

**ACTION PLAN FOR INDUSTRIAL CLUSTER IN  
SEVERLY POLLUTED AREA**

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

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## Index

|   |           |
|---|-----------|
| Acknowledgement: .....  | 3         |
| Abbreviations: .....  | 4         |
| <b>1. Introduction: .....</b>   | <b>5</b>  |
| <b>2. Scope of Work.....</b>  | <b>5</b>  |
| 2.1 Stack Emission Parameters.....  | 6         |
| 2.2 Ambient Air Quality Parameters .....  | 7         |
| 2.3 Water/Waste Water Parameters .....  | 7         |
| 2.3 Methodology followed in Sampling and Analysis .....   | 10        |
| <b>3. Result of Analysis: .....</b>   | <b>10</b> |
| 3.1 Stack Emission: .....   | 10        |
| 3.2 Ambient Air Quality: .....  | 15        |
| 3.3 Water/Waste Water Quality: .....  | 21        |
| 3.4 Ground Water Quality: .....   | 26        |
| <b>4. Summary and Conclusion.....</b>   | <b>47</b> |
| 4.1 Stack Emission Monitoring:.....   | 47        |
| 4.2 Ambient Air Quality Monitoring: .....   | 47        |
| 4.3 Waste Water Quality Monitoring:.....  | 48        |
| 4.3 Ground Water Quality Monitoring: .....  | 49        |
| <b>5. CEPI Score .....</b>  | <b>50</b> |
| 5.1 Comparison of CEPI scores:.....   | 52        |
| <b>6. Conclusion .....</b>  | <b>54</b> |
| <b>7. References.....</b>   | <b>55</b> |
| <b>8. Annexure .....</b>  | <b>56</b> |
| Annexure I: Health related data in impact on humans.....  | 56        |
| Annexure II: Stack Emission Sampling and Analysis Methodology .....   | 57        |
| Annexure III: Ambient Air Sampling and Analysis Methodology .....   | 59        |
| Annexure IV: Water/Wastewater Sampling and Analysis Methodology .....   | 61        |
| Annexure V: National Ambient Air Quality Standards, 2009.....   | 65        |
| Annexure VI: General Standards for Discharge of Environmental Pollutants, Part A:<br>Effluents (The Environment (Protection) Rules, 1986, Schedule VI)..... | 66        |
| Annexure VII: Drinking Water Specification-IS 10500:2012 .....  | 70        |
| Annexure VIII: CPCB Water Quality Criteria: .....   | 74        |
| Annexure IX: Water Quality Parameters Requirements and Classification.....  | 75        |

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## Abbreviations:

|                         |   |
|-------------------------|---|
| <b>APHA</b>             | American Public Health Association          |
| <b>BDL</b>              | Below Detection Limit                       |
| <b>BOD</b>              | Biochemical Oxygen Demand                   |
| <b>CEPI</b>             | Comprehensive Environmental Pollution Index |
| <b>CETP</b>             | Common Effluent Treatment Plant             |
| <b>COD</b>              | Chemical Oxygen Demand                      |
| <b>CPA</b>              | Critically Polluted Areas                   |
| <b>SPA</b>              | Severely Polluted Areas                     |
| <b>DO</b>               | Dissolved Oxygen                            |
| <b>ETP</b>              | Effluent Treatment Plant                    |
| <b>MIBK</b>             | Methyl Isobutyl Ketone                      |
| <b>MPCB</b>             | Maharashtra Pollution Control Board         |
| <b>NAAQS</b>            | National Ambient Air Quality Standards      |
| <b>NO<sub>x</sub></b>   | Oxides of Nitrogen                          |
| <b>ND</b>               | Not Detected                                |
| <b>PAH</b>              | Poly Aromatic Hydrocarbons                  |
| <b>PCB</b>              | Poly Chlorinated Biphenyls                  |
| <b>PCT</b>              | Poly Chlorinated Terphenyls                 |
| <b>PM<sub>10</sub></b>  | Particulate Matter (size less than 10 µm)   |
| <b>PM<sub>2.5</sub></b> | Particulate Matter (size less than 2.5 µm)  |
| <b>SO<sub>2</sub></b>   | Sulphur Dioxide                             |
| <b>STAP</b>             | Short Term Action Plan                      |
| <b>WHO</b>              | 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 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.

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.

Nashik is a city in the northwest region of Maharashtra in India, and is the administrative headquarter of the Nashik District and Nashik Division. There is a Hindustan Aeronautics Limited aircraft manufacturing plant located 16 km from Nashik. The Currency Note Press and India Security Press are on Nashik Road, where Indian currency and government stamp papers are printed respectively. Nashik also has textile industry, e.g., carpet weaving in remote areas like Surgana Block, National Bank for Agriculture and Rural Development has selected Yeola Block for development of Paithani Cluster. To facilitate the export a container freight station was started at MIDC Ambad by the Central Government. Nashik has been described as "The Wine Capital of India" by Alok Chandra of Business Standard due to the numerous wineries located within the district. As of 2013, the Nashik region reportedly produces 10,000 tonnes of grapes per year. There are 22 wineries in Nashik, out of 46 wineries throughout India total. Nashik is home to several wine festivals, such as Sula Fest in the harvest season.

## 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

Severely Polluted Areas: Monitoring, sampling, analysis of Stack, Ambient Air Quality, Surface Water, Ground Water, Waste Water

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 Nashik:**

- The sampling was carried out in 11 days i.e. on 28<sup>th</sup> May to & 8<sup>th</sup> June 2017 for Nashik region.
- In MIDC Ambad, total of 7 Stack Monitoring Samples, 6 Ambient Air Quality Monitoring Samples, 6 Ground Water Samples and 2 VOC Samples from Stack were collected and analyzed.
- In MIDC Satpur, total of 8 Stack Monitoring Samples, 6 Ambient Air Quality Monitoring Samples, 2 waste water samples, 6 Ground Water Samples were collected and 2 VOC Samples from Stack 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<sub>2</sub>)
2. Nitrogen Dioxide (NO<sub>2</sub>)
3. Particulate Matter (PM10)
4. Particulate Matter (PM2.5)
5. Ozone (O<sub>3</sub>)
6. Lead (Pb)
7. Carbon Monoxide (CO)
8. Ammonia (NH<sub>3</sub>)
9. Benzene (C<sub>6</sub>H<sub>6</sub>)
10. Benzo (a) Pyrene (BaP) (Particulate Phase Only)
11. Arsenic (As)
12. Nickel (Ni)

## **2.3 Water/Waste Water Parameters**

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

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

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

**i. Simple Parameters:**

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

**ii. Regular Monitoring Parameters:**

7. pH
8. Oil & Grease
9. Suspended Solids
10. Dissolved Oxygen (% saturation) (Not applicable for ground waters)
11. Chemical Oxygen Demand
12. Biochemical Oxygen Demand
13. Electrical Conductivity
14. Nitrite-Nitrogen
15. Nitrate-Nitrogen
16. (NO<sub>2</sub> + NO<sub>3</sub>)-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.**

## 2.3 Methodology followed in Sampling and Analysis

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

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

## 3. Result of Analysis:

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

### \*Kindly note:

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

**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 | MIDC   | Table No.  |
|-----|------------------------------|----------------|--------|------------|
| 1.  | Shakti Synergic Pvt. Ltd.    | Boiler         | Ambad  | <b>I</b>   |
| 2.  | Sudal Industries             | Boiler         | Ambad  | <b>I</b>   |
| 3.  | Isovolta India Pvt. Ltd.     | Boiler         | Ambad  | <b>I</b>   |
| 4.  | Vir Electro EnggPvt. Ltd.    | Furnace Stack  | Ambad  | <b>II</b>  |
| 5.  | Rainbow Decoplus Pvt Ltd.    | Process Stack  | Ambad  | <b>II</b>  |
| 6.  | Lube Tech oil co.            | Boiler         | Ambad  | <b>II</b>  |
| 7.  | Kirloskat Engine Oil Ltd.    | Process Stack  | Ambad  | <b>III</b> |
| 8.  | Graphite India Ltd.          | Stack no. 10   | Satpur | <b>III</b> |
| 9.  | Glenmark Pharmaceutical Ltd. | Boiler         | Satpur | <b>III</b> |

| Sr. | Name of Industry               | Stack Identity   | MIDC   | Table No. |
|-----|--------------------------------|------------------|--------|-----------|
| 10. | Ceat Ltd.                      | Boiler           | Satpur | <b>IV</b> |
| 11. | Jyoti Structure Ltd.           | Furnace Stack    | Satpur | <b>IV</b> |
| 12. | Caprihans India Ltd            | Boiler           | Satpur | <b>IV</b> |
| 13. | MSL Oriveline System Ltd.      | Process Stack    | Satpur | <b>V</b>  |
| 14. | AATCO Food India Pvt. Ltd      | Boiler Stack     | Satpur | <b>V</b>  |
| 15. | Mahindra & Mahindra (Plant -I) | Oven Stack No. I | Satpur | <b>V</b>  |

**\*The VOC result of stack emission is provided in Table No. VI**

**TableNo.I**

| Name of Industry |                                       |                          | Shakti Synergic Pvt. Ltd. | Sudal Industries | Isovolta India Pvt. Ltd. |
|------------------|---------------------------------------|--------------------------|---------------------------|------------------|--------------------------|
| Date of Sampling |                                       |                          | <b>01.06.17</b>           | <b>01.06.17</b>  | <b>04.06.17</b>          |
| Sr.              | Parameter                             | Unit                     | Results                   |                  |                          |
| 1.               | Particulate Matter (as PM)            | mg/Nm <sup>3</sup>       | 270                       | 246              | 250                      |
|                  | <b>Std. Limit</b>                     | <b>mg/Nm<sup>3</sup></b> | <b>150</b>                | <b>150</b>       | <b>150</b>               |
| 2.               | Sulphur Dioxide (as SO <sub>2</sub> ) | mg/Nm <sup>3</sup>       | 103                       | 12.1             | BDL                      |
|                  |                                       | kg/day                   | 16.7                      | 1.81             | BDL                      |
|                  | <b>Std. Limit</b>                     | <b>mg/Nm<sup>3</sup></b> | <b>100</b>                | <b>100</b>       | <b>100</b>               |
| 3.               | Nitrogen Dioxide (NO <sub>2</sub> )   | mg/Nm <sup>3</sup>       | 515                       | 457              | 98                       |
|                  | <b>Std. Limit</b>                     | <b>mg/Nm<sup>3</sup></b> | <b>250</b>                | <b>250</b>       | <b>250</b>               |

**TableNo.II**

| Name of Industry |                            |                          | Vir Electro Engg Pvt. Ltd. | Rainbow Deco plus Pvt. Ltd | Lube Tech oil co |
|------------------|----------------------------|--------------------------|----------------------------|----------------------------|------------------|
| Date of Sampling |                            |                          | <b>05.06.17</b>            | <b>05.06.17</b>            | <b>06.06.17</b>  |
| Sr.              | Parameter                  | Unit                     | Results                    |                            |                  |
| 1.               | Particulate Matter (as PM) | mg/Nm <sup>3</sup>       | 336                        | NA                         | 357              |
|                  | <b>Std. Limit</b>          | <b>mg/Nm<sup>3</sup></b> | <b>150</b>                 | <b>150</b>                 | <b>150</b>       |

| Name of Industry |                                       |                          | Vir Electro Engg Pvt. Ltd. | Rainbow Deco plus Pvt. Ltd | Lube Tech oil co |
|------------------|---------------------------------------|--------------------------|----------------------------|----------------------------|------------------|
| Date of Sampling |                                       |                          | <b>05.06.17</b>            | <b>05.06.17</b>            | <b>06.06.17</b>  |
| Sr.              | Parameter                             | Unit                     | Results                    |                            |                  |
| 2.               | Sulphur Dioxide (as SO <sub>2</sub> ) | mg/Nm <sup>3</sup>       | BDL                        | NA                         | BDL              |
|                  |                                       | kg/day                   | BDL                        | NA                         | BDL              |
|                  | <b>Std. Limit</b>                     | <b>mg/Nm<sup>3</sup></b> | -                          | -                          | -                |
| 3.               | Nitrogen Dioxide (NO <sub>2</sub> )   | mg/Nm <sup>3</sup>       | 197                        | NA                         | 211              |
|                  | <b>Std. Limit</b>                     | <b>mg/Nm<sup>3</sup></b> | <b>250</b>                 | -                          | <b>250</b>       |

TableNo.III

| Name of Industry |                                       |                          | Graphite India Ltd. | Glenmark Pharmaceutical Ltd. | Ceat Ltd.       |
|------------------|---------------------------------------|--------------------------|---------------------|------------------------------|-----------------|
| Date of Sampling |                                       |                          | <b>02.06.17</b>     | <b>02.06.17</b>              | <b>03.06.17</b> |
| Sr.              | Parameter                             | Unit                     | Results             |                              |                 |
| 1.               | Particulate Matter (as PM)            | mg/Nm <sup>3</sup>       | 192                 | 267                          | 75              |
|                  | <b>Std. Limit</b>                     | <b>mg/Nm<sup>3</sup></b> | <b>150</b>          | <b>150</b>                   | <b>150</b>      |
| 2.               | Sulphur Dioxide (as SO <sub>2</sub> ) | mg/Nm <sup>3</sup>       | 1481                | BDL                          | BDL             |
|                  |                                       | kg/day                   | 584                 | BDL                          | BDL             |
|                  | <b>Std. Limit</b>                     | <b>mg/Nm<sup>3</sup></b> | <b>100</b>          | -                            | -               |
| 3.               | Nitrogen Dioxide (NO <sub>2</sub> )   | mg/Nm <sup>3</sup>       | 448                 | 227                          | 68              |
|                  | <b>Std. Limit</b>                     | <b>mg/Nm<sup>3</sup></b> | <b>250</b>          | <b>250</b>                   | <b>250</b>      |

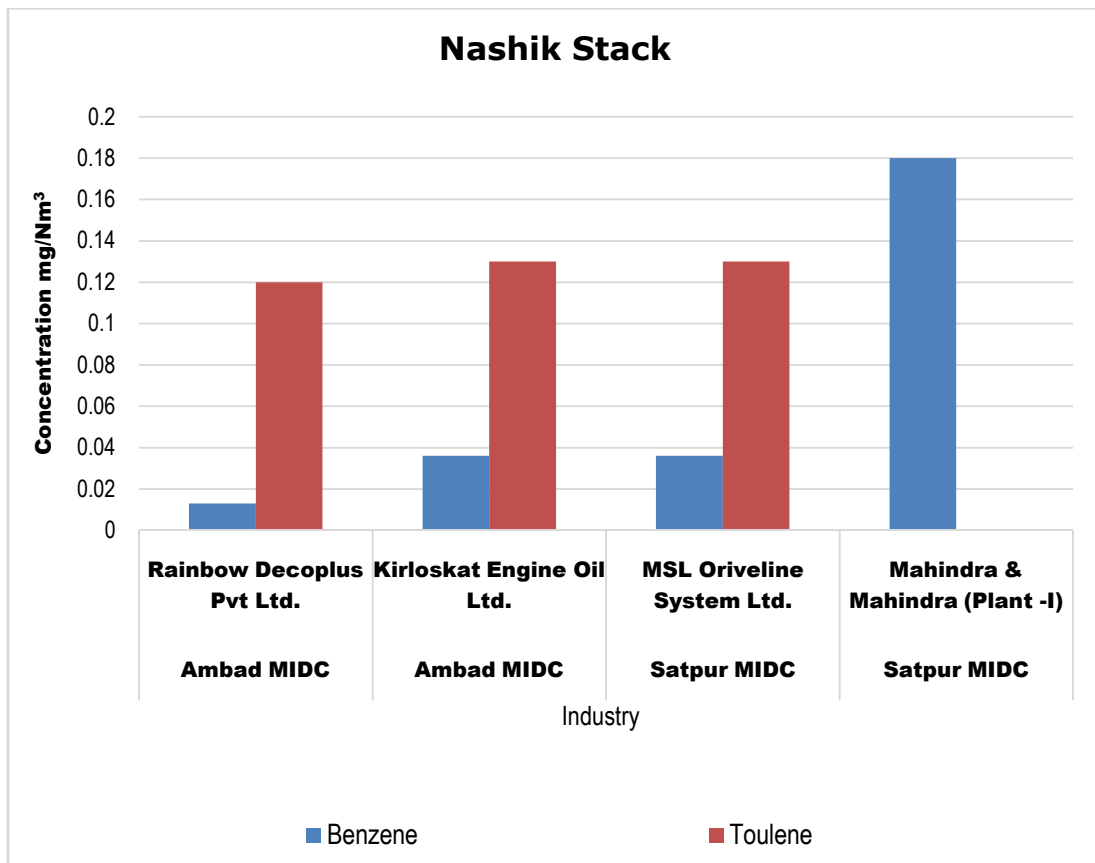
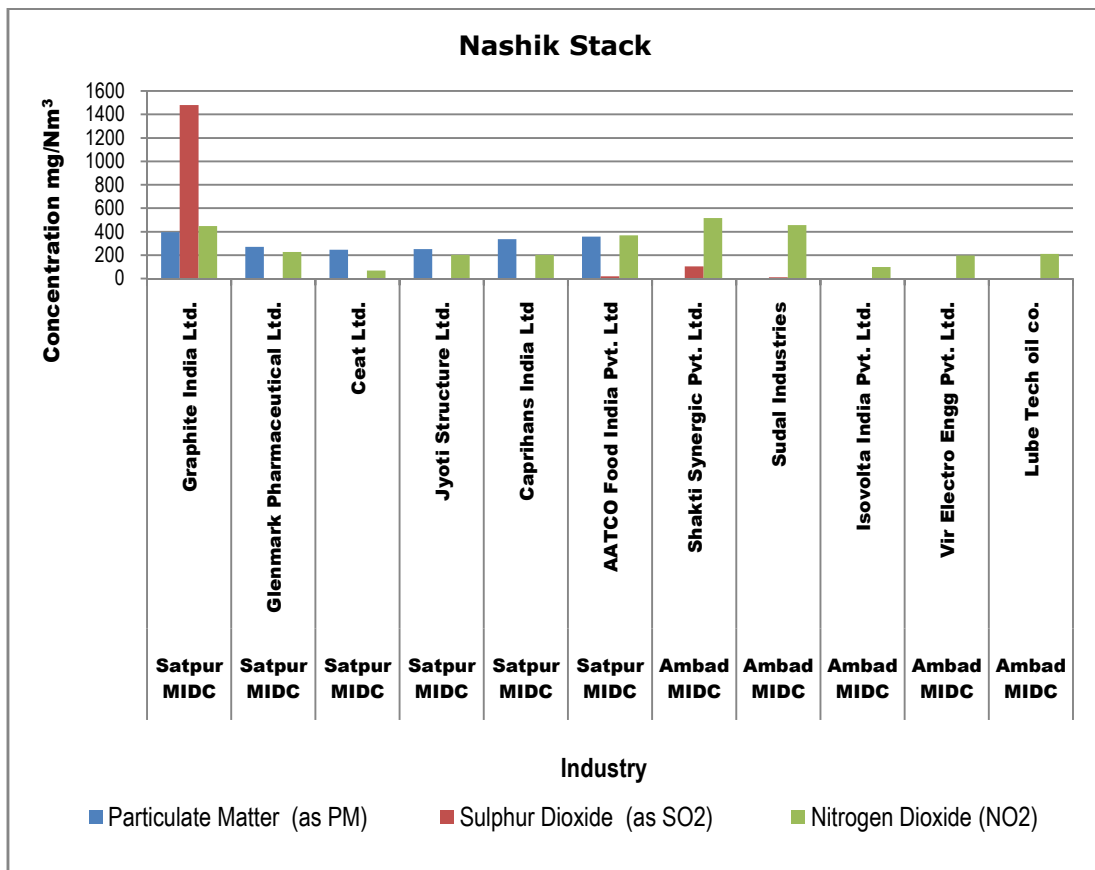
**TableNo.IV**

| Name of Industry |                                       |                          | Jyoti Structure Ltd. | Caprihans India Ltd. | AATCO Food India Pvt. Ltd. |
|------------------|---------------------------------------|--------------------------|----------------------|----------------------|----------------------------|
| Date of Sampling |                                       |                          | <b>07.06.17</b>      | <b>07.06.17</b>      | <b>31.05.17</b>            |
| Sr.              | Parameter                             | Unit                     | Results              |                      |                            |
| 1.               | Particulate Matter (as PM)            | mg/Nm <sup>3</sup>       | 176                  | 41                   | 396                        |
|                  | <b>Std. Limit</b>                     | <b>mg/Nm<sup>3</sup></b> | <b>150</b>           | <b>150</b>           | <b>150</b>                 |
| 2.               | Sulphur Dioxide (as SO <sub>2</sub> ) | mg/Nm <sup>3</sup>       | BDL                  | BDL                  | 19.2                       |
|                  |                                       | kg/day                   | BDL                  | BDL                  | 0.13                       |
|                  | <b>Std. Limit</b>                     | <b>mg/Nm<sup>3</sup></b> | <b>-</b>             | <b>-</b>             | <b>100</b>                 |
| 3.               | Nitrogen Dioxide (NO <sub>2</sub> )   | mg/Nm <sup>3</sup>       | 203                  | 203                  | 368                        |
|                  | <b>Std. Limit</b>                     | <b>mg/Nm<sup>3</sup></b> | <b>250</b>           | <b>250</b>           | <b>250</b>                 |

