	**0.01**	BDL	BDL	BDL	BDL	BDL	BDL
37.	Lead (as Pb)	mg/L	**0.01**	BDL	BDL	BDL	BDL	BDL	BDL
38.	Cadmium (as Cd)	mg/L	**0.003**	0.09	0.07	0.05	0.01	BDL	BDL
39.	Mercury (as Hg)	mg/L	**0.001**	BDL	BDL	BDL	BDL	BDL	BDL
40.	Manganese (as Mn)	mg/L	**0.1**	BDL	BDL	BDL	BDL	BDL	BDL
41.	Iron (as Fe)	mg/L	**0.3**	BDL	BDL	BDL	BDL	BDL	BDL
42.	Vanadium (as V)	mg/L		BDL	BDL	BDL	0.1	0.02	0.39
43.	Selenium (as Se)	mg/L	**0.01**	BDL	BDL	BDL	BDL	BDL	BDL

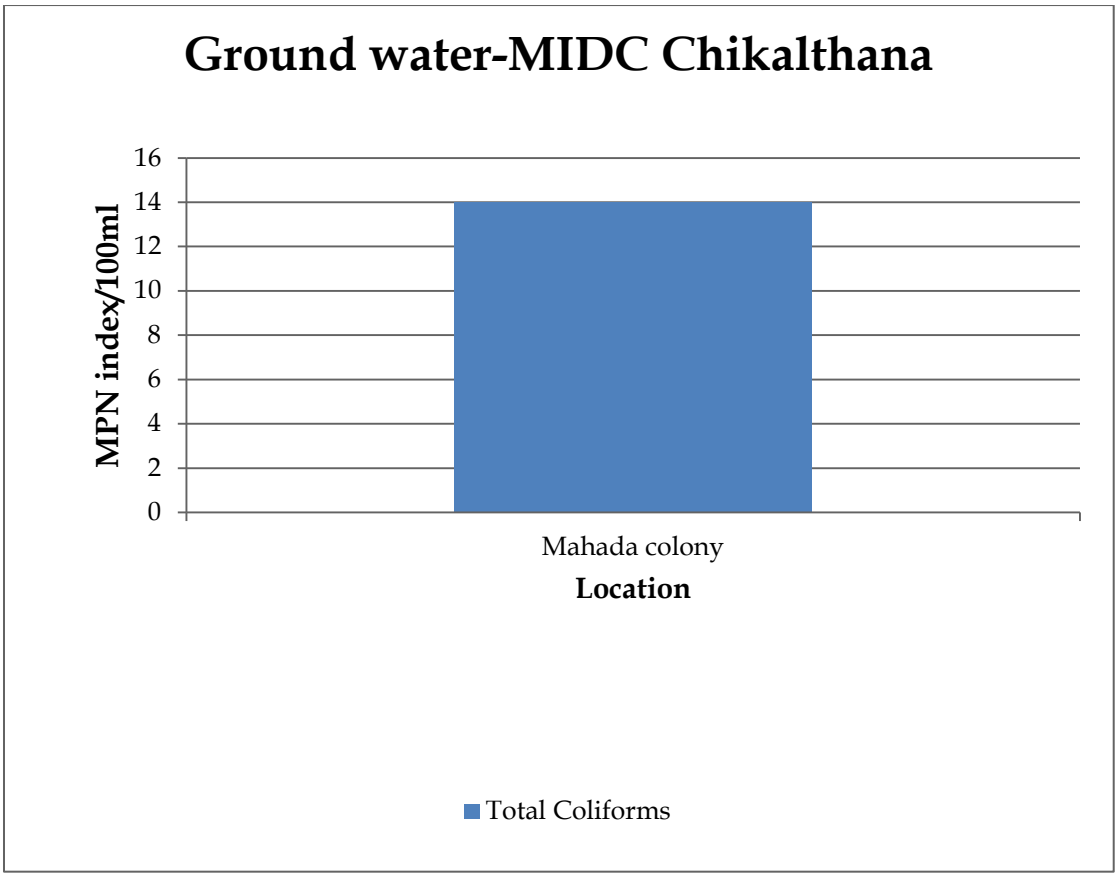
Name of Industry				**Radico Distilleries**	**Wockhardt Infrastructure development Ltd.**	**Shendra Village**	**Frigorifico Allana Ltd. Backside**	**Chitegaon Jailaxmi Carting Well**	**Ganesh Nagar**
Location				Ground Water	Well Water	Bore Well	Bore Well	Bore Well	Bore Well
Date of Sampling				**06.06.17**	**07.06.17**	**06.06.17**	**10.06.17**	**10.06.17**	**09.06.17**
Sr.	**Parameters**	**Unit**	**Std. Limit**	**Results**					
44.	Boron (as B)	mg/L		BDL	BDL	BDL	BDL	BDL	BDL
45.	Bioassay Test on fish	% survival		80	100	100	90	100	100

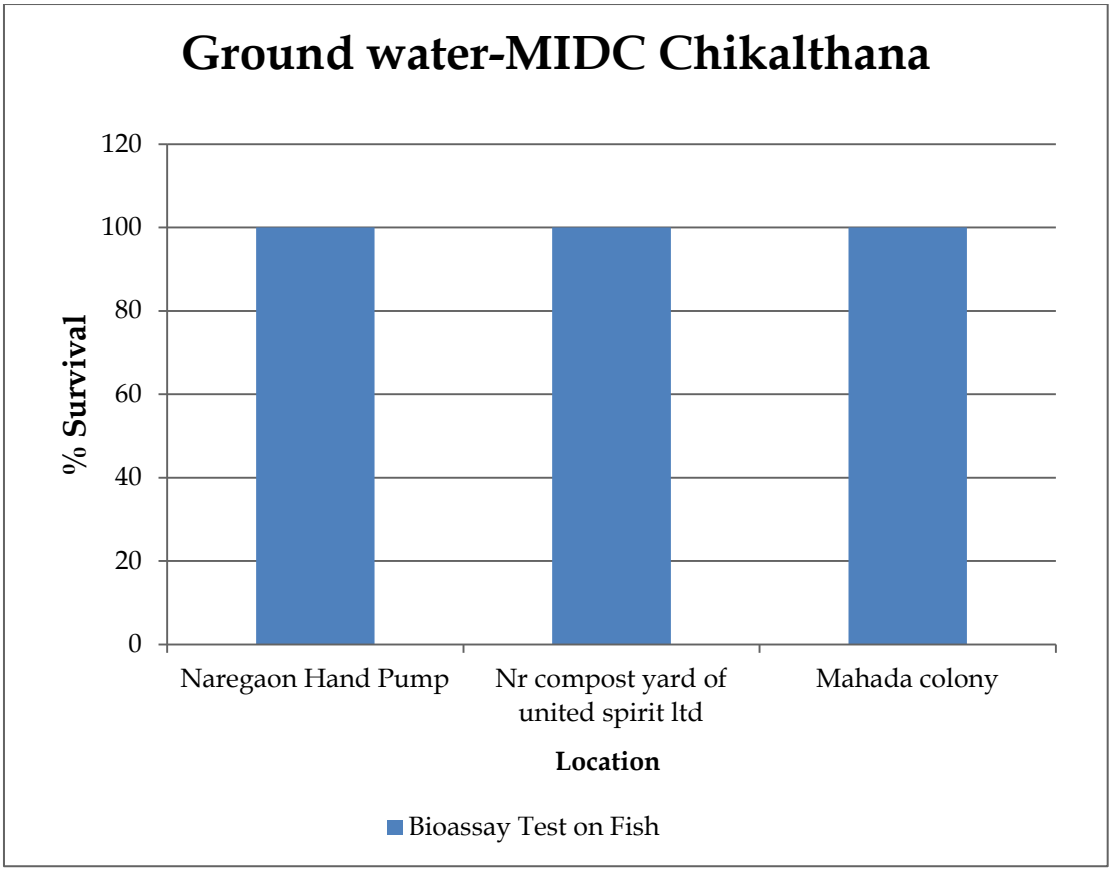
Graphs: Ground Water Analysis:

