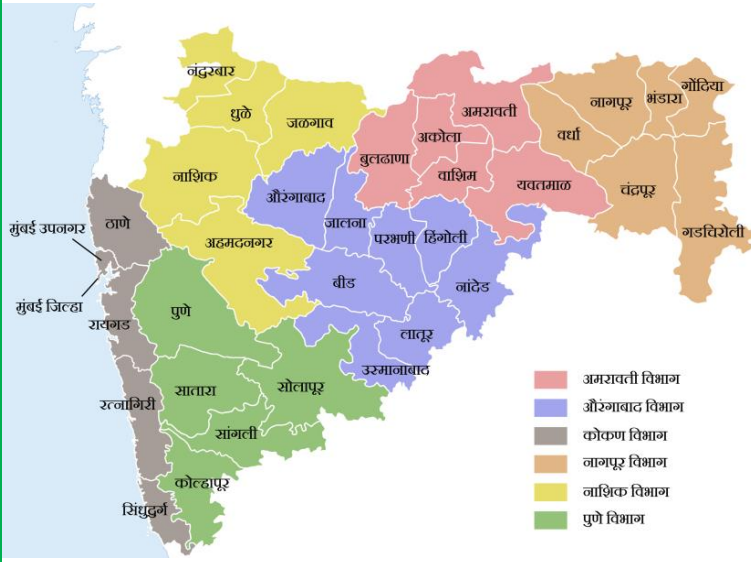
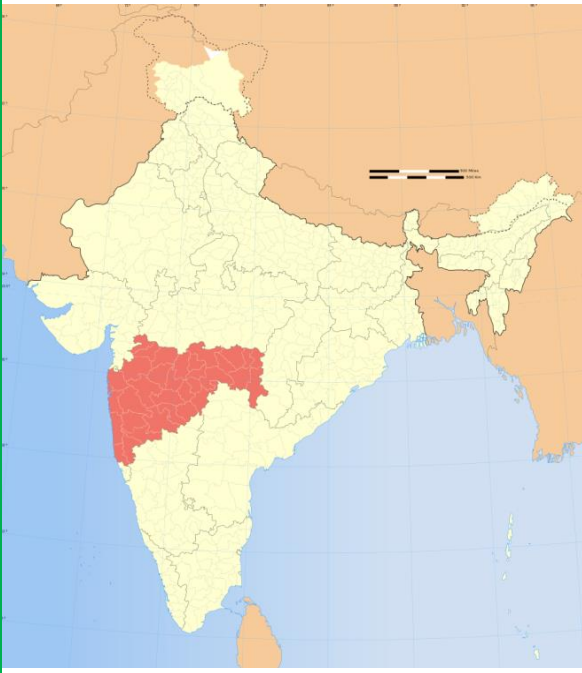


Action Plan for Industrial Cluster in Critically Polluted Areas

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

डोंबिवली Dombivali



Maharashtra Pollution Control Board

महाराष्ट्र प्रदूषण नियंत्रण मंडळ

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

Abbreviations:

APHA	American Public Health Association
BDL	Below Detection Limit
BOD	Biochemical Oxygen Demand
CEPI	Comprehensive Environmental Pollution Index
CETP	Common Effluent Treatment Plant
COD	Chemical Oxygen Demand
CPA	Critically Polluted Areas
SPA	Severely Polluted Areas
DO	Dissolved Oxygen
ETP	Effluent Treatment Plant
MIBK	Methyl Isobutyl Ketone
MPCB	Maharashtra Pollution Control Board
NAAQS	National Ambient Air Quality Standards
NO_x	Oxides of Nitrogen
ND	Not Detected
PAH	Poly Aromatic Hydrocarbons
PCB	Poly Chlorinated Biphenyls
PCT	Poly Chlorinated Terphenyls
PM₁₀	Particulate Matter (size less than 10 µm)
PM_{2.5}	Particulate Matter (size less than 2.5 µm)
SO₂	Sulphur Dioxide
STAP	Short Term Action Plan
WHO	World Health Organization

1. Introduction:

Although industries contribute significantly to India's economic growth and development, the increase in pollution of land, water, air, noise and resulting degradation of environment that they have caused, cannot be overlooked. Industries are responsible for four types of pollution: a) Air b) water c) land d) noise. Rapid industrialization carries with it the seeds of environmental damage. Pollution of natural environment not only affects people but also have adverse impact on economic growth in the long run. Analysis of pollution load shows that there are few industries in the country which contribute to more than 90percent of the pollution. Hence, scientists are exploring the quantum of pollution load as well as to devise 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.

Industrial pollution takes on many faces. It contaminates many sources of drinking water, releases unwanted toxins into the air and reduces the quality of soil all over the world. Every litre of waste water discharged by our industries pollute eight times the quantity of fresh water. The extent of pollution varies with the size of the industry, the nature of the industry, the type of products used and produced etc. 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. 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. 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. For the study, Central Pollution Control Board (CPCB) has selected a total of 88 industrial areas or clusters in consultation with the Ministry of Environment & Forests Government of India. Out of these, 5 critically polluted industrial clusters namely Tarapur, Dombivli, Navi Mumbai, Aurangabad and Chandrapur, are identified and 3 severely polluted industrial clusters namely Pimpri-chinchwad, Nashik and Chembur from Maharashtra are added into this list.

Dombivli MIDC is established in 1964 and is sub-divided in two Phases. Phase I is of approximately 148 Ha. & Phase II approximately 97 Ha. Residential Area is developed in between these two phases, having population approx. 2 lakh soles. Both Phases has a mix of industries, mainly Textile, Chemical & Engineering. Except for 10 large & 9 Medium units, most of the chemical manufacturing units are SSI. Textile Industry generates about 80% of the wastewater by volume, though low strength in terms of concentration of pollutants. CETPs are installed & operative in both phases. Phase I (DBESA) - 16 MLD for textile units and Phase II (DCETP) - 1.5 MLD for Chemical & other units.

2. Scope of Work

The Scope of Work consisted of the following:

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

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

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

- The sampling was carried out in 8 days i.e. on 19th to & 28th January 2019 for MIDC Phase-I and Phase II.
- In Dombivli MIDC Phase -I, a total of 6 Stack Monitoring Samples, 6 Ambient Air Quality Monitoring Samples, 2 Surface Water Samples, 3 Ground Water Samples and 1 VOC Samples were collected and analyzed.
- In Dombivli MIDC Phase -II, a total of 6 Stack Monitoring Samples, 8 Ambient Air Quality Monitoring Samples, 5 Surface Water Samples, 3 Ground Water Samples and 2 VOC Samples was 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 (SO₂)
2. Nitrogen Dioxide (NO₂)
3. Particulate Matter (PM₁₀)
4. Particulate Matter (PM_{2.5})
5. Ozone (O₃)
6. Lead (Pb)
7. Carbon Monoxide (CO)
8. Ammonia (NH₃)
9. Benzene (C₆H₆)
10. Benzo (a) Pyrene (BaP) (Particulate Phase Only)
11. Arsenic (As)
12. Nickel (Ni)

2.3 Water/Waste Water Parameters

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

- a. Prominent Surface Water bodies such as outfalls of CETPs, ETPs, treated effluent drainage, river, canal, ponds, lakes and other such water supply resources flowing through the area or flowing adjoining the CPA.
- b. Ground Water Quality data of prominent ground water resources such as observation wells of Central Ground Water Board, drinking water wells, hand pumps, bore wells, hand pumps, bore wells and other such water supply resources located in the industrial cluster/area under consideration or in the peripheral areas.

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

i. Simple Parameters:

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

ii. Regular Monitoring Parameters:

7. pH
8. Oil & Grease
9. Suspended Solids
10. Dissolved Oxygen (% saturation) (Not applicable for ground waters)
11. Chemical Oxygen Demand
12. Biochemical Oxygen Demand
13. Electrical Conductivity
14. Nitrite-Nitrogen
15. Nitrate-Nitrogen
16. (NO₂ + NO₃)-Nitrogen
17. Free Ammonia
18. Total Residual Chlorine
19. Cyanide
20. Fluoride
21. Sulphide

22. Dissolved Phosphate
23. Sodium Absorption Ratio (SAR)
24. Total Coliforms (MPN/100 ml)
25. Faecal Coliforms (MPN/100 ml)

iii. Special Parameters:

26. Total Phosphorous
27. Total Kjeldahl Nitrogen(TKN)
28. Total Ammonia ($\text{NH}_4 + \text{NH}_3$)-Nitrogen
29. Phenols
30. Surface Active Agents
31. Organo Chlorine Pesticides
32. Polynuclear aromatic hydrocarbons (PAH)
33. Polychlorinated Biphenyls (PCB)and Polychlorinated Terphenyls (PCT)
34. Zinc
35. Nickel
36. Copper
37. Hexavalent Chromium
38. Chromium (Total)
39. Arsenic (Total)
40. Lead
41. Cadmium
42. Mercury
43. Manganese
44. Iron

45. Vanadium

46. Selenium

47. Boron

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

2.4 Methodology followed in Sampling and Analysis

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

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

3. Result of Analysis:

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

***Kindly note:**

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

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

3.1 Stack Emission:

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

Sr.	Name of Industry	Stack Identity	Phase	Table No.
1.	Shrijee Lifestyle Pvt. Ltd.	Boiler	Phase I	I
2.	Tirupati Textile Mills	Boiler	Phase I	I
3.	Auchtel Products Ltd.	Boiler	Phase I	I
4.	Ulangil Brother	Boiler	Phase I	II

Sr.	Name of Industry	Stack Identity	Phase	Table No.
5.	Gharda Chemical Ltd.	Boiler	Phase I	II
6.	Evonik Catalysts India Pvt. Ltd.	Boiler	Phase I	II
7.	Navjeevan Synthethics Pvt. Ltd.	Boiler	Phase II	III
8.	Ridham Synthetic Pvt. Ltd.	Boiler	Phase II	III
9.	Aarti Industries Ltd.	Boiler	Phase II	III
10.	Ganesh Chemical	Boiler	Phase II	IV
11.	Sunil Industries Ltd.	Boiler	Phase II	IV
12.	Indo Amines Ltd.	Boiler	Phase II	IV

Table No. I

Name of Industry			Shrijee Lifestyle Pvt. Ltd.	Tirupati Textile Mills	Auchtel Products Ltd.
Date of Sampling			19.01.2019	19.01.2019	21.01.2019
Sr.	Parameter	Unit	Results		
1.	Particulate Matter (as PM)	mg/Nm ³	38	50	55
	Std. Limit	mg/Nm³	150	150	150
2.	Sulphur Dioxide (as SO ₂)	mg/Nm ³	5.92	68.1	12.3
		kg/day	0.042	21.08	2.18
	Std. Limit	mg/Nm³	100	100	100
3.	Nitrogen Dioxide (NO ₂)	mg/Nm ³	13.3	13.1	13
	Std. Limit	mg/Nm³	50	50	50

Table No. II

Name of Industry			Ulangil Brother	Gharda Chemical Ltd.	Evonik Catalysts India Pvt. Ltd.
Date of Sampling			21.01.2019	21.01.2019	22.01.2019
Sr.	Parameter	Unit	Results		
1.	Particulate Matter (as PM)	mg/Nm ³	18	BDL	40
	Std. Limit	mg/Nm³	150	150	50
2.	Sulphur Dioxide (as SO ₂)	mg/Nm ³	14.8	11.8	14.8
		kg/day	1.51	10.7	2.39
	Std. Limit	mg/Nm³	100	100	200
3.	Nitrogen Dioxide (NO ₂)	mg/Nm ³	16.3	13.2	26.1
	Std. Limit	mg/Nm³	50	50	50

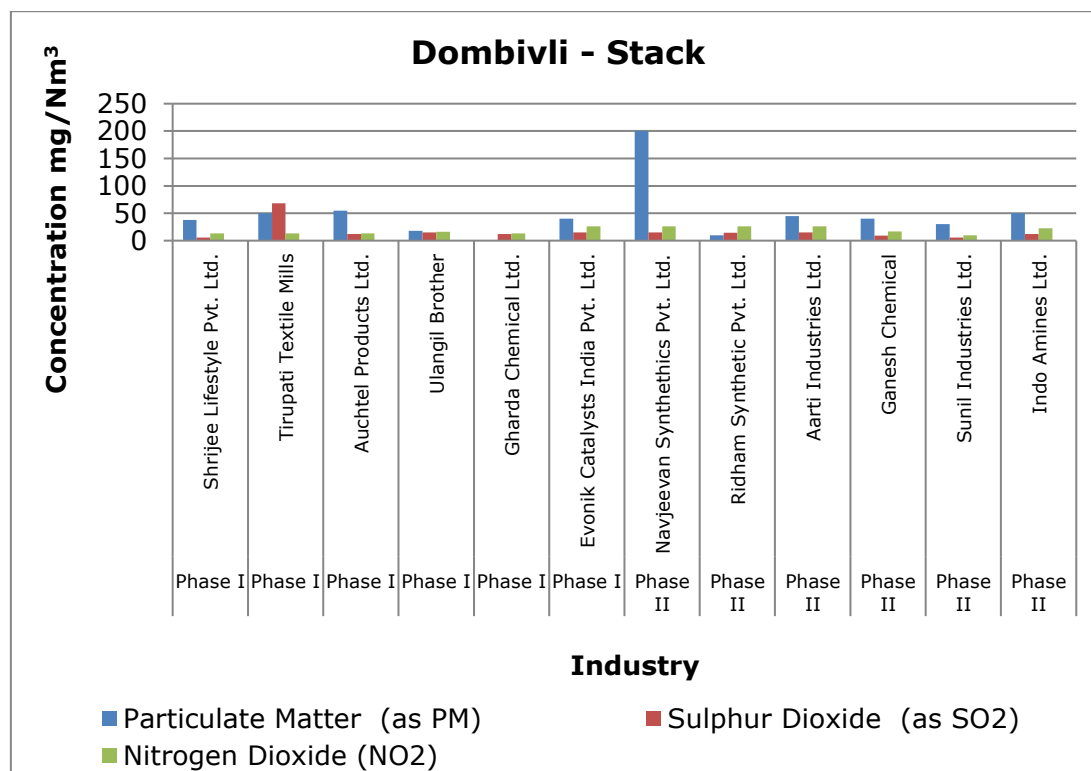
Table No. III

Name of Industry			Navjeevan Synthetics Pvt. Ltd.	Ridham Synthetic Pvt. Ltd.	Aarti Industries Ltd.
Date of Sampling			24.01.2019	24.01.2019	24.01.2019
Sr.	Parameter	Unit	Results		
1.	Particulate Matter (as PM)	mg/Nm ³	200	10	45
	Std. Limit	mg/Nm³	150	150	50
2.	Sulphur Dioxide (as SO ₂)	mg/Nm ³	14.8	14.2	14.8
		kg/day	0.925	12.5	1.53
	Std. Limit	mg/Nm³	100	100	100
3.	Nitrogen Dioxide (NO ₂)	mg/Nm ³	26.1	26.1	26.1
	Std. Limit	mg/Nm³	50	50	50

Table No. IV

Name of Industry			Ganesh Chemical	Sunil Industries Ltd.	Indo Amines Ltd.
Date of Sampling			23.01.2019	23.01.2019	22.01.2019
Sr.	Parameter	Unit	Results		
1.	Particulate Matter (as PM)	mg/Nm ³	40	30	50
	Std. Limit	mg/Nm³	150	150	50
2.	Sulphur Dioxide (as SO ₂)	mg/Nm ³	8.88	5.93	11.8
		kg/day	1.59	2.77	0.811
	Std. Limit	mg/Nm³	100	100	100
3.	Nitrogen Dioxide (NO ₂)	mg/Nm ³	16.5	9.90	22.8
	Std. Limit	mg/Nm³	50	50	50

Graphs: Stack Monitoring for Dombivli MIDC:



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 V**).

