# Air Quality Status of Maharashtra

# 2019-20

Maharashtra Pollution Control Board
महाराष्ट्र प्रदूषण नियंत्रण मंडळ

The Energy And Resources Institute

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**Prepared for**

Maharashtra Pollution Control Board
महाराष्ट्र प्रदूषण नियंत्रण मंडळ

**Prepared by**

The Energy and Resources Institute

*...towards global sustainable development*

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## Foreword

Air pollution has been a matter of serious concern in all the urban cities in India. With regards, to state of Maharashtra which has a number of metropolitan cities, air pollution is an issue of social and economic importance. People have a right to know the quality of the air they breathe. However, the data generated through the air quality monitoring network system is highly technical and not in a form that can be easily understood by common citizens. In order to ensure people's participation and awareness regarding efforts being made to improve air quality it is necessary to present the available data in a reader friendly manners.

The Maharashtra Pollution Control Board (MPCB), a state level nodal agency for regulating pollution and thereby ensuring the environmental well-being in the state of Maharashtra. In order to comply with the Air (Prevention and Control of Pollution Act), 1981, the board has set up a statewide network for ambient air quality monitoring in the state. This ambient air quality monitoring network comprises of 84 active ambient air quality monitoring sites covering 12 major cities in the state. The network includes both manually operated Ambient Air Quality Monitoring Stations (61) and Continuous Ambient Air Quality Monitoring Stations (23). The air quality data obtained is regularly updated on MPCB's website.

Air Quality Index (AQI) is a tool to disseminate information on air quality in qualitative terms (e.g. good, satisfactory, and poor) as well as its associated likely health impacts. With this report, MPCB aims to highlight the air quality in the state for the year 2019-20. It also provides a comparative analysis with the air quality status of the past few years. This helps in assessing the areas where additional measures are required to be implemented to keep the pollutant concentration within the prescribed norms.

In addition to the above, the report has also incorporated air quality status during the lockdown period which was imposed due to the spread of COVID-19 pandemic. The outbreak of COVID-19 and the consequent lockdown had major implications on the air quality of the state.

I appreciate the efforts of Dr. Anjali Parasnis, *Associate Director*, Ms. Pranali Chavan, *Research Associate*, from The Energy and Resources Institute (TERI), Western Regional Centre and their entire team for preparing this report. I also acknowledge the work done by the monitoring agencies for regularly monitoring and forwarding the air quality data. They have played a key role in monitoring the data, even during the lockdown implemented to curb the spread of the Coronavirus pandemic. The efforts of my team; Dr. V.M. Motghare, *Joint Director (Air Pollution Control)* and Shri. S.C. Kollur ,*Scientific Advisor* for supervision and finalizing the report is also acknowledged.

I hope that the report fulfills its intended purpose of providing people with information about the air quality of their state and promoting stakeholders' participation in improving Maharashtra's air quality.

**(E. Ravendiran, IAS)**
**Member Secretary, MPCB**

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## Abbreviations

| | |
|---|---|
| AAQM | Ambient Air Quality Monitoring |
| AAQMS | Ambient Air Quality Monitoring Stations |
| ALRI | Acute Lower Respiratory Infections |
| AMR | Amravati |
| AQI | Air Quality Index |
| Ar | Argon |
| AUR | Aurangabad |
| CAAQMS | Continuous Ambient Air Quality Monitoring Station |
| CDP | Chandrapur |
| $CH_4$ | Methane |
| CIDCO | City and Industrial Development Corporation |
| CO | Carbon monoxide |
| $CO_2$ | Carbon dioxide |
| CPCB | Central Pollution Control Board |
| COVID-19 | CO' stands for corona, 'VI' for virus, and 'D' for disease |
| GoM | Government of Maharashtra |
| $H_2$ | Hydrogen |
| He | Helium |
| IIT | Indian Institute of Technology |
| INAQS | Indian National Air Quality Standards |
| KOP | Kolhapur |
| Max | Maximum |
| MIDC | Maharashtra Industrial Development Corporation |
| Min | Minimum |
| MPCB | Maharashtra Pollution Control Board |
| MVD | Motor Vehicle Department |
| $N_2$ | Nitrogen |
| NAAQM | National Ambient Air Quality Monitoring |
| NAAQS | National Ambient Air Quality Standards |
| NAMP | National Air Qualty Monitoring Programme |
| Ne | Neon |
| NGP | Nagpur |

| | |
|---|---|
| NHK | Nashik |
| $NO_2$ | Nitrogen dioxide |
| $NO_X$ | Nitrogen Oxides |
| NVM | Navi Mumbai |
| $O_2$ | Oxygen |
| $O_3$ | Ozone |
| Pb | Lead |
| PM | Particulate Matter |
| $PM_{10}$/RSPM | Particulate Matter less than 10 microns/ Respirable Suspended Particulate Matter |
| $PM_{2.5}$ | Particulate Matter less than 2.5 microns |
| PUN | Pune |
| RGD | Raigad |
| RO | Regional Office |
| SAMP | State Air Quality Monitoring Program |
| $SO_2$ | Sulphur dioxide |
| TERI | The Energy and Resources Institute |
| TNA | Thane |
| TTC | Trans Thane Creek |
| USEPA | United States Environmental Protection Agency |
| VOCs | Volatile Organic Compounds |
| $\mu g/m^3$ | Micrograms per cubic meter |

# Executive Summary

Air pollution represents the biggest environmental risk to human health and environment. According the World Health Organization's (WHO) updated Global Ambient Air Quality Database (2018), it is estimated that around 7 million individuals die every year due to air pollution related health consequences especially due to exposure to fine particulates present in the air[1]. This exposure to particulate matter leads to health issues such as heart and lung diseases, pulmonary and respiratory infections. Thus, the issues and concerns of air pollution are also mentioned in the Sustainable Development Goals (SDGs)[2]. These are as follows

- Air pollution levels in cities (indicator for **Urban sustainable development – SDG 11**)
- Access to clean energy – clean household fuels and technologies (indicator for **Sustainable energy – SDG 7**)
- Mortality due to ambient and household air pollution (indicator for **Good Health and Well-being – SDG 3**)

Continuous monitoring and estimation of air pollutants thus becomes extremely important to track the progress in air quality improvements and to help evaluate effectiveness of policies being enforced to curb air pollution. It also helps track the efficacy of that policy in assessing its contribution in protecting human health.

Established in 1970, Maharashtra State Pollution Control Board (MPCB) is the regulatory body for ensuring effective implementation of environmental laws and mitigative measures for pollution control. Through the network of installed Ambient Air Quality Monitoring Stations (AAQMS) in Maharashtra, MPCB's 12 Regional offices (RO) - ensures regular monitoring and assessment of the air pollution levels across the state. These AAQMS are installed under the National Air Quality Monitoring Program (NAMP) and State Air Quality Monitoring Program (SAMP). Furthermore, to scale up the monitoring of air pollutants, 13 new Continuous AAQMS were installed in 2019-20; bringing the total tally of **Active AAQMS in Maharashtra** to 84 (NAMP -60, SAMP -1 and Continuous AAQMS – CAAQMS - 23).

AAQMS continuously records and monitors the levels of criteria pollutants namely Sulphur dioxide ($SO_2$), Nitrogen oxides (NOx), Respirable Suspended Particulate Matter (RSPM) while CAAQMS also monitors levels of other air pollutants such as Carbon monoxide (CO), Benzene and Ozone ($O_3$). The monthly and annual concentrations for $SO_2$, NOx and RSPM have been represented graphically. For $O_3$ and CO however, 8 hourly concentrations are considered and for benzene' monthly average concentrations are taken into consideration. The levels of all these pollutants are compared with standard limits as suggested by the Central Pollution Control Board (CPCB). This report also provides a **comparative analysis** (**22 February 2020**

[1] https://www.who.int/airpollution/data/en/
[2] https://apps.who.int/iris/bitstream/handle/10665/250141/9789241511353-eng.pdf?sequence=1

**to 22 April 2020) of levels of air pollutants recorded before and after the nationwide lockdown imposed due to the ongoing novel corona virus outbreak**. The comparison clearly indicates the contribution and extent of polluting sources causing air pollution.

In 2019-20, **All AAQMS recorded $SO_2$ concentration under the limit (daily - 80 µg/m³ and annual - 50 µg/m³ respectively).** Kalyan RO, a region having MIDC complexes at Dombivali and Ambernath recorded $SO_2$ levels within 21 µg/m³ to 34 µg/m³; a slight increase from 20 µg/m³ to 33 µg/m³ during 2018-19. In Mumbai RO; all AAQMS (including newly added 9) recorded annual $SO_2$ concentration within 7 µg/m³ to 16 µg/m³; a level which is far below than the annual limit of 50 µg/m³. The cities of Amaravati, Aurangabad, Chandrapur, Nagpur, Nashik, and Raigad recorded annual $SO_2$ concentrations less than 25 µg/m³ and were relatively clean with respect to $SO_2$ pollution.

In areas having high vehicular movement/traffic, the levels of NOx found to be significantly higher as it gets released as part of vehicular emissions. Prolonged exposure to NOx may leads to health issues such as breathing problems, headache, eye irritation and lung related problems. In the year 2019-20, **9 ROs (up from 6 ROs in 2018-19)** namely Aurangabad, Kalyan, Kolhapur, Mumbai, Navi Mumbai, Nagpur, Pune, Raigad and Thane **recorded annual average NOx concentrations which were higher than the prescribed annual average limit of 40µg/m³**. Thus, necessary mitigative steps especially towards curbing vehicular emissions must be taken to mitigate the issue of NOx pollution. Towards this, a draft notification was issued on February 2016 by the Indian Ministry of Road Transport and Highways (MoRTH) on Bharat Stage VI (BS-VI) emission standards for all major on-road vehicle categories in India. The standards will come into effect for all classes of vehicles manufactured on or after April 1, 2020[3]. The shift from BS-IV to BS-VI would means stricter emission norms and would help considerably to lower the NOx emissions.

In case of RSPM, it is **worth mentioning that, in this year, 15 AAQMS recorded average RSPM concentration within the standard limit (60 µg/m³) as compared to 2018-19 (4 AAQMS).** 2 ROs namely Chandrapur (Ghuggus -204 µg/m³, Rajura – 171 µg/m³), and Thane (Kopri – 154 µg/m³, Naupada – 153 µg/m³, Balkum/Glaxo – 140 µg/m³) found to be having maximum percentage of stations exceeding annual RSPM concentration beyond the standard limit. AAQMS installed in Chandrapur region has been consistently exceeding the RSPM levels. This is because of the operations related to coal mining, thermal power plant, rice and paper mills along with construction activities.

$PM_{2.5}$ concentration in 2019-20, was recorded at all 23 CAAQMS in the state. It was found that only 2 of these CAAQMS- Kalyan and Karve Road, Pune touched the mark of 40 µg/m³ which is the standard limit for annual average $PM_{2.5}$ concentration as prescribed by CPCB. Rest all CAAQMS recorded concentration less than the standard annual limit

[3] https://theicct.org/sites/default/files/publications/India%20BS%20VI%20Policy%20Update%20vF.pdf

In 2019-20, ROs like Bandra, Dombivali, Nagpur, Kalyan and Solapur exceeded 8 hourly concentration standards of 2 mg/m$^3$ for Carbon monoxide (CO). On the other hand, average concentration of CO reached closer to the limit at Pune, Mahape and Nerul. Extensive use of Public transport and applications such as Carpooling may help considerably in reducing CO emissions from vehicles.

In case of $O_3$, it was found that for most of the regions, **high concentration of ozone was found in the month of January, February, March and April**. 5 CAAQMS installed at Chandrapur (February 2020), Kalyan (Feb-March 2020), Mahape (Feb 2019), Mulund (Feb 2020 – March 2020) and Nagpur (April 2019-May 2019) recorded higher concentration than the standard limit of 100 µg/m$^3$.

Out of 22 CAAQMS, **11 CAAQMS namely Bandra, Colaba, Dombivali, Mahape, Nagpur, Nashik, Nerul, Kalyan, Kurla, Sion and Worli recorded benzene concentration above the limit** (5 µg/m$^3$) during certain period of time in the year. Dombivali region recorded annual average concentrations above the limit throughout the year thus making Dombivali a prime region as far as Benzene pollution is concerned. Followed by Dombivali, Mahape CAAQMS recorded above limit benzene average concentration for 9 months except June, August and September.

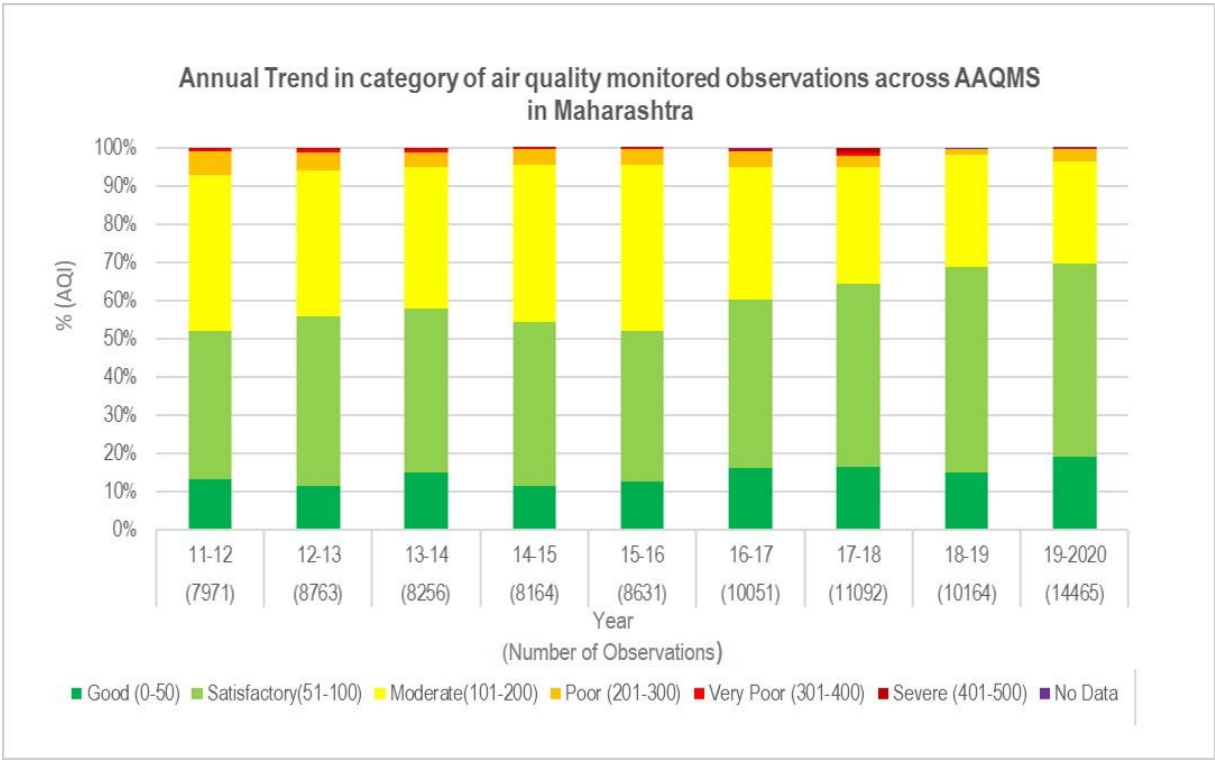



**Figure No. 1: Annual Trend in share of classes of Air Quality Index (AQI) across Maharashtra for past 9 years**

Figure No. 1 gives an overview of the AQI observations in the state. Total 14,465 observations were recorded across 84 active AAQMS in Maharashtra. It is noteworthy that daily observations under 'Good' and 'Satisfactory' categories accounted for almost 70% (10,090 observations) of total observations, which is almost similar to 68.8% in the previous year (2018- 19). Further, while the percentage of Moderate category observations has slightly decreased to 27% from 29.4% (2018-19); the percentage of Poor AQI observations has increased to 3% as compared to only

1.38% in 2018-19. Majority of the Very Poor observation were recorded at Ghuggus (12 days), Vile Parle (6 days) and Solapur (4 days).

After announcing 1-day Janta curfew (22 March, 2020), the Government of India (GoI), announced nationwide lockdown to restrict the spread of corona virus outbreak. During the lockdown, all private and public transport was stopped. Only essential services employees were allowed to travel by government arranged transport. All industrial activities (except pharma and essential goods like agricultural activities) were allowed to function; that too with utmost precautions necessary to stop the corona virus spread. Since all major polluting sources were closed down completely or partially (depends on nature of service), it was observed that the amount of pollution including air and water started decreasing considerably. In this report, the section '**Impact of COVID - 19 Lockdown on Air Quality across Maharashtra 2019-2020'** depicts the comparison in levels of air pollutants before and during the lockdown period till 22nd April 2020. Majority of the CAAQMS recorded considerable decrease in concentration for almost all 3 pollutants ($SO_2$, NOx and RSPM). It ultimately states that it the lockdown does have positive impact on our environment including air quality.

# Introduction

The ever-increasing anthropogenic activities- industrialization, excessive use of automobiles, burning of fossil fuels for generating electricity- have led to a gradual change in the natural atmospheric composition. These factors are considered to be a cause of air pollution. The Air (Prevention and Control of Pollution) Act, 1981 defines "Air Pollution" as- the presence of air pollutants in the atmosphere[4]. Air pollutants are any solid, liquid or gaseous substances (including noise) present in the atmosphere; at a concentration which may be injurious to human beings, plants, animals, infrastructure or the environment.


**Figure No. 2: Sources of Air Pollution**

**Source:http://www9.who.int/airpollution/infographics/Air-pollution-INFOGRAPHICS-English-4-1200px.jpg**

Air pollutants may be emitted from **natural** or **anthropogenic** sources. These sources may also be classified as- **point** (e.g. industrial stack, chimney), **line** (exhaust emissions from automobiles in a traffic jam) or **area source** (e.g. emissions from industrial area). The classification of air pollutants can be on the basis of emission source, origin and state of matter (Figure No. 3)

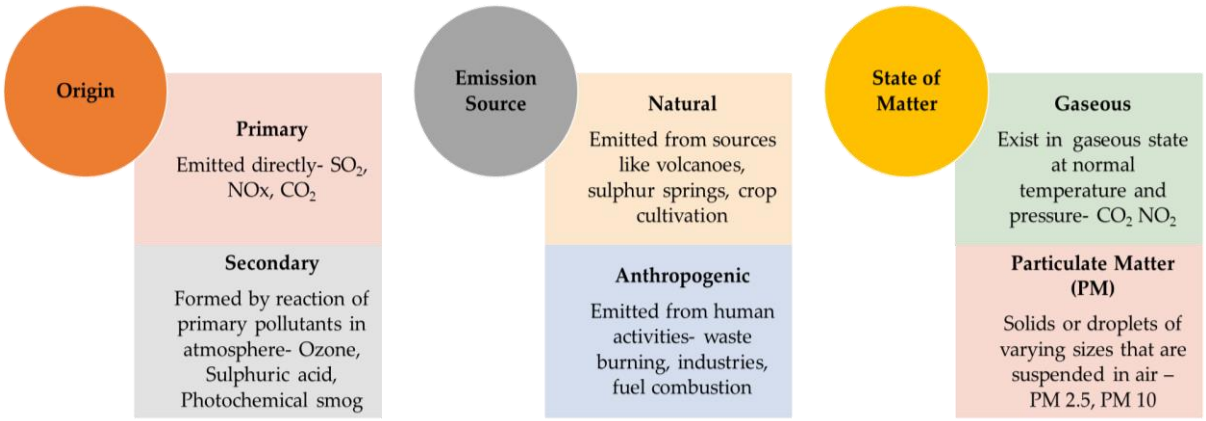



**Figure No. 3 :Origin and Sources of Air Pollutants**

[4]http://nbaindia.org/uploaded/Biodiversityindia/Legal/23.%20Air%20(Prevention%20and%20control%20of%20Pollution)%20Act%201981.pdf

## Impacts of Air pollution

Air pollution is global cause of concern due to the severe environmental impacts such as acid rain, smog, damage to crops and infrastructure; and wide-ranging health impacts like eye irritation, nasal irritation or chronic respiratory illness, depending on factors like type of pollutant, its concentration and exposure duration.

It is leading contributor to the global burden of diseases and deaths. According to the World Health Organization (WHO), globally 4.2 million people die due to ambient (outdoor) air pollution while 3.8 million die of indoor air pollution (from cookstoves and domestic fuels)[5]. In India, around 1.2 million deaths due to outdoor and indoor air pollution were reported in 2017(Health Effects Institute, 2019)[6].

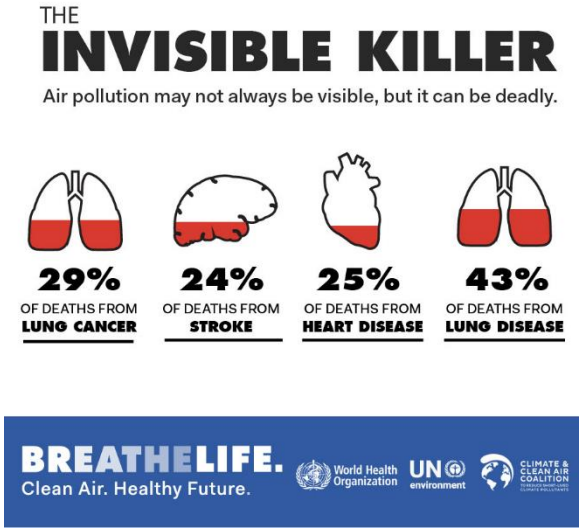



**Figure No. 4 Causes of deaths due to air pollution.**
Source: http://www9.who.int/airpollution/infographics/invisiblekiller2_all4_2018.jpg

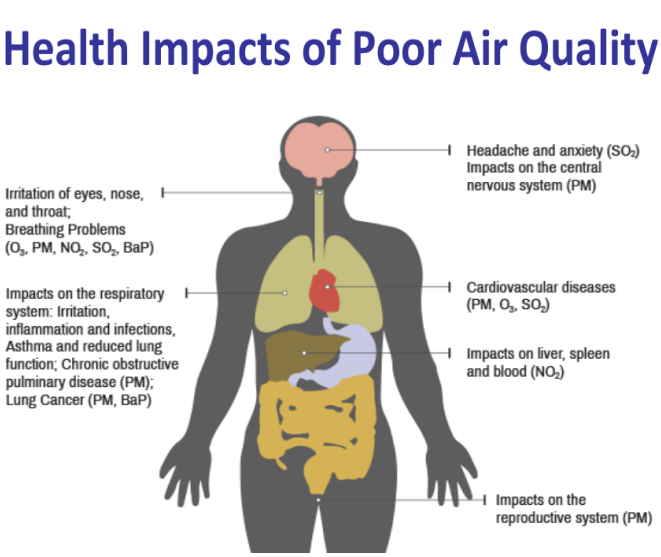



**Figure No. 5 Health impacts of air pollution**

**Source: https://louisvilleky.gov/government/air-pollution-control-district/about-air-pollution**

Thus, assessing the air quality is of extreme importance to develop policy interventions and pollution control measures to safeguard the environmental and human wellbeing in a particular area.

[5]http://nbaindia.org/uploaded/Biodiversityindia/Legal/23.%20Air%20(Prevention%20and%20control%20of%20Pollution)%20Act%201981.pdf
[6] https://www.stateofglobalair.org/

# Air Quality Monitoring in Maharashtra

Ambient Air Quality is the state of surrounding air with respect to the pollutant concentration in the outdoor environment. According to a report, published by the World Health Organization (WHO) in 2016, 14 Indian cities were among the 20 most polluted cities in the world owing to $PM_{2.5}$ levels, while 13 Indian cities were listed among the most polluted for $PM_{10}$ levels. Thus, air quality monitoring becomes essential to improve air quality and minimize its impacts on the health and environment.

The Central Pollution Control Board (CPCB) has set National Ambient Air Quality Standards (NAAQS) for various pollutants. These pollutants need to be monitored regularly as per the monitoring frequency specified by CPCB. For this purpose, the National Air Quality Monitoring Programme (NAMP) was started. Under this, a nationwide Ambient air quality monitoring network has been designed to assess spatial and temporal variations of ambient air concentrations for criteria pollutants like – Sulphur Dioxide, Oxides of nitrogen, Carbon monoxide, Particulate matter and secondary pollutants like Ozone. The monitoring results help in assessing the level of pollution in relation to the ambient air quality standards and developing a strategic management plan. The monitoring of pollutants is carried out for 24 hours (4-hourly sampling for gaseous and 8-hourly sampling for particulate matter) twice a week, to have total one hundred and four (104) observations annually. The data obtained is used to calculate the Air Quality Index (AQI)- a comprehensive and easy to interpret value, representing the air quality status.

In the current year (2019-20), under the NAMP network, there are around 793 operating stations across 344 cities/towns in 29 states and 6 Union Territories of the country[7]. The state of Maharashtra has active 84 ambient air quality monitoring stations set up across the different regions of the state, to provide a complete picture of air quality in the state.

### Active Monitoring Sites in Maharashtra (2019-2020)

MPCB monitors air quality across Maharashtra through a network of 84 active Ambient Air Quality Monitoring Stations (AAQMS) spread over 25 cities. Out of the total active AAQMS, 23 are Continuous Ambient Air Quality Monitoring Stations (CAAQMS), 60 are under NAMP and remaining 1 is under SAMP. The details of these 84 AAQMS have been represented in Annex -1.

As per the data available each year, the corresponding tally of AAQMS is presented below in Table No. 1.

[7] https://cpcb.nic.in/about-namp/

**Table No. 1: Total AAQMS across Maharashtra 2019-2020**

| Regional office | City | Monitoring Program | | | Grand Total |
|---|---|---|---|---|---|
| | | CAAQMS | NAMP | SAMP | |
| Amravati | Akola | | 3 | | 3 |
| | Amravati | | 3 | | 3 |
| Aurangabad | Aurangabad | 1 | 3 | | 4 |
| | Jalna | | 2 | | 2 |
| | Latur | | 3 | | 3 |
| Chandrapur | Chandrapur | 2 | 6 | | 8 |
| Kalyan | Ambernath | | 1 | | 1 |
| | Badlapur | | 1 | | 1 |
| | Bhiwandi | | 2 | | 2 |
| | Dombivali | 1 | 1 | 1 | 3 |
| | Kalyan | 1 | 1 | | 2 |
| | Ulhasnagar | | 2 | | 2 |
| Kolhapur | Kolhapur | | 3 | | 3 |
| | Sangli | | 3 | | 3 |
| Mumbai | Mumbai | 11 | | | 11 |
| Nagpur | Nagpur | 1 | 4 | | 5 |
| Nashik | Jalgaon | | 3 | | 3 |
| | Nashik | 1 | 4 | | 5 |
| Navi Mumbai | Navi Mumbai | 2 | 4 | | 6 |
| | Taloja | | 1 | | 1 |
| Pune | Pune | 1 | 4 | | 5 |
| | Solapur | 1 | 2 | | 3 |
| Raigad | Panvel | | 1 | | 1 |
| Thane | Thane | | 3 | | 3 |
| | Vasai | 1 | | | 1 |
| | Grand Total | **23** | **60** | **1** | **84** |

***Note: CAAQMS at Airoli (Navi Mumbai) is not considered in the list since it is closed in the current year 2019-2020.***

## Continuous Ambient Air Quality Monitoring Station (CAAQMS)

CAAQMS is an automated system for continuous monitoring of air pollution parameters. The system uses sophisticate technology and software to assess pollutant concentrations and provide continuous monitoring data. It helps to monitor real-time concentrations of pollutants like Benzene, Xylene, Carbon Monoxide, and Nitrogen Dioxide along with criteria pollutants-$SO_2$, Oxides of Nitrogen and Particulate Matter. Meteorological data like relative humidity, rainfall, solar radiation, wind speed and wind direction are also recorded by CAAQMS.

In the current year 2019-2020, Maharashtra Pollution Control Board has added 13 new CAAQMS to the existing air quality monitoring network, hereby expanding the network to 23 CAAQMS in the state. This addition is a great move to strengthen air quality monitoring in the state.

## Air Quality Monitoring Data

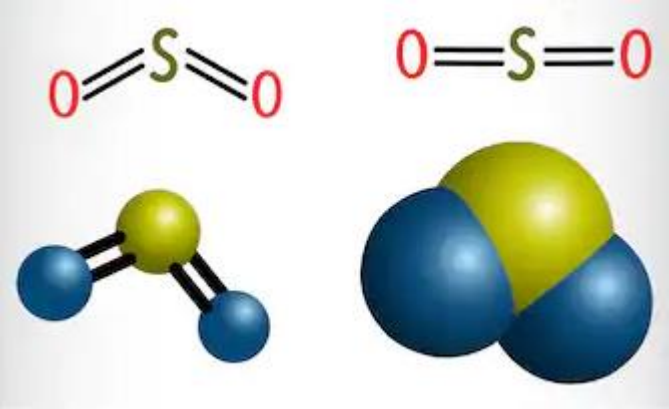
MPCB publishes the data recorded by all monitoring stations on its website. One can easily access the data as per the time series for the particular station. The data sets recorded at monitoring stations for the year 2019-2020 has been compiled in this report. The Annual and Monthly trend of the data for the current year is represented in Section – 'Data Recorded by AAQMS across Maharashtra 2019-2020'- of this report.


**Picture No. 1 : CAAQMS installed at Mulund**

# Status of Air Quality

## Sulphur dioxide- $SO_2$

### Sulphur Dioxide




Sulphur oxides (SOx) are a group of compounds made up of sulphur and oxygen molecules. The most common sulphur oxide is sulphur dioxide ($SO_2$).

Sulphur Dioxide ($SO_2$) is a colourless gas with a pungent, irritating odour and taste.

Being polar in nature, it readily dissolves in water to give an acidic solution which oxidizes to form sulphuric acid and is transported by wind currents over hundreds of miles and gets deposited as acid rain. Acid rain causes acidification of water bodies, corrosion to metal structures, skin diseases and so on

**Sources**

- **Natural: Volcanoes, biological decay, forest fires, hot springs**
- **Anthropogenic: Fossil fuel combustion, smelting of metals, manufacture of sulphuric acid, production of elemental sulphur incineration of refuse**

**Impacts**

- **Human Health- Skin and eye irritation, cough, asthma, chronic bronchitis, lung function impairment**
- **Plants- promotes opening of stomata causing excessive water loss, photosynthesis disruption, foliage damage, stunted growth**
- **Environment: Acid rain, smog**

Image Source https://www.shutterstock.com/search/sulphur+dioxide

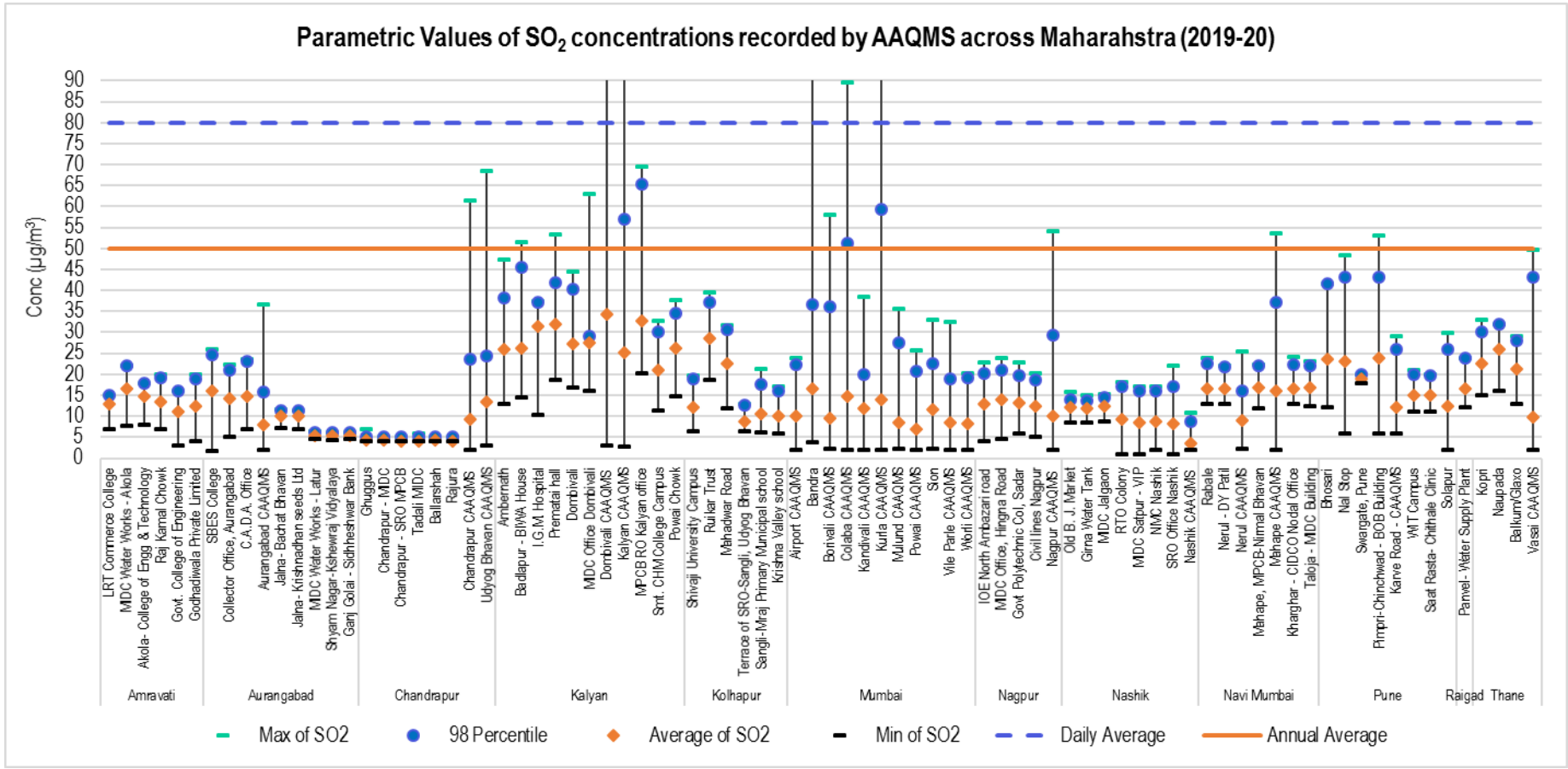



**Figure No. 6: Parametric values of $SO_2$ concentrations recorded by AAQMS across Maharashtra (2019-2020)**

As seen in Figure No. 6, it can be seen that, in case of $SO_2$ levels, all monitoring stations recorded the average concentration of $SO_2$ well within the daily (80 µg/m$^3$) and annual standards (50 µg/m$^3$).

Out of 13 newly added CAAQMS, 1 has been installed in Kalyan (Kalyan CAAQMS) making the total AAQMS installed in Kalyan RO to 11. It is important to know that all these stations recorded $SO_2$ concentration in the range of 21 to 34 µg/m$^3$. Among these 11 stations, highest annual average concentration being recorded by Dombivali CAAQMS (34 µg/m$^3$) (Table No. 2) while lowest by Smt. CHM College Campus (21 µg/m$^3$). All 4 stations with the highest $SO_2$ annual average concentration were found to be in Kalyan RO.

In Mumbai RO, new 9 CAAQMS were installed at various locations thereby bringing the total tally of AAQMS to 11. The recorded range of annual average $SO_2$ concentration rom these AAQMS were found to be from 7 µg/m$^3$ to 16 µg/m$^3$. Bandra AAQMS recorded annual average concentration of 16 µg/m$^3$ (19 µg/m$^3$ in 2018-19) while Sion AAQMS recorded concentration of 12 µg/m$^3$ (5 µg/m$^3$ in 2018-19). Lowest concentration was recorded by Powai AAQMS (7 µg/m$^3$) in 2019-20.

In case of Pune RO, though within theprescribed limit, the highest concentration was recorded by Bhosari and Pimpri-Chinchwad BOB Building (24 µg/m$^3$) followed by Nal stop (23 µg/m$^3$). Similarly, in Kolhapur RO, highest annual average $SO_2$ concentration was recorded at Ruikar Trust (29 µg/m$^3$), followed by Mahadwar Road AAQMS (23 µg/m$^3$). Lowest concentration was recorded by Terrace of SRO-Sangli, Udyog Bhavan (9 µg/m$^3$).

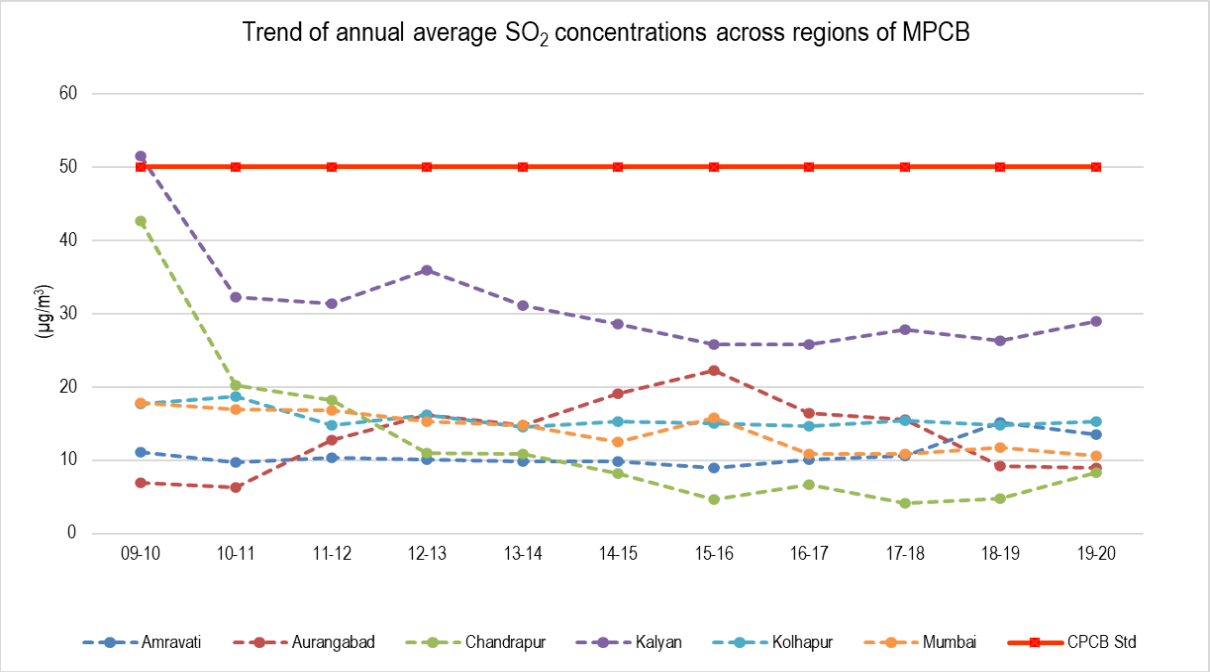
The cities of Amaravati, Aurangabad, Chandrapur, Nagpur, Nashik, and Raigad recorded annual $SO_2$ concentrations less than 20 µg/m$^3$ and were relatively clean with respect to $SO_2$ pollution.