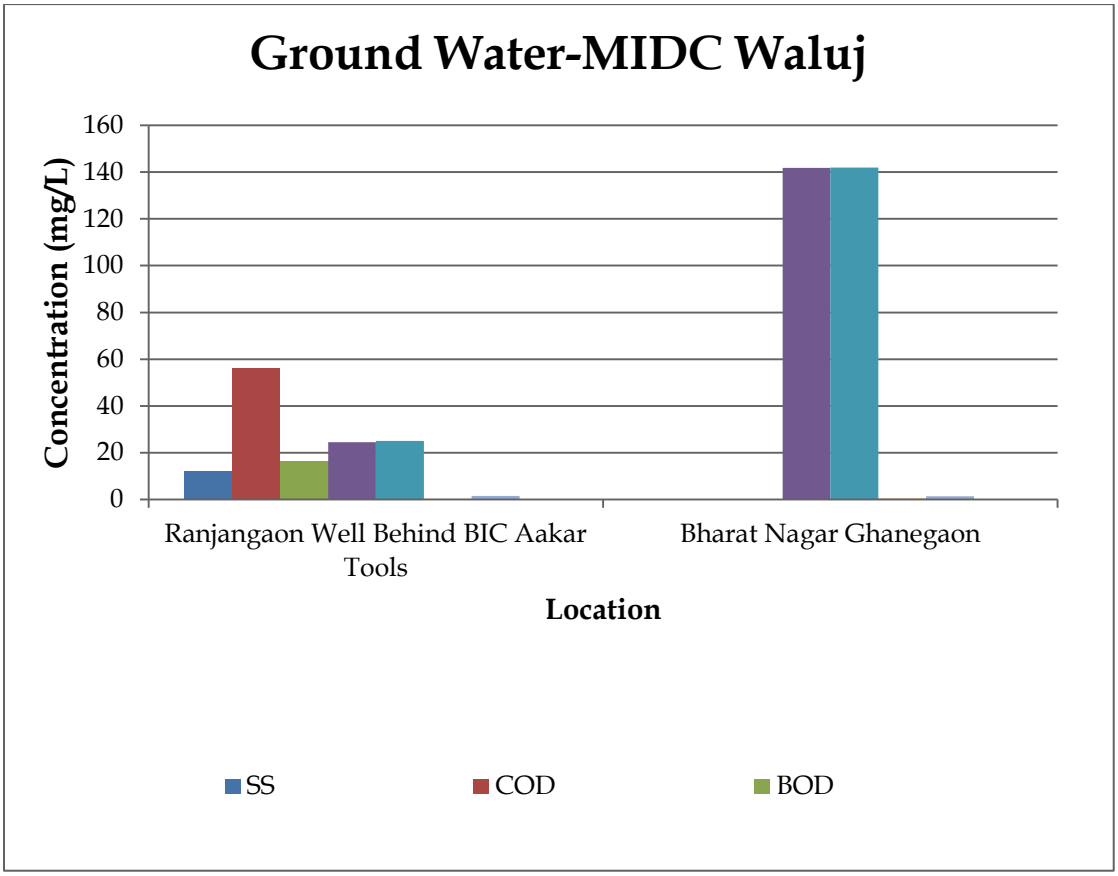


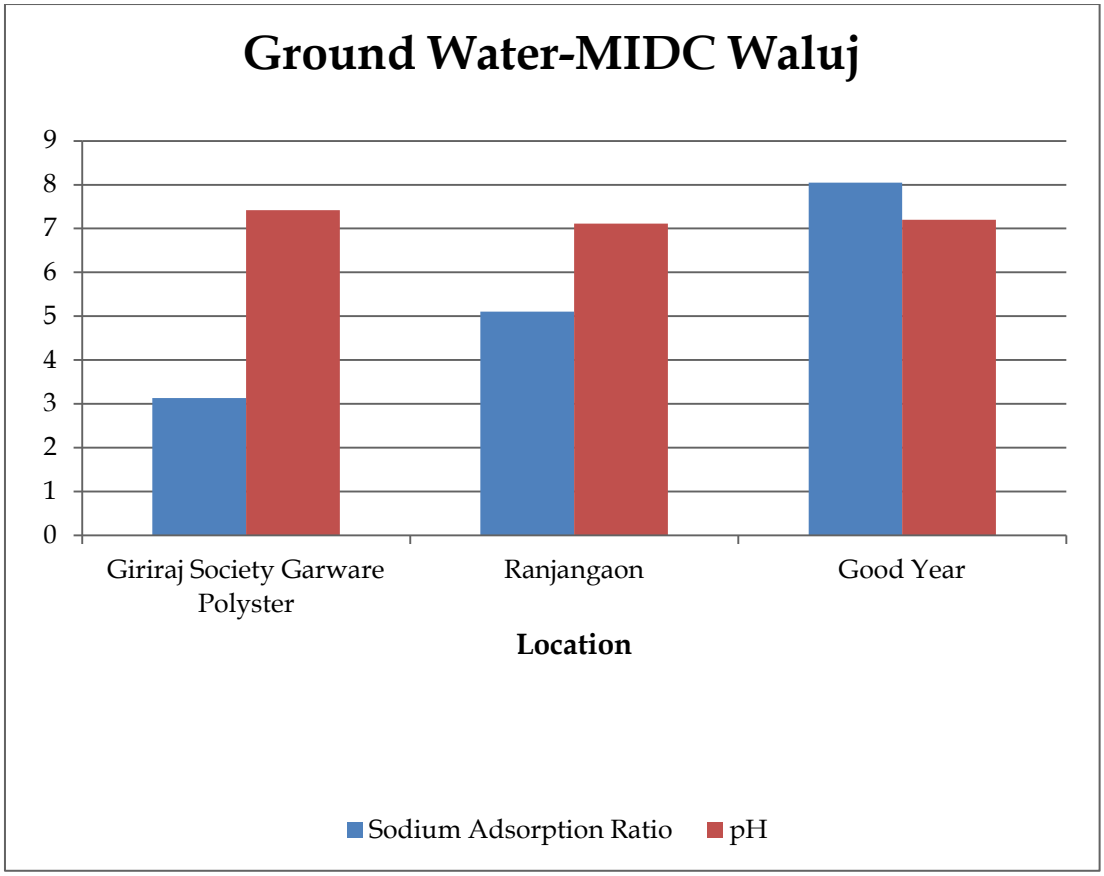


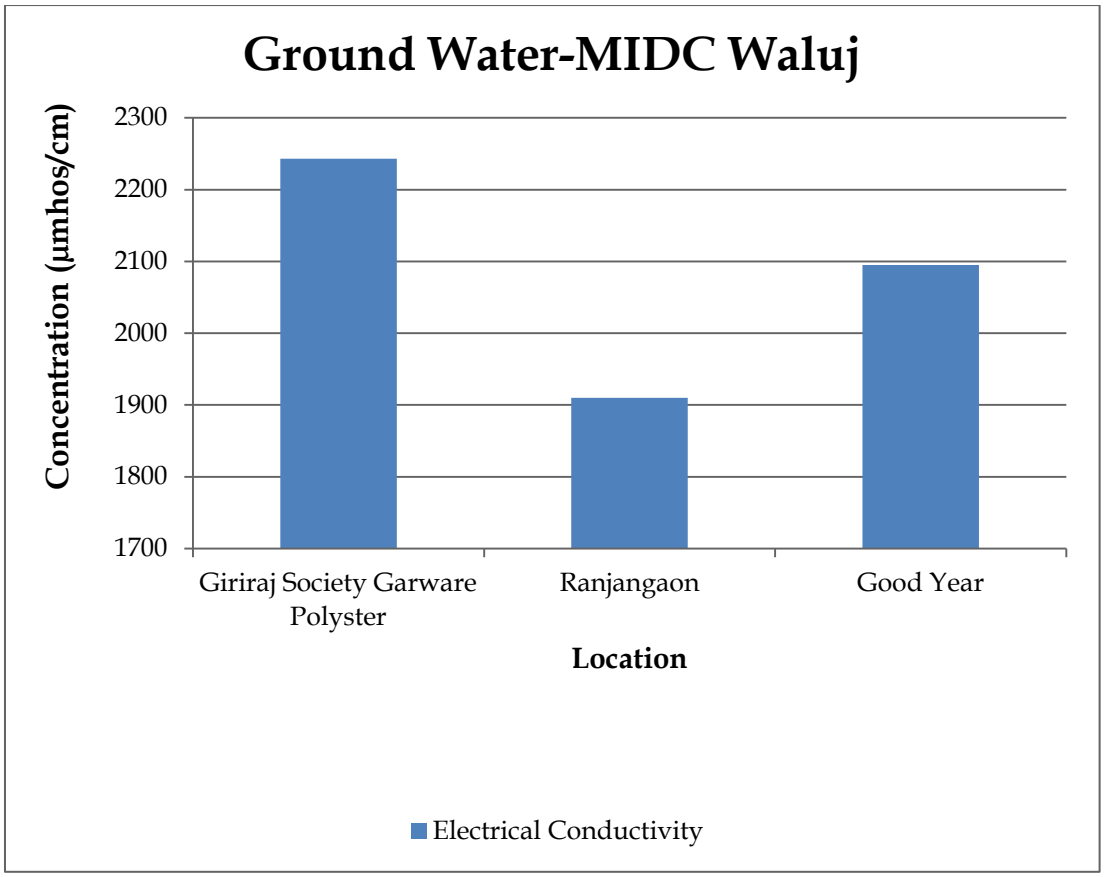

Ground water-MIDC Chikalthana
Concentration (µmhos/cm)
2500
2000
1500
1000
500
0
Naregaon Hand Pump
Nr compost yard of united spirit ltd
Mahada colony
Location
Electrical Conductivity

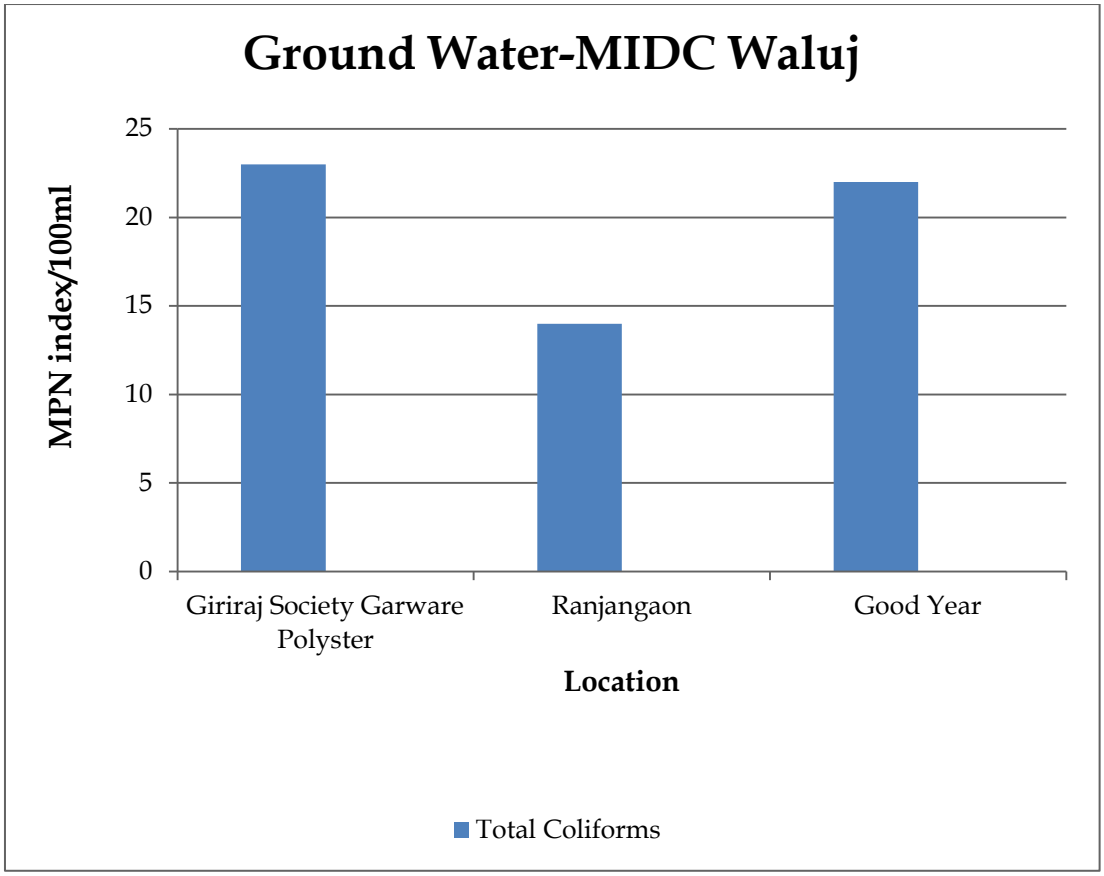

Ground water-MIDC Chikalthana
MPN index/100ml
16
14
12
10
8
6
4
2
0
Mahada colony
Location
Total Coliforms

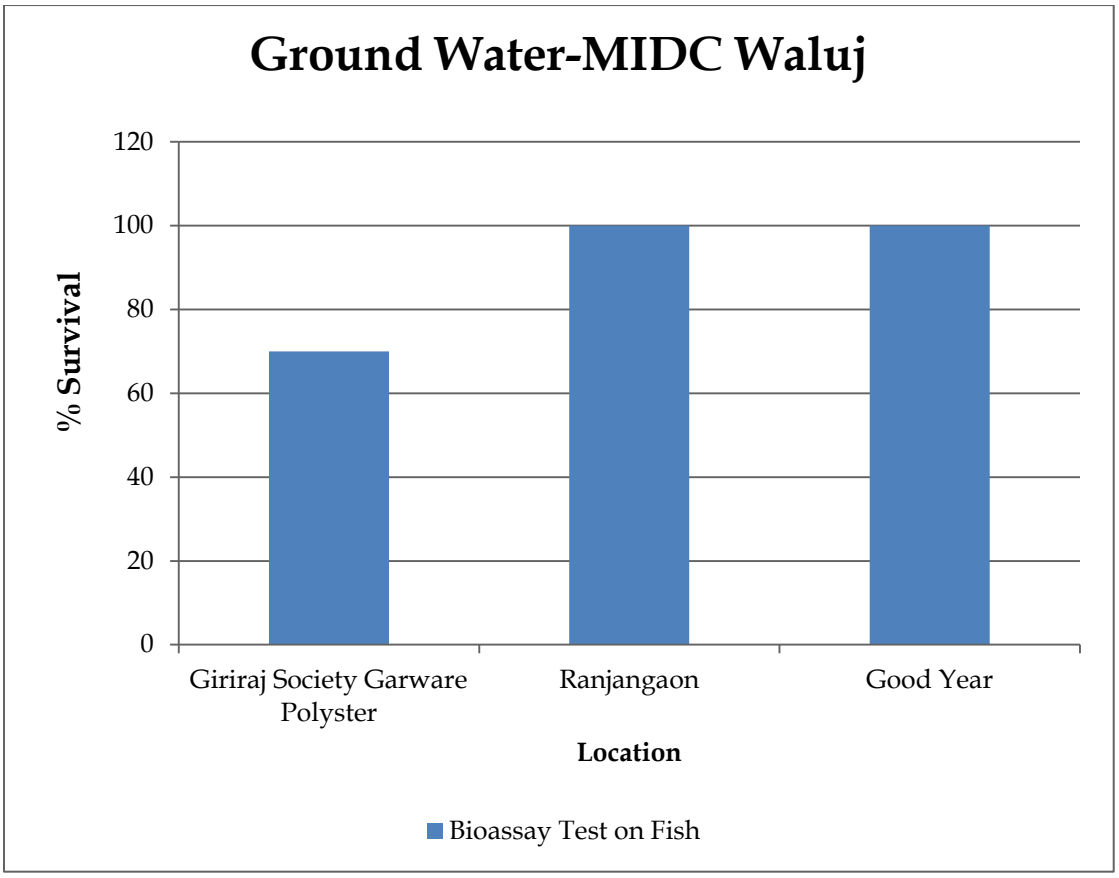

Ground water-MIDC Chikalthana
120
100
80
60
40
20
0
% Survival
Naregaon Hand Pump
Nr compost yard of united spirit ltd
Mahada colony
Location
Bioassay Test on Fish

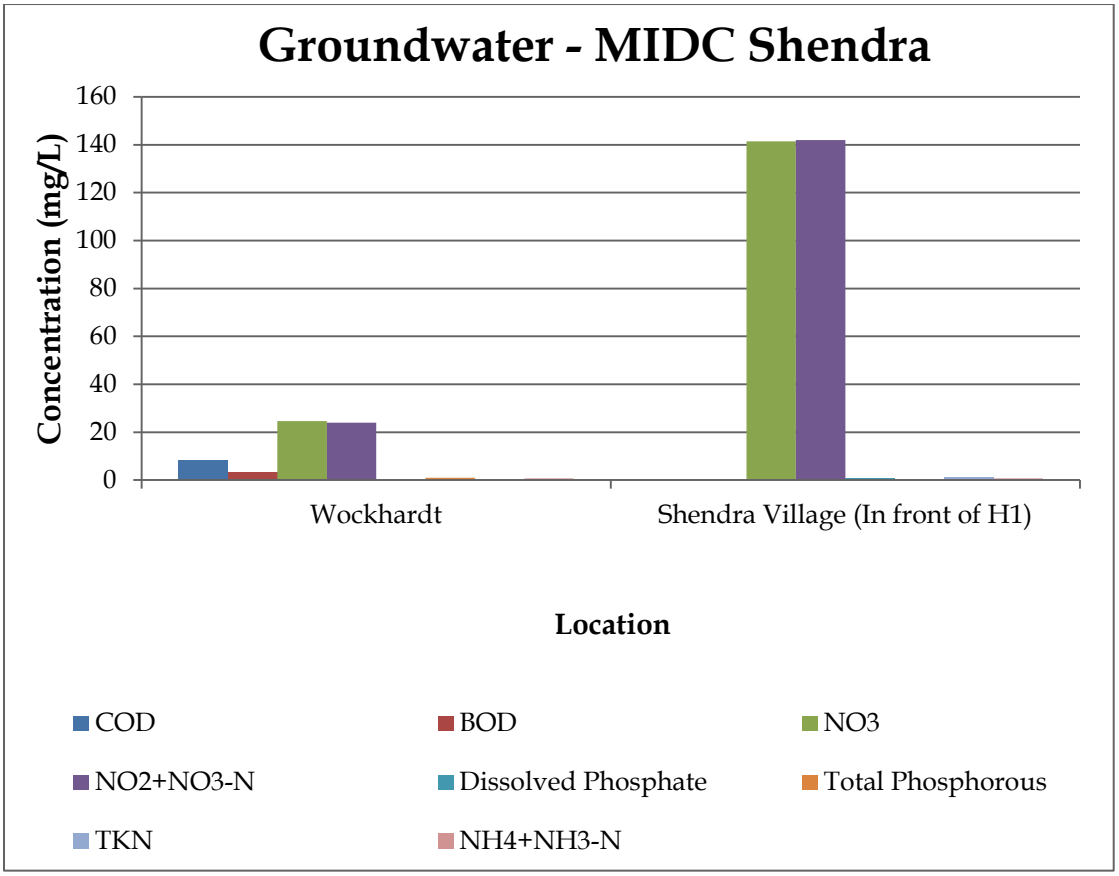

Ground Water-MIDC Waluj
160
140
120
100
80
60
40
20
0
Concentration (mg/L)
Ranjangaon Well Behind BIC Aakar Tools
Bharat Nagar Ghanegaon
Location
SS
COD
BOD