**TableNo. V**

| Name of Industry |                        |                    | Rainbow Decoplus Pvt Ltd. | Kirloskat Engine Oil Ltd. | MSL Oriveline System Ltd. | Mahindra & Mahindra (Plant -I) |
|------------------|------------------------|--------------------|---------------------------|---------------------------|---------------------------|--------------------------------|
| Date of Sampling |                        |                    | <b>05.06.17</b>           | <b>06.06.17</b>           | <b>31.05.17</b>           | <b>08.06.17</b>                |
| Sr.              | Parameter              | Unit               | Results                   |                           |                           |                                |
| 1.               | VOC                    |                    |                           |                           |                           |                                |
| I.               | Methyl Isobutyl Ketone | mg/Nm <sup>3</sup> | ND                        | ND                        | ND                        | ND                             |
| II.              | Benzene                | mg/Nm <sup>3</sup> | 0.013                     | 0.036                     | 0.036                     | 0.18                           |
| III.             | Toulene                | mg/Nm <sup>3</sup> | 0.12                      | 0.13                      | 0.13                      | ND                             |
| IV.              | Xylene                 | mg/Nm <sup>3</sup> | ND                        | ND                        | ND                        | ND                             |
| V.               | Ethyl Benzene          | mg/Nm <sup>3</sup> | ND                        | ND                        | ND                        | ND                             |
| VI.              | Ethyl Acetate          | mg/Nm <sup>3</sup> | ND                        | ND                        | ND                        | ND                             |

**Graphs: Stack Monitoring for Nashik:**



### 3.2 Ambient Air Quality:

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

| Sr. | Location                     | MIDC   | Location detail | Table No.  |
|-----|------------------------------|--------|-----------------|------------|
| 1.  | Sudal Industries Ltd.        | Ambad  | Near Temple     | <b>I</b>   |
| 2.  | Shakti Synergetics Pvt. Ltd. | Ambad  | Near Main Gate  | <b>I</b>   |
| 3.  | Vir Electro Engg. Pvt. Ltd.  | Ambad  | Near Main Gate  | <b>I</b>   |
| 4.  | Isovolta India Pvt. Ltd.     | Ambad  | Near Main Gate  | <b>II</b>  |
| 5.  | Lub Tech Oil Company         | Ambad  | Near Main Gate  | <b>II</b>  |
| 6.  | Mahindra CIE Automotive Ltd. | Ambad  | Near Main Gate  | <b>II</b>  |
| 7.  | Mahindra Sona Ltd.           | Satpur | Near Main Gate  | <b>III</b> |
| 8.  | Atco Foods India Pvt. Ltd.   | Satpur | Near Main Gate  | <b>III</b> |
| 9.  | VIP Industries Ltd.          | Satpur | Near ETP        | <b>III</b> |
| 10. | Graphite India Ltd.          | Satpur | Near Main Gate  | <b>IV</b>  |
| 11. | Ceat Ltd.                    | Satpur | Near STP        | <b>IV</b>  |
| 12. | M & M (Plant I)              | Satpur | Near MQS Gate   | <b>IV</b>  |

**TableNo.I**

| Location       |   |                   |                        | Sudhal Industries | Shakti Synergetics Pvt. Ltd. | Vir Electro Engg. Pvt. Ltd. |
|----------------|---|-------------------|------------------------|-------------------|------------------------------|-----------------------------|
| DateofSampling |   |                   |                        | <b>02.06.17</b>   | <b>02.06.17</b>              | <b>05.06.17</b>             |
| Sr.            | Parameters  | Unit              | Std.Limit (NAAQS 2009) | Results           |                              |                             |
| 1.             | Sulphur Dioxide (SO <sub>2</sub> )                            | µg/m <sup>3</sup> | <b>80</b>              | BDL               | BDL                          | BDL                         |
| 2.             | Nitrogen Dioxide (NO <sub>2</sub> )                           | µg/m <sup>3</sup> | <b>80</b>              | BDL               | BDL                          | 4.86                        |
| 3.             | Particulate Matter (size less than 10 µm) or PM <sub>10</sub> | µg/m <sup>3</sup> | <b>100</b>             | 233               | 91                           | 140                         |

| Location         |   |                   |                         | Sudhal Industries | Shakti Synergetics Pvt. Ltd. | Vir Electro Engg. Pvt. Ltd. |
|------------------|---|-------------------|-------------------------|-------------------|------------------------------|-----------------------------|
| Date of Sampling |   |                   |                         | 02.06.17          | 02.06.17                     | 05.06.17                    |
| Sr.              | Parameters  | Unit              | Std. Limit (NAAQS 2009) | Results           |                              |                             |
| 4.               | Particulate Matter (size less than 2.5 µm) or PM <sub>2.5</sub> | µg/m <sup>3</sup> | 60                      | 87                | 13                           | 38                          |
| 5.               | Ozone (O <sub>3</sub> )   | µg/m <sup>3</sup> | 180                     | BDL               | BDL                          | BDL                         |
| 6.               | Lead (Pb)   | µg/m <sup>3</sup> | 1                       | 0.028             | 0.0204                       | BDL                         |
| 7.               | Carbon Monoxide (CO)  | mg/m <sup>3</sup> | 4                       | 8.24              | 6.29                         | BDL                         |
| 8.               | Ammonia (NH <sub>3</sub> )                                      | µg/m <sup>3</sup> | 400                     | BDL               | 70                           | BDL                         |
| 9.               | Benzene (C <sub>6</sub> H <sub>6</sub> )                        | µg/m <sup>3</sup> | 5                       | BDL               | BDL                          | BDL                         |
| 10.              | Benzo (a) Pyrene (BaP) – particulate phase only                 | ng/m <sup>3</sup> | 1                       | BDL               | BDL                          | BDL                         |
| 11.              | Arsenic (As)  | ng/m <sup>3</sup> | 6                       | BDL               | BDL                          | BDL                         |
| 12.              | Nickel (Ni)   | ng/m <sup>3</sup> | 20                      | BDL               | BDL                          | BDL                         |

Table No. II

| Location         |                                     |                   |                         | Isovolta India Pvt. Ltd. | Lub Tech Oil Company | Mahindra CIE Automotive Ltd. |
|------------------|-------------------------------------|-------------------|-------------------------|--------------------------|----------------------|------------------------------|
| Date of Sampling |                                     |                   |                         | 05.06.17                 | 06.06.17             | 07.06.17                     |
| Sr.              | Parameter                           | Unit              | Std. Limit (NAAQS 2009) | Results                  |                      |                              |
| 1.               | Sulphur Dioxide (SO <sub>2</sub> )  | µg/m <sup>3</sup> | 80                      | BDL                      | BDL                  | BDL                          |
| 2.               | Nitrogen Dioxide (NO <sub>2</sub> ) | µg/m <sup>3</sup> | 80                      | 3.03                     | BDL                  | 5.67                         |



| Location         |   |                          |                                  | Isovolta<br>India Pvt.<br>Ltd. | Lub Tech<br>Oil<br>Company | Mahindra<br>CIE<br>Automotive<br>Ltd. |
|------------------|---|--------------------------|----------------------------------|--------------------------------|----------------------------|---------------------------------------|
| Date of Sampling |   |                          |                                  | <b>05.06.17</b>                | <b>06.06.17</b>            | <b>07.06.17</b>                       |
| Sr.              | Parameter   | Unit                     | Std.<br>Limit<br>(NAAQS<br>2009) | Results                        |                            |                                       |
| 3.               | Particulate Matter<br>(size less than 10<br>$\mu\text{m}$ ) or $\text{PM}_{10}$   | $\mu\text{g}/\text{m}^3$ | <b>100</b>                       | 435                            | 504                        | 352                                   |
| 4.               | Particulate Matter<br>(size less than 2.5<br>$\mu\text{m}$ ) or $\text{PM}_{2.5}$ | $\mu\text{g}/\text{m}^3$ | <b>60</b>                        | 105                            | 124                        | 31                                    |
| 5.               | Ozone ( $\text{O}_3$ )  | $\mu\text{g}/\text{m}^3$ | <b>180</b>                       | BDL                            | BDL                        | BDL                                   |
| 6.               | Lead (Pb)   | $\mu\text{g}/\text{m}^3$ | <b>1</b>                         | BDL                            | 0.021                      | 0.022                                 |
| 7.               | Carbon Monoxide<br>(CO)   | $\text{mg}/\text{m}^3$   | <b>4</b>                         | BDL                            | 0.68                       | BDL                                   |
| 8.               | Ammonia ( $\text{NH}_3$ )   | $\mu\text{g}/\text{m}^3$ | <b>400</b>                       | BDL                            | BDL                        | BDL                                   |
| 9.               | Benzene ( $\text{C}_6\text{H}_6$ )  | $\mu\text{g}/\text{m}^3$ | <b>5</b>                         | BDL                            | 8                          | 23                                    |
| 10.              | Benzo (a) Pyrene<br>(BaP) – particulate<br>phase only                             | $\text{ng}/\text{m}^3$   | <b>1</b>                         | BDL                            | BDL                        | BDL                                   |
| 11.              | Arsenic (As)  | $\text{ng}/\text{m}^3$   | <b>6</b>                         | BDL                            | BDL                        | BDL                                   |
| 12.              | Nickel (Ni)   | $\text{ng}/\text{m}^3$   | <b>20</b>                        | BDL                            | BDL                        | 3.09                                  |

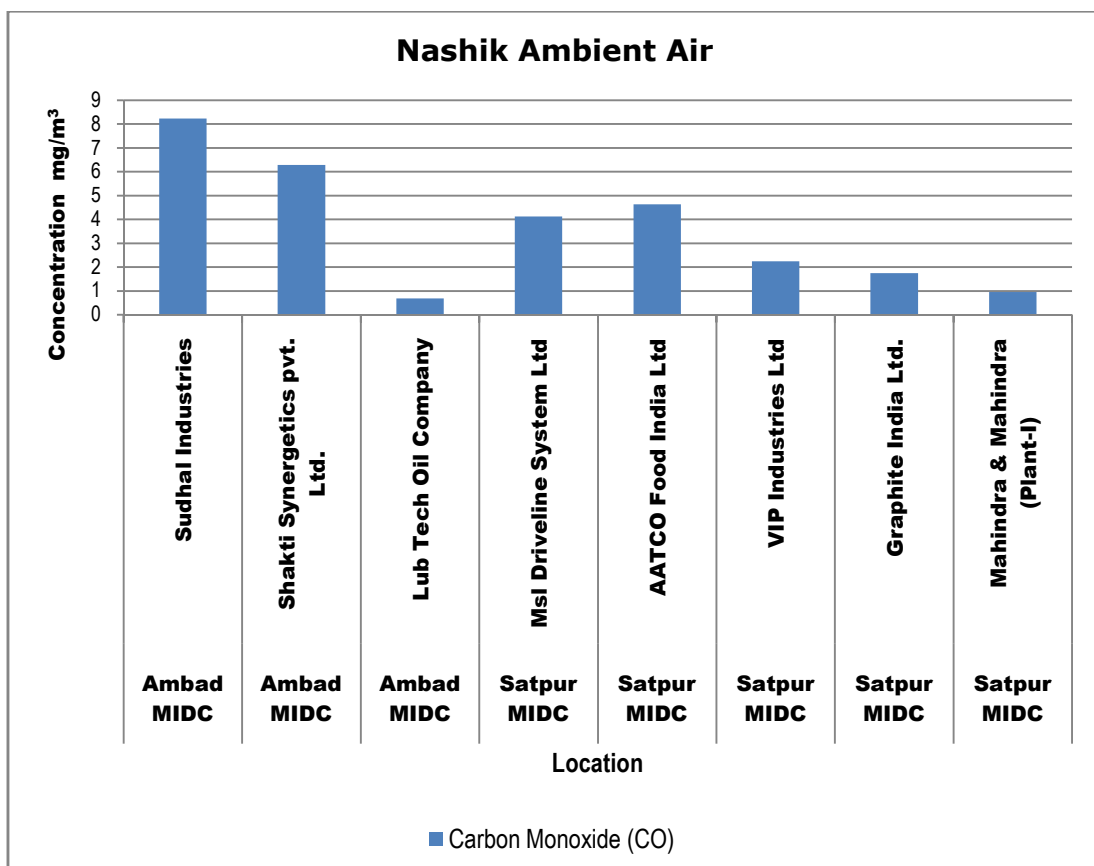
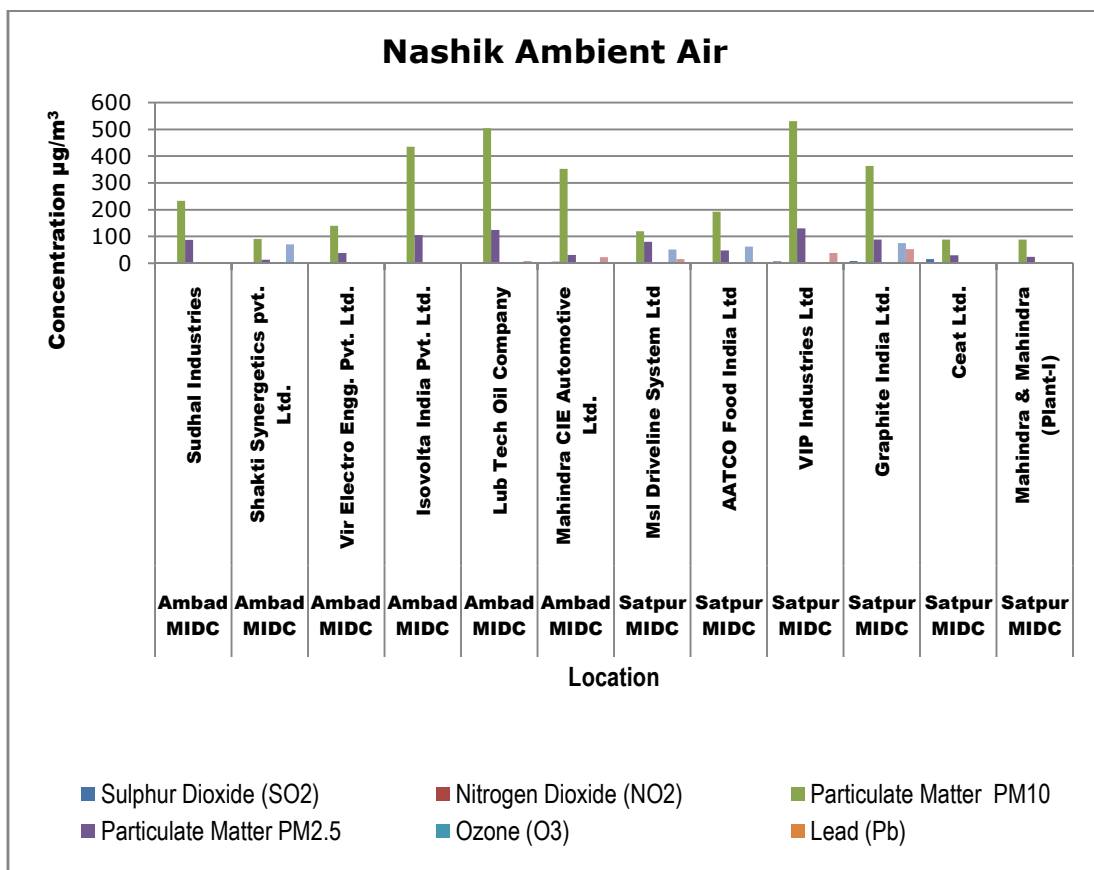
**TableNo.III**

| Location       |   |                   |                                  | Msl<br>Driveline<br>System Ltd | AATCO<br>Food India<br>Ltd | VIP<br>Industries<br>Ltd |
|----------------|---|-------------------|----------------------------------|--------------------------------|----------------------------|--------------------------|
| DateofSampling |   |                   |                                  | <b>01.06.17</b>                | <b>01.06.17</b>            | <b>03.06.17</b>          |
| Sr.            | Parameters  | Unit              | Std.<br>Limit<br>(NAAQS<br>2009) | Results                        |                            |                          |
| 1.             | Sulphur Dioxide (SO <sub>2</sub> )                              | µg/m <sup>3</sup> | <b>80</b>                        | BDL                            | BDL                        | 7                        |
| 2.             | Nitrogen Dioxide (NO <sub>2</sub> )                             | µg/m <sup>3</sup> | <b>80</b>                        | BDL                            | BDL                        | 4.25                     |
| 3.             | Particulate Matter (size less than 10 µm) or PM <sub>10</sub>   | µg/m <sup>3</sup> | <b>100</b>                       | 120                            | 193                        | 531                      |
| 4.             | Particulate Matter (size less than 2.5 µm) or PM <sub>2.5</sub> | µg/m <sup>3</sup> | <b>60</b>                        | 80                             | 48                         | 130                      |
| 5.             | Ozone (O <sub>3</sub> )   | µg/m <sup>3</sup> | <b>180</b>                       | BDL                            | BDL                        | BDL                      |
| 6.             | Lead (Pb)   | µg/m <sup>3</sup> | <b>1</b>                         | BDL                            | BDL                        | 0.021                    |
| 7.             | Carbon Monoxide (CO)  | mg/m <sup>3</sup> | <b>4</b>                         | 4.13                           | 4.64                       | 2.24                     |
| 8.             | Ammonia (NH <sub>3</sub> )                                      | µg/m <sup>3</sup> | <b>400</b>                       | 51                             | 62.1                       | BDL                      |
| 9.             | Benzene (C <sub>6</sub> H <sub>6</sub> )                        | µg/m <sup>3</sup> | <b>5</b>                         | 16.1                           | 4.97                       | 38                       |
| 10.            | Benzo (a) Pyrene (BaP) – particulate phase only                 | ng/m <sup>3</sup> | <b>1</b>                         | BDL                            | BDL                        | BDL                      |
| 11.            | Arsenic (As)  | ng/m <sup>3</sup> | <b>6</b>                         | BDL                            | BDL                        | BDL                      |
| 12.            | Nickel (Ni)   | ng/m <sup>3</sup> | <b>20</b>                        | BDL                            | BDL                        | BDL                      |