**Table No. 2 : Stations with the highest $SO_2$ annual average concentration (within the limit) in 2019-2020**

| Sr. No. | MPCB RO | Station Name | No. of Days of observations | Average (µg/m$^3$) |
|---|---|---|---|---|
| 1 | Kalyan | Dombivali CAAQMS | 333 | 34 |
| 2 | | MPCB RO Kalyan Office | 108 | 33 |
| 3 | | Prematai Hall | 103 | 32 |
| 4 | | I.G.M Hospital | 100 | 31 |
| 5 | Kolhapur | Ruikar Trust | 95 | 29 |

*Note: All annual $SO_2$ values are within the standard limit (50 µg/m$^3$)*

# Trend in Sulphur Dioxide concentrations in Maharashtra



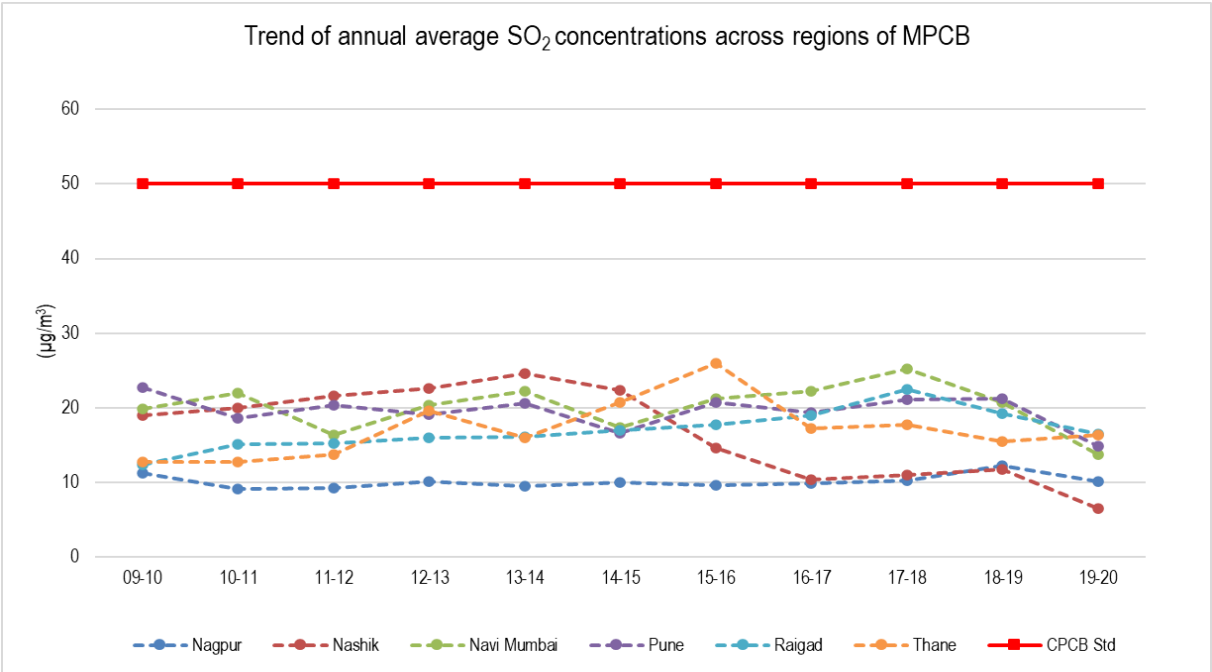




**Figure No. 7: Trend in annual $SO_2$ concentrations across different regions of Maharashtra**

It has been consistently observed that the annual average of $SO_2$ concentrations recorded by AAQMS in Maharashtra was found to be well within the standard limit prescribed by the NAAQS (50 μg/m$^3$). As per the trend observed in Figure No. 7, only 3 RO namely Chandrapur, Kalyan and Thane showed slight increase in $SO_2$ concentrations whereas remaining RO recorded decrease in the same. Even though majority of the regions are relatively clean towards $SO_2$ pollution; one thing must be taken into consideration that all these regions are witnessing infrastructural development in all 3 sectors namely residential, commercial and industrial. (Though the pace of development has gone down due to COVID related ongoing lockdown implemented pan India and almost in all regions of Maharashtra; once the situation gets clear, all development work would start at full pace). Hence, continuous monitoring and effective mitigative measures need to be taken in advance for avoiding any future problems related to pollution.

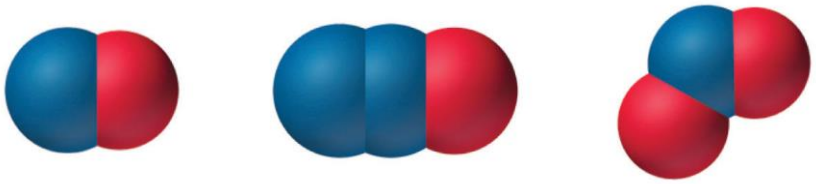
Out of 3 ROs which shows increasing trend in $SO_2$ concentration, Kalyan RO; though under the permissible limit; recorded highest increase (26 μg/m$^3$ to 29 μg/m$^3$). While considering the increase in concentrations in Kalyan RO, it must be taken into consideration that the RO has presence of large and well established MIDC sections in cities of Dombivali and Ambernath. These industrial complexes have presence of multiple manufacturing units of chemical, pharma and other sectors. These areas are the primarysource of pollution in Kalyan RO. Thane RO, neighbouring region to Kalyan RO showed slight increase in annual average $SO_2$ concentrations (15.6 μg/m$^3$ to 16.4 μg/m$^3$)

The primary reasons of air pollution faced by Chandrapur region are coal burning industries and auto-exhaust. This region has a significant presence of coal mines, cement industries, paper and rice mills and thermal power plant, too showed increasing trend (5 μg/m$^3$ - 8 μg/m$^3$).

It must be taken into account that even though the regions are recording $SO_2$ levels below the standard limit, all these regions are expanding exponentially and witnessing rapid population growth and industrial developments. Hence, appropriate mitigative measures must be taken to keep emissions under control in these regions for which continuous monitoring and implementation of advance pollution control technologies is needed. MPCB is continuously monitoring the pollution trend for taking future mitigative measures towards curbing the pollution levels.

## Oxides of Nitrogen

### Oxides of Nitrogen



NO $N_2O$ $NO_2$

Nitrogen oxides (NOx) are gases comprising of nitrogen and oxygen.

Toxicologically, the most significant nitrogen oxides are:

1. Nitric oxide (NO): It is a colourless, odourless, non- toxic gas.
2. Nitrogen dioxide ($NO_2$). It is a reddish-brown gas that has a pungent, irritating odour. It rapidly oxidizes in air to form nitrogen oxide.

$NO_2$ and NO are responsible for atmospheric chemical reaction involved in ozone formation and acid rain. Further in the presence of sunlight react with unburnt hydrocarbons to form photochemical smog which damages plants and detrimental health impacts. Thus, monitoring of NOx is of great importance

**Sources**

- **Natural: Lighting, forest fires and bacterial activity**
- **Anthropogenic: Ccombustion of fossil fuels for electricity generation, biomass burning and automobile exhaust emissions**

**Impacts**

- **Human Health- nose eye and throat irritation, headache reduced lung function, reduced oxygenation of body tissues**
- **Plants- foliage damage, stunted growth, increased susceptibility to frost damage**
- **Environment: Acid rain, smog**

Image Source: http://nbrienvis.nic.in/Database/1_2039.aspx

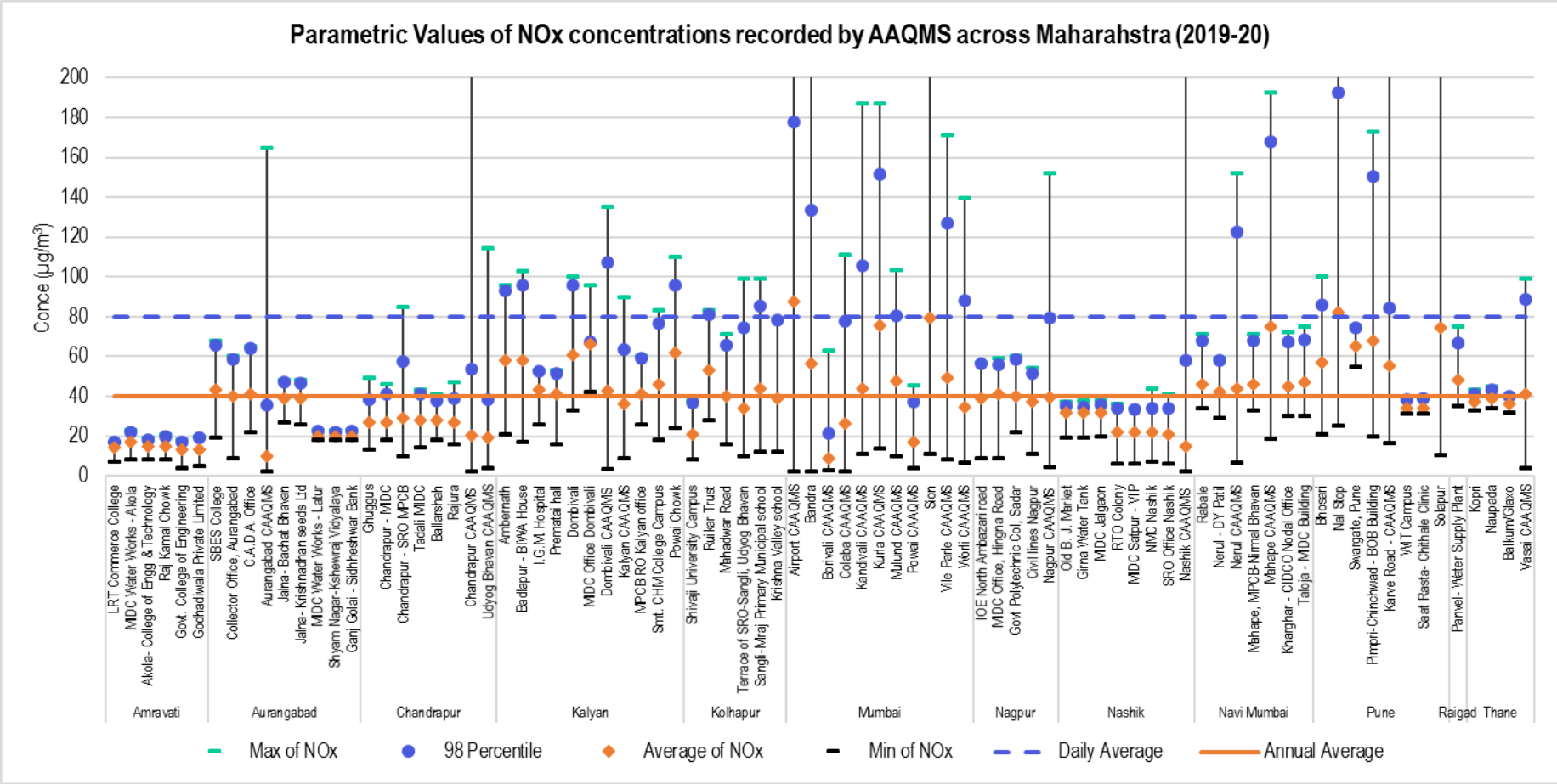



**Figure No. 8: Parametric values of NOx concentrations recorded by AAQMS across Maharashtra (2019-2020)**

In the year 2019-20, out of 12 ROs, 9 ROs (up from 6 ROs in 2018-19) namely Aurangabad, Kalyan, Kolhapur, Mumbai, Navi Mumbai, Nagpur, Pune, Raigad and Thane recorded annual average NOx concentrations which were higher than the prescribed annual average limit of 40µg/m$^3$. Out of these ROs, highest annual average concentration was recorded at Mumbai RO (Mumbai Airport CAAQMS -87 µg/m$^3$) followed by Pune RO (Nal stop-82 µg/m$^3$)

In Kalyan RO, all AAQMS except Kalyan CAAQMS (36 µg/m$^3$) exceeded the annual average concentration limit. This situation has been consistently witnessed by Kalyan RO over the years making this RO prime region in case of NOx pollution. MIDC office Dombivali AAQMS recorded highest (66 µg/m$^3$) followed by Powai chowk (62 µg/m$^3$) and Dombivali AAQMS (61 µg/m$^3$). The presence of large industrial areas and vehicular emissions might be contributing to the consistently high levels of NOx in Kalyan RO.

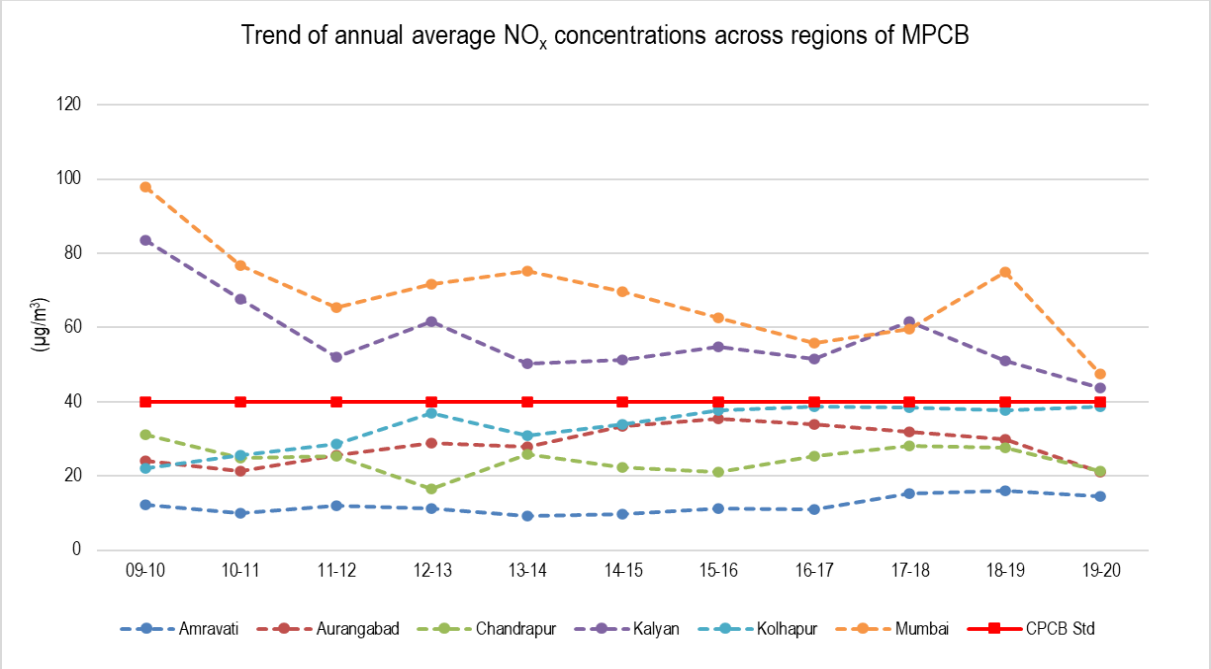
Out of 8 stations coming under Pune RO, only 2 namely WIT campus (34 µg/m$^3$) and Saat Rasta-Chitale Clinic (34 µg/m$^3$) recorded annual average concentration below the limit. All other 6 AAQMS recorded concentration between the range 55 µg/m$^3$– 82 µg/m$^3$.

The only AAQMS installed in Raigad RO i.e. Panvel Water supply plant AAQMS recorded annual NOx average of about 48 µg/m$^3$ which exceeds the limit value of 40 µg/m$^3$. All 4 AAQMS from Thane RO recorded near 40 µg/m$^3$ concentration. The recorded concentrations were found to be 37 µg/m$^3$ (Kopri), 39 µg/m$^3$ (Naupada), 36 µg/m$^3$ (Balkum/Glaxo) and 41 µg/m$^3$ (Vasai CAAQMS).

**Table No. 3: Top ten stations which exceeded NOx annual standard (40µg/m$^3$) in 2019-20**

| Sr No | MPCB RO | City | Station Name | Number of days of observations | Average (µg/m$^3$) |
|---|---|---|---|---|---|
| 1 | Mumbai | Mumbai | Airport CAAQMS | 365 | 87 |
| 2 | Pune | Pune | Nal Stop | 71 | 82 |
| 3 | Mumbai | Sion | Sion CAAQMS | 366 | 79 |
| 4 | | Kurla | Kurla CAAQMS | 366 | 76 |
| 5 | Navi Mumbai | Navi Mumbai | Mahape CAAQMS | 366 | 75 |
| 6 | Pune | Solapur | Solapur CAAQMS | 366 | 75 |
| 7 | | Pimpri-Chichwad | Pimpri Chinchwad–BOB building | 164 | 68 |
| 8 | Kalyan | Dombivali | MIDC Office Dombivali | 92 | 66 |
| 9 | Pune | Pune | Swargate | 2 | 65 |
| 10 | Kalyan | Ulhasnagar | Powai Chowk | 91 | 62 |

# Trend in Nitrogen Dioxide concentrations in Maharashtra



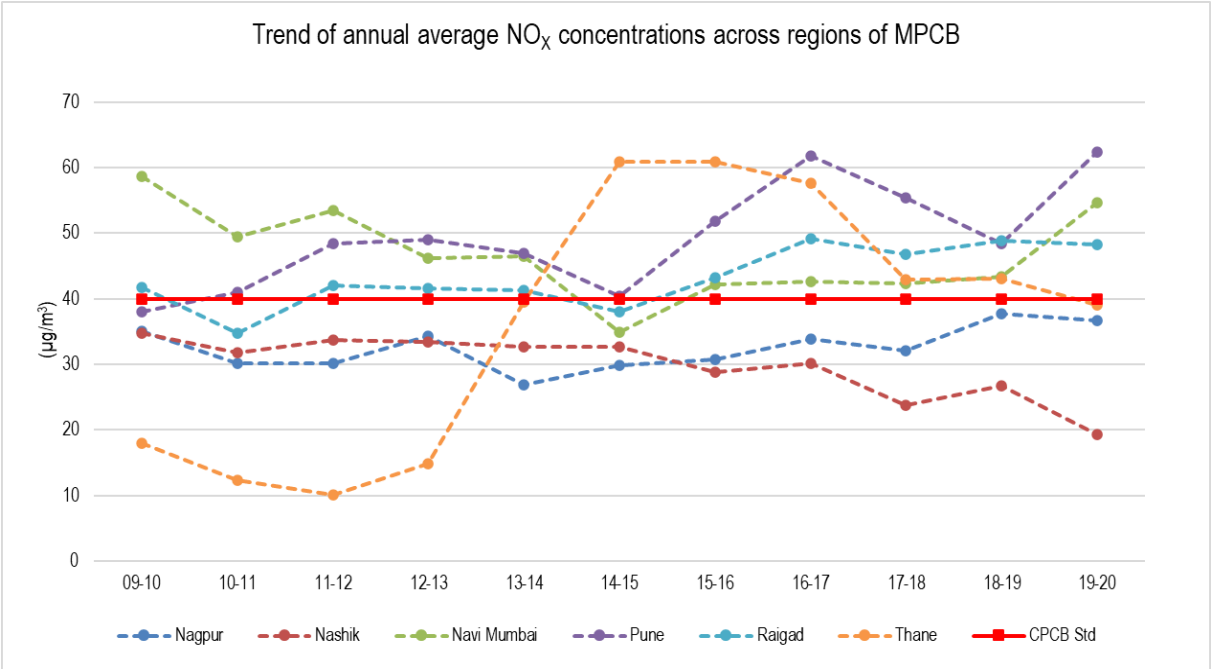




**Figure No. 9: Trend in annual Nitrogen Dioxide concentrations across different regions of Maharashtra**

In the year 2019-20, 2 ROs namely Navi Mumbai and Pune showed considerable increase in annual average NOx Concentrations from 43 µg/m$^3$ to 55 µg/m$^3$ and 48 µg/m$^3$ to 62 µg/m$^3$ respectively. Both regions crossed the prescribed limit of 40 µg/m$^3$ which puts these regions in the category of polluted regions in case of NOx pollution (Figure No. 9).

Out of other remaining 10 ROs, 3 ROs namely Kalyan, Mumbai and Raigad; though concentrations above the limit recorded decrease (51 µg/m$^3$ to 44 µg/m$^3$, 75 µg/m$^3$ to 47 µg/m$^3$ and 49 µg/m$^3$ to 48 µg/m$^3$ respectively). Neighbouring Thane RO too showed decreasing trend from 43 µg/m$^3$ to 39 µg/m$^3$, value which is slightly less that the limit if 40 µg/m$^3$.

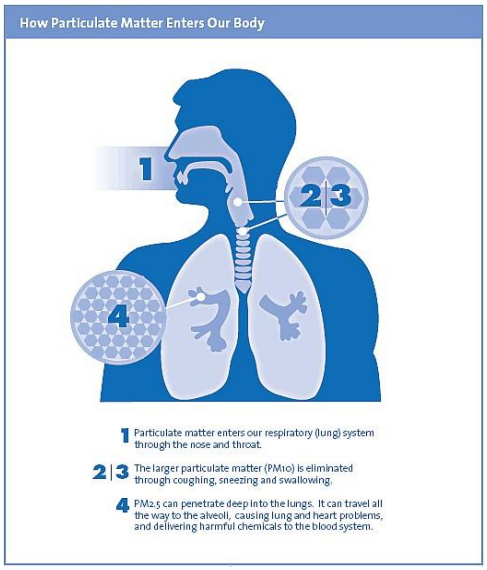
Vehicular exhaust is the primary reason behind the NOx pollution. The Government of India is taking concrete measures in curbing the pollution levels causing due to vehicular emissions. Towards this, a draft notification was issued on February 2016 by the Indian Ministry of Road Transport and Highways (MoRTH) on Bharat Stage VI (BS-VI) emission standards for all major on-road vehicle categories in India. The standards will come into effect for all classes of vehicles manufactured on or after April 1, 2020[8]. The shift from BS-IV to BS-VI would means stricter emission norms and would help considerably to lower the NOx emissions.

[8] https://theicct.org/sites/default/files/publications/India%20BS%20VI%20Policy%20Update%20vF.pdf

## Particulate Matter

Particulate matter (PM) refers to a complex mixture of extremely small particles and liquid droplets- acids (nitrates and sulphates), hydrocarbons, heavy metals, soil or dust particles*.

These particles vary in size and chemical composition. The smaller the particles, < 2.5 micron in size can enter our lungs resulting in respiratory health problems. Particulate matter pollution is a worldwide concern. It is estimated that in 2016, ~91% of the global city population lived exposed to particulate matter concentrations higher than the WHO guidelines*.




### Sources

- Natural: Volcanoes, dust storms, forest and grassland fires, living vegetation, and sea spray
- Anthropogenic: Power plants, industrial processes, mining and quarrying activities, vehicular traffic, domestic coal burning, waste incinerator, burning agriculture residues

### Impacts

- Human Health- Irritation of eyes, nose, throat, cough, breathing difficulty, Premature death, aggravated asthma, acute respiratory symptoms including aggravated coughing, aggravation of asthma, chronic bronchitis reduced lung function
- Plants- Clog stomatal openings of plants and interfere with the function of photosynthesis
- Environment: Smog, haze (reduced visbility)

**Image Source:** http://www.fnsb.us/transportation/Pages/What-is-PM2.5.aspx

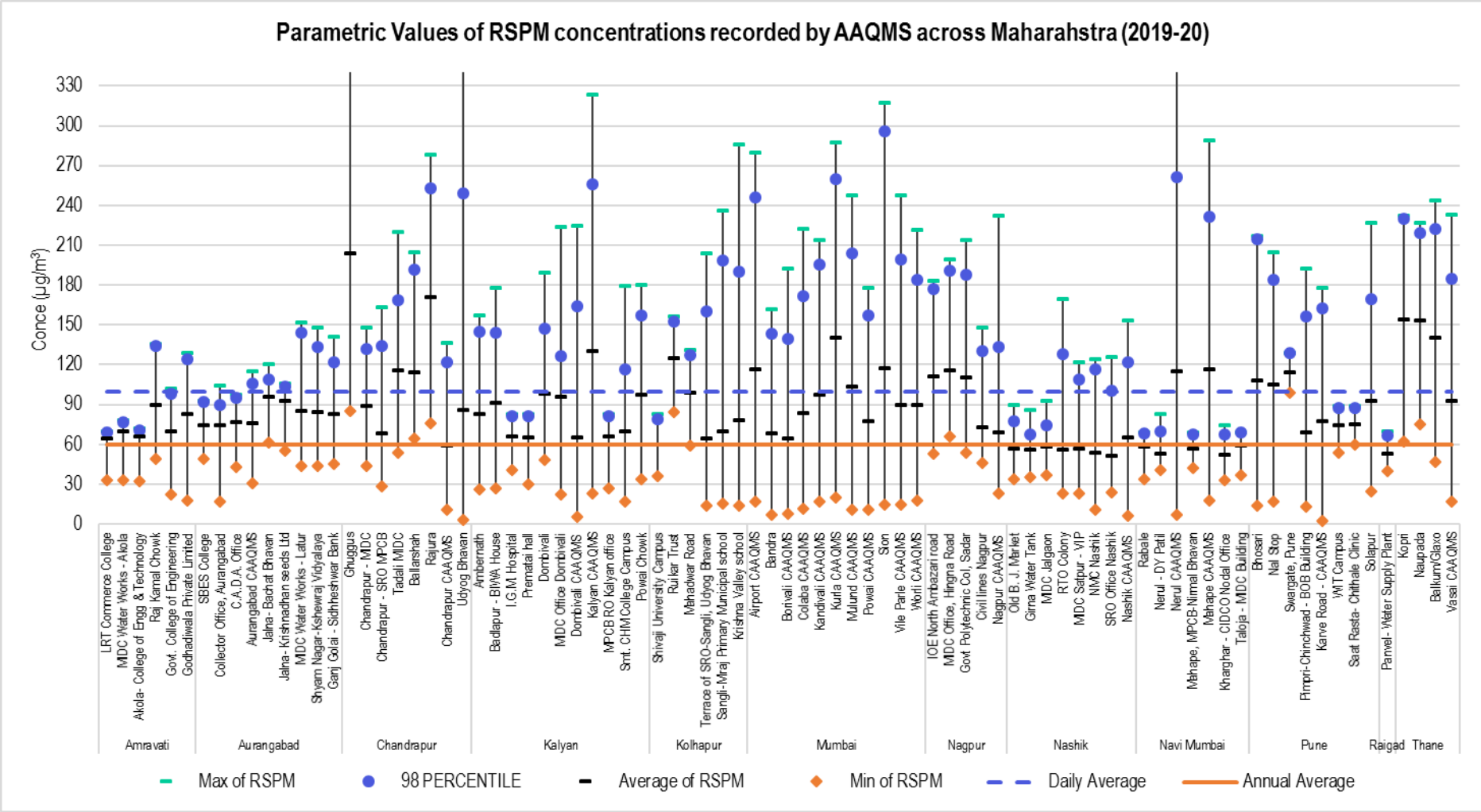



**Figure No. 10: Parametric values of RSPM ($PM_{10}$) concentrations recorded by AAQMS across Maharashtra (2019-2020)**

Respirable suspended Particulate Matter (RSPM) poses greater risk to the human health because these particles can enter deep into lungs through respiration and some of them may even enter the bloodstream. The levels of RSPM are always a matter of great concern for Maharashtra as RSPM is one of the most persistent reasons for increasing air pollution. A list of the Inferior sites of these has been enlisted in **Table No. 4**.

Even though the problem of RSPM is persistent, still it is worth mentioning that this year (2019-20), 15 AAQMS recorded average RSPM concentration within the standard limit of 60 $\mu g/m^3$ as compared to previous year (2018-19) where only 4 AAQMS recorded the same levels. These 15 AAQMS includes SRO office Nashik (51 $\mu g/m^3$), Kharghar-CIDCO Nodal Office (52 $\mu g/m^3$), Nerul-D Y Patil (53 $\mu g/m^3$), Panvel-Water supply plant (53 $\mu g/m^3$), NMC Nashik (54 $\mu g/m^3$), Girna water tank (56 $\mu g/m^3$), RTO colony (56 $\mu g/m^3$), Old B.J. Market (57 $\mu g/m^3$), MIDC Satpur-VIP (57 $\mu g/m^3$), Mahape-Nirmal Bhavan (57 $\mu g/m^3$), MIDC Jalgaon (58 $\mu g/m^3$), Rabale (58 $\mu g/m^3$), Chandrapur CAAQMS (59 $\mu g/m^3$), Taloja-MIDC building (59 $\mu g/m^3$) and Shivaji University Campus (60 $\mu g/m^3$).

Chandrapur RO has always experienced high levels of RSPM. This might be due to presence of coal mines, thermal power plant, rice and paper mills and other industrial units. Highest levels of RSPM (annual average) was recorded at Ghuggus (204 $\mu g/m^3$) which has been increased from 181 $\mu g/m^3$ (2018-19). It was followed by Rajura (171 $\mu g/m^3$), Tadali (116 $\mu g/m^3$) and Ballarshah (114 $\mu g/m^3$). Udyog Bhavan CAAQMS (86 $\mu g/m^3$), a newly added AAQMS too recorded annual average RSPM concentration above the standard limit. This is indicative of the high levels of air pollution in the region which need to be addressed urgently; furthermore, effective mitigative measures need to be undertaken to curb the air pollution problem.

Similar trend was observed in Kalyan RO where all 11 AAQMS recorded above limit RSPM concentrations. Kalyan CAAQMS, newly added AAQMS recorded highest annual average concentration (131 $\mu g/m^3$) followed by Dombivali (98 $\mu g/m^3$), Powai Chowk (97 $\mu g/m^3$), MIDC office – Dombivali (96 $\mu g/m^3$) and Badlapur – BIWA House (91 $\mu g/m^3$). Kalyan RO too has a presence of industrial areas (MIDC). These complexes along with the development activities and vehicular exhaust contribute to the RSPM pollution. Effective measures are needed to be taken to reduce these levels and to elevate the quality of air.

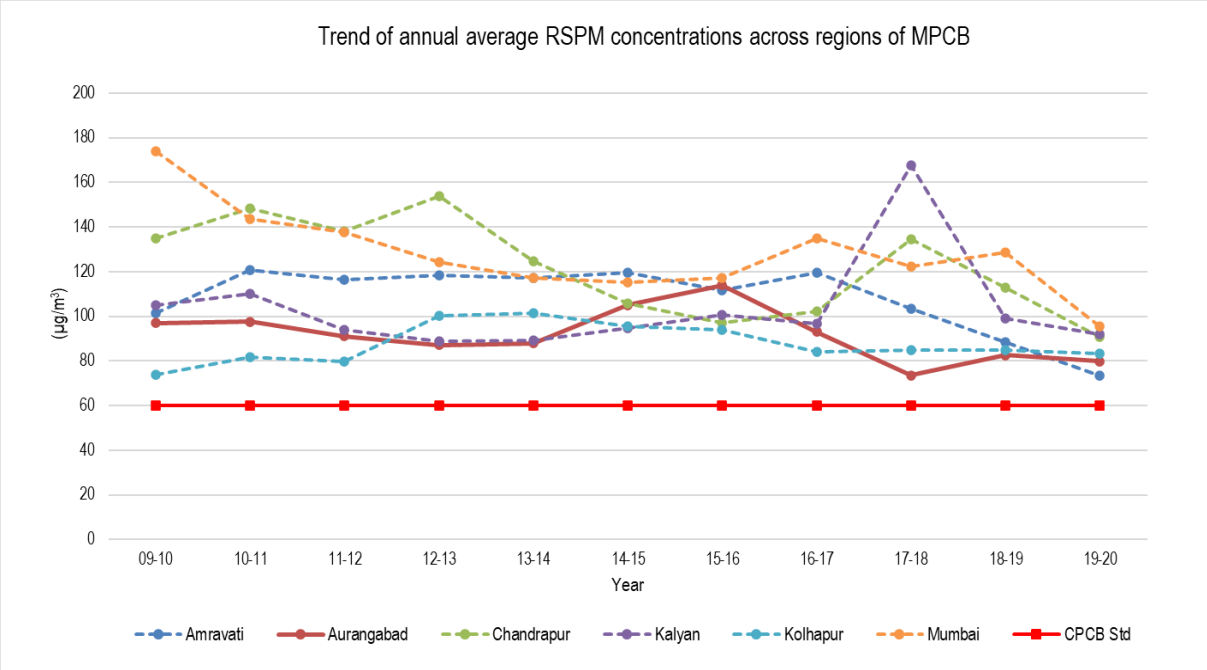
In the Financial Capital of India i.e Mumbai RO, along with previous AAQMS (Bandra and Sion), 9 new CAAQMS were installed for effective monitoring and assessment of air pollutants in the Mumbai city. All 11 AAQMS exceeded the annual average RSPM concentration (Range 64 $\mu g/m^3$to 140 $\mu g/m^3$). The highest levels were recorded by Kurla CAAQMS (140 $\mu g/m^3$) followed by Sion (117 $\mu g/m^3$), Airport CAAQMS (116 $\mu g/m^3$), Mulund CAAQMS (103 $\mu g/m^3$). Remaining stations recorded concentration in the range of 64 $\mu g/m^3$ to 98 $\mu g/m^3$.

In Navi Mumbai, out of 7 AAQMs, only 2 AAQMS namely Mahape CAAQMS (117 $\mu g/m^3$) and Nerul CAAQMS (115 $\mu g/m^3$) exceeded the annual average RSPM concentration above the limit. Rest all 5 stations recorded the levels within the prescribed limit.

**Table No. 4: Ten Inferior sites with AAQMS which recorded the highest minimum daily RSPM concentrations in 2019-20**

| Sr No | Station Name | Region | Annual Average concentrations (µg/m³) |
|---|---|---|---|
| 1 | Ghuggus | Chandrapur | 204 |
| 2 | Rajura | | 171 |
| 3 | Kopri | Thane | 154 |
| 4 | Naupada | | 153 |
| 5 | Balkum/Glaxo | | 140 |
| 6 | Kurla CAAQMS | Mumbai | 140 |
| 7 | Kalyan CAAQMS | Kalyan | 131 |
| 8 | Ruikar Trust | Kolhapur | 125 |
| 9 | Sion CAAQMS | Mumbai | 117 |
| 10 | Mahape CAAQMS | Navi Mumbai | 117 |

# Trend in RSPM concentrations in Maharashtra



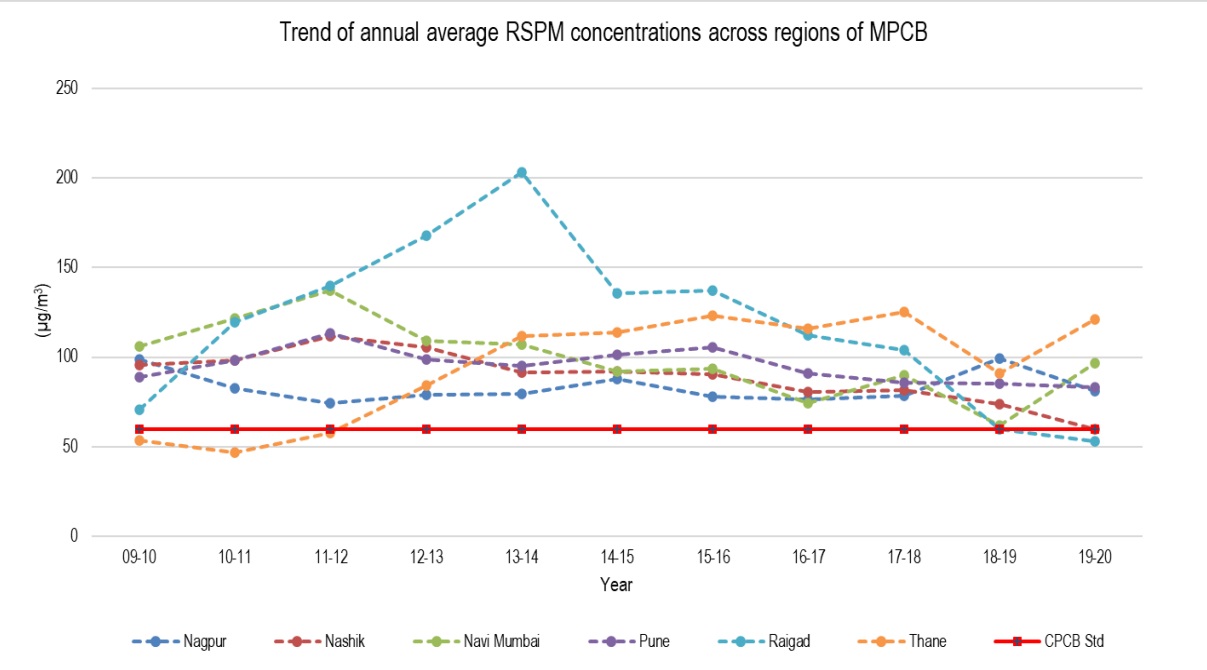




**Figure No. 11: Trend in RSPM concentrations across different regions of Maharashtra**

Some of the Particulate matters emit directly from sources such as construction and quarrying sites, fires, unpaved roads, fields' whereas most of the particles forms in the atmosphere as a result of complex reactions involving chemical pollutants such as $SO_2$ and NOx which emits from power plants, vehicles and industrial activities[9]. RSPM especially poses greater risk to health as these particles can enter into lungs and some may enter into the bloodstream.

The annual average RSPM levels are always being above the standard prescribed limit of 60 $\mu g/m^3$ in almost all ROs of Maharashtra (Figure No. 11). Even the regions with low $SO_2$ and NOx concentrations have recorded high RSPM concentration. In the year 2019-20, 2 ROs namely Navi Mumbai and Thane recorded considerable increase in RSPM levels from 62 $\mu g/m^3$ to 96 $\mu g/m^3$ and 91 $\mu g/m^3$ to 121 $\mu g/m^3$ respectively which is double the limit value of 60 $\mu g/m^3$.

On the other hand, majority of the ROs though above the limit recorded decrease in RSPM levels with major decrease being witnessed by Mumbai and Chandarpur from 129 $\mu g/m^3$ to 95 $\mu g/m^3$ and 113 $\mu g/m^3$ to 91 $\mu g/m^3$. The only RO which recorded levels below the standard limit is Raigad RO from 60 $\mu g/m^3$ in 2018-19 to 53 $\mu g/m^3$ in 2019-20 which shows that Raigad RO is considerably clean compared to other ROs in case of annual RSPM level concentrations.

[9] https://www.epa.gov/pm-pollution/particulate-matter-pm-basics

## Trend in $PM_{2.5}$ concentrations in Maharashtra

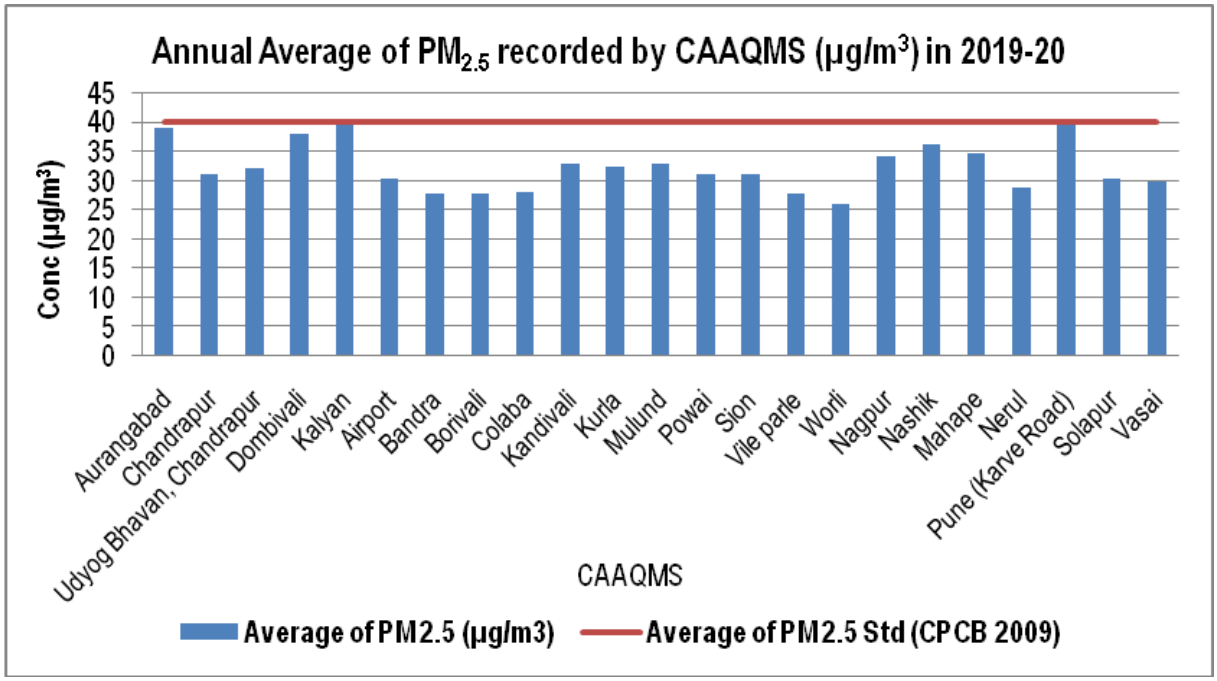



**Figure No. 12 Annual average concentration of $PM_{2.5}$ recorded by CAAQMS across Maharashtra**

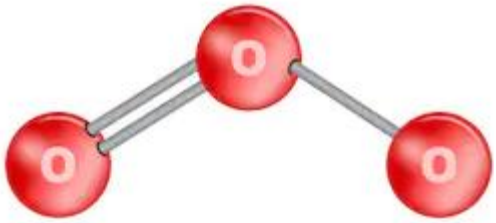
$PM_{2.5}$, particles with diameter less than 2.5 microns are result of fuel combustion mainly from car engines, coal/natural gas fired power plants, wood burning and fireplaces. These particulates are small enough to bypass respiratory systems' defense system, gets into person's lungs and may even enter the bloodstream. Due to this, person may face health problems such as asthma, lowered lung function and even heart attack.

In 2019-20, All 23 CAAQMS recorded $PM_{2.5}$ concentrations. It was found that out of 23 only 2 CAAQMS namely Kalyan and Karve Road, Pune touched the mark of 40 $\mu g/m^3$ which is the standard limit for annual average $PM_{2.5}$ concentration as prescribed by CPCB. Rest all CAAQMS recorded concentration less than the standard annual limit (Figure No. 12).