Sr.	Location	Location detail	Phase	Table No.
1.	MIDC	Near Plant area	Phase I	I
2.	Zenith industrial Rubber Product Pvt. Ltd.	Near Plant area	Phase I	I
3.	BKT C-21, Behind vico laboratory	Near Plant area	Phase I	I
4.	Kalyan Ambernath Manufacture Association (KAMA Office)	Near office Gate	Phase I	II
5.	MIDC office	Near MIDC	Phase I	II
6.	CETP MIDC Phase II	Near Plant	Phase II	II
7.	MIDC Sump Near W226	Near Office	Phase II	III
8.	Suvishrhu Speciality Chemicals Pvt. Ltd.	Near Main Gate	Phase II	III
9.	SWC A & T Plot No. P-14	Near Plant	Phase II	III
10.	Navjeevan (Parag) Synthetics Pvt Ltd.	Near Main Gate	Phase II	IV
11.	BRW Engineer Plot No. FE-10	Near Plant	Phase II	IV
12.	Gharda Chemical Ltd.	Near Plant	Phase I	V
13.	Aarti Industries Ltd.	Near Plant	Phase II	V
14.	Indo Amines Ltd.	Near Plant	Phase II	V

*** The VOC result of ambient air emission is provided in Table No. V**

Table No. I

Location				MIDC	Zenith industrial Rubber Product Pvt. Ltd.	BKT C-21
Date of Sampling				19.01.2019	19.01.2019	21.01.2019
Sr.	Parameters	Unit	Std. Limit (NAAQS 2009)	Results		
1.	Sulphur Dioxide (SO ₂)	µg/m ³	80	6.46	7.04	8.87
2.	Nitrogen Dioxide (NO ₂)	µg/m ³	80	8.69	9.19	10.45
3.	Particulate Matter (size less than 10 µm) or PM ₁₀	µg/m ³	100	236	412	467
4.	Particulate Matter (size less than 2.5 µm) or PM _{2.5}	µg/m ³	60	55	100	114
5.	Ozone (O ₃)	µg/m ³	180	BDL	BDL	BDL
6.	Lead (Pb)	µg/m ³	1	BDL	BDL	BDL
7.	Carbon Monoxide (CO)	mg/m ³	4	2.18	2.05	4.4
8.	Ammonia (NH ₃)	µg/m ³	400	BDL	BDL	BDL
9.	Benzene (C ₆ H ₆)	µg/m ³	5	8.47	8.46	BDL
10.	Benzo (a) Pyrene (BaP) – particulate phase only	ng/m ³	1	BDL	BDL	BDL
11.	Arsenic (As)	ng/m ³	6	BDL	BDL	BDL
12.	Nickel (Ni)	ng/m ³	20	BDL	BDL	BDL

Table No. II

Location				KAMA Office	MIDC office	CETP MIDC
Date of Sampling				21.01.2019	28.01.2019	22.01.2019
Sr.	Parameters	Unit	Std. Limit (NAAQS 2009)	Results		
1.	Sulphur Dioxide (SO ₂)	µg/m ³	80	8.71	6.28	8.19
2.	Nitrogen Dioxide (NO ₂)	µg/m ³	80	9.93	8.45	9.44
3.	Particulate Matter (size less than 10 µm) or PM ₁₀	µg/m ³	100	107	220	229
4.	Particulate Matter (size less than 2.5 µm) or PM _{2.5}	µg/m ³	60	24	45	55
5.	Ozone (O ₃)	µg/m ³	180	BDL	BDL	BDL
6.	Lead (Pb)	µg/m ³	1	BDL	BDL	BDL
7.	Carbon Monoxide (CO)	mg/m ³	4	4.29	1.74	3.98
8.	Ammonia (NH ₃)	µg/m ³	400	BDL	BDL	BDL
9.	Benzene (C ₆ H ₆)	µg/m ³	5	6.94	BDL	BDL
10.	Benzo (a) Pyrene (BaP) – particulate phase only	ng/m ³	1	BDL	BDL	BDL
11.	Arsenic (As)	ng/m ³	6	BDL	BDL	BDL
12.	Nickel (Ni)	ng/m ³	20	BDL	BDL	BDL

Table No. III

Location				MIDC Sump	Suvishrhu Speciality Chemicals Pvt. Ltd.	SWC A & T
Date of Sampling				22.01.2019	23.01.2019	23.01.2019
Sr.	Parameters	Unit	Std. Limit (NAAQS 2009)	Results		
1.	Sulphur Dioxide (SO ₂)	µg/m ³	80	7.78	6.42	6.44
2.	Nitrogen Dioxide (NO ₂)	µg/m ³	80	8.94	10.9	8.45
3.	Particulate Matter (size less than 10 µm) or PM ₁₀	µg/m ³	100	97	166	112
4.	Particulate Matter (size less than 2.5 µm) or PM _{2.5}	µg/m ³	60	22	39	26
5.	Ozone (O ₃)	µg/m ³	180	BDL	BDL	BDL
6.	Lead (Pb)	µg/m ³	1	BDL	BDL	BDL
7.	Carbon Monoxide (CO)	mg/m ³	4	3.98	2.91	3.16
8.	Ammonia (NH ₃)	µg/m ³	400	BDL	BDL	BDL
9.	Benzene (C ₆ H ₆)	µg/m ³	5	BDL	7.6	7.89
10.	Benzo (a) Pyrene (BaP) – particulate phase only	ng/m ³	1	BDL	BDL	BDL
11.	Arsenic (As)	ng/m ³	6	BDL	BDL	BDL
12.	Nickel (Ni)	ng/m ³	20	BDL	BDL	BDL

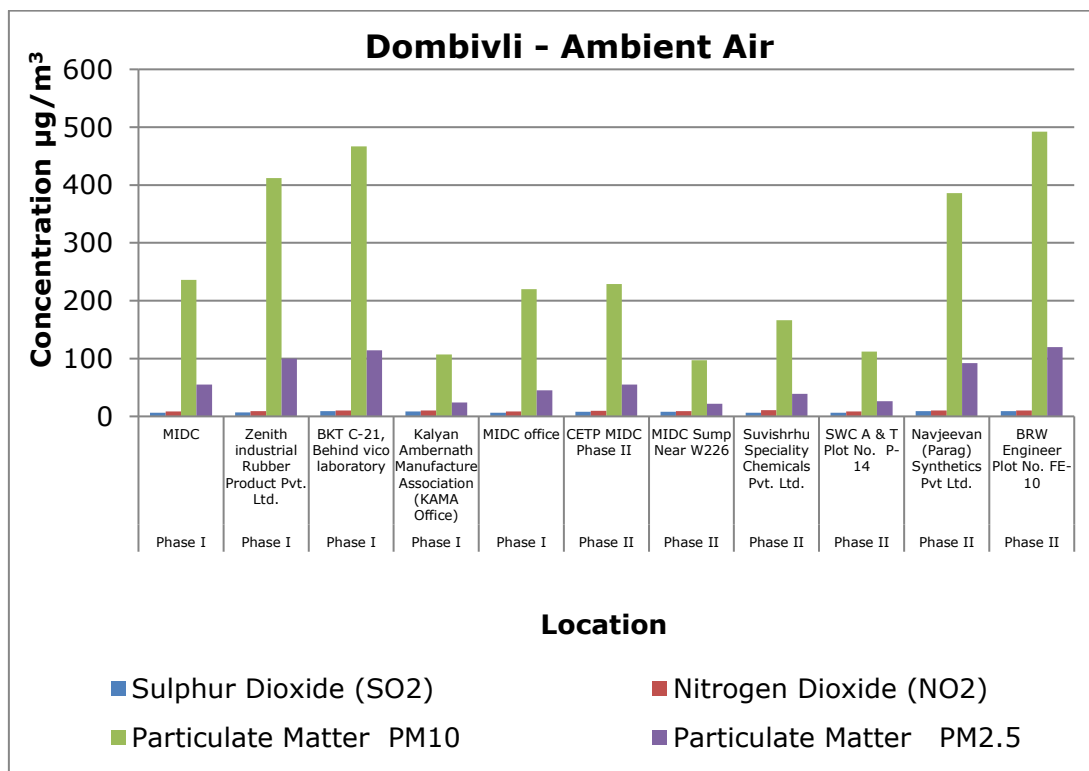
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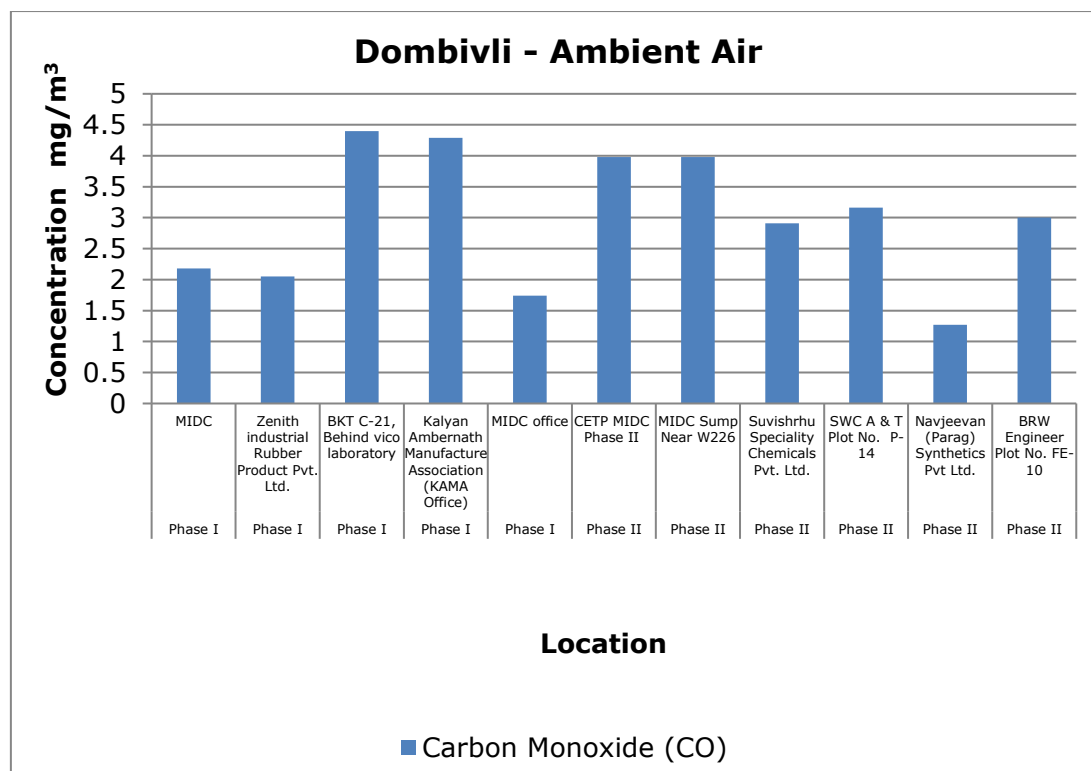
Location				Navjeevan (Parag) Synthetics Pvt Ltd.	BRW Engineer
Date of Sampling				24.01.2019	24.01.2019
Sr.	Parameters	Unit	Std. Limit (NAAQS 2009)	Results	
1.	Sulphur Dioxide (SO ₂)	µg/m ³	80	8.82	9.05
2.	Nitrogen Dioxide (NO ₂)	µg/m ³	80	9.92	10.1
3.	Particulate Matter (size less than 10 µm) or PM ₁₀	µg/m ³	100	386	492
4.	Particulate Matter (size less than 2.5 µm) or PM _{2.5}	µg/m ³	60	92	120
5.	Ozone (O ₃)	µg/m ³	180	BDL	BDL
6.	Lead (Pb)	µg/m ³	1	BDL	BDL
7.	Carbon Monoxide (CO)	mg/m ³	4	1.27	3
8.	Ammonia (NH ₃)	µg/m ³	400	BDL	BDL
9.	Benzene (C ₆ H ₆)	µg/m ³	5	BDL	BDL
10.	Benzo (a) Pyrene (BaP) – particulate phase only	ng/m ³	1	BDL	BDL
11.	Arsenic (As)	ng/m ³	6	BDL	BDL
12.	Nickel (Ni)	ng/m ³	20	BDL	BDL