**TableNo.IV**

| Location       |   |                   |                         | Graphite India Ltd. | Ceat Ltd.       | Mahindra & Mahindra (Plant-I) |
|----------------|---|-------------------|-------------------------|---------------------|-----------------|-------------------------------|
| DateofSampling |   |                   |                         | <b>03.06.17</b>     | <b>04.06.17</b> | <b>09.06.17</b>               |
| Sr.            | Parameters  | Unit              | Std. Limit (NAAQS 2009) | Results             |                 |                               |
| 1.             | Sulphur Dioxide (SO <sub>2</sub> )                              | µg/m <sup>3</sup> | <b>80</b>               | 8.76                | 15.1            | BDL                           |
| 2.             | Nitrogen Dioxide (NO <sub>2</sub> )                             | µg/m <sup>3</sup> | <b>80</b>               | 3.44                | 3.43            | BDL                           |
| 3.             | Particulate Matter (size less than 10 µm) or PM <sub>10</sub>   | µg/m <sup>3</sup> | <b>100</b>              | 363                 | 89              | 88                            |
| 4.             | Particulate Matter (size less than 2.5 µm) or PM <sub>2.5</sub> | µg/m <sup>3</sup> | <b>60</b>               | 89                  | 30              | 24                            |
| 5.             | Ozone (O <sub>3</sub> )   | µg/m <sup>3</sup> | <b>180</b>              | BDL                 | BDL             | BDL                           |
| 6.             | Lead (Pb)   | µg/m <sup>3</sup> | <b>1</b>                | 0.02                | BDL             | BDL                           |
| 7.             | Carbon Monoxide (CO)  | mg/m <sup>3</sup> | <b>4</b>                | 1.75                | BDL             | 0.95                          |
| 8.             | Ammonia (NH <sub>3</sub> )                                      | µg/m <sup>3</sup> | <b>400</b>              | 75.4                | BDL             | BDL                           |
| 9.             | Benzene (C <sub>6</sub> H <sub>6</sub> )                        | µg/m <sup>3</sup> | <b>5</b>                | 52                  | BDL             | BDL                           |
| 10.            | Benzo (a) Pyrene (BaP) – particulate phase only                 | ng/m <sup>3</sup> | <b>1</b>                | BDL                 | BDL             | BDL                           |
| 11.            | Arsenic (As)  | ng/m <sup>3</sup> | <b>6</b>                | BDL                 | BDL             | BDL                           |
| 12.            | Nickel (Ni)   | ng/m <sup>3</sup> | <b>20</b>               | BDL                 | BDL             | BDL                           |

**Graphs: Ambient Air Quality Monitoring for Nashik:**



### 3.3 Water/Waste Water Quality:

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

| Sr. | Location   | Source               | TableNo. |
|-----|--|----------------------|----------|
| 1.  | Sahid Arun Chitte Pool, Gangapur Rd, Anandvali, Satpur | Chitte Pool,         | I        |
| 2.  | Nasardi Bridge Near NIMA Bhavan, Satpur                | Nasardi Bridge water | I        |

**TableNo.I**

| Location         |  |       |                | Sahid Arun Chitte Pool, Gangapur Rd, Anandvali, Satpur | Nasardi Bridge Near NIMA Bhavan, Satpur |
|------------------|--|-------|----------------|--|---|
| Date of Sampling |  |       |                | <b>07.06.17</b>  | <b>08.06.17</b>                         |
| Sr.              | Parameters                             | Unit  | Std. Limit     | Results  |   |
| 1.               | Colour                                 | Hazen |                | 1  | 50                                      |
| 2.               | Smell                                  | -     |                | Agreeable  | Disagreeable                            |
| 3.               | pH                                     | -     | <b>5.5-9.0</b> | 7.7  | 7.3                                     |
| 4.               | Oil &Grease                            | mg/L  | <b>10.0</b>    | BDL  | BDL                                     |
| 5.               | Suspended Solids                       | mg/L  | <b>100.0</b>   | 28   | 51                                      |
| 6.               | Dissolved Oxygen (%Saturation)         | %     |                | 65   | 57                                      |
| 7.               | Chemical Oxygen Demand                 | mg/L  | <b>250.0</b>   | 30   | 20                                      |
| 8.               | Biochemical Oxygen Demand (3days,27°C) | mg/L  | <b>30.0</b>    | 9.7  | 7.04                                    |

| Location         |  |                 |               | Sahid Arun<br>Chitte Pool,<br>Gangapur Rd,<br>Anandvali,<br>Satpur | Nasardi Bridge<br>Near NIMA<br>Bhavan, Satpur |
|------------------|--|-----------------|---------------|--|---|
| Date of Sampling |  |                 |               | 07.06.17   | 08.06.17                                      |
| Sr.              | Parameters                                   | Unit            | Std. Limit    | Results  |   |
| 9.               | Electrical Conductivity (at25°C)             | µmho/cm         |               | 373  | 743   |
| 10.              | Nitrite Nitrogen (asNO <sub>2</sub> )        | mg/L            |               | 0.06   | BDL   |
| 11.              | Nitrate Nitrogen (asNO <sub>3</sub> )        | mg/L            | <b>10.0</b>   | 2.12   | 5.7   |
| 12.              | (NO <sub>2</sub> +NO <sub>3</sub> )-Nitrogen | mg/L            | <b>5.0</b>    | 2.18   | 5.37  |
| 13.              | Free Ammonia (asNH <sub>3</sub> -N)          | mg/L            | <b>5.0</b>    | BDL  | BDL   |
| 14.              | Total Residual Chlorine                      | mg/L            | <b>1.0</b>    | 0.52   | BDL   |
| 15.              | Cyanide (as CN)                              | mg/L            | <b>0.2</b>    | BDL  | BDL   |
| 16.              | Fluoride(as F)                               | mg/L            | <b>2.0</b>    | 0.44   | 0.52  |
| 17.              | Sulphide (as S <sub>2</sub> -)               | mg/L            | <b>2.0</b>    | BDL  | BDL   |
| 18.              | Dissolved Phosphate (as P)                   | mg/L            | <b>5.0</b>    | BDL  | BDL   |
| 19.              | Sodium Absorption Ratio                      | mg/L            |               | 0.48   | 0.64  |
| 20.              | Total Coliforms                              | MPN index/100ml | <b>100.0</b>  | 170  | 1600  |
| 21.              | Faecal Coliforms                             | MPN index/100ml | <b>1000.0</b> | 49   | 350   |

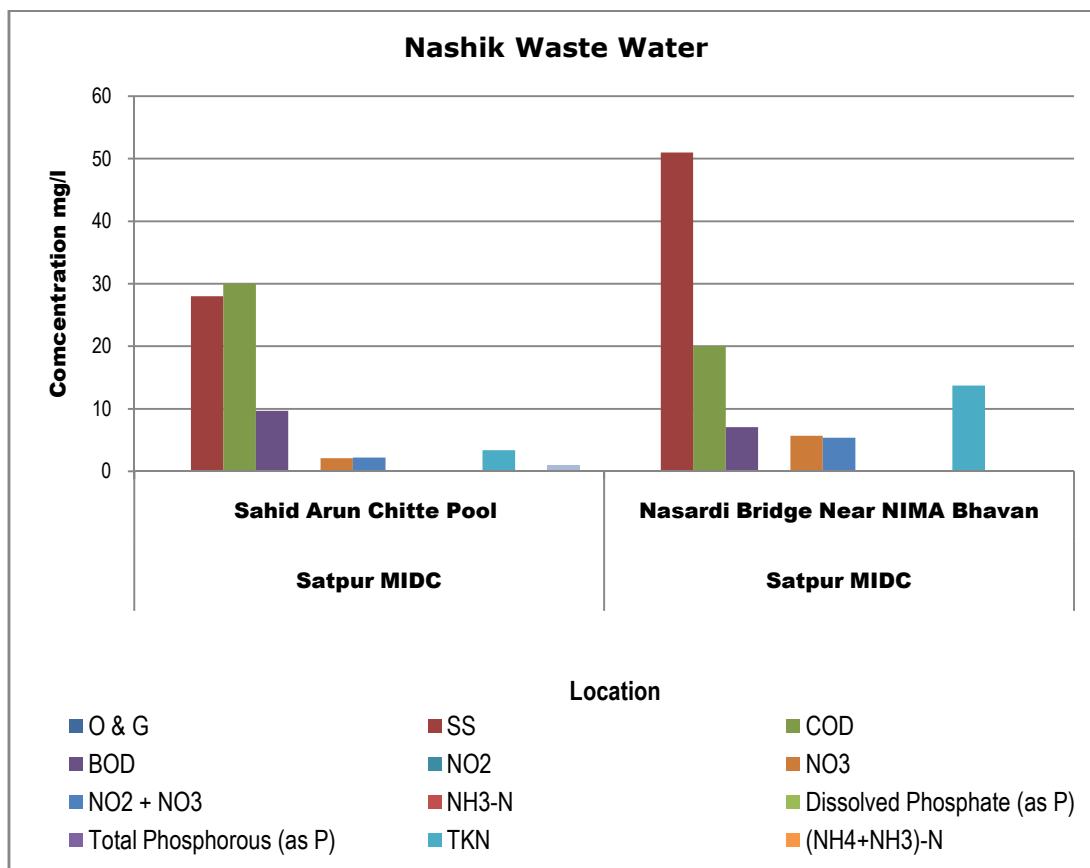
| Location         |   |      |            | Sahid Arun<br>Chitte Pool,<br>Gangapur Rd,<br>Anandvali,<br>Satpur | Nasardi Bridge<br>Near NIMA<br>Bhavan, Satpur |
|------------------|---|------|------------|--|---|
| Date of Sampling |   |      |            | 07.06.17   | 08.06.17                                      |
| Sr.              | Parameters  | Unit | Std. Limit | Results  |   |
| 22.              | Total Phosphorous<br>(as P)                           | mg/L | 1.0        | BDL  | 0.15  |
| 23.              | Total Kjeldahl<br>Nitrogen                            | mg/L | 100.0      | 3.36   | 13.7  |
| 24.              | Total Ammonia<br>(NH <sub>4</sub> +NH <sub>3</sub> )- | mg/L | 5.0        | BDL  | 0.17  |
| 25.              | Phenols<br>(as C <sub>6</sub> H <sub>5</sub> OH)      | mg/L | 3.0        | BDL  | BDL   |
| 26.              | Surface Active<br>Agents<br>(as MBAS)                 | mg/L | 3.0        | BDL  | BDL   |
| 27.              | Organo Chlorine<br>Pesticides                         |      |            |  |   |
| I.               | Alachlor  | µg/L | 2.0        | BDL  | BDL   |
| II.              | Atrazine  | µg/L | 0.2        | BDL  | BDL   |
| III.             | Aldrin  | µg/L | 0.1        | BDL  | BDL   |
| IV.              | Dieldrin  | µg/L | 2.0        | BDL  | BDL   |
| V.               | Alpha HCH   | µg/L | 0.01       | BDL  | BDL   |
| VI.              | Beta HCH  | µg/L | 2.0        | BDL  | BDL   |
| VII.             | Delta HCH   | µg/L | 3.0        | BDL  | BDL   |
| VIII.            | Butachlor   | µg/L | 0.2        | BDL  | BDL   |
| IX.              | p,pDDT  | µg/L | 0.05       | BDL  | BDL   |
| X.               | o,pDDT  | µg/L | 100.0      | BDL  | BDL   |
| XI.              | p,pDDE  | µg/L | 250.0      | BDL  | BDL   |
| XII.             | o,pDDE  | µg/L | 30.0       | BDL  | BDL   |

| Location         |  |      |            | Sahid Arun<br>Chitte Pool,<br>Gangapur Rd,<br>Anandvali,<br>Satpur | Nasardi Bridge<br>Near NIMA<br>Bhavan, Satpur |
|------------------|--|------|------------|--|---|
| Date of Sampling |  |      |            | 07.06.17   | 08.06.17                                      |
| Sr.              | Parameters                                 | Unit | Std. Limit | Results  |   |
| XIII.            | p,pDDD                                     | µg/L |            | BDL  | BDL   |
| XIV.             | o,pDDD                                     | µg/L |            | BDL  | BDL   |
| XV.              | Alpha Endosulfan                           | µg/L | 10.0       | BDL  | BDL   |
| XVI.             | Beta Endosulfan                            | µg/L |            | BDL  | BDL   |
| XVII.            | Endosulfan Sulphate                        | µg/L | 5.0        | BDL  | BDL   |
| VIII.            | YHCH (Lindane)                             | µg/L | 1.0        | BDL  | BDL   |
| 28.              | Polynuclear aromatic hydrocarbons (as PAH) | mg/L | 0.2        | BDL  | BDL   |
| 29.              | Polychlorinated Biphenyls (PCB)            | mg/L | 2.0        | BDL  | BDL   |
| 30.              | Zinc(as Zn)                                | mg/L | 5.0        | 0.055  | BDL   |
| 31.              | Nickel(as Ni)                              | mg/L | 3.0        | BDL  | BDL   |
| 32.              | Copper(as Cu)                              | mg/L |            | BDL  | BDL   |
| 33.              | Hexavalent Chromium (as Cr <sup>6+</sup> ) | mg/L | 0.1        | BDL  | BDL   |
| 34.              | Total Chromium (as Cr)                     | mg/L | 2.0        | BDL  | BDL   |
| 35.              | Total Arsenic(as As)                       | mg/L | 0.2        | BDL  | BDL   |
| 36.              | Lead(as Pb)                                | mg/L | 0.1        | BDL  | 0.014   |
| 37.              | Cadmium (as Cd)                            | mg/L | 2.0        | BDL  | BDL   |



| Location         |                          |               |            | Sahid Arun<br>Chitte Pool,<br>Gangapur Rd,<br>Anandvali,<br>Satpur | Nasardi Bridge<br>Near NIMA<br>Bhavan, Satpur |
|------------------|--------------------------|---------------|------------|--|---|
| Date of Sampling |                          |               |            | 07.06.17   | 08.06.17                                      |
| Sr.              | Parameters               | Unit          | Std. Limit | Results  |   |
| 38.              | Mercury<br>(as Hg)       | mg/L          | 0.01       | BDL  | BDL   |
| 39.              | Manganese<br>(as Mn)     | mg/L          | 2.0        | 0.188  | 0.232   |
| 40.              | Iron(as Fe)              | mg/L          | 3.0        | 3.87   | 0.323   |
| 41.              | Vanadium<br>(as V)       | mg/L          | 0.2        | BDL  | BDL   |
| 42.              | Selenium<br>(as Se)      | mg/L          | 0.05       | BDL  | BDL   |
| 43.              | Boron(as B)              | mg/L          |            | BDL  | BDL   |
| 44.              | Bioassay Test on<br>fish | %<br>survival |            | 50   | 0   |

**Graphs: Water/Waste Water Quality Monitoring for Nashik:**



**3.4 Ground Water Quality:**

| Sr. | Location   | Source         | MIDC   | TableNo.   |
|-----|--|----------------|--------|------------|
| 1.  | Hotel Tapovan, Ambad MIDC, Near Garware Point  | Borewell Water | Ambad  | <b>I</b>   |
| 2.  | ShivajiKacharu Chavan, Gat No. 154/3, Vilholi  | Well Water     | Ambad  | <b>I</b>   |
| 3.  | Mr. Dashrat Pandit Nikam, Plot No. 4, Mauli Chowk, Dattanagar, Chunchule               | Borewell Water | Ambad  | <b>I</b>   |
| 4.  | Pancharatna Farm, Maruti Sankul, Dattanagar, back side Kirloskar Industries            | Well Water     | Ambad  | <b>II</b>  |
| 5.  | Mr. GovindVithobaShirsat   | Well Water     | Ambad  | <b>II</b>  |
| 6.  | Mr. Satish Sukhlal Lad, (Sai Ekta Park), Ambad Village, in front of Indoline furniture | Borewell Water | Ambad  | <b>II</b>  |
| 7.  | Ramesh Ramchandra Kale   | Borewell Water | Satpur | <b>III</b> |

| Sr. | Location                                 | Source         | MIDC   | TableNo.   |
|-----|--|----------------|--------|------------|
| 8.  | Seva Developers Pvt. Ltd.                | Borewell Water | Satpur | <b>III</b> |
| 9.  | Shivaji Nagar 55/6                       | Well Water     | Satpur | <b>III</b> |
| 10. | Shradha Farm House                       | Well Water     | Satpur | <b>IV</b>  |
| 11. | Amit Dilip Yadav P. no. 50, Ganesh nagar | Borewell Water | Satpur | <b>IV</b>  |
| 12. | Vrushab Industry Vanvihar Colony         | Borewell Water | Satpur | <b>IV</b>  |