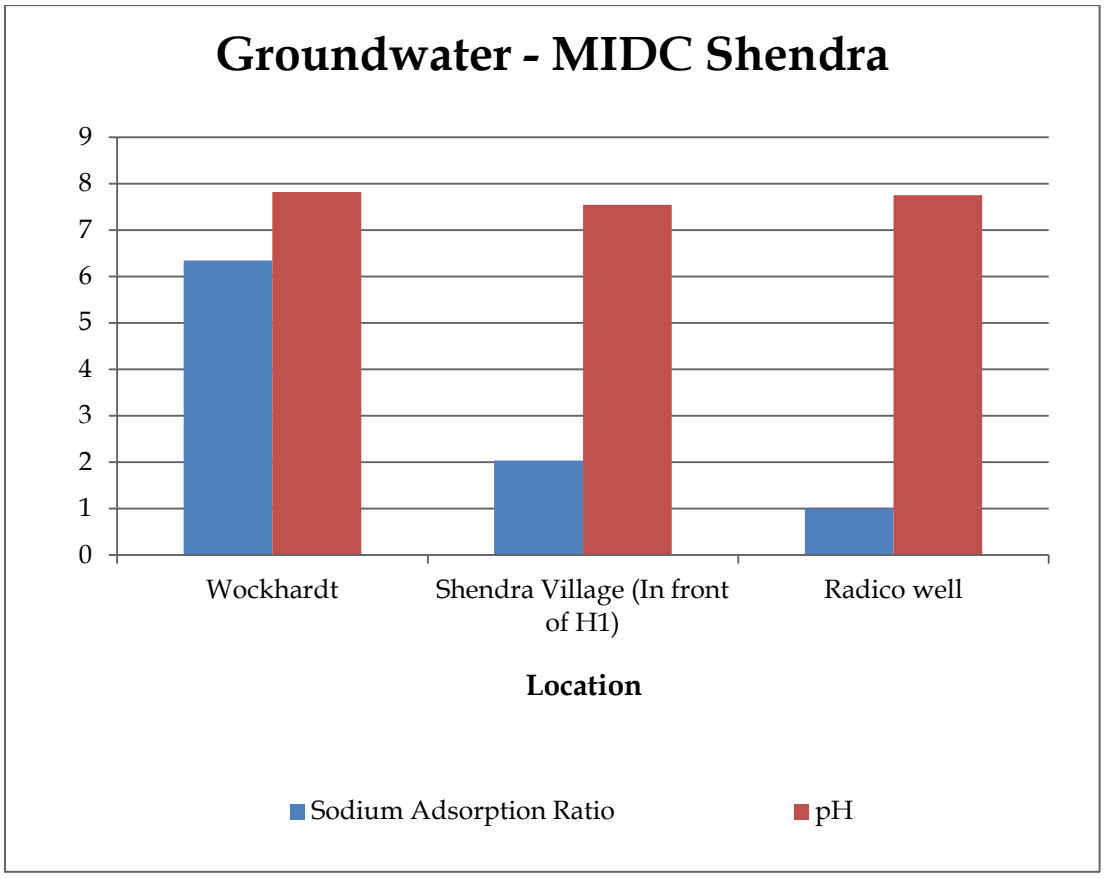

Ground Water-MIDC Waluj
9
8
7
6
5
4
3
2
1
0
Giriraj Society Garware Polyster
Ranjangaon
Good Year
Location
Sodium Adsorption Ratio
pH

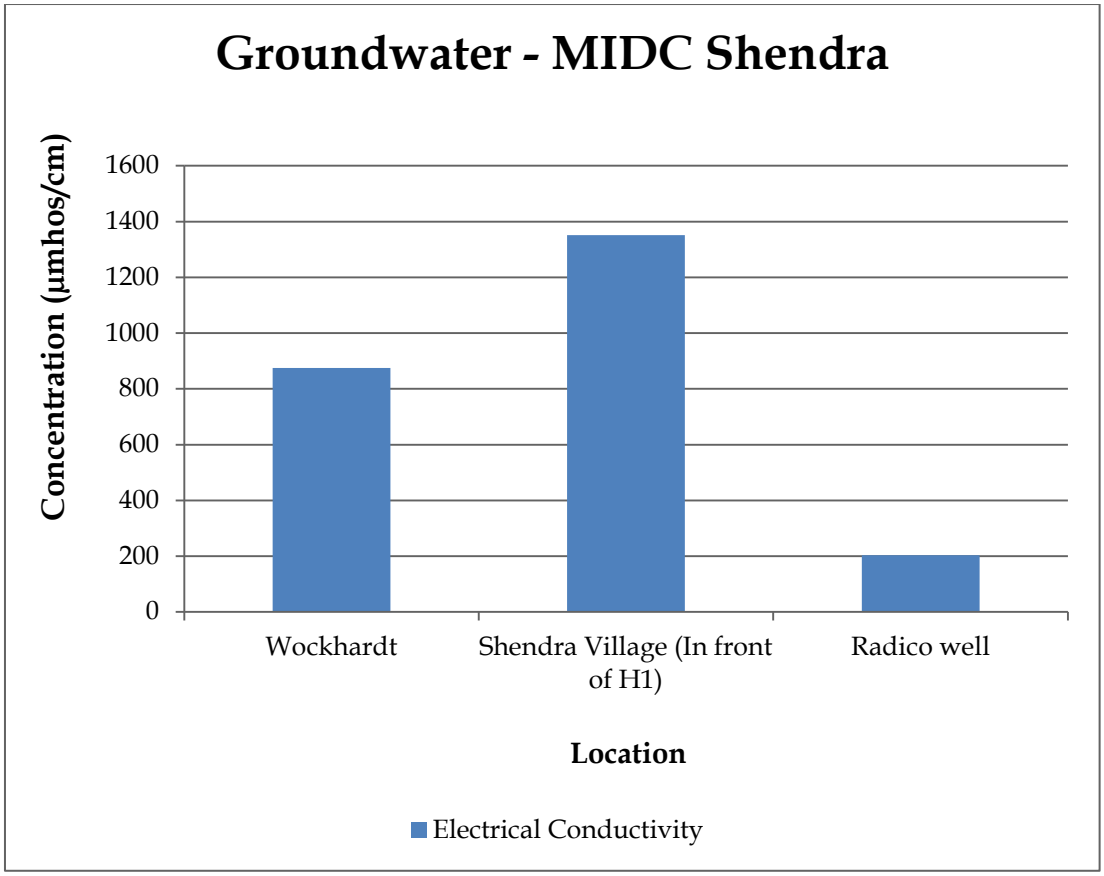

Ground Water-MIDC Waluj
Concentration (µmhos/cm)
2300
2200
2100
2000
1900
1800
1700
Giriraj Society Garware Polyster
Ranjangaon
Good Year
Location
Electrical Conductivity

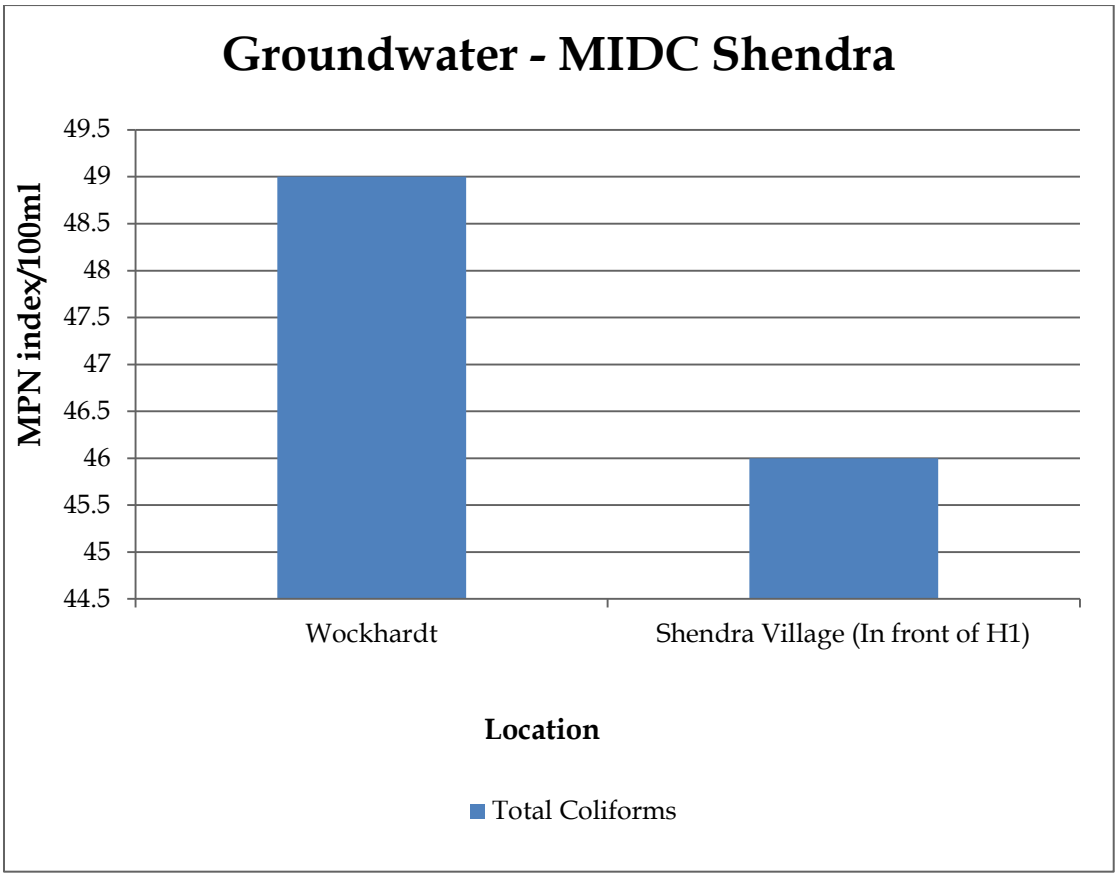

Ground Water-MIDC Waluj
MPN index/100ml
25
20
15
10
5
0
Giriraj Society Garware Polyster
Ranjangaon
Good Year
Location
Total Coliforms

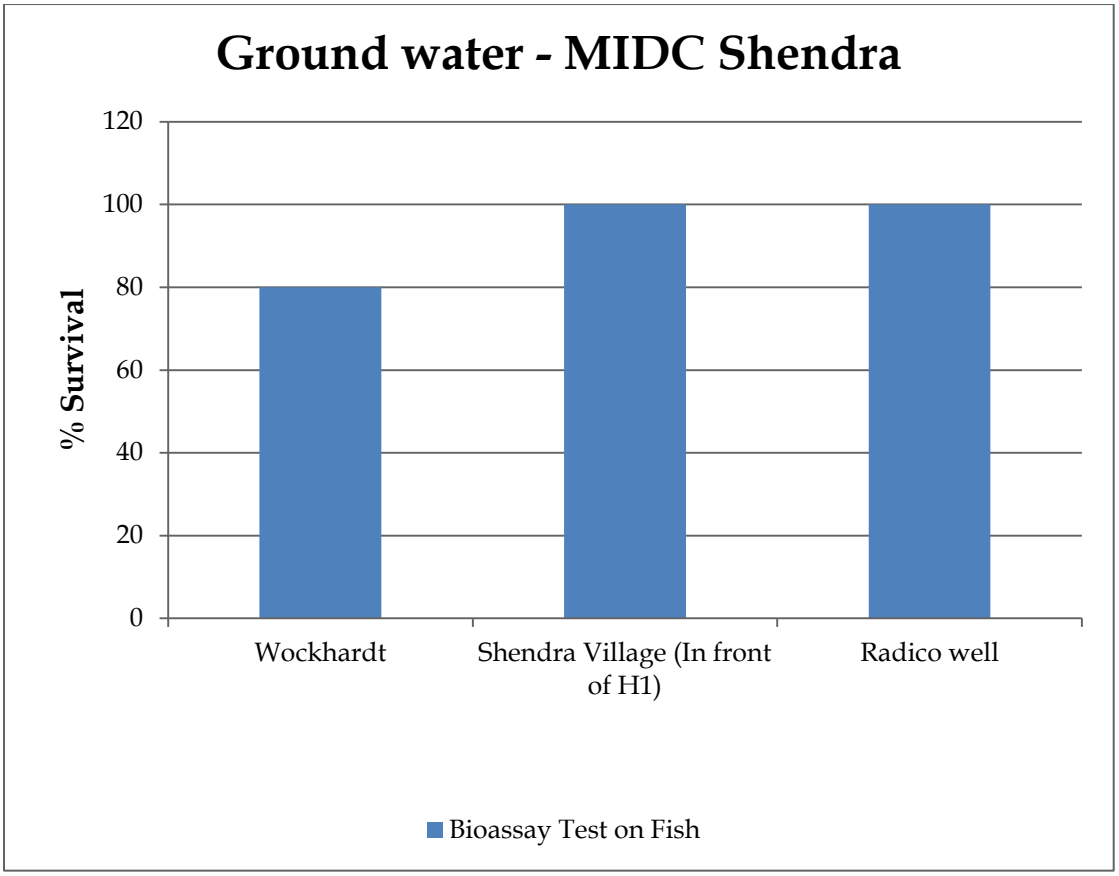

Ground Water-MIDC Waluj
% Survival
120
100
80
60
40
20
0
Giriraj Society Garware Polyster
Ranjangaon
Good Year
Location
Bioassay Test on Fish