Table No. V

Name of Industry			Gharda Chemical Ltd.	Aarti Industries Ltd.	Indo Amines Ltd.
Date of Sampling			23.01.2019	24.01.2019	24.01.2019
Sr.	Parameter	Unit	Results		
1.	VOC				
I.	Methyl Isobutyl Ketone	mg/Nm ³	ND	ND	ND
II.	Benzene	mg/Nm ³	ND	ND	ND
III.	Toulene	mg/Nm ³	ND	ND	ND
IV.	Xylene	mg/Nm ³	ND	ND	ND
V.	Ethyl Benzene	mg/Nm ³	ND	ND	ND
VI.	Ethyl Acetate	mg/Nm ³	ND	ND	ND

Graphs: Ambient Air Quality Monitoring for Dombivli MIDC:





3.3 Surface Water/ Waste Water Quality:

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

Sr.	Location	Source	Phase	Table No.
1.	CETP	CETP Outlet	Phase I	I
2.	Khambal Pada	Surface Water	Phase I	I
3.	CETP	CETP Outlet	Phase II	I
4.	Gandinagar Nala	Nallah Water	Phase II	II
5.	Nala Jarimary Talav	Nallah Water	Phase II	II
6.	Vitthalwadi	Nallah Water	Phase II	II
7.	Chinchpada	Nallah Water	Phase II	III

Table No. I

Location				CETP Phase I	Khambal Pada	CETP Phase II
Date of Sampling				26.01.2019	26.01.2019	26.01.2019
Sr.	Parameters	Unit	Std. Limit	Results		
1.	Colour	Hazen		4	5	5
2.	Smell	-	Agreeable	Disagreeable	Disagreeable	Disagreeable
3.	pH	-	5.5 -9.0	6.86	7.07	7.59
4.	Oil & Grease	mg/L	10.0	BDL	BDL	BDL
5.	Suspended Solids	mg/L	100.0	20	42	28
6.	Dissolved Oxygen (%Saturation)	%		37	0	23
7.	Chemical Oxygen Demand	mg/L	250.0	100	100	100
8.	Biochemical Oxygen Demand (3 days, 27°C)	mg/L	30.0	34	32	33
9.	Electrical Conductivity (at 25°C)	µmhos/cm		3980	837	3520
10.	Nitrite Nitrogen (as NO ₂)	mg/L		BDL	BDL	0.21
11.	Nitrate Nitrogen (as NO ₃)	mg/L	10.0	5.30	17.2	5.54
12.	(NO ₂ + NO ₃)-Nitrogen	mg/L		5.30	17.2	5.75
13.	Free Ammonia (as NH ₃ -N)	mg/L	5.0	BDL	BDL	BDL
14.	Total Residual Chlorine	mg/L	1.0	BDL	BDL	BDL
15.	Cyanide (as CN)	mg/L	0.2	BDL	BDL	BDL
16.	Fluoride (as F)	mg/L	2.0	1.4	1.08	0.64

Location				CETP Phase I	Khambal Pada	CETP Phase II
Date of Sampling				26.01.2019	26.01.2019	26.01.2019
Sr.	Parameters	Unit	Std. Limit	Results		
17.	Sulphide (as S ²⁻)	mg/L	2.0	0.24	BDL	BDL
18.	Dissolved Phosphate (as P)	mg/L	5.0	1.1	1.8	0.62
19.	Sodium Absorption Ratio			7.45	2.03	7.38
20.	Total Coliforms	MPN index /100 mL	100.0	280	170	170
21.	Faecal Coliforms	MPN index /100 mL	1000.0	13	11	20
22.	Total Phosphate (as P)	mg/L		0.58	0.76	1.12
23.	Total Kjeldahl Nitrogen	mg/L	100.0	89.6	16.1	24.1
24.	Total Ammonia (NH ₄ +NH ₃)-Nitrogen	mg/L	50	2.38	2	2.37
25.	Phenols (as C ₆ H ₅ OH)	mg/L	1.0	BDL	BDL	BDL
26.	Surface Active Agents (as MBAS)	mg/L		BDL	BDL	BDL
27.	Organo Chlorine Pesticides					
I.	Alachlor	µg/L	2.0	BDL	BDL	BDL
II.	Atrazine	µg/L	0.2	BDL	BDL	BDL
III.	Aldrin	µg/L	0.1	BDL	BDL	BDL
IV.	Dieldrin	µg/L	2.0	BDL	BDL	BDL
V.	Alpha HCH	µg/L	0.01	BDL	BDL	BDL
VI.	Beta HCH	µg/L	2.0	BDL	BDL	BDL

Location				CETP Phase I	Khambal Pada	CETP Phase II
Date of Sampling				26.01.2019	26.01.2019	26.01.2019
Sr.	Parameters	Unit	Std. Limit	Results		
VII.	Chlorpyriphos	µg/L	3.0	BDL	BDL	BDL
VIII.	Butachlor	µg/L		BDL	BDL	BDL
IX.	Delta HCH	µg/L	0.2	BDL	BDL	BDL
X.	p,p DDT	µg/L	0.05	BDL	BDL	BDL
XI.	o,p DDT	µg/L	100.0	BDL	BDL	BDL
XII.	p,p DDE	µg/L	250.0	BDL	BDL	BDL
XIII.	o,p DDE	µg/L	30.0	BDL	BDL	BDL
XIV.	p,p DDD	µg/L		BDL	BDL	BDL
XV.	o,p DDD	µg/L		BDL	BDL	BDL
XVI.	Alpha Endosulfan	µg/L	10.0	BDL	BDL	BDL
XVII.	Beta Endosulfan	µg/L		BDL	BDL	BDL
XVIII.	Endosulfan Sulphate	µg/L	5.0	BDL	BDL	BDL
XIX.	Y HCH (Lindane)	µg/L	1.0	BDL	BDL	BDL
28.	Polynuclear aromatic hydrocarbons (as PAH)	mg/L	0.2	0.003	0.004	0.004
29.	Polychlorinated Biphenyls (PCB)	mg/L	2.0	BDL	BDL	BDL
30.	Zinc (as Zn)	mg/L	5.0	BDL	BDL	0.069
31.	Nickel (as Ni)	mg/L	3.0	0.037	0.02	0.029
32.	Copper (as Cu)	mg/L	3.0	BDL	BDL	BDL
33.	Hexavalent Chromium (as Cr ⁶⁺)	mg/L	0.1	BDL	BDL	BDL
34.	Total Chromium (as Cr)	mg/L	2.0	0.122	0.143	0.335

Location				CETP Phase I	Khambal Pada	CETP Phase II
Date of Sampling				26.01.2019	26.01.2019	26.01.2019
Sr.	Parameters	Unit	Std. Limit	Results		
35.	Total Arsenic (as As)	mg/L	0.2	BDL	BDL	BDL
36.	Lead (as Pb)	mg/L	0.1	BDL	0.022	BDL
37.	Cadmium (as Cd)	mg/L	2.0	BDL	BDL	BDL
38.	Mercury (as Hg)	mg/L	0.01	BDL	BDL	BDL
39.	Manganese (as Mn)	mg/L	2.0	0.190	0.318	0.079
40.	Iron (as Fe)	mg/L	3.0	BDL	1.15	BDL
41.	Vanadium (as V)	mg/L	0.2	BDL	BDL	BDL
42.	Selenium (as Se)	mg/L	0.05	BDL	BDL	BDL
43.	Boron (as B)	mg/L		0.202	BDL	0.993
44.	Bioassay Test on fish	% survival	90% survival of fish after 96 hours in 100% effluent	0	0	0

Table No. II

Location				Gandinagar Nala	Nala Jarimary Talav	Vitthalwadi
Date of Sampling				26.01.2019	26.01.2019	26.01.2019
Sr.	Parameters	Unit	Std. Limit	Results		
1.	Colour	Hazen		5	2	4
2.	Smell	-	Agreeable	Disagreeable	Disagreeable	Disagreeable
3.	pH	-	5.5 -9.0	7	7.35	7.10

Location				Gandinagar Nala	Nala Jarimary Talav	Vitthalwadi
Date of Sampling				26.01.2019	26.01.2019	26.01.2019
Sr.	Parameters	Unit	Std. Limit	Results		
4.	Oil & Grease	mg/L	10.0	BDL	BDL	BDL
5.	Suspended Solids	mg/L	100.0	128	22	36
6.	Dissolved Oxygen (%Saturation)	%		0	64	0
7.	Biochemical Oxygen Demand (3 days, 27°C)	mg/L	30.0	34	3	55
8.	Chemical Oxygen Demand	mg/L	250.0	100	10	160
9.	Electrical Conductivity (at 25°C)	µmhos/cm		833	1069	810
10.	Nitrite Nitrogen (as NO ₂)	mg/L		BDL	BDL	BDL
11.	Nitrate Nitrogen (as NO ₃)	mg/L	10.0	3.387	1.2	12.2
12.	(NO ₂ + NO ₃)-Nitrogen	mg/L		3.87	1.2	12.2
13.	Free Ammonia (as NH ₃ -N)	mg/L	5.0	BDL	BDL	BDL
14.	Total Residual Chlorine	mg/L	1.0	BDL	BDL	BDL
15.	Cyanide (as CN)	mg/L	0.2	BDL	BDL	BDL
16.	Fluoride (as F)	mg/L	2.0	1.66	1.55	1.27
17.	Sulphide (as S ²⁻)	mg/L	2.0	0.30	BDL	0.15
18.	Dissolved Phosphate (as P)	mg/L	5.0	0.8	0.52	1.4
19.	Sodium Absorption Ratio			1.8	1.2	1.51

Location				Gandinagar Nala	Nala Jarimary Talav	Vitthalwadi
Date of Sampling				26.01.2019	26.01.2019	26.01.2019
Sr.	Parameters	Unit	Std. Limit	Results		
20.	Total Coliforms	MPN index /100 mL	100.0	170	280	280
21.	Faecal Coliforms	MPN index /100 mL	1000.0	14	13	20
22.	Total Phosphate (as P)	mg/L		1.7	1.04	1.9
23.	Total Kjeldahl Nitrogen	mg/L	100.0	21.1	1.57	358
24.	Total Ammonia (NH ₄ +NH ₃)-Nitrogen	mg/L	50	2.34	1.07	2.4
25.	Phenols (as C ₆ H ₅ OH)	mg/L	1.0	BDL	BDL	BDL
26.	Surface Active Agents (as MBAS)	mg/L		BDL	BDL	BDL
27.	Organo Chlorine Pesticides					
I.	Alachlor	µg/L	2.0	BDL	BDL	BDL
II.	Atrazine	µg/L	0.2	BDL	BDL	BDL
III.	Aldrin	µg/L	0.1	BDL	BDL	BDL
IV.	Dieldrin	µg/L	2.0	BDL	BDL	BDL
V.	Alpha HCH	µg/L	0.01	BDL	BDL	BDL
VI.	Beta HCH	µg/L	2.0	BDL	BDL	BDL
VII.	Chlorpyrifos	µg/L	3.0	BDL	BDL	BDL
VIII.	Butachlor	µg/L		BDL	BDL	BDL
IX.	Delta HCH	µg/L	0.2	BDL	BDL	BDL

Location				Gandinagar Nala	Nala Jarimary Talav	Vitthalwadi
Date of Sampling				26.01.2019	26.01.2019	26.01.2019
Sr.	Parameters	Unit	Std. Limit	Results		
X.	p,p DDT	µg/L	0.05	BDL	BDL	BDL
XI.	o,p DDT	µg/L	100.0	BDL	BDL	BDL
XII.	p,p DDE	µg/L	250.0	BDL	BDL	BDL
XIII.	o,p DDE	µg/L	30.0	BDL	BDL	BDL
XIV.	p,p DDD	µg/L		BDL	BDL	BDL
XV.	o,p DDD	µg/L		BDL	BDL	BDL
XVI.	Alpha Endosulfan	µg/L	10.0	BDL	BDL	BDL
XVII.	Beta Endosulfan	µg/L		BDL	BDL	BDL
XVIII.	Endosulfan Sulphate	µg/L	5.0	BDL	BDL	BDL
XIX.	Y HCH (Lindane)	µg/L	1.0	BDL	BDL	BDL
28.	Polynuclear aromatic hydrocarbons (as PAH)	mg/L	0.2	0.001	BDL	0.006
29.	Polychlorinated Biphenyls (PCB)	mg/L	2.0	BDL	BDL	BDL
30.	Zinc (as Zn)	mg/L	5.0	BDL	BDL	BDL
31.	Nickel (as Ni)	mg/L	3.0	0.018	0.012	0.013
32.	Copper (as Cu)	mg/L	3.0	BDL	BDL	BDL
33.	Hexavalent Chromium (as Cr ⁶⁺)	mg/L	0.1	BDL	BDL	BDL
34.	Total Chromium (as Cr)	mg/L	2.0	0.066	0.061	<0.02
35.	Total Arsenic (as As)	mg/L	0.2	BDL	BDL	BDL
36.	Lead (as Pb)	mg/L	0.1	BDL	0.04	BDL

Location				Gandinagar Nala	Nala Jarimary Talav	Vitthalwadi
Date of Sampling				26.01.2019	26.01.2019	26.01.2019
Sr.	Parameters	Unit	Std. Limit	Results		
37.	Cadmium (as Cd)	mg/L	2.0	BDL	BDL	BDL
38.	Mercury (as Hg)	mg/L	0.01	BDL	BDL	BDL
39.	Manganese (as Mn)	mg/L	2.0	0.375	0.046	0.430
40.	Iron (as Fe)	mg/L	3.0	BDL	BDL	BDL
41.	Vanadium (as V)	mg/L	0.2	BDL	BDL	BDL
42.	Selenium (as Se)	mg/L	0.05	BDL	BDL	BDL
43.	Boron (as B)	mg/L		BDL	2.74	0.106
44.	Bioassay Test on fish	% survival	90% survival of fish after 96 hours in 100% effluent	80	0	0