**Table No. I**

| Location         |   |       |                       | Hotel Tapovan   | Shivaji Kacharu Chavan | Mr. Dashrat Pandit Nikam |
|------------------|---|-------|-----------------------|-----------------|------------------------|--------------------------|
| Date of Sampling |   |       |                       | <b>01.06.17</b> | <b>01.06.17</b>        | <b>01.06.17</b>          |
| Sr.              | Parameters                              | Unit  | Std.   Limit          | Results         |                        |                          |
| 1.               | Colour                                  | Hazen |                       | 1               | 1                      | 1                        |
| 2.               | Smell                                   | -     | <b>Agreeable</b>      | Agreeable       | Agreeable              | Agreeable                |
| 3.               | pH                                      | -     | <b>6.5-8.5</b>        | 6.83            | 7.75                   | 6.64                     |
| 4.               | Oil & Grease                            | mg/L  |                       | BDL             | BDL                    | BDL                      |
| 5.               | Suspended Solids                        | mg/L  | <b>100</b>            | BDL             | 5                      | BDL                      |
| 6.               | Dissolved Oxygen (% Saturation)         | %     |                       | 85              | 85                     | 60                       |
| 7.               | Chemical Oxygen Demand                  | mg/L  | <b>500</b>            | BDL             | BDL                    | 13                       |
| 8.               | Biochemical Oxygen Demand (3days, 27°C) | mg/L  | <b>10 (WHO, 1993)</b> | BDL             | BDL                    | 3.8                      |

| Location         |  |                |                       | Hotel Tapovan   | Shivaji Kacharu Chavan | Mr. Dashrat Pandit Nikam |
|------------------|--|----------------|-----------------------|-----------------|------------------------|--------------------------|
| Date of Sampling |  |                |                       | <b>01.06.17</b> | <b>01.06.17</b>        | <b>01.06.17</b>          |
| Sr.              | Parameters                                   | Unit           | Std.   Limit          | Results         |                        |                          |
| 9.               | Electrical Conductivity (at25°C)             | µmho/cm        | <b>6 (WHO,1993)</b>   | 1794            | 801                    | 1846                     |
| 10.              | Nitrite Nitrogen (asNO <sub>2</sub> )        | mg/L           | <b>0.3 (WHO,1993)</b> | 0.01            | 0.73                   | 0.27                     |
| 11.              | Nitrate Nitrogen (asNO <sub>3</sub> )        | mg/L           |                       | 45.7            | 41.1                   | 40.7                     |
| 12.              | (NO <sub>2</sub> +NO <sub>3</sub> )-Nitrogen | mg/L           | <b>45</b>             | 45.7            | 41.8                   | 41                       |
| 13.              | Free Ammonia (asNH <sub>3</sub> -N)          | mg/L           | <b>1.0</b>            | BDL             | BDL                    | BDL                      |
| 14.              | Total Residual Chlorine                      | mg/L           | <b>0.5</b>            | BDL             | BDL                    | BDL                      |
| 15.              | Cyanide (as CN)                              | mg/L           | <b>0.2</b>            | BDL             | BDL                    | BDL                      |
| 16.              | Fluoride(as F)                               | mg/L           |                       | 0.28            | 0.28                   | 1.04                     |
| 17.              | Sulphide (as S <sub>2</sub> -)               | mg/L           | <b>1</b>              | BDL             | BDL                    | BDL                      |
| 18.              | Dissolved Phosphate (as P)                   | mg/L           | <b>0.05</b>           | BDL             | BDL                    | BDL                      |
| 19.              | Sodium Absorption Ratio                      | mg/L           |                       | 0.3             | 0.39                   | 0.28                     |
| 20.              | Total Coliforms                              | MPNindex/100ml |                       | 23              | 11                     | BDL                      |
| 21.              | Faecal Coliforms                             | MPNindex/100ml | <b>ND</b>             | 4.5             | 7.8                    | BDL                      |

| Location         |  |      |              | Hotel Tapovan   | Shivaji Kacharu Chavan | Mr. Dashrat Pandit Nikam |
|------------------|--|------|--------------|-----------------|------------------------|--------------------------|
| Date of Sampling |  |      |              | <b>01.06.17</b> | <b>01.06.17</b>        | <b>01.06.17</b>          |
| Sr.              | Parameters   | Unit | Std.   Limit | Results         |                        |                          |
| 22.              | Total Phosphorous (as P)                           | mg/L | <b>ND</b>    | BDL             | BDL                    | BDL                      |
| 23.              | Total Kjeldahl Nitrogen                            | mg/L | <b>0.5</b>   | 0.56            | BDL                    | 0.22                     |
| 24.              | Total Ammonia (NH <sub>4</sub> +NH <sub>3</sub> )- | mg/L | <b>0.001</b> | BDL             | BDL                    | BDL                      |
| 25.              | Phenols (as C <sub>6</sub> H <sub>5</sub> OH)      | mg/L | <b>0.5</b>   | BDL             | BDL                    | BDL                      |
| 26.              | Surface Active Agents (as MBAS)                    | mg/L | <b>0.001</b> | BDL             | BDL                    | BDL                      |
| 27.              | Organo Chlorine Pesticides                         |      |              |                 |                        |                          |
| I.               | Alachlor   | µg/L | <b>0.05</b>  | BDL             | BDL                    | BDL                      |
| II.              | Atrazine   | µg/L | <b>20</b>    | BDL             | BDL                    | BDL                      |
| III.             | Aldrin   | µg/L | <b>2</b>     | BDL             | BDL                    | BDL                      |
| IV.              | Dieldrin   | µg/L | <b>0.03</b>  | BDL             | BDL                    | BDL                      |
| V.               | Alpha HCH  | µg/L | <b>0.03</b>  | BDL             | BDL                    | BDL                      |
| VI.              | Beta HCH   | µg/L | <b>0.01</b>  | BDL             | BDL                    | BDL                      |
| VII.             | Delta HCH  | µg/L | <b>0.04</b>  | BDL             | BDL                    | BDL                      |
| VIII.            | Butachlor  | µg/L | <b>125</b>   | BDL             | BDL                    | BDL                      |
| IX.              | p,pDDT   | µg/L | <b>0.04</b>  | BDL             | BDL                    | BDL                      |
| X.               | o,pDDT   | µg/L | <b>1</b>     | BDL             | BDL                    | BDL                      |
| XI.              | p,pDDE   | µg/L | <b>1</b>     | BDL             | BDL                    | BDL                      |
| XII.             | o,pDDE   | µg/L | <b>1</b>     | BDL             | BDL                    | BDL                      |

| Location         |  |      |               | Hotel Tapovan   | Shivaji Kacharu Chavan | Mr. Dashrat Pandit Nikam |
|------------------|--|------|---------------|-----------------|------------------------|--------------------------|
| Date of Sampling |  |      |               | <b>01.06.17</b> | <b>01.06.17</b>        | <b>01.06.17</b>          |
| Sr.              | Parameters                                 | Unit | Std.   Limit  | Results         |                        |                          |
| XIII.            | p,pDDD                                     | µg/L | <b>1</b>      | BDL             | BDL                    | BDL                      |
| XIV.             | o,pDDD                                     | µg/L | <b>1</b>      | BDL             | BDL                    | BDL                      |
| XV.              | Alpha Endosulfan                           | µg/L | <b>1</b>      | BDL             | BDL                    | BDL                      |
| XVI.             | Beta Endosulfan                            | µg/L | <b>0.4</b>    | BDL             | BDL                    | BDL                      |
| XVII.            | Endosulfan Sulphate                        | µg/L | <b>0.4</b>    | BDL             | BDL                    | BDL                      |
| VIII.            | YHCH (Lindane)                             | µg/L | <b>0.4</b>    | BDL             | BDL                    | BDL                      |
| 28.              | Polynuclear aromatic hydrocarbons (as PAH) | mg/L | <b>2.0</b>    | BDL             | BDL                    | BDL                      |
| 29.              | Polychlorinated Biphenyls (PCB)            | mg/L | <b>0.0001</b> | BDL             | BDL                    | BDL                      |
| 30.              | Zinc(as Zn)                                | mg/L | <b>0.0005</b> | BDL             | BDL                    | BDL                      |
| 31.              | Nickel(as Ni)                              | mg/L | <b>5.0</b>    | BDL             | BDL                    | BDL                      |
| 32.              | Copper(as Cu)                              | mg/L | <b>0.02</b>   | BDL             | BDL                    | BDL                      |
| 33.              | Hexavalent Chromium (as Cr <sup>6+</sup> ) | mg/L | <b>0.05</b>   | BDL             | BDL                    | BDL                      |
| 34.              | Total Chromium (as Cr)                     | mg/L | <b>1</b>      | BDL             | BDL                    | BDL                      |
| 35.              | Total Arsenic(as As)                       | mg/L | <b>0.05</b>   | BDL             | BDL                    | BDL                      |
| 36.              | Lead(as Pb)                                | mg/L | <b>0.01</b>   | BDL             | BDL                    | BDL                      |

| Location         |                       |           |              | Hotel Tapovan   | Shivaji Kacharu Chavan | Mr. Dashrat Pandit Nikam |
|------------------|-----------------------|-----------|--------------|-----------------|------------------------|--------------------------|
| Date of Sampling |                       |           |              | <b>01.06.17</b> | <b>01.06.17</b>        | <b>01.06.17</b>          |
| Sr.              | Parameters            | Unit      | Std.   Limit | Results         |                        |                          |
| 37.              | Cadmium (as Cd)       | mg/L      | <b>0.01</b>  | BDL             | BDL                    | BDL                      |
| 38.              | Mercury (as Hg)       | mg/L      | <b>0.003</b> | BDL             | BDL                    | BDL                      |
| 39.              | Manganese (as Mn)     | mg/L      | <b>0.001</b> | 0.038           | BDL                    | 0.27                     |
| 40.              | Iron(as Fe)           | mg/L      | <b>0.1</b>   | 0.694           | 0.083                  | 1.09                     |
| 41.              | Vanadium (as V)       | mg/L      | <b>0.3</b>   | BDL             | BDL                    | BDL                      |
| 42.              | Selenium (as Se)      | mg/L      |              | BDL             | BDL                    | BDL                      |
| 43.              | Boron(as B)           | mg/L      | <b>0.01</b>  | 0.115           | BDL                    | 0.161                    |
| 44.              | Bioassay Test on fish | %survival |              | 100             | 100                    | 100                      |

**TableNo.II**

| Location         |            |       |                  | Pancharatna Farm | Mr. Govind Vithoba Shirsat | Mr. Satish Sukhlal Lad |
|------------------|------------|-------|------------------|------------------|----------------------------|------------------------|
| Date of Sampling |            |       |                  | <b>01.06.17</b>  | <b>01.06.17</b>            | <b>06.06.17</b>        |
| Sr.              | Parameters | Unit  | Std. Limit       | Results          |                            |                        |
| 1.               | Colour     | Hazen |                  | 1                | 1                          | 1                      |
| 2.               | Smell      | -     | <b>Agreeable</b> | Agreeable        | Agreeable                  | Agreeable              |
| 3.               | pH         | -     | <b>6.5-8.5</b>   | 7.51             | 7.4                        | 7.38                   |

| Location         |  |         |                        | Pancharatna Farm | Mr. Govind Vithoba Shirsat | Mr. Satish Sukhlal Lad |
|------------------|--|---------|------------------------|------------------|----------------------------|------------------------|
| Date of Sampling |  |         |                        | <b>01.06.17</b>  | <b>01.06.17</b>            | <b>06.06.17</b>        |
| Sr.              | Parameters                                   | Unit    | Std. Limit             | Results          |                            |                        |
| 4.               | Oil & Grease                                 | mg/L    |                        | BDL              | BDL                        | BDL                    |
| 5.               | Suspended Solids                             | mg/L    | <b>100</b>             | BDL              | 12                         | 8                      |
| 6.               | Dissolved Oxygen (% Saturation)              | %       |                        | 75               | 65                         | 65                     |
| 7.               | Chemical Oxygen Demand                       | mg/L    | <b>500</b>             | 6                | 6                          | 6                      |
| 8.               | Biochemical Oxygen Demand (3 days, 27°C)     | mg/L    | <b>10 (WHO, 1993)</b>  | 1.8              | 1.8                        | 1.8                    |
| 9.               | Electrical Conductivity (at 25°C)            | µmho/cm | <b>6 (WHO, 1993)</b>   | 1155             | 1545                       | 451                    |
| 10.              | Nitrite Nitrogen (as NO <sub>2</sub> )       | mg/L    | <b>0.3 (WHO, 1993)</b> | 0.14             | 0.11                       | BDL                    |
| 11.              | Nitrate Nitrogen (as NO <sub>3</sub> )       | mg/L    |                        | 23.9             | 6.03                       | 31.6                   |
| 12.              | (NO <sub>2</sub> +NO <sub>3</sub> )-Nitrogen | mg/L    | <b>45</b>              | 24               | 6.44                       | 31.6                   |
| 13.              | Free Ammonia (as NH <sub>3</sub> -N)         | mg/L    | <b>1.0</b>             | BDL              | BDL                        | BDL                    |
| 14.              | Total Residual Chlorine                      | mg/L    | <b>0.5</b>             | 0.06             | BDL                        | BDL                    |
| 15.              | Cyanide (as CN)                              | mg/L    | <b>0.2</b>             | BDL              | BDL                        | BDL                    |



| Location         |  |                |              | Pancharatna Farm | Mr. Govind Vithoba Shirsat | Mr. Satish Sukhlal Lad |
|------------------|--|----------------|--------------|------------------|----------------------------|------------------------|
| Date of Sampling |  |                |              | <b>01.06.17</b>  | <b>01.06.17</b>            | <b>06.06.17</b>        |
| Sr.              | Parameters   | Unit           | Std. Limit   | Results          |                            |                        |
| 16.              | Fluoride(as F)                                     | mg/L           |              | 0.24             | 0.54                       | 0.2                    |
| 17.              | Sulphide (as S <sub>2</sub> -)                     | mg/L           | <b>1</b>     | BDL              | BDL                        | BDL                    |
| 18.              | Dissolved Phosphate (as P)                         | mg/L           | <b>0.05</b>  | BDL              | BDL                        | 0.1                    |
| 19.              | Sodium Absorption Ratio                            | mg/L           |              | 0.41             | 0.31                       | 0.46                   |
| 20.              | Total Coliforms                                    | MPNindex/100ml |              | 280              | 350                        | 49                     |
| 21.              | Faecal Coliforms                                   | MPNindex/100ml | <b>ND</b>    | 140              | 39                         | BDL                    |
| 22.              | Total Phosphorous (as P)                           | mg/L           | <b>ND</b>    | BDL              | BDL                        | 0.15                   |
| 23.              | Total Kjeldahl Nitrogen                            | mg/L           | <b>0.5</b>   | BDL              | 0.34                       | 3.4                    |
| 24.              | Total Ammonia (NH <sub>4</sub> +NH <sub>3</sub> )- | mg/L           | <b>0.001</b> | BDL              | BDL                        | BDL                    |
| 25.              | Phenols (as C <sub>6</sub> H <sub>5</sub> OH)      | mg/L           | <b>0.5</b>   | BDL              | BDL                        | BDL                    |
| 26.              | Surface Active Agents (as MBAS)                    | mg/L           | <b>0.001</b> | BDL              | BDL                        | BDL                    |
| 27.              | Organo Chlorine Pesticides                         |                |              |                  |                            |                        |
| I.               | Alachlor   | µg/L           | <b>0.05</b>  | BDL              | BDL                        | BDL                    |

| Location         |  |      |             | Pancharatna Farm | Mr. Govind Vithoba Shirsat | Mr. Satish Sukhlal Lad |
|------------------|--|------|-------------|------------------|----------------------------|------------------------|
| Date of Sampling |  |      |             | <b>01.06.17</b>  | <b>01.06.17</b>            | <b>06.06.17</b>        |
| Sr.              | Parameters                                 | Unit | Std. Limit  | Results          |                            |                        |
| II.              | Atrazine                                   | µg/L | <b>20</b>   | BDL              | BDL                        | BDL                    |
| III.             | Aldrin                                     | µg/L | <b>2</b>    | BDL              | BDL                        | BDL                    |
| IV.              | Dieldrin                                   | µg/L | <b>0.03</b> | BDL              | BDL                        | BDL                    |
| V.               | Alpha HCH                                  | µg/L | <b>0.03</b> | BDL              | BDL                        | BDL                    |
| VI.              | Beta HCH                                   | µg/L | <b>0.01</b> | BDL              | BDL                        | BDL                    |
| VII.             | Delta HCH                                  | µg/L | <b>0.04</b> | BDL              | BDL                        | BDL                    |
| VIII.            | Butachlor                                  | µg/L | <b>125</b>  | BDL              | BDL                        | BDL                    |
| IX.              | p,pDDT                                     | µg/L | <b>0.04</b> | BDL              | BDL                        | BDL                    |
| X.               | o,pDDT                                     | µg/L | <b>1</b>    | BDL              | BDL                        | BDL                    |
| XI.              | p,pDDE                                     | µg/L | <b>1</b>    | BDL              | BDL                        | BDL                    |
| XII.             | o,pDDE                                     | µg/L | <b>1</b>    | BDL              | BDL                        | BDL                    |
| XIII.            | p,pDDD                                     | µg/L | <b>1</b>    | BDL              | BDL                        | BDL                    |
| XIV.             | o,pDDD                                     | µg/L | <b>1</b>    | BDL              | BDL                        | BDL                    |
| XV.              | Alpha Endosulfan                           | µg/L | <b>1</b>    | BDL              | BDL                        | BDL                    |
| XVI.             | Beta Endosulfan                            | µg/L | <b>0.4</b>  | BDL              | BDL                        | BDL                    |
| XVII.            | Endosulfan Sulphate                        | µg/L | <b>0.4</b>  | BDL              | BDL                        | BDL                    |
| XVIII.           | YHCH (Lindane)                             | µg/L | <b>0.4</b>  | BDL              | BDL                        | BDL                    |
| 28.              | Polynuclear aromatic hydrocarbons (as PAH) | mg/L | <b>2.0</b>  | BDL              | BDL                        | BDL                    |

| Location         |  |      |               | Pancharatna Farm | Mr. Govind Vithoba Shirsat | Mr. Satish Sukhlal Lad |
|------------------|--|------|---------------|------------------|----------------------------|------------------------|
| Date of Sampling |  |      |               | <b>01.06.17</b>  | <b>01.06.17</b>            | <b>06.06.17</b>        |
| Sr.              | Parameters                                 | Unit | Std. Limit    | Results          |                            |                        |
| 29.              | Polychlorinated Biphenyls (PCB)            | mg/L | <b>0.0001</b> | BDL              | BDL                        | BDL                    |
| 30.              | Zinc(as Zn)                                | mg/L | <b>0.0005</b> | BDL              | BDL                        | BDL                    |
| 31.              | Nickel(as Ni)                              | mg/L | <b>5.0</b>    | BDL              | BDL                        | BDL                    |
| 32.              | Copper(as Cu)                              | mg/L | <b>0.02</b>   | BDL              | BDL                        | BDL                    |
| 33.              | Hexavalent Chromium (as Cr <sup>6+</sup> ) | mg/L | <b>0.05</b>   | BDL              | BDL                        | BDL                    |
| 34.              | Total Chromium (as Cr)                     | mg/L | <b>1</b>      | BDL              | BDL                        | BDL                    |
| 35.              | Total Arsenic(as As)                       | mg/L | <b>0.05</b>   | BDL              | BDL                        | BDL                    |
| 36.              | Lead(as Pb)                                | mg/L | <b>0.01</b>   | BDL              | BDL                        | BDL                    |
| 37.              | Cadmium (as Cd)                            | mg/L | <b>0.01</b>   | BDL              | BDL                        | BDL                    |
| 38.              | Mercury (as Hg)                            | mg/L | <b>0.003</b>  | BDL              | BDL                        | BDL                    |
| 39.              | Manganese (as Mn)                          | mg/L | <b>0.001</b>  | BDL              | BDL                        | BDL                    |
| 40.              | Iron(as Fe)                                | mg/L | <b>0.1</b>    | 0.557            | 0.078                      | BDL                    |
| 41.              | Vanadium (as V)                            | mg/L | <b>0.3</b>    | BDL              | BDL                        | BDL                    |
| 42.              | Selenium (as Se)                           | mg/L |               | BDL              | BDL                        | BDL                    |
| 43.              | Boron(as B)                                | mg/L | <b>0.01</b>   | 5.7              | BDL                        | BDL                    |

| Location         |                       |           |            | Pancharatna Farm | Mr. Govind Vithoba Shirsat | Mr. Satish Sukhlal Lad |
|------------------|-----------------------|-----------|------------|------------------|----------------------------|------------------------|
| Date of Sampling |                       |           |            | 01.06.17         | 01.06.17                   | 06.06.17               |
| Sr.              | Parameters            | Unit      | Std. Limit | Results          |                            |                        |
| 44.              | Bioassay Test on fish | %survival |            | 100              | 100                        | 100                    |