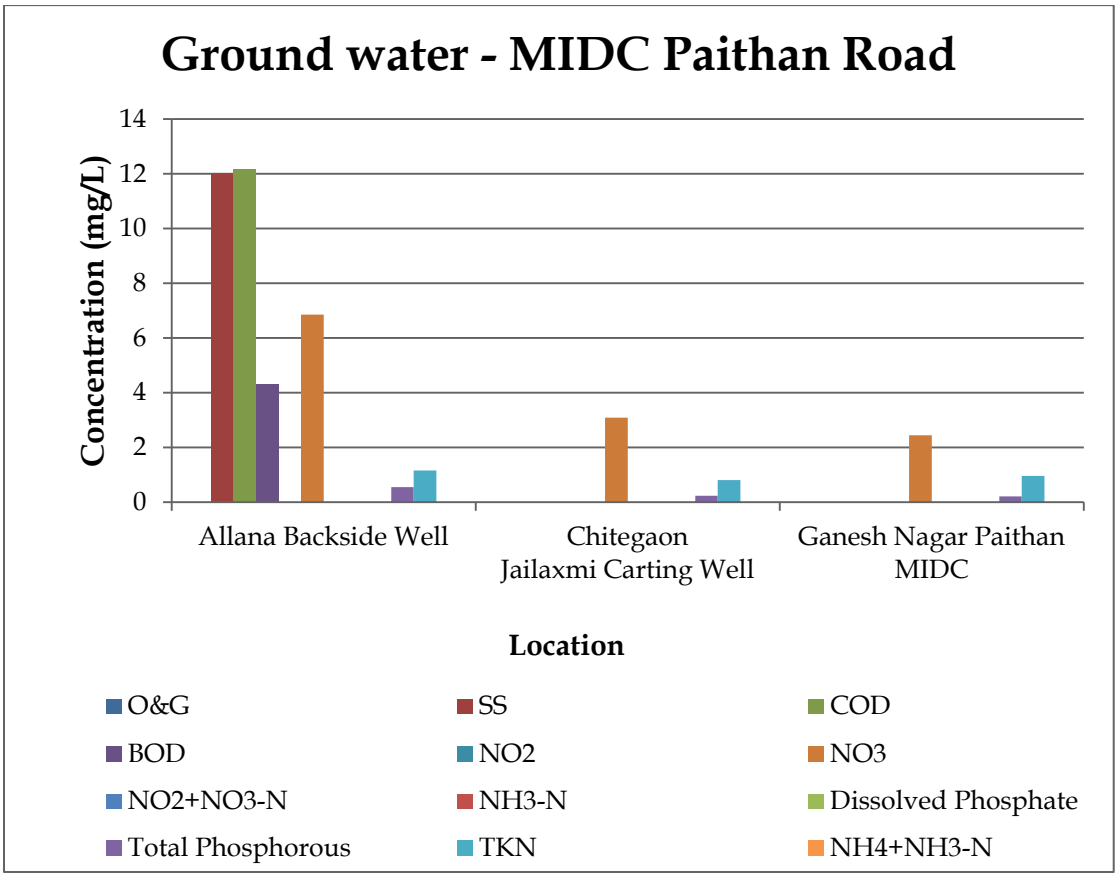

Groundwater - MIDC Shendra
Concentration (mg/L)
160
140
120
100
80
60
40
20
0
Wockhardt
Shendra Village (In front of H1)
Location
COD
BOD
NO3
NO2+NO3-N
Dissolved Phosphate
Total Phosphorous
TKN
NH4+NH3-N

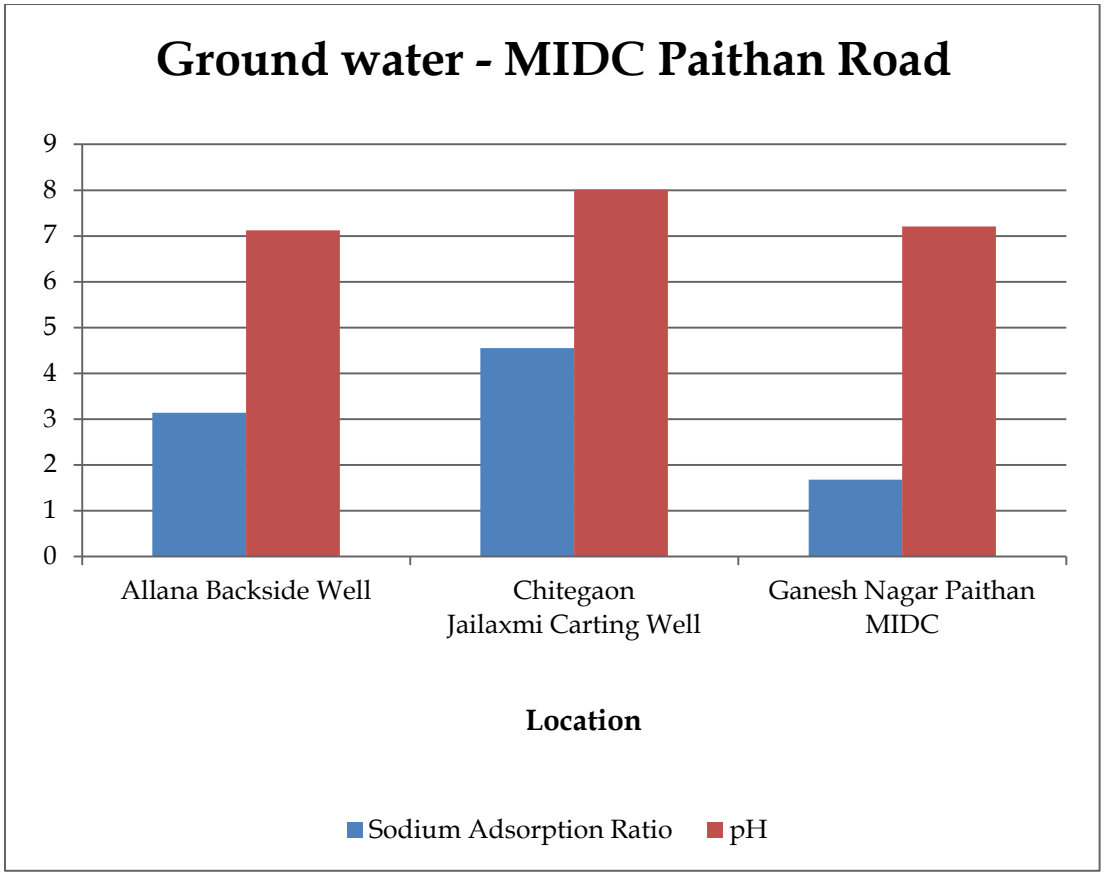

Groundwater - MIDC Shendra
9
8
7
6
5
4
3
2
1
0
Wockhardt
Shendra Village (In front of H1)
Radico well
Location
Sodium Adsorption Ratio
pH

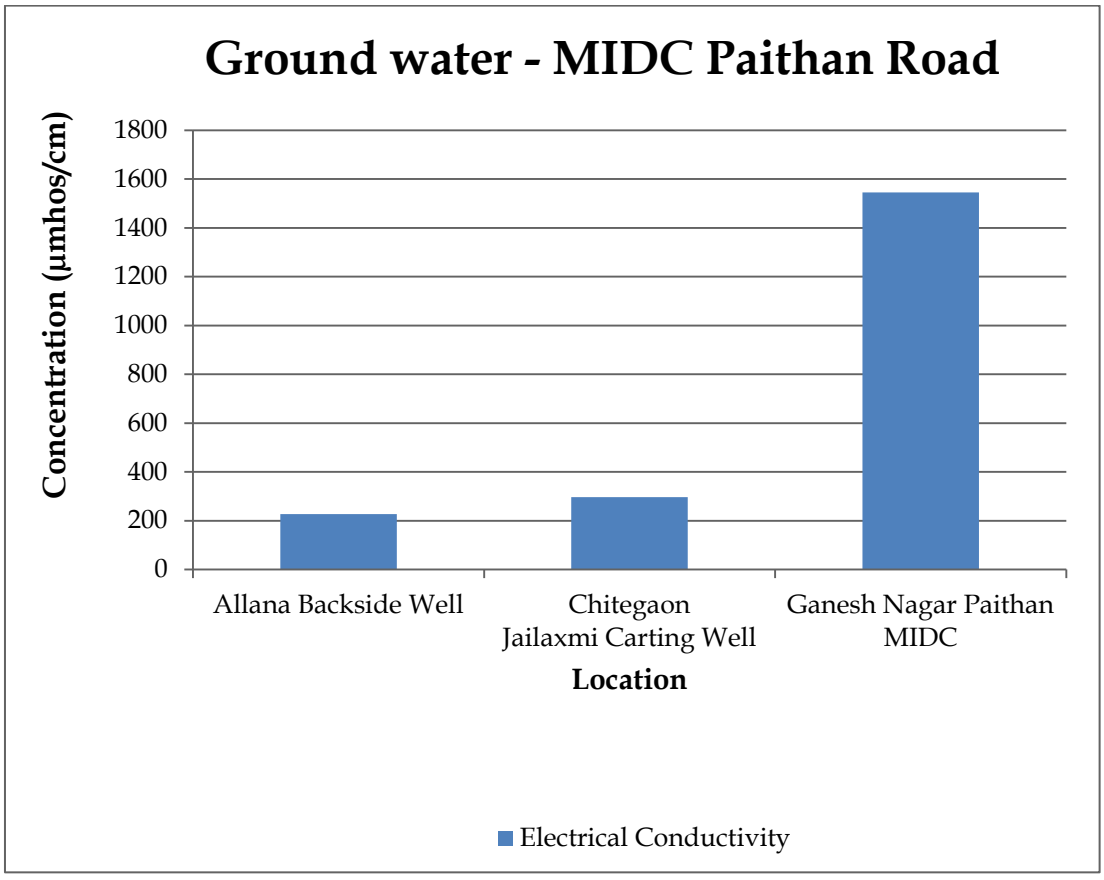

Groundwater - MIDC Shendra
Concentration (µmhos/cm)
1600
1400
1200
1000
800
600
400
200
0
Wockhardt
Shendra Village (In front of H1)
Radico well
Location
Electrical Conductivity

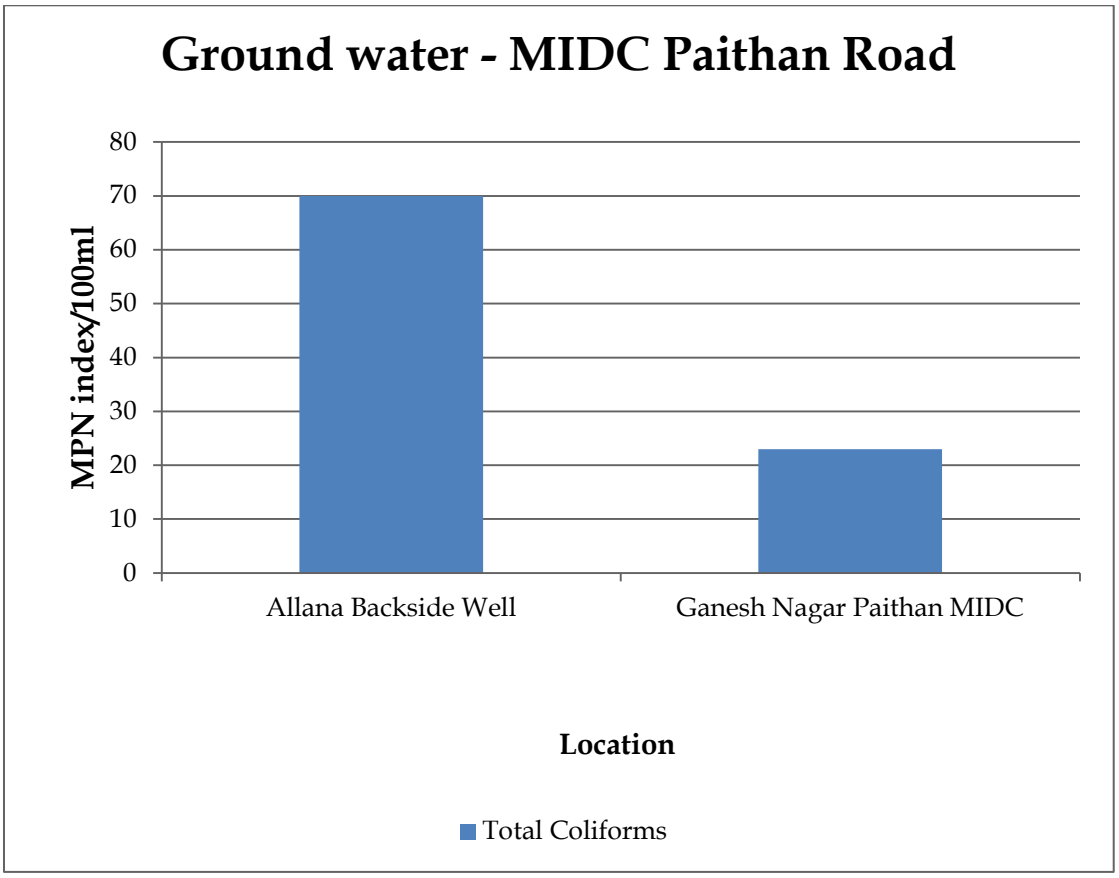

Groundwater - MIDC Shendra
MPN index/100ml
49.5
49
48.5
48
47.5
47
46.5
46
45.5
45
44.5
Wockhardt
Shendra Village (In front of H1)
Location
Total Coliforms