Another CAAQMS from Kalyan RO i.e Dombivali CAAQMS recorded annual average concentration of 38 $\mu g/m^3$ which is though below limit but still it is close to that mark. This makes Kalyan RO predominantly vulnerable to increased levels of $PM_{2.5}$ if in case mitigative measures are not implemented. Same situation is with Aurangabad CAAQMS which recorded concentration of about 39 $\mu g/m^3$ in 2019-20. All CAAQMS from Mumbai region recorded concentration in the range of 26 $\mu g/m^3$ to 33 $\mu g/m^3$ which are well under the standard limit of 40 $\mu g/m^3$.

## Ozone

# Ozone




Ozone ($O_3$), is a pale blue gas, that has a pungent smell. It is a strong oxidizing agent. It is naturally found in small concentrations in the stratosphere- this prevents much of the harmful Ultraviolet solar radiations from reaching the earth thus, minimizing the risk of diseases like skin cancer.

Ozone found in troposphere (Earth's lower atmosphere) is a 'secondary' pollutant formed by nitrogen oxides reacting with volatile organic compounds in the presence of solar radiation. Tropospheric ozone concentration is governed by anthropogenic activities- internal combustion engines and power plants. This concentration also varies temporally- maximum during day time and summer seasons and minimum during night and monsoons. Tropospheric ozone is harmful for human health and environment. It is known to cause more severe damage to plants as compared to other air pollutants

### Sources

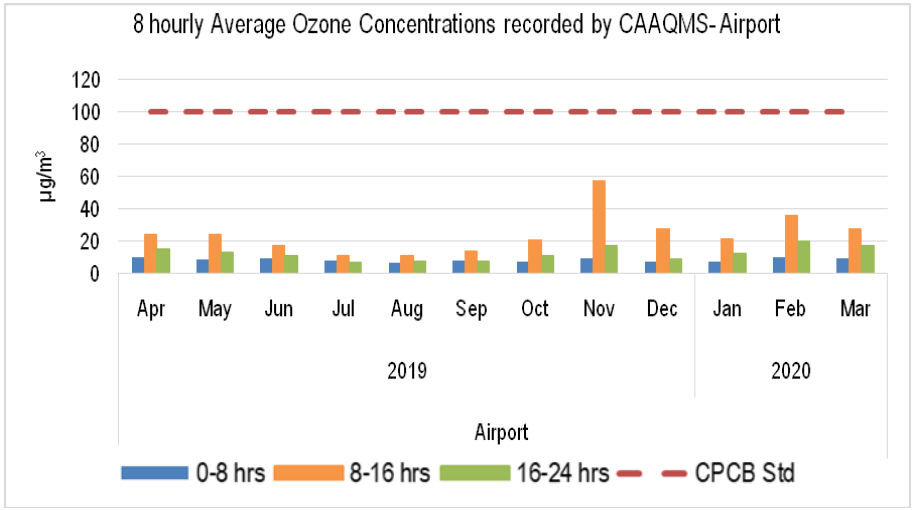
- Photochemical reaction of NOx with VOCs and Hydrocarbons.

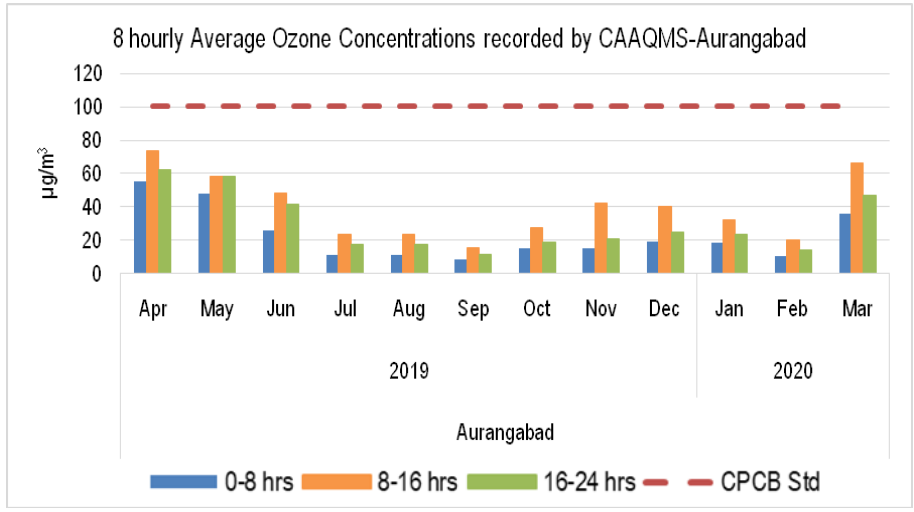
  VOCs are emitted from petrochemical production, transportation, combustion and various chemical solvents

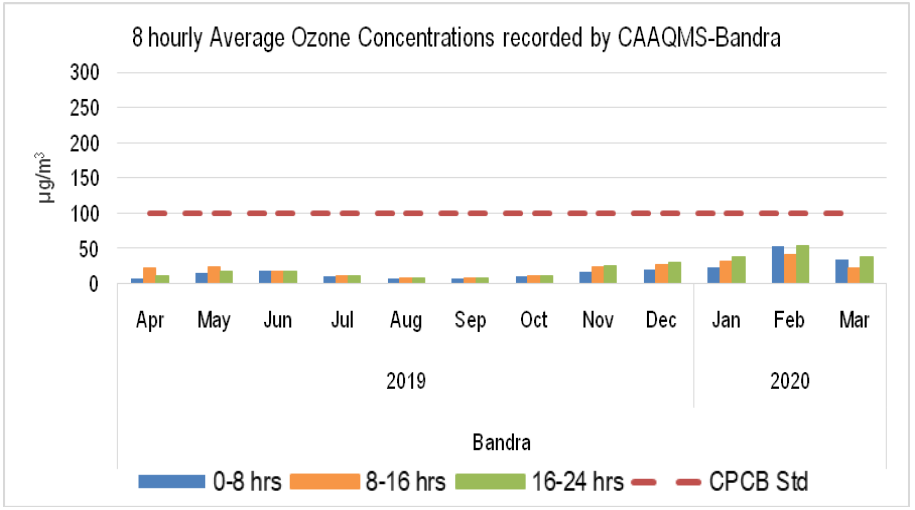
### Impacts

- Human Health- Cough, irritation in rose and throat, chest discomfort, difficulty in breathing, reduced lung function, and can aggravate respiratory illness- bronchitis, asthma
- Plants- Leaf injury due to oxidation of cells causing- necrosis, chlorosis, occurrence of red/ brown spots
- Environment: Increased green house effect, Smog

Image Source: https://www.shutterstock.com/search/trioxygen



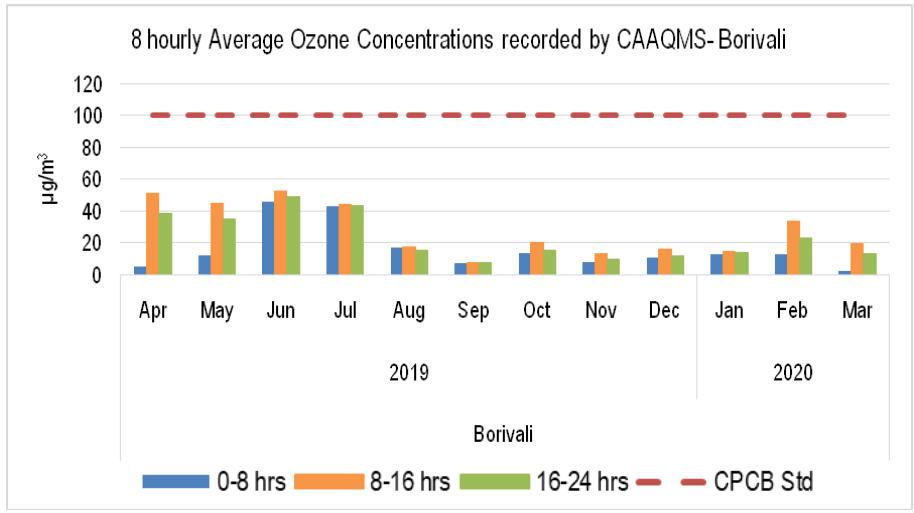




**Figure No. 13: 8- hourly monthly average $O_3$ concentrations recorded by CAAQMS in Airport, Aurangabad, Bandra, and Borivali**

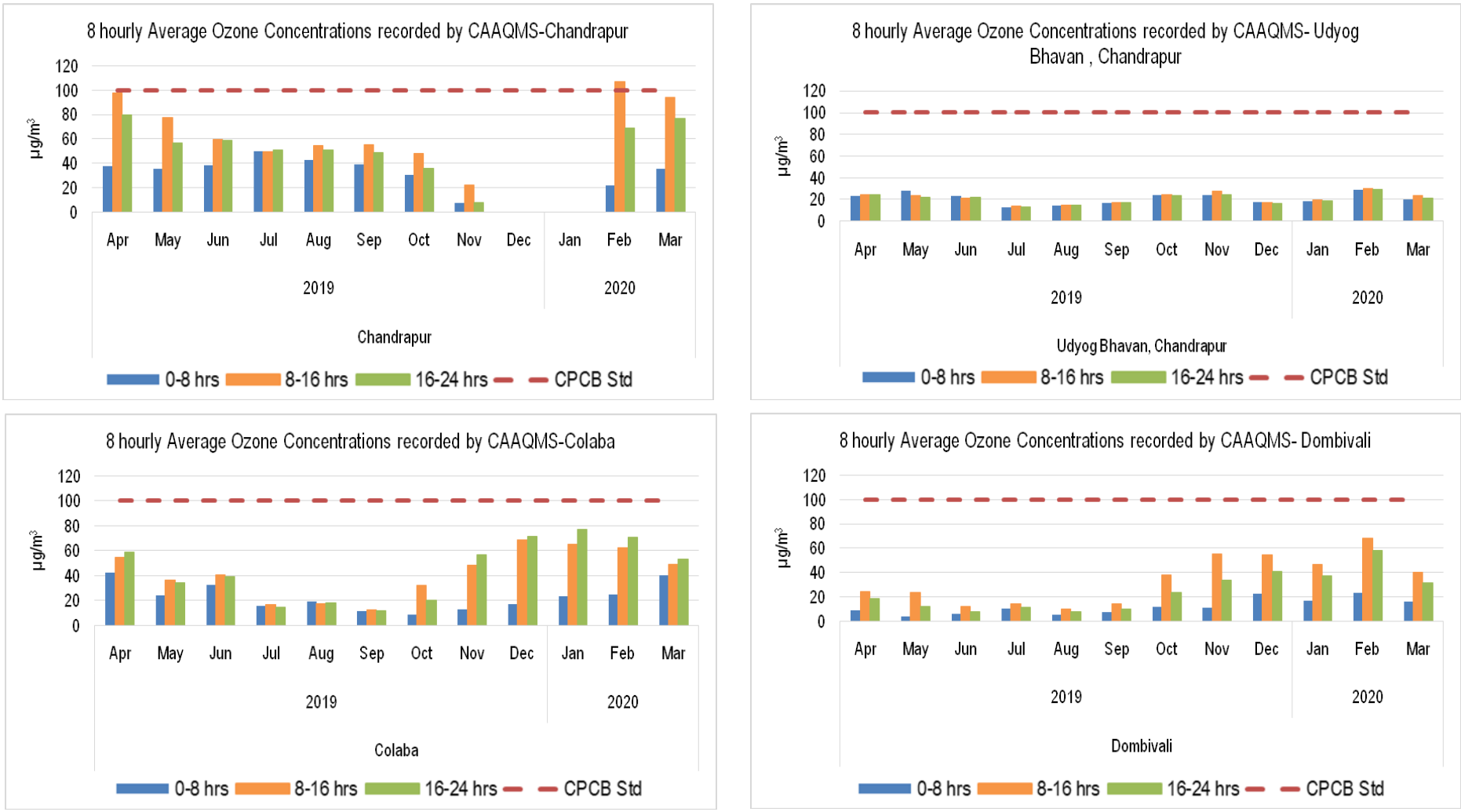



**Figure No. 14: 8- hourly monthly average $O_3$ concentrations recorded by CAAQMS in Chandrapur, Udyog Bhavan-Chandrapur, Colaba and Dombivali**

*Note: No data for the months of December and January (Chandrapur)*

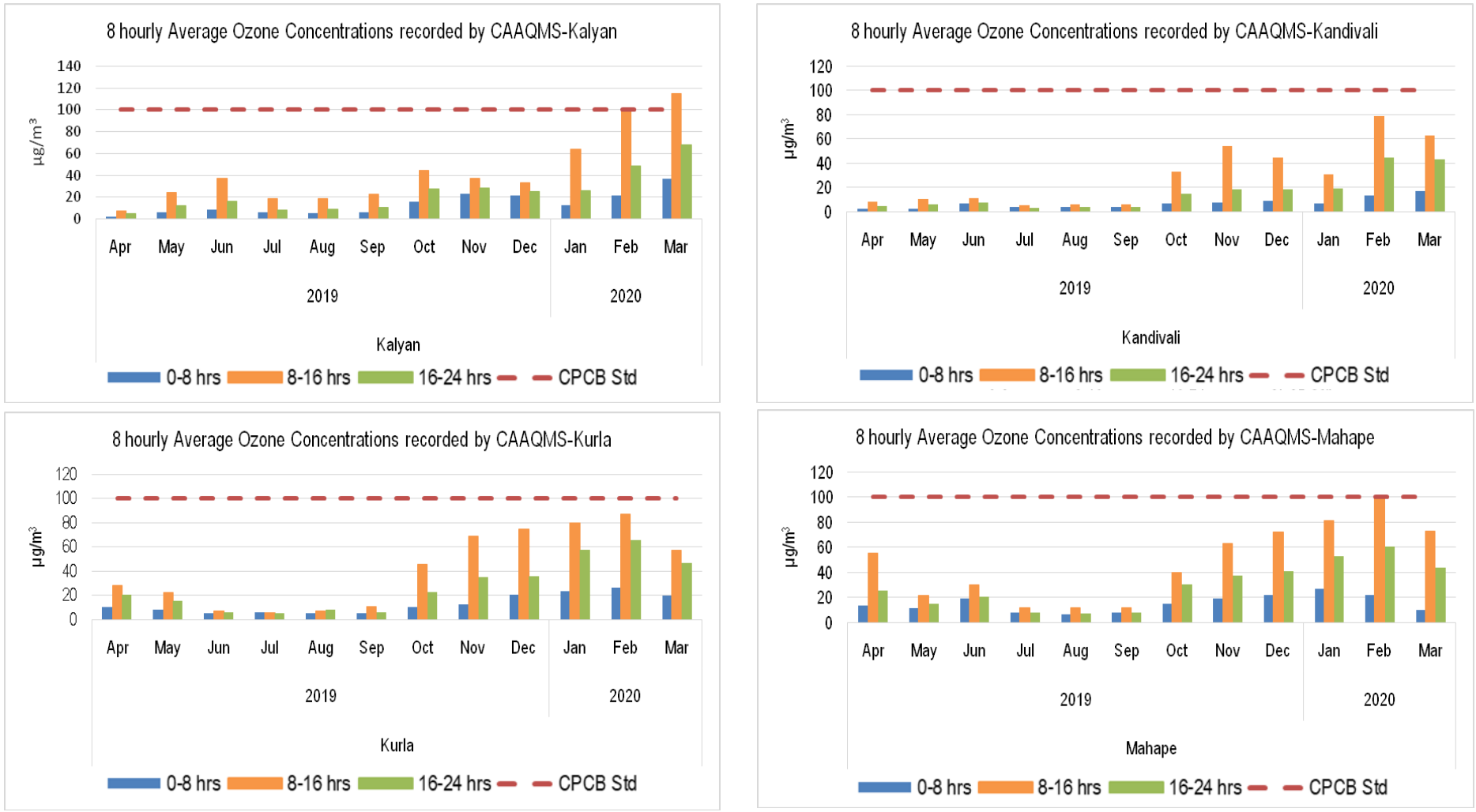



**Figure No. 15: 8- hourly monthly average $O_3$ concentrations recorded by CAAQMS in Kalyan, Kandivali, Kurla and Mahape**

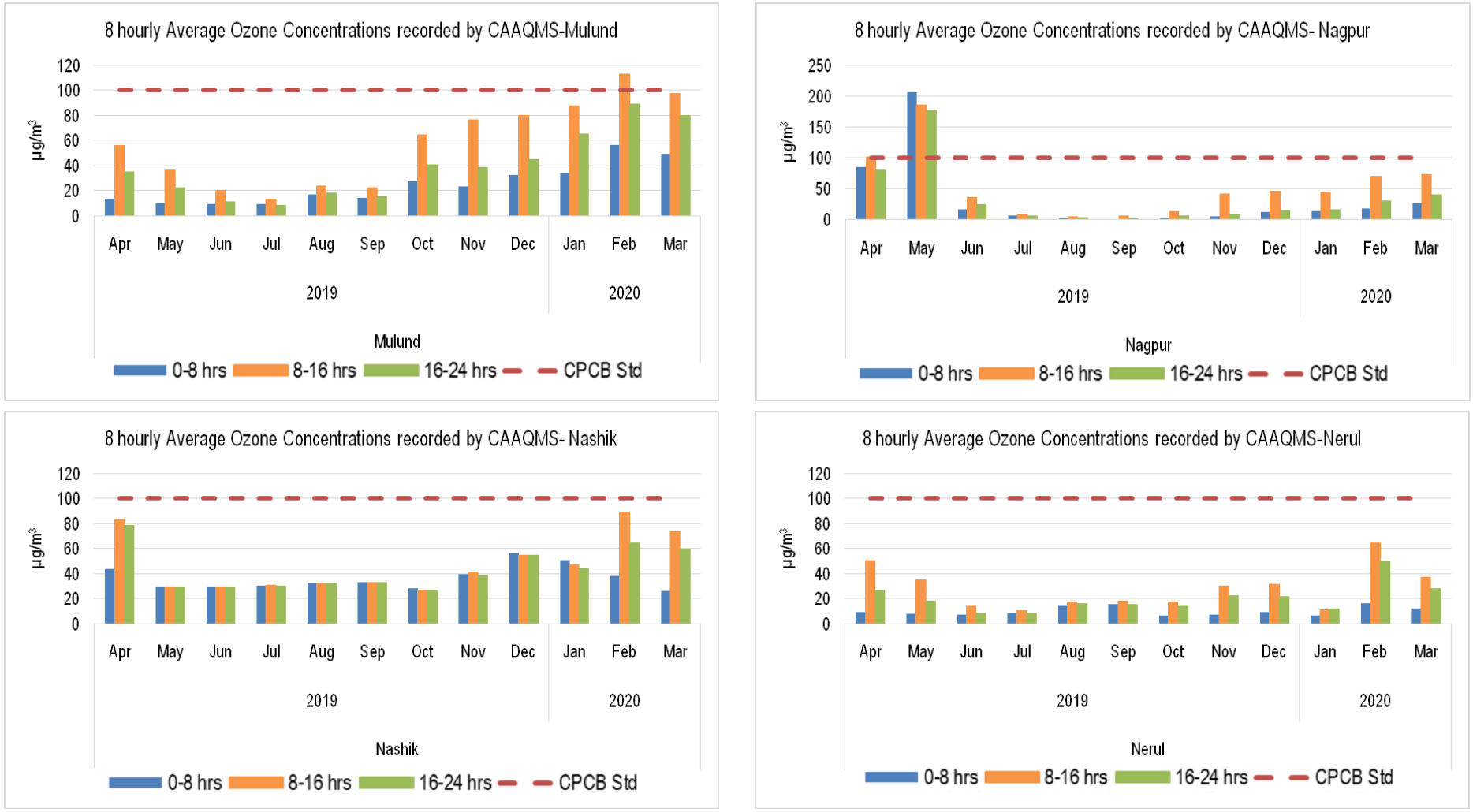



**Figure 16: 8- hourly monthly average $O_3$ concentrations recorded by CAAQMS in Mulund, Nagpur, Nashik and Nerul**

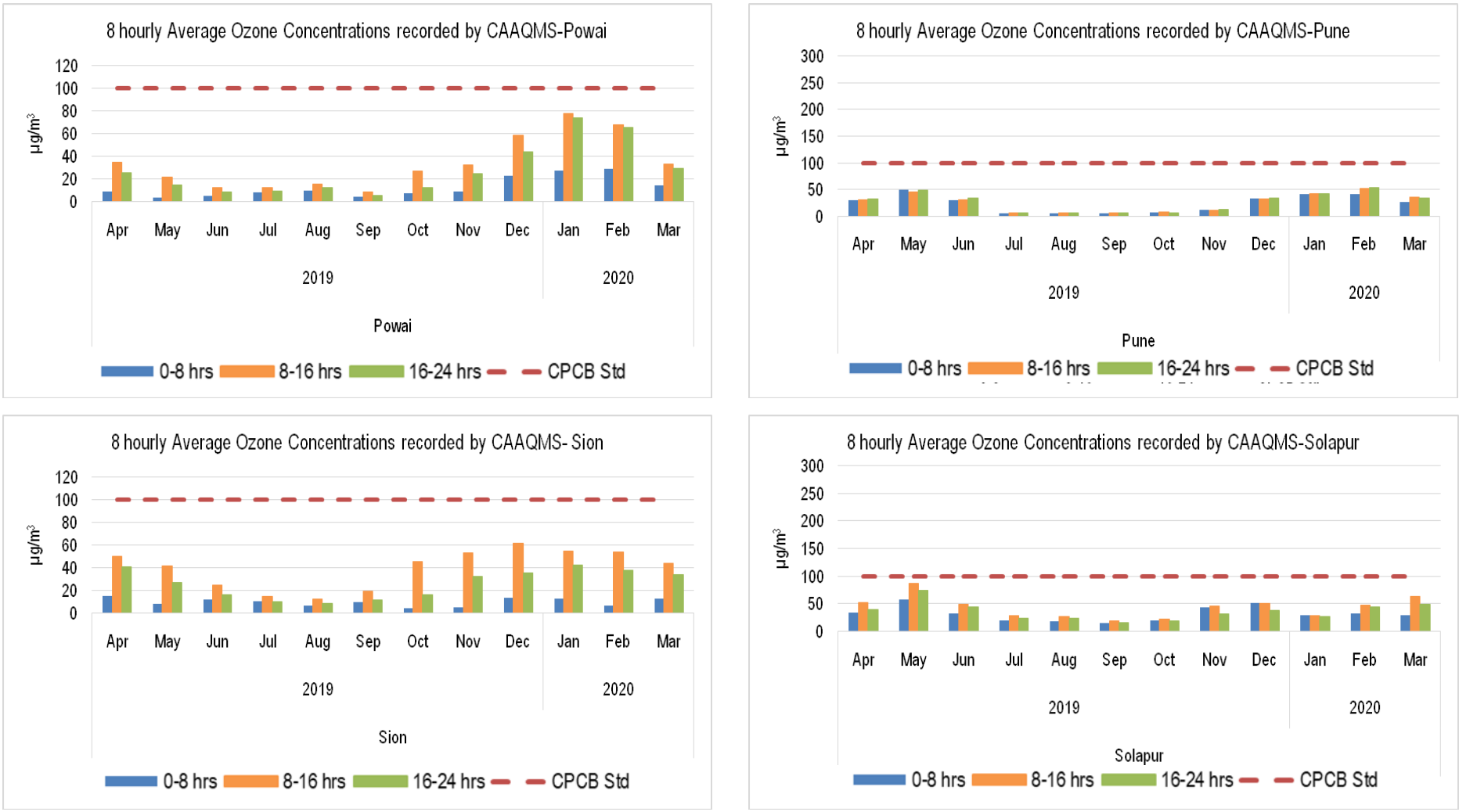
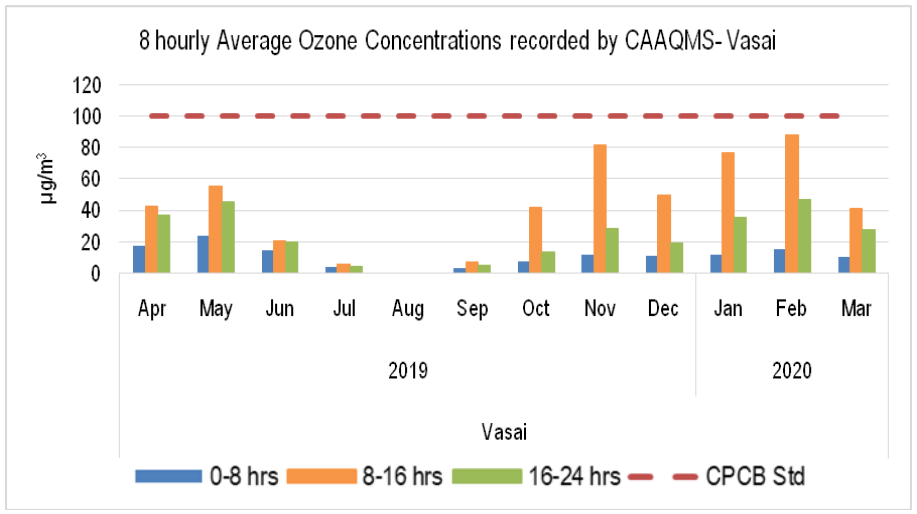
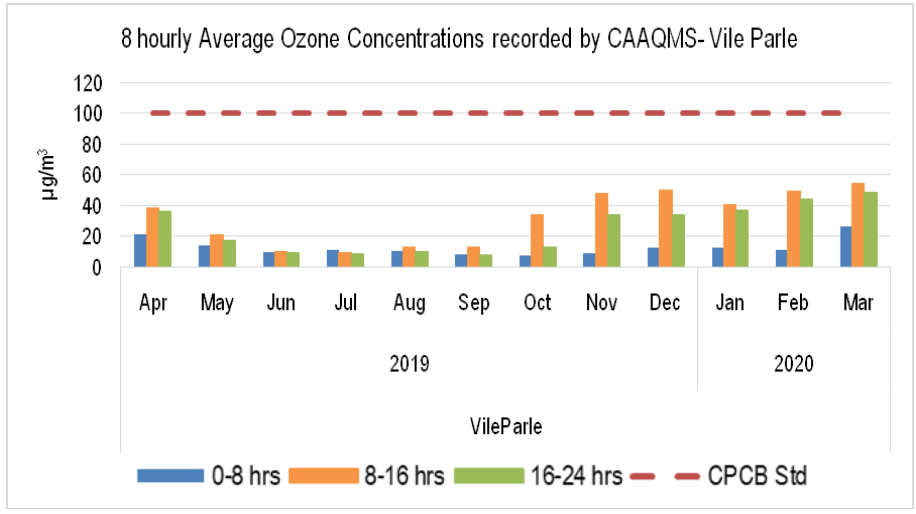



**Figure No. 17: 8- hourly monthly average $O_3$ concentrations recorded by CAAQMS in Powai, Pune, Sion and Solapur**



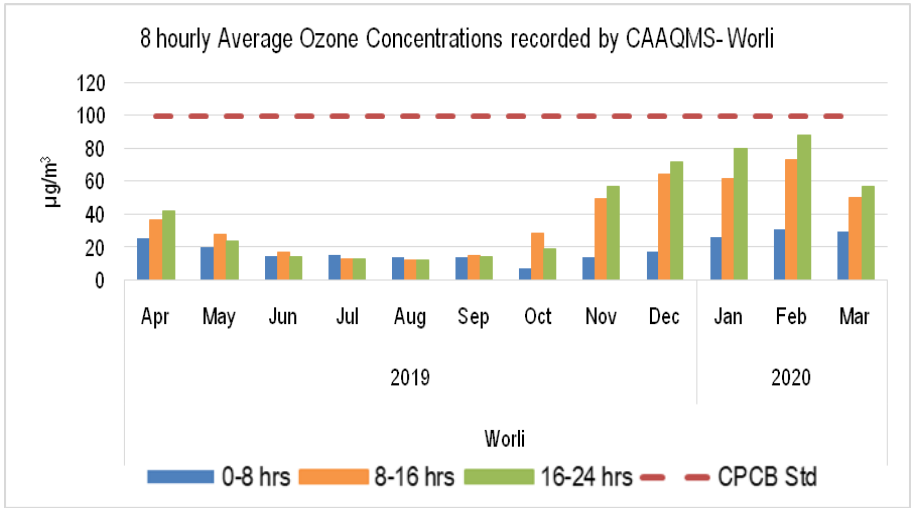




**Figure No. 18: 8- hourly monthly average $O_3$ concentrations recorded by CAAQMS in Vasai, Vile Parle and Worli** ***Note: No Data for August (Vasai)***

In the year 2019- 20, Total active 23 CAAQMS recorded the ozone concentrations in Maharashtra (13 new CAAQMS were added in the overall network of CAAQMS). (Figure No. 13 to Figure No. 18) depicts the 8 hourly monthly averages of ozone concentrations across the CAAQMS in Maharashtra.

Out of the 23 active CAAQMS, only 5 CAAQMS installed at Chandrapur (February 2020), Kalyan (Feb-March 2020), Mahape (Feb 2019), Mulund (Feb 2020 – March 2020) and Nagpur (April 2019-May 2019) recorded higher concentration than the standard limit of 100 $\mu g/m^3$. For most of the regions, high concentration of ozone was found in the month of January, February, March and April. Ozone concentration was found o be highest during the afternoon hours especially during the summer months. This is the time usually when the influence of direct sunlight is at its peak.

Out of 5 CAAQMS which recorded higher Ozone concentration than the standard limit, Nagpur CAAQMS recorded average concentration of around 206 $\mu g/m^3$ (more than double the limit of 100 $\mu g/m^3$) during 0-8 hours; 185 $\mu g/m^3$ during 8-16 hours and about 177 $\mu g/m^3$ during 18-24 hours in the month of May.

In Chadrapur, highest ozone concentration was recorded in the month of February 2020 (8-16 hours ~107 $\mu g/m^3$) whereas in March 2020 and April 2019 it almost touched the level of standard limit (100 $\mu g/m^3$) by recording concentrations of about 94 $\mu g/m^3$ and 98 $\mu g/m^3$ respectively; both during 8-16 hours i.e mid - day hours.

The average $O_3$ concentrations recorded in all other CAAQMS (except 5 mentioned above) were found to be within the limit of 100 $\mu g/m^3$.

Thus, in terms of ozone pollution, there is a need to implement strategies to reduce ozone pollution especially in the cities of Chandrapur, Kalyan, Nagpur, Mulund and region like Mahape.

## Carbon Monoxide

# Carbon Monoxide


Carbon Monoxide (CO) is a colourless, odourless, tasteless, non-irritating, toxic gas. It consists of one carbon and one oxygen atom, bonded by a triple bond.

CO is emitted as a result of partial/ incomplete combustion of carbon-containing compounds such as automobile fuels, coal and natural gas. Nearly 60% of the carbon Monoxide emissions are from anthropogenic sources and only 40% emissions are from natural sources.

CO has a higher binding affinity with haemoglobin than oxygen. Thus, CO absorbed through the lungs into the blood, combines with haemoglobin to form carboxyhaemoglobin (COHb). The COHb cannot transport oxygen, to tissues and organs of the body. Thus, resulting in oxygen deficiency which can be fatal

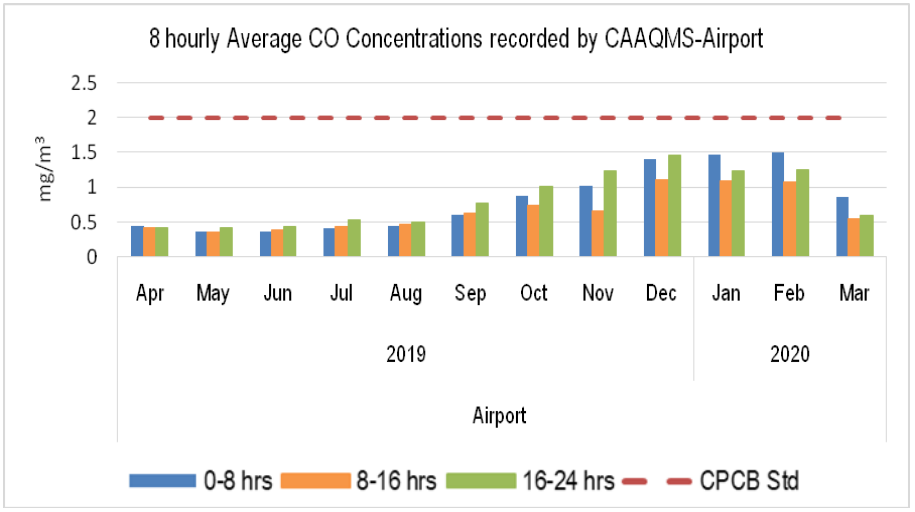
**Sources**

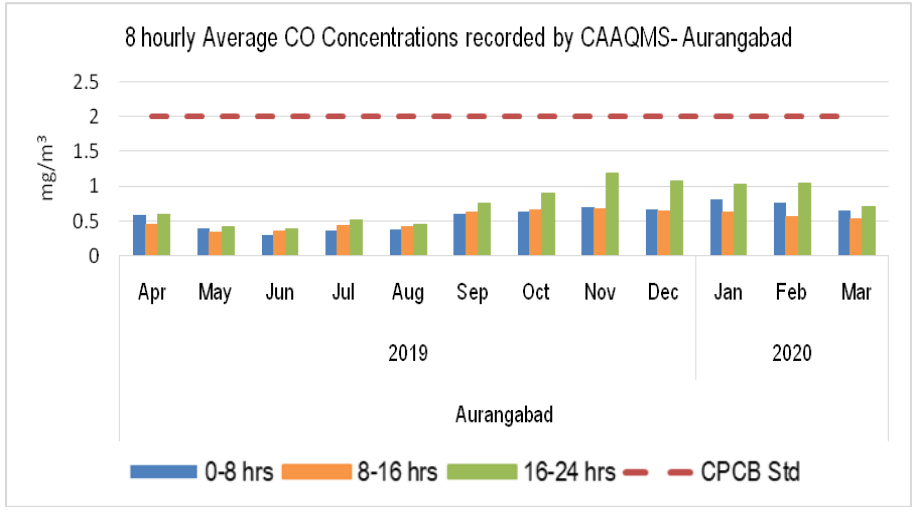
- **Natural: Volcanoes and forest fires**
- **Anthropogenic: Emissions from automobiles, fossil fuel combustion, coal based power generation, waste incineration, burning agriculture residue , smouldering coal**

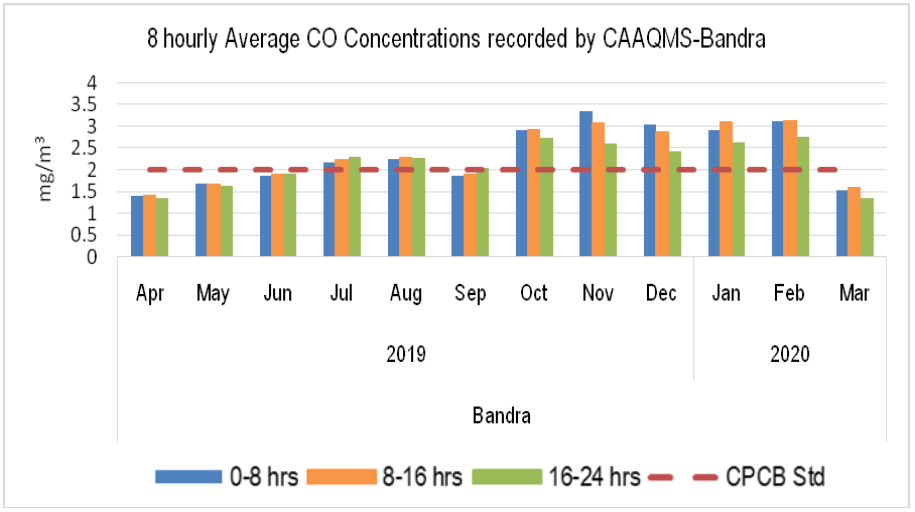
**Impacts**

- **Human Health- Headache, dizziness, nausea tiredness. stomach pain, shortness of breath, difficulty in breathing, blue baby syndrome**
- **Plants- Not toxic to plants as rapidly oxidizes to CO2 which is used up during photosynthesis**

Image Source :https://www.shutterstock.com/image-vector/vector-ball-stick-model-chemical-substance-1486803092



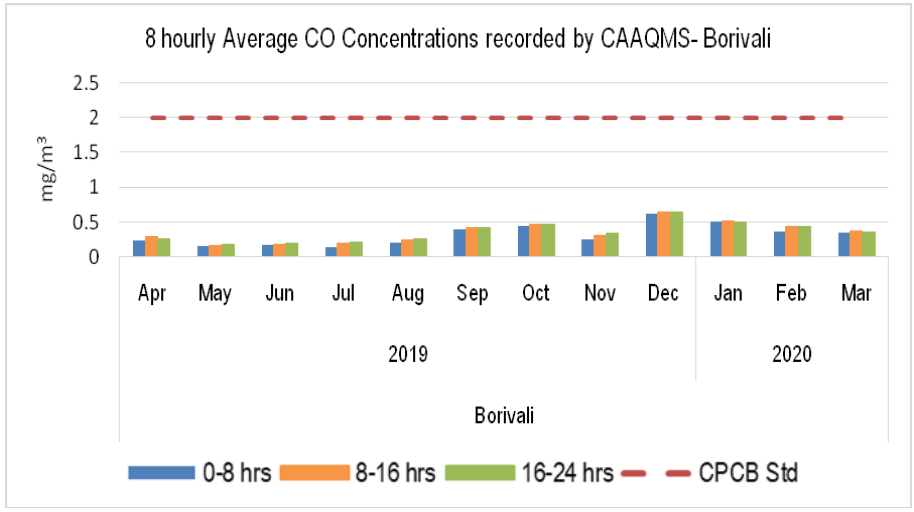




**Figure No. 19: 8-hourly average CO concentrations recorded by CAAQMS at Airport, Aurangabad, Bandra and Borivali**

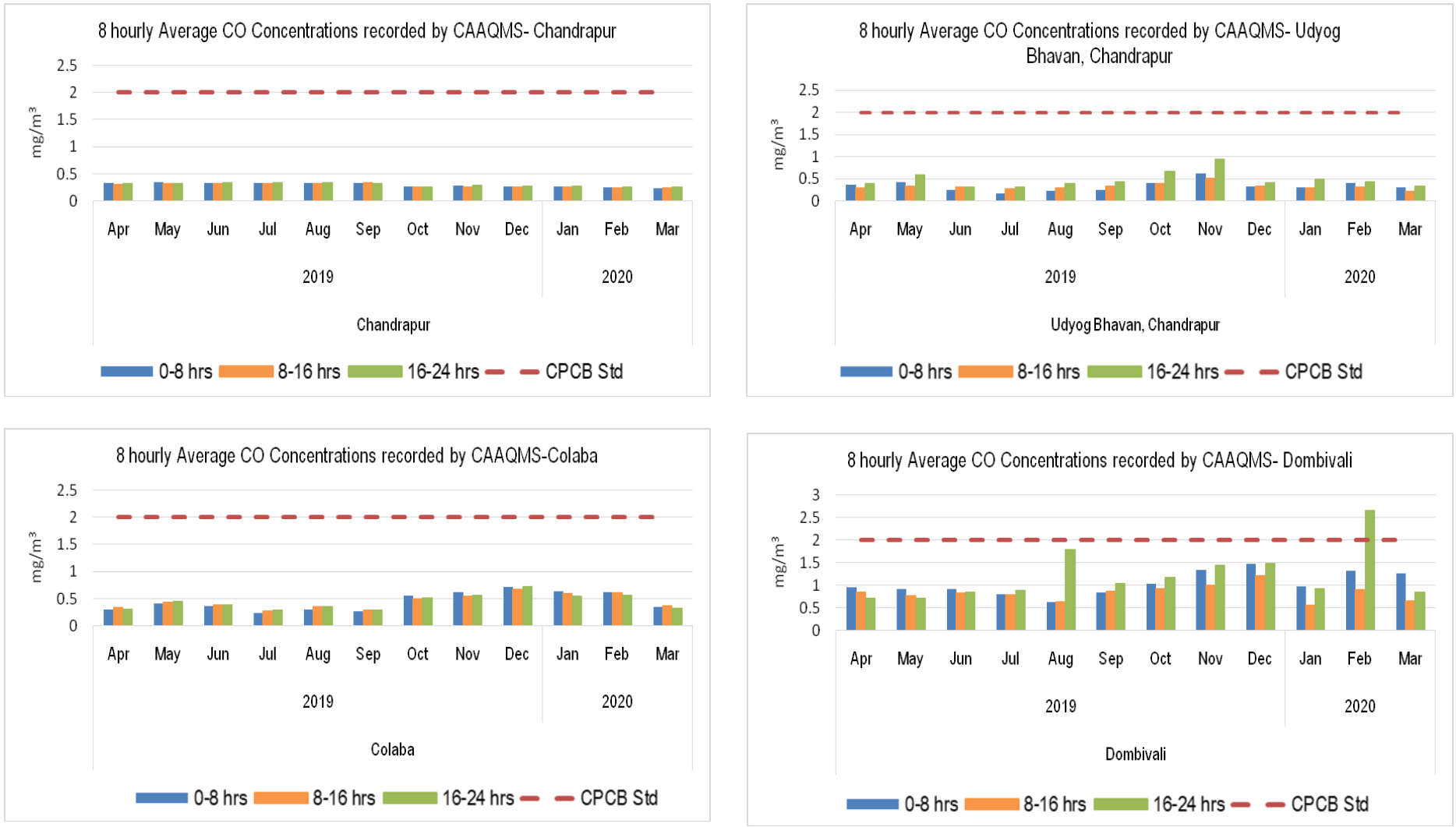



**Figure No. 20: Figure No: 8-hourly average CO concentrations recorded by CAAQMS at Chandrapur, Udyog Bhavan-Chandrapur, Colaba and Dombivali**