TableNo.III

| Location         |  |       |                | Ramesh Ram chandra Kale, Satpur | Seva Developers Pvt. Ltd. Satpur | Shivaji Nagar 55/6, Satpur |
|------------------|--|-------|----------------|---------------------------------|----------------------------------|----------------------------|
| Date of Sampling |  |       |                | 02.06.17                        | 02.06.17                         | 02.06.17                   |
| Sr.              | Parameters                             | Unit  | Std. Limit     | Results                         |                                  |                            |
| 1.               | Colour                                 | Hazen |                | 1                               | 1                                | 1                          |
| 2.               | Smell                                  | -     | Agreeable      | Agreeable                       | Agreeable                        | Agreeable                  |
| 3.               | pH                                     | -     | 6.5-8.5        | 7.76                            | 7.7                              | 7.95                       |
| 4.               | Oil &Grease                            | mg/L  |                | BDL                             | BDL                              | BDL                        |
| 5.               | Suspended Solids                       | mg/L  | 100            | 7                               | BDL                              | 5                          |
| 6.               | Dissolved Oxygen (%Saturation)         | %     |                | 70                              | 75                               | 80                         |
| 7.               | Chemical Oxygen Demand                 | mg/L  | 500            | 198                             | 99                               | 30                         |
| 8.               | Biochemical Oxygen Demand (3days,27°C) | mg/L  | 10 (WHO, 1993) | 64                              | 32                               | 9.7                        |

| Location         |  |                |                        | Ramesh Ram chandra Kale, Satpur | Seva Developers Pvt. Ltd. Satpur | Shivaji Nagar 55/6, Satpur |
|------------------|--|----------------|------------------------|---------------------------------|----------------------------------|----------------------------|
| Date of Sampling |  |                |                        | 02.06.17                        | 02.06.17                         | 02.06.17                   |
| Sr.              | Parameters                                   | Unit           | Std. Limit             | Results                         |                                  |                            |
| 9.               | Electrical Conductivity (at25°C)             | µmho/cm        | <b>6 (WHO, 1993)</b>   | 1051                            | 598                              | 1027                       |
| 10.              | Nitrite Nitrogen (asNO <sub>2</sub> )        | mg/L           | <b>0.3 (WHO, 1993)</b> | 0.45                            | BDL                              | 0.07                       |
| 11.              | Nitrate Nitrogen (asNO <sub>3</sub> )        | mg/L           |                        | 6.83                            | 33.6                             | 11                         |
| 12.              | (NO <sub>2</sub> +NO <sub>3</sub> )-Nitrogen | mg/L           | <b>45</b>              | 7.28                            | 33.7                             | 11.1                       |
| 13.              | Free Ammonia (asNH <sub>3</sub> -N)          | mg/L           | <b>1.0</b>             | BDL                             | BDL                              | BDL                        |
| 14.              | Total Residual Chlorine                      | mg/L           | <b>0.5</b>             | BDL                             | BDL                              | BDL                        |
| 15.              | Cyanide (as CN)                              | mg/L           | <b>0.2</b>             | BDL                             | BDL                              | BDL                        |
| 16.              | Fluoride(as F)                               | mg/L           |                        | 0.2                             | 0.08                             | 0.86                       |
| 17.              | Sulphide (as S <sub>2</sub> -)               | mg/L           | <b>1</b>               | BDL                             | BDL                              | BDL                        |
| 18.              | Dissolved Phosphate (as P)                   | mg/L           | <b>0.05</b>            | BDL                             | BDL                              | BDL                        |
| 19.              | Sodium Absorption Ratio                      | mg/L           |                        | 0.53                            | 0.47                             | 0.36                       |
| 20.              | Total Coliforms                              | MPNindex/100ml |                        | BDL                             | BDL                              | 110                        |

| Location         |  |                |            | Ramesh Ram chandra Kale, Satpur | Seva Developers Pvt. Ltd. Satpur | Shivaji Nagar 55/6, Satpur |
|------------------|--|----------------|------------|---------------------------------|----------------------------------|----------------------------|
| Date of Sampling |  |                |            | 02.06.17                        | 02.06.17                         | 02.06.17                   |
| Sr.              | Parameters   | Unit           | Std. Limit | Results                         |                                  |                            |
| 21.              | Faecal Coliforms                                   | MPNindex/100ml | ND         | BDL                             | BDL                              | 110                        |
| 22.              | Total Phosphorous (as P)                           | mg/L           | ND         | BDL                             | BDL                              | BDL                        |
| 23.              | Total Kjeldahl Nitrogen                            | mg/L           | 0.5        | 0.34                            | 0.78                             | 0.56                       |
| 24.              | Total Ammonia (NH <sub>4</sub> +NH <sub>3</sub> )- | mg/L           | 0.001      | BDL                             | BDL                              | 0.05                       |
| 25.              | Phenols (as C <sub>6</sub> H <sub>5</sub> OH)      | mg/L           | 0.5        | BDL                             | BDL                              | BDL                        |
| 26.              | Surface Active Agents (as MBAS)                    | mg/L           | 0.001      | BDL                             | BDL                              | BDL                        |
| 27.              | Organo Chlorine Pesticides                         |                |            |                                 |                                  |                            |
| I.               | Alachlor   | µg/L           | 0.05       | BDL                             | BDL                              | BDL                        |
| II.              | Atrazine   | µg/L           | 20         | BDL                             | BDL                              | BDL                        |
| III.             | Aldrin   | µg/L           | 2          | BDL                             | BDL                              | BDL                        |
| IV.              | Dieldrin   | µg/L           | 0.03       | BDL                             | BDL                              | BDL                        |
| V.               | Alpha HCH  | µg/L           | 0.03       | BDL                             | BDL                              | BDL                        |
| VI.              | Beta HCH   | µg/L           | 0.01       | BDL                             | BDL                              | BDL                        |
| VII.             | Delta HCH  | µg/L           | 0.04       | BDL                             | BDL                              | BDL                        |
| VIII.            | Butachlor  | µg/L           | 125        | BDL                             | BDL                              | BDL                        |
| IX.              | p,pDDT   | µg/L           | 0.04       | BDL                             | BDL                              | BDL                        |

| Location         |  |      |            | Ramesh Ram chandra Kale, Satpur | Seva Developers Pvt. Ltd. Satpur | Shivaji Nagar 55/6, Satpur |
|------------------|--|------|------------|---------------------------------|----------------------------------|----------------------------|
| Date of Sampling |  |      |            | 02.06.17                        | 02.06.17                         | 02.06.17                   |
| Sr.              | Parameters                                 | Unit | Std. Limit | Results                         |                                  |                            |
| X.               | o,pDDT                                     | µg/L | 1          | BDL                             | BDL                              | BDL                        |
| XI.              | p,pDDE                                     | µg/L | 1          | BDL                             | BDL                              | BDL                        |
| XII.             | o,pDDE                                     | µg/L | 1          | BDL                             | BDL                              | BDL                        |
| XIII.            | p,pDDD                                     | µg/L | 1          | BDL                             | BDL                              | BDL                        |
| XIV.             | o,pDDD                                     | µg/L | 1          | BDL                             | BDL                              | BDL                        |
| XV.              | Alpha Endosulfan                           | µg/L | 1          | BDL                             | BDL                              | BDL                        |
| XVI.             | Beta Endosulfan                            | µg/L | 0.4        | BDL                             | BDL                              | BDL                        |
| XVII.            | Endosulfan Sulphate                        | µg/L | 0.4        | BDL                             | BDL                              | BDL                        |
| XVIII.           | YHCH (Lindane)                             | µg/L | 0.4        | BDL                             | BDL                              | BDL                        |
| 28.              | Polynuclear aromatic hydrocarbons (as PAH) | mg/L | 2.0        | BDL                             | BDL                              | BDL                        |
| 29.              | Polychlorinated Biphenyls (PCB)            | mg/L | 0.0001     | BDL                             | BDL                              | BDL                        |
| 30.              | Zinc(as Zn)                                | mg/L | 0.0005     | BDL                             | BDL                              | BDL                        |
| 31.              | Nickel(as Ni)                              | mg/L | 5.0        | BDL                             | BDL                              | BDL                        |
| 32.              | Copper(as Cu)                              | mg/L | 0.02       | BDL                             | BDL                              | BDL                        |
| 33.              | Hexavalent Chromium (as Cr <sup>6+</sup> ) | mg/L | 0.05       | BDL                             | BDL                              | BDL                        |

| Location         |                        |           |              | Ramesh Ram chandra Kale, Satpur | Seva Developers Pvt. Ltd. Satpur | Shivaji Nagar 55/6, Satpur |
|------------------|------------------------|-----------|--------------|---------------------------------|----------------------------------|----------------------------|
| Date of Sampling |                        |           |              | 02.06.17                        | 02.06.17                         | 02.06.17                   |
| Sr.              | Parameters             | Unit      | Std. Limit   | Results                         |                                  |                            |
| 34.              | Total Chromium (as Cr) | mg/L      | <b>1</b>     | BDL                             | BDL                              | BDL                        |
| 35.              | Total Arsenic(as As)   | mg/L      | <b>0.05</b>  | BDL                             | BDL                              | BDL                        |
| 36.              | Lead(as Pb)            | mg/L      | <b>0.01</b>  | BDL                             | BDL                              | BDL                        |
| 37.              | Cadmium (as Cd)        | mg/L      | <b>0.01</b>  | BDL                             | BDL                              | BDL                        |
| 38.              | Mercury (as Hg)        | mg/L      | <b>0.003</b> | BDL                             | BDL                              | BDL                        |
| 39.              | Manganese (as Mn)      | mg/L      | <b>0.001</b> | BDL                             | BDL                              | BDL                        |
| 40.              | Iron(as Fe)            | mg/L      | <b>0.1</b>   | BDL                             | BDL                              | BDL                        |
| 41.              | Vanadium (as V)        | mg/L      | <b>0.3</b>   | BDL                             | BDL                              | BDL                        |
| 42.              | Selenium (as Se)       | mg/L      |              | BDL                             | BDL                              | BDL                        |
| 43.              | Boron(as B)            | mg/L      | <b>0.01</b>  | BDL                             | BDL                              | 0.084                      |
| 44.              | Bioassay Test on fish  | %survival |              | 100                             | 100                              | 80                         |



**TableNo.IV**

| Location         |  |         |                        | Shradha Farm House Satpur | Amit Dilip Yadav P. | Vrushab Industry |
|------------------|--|---------|------------------------|---------------------------|---------------------|------------------|
| Date of Sampling |  |         |                        | <b>01.06.17</b>           | <b>28.05.17</b>     | <b>28.05.17</b>  |
| Sr.              | Parameters                                   | Unit    | Std. Limit             | Results                   |                     |                  |
| 1.               | Colour                                       | Hazen   |                        | 1                         | 1                   | 1                |
| 2.               | Smell  | -       | <b>Agreeable</b>       | Agreeable                 | Agreeable           | Agreeable        |
| 3.               | pH   | -       | <b>6.5-8.5</b>         | 7.87                      | 7.89                | 7.7              |
| 4.               | Oil &Grease                                  | mg/L    |                        | BDL                       | BDL                 | BDL              |
| 5.               | Suspended Solids                             | mg/L    | <b>100</b>             | 6                         | BDL                 | 5                |
| 6.               | Dissolved Oxygen (%Saturation)               | %       |                        | 65                        | 60                  | 60               |
| 7.               | Chemical Oxygen Demand                       | mg/L    | <b>500</b>             | 179                       | 179                 | 238              |
| 8.               | Biochemical Oxygen Demand (3days,27°C)       | mg/L    | <b>10 (WHO, 1993)</b>  | 62                        | 62                  | 77               |
| 9.               | Electrical Conductivity (at25°C)             | µmho/cm | <b>6 (WHO, 1993)</b>   | 1127                      | 667                 | 725              |
| 10.              | Nitrite Nitrogen (asNO <sub>2</sub> )        | mg/L    | <b>0.3 (WHO, 1993)</b> | 0.07                      | BDL                 | BDL              |
| 11.              | Nitrate Nitrogen (asNO <sub>3</sub> )        | mg/L    |                        | 11.1                      | 8.76                | 21.7             |
| 12.              | (NO <sub>2</sub> +NO <sub>3</sub> )-Nitrogen | mg/L    | <b>45</b>              | 11.2                      | 8.77                | 21.7             |

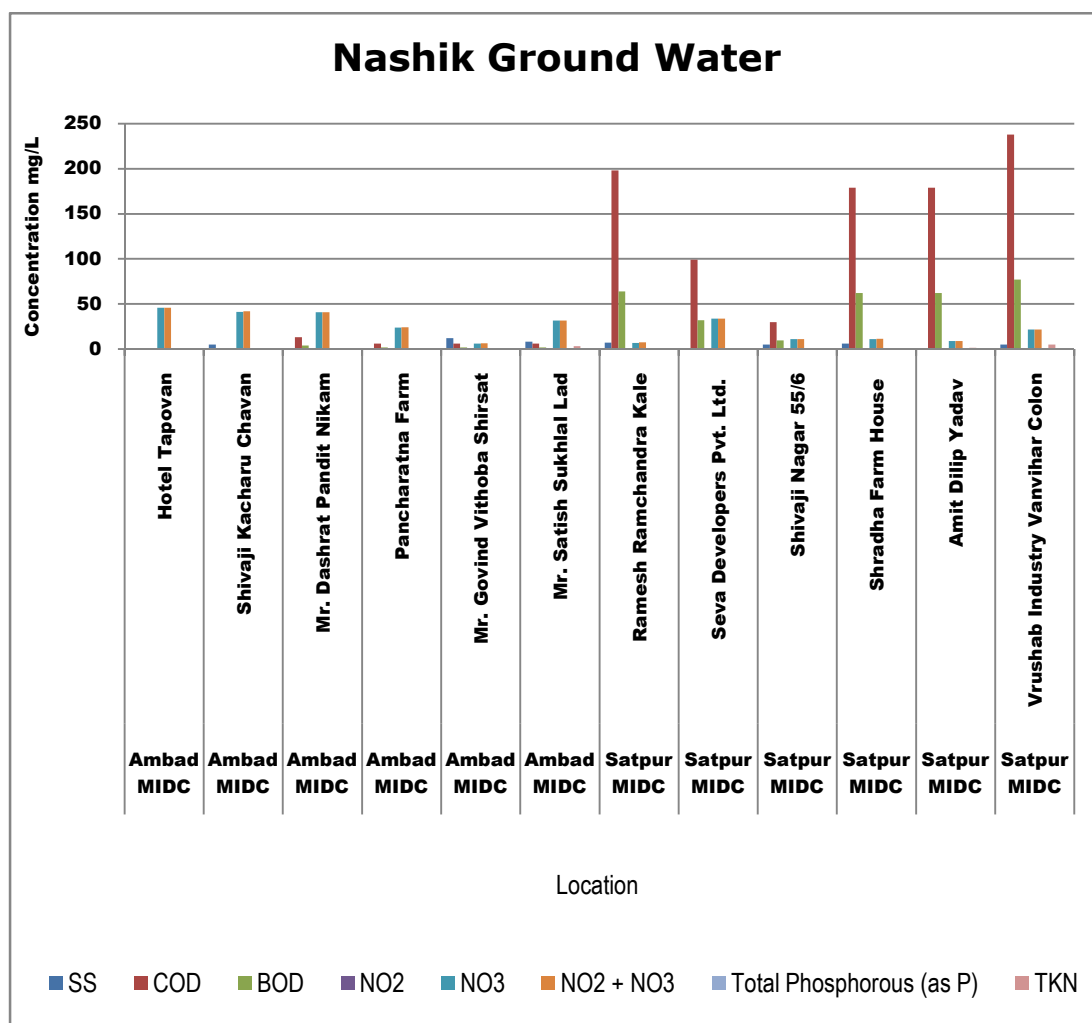
| Location         |  |                |            | Shradha Farm House Satpur | Amit Dilip Yadav P. | Vrushab Industry |
|------------------|--|----------------|------------|---------------------------|---------------------|------------------|
| Date of Sampling |  |                |            | 01.06.17                  | 28.05.17            | 28.05.17         |
| Sr.              | Parameters   | Unit           | Std. Limit | Results                   |                     |                  |
| 13.              | Free Ammonia (asNH <sub>3</sub> -N)                | mg/L           | 1.0        | BDL                       | BDL                 | BDL              |
| 14.              | Total Residual Chlorine                            | mg/L           | 0.5        | BDL                       | BDL                 | BDL              |
| 15.              | Cyanide (as CN)                                    | mg/L           | 0.2        | BDL                       | BDL                 | BDL              |
| 16.              | Fluoride(as F)                                     | mg/L           |            | 0.46                      | 0.4                 | 0.4              |
| 17.              | Sulphide (as S <sub>2</sub> -)                     | mg/L           | 1          | BDL                       | BDL                 | BDL              |
| 18.              | Dissolved Phosphate (as P)                         | mg/L           | 0.05       | BDL                       | BDL                 | BDL              |
| 19.              | Sodium Absorption Ratio                            | mg/L           |            | 0.58                      | 0.38                | 0.42             |
| 20.              | Total Coliforms                                    | MPNindex/100ml |            | 920                       | 13                  | BDL              |
| 21.              | Faecal Coliforms                                   | MPNindex/100ml | ND         | 220                       | 13                  | BDL              |
| 22.              | Total Phosphorous (as P)                           | mg/L           | ND         | BDL                       | BDL                 | BDL              |
| 23.              | Total Kjeldahl Nitrogen                            | mg/L           | 0.5        | 1.46                      | 1.68                | 5.26             |
| 24.              | Total Ammonia (NH <sub>4</sub> +NH <sub>3</sub> )- | mg/L           | 0.001      | BDL                       | BDL                 | BDL              |
| 25.              | Phenols (as C <sub>6</sub> H <sub>5</sub> OH)      | mg/L           | 0.5        | BDL                       | BDL                 | BDL              |