Table No. III

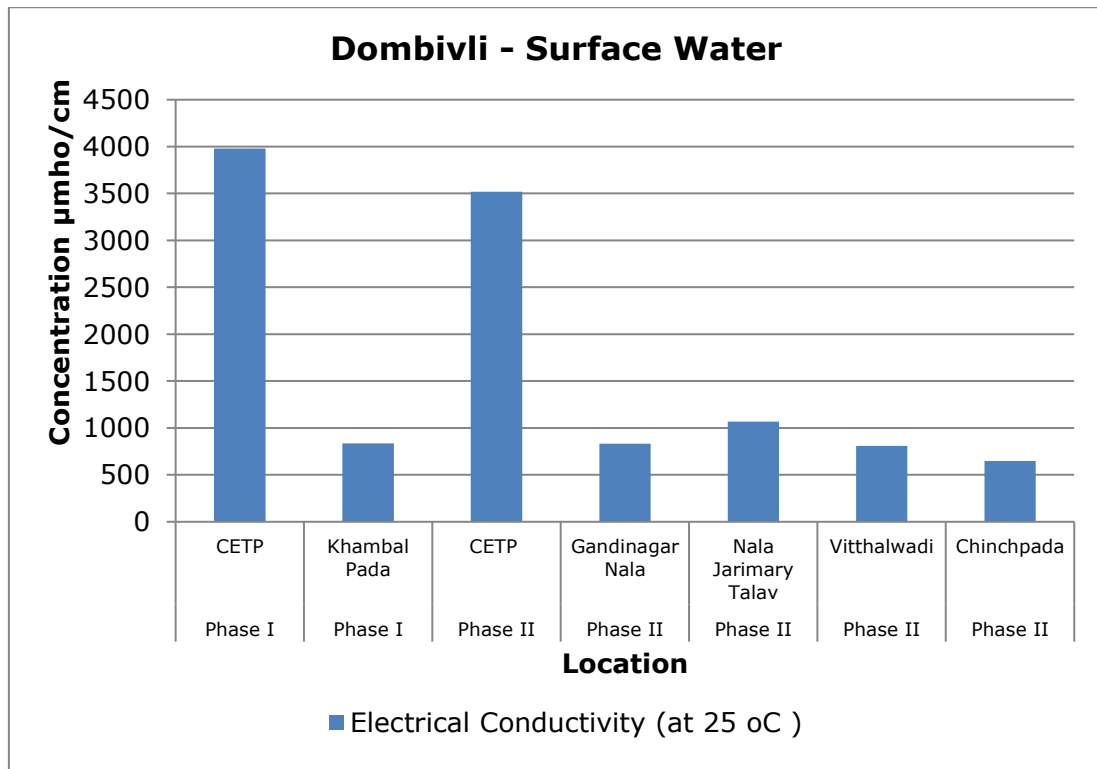
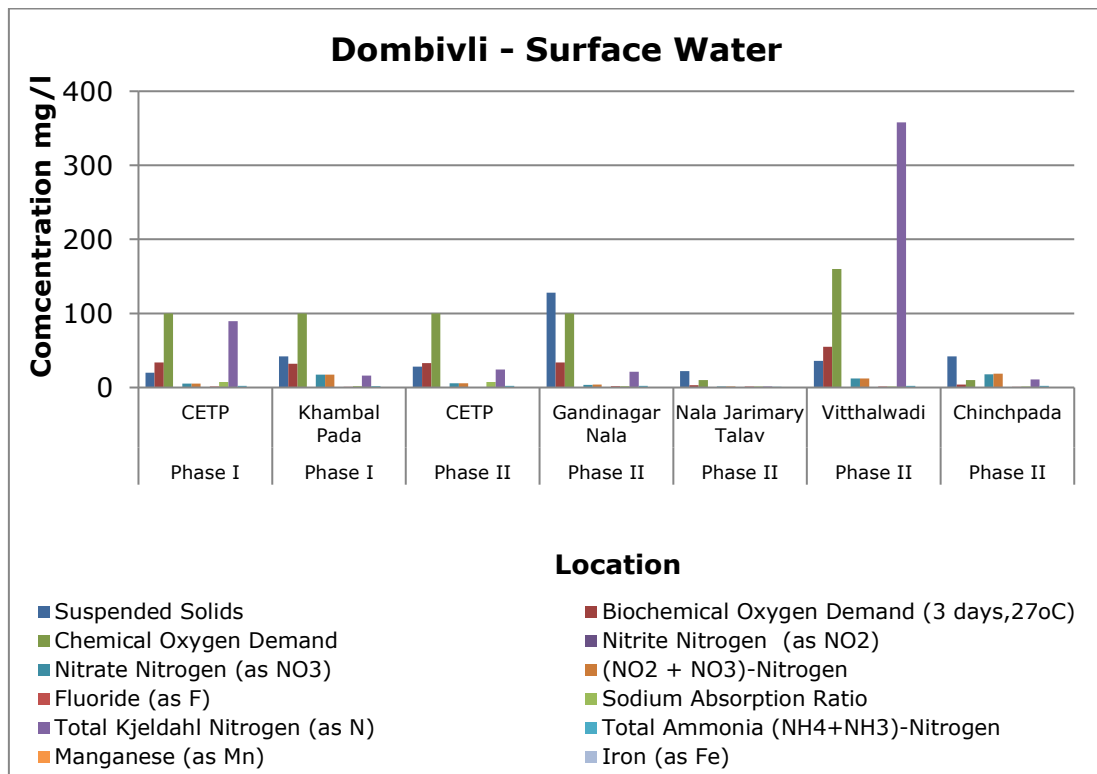
Location				Chinchpada
Date of Sampling				26.01.2019
Sr.	Parameters	Unit	Std. Limit	Results
1.	Colour	Hazen		1
2.	Smell	-	Agreeable	Agreeable
3.	pH	-	5.5 -9.0	7.41
4.	Oil & Grease	mg/L	10.0	BDL
5.	Suspended Solids	mg/L	100.0	42
6.	Dissolved Oxygen (%Saturation)	%		59

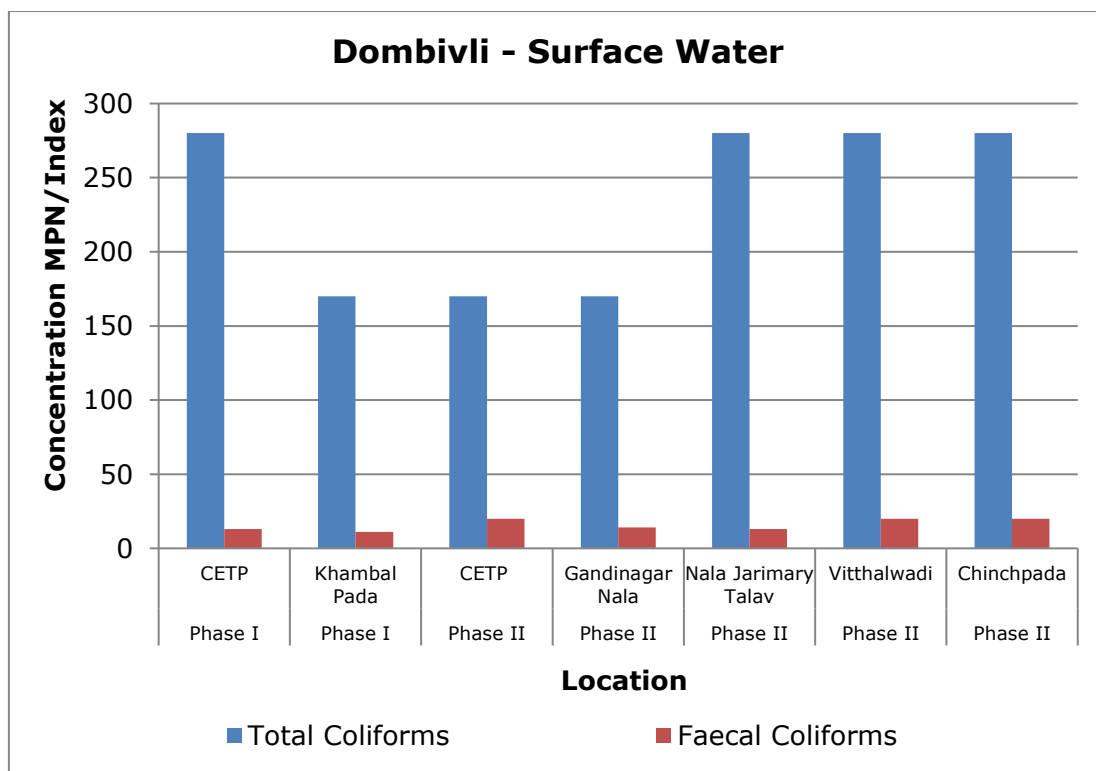
Location				Chinchpada
Date of Sampling				26.01.2019
Sr.	Parameters	Unit	Std. Limit	Results
7.	Chemical Oxygen Demand	mg/L	250.0	10
8.	Biochemical Oxygen Demand (3 days, 27°C)	mg/L	30.0	4
9.	Electrical Conductivity (at 25°C)	µmhos/cm		648
10.	Nitrite Nitrogen (as NO ₂)	mg/L		0.70
11.	Nitrate Nitrogen (as NO ₃)	mg/L	10.0	18
12.	(NO ₂ + NO ₃)-Nitrogen	mg/L		18.7
13.	Free Ammonia (as NH ₃ -N)	mg/L	5.0	BDL
14.	Total Residual Chlorine	mg/L	1.0	BDL
15.	Cyanide (as CN)	mg/L	0.2	BDL
16.	Fluoride (as F)	mg/L	2.0	0.8
17.	Sulphide (as S ²⁻)	mg/L	2.0	BDL
18.	Dissolved Phosphate (as P)	mg/L	5.0	0.58
19.	Sodium Absorption Ratio			1.37
20.	Total Coliforms	MPN index/ 100 mL	100.0	280
21.	Faecal Coliforms	MPN index/ 100 mL	1000.0	20
22.	Total Phosphate (as P)	mg/L		1.08
23.	Total Kjeldahl Nitrogen	mg/L	100.0	11
24.	Total Ammonia (NH ₄ +NH ₃)-Nitrogen	mg/L	50	2.25
25.	Phenols (as C ₆ H ₅ OH)	mg/L	1.0	BDL

Location				Chinchpada
Date of Sampling				26.01.2019
Sr.	Parameters	Unit	Std. Limit	Results
26.	Surface Active Agents (as MBAS)	mg/L		BDL
27.	Organo Chlorine Pesticides			
I.	Alachlor	µg/L	2.0	BDL
II.	Atrazine	µg/L	0.2	BDL
III.	Aldrin	µg/L	0.1	BDL
IV.	Dieldrin	µg/L	2.0	BDL
V.	Alpha HCH	µg/L	0.01	BDL
VI.	Beta HCH	µg/L	2.0	BDL
VII.	Chlorpyrifos	µg/L	3.0	BDL
VIII.	Butachlor	µg/L		BDL
IX.	Delta HCH	µg/L	0.2	BDL
X.	p,p DDT	µg/L	0.05	BDL
XI.	o,p DDT	µg/L	100.0	BDL
XII.	p,p DDE	µg/L	250.0	BDL
XIII.	o,p DDE	µg/L	30.0	BDL
XIV.	p,p DDD	µg/L		BDL
XV.	o,p DDD	µg/L		BDL
XVI.	Alpha Endosulfan	µg/L	10.0	BDL
XVII.	Beta Endosulfan	µg/L		BDL
XVIII.	Endosulfan Sulphate	µg/L	5.0	BDL
XIX.	Y HCH (Lindane)	µg/L	1.0	BDL
28.	Polynuclear aromatic hydrocarbons (as PAH)	mg/L	0.2	0.005
29.	Polychlorinated Biphenyls (PCB)	mg/L	2.0	BDL

Location				Chinchpada
Date of Sampling				26.01.2019
Sr.	Parameters	Unit	Std. Limit	Results
30.	Zinc (as Zn)	mg/L	5.0	BDL
31.	Nickel (as Ni)	mg/L	3.0	0.015
32.	Copper (as Cu)	mg/L	3.0	BDL
33.	Hexavalent Chromium (as Cr ⁶⁺)	mg/L	0.1	BDL
34.	Total Chromium (as Cr)	mg/L	2.0	BDL
35.	Total Arsenic (as As)	mg/L	0.2	BDL
36.	Lead (as Pb)	mg/L	0.1	BDL
37.	Cadmium (as Cd)	mg/L	2.0	BDL
38.	Mercury (as Hg)	mg/L	0.01	BDL
39.	Manganese (as Mn)	mg/L	2.0	0.212
40.	Iron (as Fe)	mg/L	3.0	BDL
41.	Vanadium (as V)	mg/L	0.2	BDL
42.	Selenium (as Se)	mg/L	0.05	BDL
43.	Boron (as B)	mg/L		BDL
44.	Bioassay Test on fish	% survival	90% survival of fish after 96 hours in 100% effluent	0

Graphs: Surface Water/ Waste Water Quality Monitoring for Dombivli MIDC:





3.4 Ground Water Quality:

Sr.	Location	Source	Phase	Table No.
1.	Thakurli Talav (Chole Gaon)	Lake Water (talav)	Phase I	I
2.	Gavdevi Talav	Well Water	Phase I	I
3.	Pipleshwar Mandir	Borewell water	Phase I	I
4.	Horizon Mall	Borewell water	Phase II	II
5.	Mhasoba Devstan Talav	Well Water	Phase II	II
6.	Lodha Vihar	Borewell water	Phase II	II

Table No. I

Location				Thakurli Talav	Gavdevi Talav	Pipleshwar Mandir
Date of Sampling				25.01.2019	25.01.2019	25.01.2019
Sr.	Parameters	Unit	Std. Limit	Results		
1.	Colour	Hazen	5	1	1	3
2.	Smell	-	Agreeable	Agreeable	Agreeable	Disagreeable
3.	pH	-	6.5-8.5	7	7.6	6.89
4.	Oil & Grease	mg/L		BDL	BDL	BDL
5.	Suspended Solids	mg/L	100	36	22	28
6.	Dissolved Oxygen (%Saturation)	%		37	85	58
7.	Chemical Oxygen Demand	mg/L	10 (WHO, 1993)	460	180	150
8.	Biochemical Oxygen Demand (3 days, 27° C)	mg/L	6 (WHO, 1993)	154	59	50
9.	Electrical Conductivity (at 25° C)	µmho/cm		1260	1770	1260
10.	Nitrite Nitrogen (as NO ₂)	mg/L		BDL	BDL	BDL
11.	Nitrate Nitrogen (as NO ₃)	mg/L	45	2.13	1.45	0.51
12.	(NO ₂ + NO ₃)-Nitrogen	mg/L		2.13	1.45	0.51
13.	Free Ammonia (as NH ₃ -N)	mg/L	0.5	BDL	BDL	BDL
14.	Total Residual Chlorine	mg/L	0.2	BDL	BDL	BDL
15.	Cyanide (as CN)	mg/L	0.05	BDL	BDL	BDL
16.	Fluoride (as F)	mg/L	1.0	1.9	2	0.96
17.	Sulphide (as S ²⁻)	mg/L	0.05	BDL	BDL	BDL