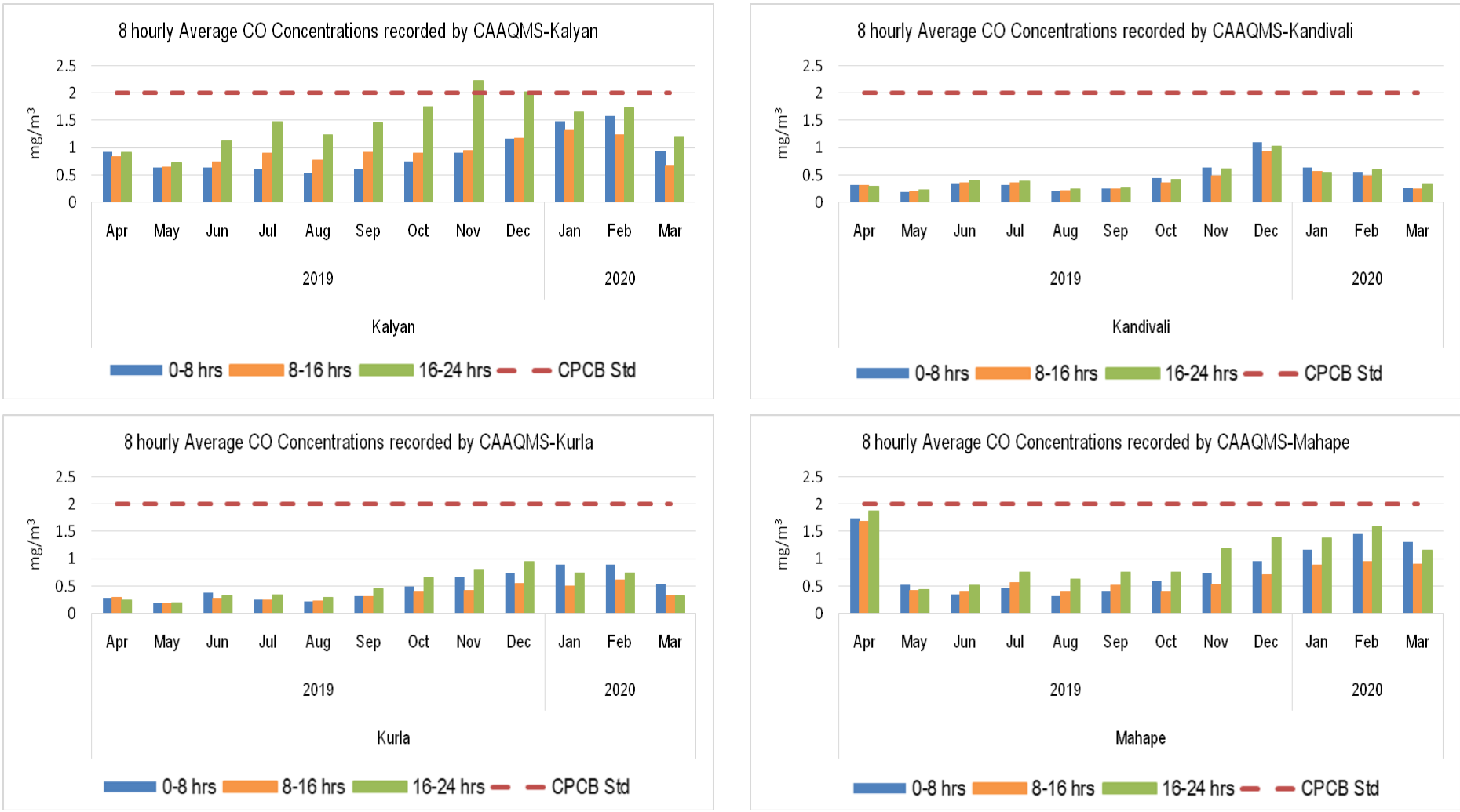



**Figure No. 21: 8- hourly average CO concentrations recorded by CAAQMS at Kalyan, Kandivali, Kurla and Mahape**

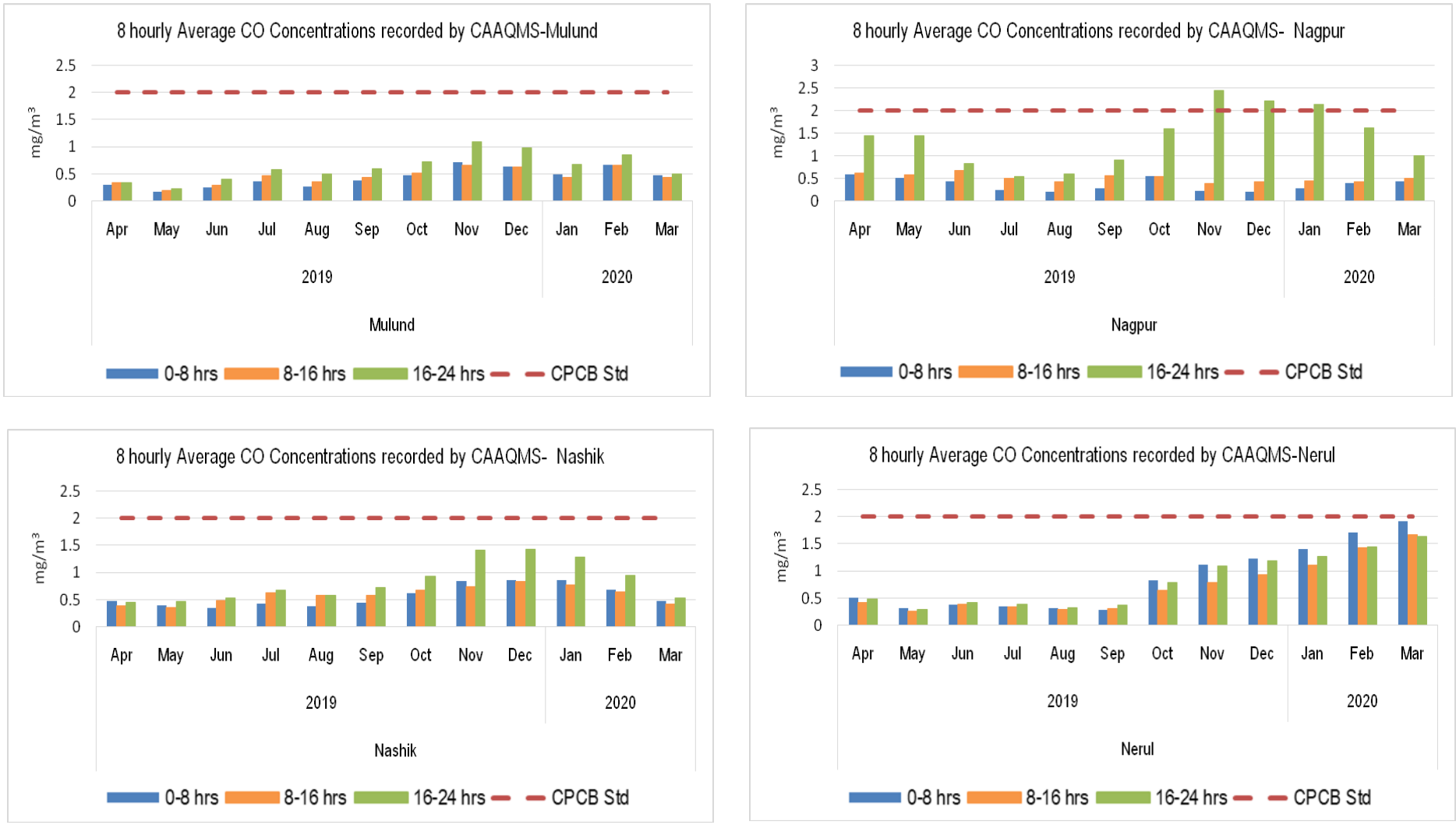
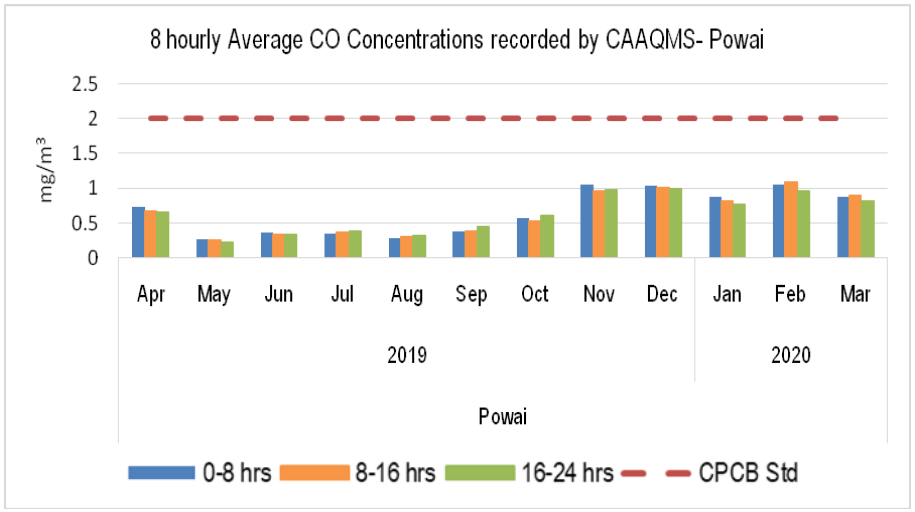
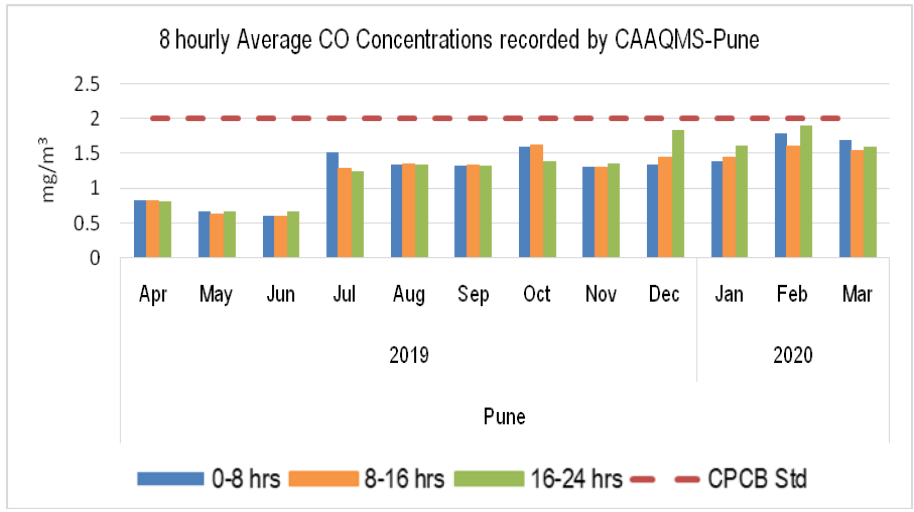
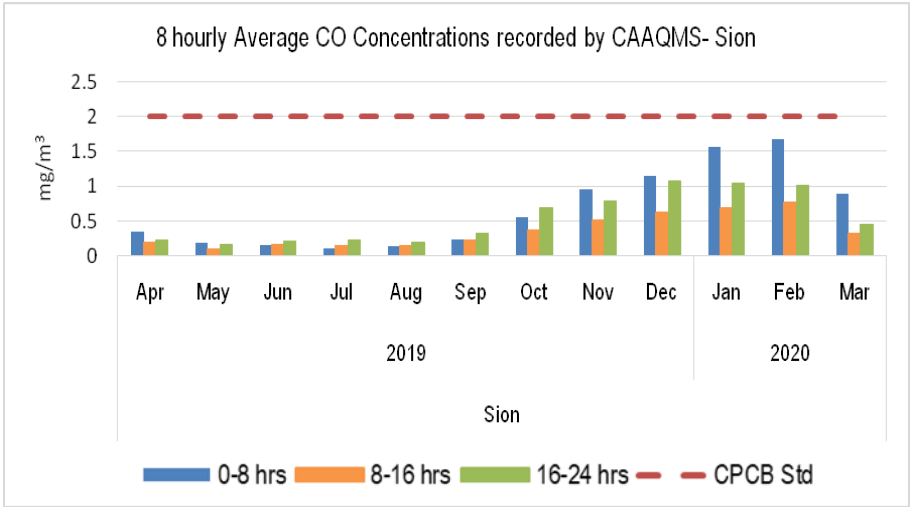



**Figure No. 22: 8-hourly average CO concentrations recorded by CAAQMS at Mulund, Nagpur, Nashik and Nerul**



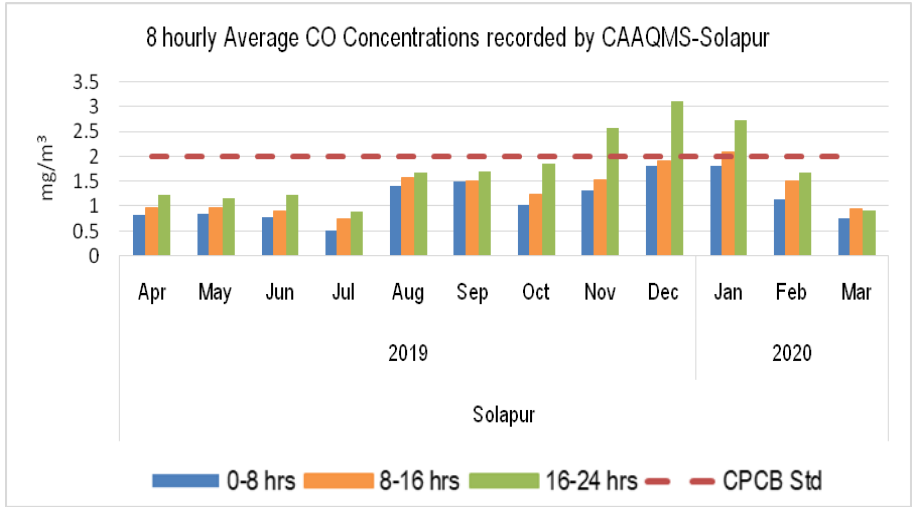
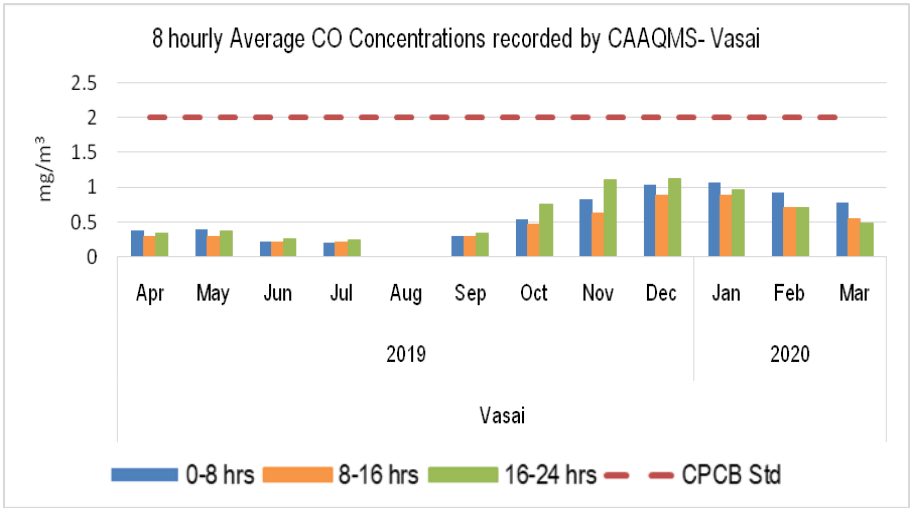
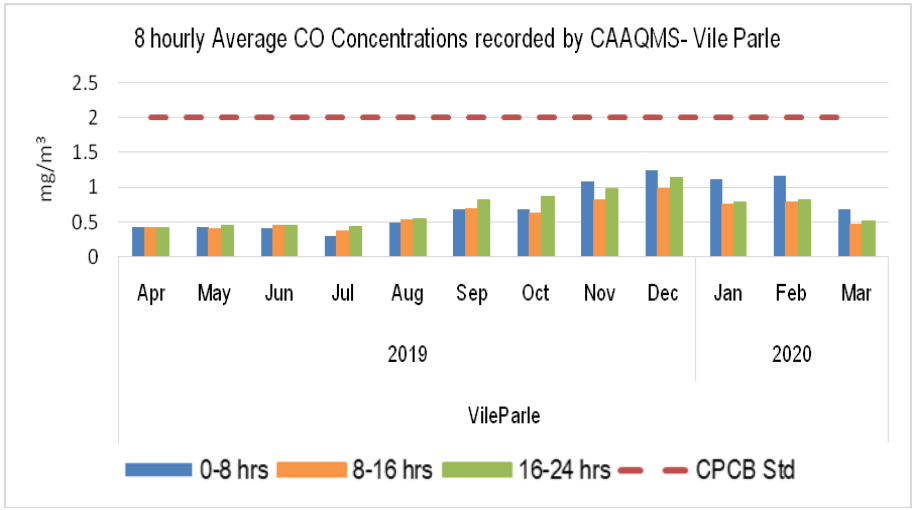




**Figure No. 23: 8- hourly average CO concentrations recorded by CAAQMS at Powai, Pune, Sion and Solapur**



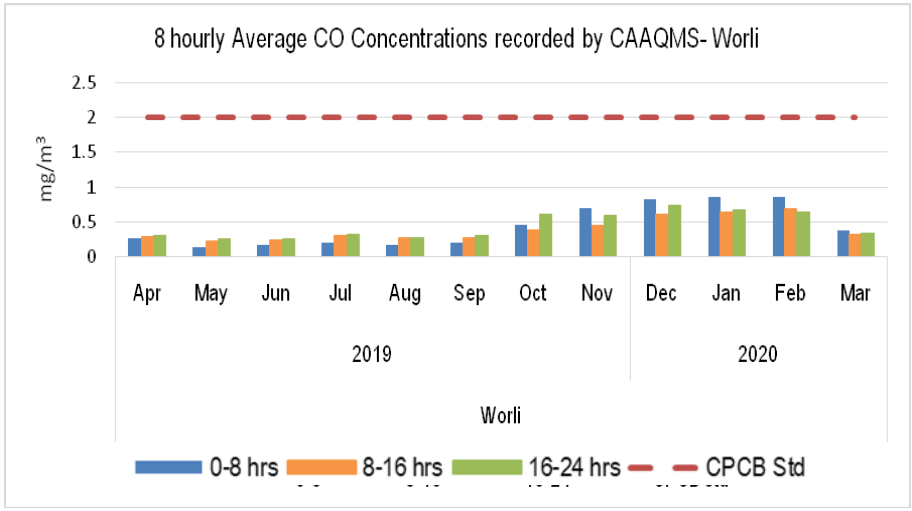




**Figure No. 24 : 8- hourly average CO concentrations recorded by CAAQMS at Vasai, Vile Parle and Worli** *Note: No Data for August (Vasai)*

Carbon Monoxide concentrations were recorded at 23 CAAQMS as enlisted in and graphically depicted from Figure No. 19 to. Figure No. 24. From the figures, it is clear that Bandra, Dombivali, Nagpur, Kalyan and Solapur violated 8 hourly concentration standards of 2 mg/m$^3$. On the other hand, average concentration of CO reached closer to the limit at Pune, Mahape and Nerul.

It has been observed that out of all CAAQMS, Bandra CAAQMS has been more often recorded CO concentration above the limit. In the year 2019-20, from July 2019 to February 2020, the CO concentrations were above the standard limit with the highest concentration recorded was during the month of November (3.36 mg/m$^3$; 0-8 hours) followed by February (3.13 mg/m$^3$; 8-16 hours).

Like Bandra, Solapur region too faces problem of high CO concentration quite often. In 2018-19, the CAAQMS (Solapur) recorded average concentration of CO more than the limit from December 2019 to January 2020. The highest concentration was recorded during the month of December 2019 (3.11 mg/m$^3$; 16-24 hours) followed by January 2020 (2.72 mg/m$^3$;16-24 hours) and November 2019 (2.58 mg/m$^3$;16-24 hours).

The CO concentration in Pune, unlike last year (2018-19), was recorded within the limit. Even so, the concentration was almost reached the limit of 2 mg/m$^3$ during the month of February 2020 (1.9 mg/m$^3$; 16-24 hours), December 2019 (1.8 mg/m$^3$; 16-24 hours) and March 2020 (1.7 mg/m$^3$; 0-8 hours).

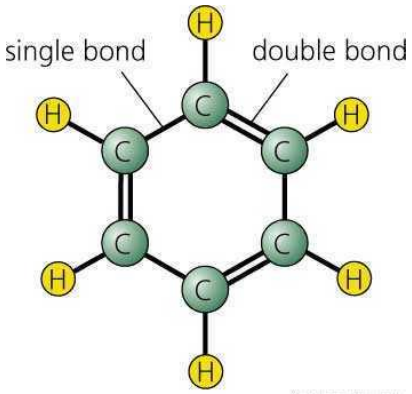
Out of newly installed 10 CAAQMS, Nerul CAAQMS recorded average CO concentration reaching near limit (about 1.92 mg/m$^3$ in the month of March 2020 followed by 1.71 mg/m$^3$ during February 2020). Similar situation was observed at Mahape CAAQMS where the average concentration peaked during April 2019 (1.86 mg/m$^3$) and Sion CAAQMS during February 2020 (1.68 mg/m$^3$; 0-8 hours) and January 2020 (1.6 mg/m$^3$;0-8 hours).

It was observed that the CO concentration exceeds the standard limit mainly in the post monsoon months (October to February). This trend was observed in almost all CAAQMS (even in newly established) in the Maharashtra region.

Thus, in terms of carbon monoxide pollution, the cities of Bandra, Dombivali, Nagpur, Pune, Kalyan and Solapur need to implement strategies to reduce the carbon monoxide pollution especially during the post monsoon season as CO concentration was found to be violating the limit during this period.

## Benzene

### Benzene




Benzene is an aromatic hydrocarbon. It is a sweet smelling, colourless, volatile and flammable liquid that is highly toxic and a proven carcinogen.

It is generated on incomplete combustion of organic compounds. It is widely used as an industrial solvent, an intermediate for manufacture of various chemicals, and in manufacture of certain lubricants, pesticides and dyes.

Epidemiology studies provide substantial evidence of linkage between benzene exposure and occurrence of aplastic anaemia, acute leukaemia, and bone marrow abnormalities. Benzene exposure generally affects liver, kidneys, lungs, heart and the brain. It can also cause chromosomal damage.

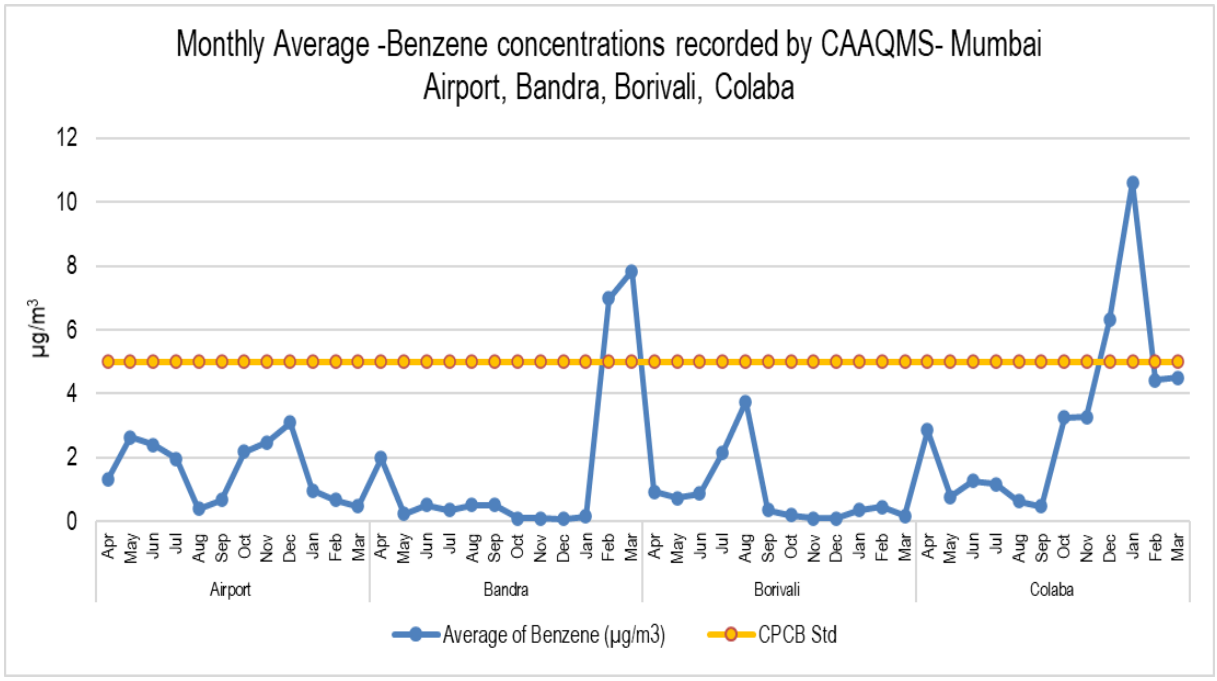
**Sources**

- **Natural: Volcanoes and forest fires**
- **Anthropogenic: combustion of hydrocarbon, refining of crude oil and other petroleum products, tobacco smoke, paints, furniture wax**

**Impacts**

- **Human Health: Acute impacts like headache, eye and skin irritation, irregular heartbeat, dizziness, and Chronic impacts such as leukaemia, aplastic anaemia, chromosomal damage**
- **Environment: Smog, contamination of soil, water and ground water when mixed with rain, in water it impacts aquatic life- impaired reproduction and development**

Image Source: https://www.yourdictionary.com/benzene-ring



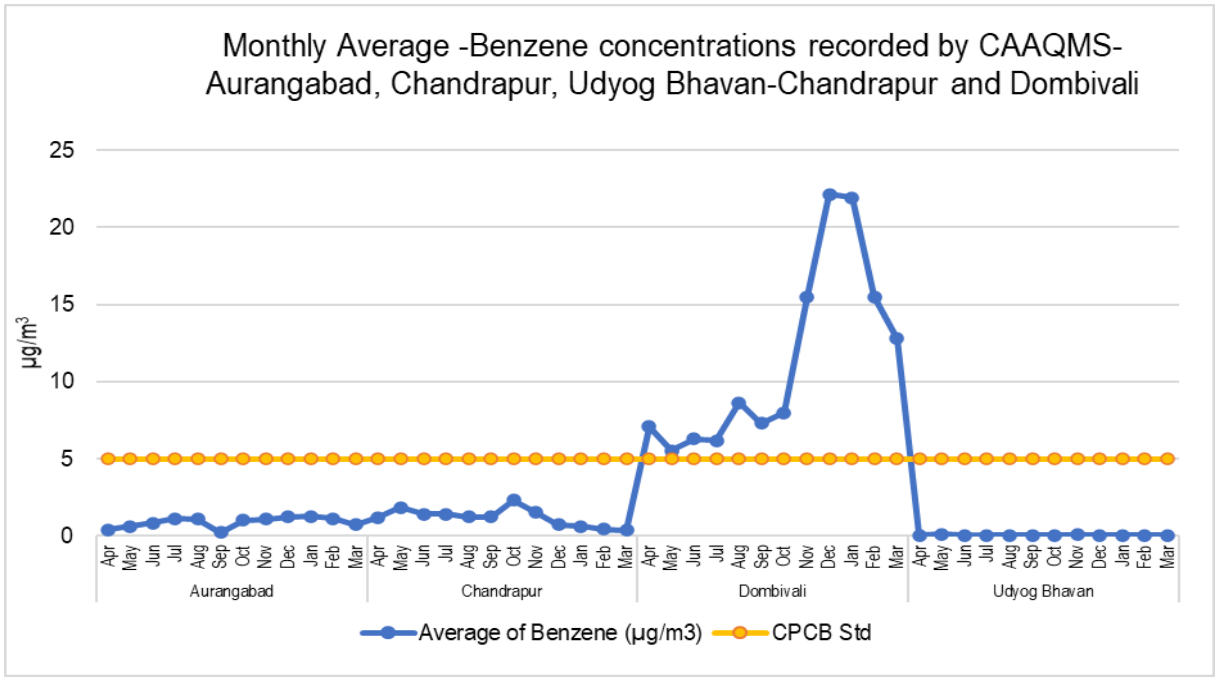




**Figure No. 25: Annual Average trend of Benzene concentration recorded at Airport, Bandra, Borivali Colaba CAAQMS (top) and Aurangabad, Chandrapur, Udyog Bhavan-Chandrapur and Dombivali CAAQMS (down)**

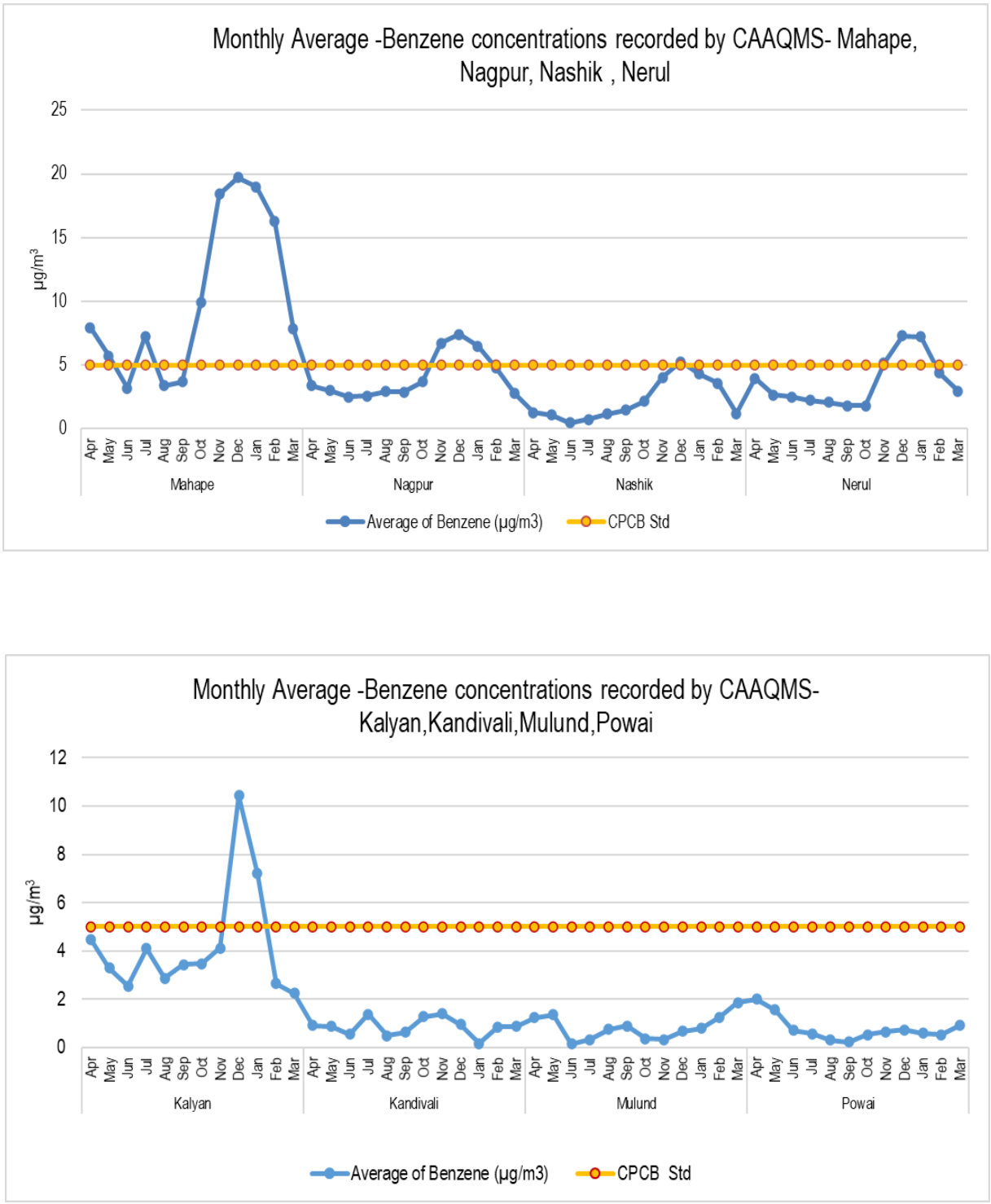



**Figure No. 26.: Annual Average trend of Benzene concentration recorded at Mahape,Nagpur, Nashik, Nerul CAAQMS (top) and Kalyan, Kandivali, Mulund, Powai CAAQMS (down)**

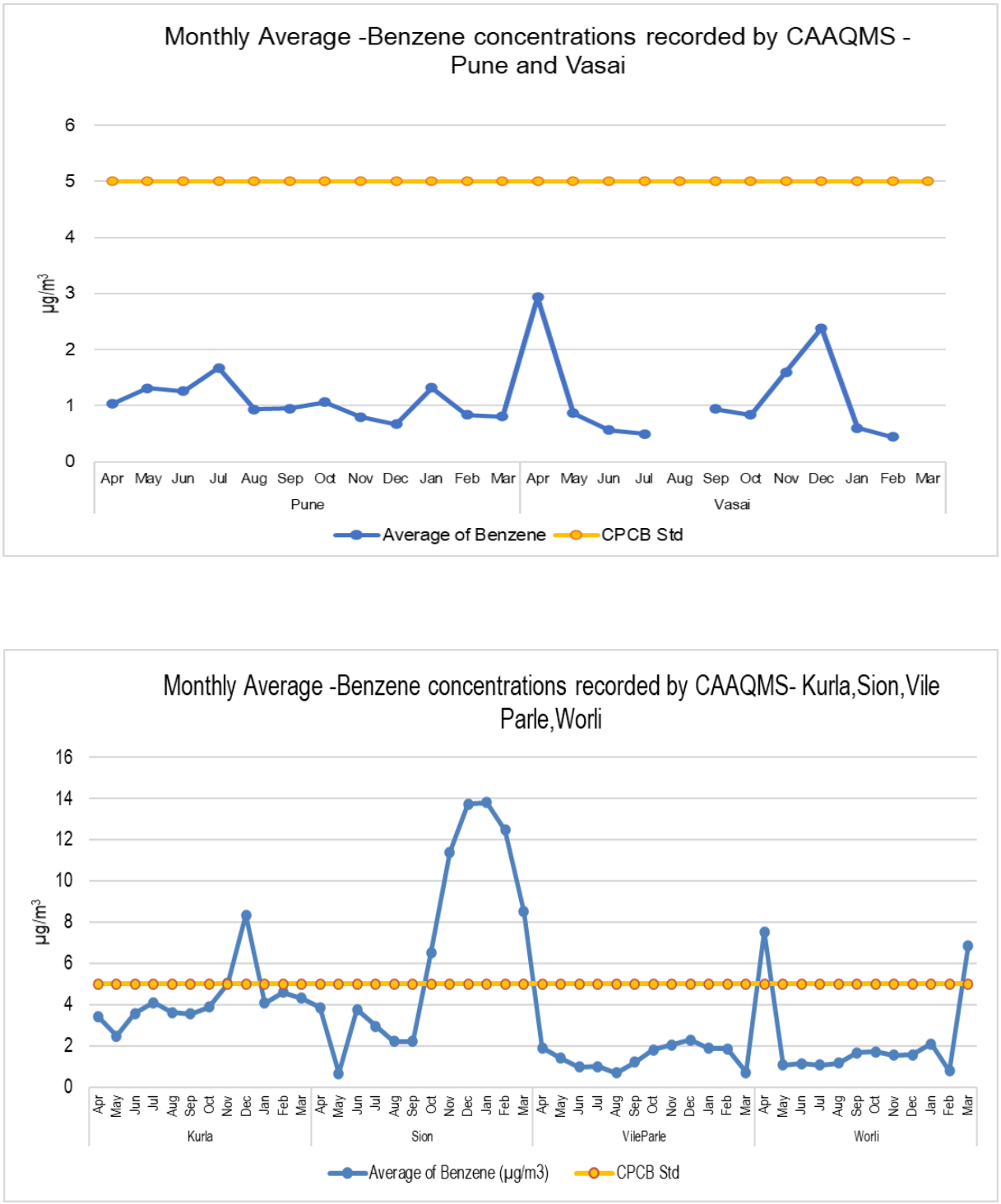



**Figure No. 27.: Annual Average trend of Benzene concentration recorded at Pune and Vasai CAAQMS (top) and Kurla, Sion, Vile Parle and Worli CAAQMS (down)**

*Note: No data for the month of August (Vasai)*

The Benzene concentration was recorded at 22 active CAAQMS during 2019-20. The annual average concentration limit set by CPCB is 5 μg/m$^3$. Out of 21 CAAQMS, 11 CAAQMS namely Bandra, Colaba, Dombivali, Mahape, Nagpur, Nashik, Nerul, Kalyan, Kurla, Sion and Worli recorded benzene concentration above the limit during certain period of time in the year.

Out of 22 CAAQMS, major 3 CAAQMS where the benzene concentration was found to be higher especially during the months of December and January) are Dombivali (about 22 μg/m$^3$) followed by Mahape (between 19-20 μg/m$^3$) and Sion (about 14 μg/m$^3$). Dombivali region recorded annual average comncentration above the limit throughout the year thus making Dombivali one of the prime regions as far as Benzene pollution is concerned. Followed by Dombivali, Mahape CAAQMS recorded above limit benzene average concentration for 9 months except June, August and September.

Bandra, a region which was relatively clean during 2018-19 witnessed benzene concentration above the limit during the months of February (7 μg/m$^3$) and March (7.8 μg/m$^3$). Similarly, Colaba CAAQMS, a newly added in the AQMS network recorded above limit concentration for 2 months namely December (6.3 μg/m$^3$) and January (10.6 μg/m$^3$) whereas February (4.4 μg/m$^3$) and March (4.5 μg/m$^3$), the concentration reached near the limit of 5 μg/m$^3$.

Just like Colaba, Kurla CAAQMS too recorded above limit benzene concentration during the months of November (5.03 μg/m$^3$) and December (8.34 μg/m$^3$) whereas the annual average concentration reached near the limit value during February (4.6 μg/m$^3$) followed by July (4.1 μg/m$^3$).

Airport, Aurangabad, Borivali, Udyog Bhavan-Chandrapur, Pune, Vile Parle, and Vasai CAAQMS recorded Benzene concentrations that were well within the standard limit of 5 μg/m$^3$. Hence, these regions were relatively clean throughout the year with respect to Benzene concentration levels.

# Air Quality Index

Air Quality Index (AQI) is a comprehensive index value calculated by transforming weighted values of impacts of individual air pollutants (e.g. $SO_2$, CO, NOx,) into a single number or set of numbers. It reflects air quality of an area in terms of health impacts on the population. This makes it an easy to understand parameter of air quality that can be communicated to the masses and can be used by decision makers for devising policies on air pollution abatement. The standard AQI values in India are based on health breakpoints for the following eight pollutants- CO, $NO_2$, $SO_2$, $PM_{10}$, $PM_{2.5}$, $O_3$, Pb and $NH_3$. AQI has diverse uses and applications for policy makers, researchers and the public (Figure No. 28). It is a key tool in air quality monitoring and regulation. The subsequent sections elaborate the AQI trend in Maharashtra during the year 2019-20.