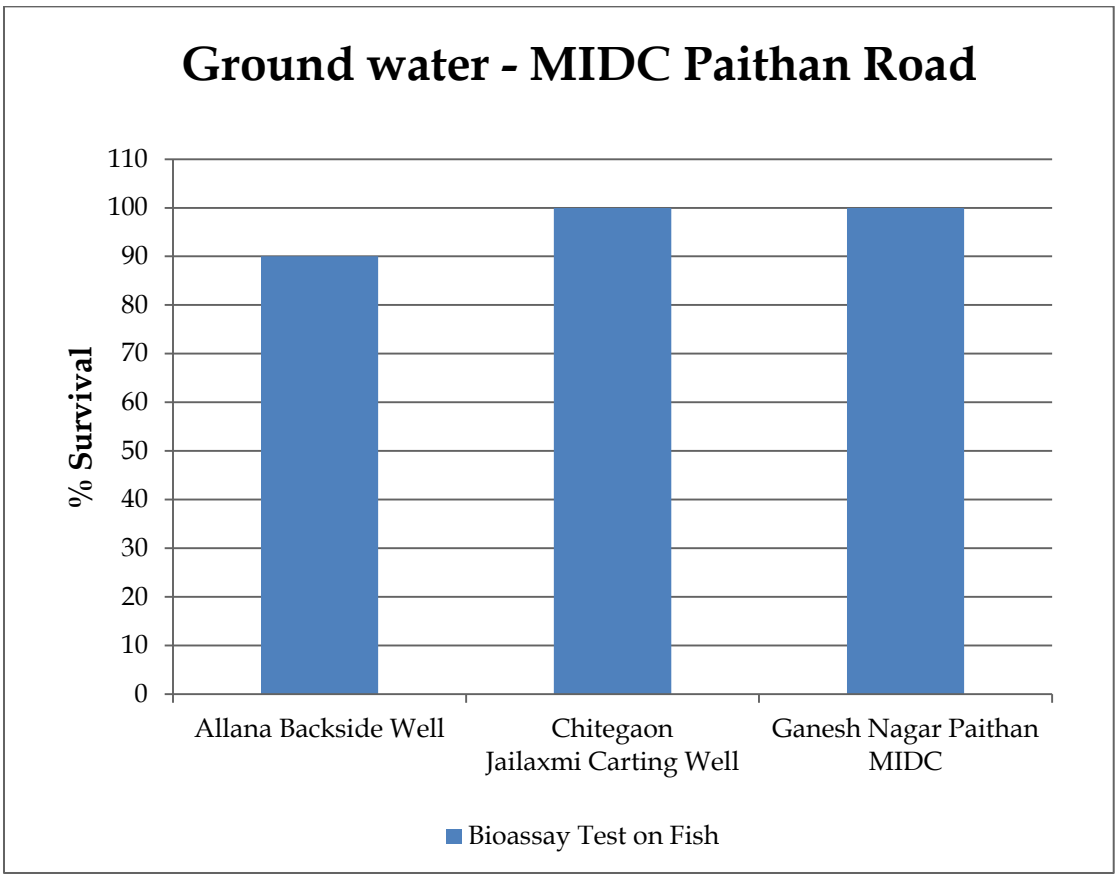

Ground water - MIDC Shendra
120
100
80
60
40
20
0
% Survival
Wockhardt
Shendra Village (In front of H1)
Radico well
Bioassay Test on Fish


Ground water - MIDC Paithan Road
14
12
10
8
6
4
2
0
Concentration (mg/L)
Allana Backside Well
Chitegaon Jailaxmi Carting Well
Ganesh Nagar Paithan MIDC
Location
O&G
SS
COD
BOD
NO2
NO3
NO2+NO3-N
NH3-N
Dissolved Phosphate
Total Phosphorous
TKN
NH4+NH3-N


Ground water - MIDC Paithan Road
9
8
7
6
5
4
3
2
1
0
Allana Backside Well
Chitegaon Jailaxmi Carting Well
Ganesh Nagar Paithan MIDC
Location
Sodium Adsorption Ratio
pH


Ground water - MIDC Paithan Road
Concentration (µmhos/cm)
1800
1600
1400
1200
1000
800
600
400
200
0
Allana Backside Well
Chitegaon Jailaxmi Carting Well
Ganesh Nagar Paithan MIDC
Location
Electrical Conductivity


Ground water - MIDC Paithan Road
MPN index/100ml
80
70
60
50
40
30
20
10
0
Allana Backside Well
Ganesh Nagar Paithan MIDC
Location
Total Coliforms


Ground water - MIDC Paithan Road
% Survival
110
100
90
80
70
60
50
40
30
20
10
0
Allana Backside Well
Chitegaon Jailaxmi Carting Well
Ganesh Nagar Paithan MIDC
Bioassay Test on Fish

4 Summary and Conclusions:

The results are summarized and concluded based on various standards mentioned in the previous chapter.

4.1 Stack Emission Monitoring:

Stack monitoring was done at four MIDC clusters and they are:

a) Chikalthana MIDC includes Radient Indus Chem Pvt. Ltd, NRB Bearing Ltd., Wockhardt Ltd L-1, M/s Lupin Ltd., United Spirits Ltd. And Harman Finochem Ltd. The status of stack parameters in these industrial clusters is discussed below:

1. **Particulate Matter:** At all the six locations of MIDC Chikalthana, obtained values for particulate matter are below the standard limit of 150mg/Nm^3. It is observed in the range from 65.2 to 131.8 mg/Nm^3.

2. **Sulphur Dioxide and Oxides of Nitrogen:** All industries in this MIDC displayed different concentrations depending on fuel and load. Sulphur dioxide is found in the range of BDL (<5.0) to 142.6mg/Nm^3 and oxides of nitrogen is observed in the range of 23.5 to 496.2mg/Nm^3.

3. **Carbon Monoxide**: Concentration of Carbon monoxide is also observed in all the stack samples ranging from 89 to 468mg/L.

4. **Oxygen**: It is found in the range of 11.2 to 14.6%.

5. **Flouride, H_2S, PAHs, Ammonia, Hydrochloride, benzene Volatile Organic Carbons and Acid Mist** concentration at all the studied locations are either not detected or detected below detection limits.

b) Waluj MIDC includes six locations under study namely IPCA (Paschim Chem), BKT Tyre, Carlsberg Ltd., Garware Polyester Ltd., SAB Miller I(I) Ltd. And Sterlite Tech. The status of stack parameters in these industrial clusters is discussed below:

1. **Particulate Matter:** All obtained values for particulate matter are below the standard limit of 150mg/Nm^3. It is observed in the range of 44.9 to 106.3mg/Nm^3.

2. **Sulphur Dioxide and Oxides of Nitrogen:** Sulphur dioxide is found in the range of 6.5 to 119.4 mg/Nm^3 and oxides of nitrogen is observed in the range of 58.6 to 143.5 mg/Nm^3.

3. **Carbon Monoxide**: Concentrations of Carbon monoxide is also observed in all the stack samples ranging from 129 to 549mg/L.

4. **Oxygen**: It is found in the range of 9.6 to 14.6%.

5. **Flouride, Acid Mist, H_2S, PAHs, Ammonia, Hydrochloride, benzene and Volatile Organic Carbons** concentration at all the studied locations are either not detected or detected below detection limits.

c) Shendra MIDC includes Glenmark Pharma-ceuticals Lab., Radico NV Distilleries Maharashtra Ltd., Wockhardt Ltd., Skoda Auto India Pvt. Ltd. And Harman Finochem Ltd. The status of stack parameters in these industrial clusters is discussed below:

1. **Particulate Matter:** All obtained values for particulate matter are below the standard limit of 150mg/Nm^3. It is observed in the range of 48.6 to 115.3µg/Nm^3.

2. **Sulphur Dioxide and Oxides of Nitrogen:** Sulphur dioxide is found in the range of BDL to 103.5mg/Nm^3 and oxides of nitrogen is observed in the range of BDL to 141.6mg/Nm^3.

3. **Carbon Monoxide**: Concentrations of Carbon monoxide is also observed in all the stack samples ranging from 396 to 532mg/L.

4. **Oxygen**: It is found in the range of 12.5 to 14.3%.

5. **Flouride, H_2S, PAHs, Ammonia, Hydrochloride, benzene and Volatile Organic Carbons** concentration at all the studied locations are either not detected or detected below detection limits.

d) Paithan MIDC includes Jai Laxmi Casting Pvt. Ltd., Pepsico India Ltd., Ajantha Pharma, R. L. Steel Industries, Encore Laboratories and Frigorifico Allana Ltd. The status of stack parameters in these industrial clusters is discussed below:

1. **Particulate Matter:** All obtained values for particulate matter are below the standard limit of 150mg/Nm^3. It is observed in the range of 41.2 to 114.7mg/Nm^3.

2. **Sulphur Dioxide and Oxides of Nitrogen:** Sulphur dioxide is found in the range of BDL to 137.6 mg/Nm^3 and Oxides of Nitrogen is observed in the range of 28.6 to 211.8mg/Nm^3.

3. **Carbon Monoxide**: Concentrations of Carbon monoxide is also observed in all the stack samples ranging from 273 to 592mg/L.

4. **Oxygen**: It is found in the range of 9.2 to 14.2%.

5. **Flouride, H_2S, PAHs, Ammonia, Hydrochloride, benzene, Volatile Organic Carbons and Acid Mist** concentration at all the studied locations is either not detected or detected below detection limits.

4.2 Ambient Air Quality:

Ambient Air Quality parameters are compared with NAAQ, 2009 by CPCB. Allthe four MIDCs covered with 3 locations each under study.

a) MIDC Chikalthana

MIDC Chikalthana is covered by studying 3 locations i. e. United Spirits Ltd., NRB Bearings Ltd. And Greaves Cotton Ltd.

1. Sulphur dioxide: Sulphur dioxide at all the three locations of MIDC Chikalthana is observed very low in concentration and hence, below its standard limit of NAAQ, 2009. It is ranged between minimum of 14.8 to maximum of 18.8 µg/m^3.

2. Nitrogen Dioxide: It ranges between minimum of 29.9µg/m^3 at Greaves Cotton Ltd.and maximum 44.7µg/m^3 at United Spirits Ltd. All the values are quiet below the standard limit of 80 µg/m^3.

3. Particulate Matter (PM10): All the values of Particulate Matter are found below the standard limit of NAAQ Standards, 2009. It is ranged from minimum of 57 µg/m^3 and maximum of 69 µg/m^3 at Chikalthana MIDC.

4. Particulate Matter (PM2.5): Range between minimum of 26.4µg/m^3 at NRB Bearings Ltd. and maximum of 31.5µg/m^3 at United Spirits of Chikalthana MIDC. All the values are below the standard limit of 60µg/m^3.

5. Ozone (O_3): Well within the limit and it is detected in the range of 31.6 to 42.8µg/m^3 at all the locations.

6. Lead (Pb): It is observed below detection limit at all other locations ranging from 0.036 to 0.07µg/m^3.

7. Carbon monoxide (CO): It is also observed in very low concentrations and well below standard limit i.e. in the range of 0.507 to 0.636mg/m^3.

8. Nickel and Arsenic : Being carcinogenic in nature high concentration of nickel and Arsenic may become fatal for all human beings. However, both the metals are observed below detection limit in the ambient air samples studied.

9. Ammonia: It is also observed below detection limit in the ambient air samples studied

10. Benzene: Benzene is categorized as a known carcinogen in CEPI guidelines. It is present in all the collected samples but below standard limit in the range of 1.70 to 2.18µg/m^3.

11. Benzo(a)Pyrene : All values are observed BDL at all the locations.

b) MIDC Waluj

MIDC Waluj includes 3 locations namely: Garware polyster Ltd., Pfizer India Ltd. and SAB Miler Ltd.

1. Sulphur dioxide: Sulphur dioxide at all the three locations of MIDC Waluj is observed very low in concentration and hence, below its standard limit of NAAQ, 2009. It is ranged between minimum of 16.34 to maximum of 18.5 µg/m^3.

2. Nitrogen Dioxide: It ranges between minimum of 38.3µg/m^3 at Pfizer India Ltd. and maximum 45.6µg/m^3 at Garware Polysters Ltd. All the values are quiet below the standard limit of 80 µg/m^3.

3. Particulate Matter (PM10): All the values of Particulate Matter are found below the standard limit of NAAQ Standards, 2009. It is ranged from minimum of 58.0 µg/m^3 at SAB Miler Ltd and maximum of 61.0µg/m^3 at Garware Polysters Ltd.

4. Particulate Matter (PM2.5): Range between minimum of 24.1µg/m^3 at Pfizer India Ltd. and maximum of 29.5µg/m^3 at Garware Polysters Ltd. All the values are below the standard limit of 60µg/m^3.

5. Ozone (O_3): Well within the limit and it is detected in the range of 44.7 to 48.6µg/m^3 at all the locations.

6. Lead (Pb): It is observed below detection limit at all other locations ranging from 0.02 to 0.04µg/m^3.

7. Carbon monoxide (CO): It is also observed in very low concentrations and well below standard limit i.e. in the range of 0.612 to 0.712mg/m^3.

8. Nickel and Arsenic : Being carcinogenic in nature high concentration of nickel and Arsenic may become fatal for all human beings. However, both the metals are observed below detection limit in the ambient air samples studied.

9. Ammonia: It is also observed below detection limit in the ambient air samples studied

10. Benzene: Benzene is categorized as a known carcinogen in CEPI guidelines. It is present in all the collected samples but below standard limit in the range of 1.85 to 2.24µg/m^3.

11. Benzo(a)Pyrene : All values are observed BDL at all the locations.

c) MIDC Shendra

MIDC Shendra includes 3 locations namely: Radico NV Distilleries Maharashtra Ltd., Metalyst Forgings Ltd., and Perkins Pvt. Ltd.