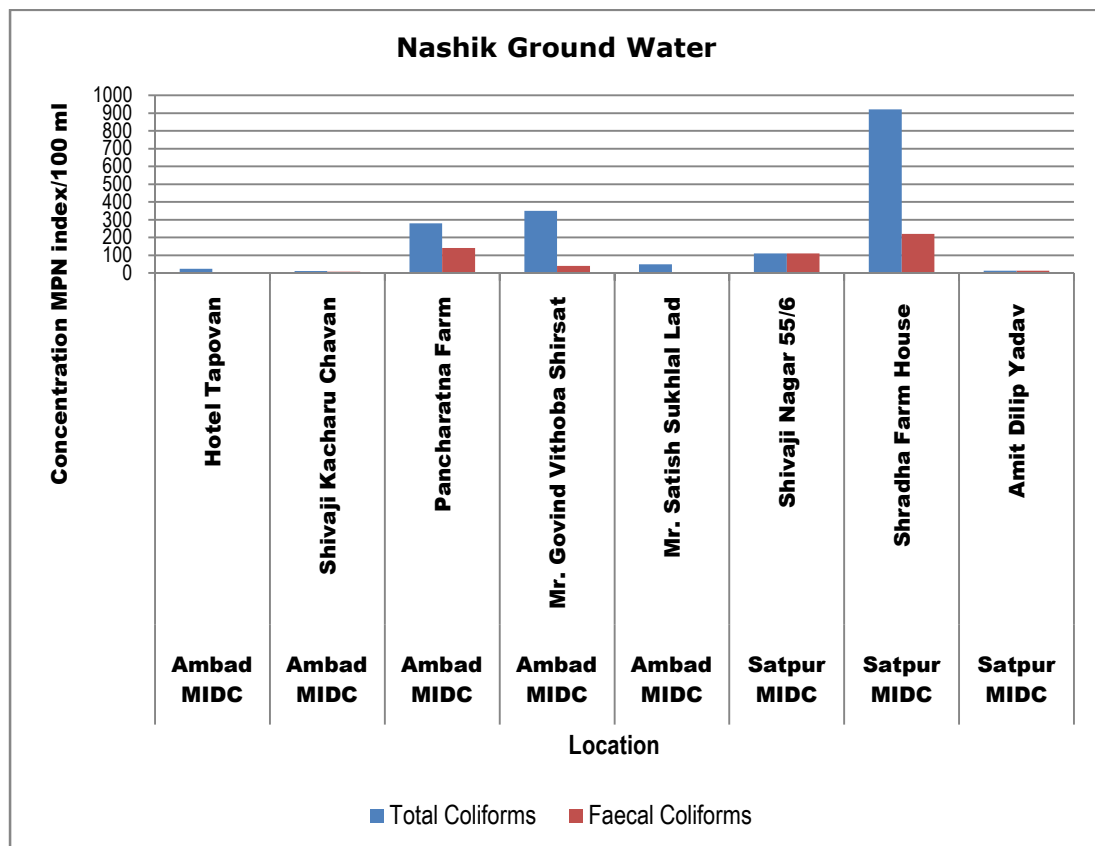
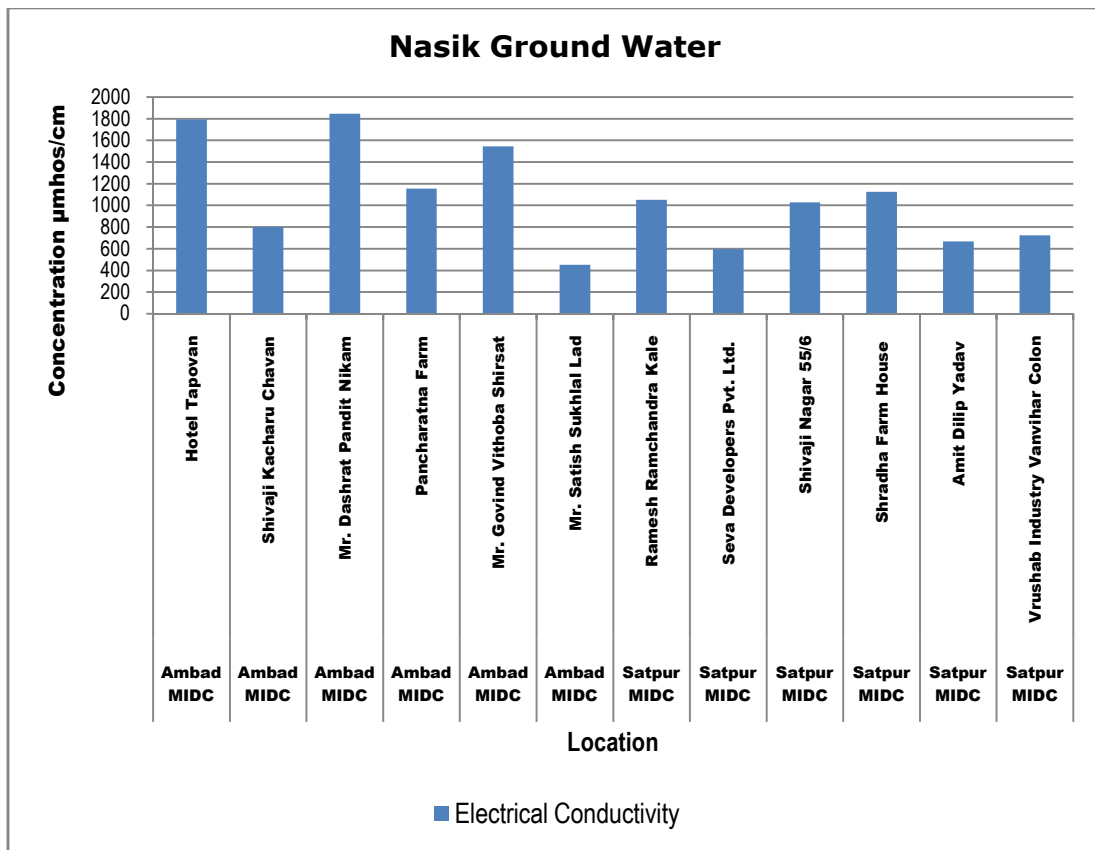
| Location         |                                 |      |            | Shradha Farm House Satpur | Amit Dilip Yadav P. | Vrushab Industry |
|------------------|---------------------------------|------|------------|---------------------------|---------------------|------------------|
| Date of Sampling |                                 |      |            | 01.06.17                  | 28.05.17            | 28.05.17         |
| Sr.              | Parameters                      | Unit | Std. Limit | Results                   |                     |                  |
| 26.              | Surface Active Agents (as MBAS) | mg/L | 0.001      | BDL                       | BDL                 | BDL              |
| 27.              | Organo Chlorine Pesticides      |      |            |                           |                     |                  |
| I.               | Alachlor                        | µg/L | 0.05       | BDL                       | BDL                 | BDL              |
| II.              | Atrazine                        | µg/L | 20         | BDL                       | BDL                 | BDL              |
| III.             | Aldrin                          | µg/L | 2          | BDL                       | BDL                 | BDL              |
| IV.              | Dieldrin                        | µg/L | 0.03       | BDL                       | BDL                 | BDL              |
| V.               | Alpha HCH                       | µg/L | 0.03       | BDL                       | BDL                 | BDL              |
| VI.              | Beta HCH                        | µg/L | 0.01       | BDL                       | BDL                 | BDL              |
| VII.             | Delta HCH                       | µg/L | 0.04       | BDL                       | BDL                 | BDL              |
| VIII.            | Butachlor                       | µg/L | 125        | BDL                       | BDL                 | BDL              |
| IX.              | p,pDDT                          | µg/L | 0.04       | BDL                       | BDL                 | BDL              |
| X.               | o,pDDT                          | µg/L | 1          | BDL                       | BDL                 | BDL              |
| XI.              | p,pDDE                          | µg/L | 1          | BDL                       | BDL                 | BDL              |
| XII.             | o,pDDE                          | µg/L | 1          | BDL                       | BDL                 | BDL              |
| XIII.            | p,pDDD                          | µg/L | 1          | BDL                       | BDL                 | BDL              |
| XIV.             | o,pDDD                          | µg/L | 1          | BDL                       | BDL                 | BDL              |
| XV.              | Alpha Endosulfan                | µg/L | 1          | BDL                       | BDL                 | BDL              |
| XVI.             | Beta Endosulfan                 | µg/L | 0.4        | BDL                       | BDL                 | BDL              |
| XVII.            | Endosulfan Sulphate             | µg/L | 0.4        | BDL                       | BDL                 | BDL              |

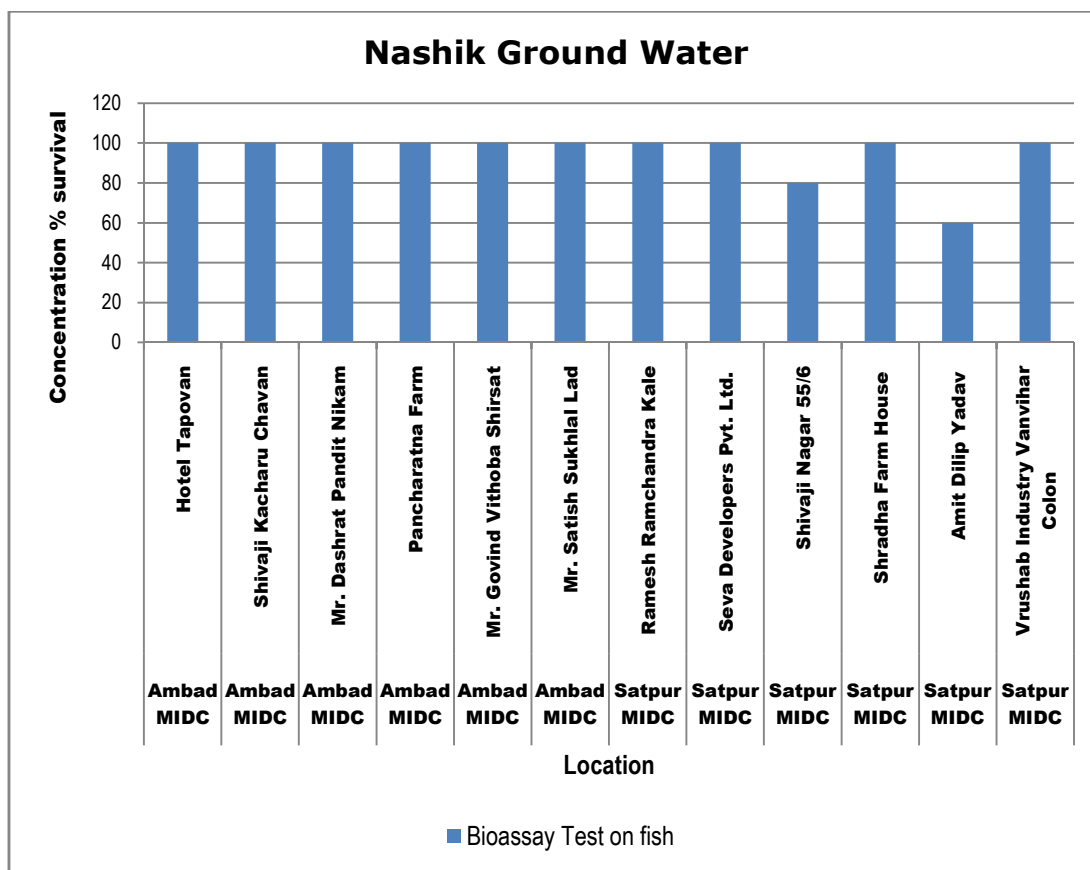
| Location         |  |      |            | Shradha Farm House Satpur | Amit Dilip Yadav P. | Vrushab Industry |
|------------------|--|------|------------|---------------------------|---------------------|------------------|
| Date of Sampling |  |      |            | 01.06.17                  | 28.05.17            | 28.05.17         |
| Sr.              | Parameters                                 | Unit | Std. Limit | Results                   |                     |                  |
| KVIII.           | YHCH (Lindane)                             | µg/L | 0.4        | BDL                       | BDL                 | BDL              |
| 28.              | Polynuclear aromatic hydrocarbons (as PAH) | mg/L | 2.0        | BDL                       | BDL                 | BDL              |
| 29.              | Polychlorinated Biphenyls (PCB)            | mg/L | 0.0001     | BDL                       | BDL                 | BDL              |
| 30.              | Zinc(as Zn)                                | mg/L | 0.0005     | BDL                       | BDL                 | BDL              |
| 31.              | Nickel(as Ni)                              | mg/L | 5.0        | BDL                       | BDL                 | BDL              |
| 32.              | Copper(as Cu)                              | mg/L | 0.02       | BDL                       | BDL                 | BDL              |
| 33.              | Hexavalent Chromium (as Cr <sup>6+</sup> ) | mg/L | 0.05       | BDL                       | BDL                 | BDL              |
| 34.              | Total Chromium (as Cr)                     | mg/L | 1          | BDL                       | BDL                 | BDL              |
| 35.              | Total Arsenic(as As)                       | mg/L | 0.05       | BDL                       | BDL                 | BDL              |
| 36.              | Lead(as Pb)                                | mg/L | 0.01       | BDL                       | BDL                 | BDL              |
| 37.              | Cadmium (as Cd)                            | mg/L | 0.01       | BDL                       | BDL                 | BDL              |
| 38.              | Mercury (as Hg)                            | mg/L | 0.003      | BDL                       | BDL                 | BDL              |
| 39.              | Manganese (as Mn)                          | mg/L | 0.001      | BDL                       | BDL                 | BDL              |
| 40.              | Iron(as Fe)                                | mg/L | 0.1        | BDL                       | BDL                 | BDL              |

| Location         |                       |           |            | Shradha Farm House Satpur | Amit Dilip Yadav P. | Vrushab Industry |
|------------------|-----------------------|-----------|------------|---------------------------|---------------------|------------------|
| Date of Sampling |                       |           |            | 01.06.17                  | 28.05.17            | 28.05.17         |
| Sr.              | Parameters            | Unit      | Std. Limit | Results                   |                     |                  |
| 41.              | Vanadium (as V)       | mg/L      | 0.3        | BDL                       | BDL                 | BDL              |
| 42.              | Selenium (as Se)      | mg/L      |            | BDL                       | BDL                 | BDL              |
| 43.              | Boron (as B)          | mg/L      | 0.01       | BDL                       | BDL                 | BDL              |
| 44.              | Bioassay Test on fish | %survival |            | 100                       | 60                  | 100              |

Graphs: Ground Water Quality Monitoring for Nashik:







## 4. Summary and Conclusion

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

### 4.1 Stack Emission Monitoring:

Fifteen industries from Nashik were selected for Stack emission monitoring.

- 1. Particulate matter (PM):** Out of the 15 stacks, the result of 4 stacks was found to be below the detectable limit. Remaining all the results obtained is within the standard emission for the specified industry.
- 2. Sulphur dioxide (SO<sub>2</sub>):** Emission of SO<sub>2</sub> was higher than the permissible limit only at Ceat Ltd. with 993 mg/Nm<sup>3</sup> emission.
- 3. Nitrogen dioxide (NO<sub>2</sub>):** Emission of NO<sub>2</sub> was higher than the permissible limit in 4 stacks sampled. The highest level of NO<sub>2</sub> was observed at Graphite India Ltd. stack with 118 mg/Nm<sup>3</sup> emission.

### 4.2 Ambient Air Quality Monitoring:

Six ambient air samples were collected from Nashik monitored were studied as per the NAAQ standards. The variations of each parameter within the study are discussed below:

- 1. Sulphur dioxide (SO<sub>2</sub>):** All the locations are observed with very low concentrations of SO<sub>2</sub>, with 6 stacks out of the 12 showed results below the detection limit. The highest level of SO<sub>2</sub> was observed at Mahindra UGINE Steel Co with 5.56 µg/m<sup>3</sup> which is very much lower than the standard limit of NAAQS i.e. 80 µg/m<sup>3</sup>.

2. **Nitrogen dioxide (NO<sub>2</sub>):** Values of nitrogen dioxide are also observed below the standard limit of 80 µg/m<sup>3</sup> at all the 12 locations. The highest level of NO<sub>2</sub> was observed at Lub Tech Oil Company with a result of 7.17µg/m<sup>3</sup>.
3. **Particulate Matter (PM<sub>10</sub>):** PM<sub>10</sub> concentration of 10 locations was higher than the standard limit of 100 µg/m<sup>3</sup>. The highest concentration of PM<sub>10</sub> was observed at Graphite India Ltd. with 658µg/m<sup>3</sup>.
4. **Particulate Matter (PM<sub>2.5</sub>):** The highest level of PM<sub>2.5</sub> was also observed at Graphite India Ltd. with a result of 161µg/m<sup>3</sup>.
5. **Ozone (O<sub>3</sub>):** Ozone was found at only two locations out of the 12 locations monitored and was below detectable limit.
6. **Lead (Pb):** All 12 locations monitored had concentration of lead below permissible limit.
7. **Carbon Monoxide (CO):** Concentration of carbon monoxide was higher than the permissible limit in 6 out of 12 locations monitored. The highest level of CO was observed at Sudal Industries Ltd. with 19.1 mg/m<sup>3</sup>.
8. **Ammonia(NH<sub>3</sub>):** Ammonia was observed at only 2 locations out of the 12 locations monitored, and was well within the permissible limit.
9. **Benzene(C<sub>6</sub>H<sub>6</sub>):** All 12 locations monitored had Benzene concentration higher than 5 µg/m<sup>3</sup> which is the standard limit as per NAAQS. The highest level of was observed at Sudal Industries Ltd. with 2.97 ng/m<sup>3</sup>.
10. **Benzo(a)pyrene (BaP):** BaP was below detectable limit in all 6 locations monitored.
11. **Arsenic(As):** As was detected on in 7 locations out of the 12 locations monitored and was well within the standard limit of 6 ng/m<sup>3</sup>.
12. **Nickel(Ni):** Ni was detected on in 5 locations out of the 12 locations monitored and was well within the standard limit of 20 ng/m<sup>3</sup>.