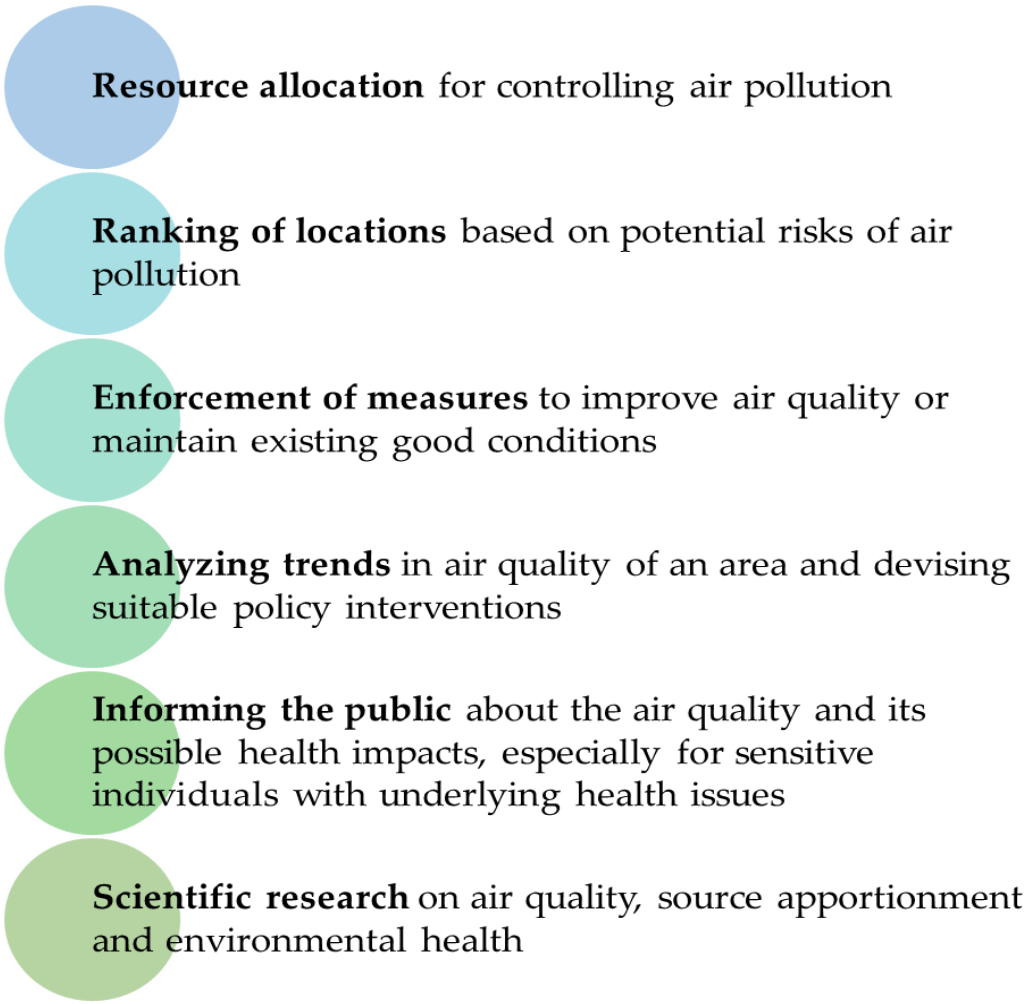



**Figure No. 28 :Applications of AQI**

## Calculation of AQI

AQI is calculated using the AQ sub index and the health breakpoints which are evolved for eight pollutants ($PM_{10}$, $PM_{2.5}$, $NO_2$, $SO_2$, CO, $O_3$, $NH_3$, and Pb) for which short-term (up to 24-hours) are prescribed by NAAQS. Based on the measured ambient concentrations of a pollutant, sub-index is calculated, which is a linear function of concentration (e.g. the sub-index for $PM_{2.5}$ will be 51 at concentration 31µg/m$^3$, 100 at concentration 60µg/m$^3$, and 75 at concentration of 45µg/m$^3$). The worst sub-index determines the overall AQI. The sub-indices for individual pollutants at a monitoring location are calculated using its 24-hourly average concentration value (8-hourly in case of CO and $O_3$) and health breakpoint concentration range (Table No. 5).

Overall AQI is calculated only if data are available for minimum three pollutants out of which one should necessarily be either $PM_{2.5}$ or $PM_{10}$. Else, data are considered insufficient for calculating AQI. Similarly, a minimum of 16 hours' data is considered necessary for calculating sub index. The sub-indices for monitored pollutants are calculated and disseminated, even if data are inadequate for determining AQI. The Individual pollutant-wise sub-index will provide air quality status for that pollutant. The worst sub-index is the AQI for that location.

**Table No. 5: Sub-index and breakpoint pollutant concentration for Indian Air Quality Index**

| AQI Category (Range) | PM10 24-hr | PM2.5 24-hr | NO2 24-hr | O3 8-hr | CO 8-hr (mg/ m3) | SO2 24-hr | NH3 24-hr | Pb 24-hr |
|---|---|---|---|---|---|---|---|---|
| Good (0-50) | 0-50 | 0-30 | 0-40 | 0-50 | 0-1.0 | 0-40 | 0-200 | 0-0.5 |
| Satisfactory (51-100) | 51-100 | 31-60 | 41-80 | 51-100 | 1.1-2.0 | 41-80 | 201-400 | 0.5 –1.0 |
| Moderate (101-200) | 101-250 | 61-90 | 81-180 | 101-168 | 2.1- 10 | 81-380 | 401-800 | 1.1-2.0 |
| Poor (201-300) | 251-350 | 91-120 | 181-280 | 169-208 | 10-17 | 381-800 | 801-1200 | 2.1-3.0 |
| Very poor (301-400) | 351-430 | 121-250 | 281-400 | 209-748* | 17-34 | 801-1600 | 1200-1800 | 3.1-3.5 |
| Severe (401-500) | 430 + | 250+ | 400+ | 748+* | 34+ | 1600+ | 1800+ | 3.5+ |

$$I = \frac{(I_{High} - I_{low})}{(C - C_{low})} * (C - C_{low}) + I_{low}$$

where: $I$ = the (Air Quality) index

$C$ = the pollutant concentration

$C_{low}$= the concentration breakpoint that is ≤ $C$

$C_{high}$= the concentration breakpoint that is ≥ $C$

$I_{low}$= the index breakpoint corresponding to $C_{low}$

$I_{High}$= the index breakpoint corresponding to $C_{high}$

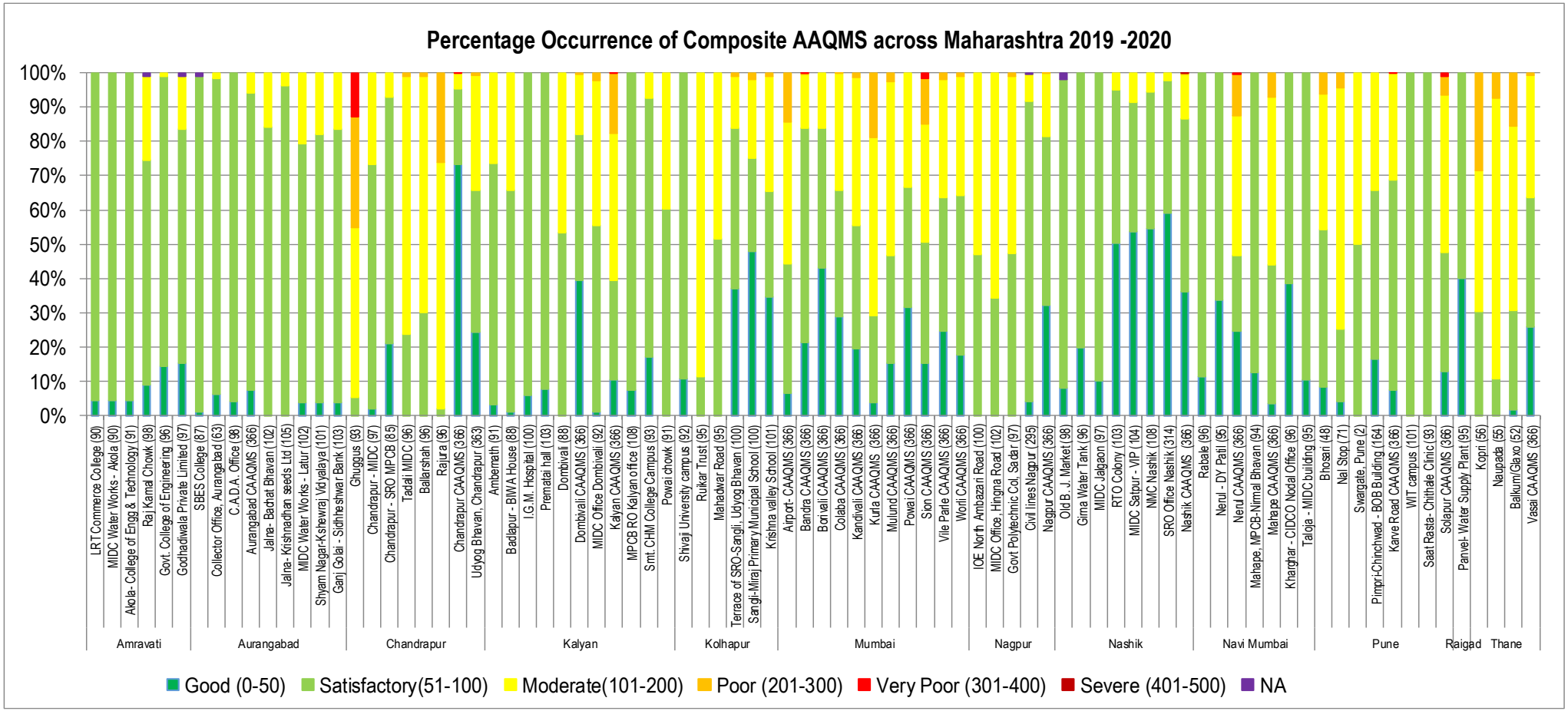



**Figure No.29: Percentage occurrence for the classes of AQI across AAQMS in Maharashtra – 2019-2020**

## Air Quality Index across Maharashtra 2019-2020

An overview of the AQI for the readings recorded by the AAQMS network in Maharashtra has been calculated based on 3 parameters- $SO_2$, NOx and RSPM; using the calculation method provided by CPCB and IIT Kanpur in October 2014. According to this methodology, first sub-indices for individual pollutants are calculated for a particular region. Then the highest sub-index value from that AAQMS is considered as the AQI.

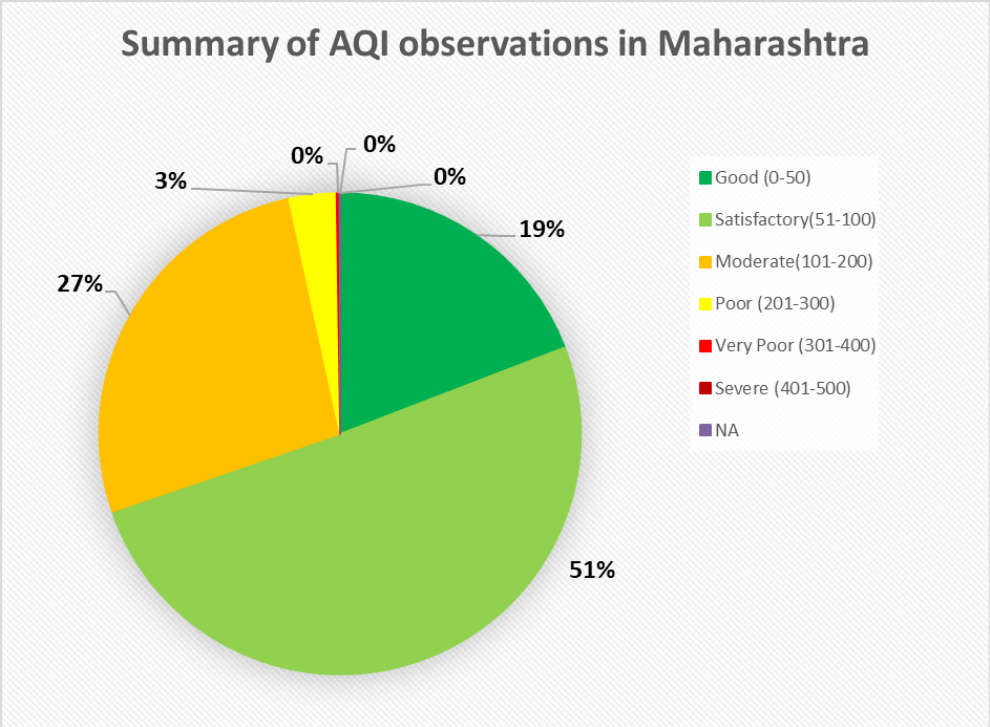



**Figure No. 30: Share of AQI category for air quality for monitored observations across all AAQMS in Maharashtra (2019-20))[10]**

As depicted in Figure No. 29, in the year 2019-20, air quality was monitored at 84 active AAQMS across 12 regional offices of MPCB in the state. It is noteworthy that daily observations under 'Good' and 'Satisfactory' categories accounted for 70% (10,090 observations) of total observations, which is almost similar to 68.8% in the previous year (2018- 19). Further, while the percentage of Moderate category observations has slightly decreased to 27% from 29.4% in the previous year (2018-19); the percentage of Poor AQI observations has increased to 3% as compared to only 1.38% in 2018-19. Majority of the Very Poor observation were recorded at Ghuggus (12 days), Vile Parle (6 days) and Solapur (4 days). Severe AQI was recorded only at Nashik (1 day).

In the Amravati region, observations from all locations were found to be in the 'Good', 'Satisfactory' and 'Moderate' categories. at LRT Commerce College, MIDC

[10]*Note:Since the values have been rounded up, some values may appear as zero.*

Waterworks Akola and Akola College of Engineering more nearly 95% of the observations were Satisfactory category and remaining 5% were Moderate AQI category. At Raj Kamal Chowk nearly 65% observations were Satisfactory, 24% Moderate and 9% were Good.

In Aurangabad city, all observations ranged between Good, Satisfactory and Moderate AQI. More than 95% AQI observations were in Satisfactory category at SBES college, C.A.D.A. office and Krishnandan seeds Ltd., Jalna. Similarly, at CADA office ~92% observations were Satisfactory. At Aurangabad CAAQMS and Jalna Bachat bhawan the AQI was Satisfactory for more than 80% observations' while Moderate AQI was recorded for ~65 and 16% observations. At MIDC Waterworks, Latur, Shyam Nagar Kshewraj Vidyalaya and Ganj Golai Siddheshwar Bank more than 75% observations were Satisfactory AQI, and almost only 4% observations were under Good category and remaining observations were Moderate AQI.

In Chandrapur Area, 35% of the total observations were Satisfactory AQI and nearly 32% were Good AQI category. However, it should be noted that around 13% observations at Ghughus recorded Very Poor AQI and one observation at Chandrapur CAAQMS was under Very Poor Category. Poor AQI was observed at Ghughus (32%), Rajura (26%), Udyog Bhavan (1%), Tadali (1%) and Ballarshah (1%).

In the Kalyan region, IGM Hospital, Premlata Hall and MPCB RO Kalyan Office recorded all AQI observations in the Good and Satisfactory categories. In Badlapur-BIWA House nearly 65% observations were in the Satisfactory category, followed by 34% in Moderate and 1% in Good categories. Similarly, in Ambernath 70% and 26% observation were in Satisfactory and Moderate categories respectively and remaining were in Good category. It is important to note that Poor AQI was recorded at Dombivali CAQMS (2 days), MIDC Office Dombivali (2 days) and Kalyan CAQMS (64 days). Further, Dombivali and Powai Chowk did not record Good AQI on any day. However, at both these places more than 50% observations were Satisfactory while Moderate AQI was recorded for 47% observations at Dombivali and 37% observations at Powai Chowk.

In Kolhapur, 42% of all observations were Satisfactory and 35% were Moderate AQI. At Shivaji University there were no polluted days as all observation were under Good and Satisfactory categories. The AAQMS at Terrace of SRO Sangli Udyog Bhawan, Sangli Miraj Primary Municipal School and Krishna Valley School recorded Good AQI for almost 37%, 48% and 355 observation respectively. However, these locations also recorded Poor AQI on 1-2% observation days.

In Mumbai all observations were made by CAAQMS installed at 11 locations across the city. AQI at almost all location ranged between Good to Poor categories. Good AQI was recorded for only 21% of the total observations in the city; with Maximum observations for Good AQI at Borivali (43%) and minimum at Kurla (3.8%). Very Poor AQI was observed only at two locations- Bandra (1 day) and Sion (6 days). The Airport recorded Good to Satisfactory AQI for 44% of the observations while 41% and 14% observations were under Moderate and Poor categories respectively. Borivali, Powai and Colaba recorded the greatest number of low pollution days with 84%, 67% and 66% observations under Good and Satisfactory categories. Moderate AQI was observed at Kurla and Mulund for more than 50% observations; and for around 30% - 35% observations at Powai, Sion, Vile Parle and Worli were Colaba.

Poor AQI was reported for most observations at Kurla (19%) followed by airport (14%) and Sion (13%).

In the Nagpur region, the AQI observations were mostly in the Satisfactory and Moderate categories. Good AQI was observed only at 2 locations- Civil Lines, Nagpur (4%) and Nagpur CAAQMS (32%). One observation each at MIDC Office Hingna Road and Nagpur CAAQMS recorded Poor AQI.

In Nashik the AQI observations ranged between Good, Satisfactory and Moderate categories. Old B.J. Market, Girna Water Tank and MIDC Jalgaon recorded all days in Good and Satisfactory categories. At other locations- RTO Colony, MIDC Satpur, NMC Nashik, SRO office and Nashik CAAQMS, more than 90% observation were in the Good and Satisfactory categories, while the remaining were in the Moderate category.

In Navi Mumbai region 5 locations- Rabale, Nerul D.Y. Patil, Mahape MPCB Nirmal Bhawan Kharghar CIDCO Nodal Office and Taloja MIDC Building recorded all observations in the Good and Satisfactory categories. Moderate and Poor AQI was observed at Nerul CAAQMS (41%, 12%) and Mahape CAAQMS (49%, 7%).

In the Pune region, WIT Campus and Saat Rasta Chithale Clinic all observations were in the Satisfactory categories. Good AQI was recorded at Bhosari, Nal Stop, Pimpri Chinchwad BOB Building, Karve Road CAAQMS and Solapur CAAQMS for less than 20% observations. It is important to note that of all the locations, Severe AQI was reordered at Bhosari for 12.5% observations. Further, Poor AQI was also recorded for most observations at Bhosari (6%), followed by Solapur CAAQMS (5%) and Nal Stop (4%) and Very Poor AQI was recorded at Karve Road CAAQMS (4 days) and Solapur CAAQMS (1 day).

In Raigad region, the AAQMS at Panvel Water tank recorded Good AQI for 40% observations and the remaining observations were in Satisfactory category.

In Thane, all 4 monitoring locations recorded Poor AQI, with maximum observations at Kopri (28.5%), followed by Balkum/ Glaxo (15%), Naupada (7%) and Vasai CAAQMS (0.8%). Good AQI was observed only at Balkum/ Glaxo (<1%) and Vasai CAAQMS (26%). At Naupada (89%) and Kopri (69.6%) most of the observations were in the Moderate and Poor categories.

# Impact of COVID -19 Lockdown on Air Quality across Maharashtra 2019-2020

The COVID-19 pandemic has brought the world to a standstill. Almost all countries have gradually gone into complete lockdown since late February or early March. Even now, most countries are still under lockdown while some are gradually lifting the restrictions while trying to control the spread of the pandemic. This has led to a drastic drop in anthropogenic activities-most industries have been shut, construction activities halted and public transportation has completely stopped or is available for only emergency situations- as a result pollution levels in various parts of the world have dropped considerably.

Further, numerous studies have compared air quality data for the pre lockdown and lockdown periods; and their results show considerable improvement in air quality during the lockdown phase. In Rio de Janerio the partial lockdown in March saw a significant decline of about 30%-49% in the CO concentrations, as compared to the pre lockdown phase. Further, CO and $NO_2$ concentrations during lockdown were considerably less as compared to the concentration in the previous year during the same time period[1]. Similarly, in the Yangtze River Delta Region of China, $SO_2$, NOx and $PM_{2.5}$ reduced significantly in the initial phases of lockdown[2]. However, despite reduction of these pollutants both these studies saw an increase in the O3 concentration during the lockdown period. This was attributed to decrease in $NO_2$ conentration[1,2]. In India too, the suspension of quarrying activities amid lockdown saw a considerable decline in the $PM_{10}$ concentration in areas around the Dwarka river basin[3]. Similarly, in AQI values across the city improved between 30% - 55% and concentrations of $PM_{10}$ and $PM_{2.5}$ had reduced to nearly half, as compared the pre lockdown phase. This may be a temporary relief from air pollution before economic activities resume in full swing, but most people are considering it to be a healing period for the earth.

In this section, we attempt to assess the impact of the reduced anthropogenic activities amid the lockdown, on the air quality of the state of Maharashtra.

**Data of April 2020 used for comparison, was available only from 23 active CAAQMS*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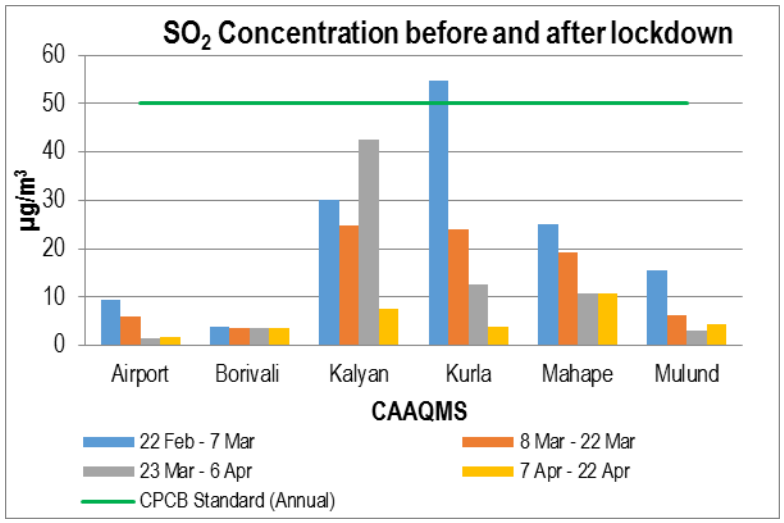
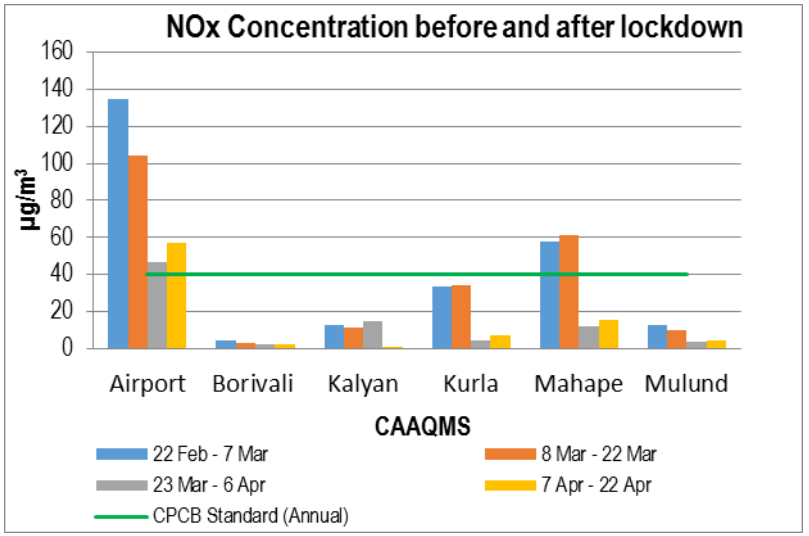


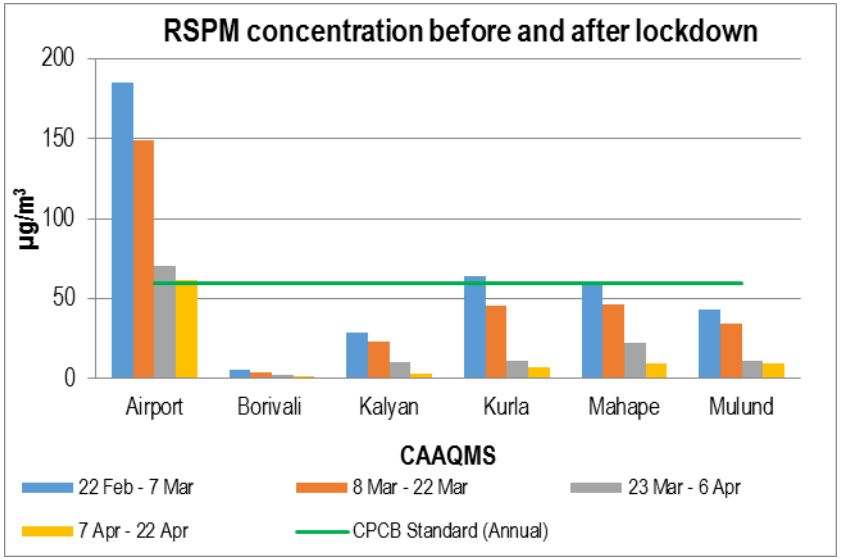
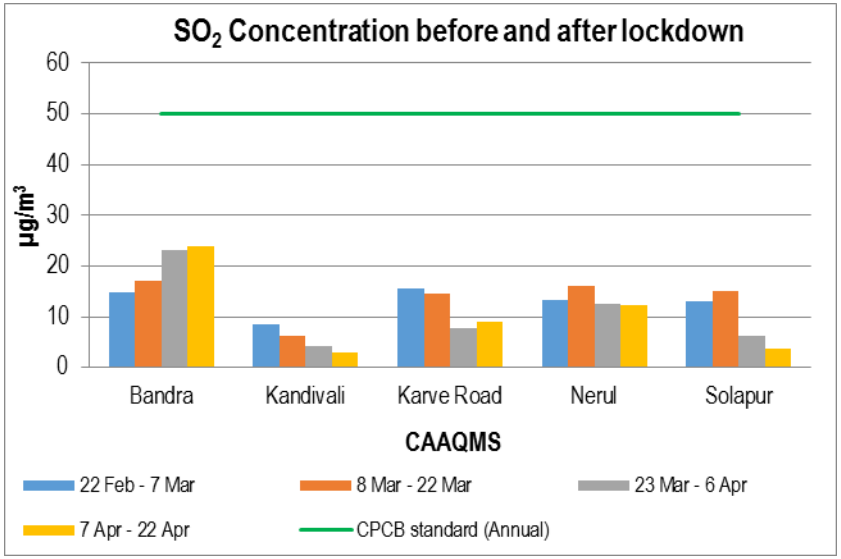
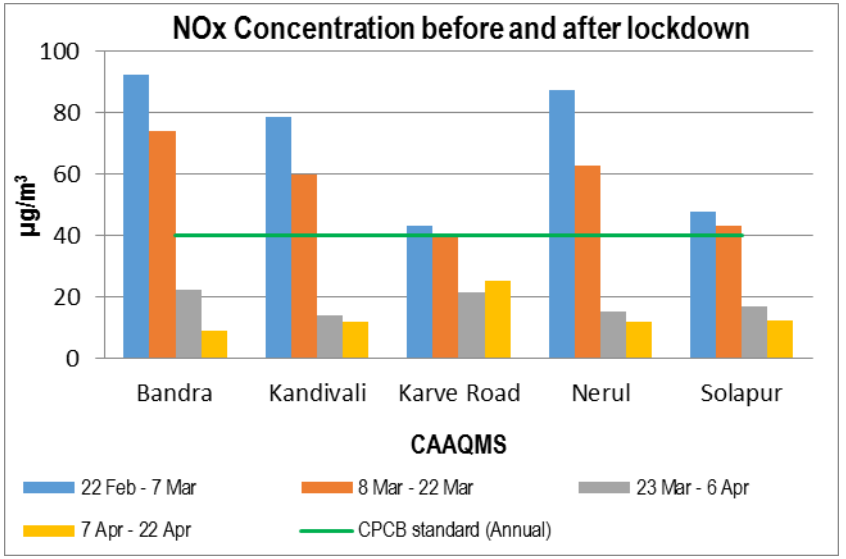




**Figure No. 31 : $SO_2$, NOx, RSPM concentration recorded by CAAQMS of Airport, Borivali, Kalyan, Kurla. Mahape and Mulund: before (22 February –22 March) and after lockdown (22 March -22 April 2020)**



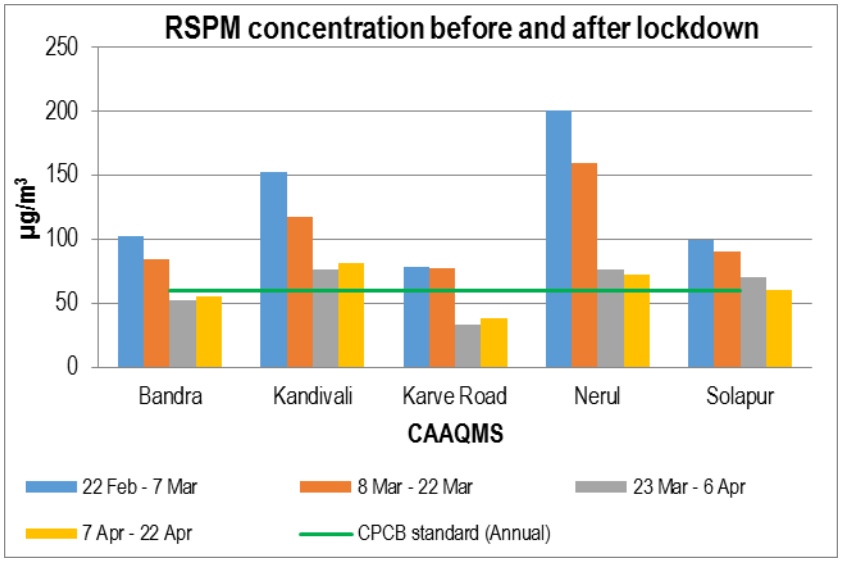
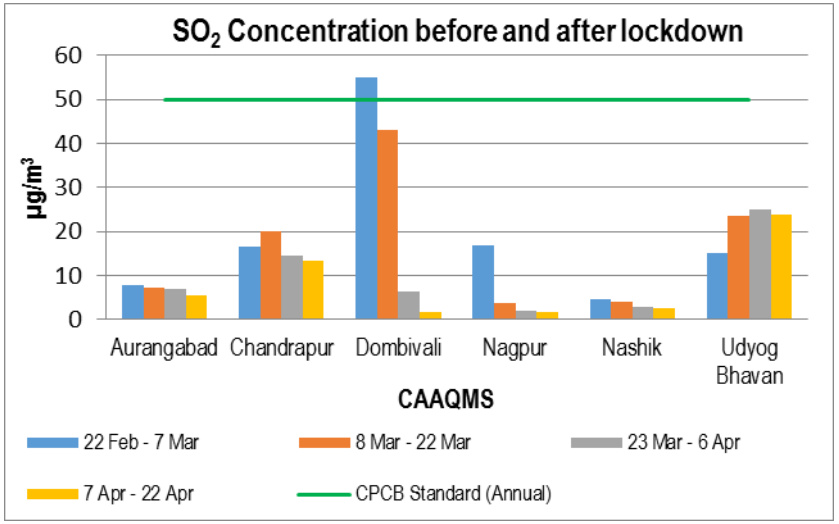
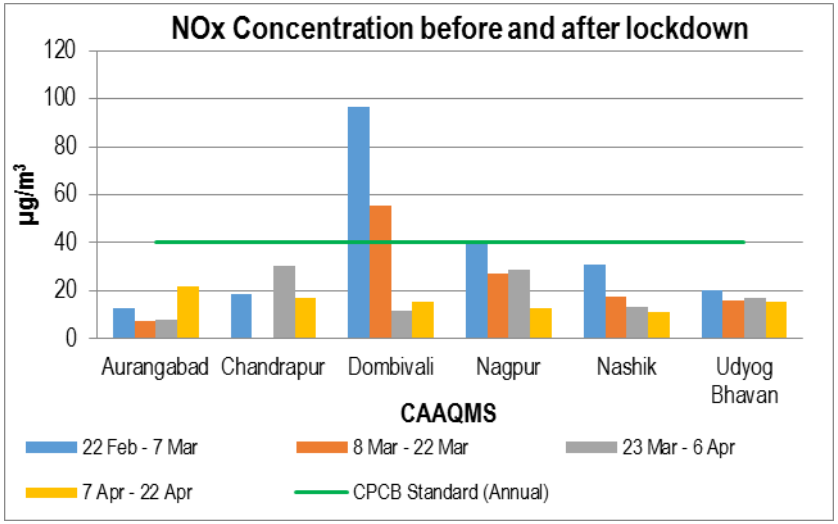




**Figure No. 32: $SO_2$, NOx, RSPM concentration recorded by CAAQMS of Bandra, Kandivali, Karve Road (Pune), Nerul and Solapur: before (22 February –22 March) and after lockdown (22 March -22 April 2020)**



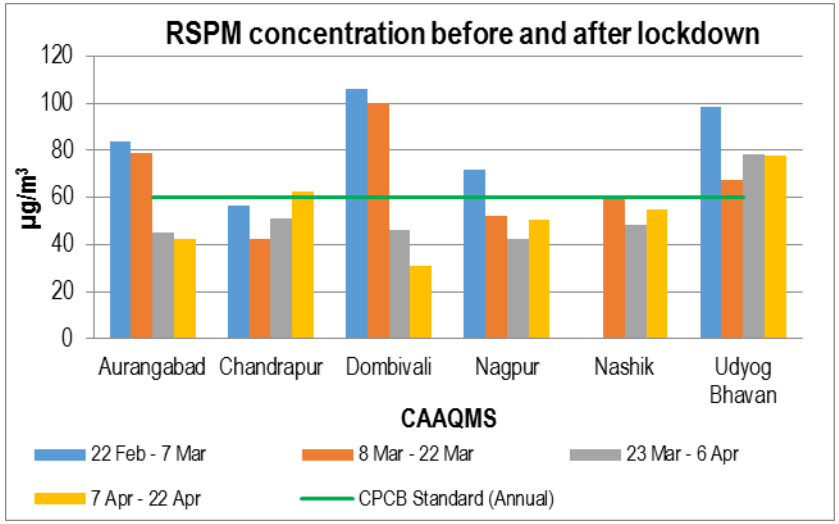
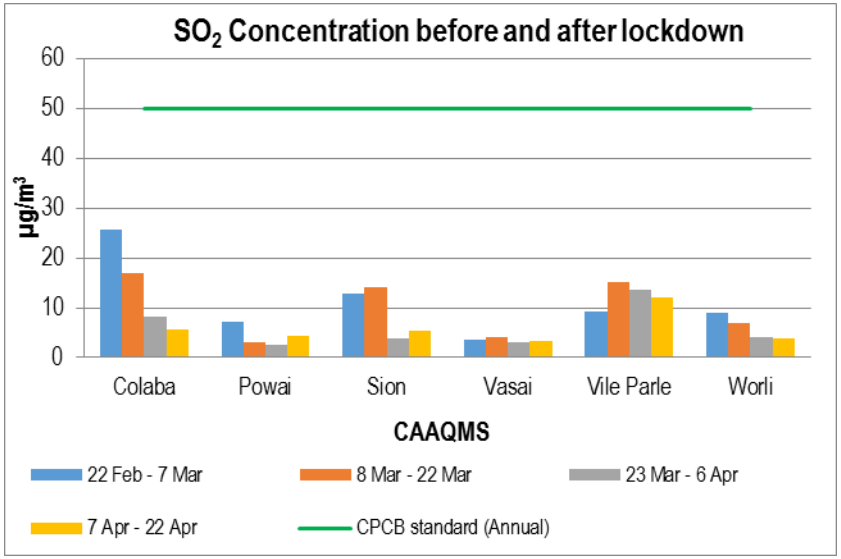
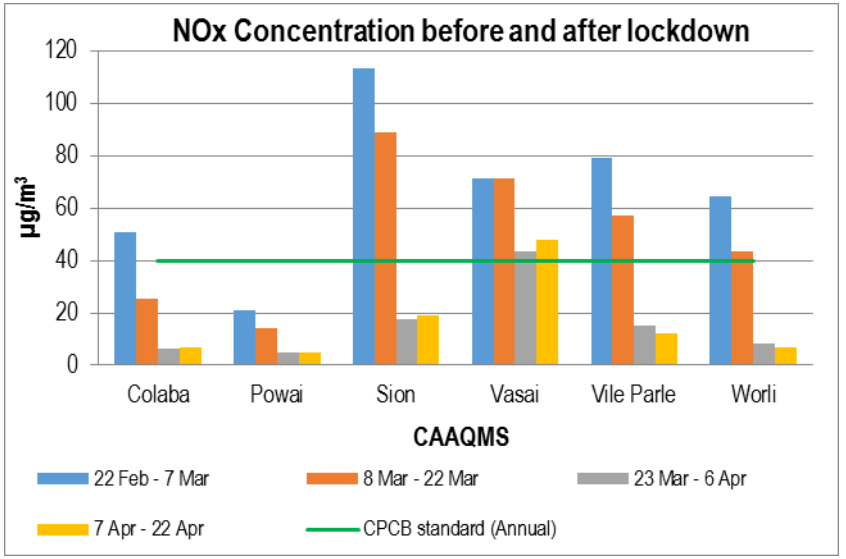




**Figure No. 33: $SO_2$, NOx, RSPM concentration recorded by CAAQMS of Aurangabad, Chandrapur, Dombivali, Nagpur, Nashik and Udyog Bhavan-Chandrapur: before (22 February –22 March) and after lockdown (22 March -22 April 2020)** *Note: Station under maintenance during March at Chandrapur*



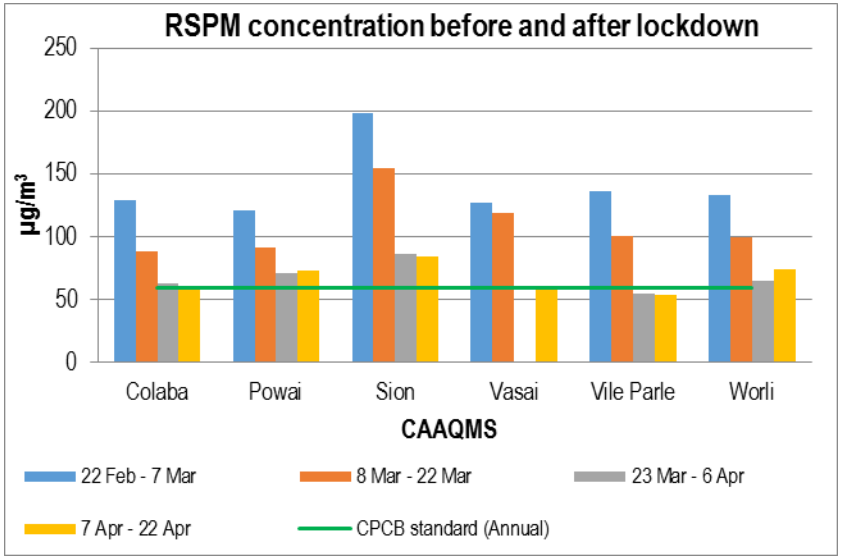




**Figure No. 34: $SO_2$, NOx, RSPM concentration recorded by CAAQMS of Colaba, Powai, Sion, Vasai, Vile Parle and Worli: before (22 February –22 March) and after lockdown (22 March -22 April 2020)**

To inhibit the community spread of Novel Corona Virus, the Government of India announced total lockdown on March 24, 2020 after announcing 1-day public curfew (22 March, 2020). A series of restrictions were imposed by the government all over the country i. In this period, all private and public transport was stopped. Only essential services employees were allowed to travel by government arranged transport. All industrial activities (except pharma and essential goods like agricultural activities) were allowed to function; that too with utmost precautions necessary to stop the corona virus spread. Since almost all business, transport, industrial activities came to a standstill; it was observed at many places that the amount of pollution including air and water started decreasing considerably. Figure No. 31 to Figure No. 34. shows the comparative analysis of major air pollutant levels 1 month before and after implementing nationwide lockdown. Majority of the CAAQMS recorded considerable decrease in concentration for almost all 3 pollutants ($SO_2$, NOx and RSPM).

In case of Dombivali (Kalyan RO) which has a presence of MIDC complex and which shows generally higher trend of pollution, recorded sizable decrease in concentration of $SO_2$ (before-54 μg/m$^3$;after – 2 μg/m$^3$), NOx (before- 96 μg/m$^3$;after-15.4 μg/m$^3$) and RSPM (before –106 μg/m$^3$ after- 31 μg/m$^3$). Thereby the levels of all 3 major pollutants came down within the standard prescribed limit of 50 μg/m$^3$, 40 μg/m$^3$ and 60 μg/m$^3$ respectively.