1. Sulphur dioxide: Sulphur dioxide at all the three locations of MIDC Shendra is observed very low in concentration and hence, below its standard limit of NAAQ, 2009. It is ranged between minimum of 15.7 to maximum of 17.5 µg/m^3.

2. Nitrogen Dioxide: It ranges between minimum of 22.5µg/m^3 at Perkins Ltd. and maximum 33.8µg/m^3 at Radico Distilleries Ltd. All the values are quiet below the standard limit of 80 µg/m^3.

3. Particulate Matter (PM10): All the values of Particulate Matter are found above the standard limit of NAAQ Standards, 2009. It is ranged from minimum of 51 µg/m^3 at Metalysts Ltd. and maximum of 60 µg/m^3 at Radico Distilleries Ltd.

4. Particulate Matter (PM2.5): Range between minimum of 22.6µg/m^3 at Metalysts Ltd. and maximum of 28.1µg/m^3 at Radico Distilleries Ltd. All the values are below the standard limit.

5. Ozone (O_3): Well within the limit and it is detected in the range of 26.1 to 39.4µg/m^3 at all the locations.

6. Lead (Pb): It is observed below detection limit at all other locations ranging from below detection limit at Radico Distilleries to 0.08µg/m^3 at Metalysts Ltd.

7. Carbon monoxide (CO): It is also observed in very low concentrations and well below standard limit i.e. in the range of 0.510 to 0.629mg/m^3.

8. Nickel and Arsenic : Being carcinogenic in nature high concentration of nickel and Arsenic may become fatal for all human beings. However, both the metals are observed below detection limit in the ambient air samples studied.

9. Ammonia: It is also observed below detection limit in the ambient air samples studied

10. Benzene: Benzene is categorized as a known carcinogen in CEPI guidelines. It is present in all the collected samples but below standard limit in the range of 1.12 to 1.85µg/m^3.

11. Benzo(a)Pyrene : All values are observed BDL at all the locations.

d) MIDC Paithan Road

MIDC Paithan Road includes 3 locations namely: Encore Laboratories, Pepsico India Ltd., and Videocon India Ltd.

1. Sulphur dioxide: Sulphur dioxide at all the three locations of MIDC Paithan is observed very low in concentration and hence, below its standard limit of NAAQ, 2009. It is ranged between minimum of 13.8 to maximum of 17.3µg/m^3.

2. Nitrogen Dioxide: It ranges between minimum of 28.6µg/m^3 at videocon Ltd. and maximum 32.9µg/m^3 at Pepsico Ltd. All the values are quiet below the standard limit of 80µg/m^3.

3. Particulate Matter (PM10): All the values of Particulate Matter are found above the standard limit of NAAQ Standards, 2009. It is ranged from minimum of 58.5µg/m^3 at Pepsico Ltd and maximum of 60.0µg/m^3 at Encore Laboratories.

4. Particulate Matter (PM2.5): Range between minimum of 25.1µg/m^3 at Videocon Ltd. and maximum of 28.2µg/m^3 at Pepsico Ltd. All the values are below the standard limit.

5. Ozone (O_3): Well within the limit and it is detected in the range of 38.4 to 47.7µg/m^3 at all the locations.

6. Lead (Pb): It is observed below detection limit at all other locations ranging from below detection limit at Pepsico Ltd. to 0.07µg/m^3 at videocon Ltd.

7. Carbon monoxide (CO): It is also observed in very low concentrations and well below standard limit i.e. in the range of 0.609 to 0.653mg/m^3.

8. Nickel and Arsenic : Being carcinogenic in nature high concentration of nickel and Arsenic may become fatal for all human beings. However, both the metals are observed below detection limit in the ambient air samples studied.

9. Ammonia: It is also observed below detection limit in the ambient air samples studied

10. Benzene: Benzene is categorized as a known carcinogen in CEPI guidelines. It is present in all the collected samples but below standard limit in the range of 1.78 to 1.99µg/m^3.

11. Benzo(a)Pyrene : All values are observed BDL at all the locations.

4.3 Water and Waste Water Quality:

Waste water parameters are compared with general water standards by CPCB. All the ground water parameters are compared with ISO 10500:2012 standards. Parameters which are not included in ISO 10500:2012 are compared with WHO standards like BOD (6mg/L) and COD (10mg/L).

a) MIDC Chikalthana:

Waste Water:

Samples of outlet effluent from six different Industries were drawn from their Effluent Treatment Plants. The names of Industries are i) NRB Bearing Ltd. (ii) Wockhardt Ltd. L-1 (iii) M/s Lupin Ltd. (iv) Radiant Indus Chem Pvt. Ltd. (v) Exedy India Ltd. (vi) Allied Blenders & Distillers Ltd.

- Out of all six industries, in case of NRB Bearing and Radiant Indus Chem Ltd., BOD and COD are observed above standard limit.

- Except Allied Blenders & Distilleries Ltd. water samples of all other locations are found with high nitrate concentration and above standard limit too.

- Among heavy metals, lead is observed above the standard limits in 3 industrial water samples namely Wockhardt Ltd., Lupin Ltd. And Allied Blenders & distilleries Ltd.

- Bioassay test on fish shows 100 % survival in the waste water samples of 3 industries namely Wockhardt Ltd., Lupin Ltd. And Allied Blenders & distilleries Ltd.

Ground water

Three samples of Ground water from Nr. Compost yard of United Spirits Ltd, Naregaon and MHADA Colony were taken for analysis.

- Out of all 3 water samples, water sample of MHADA Colony is found to exceed the standard limit of BOD (9.56mg/L) and COD (28.42mg/L) parameters.

- Waters of Naregaon and MHADA colony also exceed the standard limit of nitrate.

- Among heavy metals, lead is observed above the standard limits in all 3 bore well water samples.

b) MIDC Waluj:

Waste water

MIDC at Waluj has maximum concentration of industries in Aurangabad District. There are more than 10 industries in the area where the total effluent generation is about 11 MLD. Large and medium scale industries are provided with ETP having primary and secondary treatment. These industries are also provided with septic tanks or STP for domestic waste water. Most of the units are bulk drugs and electroplating generating carcinogenic wastes.

In this MIDC area, 6 ETP samples were collected and analyzed for general water parameters, metals, phenols, cyanides, surface active agents.

ETP Outlet sample were taken from 1) IPCA (Paschim Chem) 2) Good year South Area 3) Sab Miller I (I) Ltd. (Pals) 4) Endurance Technology K-120 5) Varvoc Ltd L-4 and 6) Wockhardt Biotech

- BOD and COD of all the samples are observed within the standard limit, except BOD sample of Sab Miller I (I) Ltd. (Pals) (46.3mg/L).

- Except Good year South Area and Sab Miller I (I) Ltd. (Pals), water samples of all other locations are found to have nitrate concentration within the standard limit.

- All heavy metals concentration is also observed below standard limits in all the waste water samples.

- Except Sab Miller I (I) Ltd. (Pals) (70%), all other industrial water samples show 100% fish survival in Bioassay test.

Ground Water

Three water samples are taken from Ranjangao, Bharat nagar and Giriraj Society industries for the analysis of ground water.

- BOD and COD of all the samples are observed within the standard limit, except water sample of Ranjangaon.

- Except Giriraj Society water sample, both the other ground water samples are found to have nitrate concentration above the standard limit.

- Lead is exceeding the limit in all the 3 samples. However, iron is observed higher than the limit in 2 samples namely Ranjangao and Bharat nagar.

- Except Ranjangaon water sample (70%), other two ground water samples show 100% fish survival in Bioassay test

a) MIDC Shendra:

Waste Water

In this, 6 ETP outlet samples were collected and analyzed for general water parameters.

Samples were taken from following industries:

1) Glenmark Pharmaceutical Ltd.
2) Skoda Auto India Pvt. Ltd.
3) NRB Industrial Bearings Ltd.
4) Wockhardt Infrastructure Development Ltd.
5) Harman Finochem Ltd.
6) Perkins India Pvt. Ltd.

All the parameters of industries under this MIDC are observed within the standard limits.

Ground water

Ground water analysis at MIDC Shendra comprised of water samples from 3 industries namely: Wockhardt Infrastructure Development Ltd., Shendra Village and Radico Distilleries.

- Nitrate concentration is observed beyond standard limits in Wockhardt Infrastructure Development Ltd. and Shendra Village.

- Lead concentration is also found to exceed the standard limit in all the samples.

- Except Wockhardt Infrastructure Development Ltd (80%), other two ground water samples show 100% fish survival in Bioassay test.

b) MIDC Paithan Road

Waste Water

From Paithan Road industrial area, waste water samples were collected from 6 industries namely:

1) Pepsico India Ltd.

2) Ajantha Pharma
3) Frogorifico Allan Ltd.
4) Videocon India Ltd.
5) Value Industries
6) Badve Engineering

- BOD and COD of all the samples are observed within the standard limit, except BOD sample of Badve Engineering (68.35mg/L).

- Except Ajantha Pharma (90%) and Badve Engineering (70%), all other industrial water samples show 100% fish survival in Bioassay test.

Ground Water

At this MIDC, 3 water samples are collected from Frigorifico Allana Ltd. Backside, Chitegaon Jailaxmi Carting Well and Ganesh Nagar Paithan Road.

Water sample of Frigorifico Allana Ltd has exceeded the standard limit of COD concentration.

All other parameters are observed within the standard limit.

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. 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 further under this section

To overcome the subjectivity, revised concept is proposed by eliminating the subjective factors as described in the previous section, but retaining the factors which can be measured precisely.

i. Revised concept is prepared by eliminating the debatable factors but retaining the factors which can be measured precisely.

ii. It is decided to develop the Comprehensive Environmental Pollution Index (CEPI) retaining the existing algorithm of Source, Pathway and Receptor.

iii. Health component was also retained in the revised concept in line with the suggestions of Secretary, MoEFCC during the meeting held in MoEF.

Outlines of revised CEPI 2016 criteria

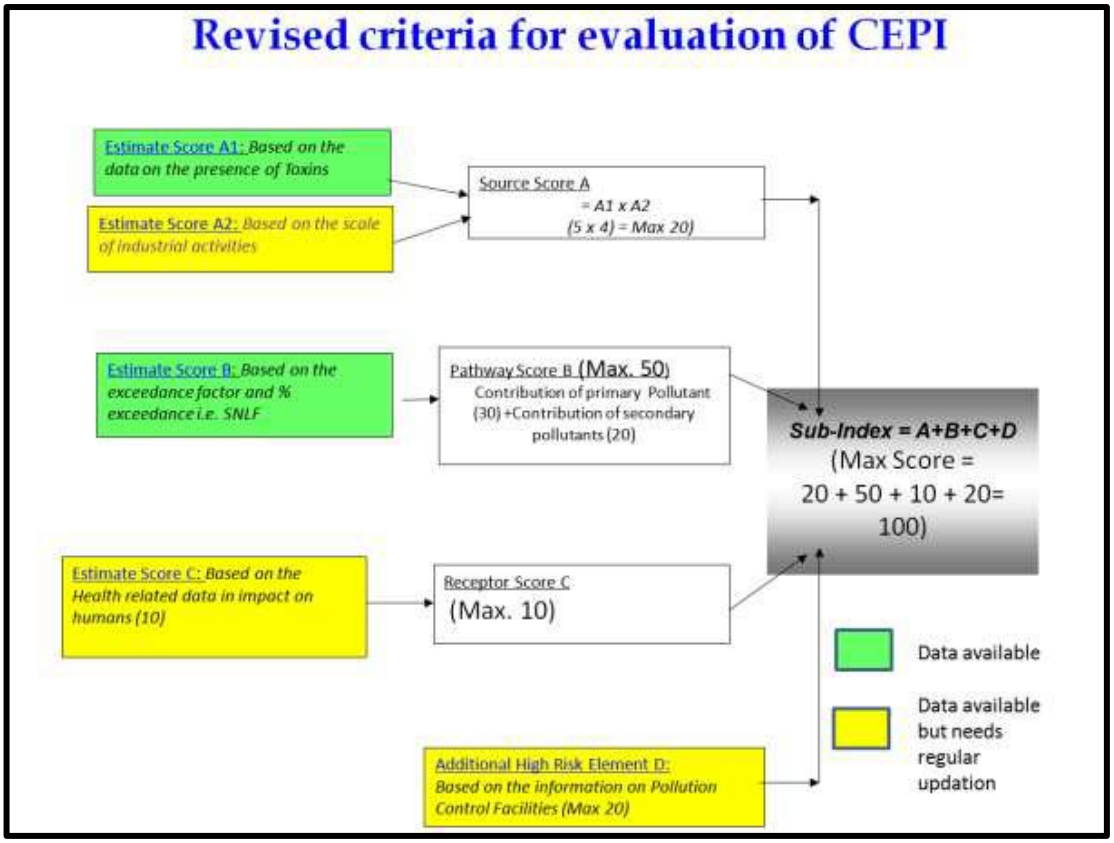
The outlines of the revised CEPI criteria are as follows:

1. It is proposed to develop the Comprehensive Environmental Pollution Index (CEPI) based on Sources of pollution, real time observed values of the pollutants in the ambient air, surface water and ground water in & around the industrial cluster and health related statistics.

2. For assessment of the environmental quality of the area i.e. CEPI score, the concept of SNLF i.e. a surrogate number which represents the level of exposure (a function of percentage sample exceedance & Exceedance Factor) shall be used.

3. Health component to be evaluated based on the health data available from major hospitals in the area was also retained in the revised concept.

4. The evaluation criterion of the revised CEPI version 2016 is described in the flowchart given below:



Here, health data collected for Receptor score C is included in **Annexure I**

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 2016 prepared by MPCB, CEPI is calculated considering all these revised standards' limiting values, list of parameters and complete scope of monitoring.