#### 4.3 Waste Water Quality Monitoring:

To understand the quality of treated effluent, samples were collected from 2 industries of Nashik. Considering the general parameters of all the industries mentioned, following are the conclusions:

1. **pH:** it is observed in between 6.97 and 7.67 which is well within the range.
2. **Suspended Solids:** Suspended solids of both water samples are well within the limits.
3. **Chemical Oxygen Demand:** Both samples collected, were well within the limit required as per standard. The highest COD was observed at Nasardi Bridge Near NIMA Bhavan with 100 mg/L concentration.
4. **Biochemical Oxygen Demand:** The highest BOD was observed at Nasardi Bridge Near NIMA Bhavan with 30 mg/L concentration.



5. **Sulphide:** Sulphide concentration was high at Nasardi Bridge near NIMA Bhavan with 13.6 mg/L.
6. **Total Ammonia:** 2 water samples collected was well within the permissible limit of Ammonia.
7. **Total Kjeldahl Nitrogen:** All samples collected, were well within the limit required as per standard.
8. **Fish Bioassay:** 20% Survival was only attained in Nasardi Bridge Near NIMA Bhavan.
9. **Heavy metals:** All the heavy metals are found below the standard limits in all the samples.

#### 4.3 Ground Water Quality Monitoring:

Four ground water samples were collected from Nashik region.

- 1) **Chemical Oxygen Demand:** The COD of all 12 samples was found in the range between 9 mg/L to 82 mg/L.
- 2) **Biological Oxygen Demand:** BOD of all 6 samples was found in the range between 1.83 mg/L to 3.35 mg/L.

Following are the parameters which are compared with ISO10500:2012 Drinking water specifications.

- 1) **Nitrite:** Values of Nitrite at all location was well within the standard.
- 2) **Nitrate:** Results of Nitrate are also observed below standard limit (42 mg/L).
- 3) **Residual Free Chlorine:** Values are below the detectable limit in all 12 samples collected.
- 4) **Total Ammonia:** Values are below the detectable limit in all samples collected.
- 5) **Fluoride:** Values are below the acceptable standards, below <0.05mg/L.
- 6) **Sulphide:** All the readings of sulphide are below detectable limit in all 12 samples collected.
- 7) **Sodium Absorption Ratio:** These values fit within range of water quality criteria of CPCB.
- 8) **Total Kjeldahl nitrogen:** All 12 water sample collected exceeded the standard limit of TKN and ranged in between 0.69 mg/L to 1.14 mg/L concentration.
- 9) **Fish Bioassay:** All location obtained 100% survival was observed.
- 10) **Boron:** 5 out of the 12 water samples collected had Boron concentration higher than the prescribed value of 0.01 mg/L.
- 11) **Surface Active Agents:** All 4 samples showed below detectable limit.

- 12) Metals:** All the metals except Copper, Lead and Total Chromium 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.

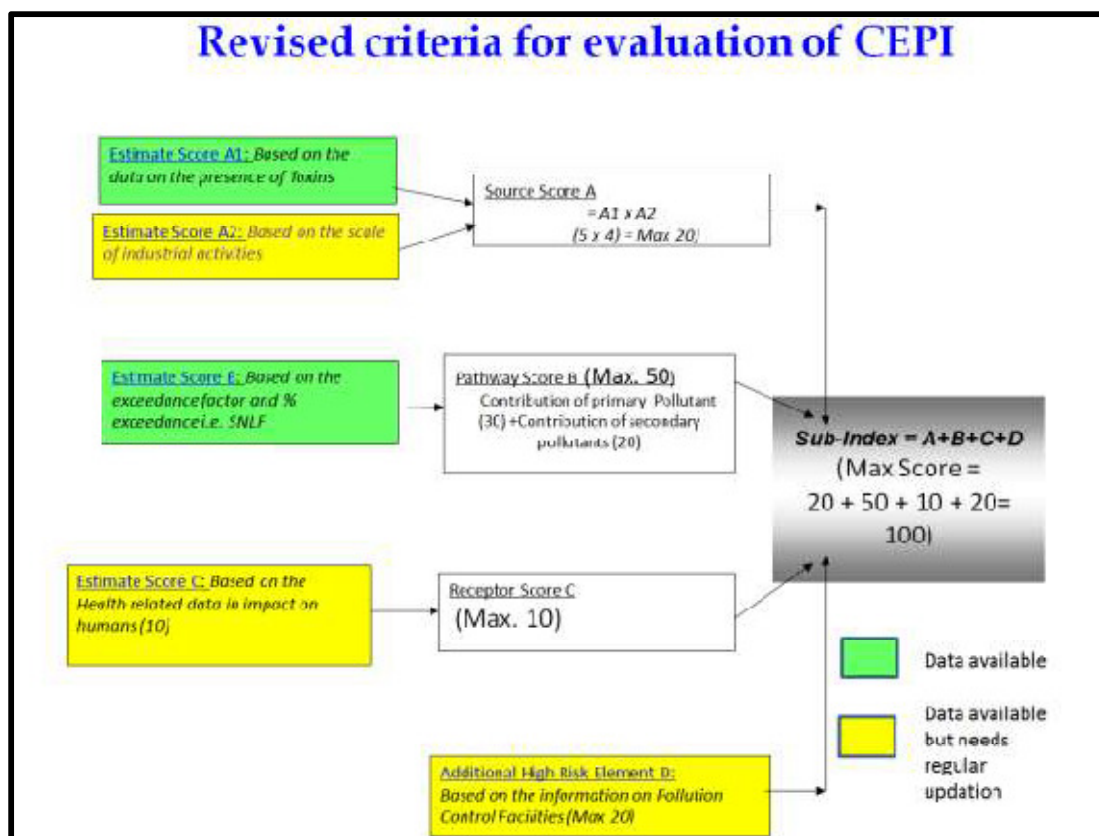
To overcome the subjectivity, revised concept is proposed by eliminating the subjective factors as described in the previous section, but retaining the factors which can be measured precisely.

- 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.
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 44.78. The present study is the compilation of pre-monsoon season, which also affects the score value. It should be noticed 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 Chembur area in past three years. This has also resulted in decreased score of CEPI.

### 5.1 Comparison of CEPI scores:

Results show that present CEPI score (44.78) of Nashik considering all revised standards is less than the CEPI Score of February 2017 (57.05) report.

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

#### Air

|   | A1   | A2 | A     | B1 | B2 | B3 | B   | C1 | C2   | C3 | C     | D  | CEPI         |
|---|------|----|-------|----|----|----|-----|----|------|----|-------|----|--------------|
| <b>Present Report June 2017 (Revised CEPI 2016)</b> | 2.9  | 5  | 14.5  | -  | -  | -  | 9.3 | -  | -    | -  | 5     | 10 | <b>38.8</b>  |
| <b>February, 2017</b>                               | 4    | 5  | 20    | 6  | 0  | 0  | 6   | 3  | 4    | 0  | 12    | 10 | <b>48</b>    |
| <b>CPCB Report 2009</b>                             | 5.75 | 5  | 28.75 | 6  | 0  | 0  | 6   | 3  | 3.50 | 0  | 10.50 | 10 | <b>55.25</b> |

#### Water:

|   | A1  | A2 | A   | B1 | B2 | B3 | B   | C1 | C2  | C3 | C    | D  | CEPI        |
|---|-----|----|-----|----|----|----|-----|----|-----|----|------|----|-------------|
| <b>Present Report June 2017 (Revised CEPI 2016)</b> | 2.2 | 3  | 6.6 | -  | -  | -  | 9.8 | -  | -   | -  | 5    | 10 | <b>31.4</b> |
| <b>February, 2017</b>                               | 2   | 5  | 10  | 6  | 0  | 2  | 8   | 5  | 3.1 | 0  | 15.5 | 10 | <b>43.5</b> |
| <b>CPCB Report 2009</b>                             | 3   | 5  | 15  | 7  | 0  | 3  | 10  | 5  | 3.5 | 0  | 17.5 | 10 | <b>52.5</b> |

**Land:**

|   | <b>A1</b> | <b>A2</b> | <b>A</b> | <b>B1</b> | <b>B2</b> | <b>B3</b> | <b>B</b> | <b>C1</b> | <b>C2</b> | <b>C3</b> | <b>C</b> | <b>D</b> | <b>CEPI</b>  |
|---|-----------|-----------|----------|-----------|-----------|-----------|----------|-----------|-----------|-----------|----------|----------|--------------|
| <b>Present Report June 2017 (Revised CEPI 2016)</b> | 1.9       | 4.1       | 7.79     | -         | -         | -         | 8.36     | -         | -         | -         | 5        | 10       | <b>31.15</b> |
| <b>February, 2017</b>                               | 2.3       | 5         | 5        | 8         | 0         | 3         | 11       | 4         | 4         | 0         | 16       | 10       | <b>42</b>    |
| <b>CPCB Report 2009</b>                             | 3         | 5         | 15       | 6         | 0         | 3         | 9        | 3         | 4         | 0         | 12       | 10       | <b>46.0</b>  |

**AggregatedCEPI:**

|   | <b>Air Index</b> | <b>Water Index</b> | <b>Land Index</b> | <b>CEPI</b>  |
|---|------------------|--------------------|-------------------|--------------|
| <b>Present Report June 2017 (Revised CEPI 2016)</b> | 38.8             | 31.4               | 31.15             | <b>44.78</b> |
| <b>February, 2017</b>                               | 48               | 43.5               | 42                | <b>57.5</b>  |
| <b>CPCB Report 2009</b>                             | 55.25            | 52.50              | 46.00             | <b>66.06</b> |

## 6. Conclusion

Nasik is fast growing city in industrial sector. It is having its own vast history about industries. MIDC (Maharashtra Industrial Development Co-operation) have developed industrial zone in different area like Ambad, Satpur, Gonde, Igatpuri, Sinnar. HAL (Hindustan Aeronautics Ltd.), Mahindra & Mahindra, Bosch (MICO), V.I.P., CEAT, ABB, Crompton Greaves, SIEMENCE, Kirloskar Oil Engine, Glaxo, are major industries in Nasik. About 10,000 industries are working in Nasik including Large, Medium and Small Scale.

A total of 15 stacks where monitored for the project. Out of which 2 stacks showed higher concentration of SO<sub>2</sub> and three stacks showed higher concentration of NO<sub>2</sub>.

In the 12 ambient air samples collected only PM<sub>10</sub>, PM<sub>2.5</sub> and CO was exceeding the limit prescribed as per NAAQS. This is mainly due to the vehicle emissions in the region.

Only two waste water samples have been collected for testing. All parameters except total coliforms and Faecal coliforms have higher concentration and the reason behind it is that the waste waters are collected from nallah which are dried due to summer season.

In the ground water samples collected, only Electrical Conductivity was found in higher concentration. The ground water collected is from Borewell and well water and is not used for drinking purpose.

The overall pollution load in the region is reduced and continuous efforts have been inputted by the Regional pollution control board and state pollution control board inbrining the pollution lesser.

|                        | <b>A1</b> | <b>A2</b> | <b>A</b> | <b>B</b> | <b>C</b> | <b>D</b> | <b>CEPI</b>  |
|------------------------|-----------|-----------|----------|----------|----------|----------|--------------|
| <b>Air Index</b>       | 2.9       | 5         | 14.5     | 9.3      | 5        | 10       | <b>38.8</b>  |
| <b>Water Index</b>     | 2.2       | 3         | 6.6      | 9.8      | 5        | 10       | <b>31.4</b>  |
| <b>Land Index</b>      | 1.9       | 4.1       | 7.79     | 8.36     | 5        | 10       | <b>31.15</b> |
| <b>Aggregated CEPI</b> |           |           |          |          |          |          | <b>44.78</b> |

## 7. 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: Chembur, November 2010, MPCB
- 5) Action Plan for Industrial Cluster: Aurangabad, November 2010, MPCB
- 6) Action Plan for Industrial Cluster: Navi Mumbai, November 2010, MPCB
- 7) Action Plan for Industrial Cluster: Navi Mumbai, November 2010, MPCB
- 8) Standard Methods for the Examination of Water and Waste Water, American Public Health Association, 22<sup>nd</sup> Edition, 2012.
- 9) IS 3025 (various parts)
- 10) [www.mpcb.gov.in](http://www.mpcb.gov.in)
- 11) [www.cpcb.gov.in](http://www.cpcb.gov.in)

## 8. Annexure

### Annexure I: Health related data in impact on humans

#### C: Receptor

| <b>Component C<br/>(Impact on Human Health)<br/>10</b> |              |
|--|--------------|
| <b>Main - 10</b>                                       |              |
| <b>% increase in cases</b>                             | <b>Marks</b> |
| <b>&lt;5%</b>  | <b>0</b>     |
| <b>5-10%</b>   | <b>5</b>     |
| <b>&gt;10%</b>   | <b>10</b>    |

- % 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 Nashik region**







**Annexure II: Stack Emission Sampling and Analysis Methodology**

| <b>Sr.</b> | <b>Parameters</b>                        | <b>Method References</b>  | <b>Techniques</b>                                     | <b>Detection Limit</b>   |
|------------|--|---|---|--------------------------|
| 1.         | Acid Mist<br>(as Sulphuric Acid)         | US EPA Method no.m-8  | Barium thorine titration Method                       | 0.6 mg/Nm <sup>3</sup>   |
| 2.         | Ammonia                                  | IS 11255 (Part 6):1999, Reaffirmed 2003   | Titration/Nessler Reagent / Spectrophotometric Method | 1 mg/Nm <sup>3</sup>     |
| 3.         | Carbon Monoxide                          | USEPA Method 10B  | GC-FID Method   | 0.2 mg/Nm <sup>3</sup>   |
| 4.         | Chlorine                                 | US EPA Method 26 for sampling   | Titrimetric   | 0.001 mg/Nm <sup>3</sup> |
| 5.         | Fluoride (Gaseous)                       | US EPA Method 13 A  | SPADNS Zirconium Lake Spectrophotometric Method       | 0.025 mg/Nm <sup>3</sup> |
| 6.         | Fluoride (Particulate)                   | US EPA Method 13 A  | SPADNS Zirconium Lake Spectrophotometric Method       | 0.005 mg/Nm <sup>3</sup> |
| 7.         | Hydrogen Chloride                        | US EPA Method 26 for sampling   | Titrimetric   | 0.25 mg/Nm <sup>3</sup>  |
| 8.         | Hydrogen Sulphide                        | IS 11255 (Part 4):1985  | Titrimetric   | 1 mg/Nm <sup>3</sup>     |
| 9.         | Oxides of Nitrogen                       | IS 11255 (Part 7): 2005   | PDSA Colorimetric Method                              | 10 mg/Nm <sup>3</sup>    |
| 10.        | Oxygen                                   | IS 13270: 1992  | ORSAT Apparatus                                       | 1 %                      |
| 11.        | Poly Aromatic Hydrocarbons (Particulate) | IS 5182 (Part 12): 2004, Reaffirmed 2009<br>CPCB Guidelines, May 2011, Page No.39 | GC-FID Method   | 0.25 mg/Nm <sup>3</sup>  |
| 12.        | Suspended Particulate Matter             | IS 11255 (Part 1):1985, Reaffirmed 2003   | Gravimetric Method                                    | 10 mg/Nm <sup>3</sup>    |
| 13.        | Sulphur Dioxide                          | IS 11255 (Part 2): 1985, Reaffirmed 2003  | Titrimetric IPA thorine Method                        | 5.0mg/Nm <sup>3</sup>    |

| <b>Sr.</b> | <b>Parameters</b>                | <b>Method References</b>       | <b>Techniques</b>  | <b>Detection Limit</b>   |
|------------|----------------------------------|--------------------------------|--|--------------------------|
|            |                                  |                                |  | 0.02kg/day               |
| 14.        | BTX (Benzene, Toluene, Xylene)   | NIOSH (NMAM) 1501              | Adsorption and Desorption followed by GC-FID analysis          | 0.001 mg/Nm <sup>3</sup> |
| 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 <sup>3</sup> |
| ii         | Benzene                          | -                              | -  | 0.001 mg/Nm <sup>3</sup> |
| iii        | Toluene                          | -                              | -  | 0.001 mg/Nm <sup>3</sup> |
| iv         | Xylene                           | -                              | -  | 0.001 mg/Nm <sup>3</sup> |
| v          | Ethyl Benzene                    | -                              | -  | 0.001 mg/Nm <sup>3</sup> |
| vi         | Ethyl Acetate                    | -                              | -  | 0.001 mg/Nm <sup>3</sup> |

**Annexure III: Ambient Air Sampling and Analysis Methodology**

| <b>Sr.</b> | <b>Parameters</b>   | <b>Method References</b>  | <b>Techniques</b>                                     | <b>Detection Limit</b> |
|------------|---|---|---|------------------------|
| 1.         | Sulphur Dioxide (SO <sub>2</sub> )                              | CPCB Guidelines for the Measurement of Ambient Air Pollutants, Volume I, May 2011, Page No.1    | Improved West &Gaeke Method                           | 4 µg/m <sup>3</sup>    |
| 2.         | Nitrogen Dioxide (NO <sub>2</sub> )                             | CPCB Guidelines for the Measurement of Ambient Air Pollutants, Volume I, May 2011, Page No.7    | Modified Jacob &Hochheiser Method                     | 3 µg/m <sup>3</sup>    |
| 3.         | Particulate Matter (size less than 10 µm) or PM <sub>10</sub>   | CPCB Guidelines for the Measurement of Ambient Air Pollutants, Volume I, May 2011, Page No.11   | Gravimetric Method                                    | 2 µg/m <sup>3</sup>    |
| 4.         | Particulate Matter (size less than 2.5 µm) or PM <sub>2.5</sub> | CPCB Guidelines for the Measurement of Ambient Air Pollutants, Volume I, May 2011, Page No. 15  | Gravimetric Method                                    | 0.4 µg/m <sup>3</sup>  |
| 5.         | Ozone (O <sub>3</sub> )   | APHA, Method No. 820, Page no. 836  | Chemical Method                                       | 19.6 µg/m <sup>3</sup> |
| 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 <sup>3</sup> |
| 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 <sup>3</sup> |
| 8.         | Ammonia (NH <sub>3</sub> )                                      | CPCB Guidelines for the Measurement of Ambient Air Pollutants, Volume I, May 2011, Page No. 35  | Indophenol Blue Method                                | 4.0µg/m <sup>3</sup>   |
| 9.         | Benzene (C <sub>6</sub> H <sub>6</sub> )                        | IS 5182 (Part 11):2006  | Adsorption and Desorption followed by GC-FID analysis | 1.0 µg/m <sup>3</sup>  |
| 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 <sup>3</sup>  |