Similar trend was recorded by Karve Road CAAQMS (Pune) with decrease in concentration of $SO_2$ (before-15 μg/m$^3$; after – 9 μg/m$^3$), NOx (before- 43 μg/m$^3$; after-25 μg/m$^3$) and RSPM (before –78 μg/m$^3$; after- 38 μg/m$^3$).

By comparing these situations, it is evident that even though the corona outbreak caused India to come c to a standstill, it did have a positive impact on our environment, including the air quality.

# Conclusion

Air pollution is a major concern for today's world which has a serious toxicological impact on human health and the environment. Curbing air pollution is a very complex task as it has a number of different emission sources; each of which needs to have separate sets of mitigative steps. Air pollution is a worldwide phenomenon which is a concern especially for developing economies like India. India is currently going through a large expansion of its industrial base specially related to product manufacturing along with infrastructure development not only to support industrial establishments but also to meet urban population demands. In this quest of development, we are degrading the quality of the very air we breathe thus making ambient air pollution one of the top risk factors for our very existence and environment. Thus, it becomes the need of hour to tackle this problem and to implement mitigative measures while going forward on the path of development sustainably.

While addressing the air pollution, first and foremost thing of action is to monitor and assess the air pollutant levels in any region over a period of time. Continuous monitoring of such pollutants is thus very important to understand the reasons or sources which are responsible for their beyond acceptable levels in the atmosphere. With the same objective, MPCB has established a network of AAQMS in Maharashtra state which gives a broad overview of pollutant levels in any particular location or region. To scale up the activity, new AAQMS have also been introduced in various parts of Maharashtra.

MPCB continuously monitors the levels off air pollutants through the installed network of AAQMS across Maharashtra. $SO_2$, a colourless gas with suffocating odour is very toxic gas which may irritate eyes and mucous membranes. The gas emits primarily from burning of fossil fuels at power plants and other industrial facilities. In 2019-20, all AAQMS including newly installed recorded $SO_2$ concentrations well within the daily (80 $\mu g/m^3$) and annual standards (50 $\mu g/m^3$). The state of Maharashtra was found to be relatively clean for $SO_2$ pollution. In Mumbai RO; all 11 AAQMS (including newly added 9) recoded annual SO2 concentration within 7 $\mu g/m^3$ to 16 $\mu g/m^3$. Kalyan RO, a region having MIDC complexes at Dombivali and Ambernath recorded $SO_2$ levels within 21 $\mu g/m^3$ to 34 $\mu g/m^3$; a slight increase from 20 $\mu g/m^3$ to 33 $\mu g/m^3$ during 2018-19. The cities of Amaravati, Aurangabad, Chandrapur, Nagpur, Nashik, and Raigad recorded annual $SO_2$ concentrations less than 20 $\mu g/m^3$ and were relatively clean with respect to $SO_2$ pollution.

Anthropogenic activities like direct and indirect agricultural emissions and industrial emissions like combustion of fossil fuels and biomass lead to NOx emissions. High concentrations affect human health and also affect the environment by playing a major role in the processes of acidification and eutrophication. Sustainable climate-smart agricultural practices and the promotion and use of renewable energy alternatives are required to curb NOx pollution. In the year 2019-20, 9 ROs (up from 6 ROs in 2018-19) namely Aurangabad, Kalyan, Kolhapur, Mumbai, Navi Mumbai, Nagpur, Pune, Raigad and Thane recorded annual average NOx concentrations which were higher than the prescribed annual average limit of

40μg/m$^3$. Necessary mitigative steps especially in case of curbing vehicular emissions must be taken to mitigate the issue of NOx pollution.

RSPM pollution is a point of concern because these particles are capable of penetrating deep into the lungs during respiration and can enter the bloodstream. It can cause several cardiovascular and respiratory illnesses which can sometimes prove fatal to a human being. The high concentration is attributed to high levels of emissions from industries, quarrying and mining activities in the region. Still it is worth mentioning that this year (2019-20), 15 AAQMS recorded average RSPM concentration within the standard limit of 60 μg/m$^3$ as compared to previous year (2018-19) where only 4 AAQMS recorded the same levels. The Predominantly high levels of RSPM were recorded mainly at Chandrapur RO (Ghuggus -204 μg/m$^3$, Rajura – 171 μg/m$^3$), Thane RO (Kopri – 154 μg/m$^3$, Naupada – 153 μg/m$^3$, Balkum/Glaxo – 140 μg/m$^3$). Appropriate operation and maintenance practices at mines and quarry sites like use of water mists, wind screens, low dump sites, Construction of even and smooth roads, appropriate sweeping of roads and strict norms for the construction sector should be regulated to minimize the dispersion of RSPM into the air. Further, $PM_{2.5}$ concentration was monitored by 23 CAAQMS set up across the state. It is noteworthy that almost all CAAQMS recorded $PM_{2.5}$ concentration to be below the specified CPCB standard (40 μg/m$^3$). Only two locations- Kalyan and Karve road recorded annual average $PM_{2.5}$ concentrations exactly touching the specified standard value; while Aurangabad CAAQMS and Dombivali CAAQMS recorded annual average concentrations around 39 μg/m$^3$ and 38 μg/m$^3$ respectively. These values are close to the specified limit. Thus, these locations are more vulnerable to increased levels of $PM_{2.5}$ levels and require proper mitigation measures to counter the same.

In terms of Ozone pollution, only 5 CAAQMS installed at Chandrapur (February 2020), Kalyan (Feb-March 2020), Mahape (Feb 2019), Mulund (Feb 2020 – March 2020) and Nagpur (April 2019-May 2019) recorded higher concentration than the standard limit of 100 μg/m$^3$. For most of the regions, high concentration of ozone was found in the month of January, February, March and April. Ozone concentration was found to be highest during the afternoon hours especially during the summer months.

Carbon monoxide, a colourless, odourless toxic gas emits from incomplete combustion of fossil fuels such as gasoline, coal and natural gas. The gas is more toxic to humans due to its ability to lower the oxygen transport by haemoglobin once it gets inhaled with air. It may lead to other health issues like headache, high chances of chest pain. In 2019-20, ROs like Bandra, Dombivali, Nagpur, Kalyan and Solapur exceeded 8 hourly concentration standards of 2 mg/m$^3$. On the other hand, average concentration of CO reached closer to the limit at Pune, Mahape and Nerul. Since vehicular emissions are one of the main factors behind CO emissions, government must promote new eco-friendly transport systems. Public should also opt for public transport or carpooling applications instead of personal vehicles wherever and whenever possible. Regions particularly witnessing high levels of CO must take preventive steps like traffic management and periodic emission exhaust testing of vehicles.

In case of Benzene, Out of 22 CAAQMS, 11 CAAQMS namely Bandra, Colaba, Dombivali, Mahape, Nagpur, Nashik, Nerul, Kalyan, Kurla, Sion and Worli recorded benzene concentration above the limit during certain period of time in the year.

Bandra, a region which was relatively clean during 2018-19 witnessed benzene concentration above the limit (5 μg/m$^3$) during the months of February (7 μg/m$^3$) and March (7.8 μg/m$^3$). Dombivali region recorded annual average concentration above the limit throughout the year thus making Dombivali one of the prime regions as far as Benzene pollution is concerned. Followed by Dombivali, Mahape CAAQMS recorded above limit benzene average concentration for 9 months except June, August and September. Regions of Airport, Aurangabad, Borivali, Udyog Bhavan-Chandrapur, Pune, Vile Parle, and Vasai were relatively clean throughout the year with respect to Benzene concentration levels.

# Data recorded by AAQMS across Maharashtra 2019-2020

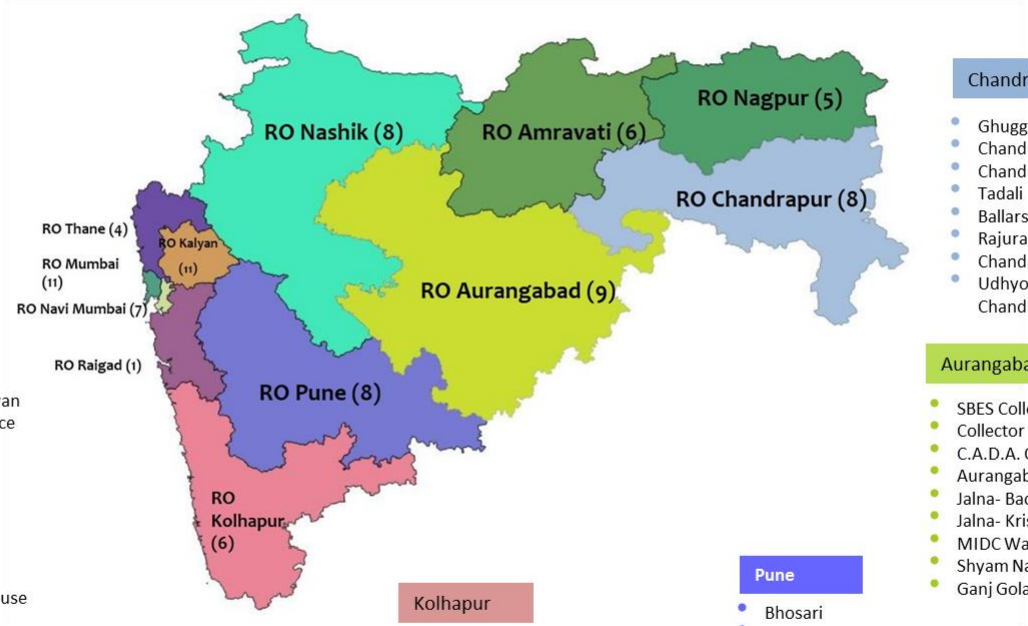
**Thane**
- Kopri
- Naupada
- Balkum/Glaxo
- Vasai CAAQMS

**Nashik**
- Old B. J. Market
- Girna Water Tank
- MIDC Jalgaon
- RTO Colony
- MIDC Satpur - VIP
- NMC Nashik
- SRO Office Nashik
- Nashik CAAQMS

**Amravati**
- LRT Commerce College
- MIDC Water Works - Akola
- Akola- College of Engg & Technology
- Raj Kamal Chowk
- Govt. College of Engineering
- Godhadiwala Private Limited

**Nagpur**
- IOE North Ambazari road
- MIDC Office, Hingna Road
- Govt Polytechnic Col, Sadar
- Civil lines Nagpur
- Nagpur CAAQMS

**Mumbai**
- Bandra
- Sion
- Airport CAAQMS
- Colaba CAAQMS
- Kandivali CAAQMS
- Borivali CAAQMS
- Vile Parle CAAQMS
- Mulund CAAQMS
- Powai CAAQMS
- Kurla CAAQMS
- Worli CAAQMS




**Chandrapur**
- Ghuggus
- Chandrapur - MIDC
- Chandrapur - SRO MPCB
- Tadali MIDC
- Ballarshah
- Rajura
- Chandrapur CAAQMS
- Udhyog Bhvan , Chandrapur

**Navi Mumbai**
- Rabale
- Nerul - DY Patil
- Mahape, MPCB-Nirmal Bhavan
- Kharghar - CIDCO Nodal Office
- Taloja - MIDC Building
- Nerul CAAQMS

**Aurangabad**
- SBES College
- Collector Office, Aurangabad
- C.A.D.A. Office
- Aurangabad CAAQMS
- Jalna- Bachat Bhavan
- Jalna- Krishnadhan seeds Ltd
- MIDC Water Works - Latur
- Shyam Nagar-Kshewraj Vidyalaya
- Ganj Golai - Sidhheshwar Bank

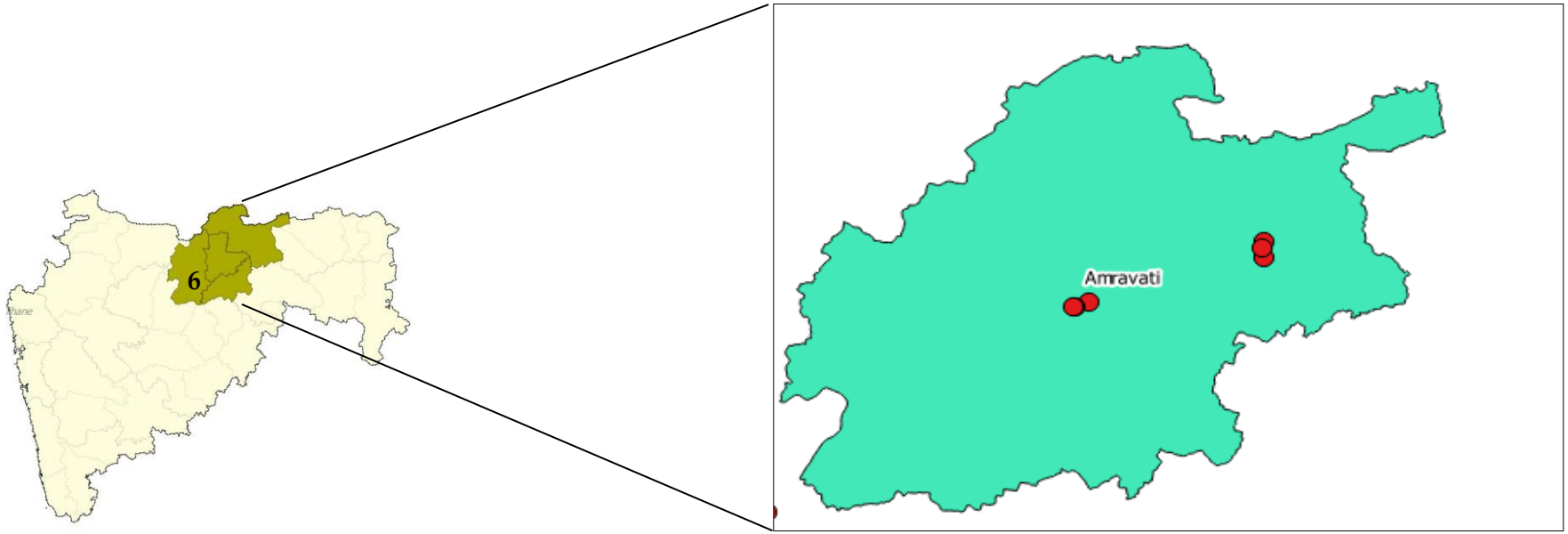
**Kalyan**
- Ambernath
- Badlapur - BIWA House
- I.G.M. Hospital
- Prematai hall
- Dombivali
- MIDC Office Dombivali
- Dombivali CAAQMS
- MPCB RO Kalyan office
- Smt. CHM College Campus
- Powai Chowk
- Kalyan CAAQMS

**Kolhapur**
- Shivaji University Campus
- Ruikar Trust
- Mahadwar Road
- Terrace of SRO-Sangli, Udyog Bhavan
- Sangli-Miraj Primary Municipal school
- Krishna Valley school

**Pune**
- Bhosari
- Nal Stop
- Swargate, Pune
- Pimpri-Chinchwad - BOB Building
- Karve Road - CAAQMS
- WIT Campus
- Saat Rasta- Chithale Clinic
- Solapur

**Raigad**
- Panvel- Water Supply Plant

# RO – Amravati




| MPCB RO | Region | Station code | Station name | Type | Latitude (deg) | Longitude (deg) |
|---|---|---|---|---|---|---|
| Amravati | Akola | 700 | LRT Commerce College | Residential | 20° 41' 01.2" N | 77° 02' 43.5" E |
| | Akola | 701 | MIDC Water Works - Akola | Industrial | 20° 41' 12.1" N | 77° 02' 20.1" E |
| | Akola | 702 | Akola- College of Engg & Technology | Commercial | 20° 42' 16.6" N | 77° 05' 35.9" E |
| | Amravati | 547 | Raj Kamal Chowk | Rural and other areas | 20° 55' 42.4" N | 77° 45' 14.2" E |
| | Amravati | 548 | Govt. College of Engineering | Residential | 20° 57' 14.8" N | 77° 45' 35.3" E |
| | Amravati | 549 | Godhadiwala Private Limited | Industrial | 20° 53' 20.9" N | 77° 45' 32.0" E |

# Akola – LRT Commerce College

**Table No. 6: Data for Monthly average reading recorded at LRT Commerce College. - Akola**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | *50* | *40* | *60* |
| LRT Commerce College | 2019 | Apr | 13 | 13 | 66 |
| | | May | 13 | 14 | 66 |
| | | Jun | 13 | 14 | 66 |
| | | Jul | 14 | 14 | 63 |
| | | Aug | 15 | 14 | 65 |
| | | Sep | 14 | 16 | 64 |
| | | Oct | 14 | 14 | 64 |
| | | Nov | 12 | 13 | 65 |
| | | Dec | 14 | 16 | 68 |
| | 2020 | Jan | 13 | 13 | 66 |
| | | Feb | 13 | 14 | 67 |
| | | Mar | 11 | 11 | 51 |

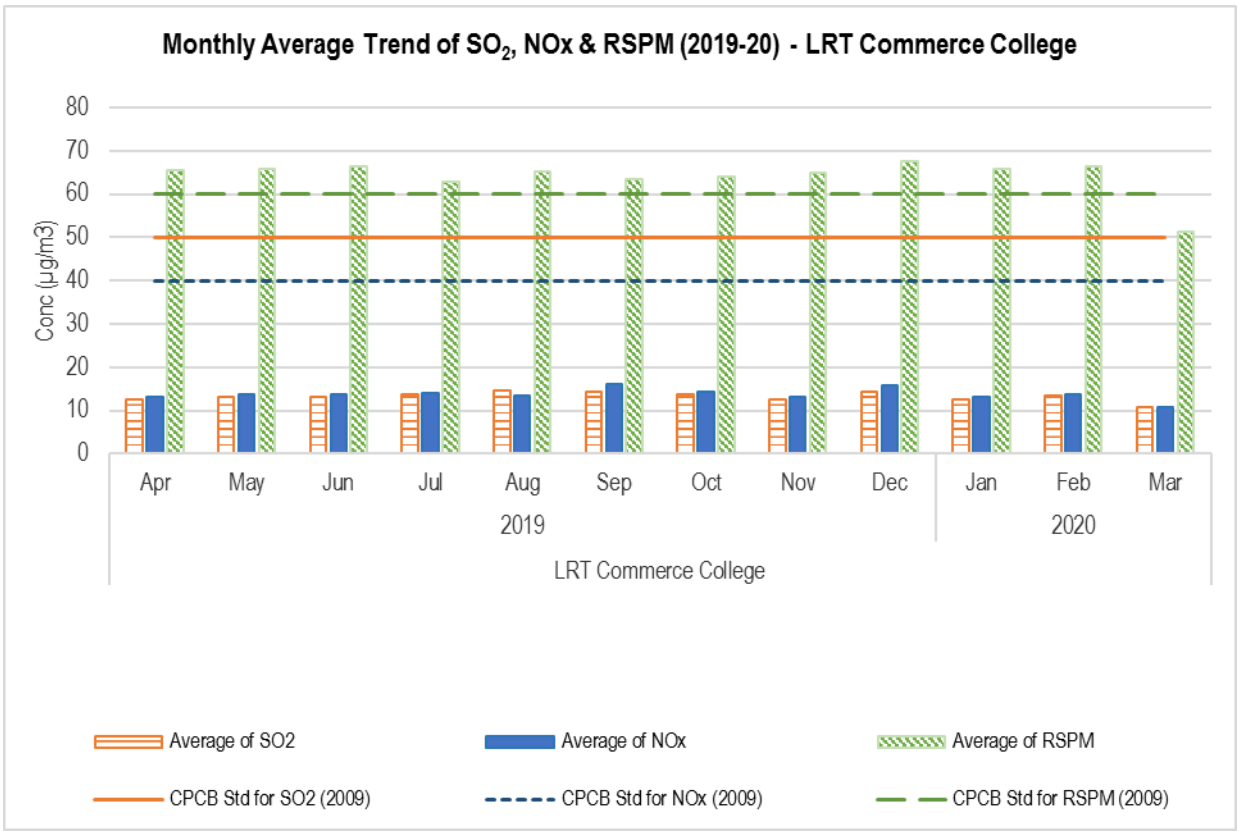



**Figure No. 35: Monthly average reading recorded at LRT Commerce College. – Akola**

**Table No. 7: Data for Annual average trend of $SO_2$, NOx, and RSPM at LRT Commerce College. – Akola**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| LRT Commerce College | 09-10 | 6 | 2 | 87 |
| | 10-11 | 6 | 3 | 107 |
| | 11-12 | 7 | 7 | 125 |
| | 12-13 | 8 | 8 | 126 |
| | 13-14 | 7 | 3 | 122 |
| | 14-15 | 7 | 3 | 117 |
| | 15-16 | 7 | 7 | 115 |
| | 16-17 | 8 | 9 | 109 |
| | 17-18 | 9 | 10 | 107 |
| | 18-19 | 13 | 14 | 72 |
| | 19-20 | 13 | 14 | 64 |

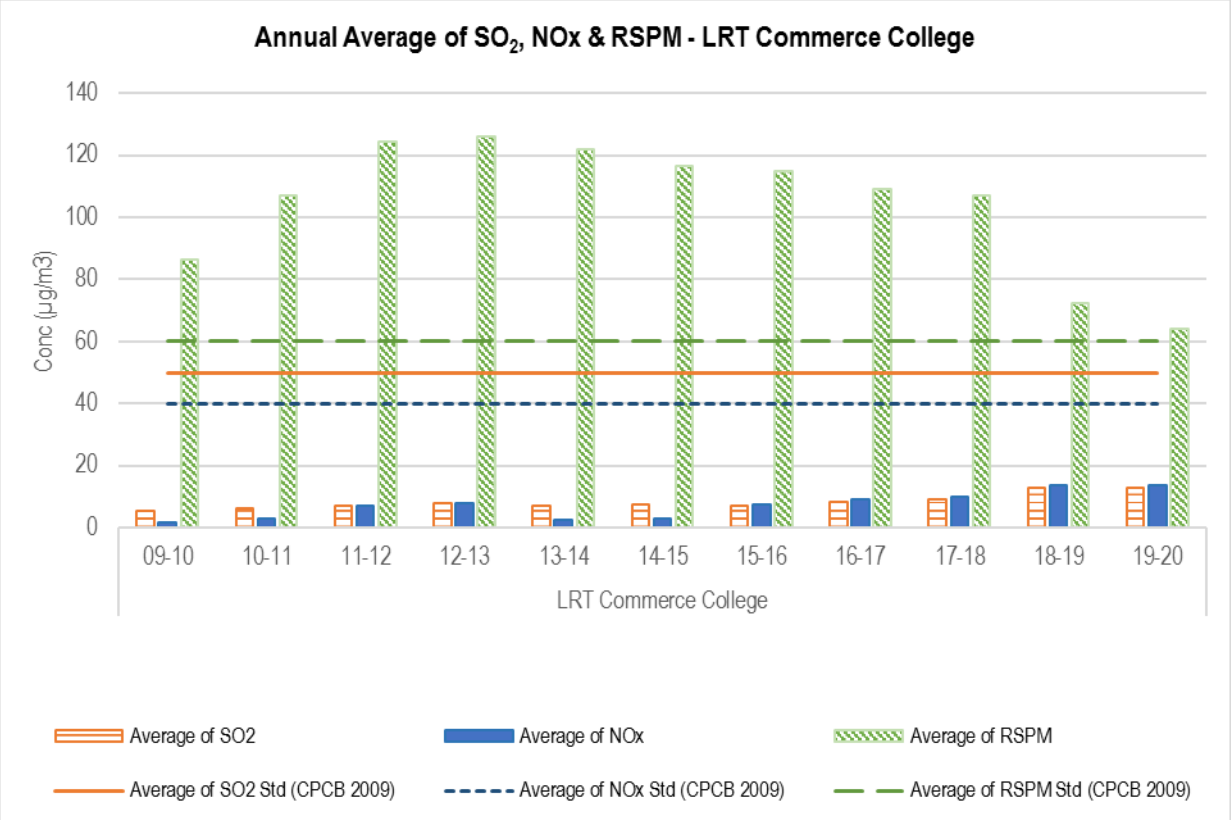



**Figure No. 36: Annual average trend of $SO_2$, NOx, and RSPM at LRT Commerce College. – Akola**

## Akola -MIDC Water Works

**Table No. 8: Data for Monthly average reading recorded at MIDC Water works.-Akola**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **MIDC Water Works - Akola** | 2019 | Apr | 15 | 17 | 75 |
| | | May | 16 | 18 | 76 |
| | | Jun | 16 | 18 | 77 |
| | | Jul | 15 | 17 | 70 |
| | | Aug | 19 | 19 | 71 |
| | | Sep | 21 | 21 | 70 |
| | | Oct | 17 | 18 | 69 |
| | | Nov | 17 | 17 | 69 |
| | | Dec | 21 | 21 | 71 |
| | 2020 | Jan | 15 | 16 | 69 |
| | | Feb | 17 | 17 | 71 |
| | | Mar | 12 | 12 | 52 |

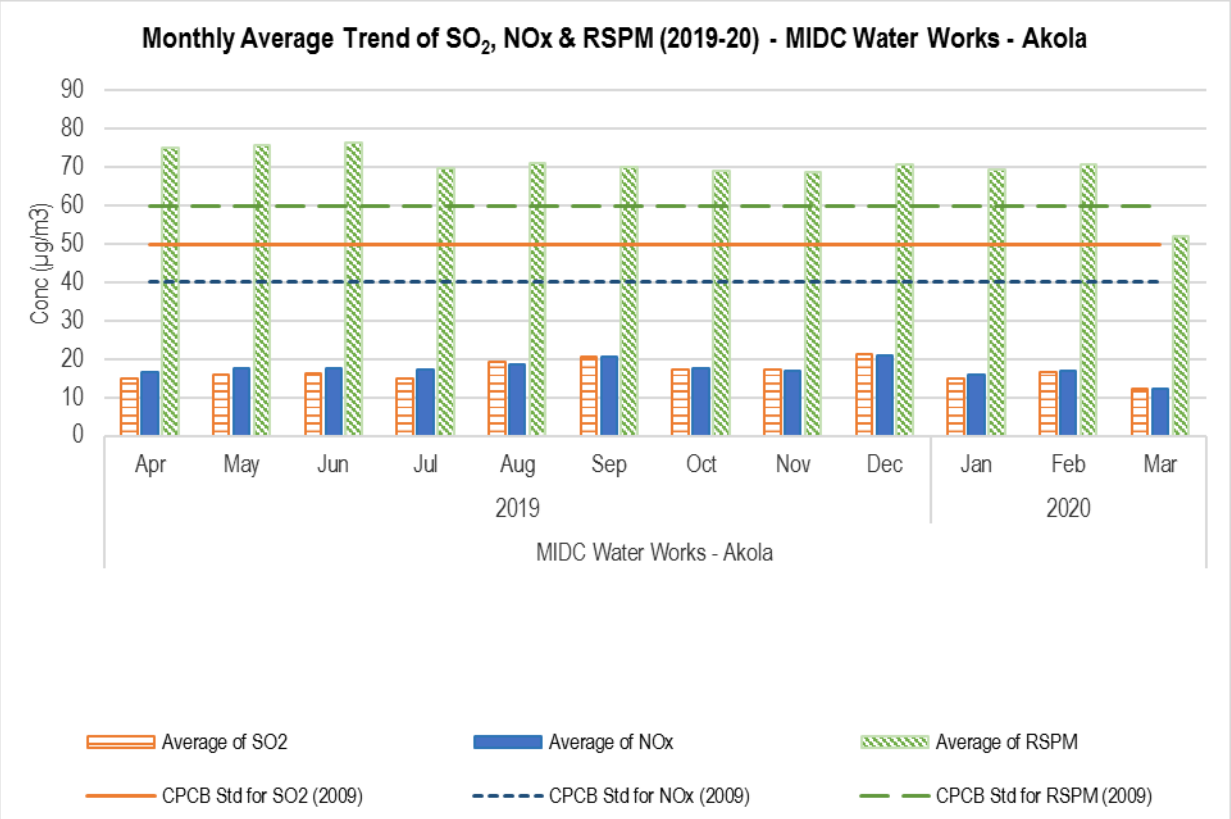



**Figure No. 37: Monthly average reading recorded at MIDC Water works.-Akola**

**Table No. 9: Data for Annual average trend of $SO_2$, NOx, and RSPM at MIDC Water works.-Akola**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| MIDC Water Works - Akola | 09-10 | 8 | 10 | 88 |
| | 10-11 | 9 | 7 | 131 |
| | 11-12 | 10 | 11 | 141 |
| | 12-13 | 10 | 11 | 142 |
| | 13-14 | 9 | 7 | 136 |
| | 14-15 | 9 | 9 | 129 |
| | 15-16 | 7 | 12 | 106 |
| | 16-17 | 9 | 10 | 128 |
| | 17-18 | 11 | 11 | 116 |
| | 18-19 | 16 | 17 | 79 |
| | 19-20 | 17 | 17 | 70 |

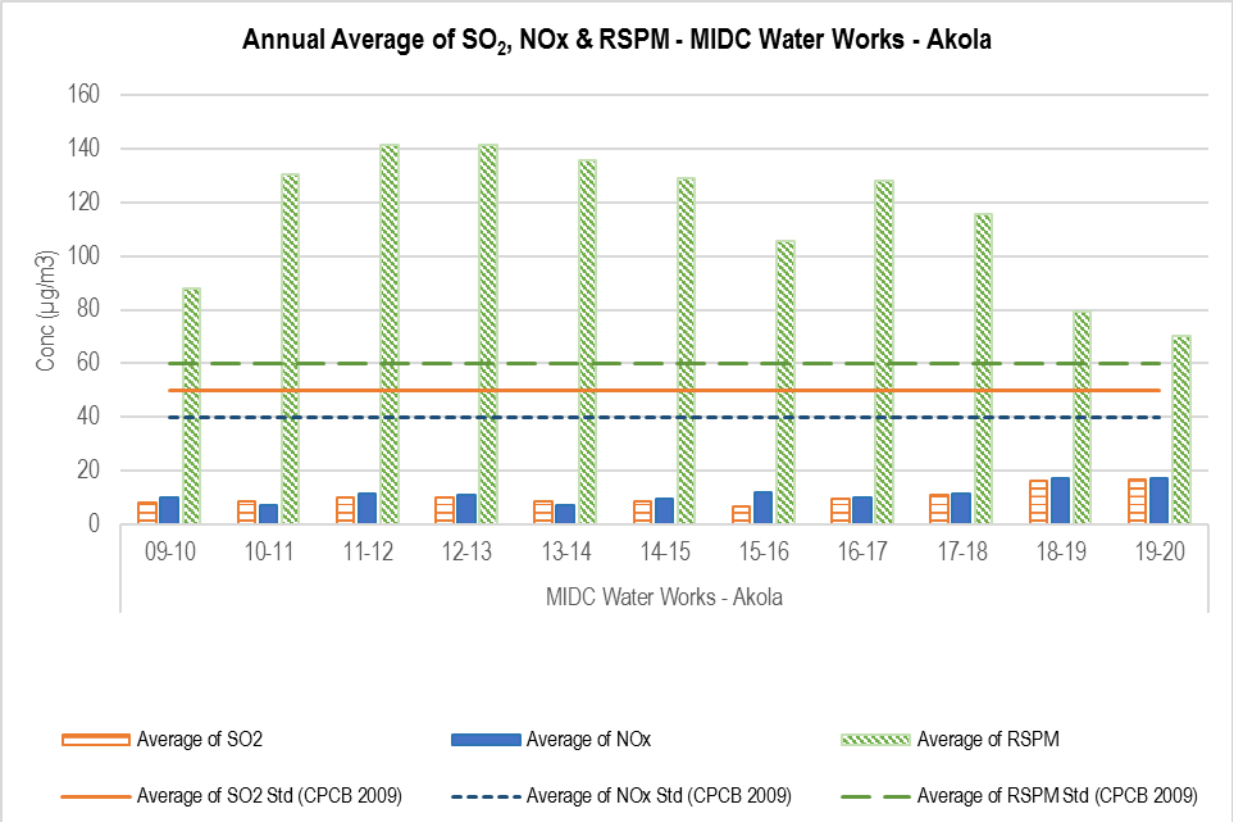



**Figure No. 38: Annual average trend of $SO_2$, NOx, and RSPM at MIDC Water works.-Akola**

# Akola - College of Engg & Technology

**Table No. 10: Data for Monthly average reading recorded at College of Engg & Technology Akola (Architecture Branch)-Akola**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | *50* | *40* | *60* |
| **Akola- College of Engg & Technology** | 2019 | Apr | 14 | 14 | 69 |
| | | May | 14 | 15 | 69 |
| | | Jun | 14 | 15 | 68 |
| | | Jul | 15 | 15 | 65 |
| | | Aug | 15 | 15 | 66 |
| | | Sep | 17 | 18 | 66 |
| | | Oct | 15 | 15 | 64 |
| | | Nov | 15 | 15 | 66 |
| | | Dec | 17 | 17 | 69 |
| | 2020 | Jan | 14 | 15 | 68 |
| | | Feb | 15 | 16 | 68 |
| | | Mar | 12 | 12 | 51 |

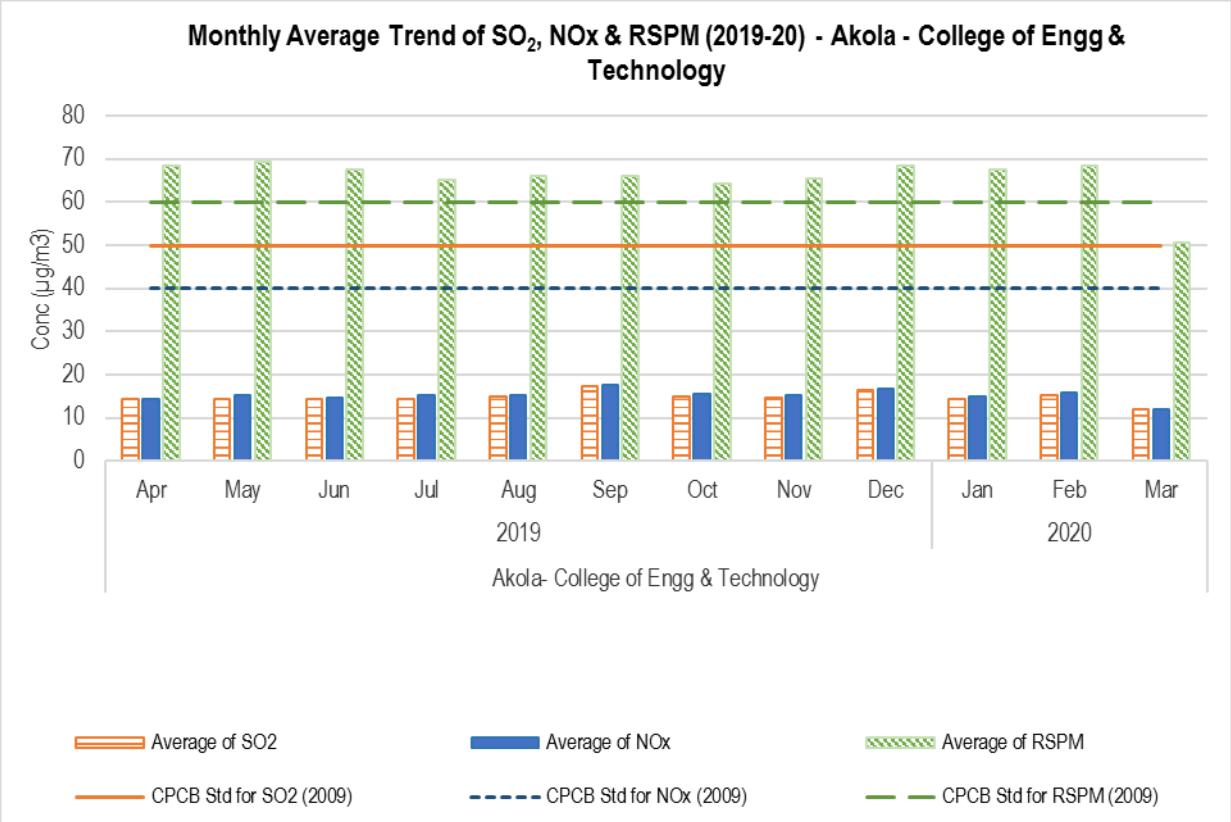



**Figure No. 39: Monthly average reading recorded at College of Engg & Technology Akola (Architecture Branch)-Akola**

**Table No.11: Data for Annual average trend of $SO_2$, NOx, and RSPM at College of Engg & Technology Akola (Architecture Branch)-Akola**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| **Akola- College of Engg & Technology** | 09-10 | 6 | 2 | 117 |
| | 10-11 | 7 | 5 | 142 |
| | 11-12 | 9 | 9 | 150 |
| | 12-13 | 9 | 8 | 151 |
| | 13-14 | 8 | 6 | 149 |
| | 14-15 | 8 | 8 | 146 |
| | 15-16 | 8 | 9 | 139 |
| | 16-17 | 9 | 9 | 142 |
| | 17-18 | 9 | 10 | 111 |
| | 18-19 | 14 | 14 | 74 |
| | 19-20 | 15 | 15 | 66 |

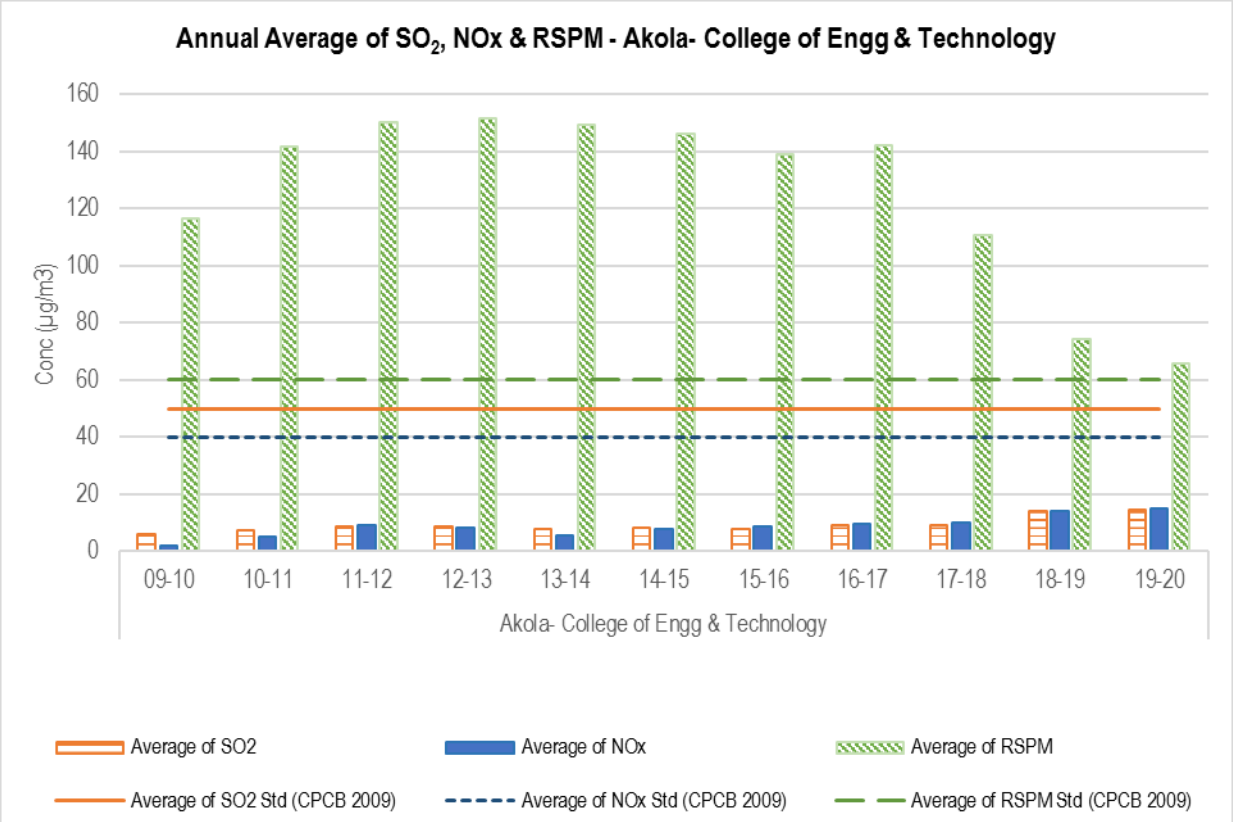



**Figure No. 40: Annual average trend of $SO_2$, NOx, and RSPM at College of Engg & Technology Akola (Architecture Branch)-Akola**