The result shows that CEPI score of present report is 64.05 which is quiet lower than the studies done by CPCB 2009 (77.43) and CEPI score 2013 (76.66). It should 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 Aurangabad 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 (64.05) of Aurangabad considering all revised standards and parameters has decreased by almost 10 points if compared with the CEPI Score of 2013 (76.66) report. This clearly indicates the successful application of STAP and LTAP of MPCB which resulted in a cleaner environment of Aurangabad in past three years.

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 (Revised CEPI 2016)	2.5	4	10	-	-	-	0	-	-	-	0	10	**20**
CEPI Score February, 2017	1	5	5	6	3	3	12	3	1	5	8	10	**35**
CEPI Score,2016	2	5	10	6	3	3	12	3	3	5	14	10	**46**
CEPI score 2013	6	5	30	6	3	3	12	3	3	5	14	10	**66**
CPCB Report 2009	5.75	5	28.75	6	3	3	12	3	3	5	14	10	**64.75**

Water

	A1	A2	A	B1	B2	B3	B	C1	C2	C3	C	D	CEPI
Present Report 2017 (Revised CEPI 2016)	3.5	4	14	-	-	-	41.5	-	-	-	0	5	**60.5**
CEPI Score February, 2017	4	5	20	8	3	3	14	3	5	5	20	5	**59**
CEPI Score,2016	1	5	10	8	3	3	14	3	5	5	20	5	**44**
CEPI score 2013	4	5	20	8	3	3	14	3	5	5	20	3	**57**
CPCB Report 2009	5.5	5	27.5	8	3	3	14	3	3	5	14	5	**60.5**

Land

	A1	A2	A	B1	B2	B3	B	C1	C2	C3	C	D	CEPI
Present Report 2017 (Revised CEPI 2016)	3.5	4	14	-	-	-	26	-	-	-	0	5	**45**
CEPI Score February, 2017	2	5	10	6	3	3	12	3	3	5	14	5	**41**
CEPI Score,2016	1	5	5	8	3	3	14	3	3	5	20	5	**44**
CEPI score 2013	4	5	20	6	3	3	12	3	5	5	20	3	**55**
CPCB Report 2009	5.5	5	27.5	7	3	3	13	3	3	5	14	5	**59.5**

Aggregated CEPI

	Air Index	Water Index	Land Index	CEPI
Present Report 2017 (Revised CEPI 2016)	20	60.5	45	**64.05**
February, 2017	35	59	41	**64.88**
CEPI Score, 2016	46	44	44	**56.45**
CEPI score 2013	66	57	57	**76.66**
CPCB Report 2009	64.75	60.5	59.5	**77.43**

6. Conclusions

The Present study has been done according to the revised CEPI Version 2016. It has been an attempt to check the characteristics and status of environment among the different industrial clusters of Aurangabad city. Revised CEPI version 2016 includes 2 major modifications in terms of evaluation of data: (1) It includes Contribution of primary as well as secondary pollutants under Factor B (Max Value 50) and (2) Exhaustive collection of health data of people residing in the vicinity of industrial clusters under study, Factor C (Max Value 10). This has changed the entire criteria of calculating CEPI as compared to the previous CEPI version and hence affected the overall CEPI score also. Being an industrial hub, the city was sampled among the industrial clusters fall into 4 different MIDCs.

The result shows that the concentration of pollutants in air, ground water and surface water is lowered down at the Industrial clusters as compared to past studies, as most of the results are observed below their standards with an exception of one or two parameters. Air sampling parameters of all the samples are observed within the permissible limits of NAAQ standards 2009. All the waste water parameters are also observed below their standards except few samples, in which BOD, Nitrate and Lead are found beyond standard limit. Similarly, ground water samples are also observed within the permissible limits except few samples, in which BOD, Nitrate and Lead are found beyond standard limit

Moreover, the lower value (64.05) of Comprehensive Environmental Pollution Index (CEPI) in the present study as compared to past few years study also reveals the fact that the environmental pollution in this city is substantially decreased over the period of times. To achieve this target, improvement in conventional practice and procedures adopted by the industries coupled with initiatives taken by Maharashtra Pollution Control Board played a major role. Although, a decrease in environmental pollution is observed, but still the city comes under severely polluted category, according to CEPI. Hence, there is lot of scope to improve the environmental quality of the city, for which continuous efforts, strategies, planning and actions are required.

	A1	**A2**	**A**	**B**	**C**	**D**	**CEPI**
Air Index	2.5	4	10	0	0	10	20
Water Index	3.5	4	14	41.5	0	5	60.5
Land Index	3.5	4	14	26	0	5	45
Aggregated CEPI							**64.055**

7. Efforts Taken For the Abatement of Pollution

The regional office of Maharashtra pollution control board has taken various initiatives in reducing the CEPI Score of 76.66 of 2013 to 64.05 of June 2017. Below mentioned are some of the efforts:

- All the large scale and medium scale industries have provided primary and secondary treatment facility for

- Treatment of the trade effluent generated. Board has persuaded large industries to adopt cleaner technologies. Following are the industries who have adopted cleaner technologies: Chrome recovery plant has been installed and operated by M/s. Metalman Industries. Metal recover plant has been provided by M/s. Endurance group of Companies and M/s. Durvoalve industry. RO system is being installed and operated by M/s. Orchid Chemicals, and M/s. Radico distillery. Multi effect evaporators are being used by M/s. Radico distillery and M/s. Pranav Agrotech distillery. Raamri, M/s Skol brewery and M/s. Foster (I) Ltd. have also provided RO system and are generating biogas from there UASB plant. M/s. Canpac industries have provided central fume extraction system and these fumes are treated by thermal oxidation system.

- Provision of tertiary treatment for industrial waste water at MIDC Waluj and provision of STP near Kham river for sale of treated water to the industries is envisaged as a project through Private Public Participation.

- Online monitoring system provided at CETP Waluj for pH and TOC It is planned to link it to MPCB and CPCB websites.

- Major industries like M/s. Orchid Chemicals and other large bulk drug industries have provided solvent recovery systems. This has lead to substantial reduction in the VOC emissions. The Board has made it mandatory for industries using coal / bagasse / biomass / briquettes as fuel to provide dust collectors and wet scrubbers to limit emissions.

- Vision 2020 is being formulated for Aurangabad city. Major concerns like sewage collection and treatment facility, municipal waste collection and treatment facility will be stressed upon. MPC Board along with the industrial associations and CETP association along with MIDC will work in co-ordination for efficient implementation of the action plan

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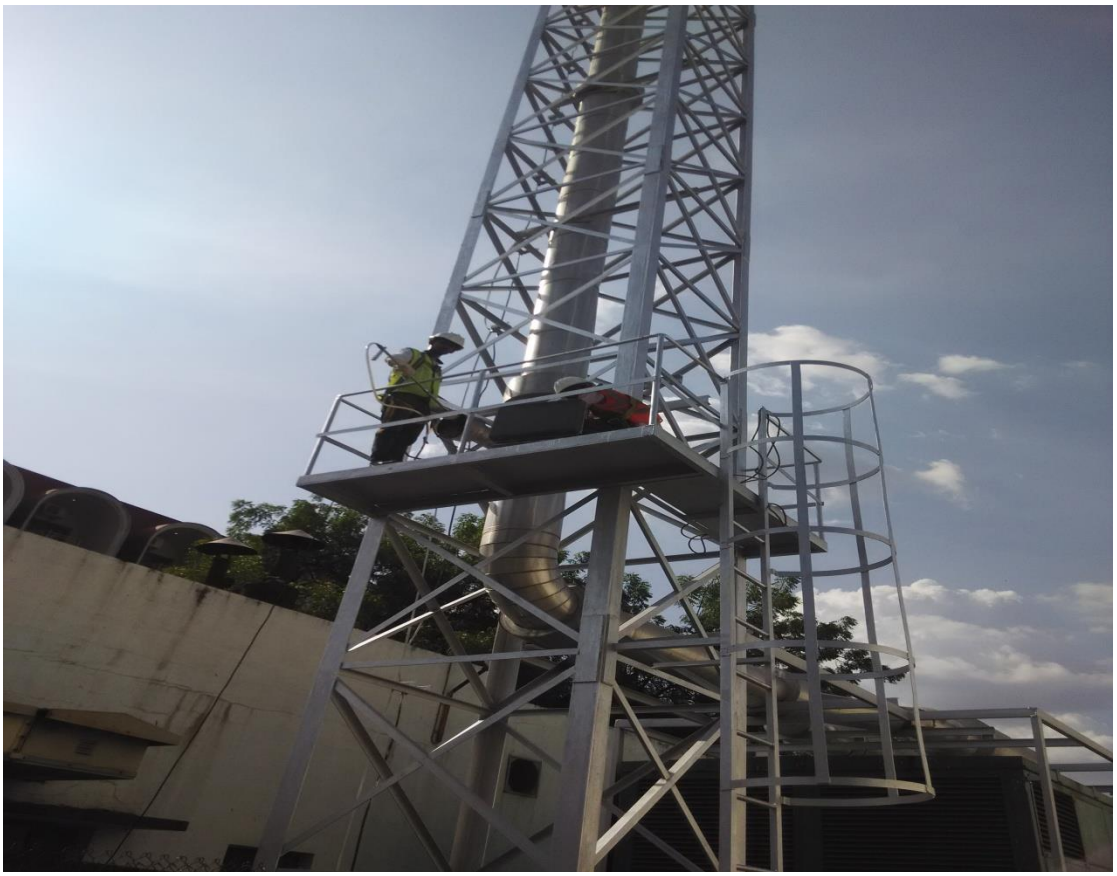
8. Photographs

Ajantha Pharma, Paithan MIDC

Wockhardt ltd L-1, Chikalthana MIDC

Jailaxmi Casting, Paithan MIDC

Lupin Ltd., Chikalthana MIDC



Allana, Paithan Road MIDC

Harman, Chikalthana

Sab Miller, MIDC Waluj

Wockhardt, MIDC Shendra

United Spirit, MIDC Chikalthana

IPCA, MIDC Waluj

Glenmark, MIDC Shendra

Exedy India Ltd., MIDC Chikalthana

Garwale Polyster, MIDC waluj

Geaves Cotton, MIDC Chikalthana

Jailakshami, MIDC Paithan Road

Metalyst Forging, MIDC Shendra

Pepscico India, MIDC Paithan Road

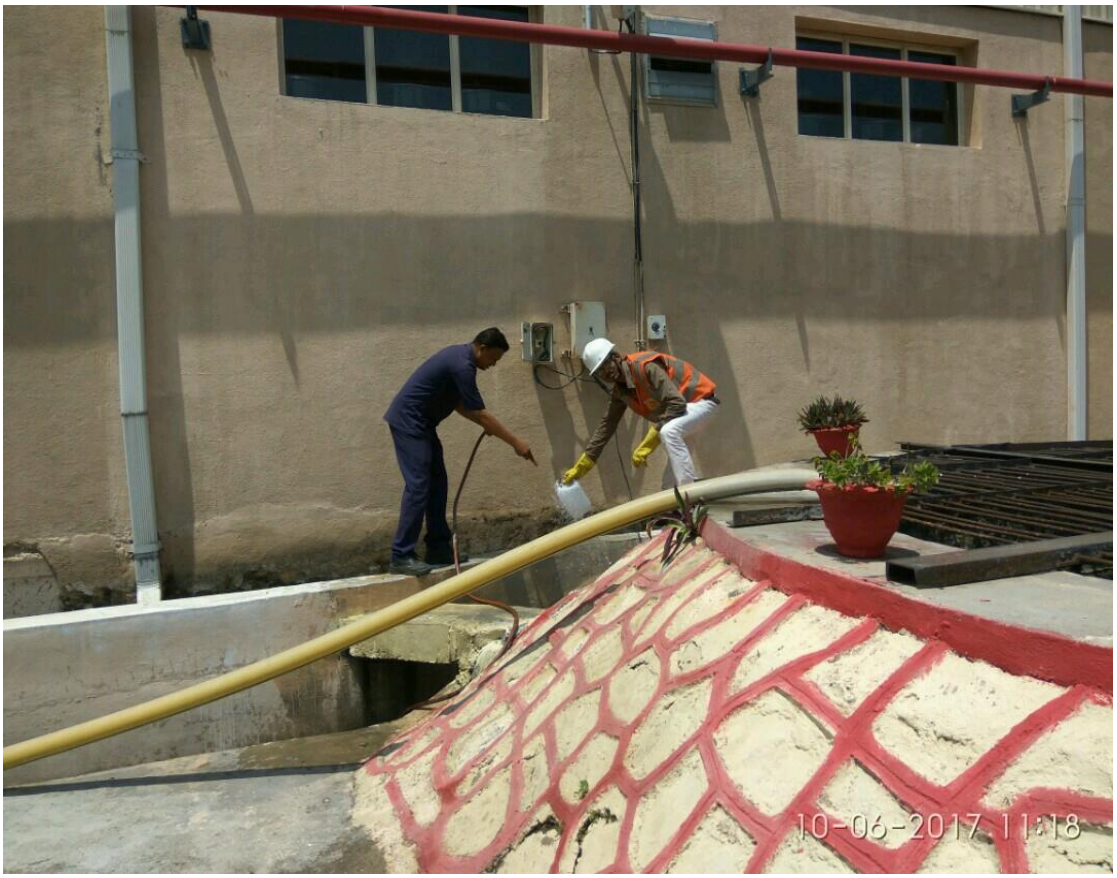
Perkins India, MIDC Paithan Road

Sterilite, MIDC Waluj

Value Industries, MIDC Paithan Road

Radico Distilleries-MIDC Shendra

Allana, paithan Road – Ground Water Monitoring



MHADA Colony, Chikalthana – Ground water Monitoring

Naregaon Hand pump, Chikalthana MIDC

Ajantha Pharma, paithan Road- Wastewater Monitoring

Videocon ltd, Paithan MIDC

NRB, Shendra – Wastewatrer Monitoring

Sab Miller, Waluj – wastewater Monitoring

Wockhardt, Shendra- Wastewater Monitoring

Wockhardt, Waluj – Wastewater Monitoringh

Perkins India, Shendra- Wastewater Monitoring

Lupin Pharma, chikalthana- Wastewater Monitoring

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:Dombivali, 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:Tarapur, November 2010,MPCB
8. Standard Methods for the Examination of Water and Waste Water, American Public Health Association, 22nd Edition, 2012.
9. IS 3025 (various parts)
10. www.mpcb.gov.in
11. www.cpcb.gov.in

10. Annexure

Annexure I Health related data in impact on humans

C: Receptor

Component C (Impact on Human Health) 10	
Main - 10	
% increase in cases	**Marks**
<5%	**0**
5-10%	**5**
>10%	**10**

- % increase is evaluated based on the total no. of cases recorded during two consecutive years.
- For Air Environment, total no. of cases related to Asthma, Bronchitis, Cancer, Acute respiratory infections etc. are to be considered.
- For surface water/ ground water Environment, cases related to Gastroenteritis, Diarrhoea, renal (kidney) malfunction, cancer etc are to be considered.
- For the above evaluation, the previous 5 years records of 3-5 major hospitals of the area shall be considered.