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

**Annexure IV: Water/Wastewater Sampling and Analysis Methodology**

| <b>Sr.</b> | <b>Parameters</b>                                 | <b>Methods References</b>   | <b>Techniques</b>                           | <b>Detection Limit</b> |
|------------|---|---|---|------------------------|
| 1.         | Sampling Procedure for Chemical Parameters        | IS 3025 (Part 1): 1987, Reaffirmed 1998, Amds.1& APHA, 22 <sup>nd</sup> Ed., 2012, 1060 B, 1-39 | -   | -                      |
| 2.         | Sampling Procedure for Microbiological Parameters | APHA, 22 <sup>nd</sup> Ed., 2012,1060 B, 1-39, 9040, 9-17, and 9060B, 9-35                      | -   | -                      |
| 3.         | Temperature                                       | APHA, 22 <sup>nd</sup> Ed., 2012, 2550-B, 2-69  | By Thermometer                              | -                      |
| 4.         | Colour  | APHA, 22 <sup>nd</sup> 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 <sup>nd</sup> Ed., 2012, 4500-H <sup>+</sup> - B, 4-92                                 | By pH Meter                                 | 1                      |
| 7.         | Oil & Grease                                      | APHA, 22 <sup>nd</sup> 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 <sup>nd</sup> 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 <sup>nd</sup> Ed., 2012, 2510- B, 2-54   | By Conductivity Meter                       | 0.1 $\mu$ mho/cm       |
| 13.        | Nitrite-Nitrogen                                  | APHA, 22 <sup>nd</sup> Ed., 2012, 4500-NO <sub>2</sub> -B, 4-120                                | Colorimetric Method                         | 0.006 mg/L             |

| Sr. | Parameters  | Methods References   | Techniques  | Detection Limit |
|-----|---|--|---|-----------------|
| 14. | Nitrate-Nitrogen  | APHA, 22 <sup>nd</sup> Ed., 2012, 4500-NO <sub>3</sub> , B-4-122   | UV Spectrophotometer Screening Method                       | 0.2 mg/L        |
| 15. | (NO <sub>2</sub> + NO <sub>3</sub> )-Nitrogen               | APHA, 22 <sup>nd</sup> Ed., 2012, 4500-NO <sub>2</sub> -B, 4-120<br>APHA, 22 <sup>nd</sup> Ed., 2012, 4500-NO <sub>3</sub> , B-4-122 | Colorimetric Method<br>V Spectrophotometer Screening Method | 0.2 mg/L        |
| 16. | Free Ammonia  | APHA, 22 <sup>nd</sup> Ed., 2012, 4500 NH <sub>3</sub> , 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 <sup>nd</sup> Ed., 2012, 4500-CN, C & E, 4-41 & 4-43  | Colorimetric Method   | 0.001 mg/L      |
| 19. | Fluoride (F)  | APHA, 22 <sup>nd</sup> Ed., 2012, 4500-F, D, 4-87  | SPADNS Method   | 0.05 mg/L       |
| 20. | Sulphide (S <sup>2-</sup> )                                 | APHA, 22 <sup>nd</sup> Ed., 2012, 4500 -S <sup>2-</sup> , C-4-175, F-4-178   | Iodometric Method   | 0.08 mg/L       |
| 21. | Dissolved Phosphate (P)                                     | APHA, 22 <sup>nd</sup> Ed., 2012, 4500 P, E, 4-155   | Ascorbic Acid Method  | 0.03 mg/L       |
| 22. | Sodium Absorption Ratio                                     | IS 11624 :1986, Reaffirmed 2006  | By Calculation  | 0.3             |
| 23. | Total Phosphorous (P)                                       | APHA, 22 <sup>nd</sup> Ed., 2012, 4500 P, E, 4-155   | Ascorbic Acid Method  | 0.03 mg/L       |
| 24. | Total Kjeldahl Nitrogen                                     | APHA, 22 <sup>nd</sup> Ed., 2012, 4500 NH <sub>3</sub> , B & C, 4 -110, 4-112  | Titrimetric Method  | 0.1 mg/L        |
| 25. | Total Ammonia (NH <sub>4</sub> + NH <sub>3</sub> )-Nitrogen | APHA, 22 <sup>d</sup> Ed., 2012, 4500 NH <sub>3</sub> , F, 4 -115  | Colorimetric Method   | 0.001 mg/L      |
| 26. | Phenols (C <sub>6</sub> H <sub>5</sub> OH)                  | APHA, 22 <sup>nd</sup> Ed., 2012, 5530- B & C, 5-44 & 5-47   | Chloroform Extraction Method                                | 0.001 mg/L      |



| <b>Sr.</b> | <b>Parameters</b>                       | <b>Methods References</b>                          | <b>Techniques</b>                | <b>Detection Limit</b> |
|------------|---|--|----------------------------------|------------------------|
| 27.        | Surface Active Agents                   | APHA, 22 <sup>nd</sup> Ed., 2012, 5540-B & C, 5-50 | Methylene Blue Extraction Method | 0.1 mg/L               |
| 28.        | Organo Chlorine Pesticides              | APHA, 22 <sup>nd</sup> Ed., 2012, 6410B, 6-74      | GC MS-MS Method                  | 0.01 µg/L              |
| 29.        | Polynuclear aromatic hydrocarbons (PAH) | APHA, 22 <sup>nd</sup> Ed., 2012, 6410B, 6-74      | GC MS-MS Method                  | 0.01 µg/L              |
| 30.        | Polychlorinated Biphenyls (PCB)         | APHA, 22 <sup>nd</sup> 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 <sup>6+</sup> ) | APHA, 22 <sup>nd</sup> 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              |

| <b>Sr.</b> | <b>Parameters</b>          | <b>Methods References</b>                     | <b>Techniques</b>                                | <b>Detection Limit</b> |
|------------|----------------------------|---|--|------------------------|
| 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 <sup>nd</sup> Ed., 2012,9221-B, 9-66 | Multiple tube fermentation technique (MPN/100ml) | 1.1 MPN/100ml          |
| 46.        | Faecal Coliforms           | APHA, 22 <sup>nd</sup> Ed., 2012,9221-E, 9-74 | Multiple tube fermentation technique (MPN/100ml) | 1.1 MPN/100ml          |
| 47.        | Bioassay Test (Zebra Fish) | IS 6582, 1971, Reaffirmed 1987                | Static Technique                                 | -                      |

**Annexure V: National Ambient Air Quality Standards, 2009**

**The Gazette of India**

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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 11<sup>th</sup> April, 1994 and S.O.935(E), dated 14<sup>th</sup> 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 <sub>2</sub> ) $\mu\text{g}/\text{m}^3$  | Annual *              | 50   | 20  | – Improved West and Gaeke<br>– Ultraviolet fluorescence   |
|         |  | 24 hours **           | 80   | 80  |   |
| 2       | Nitrogen Dioxide (NO <sub>2</sub> ) $\mu\text{g}/\text{m}^3$   | Annual *              | 40   | 30  | – Modified Jacob & Hochheiser (Na-Arsenite)<br>– Chemiluminescence                                    |
|         |  | 24 hours **           | 80   | 80  |   |
| 3       | Particulate Matter (size less than 10 $\mu\text{m}$ ) or PM <sub>10</sub> $\mu\text{g}/\text{m}^3$   | Annual *              | 60   | 60  | – Gravimetric<br>– TOEM<br>– Beta attenuation   |
|         |  | 24 hours **           | 100  | 100   |   |
| 4       | Particulate Matter (size less than 2.5 $\mu\text{m}$ ) or PM <sub>2.5</sub> $\mu\text{g}/\text{m}^3$ | Annual *              | 40   | 40  | – Gravimetric<br>– TOEM<br>– Beta attenuation   |
|         |  | 24 hours **           | 60   | 60  |   |
| 5       | Ozone (O <sub>3</sub> ) $\mu\text{g}/\text{m}^3$   | 8 hours **            | 100  | 100   | – UV photometric<br>– Chemiluminescence<br>– 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<br>– EDXRF using Teflon filter |
|         |  | 24 hours **           | 1.0  | 1.0   |   |
| 7       | Carbon Monoxide (CO) $\text{mg}/\text{m}^3$  | 8 hours **            | 02   | 02  | – Non Dispersive Infra Red (NDIR) spectroscopy  |
|         |  | 1 hour **             | 04   | 04  |   |
| 8       | Ammonia (NH <sub>3</sub> ) $\mu\text{g}/\text{m}^3$  | Annual *              | 100  | 100   | – Chemiluminescence<br>– Indophenol blue method   |
|         |  | 24 hours **           | 400  | 400   |   |
| 9       | Benzene (C <sub>6</sub> H <sub>6</sub> ) $\mu\text{g}/\text{m}^3$                                    | Annual *              | 05   | 05  | – Gas Chromatography based continuous analyzer<br>– Adsorption and Desorption followed by GC analysis |
| 10      | Benzo (a) Pyrene (BaP) – particulate phase only, $\text{ng}/\text{m}^3$                              | Annual *              | 01   | 01  | – Solvent extraction followed by HPLC/GC analysis   |
| 11      | Arsenic (As) $\text{ng}/\text{m}^3$  | Annual *              | 06   | 06  | – AAS/ICP method after sampling on EPM 2000 or equivalent filter paper.                               |
| 12      | Nickel (Ni) $\text{ng}/\text{m}^3$   | 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 11<sup>th</sup> April, 1994 and S.O. 935(E), dated 14<sup>th</sup> October, 1998.

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

$\text{ng}/\text{m}^3$ : nano-gram/ $\text{m}^3$  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<br>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<br>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 <sub>3</sub> ), mg/L, Max          | 5.0   | --                           | --                  | 5.0                          |
| 12. | Biochemical oxygen demand (5 days, at 20° c) mg/L, Max | 30  | 350                          | 100                 | 100                          |
| 13. | Chemical oxygen demand, mg/L, Max                      | 250   | --                           | --                  | 250                          |
| 14. | Arsenic (as As), mg/l, Max                             | 0.2   | 0.2                          | 0.2                 | 0.2                          |
| 15. | Mercury (as Hg). Mg/L, Max                             | 0.01  | 0.01                         | --                  | 0.01                         |
| 16. | Lead (as Pb), mg/L, Max                                | 0.1   | 1.0                          | -                   | 1.0                          |
| 17. | Cadmium (as Cd), mg/L,                                 | 2.0   | 1.0                          | --                  | 2.0                          |

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

| Sr. | Parameter  | Standards            |                  |                     |                      |
|-----|--|----------------------|------------------|---------------------|----------------------|
|     |  | Inland surface Water | Public Sewers    | Land for Irrigation | Marine Coastal Areas |
| 31. | Sulphate<br>(as SO <sub>4</sub> ), mg/L,<br>Max.                           | 1000                 | 1000             | 1000                | --                   |
| 32. | Sulphide (as S),<br>mg/L, Max.   | 2.0                  | --               | --                  | 5.0                  |
| 33. | Pesticides   | Absent               | Absent           | Absent              | Absent               |
| 34. | Phenolic compounds<br>(as C <sub>6</sub> H <sub>5</sub> OH),<br>mg/L, Max. | 1.0                  | 5.0              | --                  | 5.0                  |
| 35. | Radioactive materials:   |                      |                  |                     |                      |
|     | a. Alpha emitters<br>MC/ml., Max.  | 10 <sup>-7</sup>     | 10 <sup>-7</sup> | 10 <sup>-8</sup>    | 10 <sup>-7</sup>     |
|     | b. Beta emitters<br>µc/ml., Max  | 10 <sup>-6</sup>     | 10 <sup>-6</sup> | 10 <sup>-7</sup>    | 10 <sup>-6</sup>     |

**Annexure VII: Drinking Water Specification-IS 10500:2012**

| <b>Sr.</b>     | <b>Characteristic</b>  | <b>Unit</b> | <b>Requirement (Acceptable Limit)</b> | <b>Permissible Limit in the Absence of Alternate Source</b> |
|----------------|--|-------------|---------------------------------------|---|
| <b>Table 1</b> | <b>Organoleptic and Physical Parameters</b>                                      |             |                                       |   |
| 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  |
| <b>Table 2</b> | <b>General parameters concerning substances undesirable in excessive amounts</b> |             |                                       |   |
| 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 <sub>2</sub> )  | mg/L        | Max 4.0                               | No relaxation   |
| 14.            | Chlorides (as Cl)  | mg/L        | Max 250                               | Max 1000  |
| 15.            | Copper (as Cu)   | mg/L        | Max 0.05                              | Max 1.5   |
| 16.            | Fluoride (as F)  | mg/L        | Max 1.0                               | Max 1.5   |
| 17.            | Free residual chlorine   | mg/L        | Min 0.2                               | Min 1   |



| Sr.            | Characteristic   | Unit | Requirement (Acceptable Limit) | Permissible Limit in the Absence of Alternate Source |
|----------------|--|------|--------------------------------|--|
| 18.            | Iron (as Fe)   | mg/L | Max 0.3                        | No relaxation  |
| 19.            | Magnesium (as Mg)  | mg/L | Max 30                         | Max100   |
| 20.            | Manganese (as Mn)  | mg/L | Max 0.1                        | Max 0.3  |
| 21.            | Mineral Oil  | mg/L | Max 0.5                        | No relaxation  |
| 22.            | Nitrate (as NO <sub>3</sub> )                            | mg/L | Max 45                         | No relaxation  |
| 23.            | Phenolic compounds (as C <sub>6</sub> H <sub>5</sub> 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 <sub>4</sub> )                           | mg/L | Max 200                        | Max 400  |
| 27.            | Sulphide (as H <sub>2</sub> S)                           | mg/L | Max 0.05                       | No relaxation  |
| 28.            | Total Alkalinity as calcium carbonate                    | mg/L | Max 200                        | Max600   |
| 29.            | Total hardness (as CaCO <sub>3</sub> )                   | mg/L | Max 200                        | Max 600  |
| 30.            | Zinc (as Zn)   | mg/L | Max 5                          | Max15  |
| <b>Table 3</b> | <b>Parameters Concerning Toxic Substances</b>            |      |                                |  |
| 31.            | Cadmium (asCd)   | mg/L | Max 0.003                      | No relaxation  |
| 32.            | Cyanide (asCN)   | mg/L | Max 0.05                       | No relaxation  |
| 33.            | Lead (as Pb)   | mg/L | Max 0.01                       | No relaxation  |
| 34.            | Mercury (asHg)   | mg/L | Max 0.001                      | No relaxation  |
| 35.            | Molybdenum (as Mo)                                       | mg/L | Max 0.07                       | No relaxation  |
| 36.            | Nickel (as Ni)   | mg/L | Max 0.02                       | No relaxation  |
| 37.            | Pesticides   | mg/L | See Table 5                    | No relaxation  |
| 38.            | Polychlorinatedbiphenyls                                 | mg/L | Max 0.0005                     | No relaxation  |

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

| Sr.            | Characteristic  | Unit    | Requirement (Acceptable Limit)  | Permissible Limit in the Absence of Alternate Source |
|----------------|---|---------|---------------------------------|--|
| x)             | DDT (o,p&p,p – Isomers of DDT, DDE and DDD)   | µg/L    | 1                               | No relaxation  |
| xi)            | 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  |
| xviii)         | Phorate   | µg/L    | 2                               | No relaxation  |
| <b>Table 6</b> | <b>Bacteriological Quality of Drinking Water</b>  |         |                                 |  |
| 44.            | E.coli or thermotolerant coliform bacteria  | /100    | Not detectable                  | -  |
| 45.            | Total coliform bacteria   | /100 mL | Not detectable                  | -  |
|                | <b>Virological Requirements</b>   |         |                                 |  |
| 46.            | MS2 phage   | /1 L    | Absent                          | -  |
|                | <b>Biological Requirements</b>  |         |                                 |  |
| 47.            | Cryptosporidium   | /10 L   | Absent                          | -  |
| 48.            | Giardia   | /10 L   | Absent                          | -  |
| 49.            | Microscopic organisms such as algae,zooplanktons,flagellate s,parasites and toxin producing organisms |         | Free from microscopic organisms | -  |

**Annexure VIII: CPCB Water Quality Criteria:**

| <b>Designated best use</b>   | <b>Quality Class</b> | <b>Primary Water Quality Criteria</b>  |
|--|----------------------|--|
| Drinking water source without conventional treatment but with chlorination | A                    | <ul style="list-style-type: none"> <li>➤ Total coliform organisms (MPN*/100 ml) shall be 50 or less</li> <li>➤ pH between 6.5 and 8.5</li> <li>➤ Dissolved Oxygen 6 mg/L or more, and</li> <li>➤ Biochemical Oxygen Demand 2 mg/L or less</li> </ul> |
| Outdoor bathing (organized)  | B                    | <ul style="list-style-type: none"> <li>➤ Total coliform organisms (MPN/100 ml) shall be 500 or less</li> <li>➤ pH between 6.5 and 8.5</li> <li>➤ Dissolved Oxygen 5 mg/L or more, and</li> <li>➤ Biochemical Oxygen Demand 3 mg/L or less</li> </ul> |
| Drinking water source with conventional treatment                          | C                    | <ul style="list-style-type: none"> <li>➤ Total coliform organisms (MPN/100ml) shall be 5000 or less</li> <li>➤ pH between 6 and 9</li> <li>➤ Dissolved Oxygen 4 mg/L or more, and</li> <li>➤ Biochemical Oxygen Demand 3 mg/L or less</li> </ul>     |
| Propagation of wildlife and fisheries                                      | D                    | <ul style="list-style-type: none"> <li>➤ pH between 6.5 and 8.5</li> <li>➤ Dissolved Oxygen 4 mg/L or more, and</li> <li>➤ Free ammonia (as N) 1.2 mg/L or less</li> </ul>   |
| Irrigation, industrial cooling, and controlled disposal                    | E                    | <ul style="list-style-type: none"> <li>➤ pH between 6.0 and 8.5</li> <li>➤ Electrical conductivity less than 2250 micro mhos/cm,</li> <li>➤ Sodium Absorption Ratio less than 26,</li> <li>➤ and Boron less than 2 mg/l.</li> </ul>                  |
|  | Below E              | <ul style="list-style-type: none"> <li>➤ Not Meeting A, B, C, D &amp; E Criteria</li> </ul>  |

**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, $\mu$ mhos/cm                                  | <1000                           | <2250       | <4000        |
| (v)   | (NO <sub>2</sub> +NO <sub>3</sub> )-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 <sub>4</sub> + NH <sub>3</sub> )-Nitrogen | < 0.5 mg/l                      | < 1.0 mg/l  | < 1.5 mg/l   |
| (iv)   | Phenols   | < 2µg/l                         | < 5µg/l     | <10 µg/l     |
| (v)    | Surface Active Agents                                       | <20 µg/l                        | <100µg/l    | < 200µg/l    |
| (vi)   | Organo Chlorine Pesticides                                  | < 0.05µg/l                      | < 0.1µg/l   | < 0.2µg/l    |
| (vii)  | PAH   | < 0.05µg/l                      | <0.1 µg/l   | <0.2 µg/l    |
| (viii) | PCB and PCT   | < 0.01µg/l                      | < 0.01µg/l  | < 0.02µg/l   |
| (ix)   | Zinc  | < 100µg/l                       | < 200µg/l   | <300 µg/l    |
| (x)    | Nickel  | < 50µg/l                        | < 100µg/l   | < 200µg/l    |
| (xi)   | Copper  | < 20µg/l                        | < 50µg/l    | <100µg/l     |

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