Location				Thakurli Talav	Gavdevi Talav	Pipleshwar Mandir
Date of Sampling				25.01.2019	25.01.2019	25.01.2019
Sr.	Parameters	Unit	Std. Limit	Results		
18.	Dissolved Phosphate (as P)	mg/L		0.4	BDL	BDL
19.	Sodium Absorption Ratio	mg/L		0.32	0.47	0.67
20.	Total Coliforms	MPN index/ 100 ml		280	280	49
21.	Faecal Coliforms	MPN index/ 100 ml		7.8	11	4.5
22.	Total Phosphorous (as P)	mg/L		0.74	0.12	0.22
23.	Total Kjeldahl Nitrogen	mg/L		0.78	0.90	3.14
24.	Total Ammonia (NH ₄ +NH ₃)-Nitrogen	mg/L	0.5	0.12	BDL	BDL
25.	Phenols (as C ₆ H ₅ OH)	mg/L	0.001	BDL	BDL	BDL
26.	Surface Active Agents (as MBAS)	mg/L		BDL	BDL	BDL
27.	Organo Chlorine Pesticides					
I.	Alachlor	µg/L	20.0	BDL	BDL	BDL
II.	Atrazine	µg/L	2.0	BDL	BDL	BDL
III.	Aldrin	µg/L	0.03	BDL	BDL	BDL
IV.	Dieldrin	µg/L	0.03	BDL	BDL	BDL
V.	Alpha HCH	µg/L	0.01	BDL	BDL	BDL
VI.	Beta HCH	µg/L	0.04	BDL	BDL	BDL

Location				Thakurli Talav	Gavdevi Talav	Pipleshwar Mandir
Date of Sampling				25.01.2019	25.01.2019	25.01.2019
Sr.	Parameters	Unit	Std. Limit	Results		
VII.	Delta HCH	µg/L	0.04	BDL	BDL	BDL
VIII.	Chlorpyriphos	µg/L	30.0	BDL	BDL	BDL
IX.	Butachlor	µg/L	125.0	BDL	BDL	BDL
X.	p,p DDT	µg/L	1.0	BDL	BDL	BDL
XI.	o,p DDT	µg/L	1.0	BDL	BDL	BDL
XII.	p,p DDE	µg/L	1.0	BDL	BDL	BDL
XIII.	o,p DDE	µg/L	1.0	BDL	BDL	BDL
XIV.	p,p DDD	µg/L	1.0	BDL	BDL	BDL
XV.	o,p DDD	µg/L	1.0	BDL	BDL	BDL
XVI.	Alpha Endosulfan	µg/L	0.4	BDL	BDL	BDL
XVII.	Beta Endosulfan	µg/L	0.4	BDL	BDL	BDL
XVIII.	Endosulfan Sulphate	µg/L	0.4	BDL	BDL	BDL
XIX.	Y HCH (Lindane)	µg/L	2.0	BDL	BDL	BDL
28.	Polynuclear aromatic hydrocarbons (as PAH)	mg/L	0.0001	BDL	BDL	BDL
29.	Polychlorinated Biphenyls (PCB)	mg/L	0.0005	BDL	BDL	BDL
30.	Zinc (as Zn)	mg/L	5.0	BDL	BDL	BDL
31.	Nickel (as Ni)	mg/L	0.02	BDL	BDL	BDL
32.	Copper (as Cu)	mg/L	0.05	BDL	BDL	0.034
33.	Hexavalent Chromium (as Cr ⁶⁺)	mg/L		BDL	BDL	BDL
34.	Total Chromium (as Cr)	mg/L	0.05	BDL	BDL	BDL

Location				Thakurli Talav	Gavdevi Talav	Pipleshwar Mandir
Date of Sampling				25.01.2019	25.01.2019	25.01.2019
Sr.	Parameters	Unit	Std. Limit	Results		
35.	Total Arsenic (as As)	mg/L	0.01	BDL	BDL	BDL
36.	Lead (as Pb)	mg/L	0.01	BDL	BDL	BDL
37.	Cadmium (as Cd)	mg/L	0.003	BDL	BDL	BDL
38.	Mercury (as Hg)	mg/L	0.001	BDL	BDL	BDL
39.	Manganese (as Mn)	mg/L	0.1	0.116	0.059	2.38
40.	Iron (as Fe)	mg/L	0.3	0.08	BDL	0.173
41.	Vanadium (as V)	mg/L		BDL	BDL	BDL
42.	Selenium (as Se)	mg/L	0.01	BDL	BDL	BDL
43.	Boron (as B)	mg/L	0.5	BDL	0.117	BDL
44.	Bioassay Test on fish	% survival		70	70	80

Table No. II

Location				Horizon Mall	Mhasoba Devstan Talav	Lodha Vihar
Date of Sampling				25.01.2019	25.01.2019	26.01.2019
Sr.	Parameters	Unit	Std. Limit	Results		
1.	Colour	Hazen	5	1	1	3
2.	Smell	-	Agreeable	Agreeable	Agreeable	Disagreeable
3.	pH	-	6.5-8.5	7.17	7.98	6.83
4.	Oil & Grease	mg/L		BDL	BDL	BDL
5.	Suspended Solids	mg/L	100	32	28	38

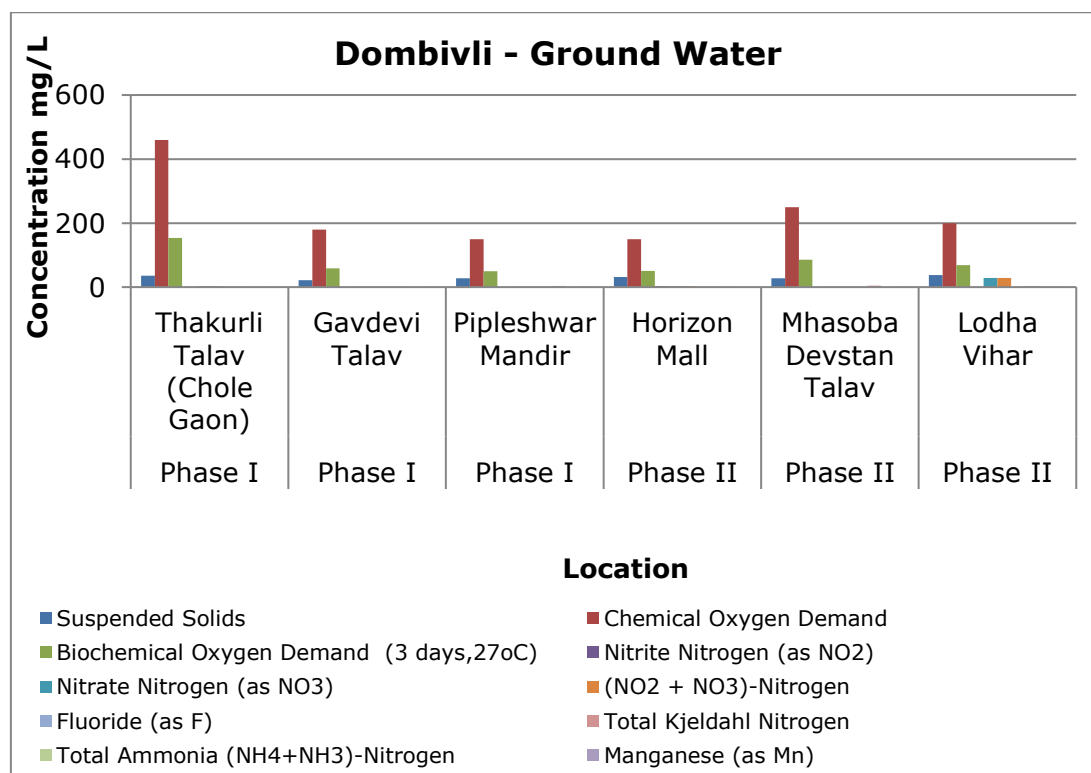
Location				Horizon Mall	Mhasoba Devstan Talav	Lodha Vihar
Date of Sampling				25.01.2019	25.01.2019	26.01.2019
Sr.	Parameters	Unit	Std. Limit	Results		
6.	Dissolved Oxygen (% Saturation)	%		66	85	38
7.	Chemical Oxygen Demand	mg/L	10 (WHO, 1993)	150	250	200
8.	Biochemical Oxygen Demand (3 days, 27° C)	mg/L	6 (WHO, 1993)	51	86	69
9.	Electrical Conductivity (at 25° C)	µmho/cm		378	708	242
10.	Nitrite Nitrogen (as NO ₂)	mg/L		0.17	BDL	BDL
11.	Nitrate Nitrogen (as NO ₃)	mg/L	45	2.52	1.29	28.3
12.	(NO ₂ + NO ₃)-Nitrogen	mg/L		2.69	1.29	28.3
13.	Free Ammonia (as NH ₃ -N)	mg/L	0.5	BDL	BDL	BDL
14.	Total Residual Chlorine	mg/L	0.2	BDL	BDL	BDL
15.	Cyanide (as CN)	mg/L	0.05	BDL	BDL	BDL
16.	Fluoride (as F)	mg/L	1.0	1.3	1.57	0.28
17.	Sulphide (as S ²⁻)	mg/L	0.05	0.21	BDL	BDL
18.	Dissolved Phosphate (as P)	mg/L		0.35	0.16	0.34
19.	Sodium Absorption Ratio	mg/L		0.42	1.08	0.76
20.	Total Coliforms	MPN index/ 100 ml		BDL	23	23

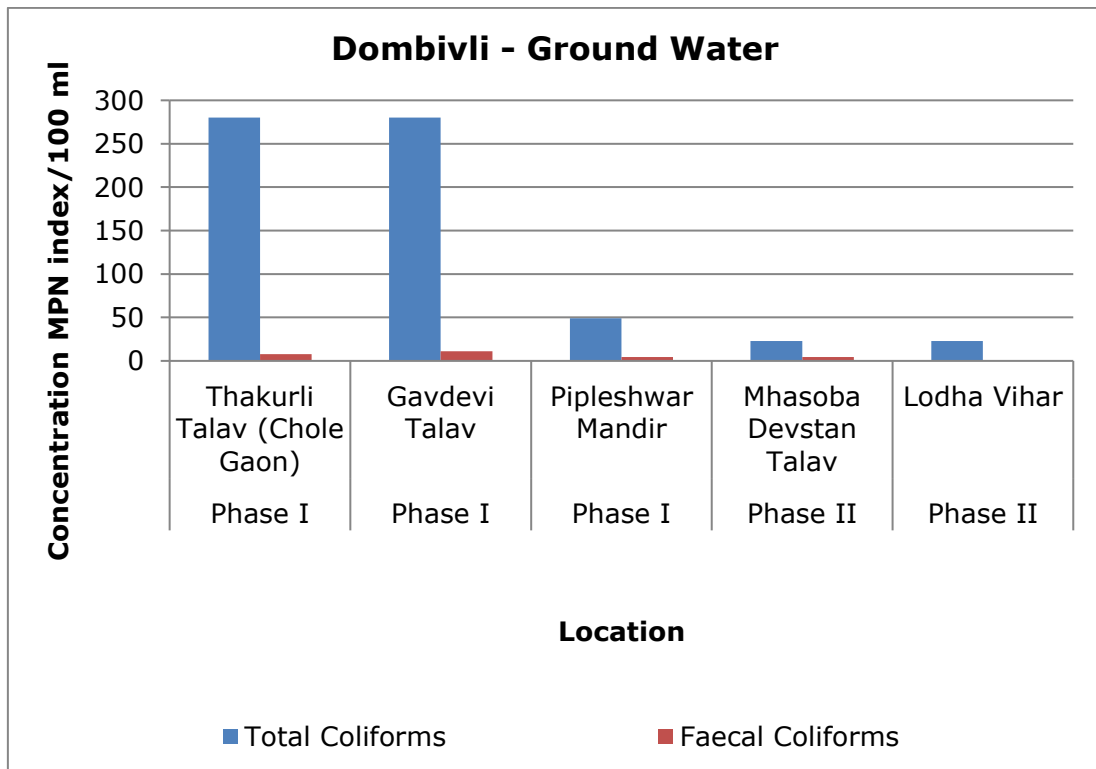
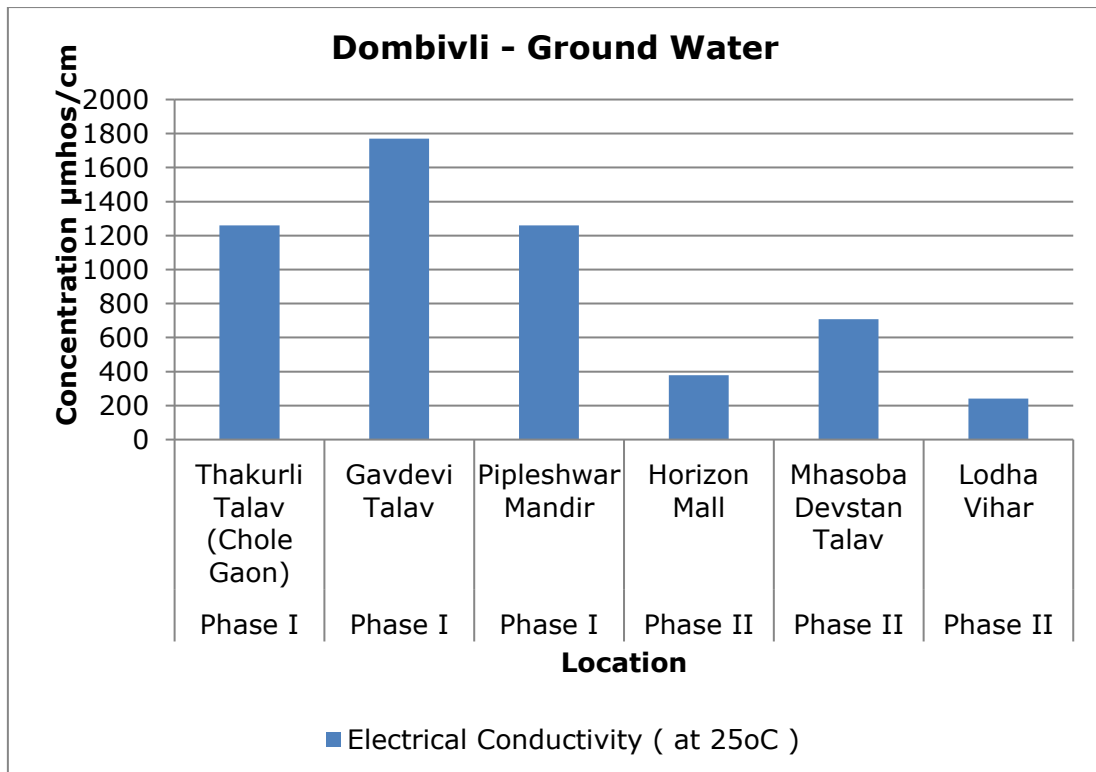
Location				Horizon Mall	Mhasoba Devstan Talav	Lodha Vihar
Date of Sampling				25.01.2019	25.01.2019	26.01.2019
Sr.	Parameters	Unit	Std. Limit	Results		
21.	Faecal Coliforms	MPN index/ 100 ml		BDL	4.5	BDL
22.	Total Phosphorous (as P)	mg/L		0.66	0.40	0.68
23.	Total Kjeldahl Nitrogen	mg/L		0.034	4.59	3.36
24.	Total Ammonia (NH ₄ +NH ₃)- Nitrogen	mg/L	0.5	0.27	BDL	1.6
25.	Phenols (as C ₆ H ₅ OH)	mg/L	0.001	BDL	BDL	BDL
26.	Surface Active Agents (as MBAS)	mg/L		BDL	BDL	BDL
27.	Organo Chlorine Pesticides					
XX.	Alachlor	µg/L	20.0	BDL	BDL	BDL
XXI.	Atrazine	µg/L	2.0	BDL	BDL	BDL
XXII.	Aldrin	µg/L	0.03	BDL	BDL	BDL
XIII.	Dieldrin	µg/L	0.03	BDL	BDL	BDL
XIV.	Alpha HCH	µg/L	0.01	BDL	BDL	BDL
XXV.	Beta HCH	µg/L	0.04	BDL	BDL	BDL
XVI.	Delta HCH	µg/L	0.04	BDL	BDL	BDL
XXVII.	Chlorpyrifos	µg/L	30.0	BDL	BDL	BDL
VIII.	Butachlor	µg/L	125.0	BDL	BDL	BDL
XIX.	p,p DDT	µg/L	1.0	BDL	BDL	BDL
XXX.	o,p DDT	µg/L	1.0	BDL	BDL	BDL