## Amravati - Raj Kamal Chowk

**Table No. 12: Data for Monthly average reading recorded at Raj Kamal Chowk. -Amravati**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Raj Kamal Chowk** | 2019 | Apr | 16 | | |
| | | May | 16 | 17 | 126 |
| | | Jun | 12 | 13 | 108 |
| | | Jul | 12 | 13 | 111 |
| | | Aug | 13 | 14 | 73 |
| | | Sep | 11 | 12 | 74 |
| | | Oct | 13 | 14 | 76 |
| | | Nov | 14 | 16 | 84 |
| | | Dec | 13 | 15 | 78 |
| | 2020 | Jan | 14 | 16 | 86 |
| | | Feb | 15 | 16 | 93 |
| | | Mar | 13 | 14 | 77 |

**Data was not available for NOx and RSPM for the month of April 2019*

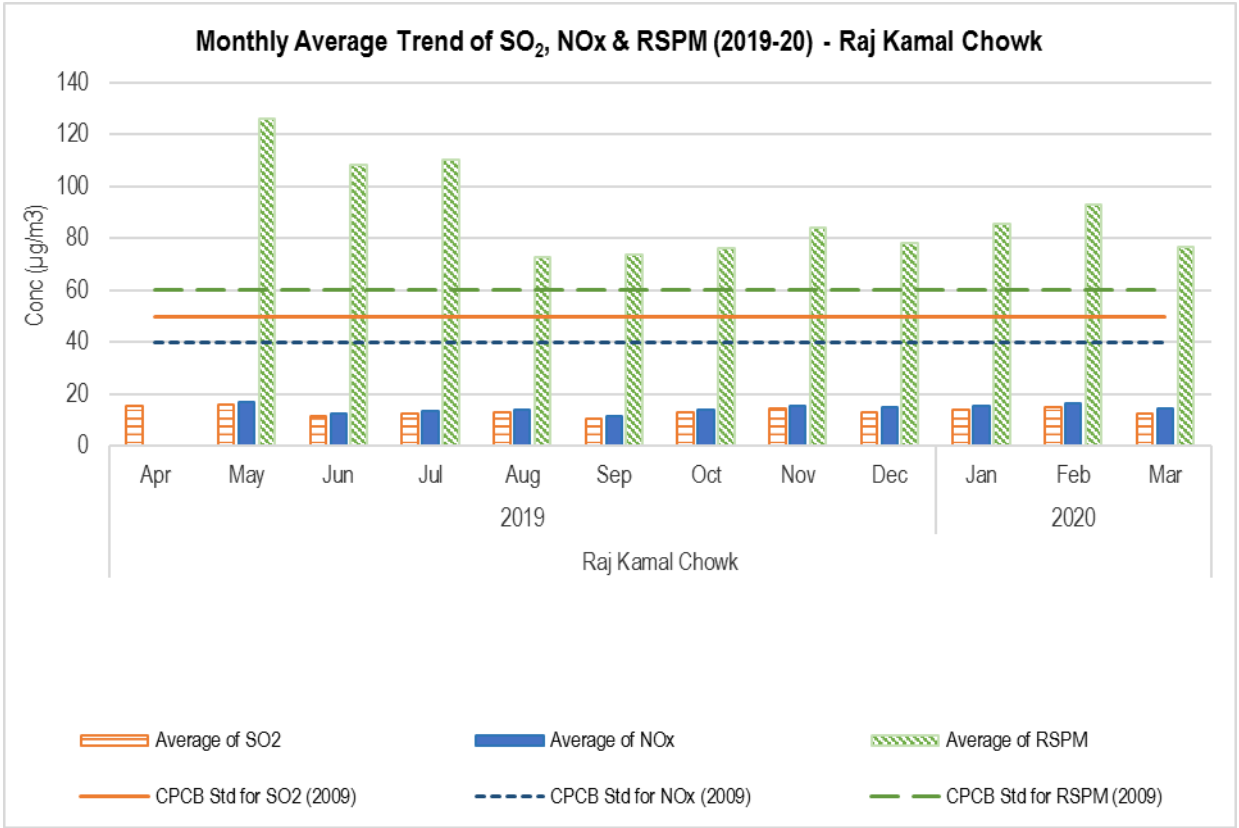



**Figure No. 41: Monthly average reading recorded at Raj Kamal Chowk. -Amravati**

**Table No. 13: Data for Annual average trend of $SO_2$, NOx, and RSPM at Raj Kamal Chowk. - Amravati**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Raj Kamal Chowk | 06-07 | 13 | 19 | 79 |
| | 07-08 | 11 | 16 | 78 |
| | 08-09 | 12 | 15 | 100 |
| | 09-10 | 14 | 16 | 125 |
| | 10-11 | 13 | 15 | 146 |
| | 11-12 | 15 | 18 | 108 |
| | 12-13 | 12 | 13 | 109 |
| | 13-14 | 12 | 13 | 128 |
| | 14-15 | 12 | 14 | 133 |
| | 15-16 | 12 | 14 | 135 |
| | 16-17 | 13 | 14 | 141 |
| | 17-18 | 13 | 23 | 120 |
| | 18-19 | 18 | 19 | 119 |
| | 19-20 | 14 | 15 | 90 |

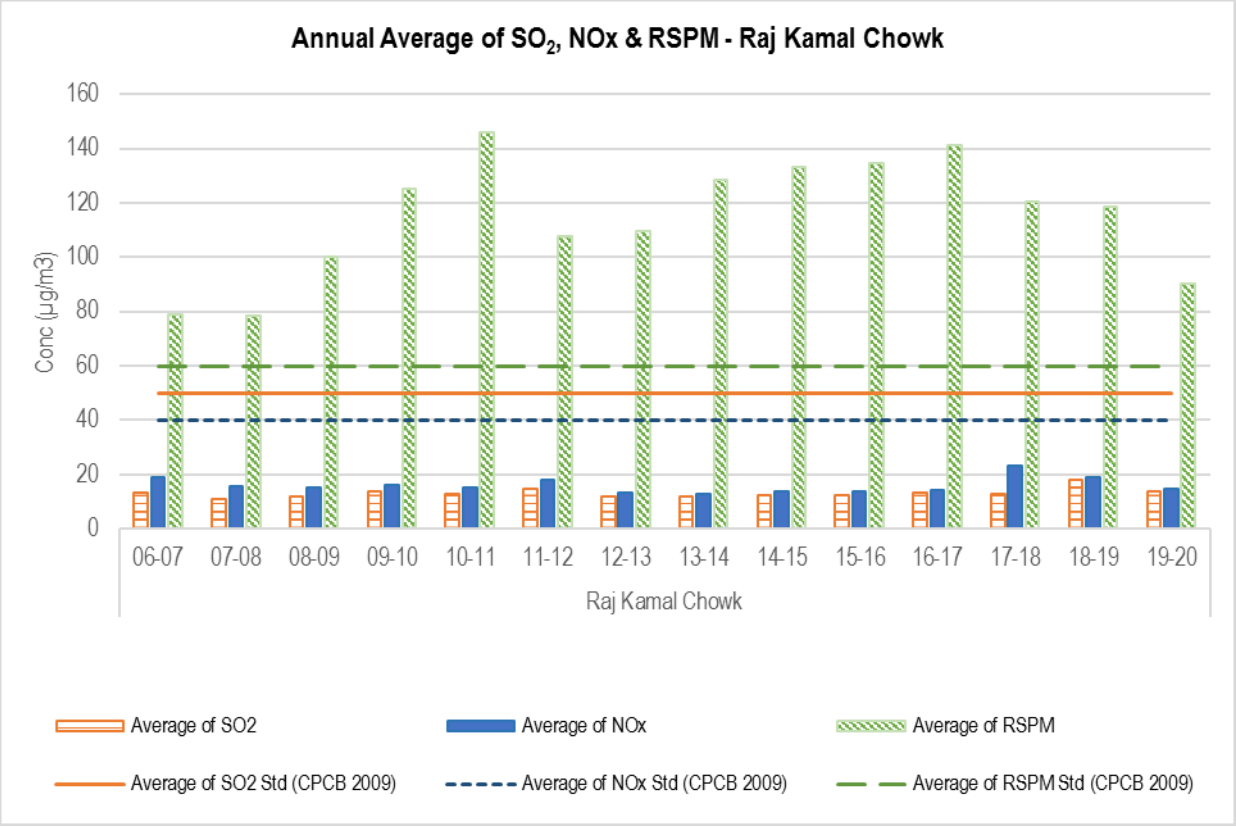



**Figure No. 42: Annual average trend of $SO_2$, NOx, and RSPM at Raj Kamal Chowk. –Amravati**

# Amravati - Govt. college of Engineering

**Table No. 14: Data for Monthly average reading recorded at Govt. college of Engineering - Amravati**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Govt. College of Engineering** | 2019 | Apr | 13 | 15 | 80 |
| | | May | 14 | 15 | 89 |
| | | Jun | 9 | 11 | 61 |
| | | Jul | 10 | 12 | 67 |
| | | Aug | 9 | 11 | 54 |
| | | Sep | 8 | 9 | 53 |
| | | Oct | 10 | 11 | 62 |
| | | Nov | 13 | 15 | 72 |
| | | Dec | 12 | 13 | 73 |
| | 2020 | Jan | 13 | 15 | 73 |
| | | Feb | 12 | 14 | 80 |
| | | Mar | 10 | 12 | 62 |

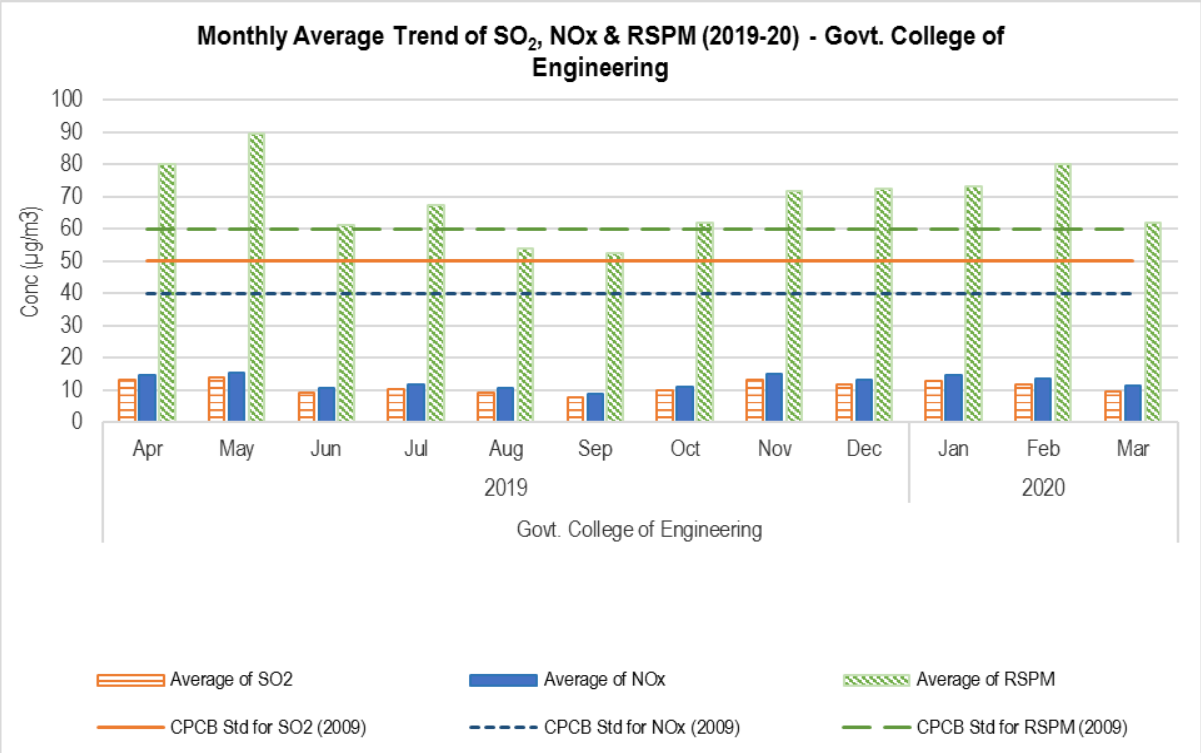



**Figure No. 43: Monthly average reading recorded at Govt. college of Engineering - Amravati**

**Table No. 15: Data for Annual average trend of $SO_2$, NOx, and RSPM at Govt. college of Engineering - Amravati**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Govt. College of Engineering-Amravati | 06-07 | 10 | 12 | 50 |
| | 07-08 | 8 | 8 | 40 |
| | 08-09 | 8 | 10 | 47 |
| | 09-10 | 10 | 12 | 78 |
| | 10-11 | 10 | 13 | 79 |
| | 11-12 | 10 | 12 | 79 |
| | 12-13 | 11 | 12 | 80 |
| | 13-14 | 10 | 12 | 80 |
| | 14-15 | 11 | 12 | 75 |
| | 15-16 | 11 | 12 | 73 |
| | 16-17 | 11 | 13 | 73 |
| | 17-18 | 11 | 16 | 69 |
| | 18-19 | 14 | 16 | 77 |
| | 19-20 | 11 | 13 | 70 |

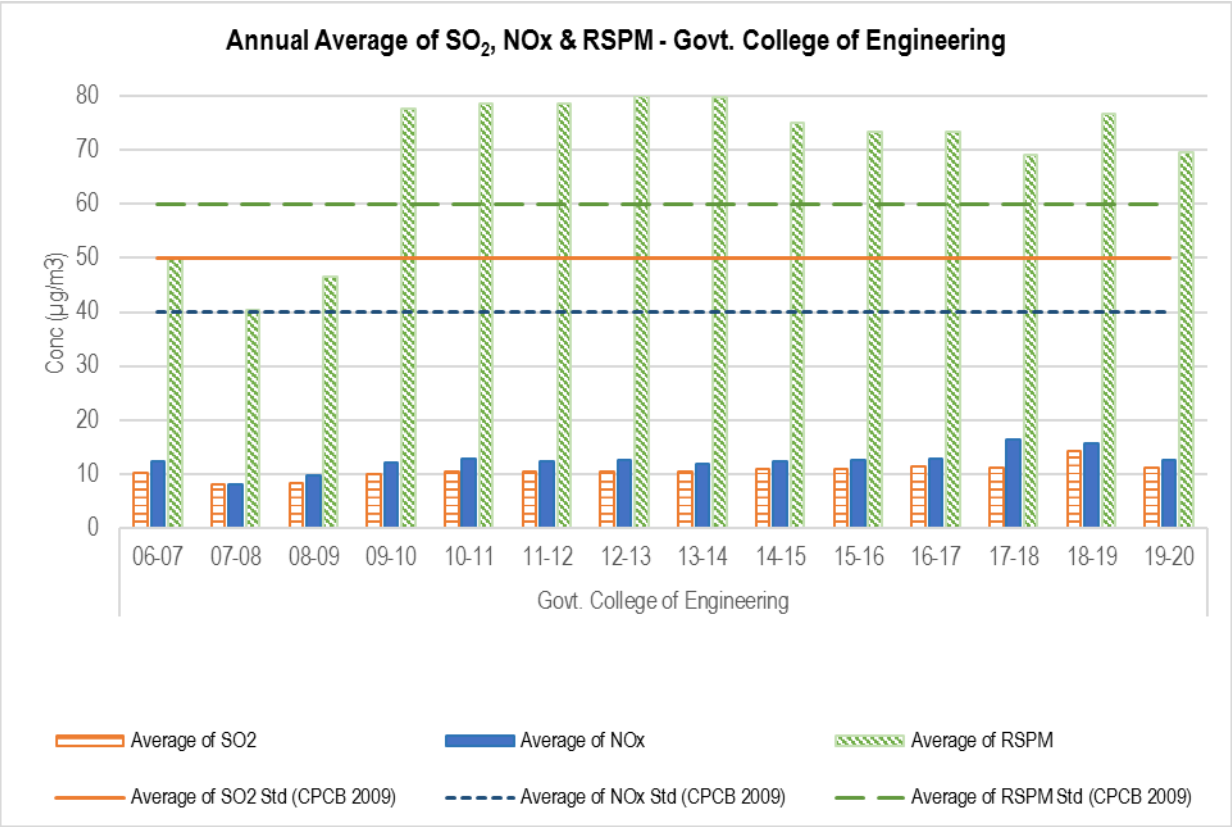



**Figure No. 44: Annual average trend of $SO_2$, NOx, and RSPM at Govt. college of Engineering - Amravati**

## Amravati - Godhadiwala Private Limited

**Table No. 16: Data for Monthly average reading recorded at Godhadiwala Private Limited - Amravati**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Godhadiwala Private Limited** | 2019 | Apr | 15 | | |
| | | May | 15 | 16 | 122 |
| | | Jun | 10 | 11 | 77 |
| | | Jul | 12 | 14 | 91 |
| | | Aug | 13 | 14 | 81 |
| | | Sep | 10 | 11 | 65 |
| | | Oct | 12 | 14 | 72 |
| | | Nov | 13 | 14 | 84 |
| | | Dec | 12 | 13 | 85 |
| | 2020 | Jan | 14 | 16 | 87 |
| | | Feb | 13 | 14 | 87 |
| | | Mar | 9 | 10 | 57 |

**Data was not available for NOx and RSPM for the month of April 2019*

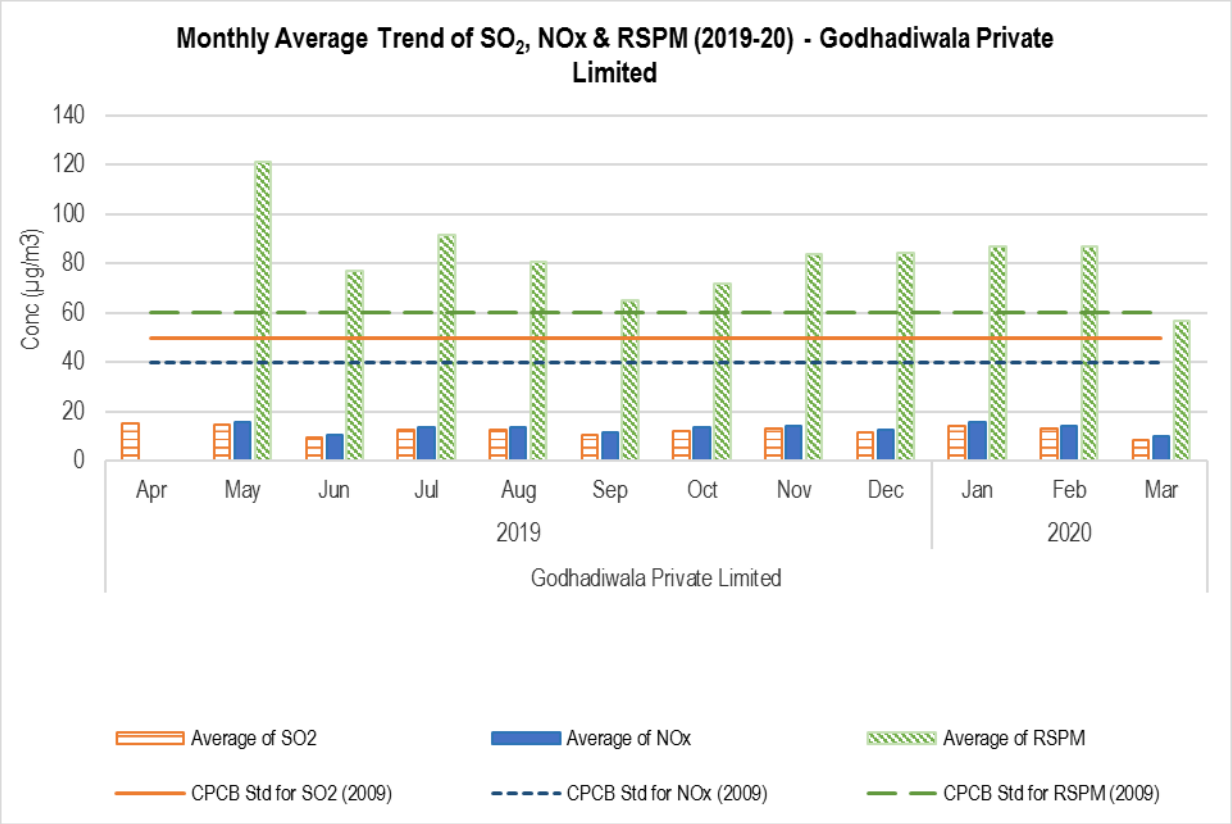



**Figure No. 45: Monthly average reading recorded at Godhadiwala Private Limited - Amravati**

**Table No. 17: Data for Annual average trend of $SO_2$, NOx, and RSPM at Godhadiwala Private Limited - Amravati**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Godhadiwala Private Limited | 06-07 | 12 | 16 | 67 |
| | 07-08 | 9 | 12 | 58 |
| | 08-09 | 10 | 13 | 71 |
| | 09-10 | 12 | 14 | 102 |
| | 10-11 | 12 | 14 | 125 |
| | 11-12 | 11 | 13 | 100 |
| | 12-13 | 12 | 13 | 101 |
| | 13-14 | 11 | 12 | 94 |
| | 14-15 | 12 | 14 | 108 |
| | 15-16 | 11 | 13 | 110 |
| | 16-17 | 12 | 13 | 108 |
| | 17-18 | 11 | 21 | 97 |
| | 18-19 | 16 | 17 | 109 |
| | 19-20 | 12 | 13 | 83 |

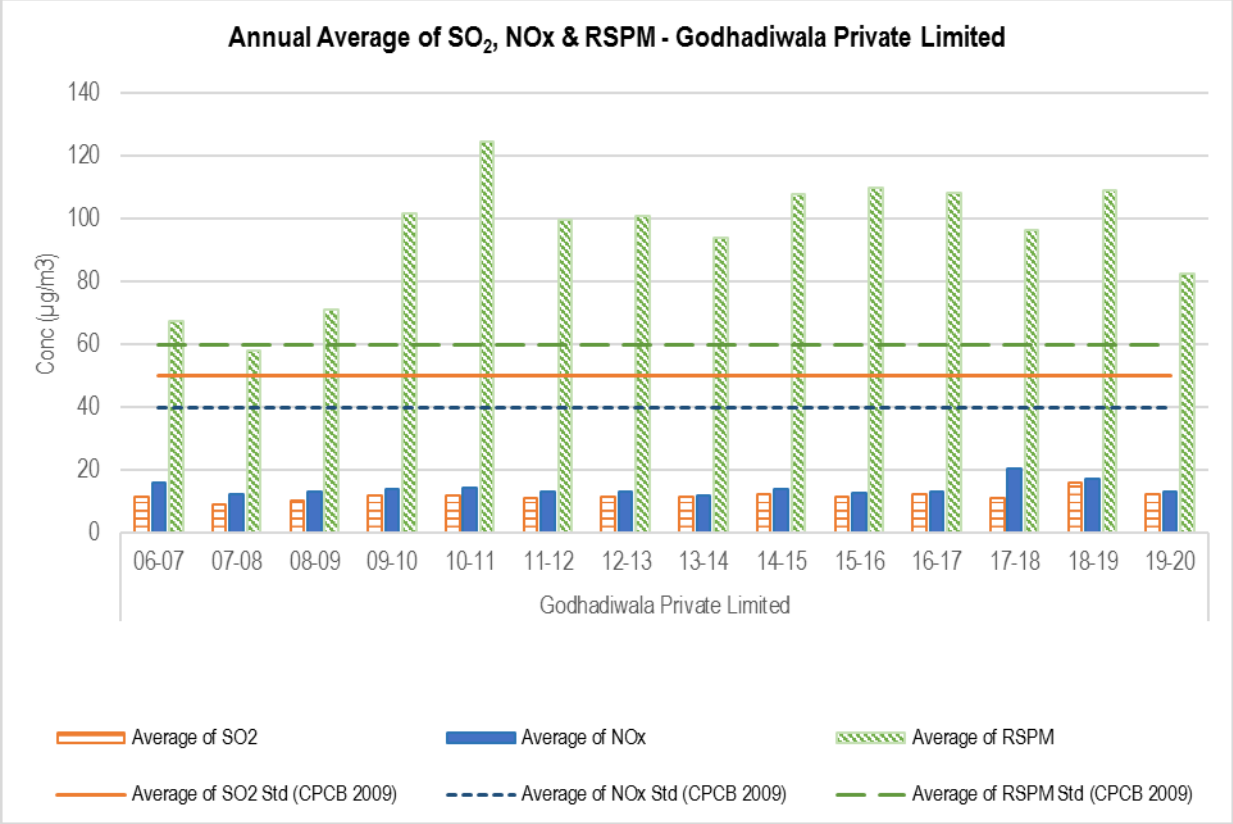
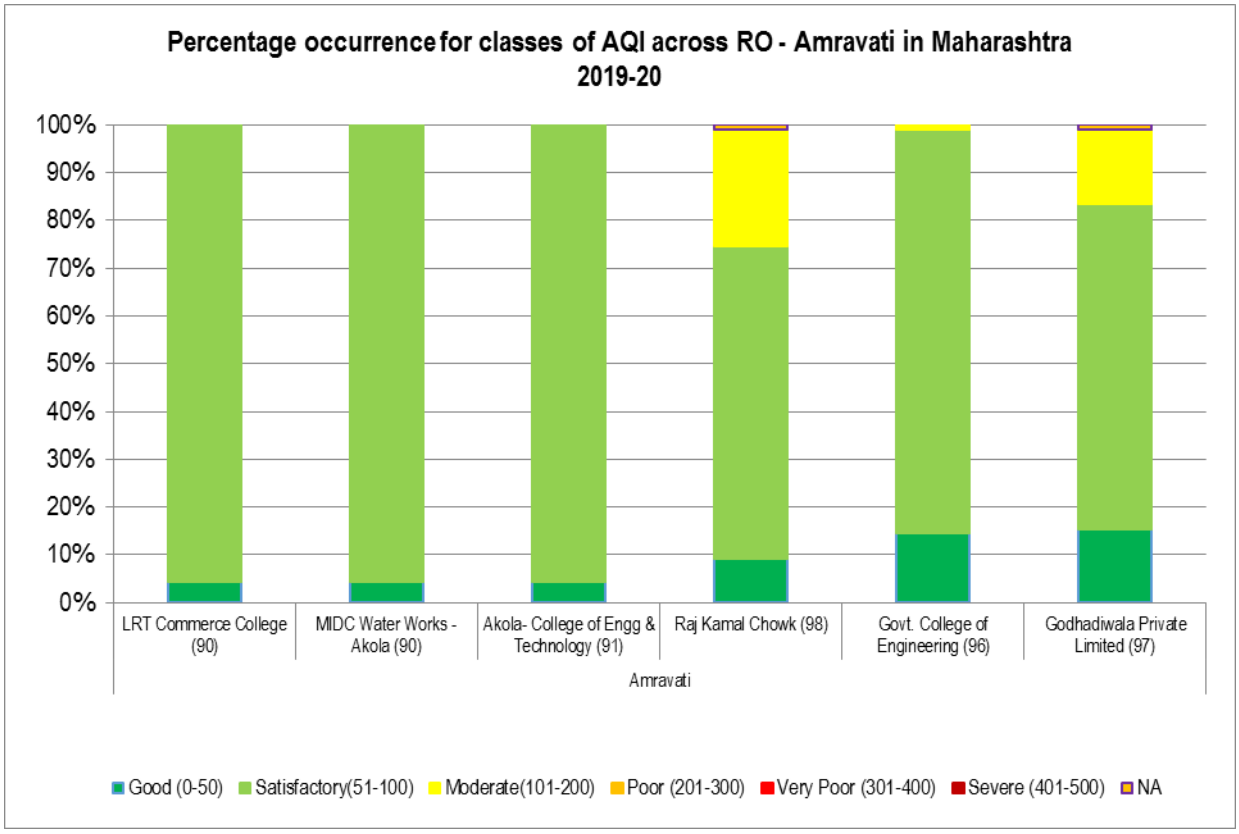


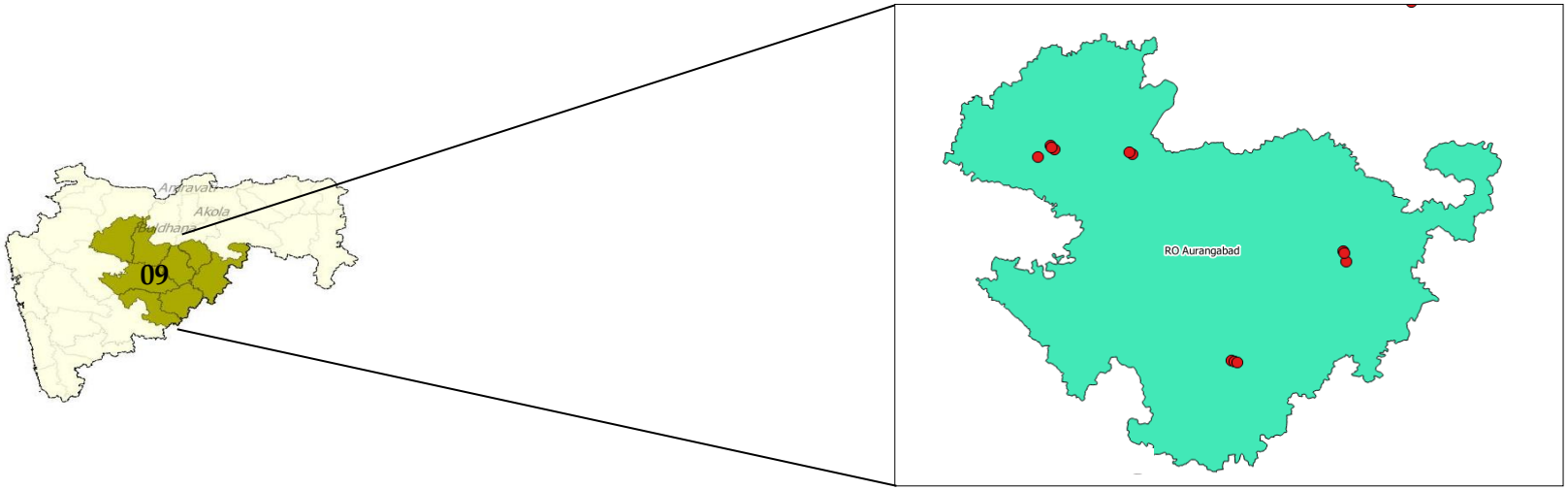

**Figure No. 46: Annual average trend of $SO_2$, NOx, and RSPM at Godhadiwala Private Limited - Amravati**

**Table No. 18: Percentage exceedance of pollutants at Amravati RO**

| Station Name | Total Observation | No. of times exceedance occurred | | | % Exceedance | | |
|---|---|---|---|---|---|---|---|
| | | $SO_2$ | NOx | RSPM | $SO_2$ | NOx | RSPM |
| LRT Commerce College | 90 | | | | | | |
| MIDC Water Works - Akola | 90 | | | | | | |
| Akola- College of Engg & Technology | 91 | | | | | | |
| Raj Kamal Chowk | 98 | | | 24 | | | 24 |
| Govt. College of Engineering | 96 | | | 1 | | | 1 |
| Godhadiwala Private Limited | 97 | | | 15 | | | 15 |



# RO – Aurangabad




| MPCB RO | Region | Station code | Station name | Type | Latitude (deg) | Longitude (deg) |
|---|---|---|---|---|---|---|
| Aurangabad | Aurangabad | 511 | SBES College | Residential | 19° 52' 54.9" N | 75° 19' 33.7" E |
| | Aurangabad | 512 | Collector Office, Aurangabad | Residential | 19° 53' 58.4" N | 75° 19' 14.2" E |
| | Aurangabad | 513 | C.A.D.A. Office | Residential | 19° 52' 14.3" N | 75° 21' 03.5" E |
| | Aurangabad | | Aurangabad CAAQMS | Industrial | 19° 48' 59.11"N | 75° 14' 18.65"E |
| | Jalna | 706 | Jalna- Bachat Bhavan | Residential | 19° 50' 26.4" N | 75° 52' 17.4" E |
| | Jalna | 707 | Jalna- Krishnadhan seeds Ltd | Industrial | 19° 51' 04.3" N | 75° 51' 14.4" E |
| | Latur | 641 | MIDC Water Works - Latur | Industrial | 18° 24' 53.0" N | 76° 32' 49.4" E |
| | Latur | 642 | Shyam Nagar-Kshewraj Vidyalaya | Residential | 18° 24' 21.6" N | 76° 33' 50.2" E |
| | Latur | 643 | Ganj Golai - Sidhheshwar Bank | Rural and other areas | 18° 23' 58.0" N | 76° 35' 02.6" E |

# Aurangabad - SBES College

**Table No. 19: Data for Monthly average reading recorded at SBES College - Aurangabad**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **SBES College** | 2019 | Apr | 13 | 33 | 66 |
| | | May | 14 | 33 | 88 |
| | | Jun | 14 | 33 | 75 |
| | | Jul | 11 | 31 | 67 |
| | | Aug | 10 | 29 | 67 |
| | | Sep | 12 | 30 | 69 |
| | | Oct | 7 | 27 | 67 |
| | | Nov | 15 | 40 | 76 |
| | | Dec | 23 | 65 | 77 |
| | 2020 | Jan | 24 | 64 | 76 |
| | | Feb | 23 | 59 | 82 |
| | | Mar | 22 | 61 | 83 |

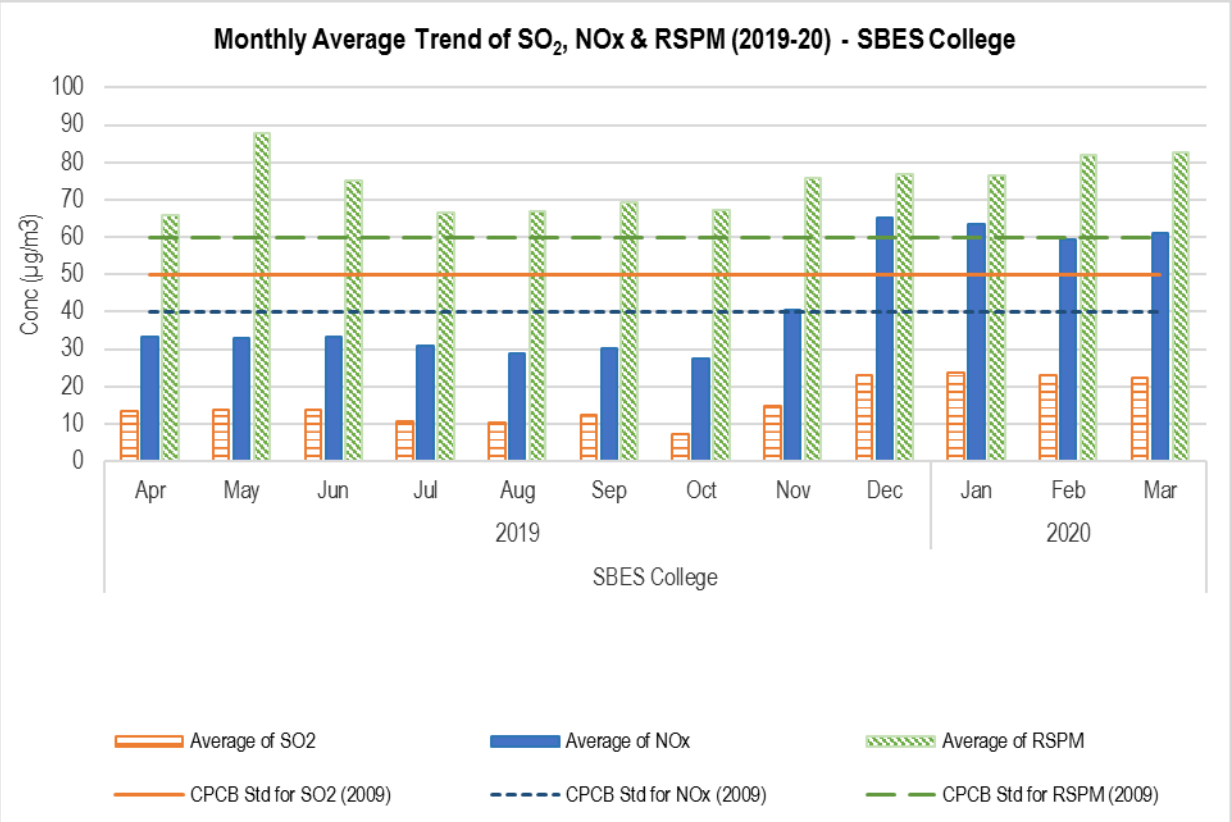



**Figure No. 47: Monthly average reading recorded at SBES College - Aurangabad**

**Table No. 20: Data for Annual average trend of $SO_2$, NOx, and RSPM at SBES College - Aurangabad**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| SBES College | 05-06 | 7 | 30 | 166 |
| | 06-07 | 6 | 18 | 85 |
| | 07-08 | 6 | 22 | 79 |
| | 08-09 | 9 | 22 | 94 |
| | 09-10 | 7 | 25 | 98 |
| | 10-11 | 7 | 23 | 94 |
| | 11-12 | 9 | 33 | 90 |
| | 12-13 | 10 | 33 | 93 |
| | 13-14 | 11 | 39 | 102 |
| | 14-15 | 13 | 43 | 97 |
| | 15-16 | 16 | 44 | 111 |
| | 16-17 | 14 | 41 | 108 |
| | 17-18 | 11 | 33 | 78 |
| | 18-19 | 15 | 38 | 70 |
| | 19-20 | 16 | 43 | 74 |

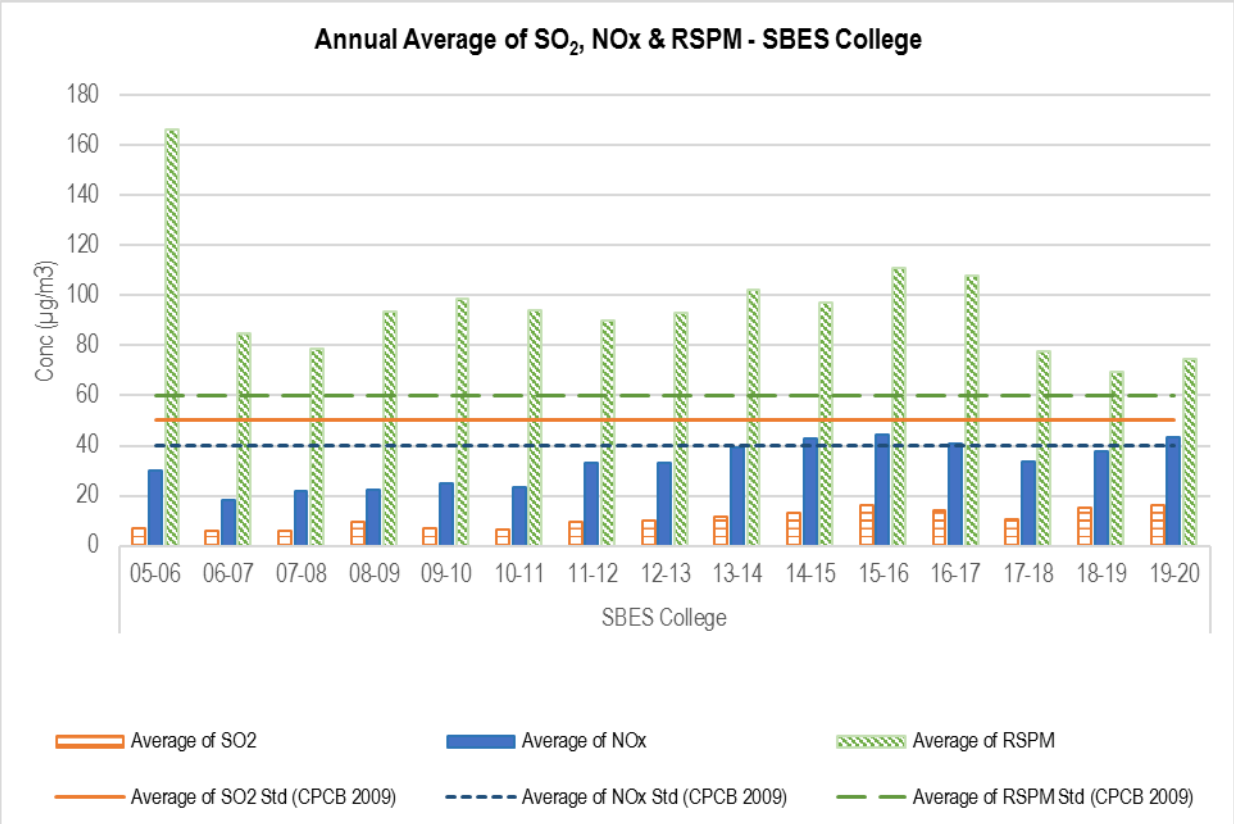



**Figure No. 48: Annual average trend of $SO_2$, NOx, and RSPM at SBES College – Aurangabad**

# Aurangabad - Collector Office

**Table No. 21: Data for Monthly average reading recorded at Collector Office, Aurangabad**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Collector Office, Aurangabad** | 2019 | Jun | 11 | 30 | 79 |
| | | Jul | 9 | 29 | 66 |
| | | Aug | 11 | 29 | 66 |
| | | Sep | 9 | 24 | 64 |
| | | Oct | 12 | 33 | 74 |
| | | Dec | 19 | 57 | 79 |
| | 2020 | Jan | 20 | 57 | 78 |
| | | Feb | 18 | 53 | 82 |
| | | Mar | 17 | 44 | 75 |