Attached below health data collected for the region

Annexure II: 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
13.	Sulphur Dioxide	IS 11255 (Part 2): 1985, Reaffirmed 2003	Titrimetric IPA thorine Method	5.0mg/Nm^3 0.02kg/day

Sr.	Parameters	Method References	Techniques	Detection Limit
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 III: 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 (NDIR) 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	Indophenol 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 IV: 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, 22nd Ed., 2012, 1060 B, 1-39	-	-
2.	Sampling Procedure for Microbiological Parameters	APHA, 22nd Ed., 2012,1060 B, 1-39, 9040, 9-17, and 9060B, 9-35	-	-
3.	Temperature	APHA, 22nd Ed., 2012, 2550-B, 2-69	By Thermometer	-
4.	Colour	APHA, 22nd 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, 22nd Ed., 2012, 4500-H^+- B, 4-92	By pH Meter	1
7.	Oil & Grease	APHA, 22nd 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,22nd 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, 22nd Ed., 2012, 2510- B, 2-54	By Conductivity Meter	0.1 µmho/cm
13.	Nitrite-Nitrogen	APHA, 22nd Ed., 2012, 4500-NO_2-B, 4-120	Colorimetric Method	0.006 mg/L
14.	Nitrate-Nitrogen	APHA,22nd Ed.,2012	UV	0.2 mg/L

Sr.	Parameters	Methods References	Techniques	Detection Limit
		,4500-NO_3,B-4-122	Spectrophotometer Screening Method	
15.	(NO_2 + NO_3)-Nitrogen	APHA, 22nd Ed., 2012, 4500-NO_2-B, 4-120 APHA,22nd Ed.,2012,4500-NO_3,B-4-122	Colorimetric Method UV Spectrophotometer Screening Method	0.2 mg/L
16.	Free Ammonia	APHA, 22nd 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, 22nd Ed., 2012 ,4500-CN, C & E, 4-41 & 4-43	Colorimetric Method	0.001 mg/L
19.	Fluoride (F)	APHA, 22nd Ed., 2012, 4500-F^-, D, 4-87	SPADNS Method	0.05 mg/L
20.	Sulphide (S^{2-})	APHA, 22nd Ed., 2012, 4500 –S^2 , C-4-175, F-4-178	IodometricMethod	0.08 mg/L
21.	Dissolved Phosphate (P)	APHA,22nd 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,22nd Ed., 2012 , 4500 P,E, 4-155	Ascorbic Acid Method	0.03 mg/L
24.	Total Kjeldahl Nitrogen	APHA, 22nd 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,22d Ed., 2012 , 4500 NH_3, F, 4 -115	Colorimetric Method	0.001 mg/L

Sr.	Parameters	Methods References	Techniques	Detection Limit
26.	Phenols (C_6H_5OH)	APHA,22nd Ed., 2012 , 5530- B & C, 5-44 & 5-47	Chloroform Extraction Method	0.001 mg/L
27.	Surface Active Agents	APHA,22nd Ed., 2012 , 5540-B & C,5-50	Methylene Blue Extraction Method	0.1 mg/L
28.	Organo Chlorine Pesticides	APHA, 22nd Ed., 2012,6410B,6-74	GC MS-MS Method	0.01 µg/L
29.	Polynuclear aromatic hydrocarbons (PAH)	APHA, 22nd Ed., 2012,6410B,6-74	GC MS-MS Method	0.01 µg/L
30.	Polychlorinated Biphenyls (PCB)	APHA, 22nd 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, 22ndEd., 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): 2004	ICP Method	0.05 mg/L
43.	Selenium (Se)	IS 3025(Part 2): 2004	ICP Method	0.005 mg/L

Sr.	Parameters	Methods References	Techniques	Detection Limit
44.	Boron (B)	IS 3025(Part 2): 2004	ICP Method	0.1 mg/L
45.	Total Coliforms	APHA, 22nd Ed., 2012,9221-B, 9-66	Multiple tube fermentation technique (MPN/100ml)	1.1 MPN/100ml
46.	Faecal Coliforms	APHA, 22nd 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 V: 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/m^3	Annual *	50	20	– Improved West and Gaeke – Ultraviolet fluorescence
		24 hours **	80	80	
2	Nitrogen Dioxide (NO_2) µg/m^3	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/m^3	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/m^3	Annual *	40	40	– Gravimetric – TOEM – Beta attenuation
		24 hours **	60	60	
5	Ozone (O_3) µg/m^3	8 hours **	100	100	– UV photometric – Chemiluminescence – Chemical Method
		1 hour **	180	180	
6	Lead (Pb) µg/m^3	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/m^3	8 hours **	02	02	– Non Dispersive Infra Red (NDIR) spectroscopy
		1 hour **	04	04	
8	Ammonia (NH_3) µg/m^3	Annual *	100	100	– Chemiluminescence – Indophenol blue method
		24 hours **	400	400	
9	Benzene (C_6H_6) µg/m^3	Annual *	05	05	– Gas Chromatography based continuous analyzer – Adsorption and Desorption followed by GC analysis
10	Benzo (a) Pyrene (BaP) – particulate phase only, ng/m^3	Annual *	01	01	– Solvent extraction followed by HPLC/GC analysis
11	Arsenic (As) ng/m^3	Annual *	06	06	– AAS/ICP method after sampling on EPM 2000 or equivalent filter paper.
12	Nickel (Ni) ng/m^3	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/m^3: micro-gram/m^3 i.e. 10^{-6}gm/m^3 ng/m^3 : nano-gram/m^3 i.e. 10^{-9}gm/m^3

Annexure VI: 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

Sr.	Parameter	Standards			
		Inland surface Water	**Public Sewers**	**Land for Irrigation**	**Marine Coastal Areas**
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
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	--

Sr.	Parameter	Standards			
		Inland surface Water	**Public Sewers**	**Land for Irrigation**	**Marine Coastal Areas**
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
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 VII: 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 undesirable 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

Sr.	Characteristic	Unit	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source
17.	Free residual chlorine	mg/L	Min 0.2	Min 1
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

Sr.	Characteristic	Unit	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source
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
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**			

Sr.	Characteristic	Unit	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source
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
x)	DDT (o,p&p,p — Isomers of DDT, DDE and DDD)	µg/L	1	No relaxation
xi)	Endosulfan (α,β & sulphate)	µg/L	0.4	No relaxation
xii)	Ethion	µg/L	3	No relaxation
xiii)	Gamma - HCH (Lindane)	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

Sr.	Characteristic	Unit	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source
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 VIII: 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/l or more, and ➢ Biochemical Oxygen Demand 2 mg/l or 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/l or more, and ➢ Biochemical Oxygen Demand 3 mg/l or 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/l or more, and ➢ Biochemical Oxygen Demand 3 mg/L or less
Propagation of wildlife and fisheries	D	➢ pH between 6.5 and 8.5 ➢ Dissolved Oxygen 4 mg/l or more, and ➢ Free ammonia (as N) 1.2 mg/L or 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 IX: 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 Indian 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
(vii)	Feacal Coliform, MPN/	<20 per 100 ml	<200 per 100 ml	<2000 per 100 ml

	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
(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
	Electrical Conductivity	APHA, 22nd Ed., 2012, 2510- B, 2-54	By Conductivity Meter	0.1 µmho/cm

48.	Nitrite-Nitrogen	APHA, 22nd Ed., 2012, 4500-NO_2-B, 4-120	Colorimetric Method	0.006 mg/L
49.	Nitrate-Nitrogen	APHA,22nd Ed.,2012 ,4500-NO_3,B-4-122	UV Spectrophotometer Screening Method	0.2 mg/L
50.	(NO_2 + NO_3)-Nitrogen	APHA, 22nd Ed., 2012, 4500-NO_2-B, 4-120 APHA,22nd Ed.,2012,4500-NO_3,B-4-122	Colorimetric Method UV Spectrophotometer Screening Method	0.2 mg/L
51.	Free Ammonia	APHA, 22nd Ed., 2012 , 4500 NH_3, F, 4 -115	Colorimetric Method	0.006 mg/L
52.	Total Residual Chlorine	IS 3025 (Part 26) :1986 , Reaffirmed 2009, Ed. 2.1(2004-02)	Iodometric Method	0.1 mg/L
53.	Cyanide (CN)	APHA, 22nd Ed., 2012 ,4500-CN, C & E, 4-41 & 4-43	Colorimetric Method	0.001 mg/L
54.	Fluoride (F)	APHA, 22nd Ed., 2012, 4500-F^-, D, 4-87	SPADNS Method	0.05 mg/L
55.	Sulphide (S^{2-})	APHA, 22nd Ed., 2012, 4500 –S^2 , C-4-175, F-4-178	IodometricMethod	0.08 mg/L
56.	Dissolved Phosphate (P)	APHA,22nd Ed., 2012 , 4500 P,E, 4-155	Ascorbic Acid Method	0.03 mg/L
57.	Sodium Absorption Ratio	IS11624 :1986, Reaffirmed 2006	By Calculation	0.3
58.	Total Phosphorous (P)	APHA,22nd Ed., 2012 , 4500 P,E, 4-155	Ascorbic Acid Method	0.03 mg/L
59.	Total Kjeldahl Nitrogen	APHA, 22nd Ed., 2012, 4500 NH_3, B & C, 4 -110, 4-112	Titrimetric Method	0.1 mg/L
60.	Total Ammonia (NH_4 +NH_3)-Nitrogen	APHA,22d Ed., 2012 , 4500 NH_3, F, 4 -115	Colorimetric Method	0.001 mg/L
61.	Phenols (C_6H_5OH)	APHA,22nd Ed., 2012 , 5530- B & C, 5-44 & 5-47	Chloroform Extraction Method	0.001 mg/L
62.	Surface Active Agents	APHA,22nd Ed., 2012 , 5540-B & C,5-50	Methylene Blue Extraction Method	0.1 mg/L
63.	Organo Chlorine Pesticides	APHA, 22nd Ed., 2012,6410B,6-74	GC MS-MS Method	0.01 µg/L
64.	Polynuclear aromatic hydrocarbons (PAH)	APHA, 22nd Ed., 2012,6410B,6-74	GC MS-MS Method	0.01 µg/L
65.	Polychlorinated Biphenyls (PCB)	APHA, 22nd Ed., 2012,6410B,6-74	GC MS-MS Method	0.01 µg/L
66.	Zinc (Zn)	IS 3025(Part 2): 2004	ICP Method	0.1 mg/L

67.	Nickel (Ni)	IS 3025(Part 2): 2004	ICP Method	0.05 mg/L
68.	Copper (Cu)	IS 3025(Part 2): 2004	ICP Method	0.03 mg/L
69.	Hexavalent Chromium (Cr^{6+})	APHA, 22nd Ed., 2012,3500-Cr,B,3-69	Colorimetric Method	0.02 mg/L
70.	Total Chromium (Cr)	IS 3025(Part 2): 2004	ICP Method	0.02 mg/L
71.	Total Arsenic (As)	IS 3025(Part 2): 2004	ICP Method	0.005 mg/L
72.	Lead (Pb)	IS 3025(Part 2): 2004	ICP Method	0.008 mg/L
73.	Cadmium (Cd)	IS 3025(Part 2): 2004	ICP Method	0.002 mg/L
74.	Mercury (Hg)	IS 3025(Part 2): 2004	ICP Method	0.0008 mg/L
75.	Manganese (Mn)	IS 3025(Part 2): 2004	ICP Method	0.02 mg/L
76.	Iron (Fe)	IS 3025(Part 2): 2004	ICP Method	0.06 mg/L
77.	Vanadium (V)	IS 3025(Part 2): 2004	ICP Method	0.05 mg/L
78.	Selenium (Se)	IS 3025(Part 2): 2004	ICP Method	0.005 mg/L
79.	Boron (B)	IS 3025(Part 2): 2004	ICP Method	0.1 mg/L
80.	Total Coliforms	APHA, 22nd Ed., 2012,9221-B, 9-66	Multiple tube fermentation technique (MPN/100ml)	1.1 MPN/100ml
81.	Faecal Coliforms	APHA, 22nd Ed., 2012,9221-E, 9-74	Multiple tube fermentation technique (MPN/100ml)	1.1 MPN/100ml
82.	Bioassay (Zebra Fish) Test	IS 6582, 1971, Reaffirmed 1987	Static Technique	-