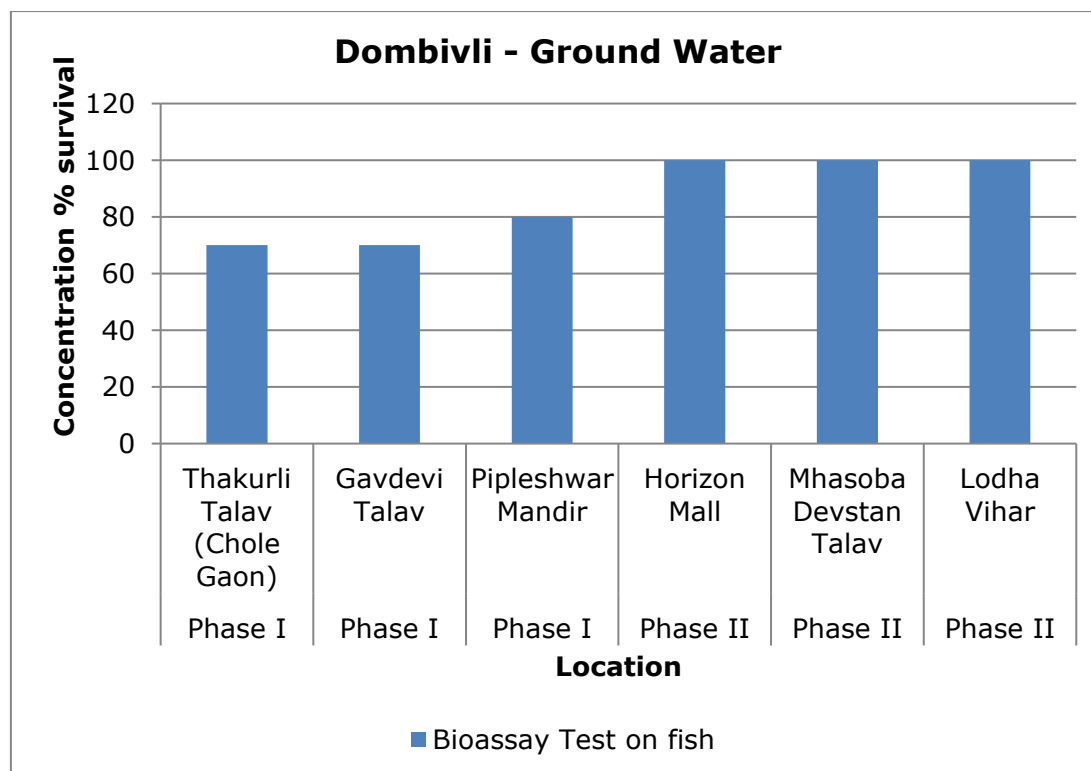
Location				Horizon Mall	Mhasoba Devstan Talav	Lodha Vihar
Date of Sampling				25.01.2019	25.01.2019	26.01.2019
Sr.	Parameters	Unit	Std. Limit	Results		
XXI.	p,p DDE	µg/L	1.0	BDL	BDL	BDL
XXII.	o,p DDE	µg/L	1.0	BDL	BDL	BDL
XIII.	p,p DDD	µg/L	1.0	BDL	BDL	BDL
XIV.	o,p DDD	µg/L	1.0	BDL	BDL	BDL
XXV.	Alpha Endosulfan	µg/L	0.4	BDL	BDL	BDL
XVI.	Beta Endosulfan	µg/L	0.4	BDL	BDL	BDL
XXVII.	Endosulfan Sulphate	µg/L	0.4	BDL	BDL	BDL
VIII.	γ HCH (Lindane)	µg/L	2.0	BDL	BDL	BDL
28.	Polynuclear aromatic hydrocarbons (as PAH)	mg/L	0.0001	BDL	0.001	BDL
29.	Polychlorinated Biphenyls (PCB)	mg/L	0.0005	BDL	BDL	BDL
30.	Zinc (as Zn)	mg/L	5.0	BDL	BDL	BDL
31.	Nickel (as Ni)	mg/L	0.02	BDL	BDL	0.26
32.	Copper (as Cu)	mg/L	0.05	BDL	BDL	BDL
33.	Hexavalent Chromium (as Cr ⁶⁺)	mg/L		BDL	BDL	BDL
34.	Total Chromium (as Cr)	mg/L	0.05	BDL	BDL	0.103
35.	Total Arsenic (as As)	mg/L	0.01	BDL	BDL	BDL
36.	Lead (as Pb)	mg/L	0.01	BDL	BDL	BDL
37.	Cadmium (as Cd)	mg/L	0.003	BDL	BDL	BDL
38.	Mercury (as Hg)	mg/L	0.001	BDL	BDL	BDL

Location				Horizon Mall	Mhasoba Devstan Talav	Lodha Vihar
Date of Sampling				25.01.2019	25.01.2019	26.01.2019
Sr.	Parameters	Unit	Std. Limit	Results		
39.	Manganese (as Mn)	mg/L	0.1	BDL	0.038	0.127
40.	Iron (as Fe)	mg/L	0.3	0.102	BDL	BDL
41.	Vanadium (as V)	mg/L		BDL	BDL	BDL
42.	Selenium (as Se)	mg/L	0.01	BDL	BDL	BDL
43.	Boron (as B)	mg/L	0.5	BDL	BDL	BDL
44.	Bioassay Test on fish	% survival		100	100	100

Graphs: Ground Water Quality Monitoring for Dombivli MIDC:







4. Summary and Conclusion

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

4.1 Stack Emission Monitoring:

Five industries from Phase I and six industries from Phase II were selected for Stack emission monitoring.

- 1. Particulate matter (PM):** All the results obtained are within the standard emission for the specified industry except at Navjeevan Synthetics Pvt. Ltd. at which had the highest range of Particulate matter was also observed with 200 mg/Nm³.
- 2. Sulphur dioxide (SO₂):** All industries result of SO₂ also was within the limits and the highest range was observed at Tirupati Textile Mills. with 68.1 mg/Nm³.
- 3. Nitrogen dioxide (NO₂):** All industries result of NO₂ also was well within the limits.

4.2 Ambient Air Quality Monitoring:

Five ambient air samples was collected from Phase I and eight samples was collected from Phase II of Dombivli region. Also one VOC sample was collected from Phase I and 2 VOC sample was collected from Phase II. The parameters monitored were studied as per the NAAQS standards. The variations of each parameter within the area under study are discussed below:

- 1. Sulphur dioxide (SO₂):** All the locations are observed with very low concentrations of SO₂. The highest level of SO₂ was observed at BRW Engineer with 9.05 µg/m³ which is very much lower than the standard limit of NAAQS i.e. 80 µg/m³.

2. **Nitrogen dioxide (NO₂):** Values of nitrogen dioxide are also observed below the standard limit of 80 µg/m³ at all the 11 locations. The highest level of NO₂ was observed at Survishru Synthetics Pvt. Ltd. with a result of 10.9 µg/m³.
3. **Particulate Matter (PM₁₀):** Out of 11 samples, 10 samples in Dombivli region showed higher level of PM₁₀ concentration than the standard limit of NAAQS. The level of PM₁₀ emission ranged from 97 µg/m³ at MIDC Sump to 492 µg/m³ at BRW Engineer.
4. **Particulate Matter (PM_{2.5}):** Out of 11 samples, 4 samples in Dombivli region showed higher level of PM_{2.5} concentration than the standard limit of NAAQS. The level of PM_{2.5} emission ranged from 22 µg/m³ at MIDC Sump to 114 µg/m³ at BKT.
5. **Ozone (O₃):** At all 11 locations the level of Ozone was observed below the detectable limit.
6. **Lead (Pb):** At all 11 locations the level of Lead also was observed below the detectable limit.
7. **Carbon Monoxide (CO):** Concentration of carbon monoxide has exceeded at 2 locations monitored.
8. **Ammonia (NH₃):** At all 11 locations the level of Lead also was observed below the detectable limit.
9. **Benzene (C₆H₆):** The concentration of Benzene have exceeded the limit at 5 locations monitored and in the remaining 6 locations the values are below the detectable limit.
10. **Benzo(a)pyrene (BaP), Arsenic (As) and Nickel (Ni)** was below the detectable limit in all 11 locations monitored.
11. **Volatile Organic Compounds (VOC):** VOC was collected from 3 ambient air samples, and the result was not detectable in any of the samples.

4.3 Surface water/ Waste Water Quality Monitoring:

To understand the quality of treated effluent and surface water, samples were collected from 2 surface water of Phase I and 5 surface water of Phase II Dombivli. Considering the general parameters of all the industries mentioned following are the conclusions:

1. **Colour:** Colour units are found in the range of 1 to 5 Hazen unit in 7 water sample collected.
2. **Odour:** odour of all the samples is found disagreeable at 7 water samples collected.
3. **pH:** it is observed in between 6.86 and 7.59 which is well within the range.
4. **Suspended Solids:** Suspended solids of 6 water sample is well within the limits and the concentration of SS at Ghandhinagar Nalah have exceeded the limit with a concentration of 128 mg/L.
5. **Chemical Oxygen Demand:** all 7 water sample had COD concentration well within the limits. The highest COD was observed at Vitthalwadi Nalah Phase II with a concentration of 160 mg/L.
6. **Biochemical Oxygen Demand:** 5 out of the 7 samples collected were exceeding the limit required as per standard of BOD. The highest BOD was observed at Vitthalwadi Nalah Phase II with a concentration of 55 mg/L.
7. **Sulphide:** Sulphide was detected only at 3 out of 7 locations monitored and the concentration was well within the limit.
8. **Total Ammonia:** The concentration of total ammonia is well within the standard limit at all 7 locations monitored.

- 9. Total Kjeldahl Nitrogen:** The concentration of TKN exceeded at Vitthalwadi Nalah with 358 mg/L concentration.
- 10. Fish Bioassay:** 80% Survival was attained only at Ghandhinagar Nalah water samples collected for Bioassay test and in the rest of the 6 samples collected no fish survived.
- 11. Heavy metals:** All the heavy metals are found below the standard limits in all the samples.

4.4 Ground Water Quality Monitoring:

Three ground water samples were collected from Phase I and three was collected from Phase II of Dombivli.

- 1. Colour (Hazen Units):** Colour units are found in the range of 1 to 3 Hazen unit in 6 water sample collected.
- 2. Odour:** Odour of 4 samples is found agreeable out of the 6 samples collected.
- 3. Chemical Oxygen Demand:** The COD of all 6 samples exceeded and was found in the range between 150 mg/L to 460 mg/L.
- 4. Biological Oxygen Demand:** The BOD of all 6 samples also exceeded and was found in the range between 50 mg/L to 154 mg/L.

Following are the parameters which are compared with ISO 10500:2012 Drinking water specifications.

- 1. Nitrite:** Values of Nitrite was below detectable limit at all 6 samples collected.
- 2. Nitrate:** Results of Nitrate are also observed below standard limit (45 mg/L). The highest value of Nitrate was observed at Lodha Vihar with 28.3 mg/L.
- 3. Residual Free Chlorine:** Values are below the detectable limit at all 6 locations monitored.
- 4. Total Ammonia:** Values are below the detectable limit in 3 samples collected and at Lodha Vihar the results was beyond the standard limit with 1.6 mg/L.
- 5. Fluoride:** 4 out of 6 samples exceeded the standard limit of Fluoride.
- 6. Sulphide:** All the readings of sulphide are observed below the detectable limit.
- 7. Sodium Absorption Ratio:** All the readings of sulphide are observed below the detectable limit.
- 8. Total Kjeldahl nitrogen:** All 6 water sample collected exceeded the standard limit of TKN.
- 9. Fish Bioassay:** 100% survival was observed only at 3 locations out of 6 locations monitored.
- 10. *Boron:** Values are below the acceptable standards.
(*CPCB Water Quality criteria for Irrigation, Industrial Cooling & Controlled Waste disposal).
- 11. Surface Active Agents:** Values are below the acceptable standards.
- 12. Metals:** All the metals except manganese at few locations are observed within the acceptable limits of drinking water standards.

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.

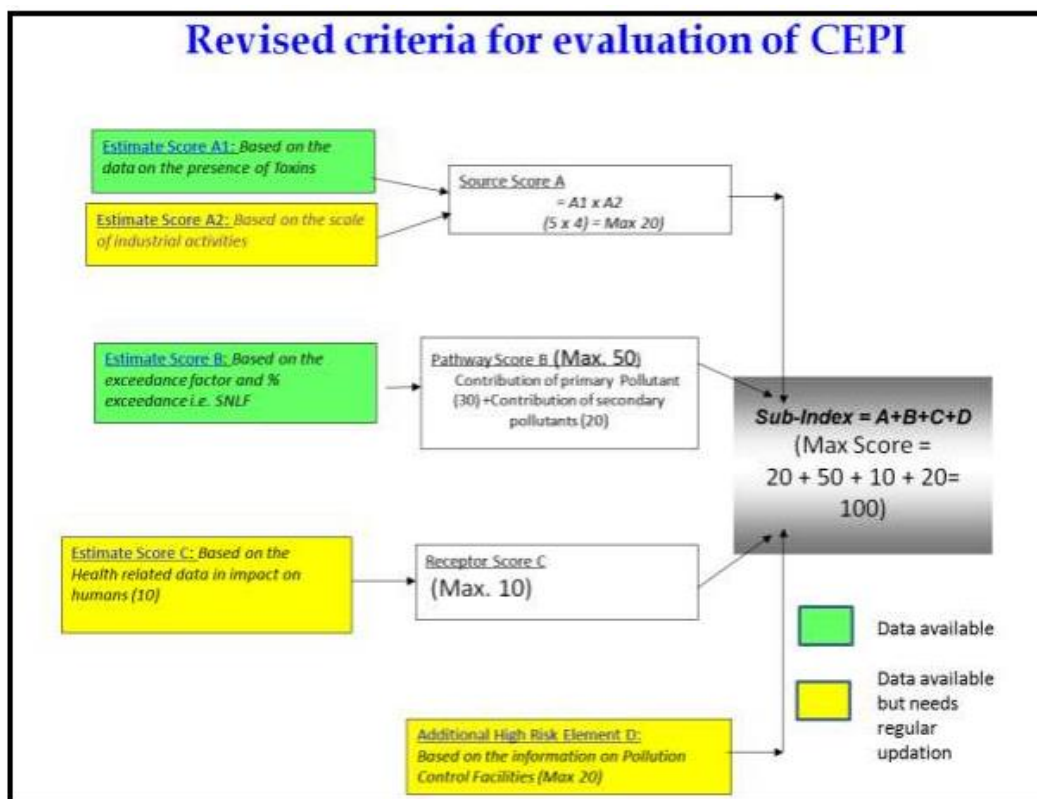
- I. Revised concept is prepared by eliminating the debatable factors but retaining the factors which can be measured precisely.
- II. It is decided to develop the Comprehensive Environmental Pollution Index (CEPI) retaining the existing algorithm of Source, Pathway and Receptor.
- III. Health component 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.

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 June 2018 prepared by MPCB, CEPI is calculated considering all these revised standards' limiting values, list of parameters and complete scope of monitoring.

5.1 Comparison of CEPI scores:

The result shows that CEPI score of present report is 55.09. The present study is the compilation of post monsoon season, which also regulates the score value. The overall CEPI is observed as 55.09 in Dombivali, which falls below the category of severely polluted areas, according to the revised CEPI guidelines. Hence, it can be concluded that the industries are following environmental rules and regulations laid by MoEF and MPCB to control the pollution and to keep the environment clean and green.

Detailed and Aggregated CEPI score of present report is being compared with the previous year's studies in the tables given below:

Air

	A1	A2	A	B1	B2	B3	B	C1	C2	C3	C	D	CEPI
CEPI score February 2019	2.35	4	9.4	-	-	-	11.5	-	-	-	10	15	45.9
CEPI score June 2018	2.6	3.4	8.84	-	-	-	12.47	-	-	-	10	15	46.31
CEPI score February 2018	3.8	4.1	15.58	-	-	-	14.3	-	-	-	10	15	54.88
CEPI score June 2017	4.3	2.2	9.46	-	-	-	16.2	-	-	-	0	15	40.66
CEPI score February 2017	2	5	10	5	4	3	12	4	3	0	12	15	49
CEPI score 2016	4	2	8	3	2.3	4	9.3	5	2	0	10	10	37.3
CEPI score 2013	6	5	30	6	0	0	6	5	3	0	15	15	66
CPCB Report 2009	6	5	30	6	0	0	6	5	3	0	15	15	66

Water:

	A1	A2	A	B1	B2	B3	B	C1	C2	C3	C	D	CEPI
CEPI score February 2019	2.7	4	10.8	-	-	-	10.75	-	-	-	10	10	41.55
CEPI score June 2018	2	2.9	5.8	-	-	-	14.8	-	-	-	10	10	40.6
CEPI score February 2018	2.6	5	13	-	-	-	15.63	-	-	-	10	10	48.63
CEPI score June 2017	2	3.6	7.2	-	-	-	12.89	-	-	-	5	10	35.09
CEPI score February 2017	2	5	10	8	3.3	0	11.3	5	5	5	30	10	61.3
CEPI score 2016	4	2	8	4	0	6	10	5	4	5	25	10	53
CEPI score 2013	6	5	30	8	0	3	11	5	5	5	30	10	81
CPCB Report 2009	3	5	15	8	0	3	11	5	4.5	5	27	10	63.5

Land:

	A1	A2	A	B1	B2	B3	B	C1	C2	C3	C	D	CEPI
CEPI score February 2019	2.1	4	8.4	-	-	-	12.5	-	-	-	10	10	40.9
CEPI score June 2018	3.5	4.2	14.7	-	-	-	11.5	-	-	-	10	10	46.2
CEPI score February 2018	4.2	3.2	13.44	-	-	-	12.6	-	-	-	10	10	46.04

	A1	A2	A	B1	B2	B3	B	C1	C2	C3	C	D	CEPI
CEPI score June 2017	3.6	4.7	16.69	-	-	-	11.47	-	-	-	5	10	43.39
CEPI score February 2017	2	5	10	7.5	1.3	0	8.8	5	4	5	25	10	53.8
CEPI score 2016	3	2	6	4	0	4.1	8.1	5	2	4	27	10	38.1
CEPI score 2013	4	5	20	7.75	1.5	3	12.25	5	4.75	5	28.75	10	71
CPCB Report 2009	3	5	15	8	1.5	3	12.5	5	3	5	20	10	57.5

Aggregated CEPI:

	Air Index	Water Index	Land Index	CEPI
CEPI score February 2019	45.9	41.55	40.9	55.09
CEPI score June 2018	46.31	40.6	46.2	56.38
CEPI score February 2018	54.88	48.63	46.04	64.98
CEPI score June 2017	40.66	35.09	43.39	49.69
CEPI score February 2017	49	61.3	53.8	65.82
CEPI score 2016	37.3	53	38.1	49.96
CEPI score 2013	66	81	71	89.90
CPCB Report 2009	66	63.5	57.5	78.41

6. Conclusion

Dombivli is an important industrial area of the state having an industrial zone lying on the eastern side of the Mumbai highway. It is well known place for its rapid industrial growth having major industries such as dye's, paints, chemicals and heavy metal factories. Some of the popular industries of Dombivli include Vicco Labs, Gharda Chemicals, Deepak fertilizers, Lloyd Steel etc. 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 Dombivli city.

For identification of the source of pollutants, we have analysed stack emission monitoring of 12 stacks in the Dombivli region. All parameters monitored were well within the standard limit and VOCs was not detectable in any samples monitored.

For the study of Air Environment, 12 ambient air samples were collected from different locations in the region. The concentration of PM₁₀ was high at 8 locations sampled. The main reason for the increase in the concentration of Particulate matter is the increase in traffic and industrial activities. Dust suppression techniques have been suggested to be carried out by industries. All other parameters were well within the limit in all locations monitored.

To understand the quality of treated effluent and surface water, samples were collected from 6 surface water and 2 ETP outlet of Phase I and Phase II Dombivli. Parameters like Chemical Oxygen Demand, Biological oxygen demand, and Ammonia was found to have exceeded the limit of surface water characteristics. We have informed the respective industry about the same and actions are taken for improving the quality of treated waste water before disposal.

For carrying out a study on the Land Environment, six ground water samples are collected. Chemical Oxygen Demand, Biological oxygen demand, Nitrate, Total Ammonia, Fluoride and Total Kjeldahl Nitrogen was found in higher concentration in many of the samples collected. The ground water collected is from Borewell and is not used for drinking purpose.

The State Pollution Control Board and Regional Office of SPCB are continuously initiating action against industries for reducing and controlling the pollution caused due the industries. Many industries were issued with closure direction and show cause notice for emission control. Regular compliance of industries is monitored by Board officials for maintain the pollution reduced due to the implementation of action plan.

	A1	A2	A	B	C	D	CEPI
Air Index	2.35	4	9.4	11.5	10	15	45.9
Water Index	2.7	4	10.8	10.75	10	10	41.55
Land Index	2.1	4	8.4	12.5	10	10	40.9
Aggregated CEPI							55.09

7. Efforts taken for the reduction in pollution:

Technological intervention

1. The industries which are using solvents are very few and are small scale therefore the solvent generated from the manufacturing is collected and send to for recovery to the authorized plants.
2. However there is a one LSI unit **M/s Gharda Chemical Ltd.** which is having solvent recovery plant for captive consumption and has taken up following initiative for waste reduction

Sr No	Brief description of the improvement	Scenario - Before Improvement	Scenario - After Improvement
1.	Change in process:	600 kg per day of residue was being incinerated.	Load on incineration reduced by 80 Kg per day.
2.	Reduction in quantity of residues by recovery of useful products	160 kg per day residue was incinerated.	160 kg per day of pure cumidine is recycled in the process.
3.	New fractionating column to separate the solvents in pure form from the mixture of solvents.	600 kg per day of Mixed solvents were incinerated.	Pure solvents, 600 kg per day after recovery are recycled in the process.
4	Recovery of intermediates and their recycle a) In CMAC process Tetra-chloro butyric Acid (TBA) is recovered by selective isolation from the waste stream of 2 -Chloro cyclo Butanone stage. b) In Isoproturon process, Di-methyl Urea (DMU) an intermediate, which is completely recovered, purified and recycled.	250 kg per day TBA was being incinerated. Only part of the DMU (3.3 MT per day) was recycled and the rest (1.3 MT) of being impure quality was being incinerated.	250 kg recovered TBA is recycled back in to the process Now all the DMU (4.6 MT per day) is being recycled after purifying the impure DMU.

Water Environment

Water quality monitoring network:-

- a) **Industries:-**The MPC Board is regularly monitoring treated effluent quality of large, medium & small industries. The large and medium industries monitor their effluent quality regularly.
- b) **CETPS:-** The MPC Board fortnightly monitors treated/untreated effluent quality of CETPs. The CETPs monitors their treated/untreated effluent quality on daily basis.
- c) **Nalla :-** There are two nalla viz. Khambalpada Nalla & Bhopar Nalla through which treated effluent is disposed by CETPs and also the untreated domestic effluent of residential area disposed. The MPC Board fortnightly monitors water quality of these nalla.

- d) **Effluent treatment plants:-** All large and medium scale industries have provided full-fledged effluent treatment facility and all small scale industries have provided primary treatment facility and dispose their effluent to CETP for further treatment through MIDC drainage.
- e) **Common Effluent treatment Plants:** - There are 2 no. of CETPs functioning in the industrial area. Quantity of Industrial and domestic effluent generated in MIDC industrial Area is about 14 MLD, the treated effluent is finally discharged into the Diva creek
- f) **D CETP Chemical (Phase-II) (1.5MLD):-** Intensive efforts were made by chemical manufacturers in Phase-II, Dombivali industrial area to setup CETP in MIDC area of 1.50 MLD capacity, commissioned in March 1999 with capital investment of Rs 3.70 crore, and having 176 user members.
- g) **Dombivali DBESA CETP Textile (Phase-I)(16MLD):-** Was set up by Textile manufactures of phase I, Dombivali in the year in October 2003, of 16.00 MLD capacity, The total capital investment of CETP is 6.6 crore, the user members are 121.

Air Environment

Dust Collectors Cyclones, Wet scrubbers, and process emissions.

As a case study the major industry M/s Gharda chemical has taken up the following initiative for control of hazardous air pollutants

- a) For scrubbing the gases like HCl, Chlorine, Sulphur Dioxide etc. Caustic solution is used and the strength of the Caustic is monitored so as to ensure that it does not go below 0.5 N. This being chemisorption the efficiency of scrubbing is 100%.
- b) For scrubbing gases like Ammonia, water is used with primary and secondary scrubber system. The secondary system is provided with chilled water-cooling.
- c) Control of Fugitive Emissions / VOC:
- All the agitated reactors having hazardous air pollutants are provided with mechanical seals to ensure no fugitive emissions.
 - All the transfer pumps are also provided with mechanical seals.
 - Gas sensors (portable and fixed) are available to detect any leakage of the hazardous pollutant.
 - Vacuum systems are available to take care of the leakage, if any.

Green Belt

Necessary follow up for the development of green belt in the industrial cluster as well as in corporation area will be taken with KDMC, KAMA, MIDC as well as local NGOs.

Public Awareness & Training Programmes

- To Organize Drawing competition in School & Colleges for making clean environment.
- Distribution of hand bills of safety measures to be adopted during accident.
- Posters and Banners displaying environmental awareness.
- To arrange Road Shows at public places.
- Arranging Lectures, Speech, Demonstration of the activities through School, Colleges, etc.

8. Photographs

Kama office Ambient Air Monitoring



BKT Ambient Air Monitoring



Backside Rice mill nahah Surface Water Sample



Horizon Mall Borewell Water sample



Gandhinagar nallah Surface Water Sample



Jarimari talav Surface Water Sample



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: Dombivli, November 2010, MPCB
- 4) Final Document on Revised CEPI Version – 2016, CPCB No.B-29012/ESS(CPA)/ 2015-16
- 5) Standard Methods for the Examination of Water and Waste Water, American Public Health Association, 22nd Edition, 2012.
- 6) IS 3025 (various parts)
- 7) www.mpcb.gov.in
- 8) www.cpcb.gov.in
- 9)

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 thorie 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	5.0 mg/Nm ³ 0.02 kg/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	4.0 µg/m ³
9.	Benzene (C ₆ H 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	0.3 ng/m ³
12.	Nickel (Ni)	CPCB Guidelines for the Measurement of Ambient Air Pollutants, Volume I, May 2011, Page No. 47	AAS Method	3.0 ng/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, 22 nd Ed., 2012, 1060 B, 1-39	-	-
2.	Sampling Procedure for Microbiological Parameters	APHA, 22 nd Ed., 2012, 1060 B, 1-39, 9040, 9-17, and 9060B, 9-35	-	-
3.	Temperature	APHA, 22 nd Ed., 2012, 2550-B, 2-69	By Thermometer	-
4.	Colour	APHA, 22 nd Ed., 2012, 2120-B, 2-26	Visible Comparison Method	1 Hazen Unit
5.	Odour	IS 3025 (Part 5): 1983, Reaffirmed 2006	Qualitative Method	-
6.	pH	APHA, 22 nd Ed., 2012, 4500-H ⁺ - B, 4-92	By pH Meter	1
7.	Oil & Grease	APHA, 22 nd Ed., 2012, 5520-B, 5-40	Liquid -liquid Partition-Gravimetric Method	1.0 mg/L
8.	Suspended Solids	IS 3025 (Part 17): 1984, Reaffirmed 2006, Amds.1	Filtration /Gravimetric Method	5.0 mg/L
9.	Dissolved Oxygen	IS 3025 (Part 38): 1989, Reaffirmed 2009	Iodometric Method-Azide modification	0.05 mg/L
10.	Chemical Oxygen Demand	APHA, 22 nd Ed., 2012, 5220-B, 5-17	Open Reflux Method	5.0 mg/L
11.	Biochemical Oxygen Demand	IS 3025 (Part 44): 1993, Reaffirmed 2009, Amds.1	Iodometric Method	5.0 mg/L
12.	Electrical Conductivity	APHA, 22 nd Ed., 2012, 2510- B, 2-54	By Conductivity Meter	0.1 µmho/cm
13.	Nitrite-Nitrogen	APHA, 22 nd Ed., 2012, 4500-NO ₂ -B, 4-120	Colorimetric Method	0.006 mg/L

Sr.	Parameters	Methods References	Techniques	Detection Limit
14.	Nitrate-Nitrogen	APHA, 22 nd Ed., 2012, 4500-NO ₃ , B-4-122	UV Spectrophotometer Screening Method	0.2 mg/L
15.	(NO ₂ + NO ₃)-Nitrogen	APHA, 22 nd Ed., 2012, 4500-NO ₂ -B, 4-120 APHA, 22 nd Ed., 2012, 4500-NO ₃ , B-4-122	Colorimetric Method V Spectrophotometer Screening Method	0.2 mg/L
16.	Free Ammonia	APHA, 22 nd Ed., 2012, 4500 NH ₃ , F, 4 -115	Colorimetric Method	0.006 mg/L
17.	Total Residual Chlorine	IS 3025 (Part 26): 1986, Reaffirmed 2009, Ed. 2.1 (2004-02)	Iodometric Method	0.1 mg/L
18.	Cyanide (CN)	APHA, 22 nd Ed., 2012, 4500-CN, C & E, 4-41 & 4-43	Colorimetric Method	0.001 mg/L
19.	Fluoride (F)	APHA, 22 nd Ed., 2012, 4500-F, D, 4-87	SPADNS Method	0.05 mg/L
20.	Sulphide (S ²⁻)	APHA, 22 nd Ed., 2012, 4500 -S ²⁻ , C-4-175, F-4-178	Iodometric Method	0.08 mg/L
21.	Dissolved Phosphate (P)	APHA, 22 nd Ed., 2012, 4500 P,E, 4-155	Ascorbic Acid Method	0.03 mg/L
22.	Sodium Absorption Ratio	IS11624: 1986, Reaffirmed 2006	By Calculation	0.3
23.	Total Phosphorous (P)	APHA, 22 nd Ed., 2012, 4500 P,E, 4-155	Ascorbic Acid Method	0.03 mg/L
24.	Total Kjeldahl Nitrogen	APHA, 22 nd Ed., 2012, 4500 NH ₃ , B & C, 4 -110, 4-112	Titrimetric Method	0.1 mg/L
25.	Total Ammonia (NH ₄ +NH ₃)-Nitrogen	APHA, 22 nd Ed., 2012, 4500 NH ₃ , F, 4 - 115	Colorimetric Method	0.001 mg/L
26.	Phenols (C ₆ H ₅ OH)	APHA, 22 nd Ed., 2012, 5530- B & C, 5-44 & 5-47	Chloroform Extraction Method	0.001 mg/L

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

Sr.	Parameters	Methods References	Techniques	Detection Limit
43.	Selenium (Se)	IS 3025 (Part 2): 2004	ICP Method	0.005 mg/L
44.	Boron (B)	IS 3025 (Part 2): 2004	ICP Method	0.1 mg/L
45.	Total Coliforms	APHA, 22 nd Ed., 2012, 9221-B, 9-66	Multiple tube fermentation technique (MPN/100ml)	1.1 MPN/100ml
46.	Faecal Coliforms	APHA, 22 nd 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 (Prevention 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) $\mu\text{g}/\text{m}^3$	Annual *	50	20	– Improved West and Gaeke – Ultraviolet fluorescence
		24 hours **	80	80	
2	Nitrogen Dioxide (NO ₂) $\mu\text{g}/\text{m}^3$	Annual *	40	30	– Modified Jacob & Hochheiser (Na-Arsenite) – Chemiluminescence
		24 hours **	80	80	
3	Particulate Matter (size less than 10 μm) or PM ₁₀ $\mu\text{g}/\text{m}^3$	Annual *	60	60	– Gravimetric – TOEM – Beta attenuation
		24 hours **	100	100	
4	Particulate Matter (size less than 2.5 μm) or PM _{2.5} $\mu\text{g}/\text{m}^3$	Annual *	40	40	– Gravimetric – TOEM – Beta attenuation
		24 hours **	60	60	
5	Ozone (O ₃) $\mu\text{g}/\text{m}^3$	8 hours **	100	100	– UV photometric – Chemiluminescence – Chemical Method
		1 hour **	180	180	
6	Lead (Pb) $\mu\text{g}/\text{m}^3$	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) $\mu\text{g}/\text{m}^3$	Annual *	100	100	– Chemiluminescence – Indophenol blue method
		24 hours **	400	400	
9	Benzene (C ₆ H ₆) $\mu\text{g}/\text{m}^3$	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.

$\mu\text{g}/\text{m}^3$: micro-gram/ m^3 i.e. $10^{-6}\text{gm}/\text{m}^3$

ng/m^3 : nano-gram/ m^3 i.e. $10^{-9}\text{gm}/\text{m}^3$

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 matter 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
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

Sr.	Parameter	Standards			
		Inland surface Water	Public Sewers	Land for Irrigation	Marine Coastal Areas
7.	Oil and Grease mg/L, Max	10	20	10	20
8.,	Total Residual chlorine, mg/L, Max	1.0	--	--	1.0
9.	Ammonical Nitrogen (as N), mg/L, Max	50	50	--	50
10.	Total Kjeldahl Nitrogen (as N), mg/L, Max.	100	--	--	100
11.	Free Ammonia (as NH ₃), mg/L, Max	5.0	--	--	5.0
12.	Biochemical oxygen demand (5 days, at 20° c) mg/L, Max	30	350	100	100
13.	Chemical oxygen demand, mg/L, Max	250	--	--	250
14.	Arsenic (as As), mg/L, Max	0.2	0.2	0.2	0.2
15.	Mercury (as Hg). Mg/L, Max	0.01	0.01	--	0.01
16.	Lead (as Pb), mg/L, Max	0.1	1.0	-	1.0
17.	Cadmium (as Cd), mg/L,	2.0	1.0	--	2.0
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

Sr.	Parameter	Standards			
		Inland surface Water	Public Sewers	Land for Irrigation	Marine Coastal Areas
20.	Copper (as Cu), mg/L, Max.	3.0	3.0	--	3.0
21.	Zinc (as Zn), mg/L, Max.	5.0	15	0--	15
22	Selenium (as Se), mg/L, Max.	0.05	0.05	--	0.05
23	Nickel (as Ni), mg/L, Max.	3.0	3.0	--	5.0
24	Boron (as B), mg/L, Max.	2.0	2.0	2.0	--
25.	Percent Sodium, Max.	--	60	60	--
26.	Residual Sodium carbonate, mg/L, Max.	--	--	5.0	--
27.	Cyanide (as Cn), mg/L, Max.	0.2	2.0	0.2	0.2
28.	Chloride (as Cl), mg/L, Max.	1000	1000	600	--
29.	Fluoride (as F), mg/L, 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 ₆ H ₅ OH), mg/L, Max.	1.0	5.0	--	5.0

Sr.	Parameter	Standards			
		Inland surface Water	Public Sewers	Land for Irrigation	Marine Coastal Areas
35.	Radioactive materials:				
	a. Alpha emitters MC/ml., Max.	10^{-7}	10^{-7}	10^{-8}	10^{-7}
	b. Beta emitters $\mu\text{c/ml.}$, 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 Cl ₂)	mg/L	Max 4.0	No relaxation
14.	Chlorides (as Cl)	mg/L	Max 250	Max 1000
15.	Copper (as Cu)	mg/L	Max 0.05	Max 1.5
16.	Fluoride (as F)	mg/L	Max 1.0	Max 1.5
17.	Free residual chlorine	mg/L	Min 0.2	Min 1
18.	Iron (as Fe)	mg/L	Max 0.3	No relaxation
19.	Magnesium (as Mg)	mg/L	Max 30	Max100

Sr.	Characteristic	Unit	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source
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 ₆ H ₅ OH)	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 ₂ S)	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 (as Cd)	mg/L	Max 0.003	No relaxation
32.	Cyanide (as CN)	mg/L	Max 0.05	No relaxation
33.	Lead (as Pb)	mg/L	Max 0.01	No relaxation
34.	Mercury (as Hg)	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

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

Sr.	Characteristic	Unit	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source
xiv)	Isoproturon	µg/L	9	No relaxation
xv)	Malathion	µg/L	190	No relaxation
xvi)	Methyl parathion	µg/L	0.3	No relaxation
xvii)	Monocrotophos	µg/L	1	No relaxation
xviii)	Phorate	µg/L	2	No relaxation
Table 6	Bacteriological Quality of Drinking Water			
44.	E.coli or thermotolerant coliform bacteria	/100	Not detectable	-
45.	Total coliform bacteria	/100 mL	Not detectable	-
	Virological Requirements			
46.	MS2 phage	/1 L	Absent	-
	Biological Requirements			
47.	Cryptosporidium	/10 L	Absent	-
48.	Giardia	/10 L	Absent	-
49.	Microscopic organisms such as algae, zooplanktons, flagellates, parasites and toxin producing organisms		Free from microscopic organisms	-

Annexure VIII: CPCB Water Quality Criteria:

Designated best use	Quality Class	Primary Water Quality Criteria
Drinking water source without conventional treatment but with chlorination	A	<ul style="list-style-type: none"> ➤ 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	<ul style="list-style-type: none"> ➤ 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	<ul style="list-style-type: none"> ➤ 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	<ul style="list-style-type: none"> ➤ 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	<ul style="list-style-type: none"> ➤ 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	<ul style="list-style-type: none"> ➤ 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, μ mhos/cm	<1000	<2250	<4000
(v)	(NO ₂ +NO ₃)-Nitrogen, mg/l	<5	<10	<15
(vi)	Suspended solid, mg/l	<25	<50	<100

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

Note:

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

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

Sr.	Parameters	Requirement for Waters of Class		
		A- Excellent	B-Desirable	C-Acceptable
(i)	Total Phosphorous	<0.1 mg/l	<0.2 mg/l	<0.3 mg/l
(ii)	T.K.N	<1.0 mg/l	<2.0 mg/l	<3.0 mg/l
(iii)	Total Ammonia (NH ₄ + NH ₃)-Nitrogen	<0.5 mg/l	<1.0 mg/l	<1.5 mg/l
(iv)	Phenols	<2 µg/l	<5 µg/l	<10 µg/l
(v)	Surface Active Agents	<20 µg/l	<100 µg/l	<200 µg/l
(vi)	Organo Chlorine Pesticides	<0.05 µg/l	<0.1 µg/l	<0.2 µg/l
(vii)	PAH	<0.05 µg/l	<0.1 µg/l	<0.2 µg/l
(viii)	PCB and PCT	<0.01 µg/l	<0.01 µg/l	<0.02 µg/l
(ix)	Zinc	<100 µg/l	<200 µg/l	<300 µg/l
(x)	Nickel	<50 µg/l	<100 µg/l	<200 µg/l
(xi)	Copper	<20 µg/l	<50 µg/l	<100 µg/l
(xii)	Chromium (Total)	<20 µg/l	<50 µg/l	<100 µg/l

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