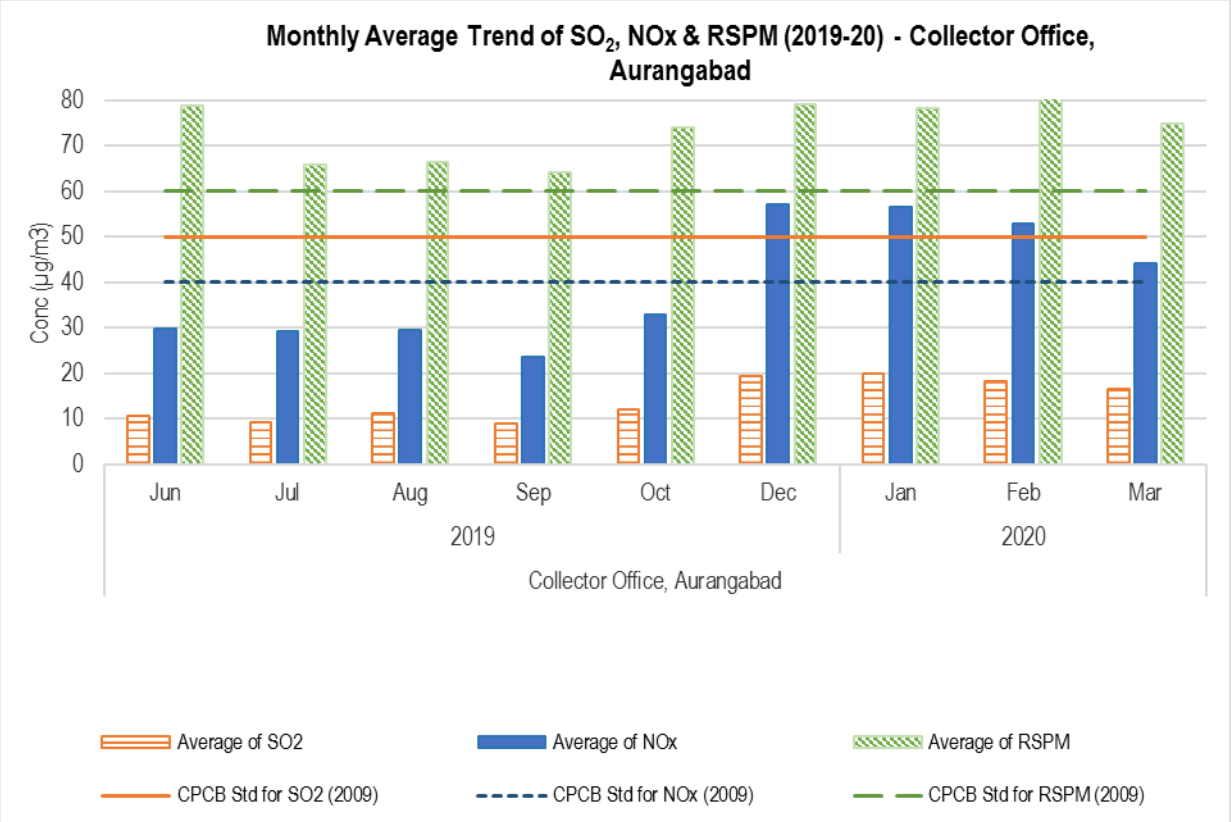



**Figure No. 49: Monthly average reading recorded at Collector Office, Aurangabad**

**Table No. 22: Data for Annual average trend of $SO_2$, NOx, and RSPM at Collector Office, Aurangabad**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Collector Office, Aurangabad | 05-06 | 6 | 19 | 108 |
| | 06-07 | 4 | 13 | 73 |
| | 07-08 | 5 | 16 | 56 |
| | 08-09 | 8 | 20 | 68 |
| | 09-10 | 6 | 22 | 85 |
| | 10-11 | 6 | 22 | 69 |
| | 11-12 | 8 | 29 | 92 |
| | 12-13 | 9 | 31 | 76 |
| | 13-14 | 9 | 36 | 79 |
| | 14-15 | 10 | 34 | 78 |
| | 15-16 | 12 | 35 | 73 |
| | 16-17 | 11 | 33 | 88 |
| | 17-18 | 9 | 30 | 74 |
| | 18-19 | 11 | 30 | 63 |
| | 19-20 | 14 | 40 | 74 |

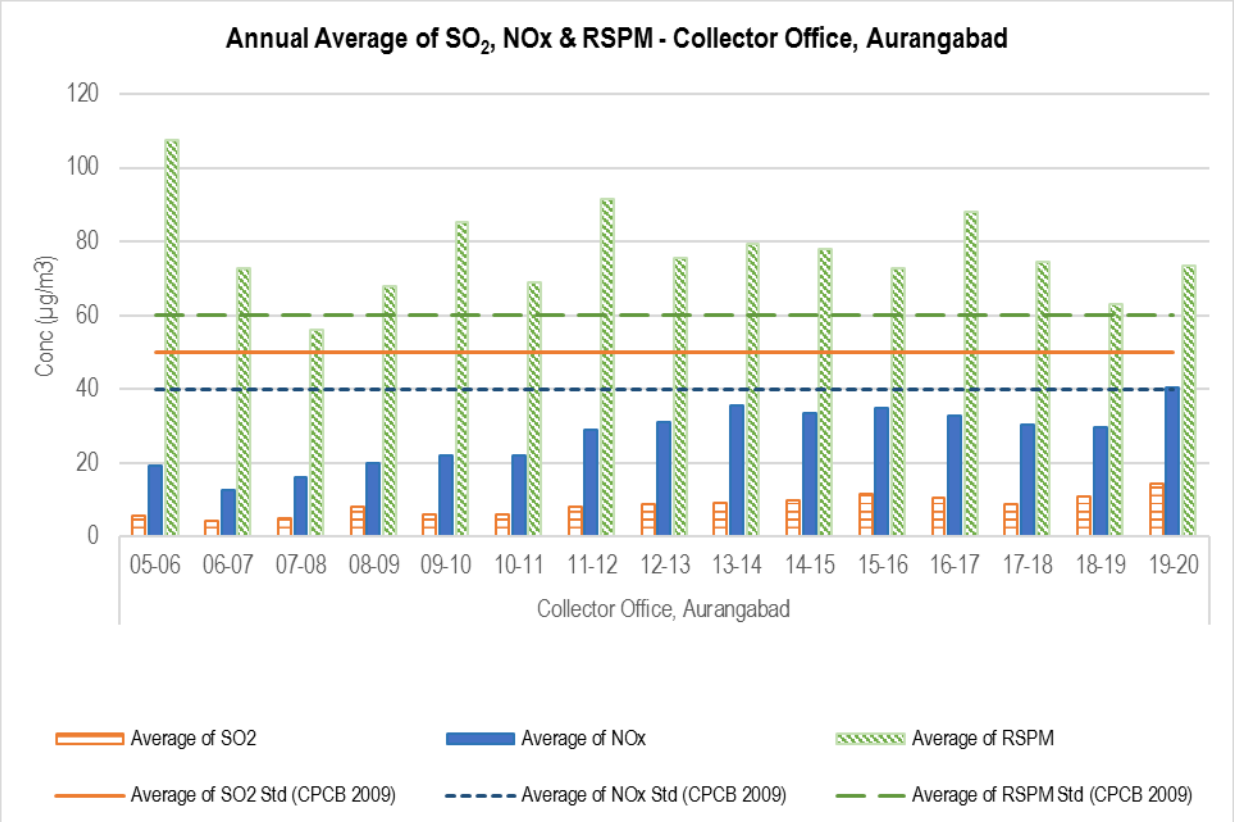



**Figure No. 50: Annual average trend of $SO_2$, NOx, and RSPM at Collector Office, Aurangabad**

# Aurangabad - C.A.D.A. Office

**Table No. 23: Data for Monthly average reading recorded at C.A.D.A. Office - Aurangabad**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **C.A.D.A. Office** | 2019 | Apr | 11 | 31 | 89 |
| | | May | 12 | 31 | 87 |
| | | Jun | 13 | 32 | 83 |
| | | Jul | 10 | 30 | 70 |
| | | Aug | 10 | 29 | 69 |
| | | Sep | 10 | 28 | 63 |
| | | Oct | 10 | 29 | 65 |
| | | Nov | 15 | 41 | 77 |
| | | Dec | 22 | 63 | 75 |
| | 2020 | Jan | 21 | 61 | 79 |
| | | Feb | 21 | 57 | 83 |
| | | Mar | 20 | 55 | 86 |

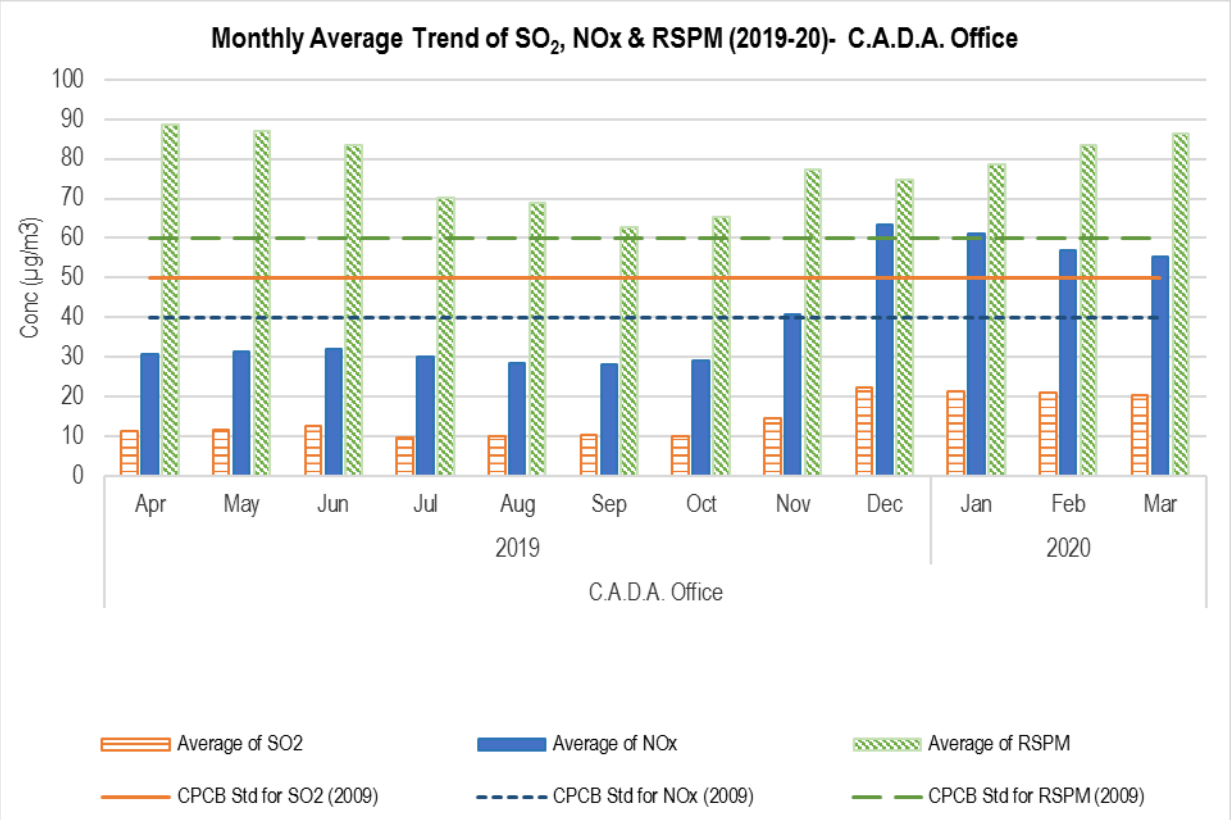



**Figure No. 51: Monthly average reading recorded at C.A.D.A. Office - Aurangabad**

**Table No. 24: Data for Annual average trend of $SO_2$, NOx, and RSPM at C.A.D.A. Office - Aurangabad**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| C.A.D.A. Office | 05-06 | 7 | 23 | 119 |
| | 06-07 | 5 | 19 | 79 |
| | 07-08 | 5 | 23 | 79 |
| | 08-09 | 9 | 21 | 63 |
| | 09-10 | 6 | 22 | 66 |
| | 10-11 | 6 | 22 | 69 |
| | 11-12 | 10 | 34 | 75 |
| | 12-13 | 11 | 35 | 68 |
| | 13-14 | 10 | 38 | 74 |
| | 14-15 | 12 | 40 | 79 |
| | 15-16 | 15 | 43 | 75 |
| | 16-17 | 13 | 39 | 82 |
| | 17-18 | 9 | 31 | 76 |
| | 18-19 | 14 | 36 | 69 |
| | 19-20 | 15 | 41 | 77 |

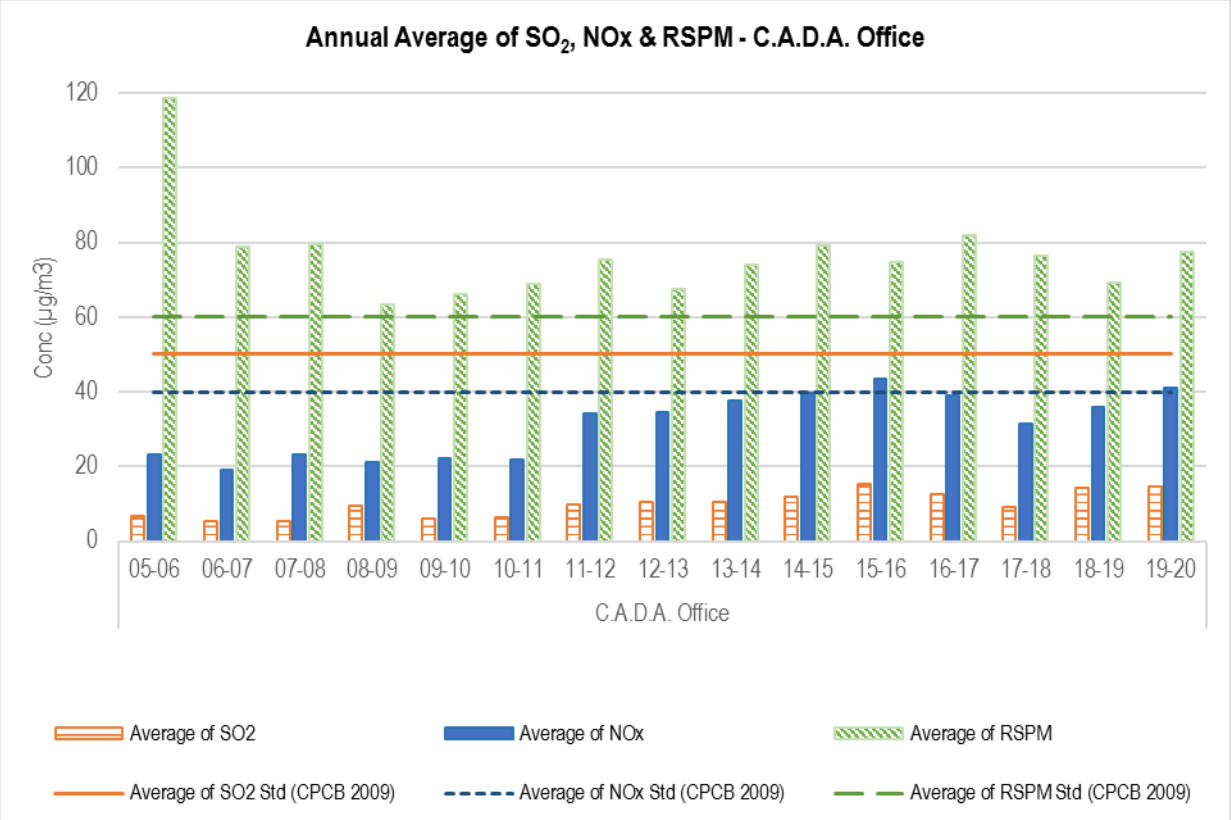
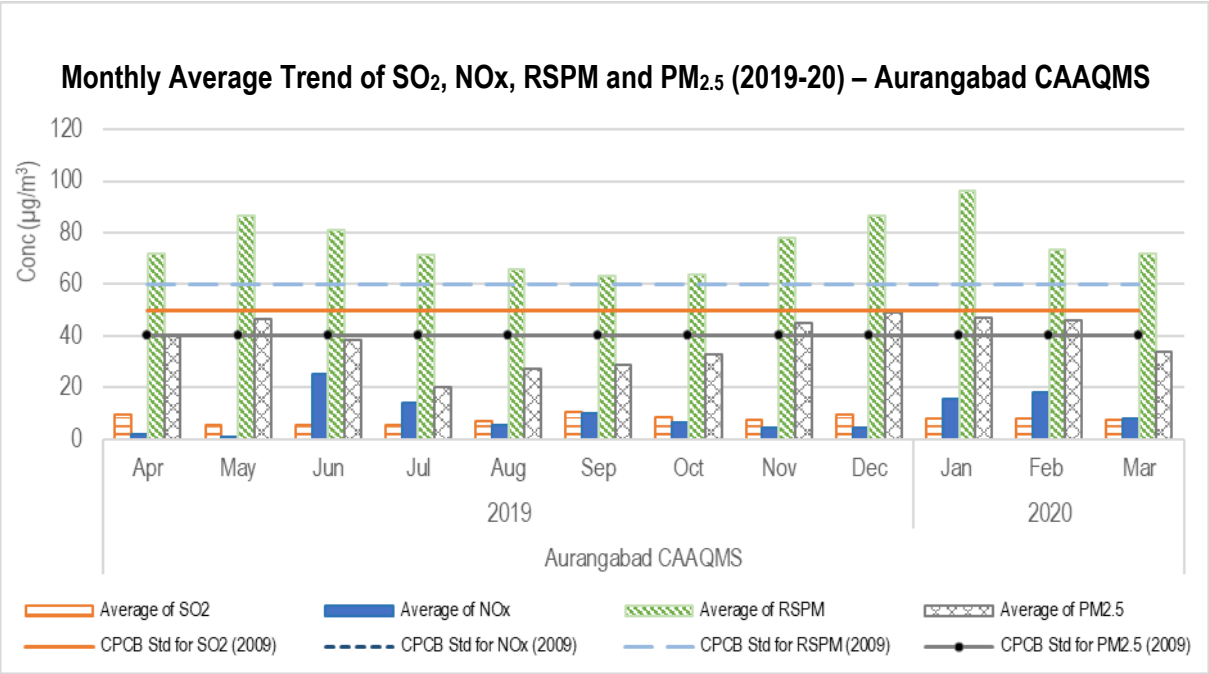



**Figure No. 52: Annual average trend of $SO_2$, NOx, and RSPM at C.A.D.A. Office – Aurangabad**

# Aurangabad - Aurangabad CAAQMS

**Table No. 25: Data for Monthly average reading recorded at Aurangabad CAAQMS**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** | ***40*** |
| **Aurangabad CAAQMS** | 2019 | Apr | 10 | 2 | 72 | 40 |
| | | May | 6 | 1 | 87 | 47 |
| | | Jun | 5 | 25 | 81 | 38 |
| | | Jul | 5 | 14 | 72 | 20 |
| | | Aug | 7 | 6 | 66 | 27 |
| | | Sep | 11 | 10 | 63 | 29 |
| | | Oct | 8 | 7 | 64 | 33 |
| | | Nov | 8 | 4 | 78 | 45 |
| | | Dec | 9 | 4 | 87 | 49 |
| | 2020 | Jan | 8 | 16 | 96 | 47 |
| | | Feb | 8 | 18 | 73 | 46 |
| | | Mar | 7 | 8 | 72 | 34 |




*CPCB standards for NOx and $PM_{2.5}$ are same, so the lines indicating them overlap and are not distinctly visible*

**Figure No. 53: Monthly average reading recorded at Aurangabad CAAQMS**

**Table No. 26: Data for Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Aurangabad CAAQMS**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|
| | | *50* | *40* | *60* | *40* |
| Aurangabad CAAQMS | 16-17 | 5 | 33 | 86 | |
| | 17-18 | 5 | 36 | 71 | |
| | 18-19 | 6 | 19 | 74 | |
| | 19-20 | 8 | 8 | 76 | 39 |

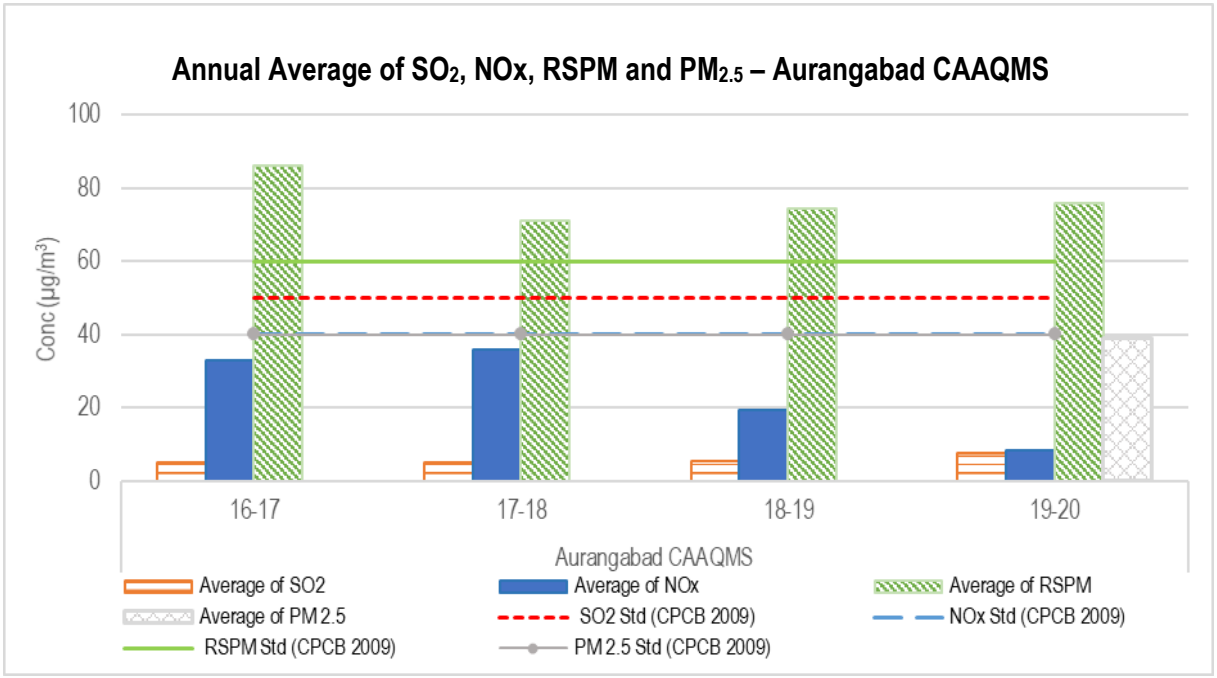



**Figure No. 54: Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Aurangabad CAAQMS**

## Jalna - Bachat Bhavan

**Table No. 27: Data for Monthly average reading recorded at Jalna - Bachat Bhavan**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Jalna- Bachat Bhavan** | 2019 | Apr | 10 | 38 | 95 |
| | | May | 10 | 38 | 98 |
| | | Jun | 10 | 37 | 96 |
| | | Jul | 10 | 38 | 100 |
| | | Aug | 10 | 40 | 94 |
| | | Sep | 10 | 38 | 92 |
| | | Oct | 10 | 38 | 94 |
| | | Nov | 10 | 39 | 100 |
| | | Dec | 10 | 42 | 99 |
| | 2020 | Jan | 10 | 41 | 99 |
| | | Feb | 11 | 40 | 97 |
| | | Mar | 10 | 39 | 89 |

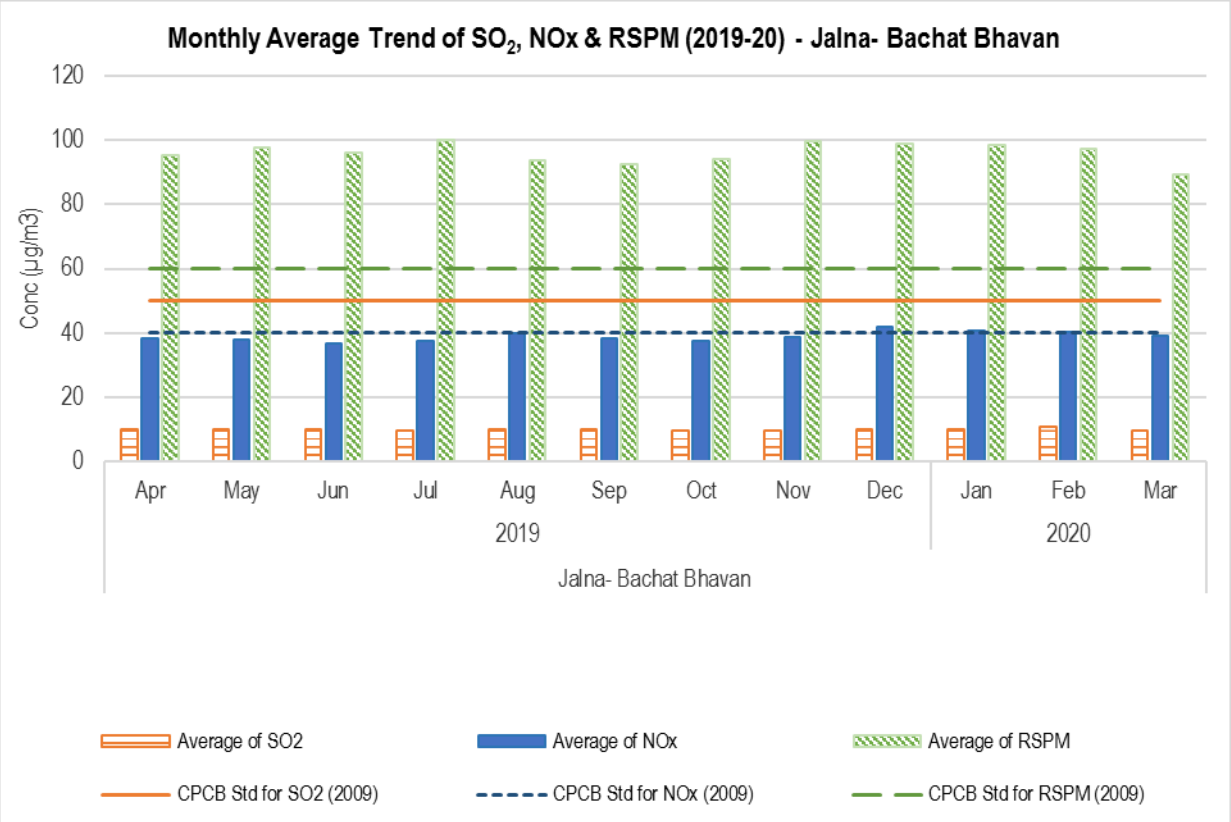



**Figure No. 55: Monthly average reading recorded at Jalna-Bachat Bhavan**

**Table No. 28: Data for Annual average trend of $SO_2$, NOx, and RSPM at Jalna-Bachat Bhavan**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Jalna- Bachat Bhavan | 06-07 | 13 | 22 | 53 |
| | 07-08 | 17 | 28 | 87 |
| | 08-09 | 17 | 32 | 66 |
| | 09-10 | 5 | 28 | 84 |
| | 10-11 | 5 | 26 | 73 |
| | 11-12 | 6 | 25 | 89 |
| | 12-13 | 10 | 30 | 97 |
| | 13-14 | 10 | 30 | 100 |
| | 14-15 | 9 | 29 | 94 |
| | 15-16 | 11 | 29 | 111 |
| | 16-17 | 10 | 33 | 128 |
| | 17-18 | 9 | 40 | 110 |
| | 18-19 | 10 | 40 | 104 |
| | 19-20 | 10 | 39 | 96 |

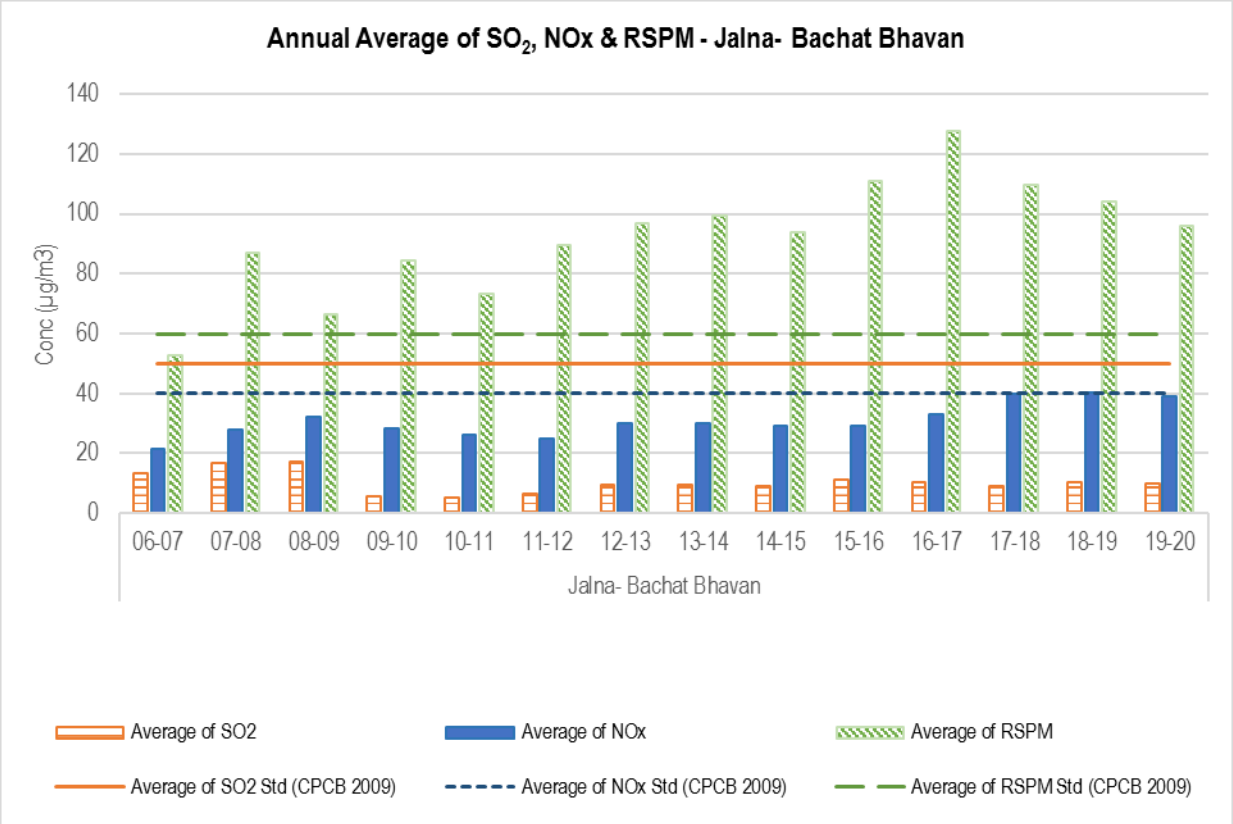



**Figure No. 56: Annual average trend of $SO_2$, NOx, and RSPM at Jalna-Bachat Bhavan**

## Jalna - Krishnadhan Seeds Ltd.

**Table No. 29: Data for Monthly average reading recorded at Jalna-Krishnadhan Seeds Ltd.**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Jalna- Krishnadhan seeds Ltd** | 2019 | Apr | 10 | 37 | 101 |
| | | May | 10 | 41 | 96 |
| | | Jun | 10 | 36 | 94 |
| | | Jul | 10 | 39 | 91 |
| | | Aug | 10 | 41 | 94 |
| | | Sep | 11 | 40 | 94 |
| | | Oct | 10 | 41 | 90 |
| | | Nov | 10 | 40 | 94 |
| | | Dec | 10 | 40 | 94 |
| | 2020 | Jan | 10 | 40 | 95 |
| | | Feb | 10 | 41 | 94 |
| | | Mar | 10 | 36 | 82 |

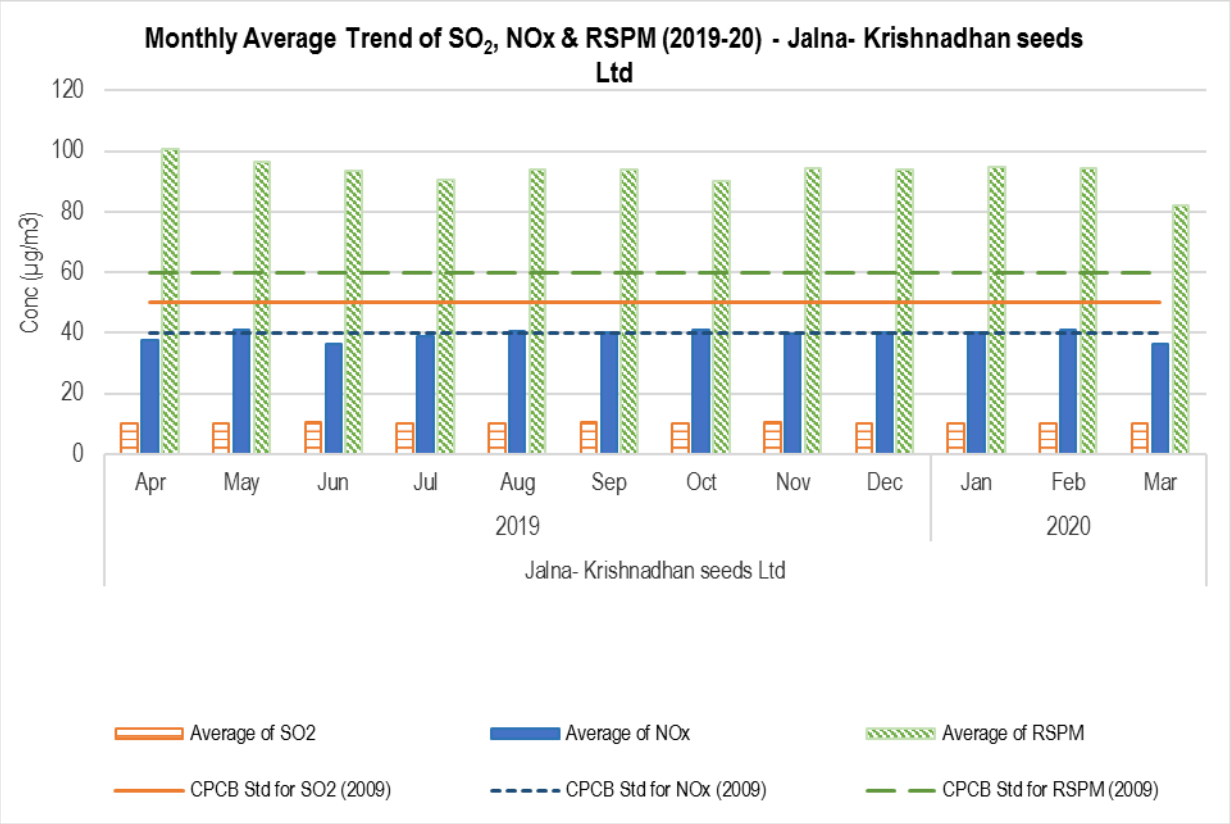



**Figure No. 57: Monthly average reading recorded at Jalna-Krishnadhan Seeds Ltd.**

**Table No. 30: Data for Annual average trend of $SO_2$, NOx, and RSPM at Jalna - Krishnadhan Seeds Ltd.**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Jalna- Krishnadhan seeds Ltd | 06-07 | 17 | 29 | 125 |
| | 07-08 | 28 | 44 | 140 |
| | 08-09 | 30 | 45 | 182 |
| | 09-10 | 13 | 37 | 111 |
| | 10-11 | 7 | 33 | 139 |
| | 11-12 | 8 | 26 | 140 |
| | 12-13 | 11 | 32 | 143 |
| | 13-14 | 11 | 31 | 150 |
| | 14-15 | 11 | 31 | 180 |
| | 15-16 | 12 | 30 | 103 |
| | 16-17 | 12 | 31 | 83 |
| | 17-18 | 9 | 39 | 87 |
| | 18-19 | 11 | 42 | 97 |
| | 19-20 | 10 | 39 | 93 |

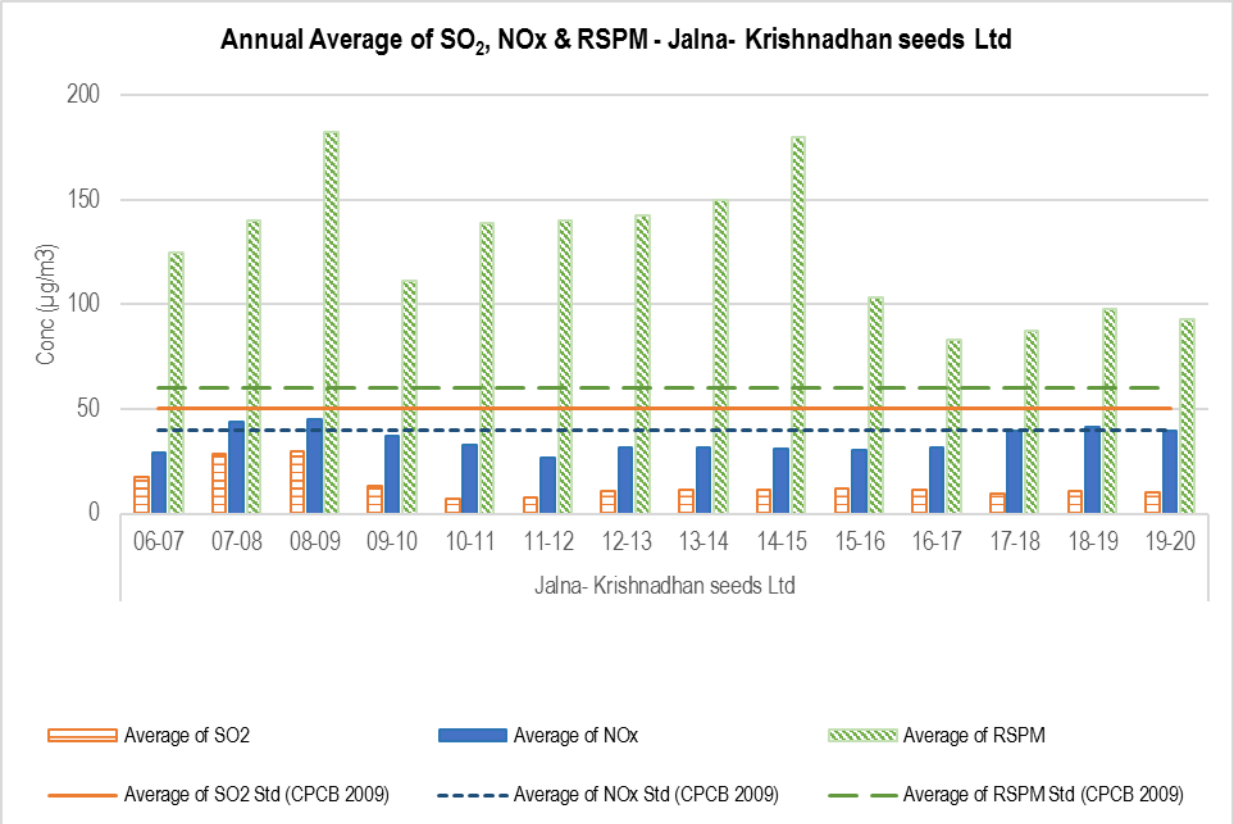



**Figure No. 58: Annual average trend of $SO_2$, NOx, and RSPM at Jalna-Krishnadhan Seeds Ltd.**

# Latur - MIDC Water Works

**Table No. 31: Data for Monthly average reading recorded at MIDC Water Works - Latur**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **MIDC Water Works - Latur** | 2019 | Apr | 6 | 21 | 124 |
| | | May | 5 | 20 | 126 |
| | | Jun | 5 | 20 | 73 |
| | | Jul | 5 | 21 | 70 |
| | | Aug | 5 | 19 | 63 |
| | | Sep | 5 | 20 | 70 |
| | | Oct | 5 | 20 | 72 |
| | | Nov | 5 | 20 | 93 |
| | | Dec | 6 | 20 | 91 |
| | 2020 | Jan | | | 82 |
| | | Feb | | | 89 |
| | | Mar | | | 64 |

**Data was not available for $SO_2$ and NOx for January 2020- March 2020*

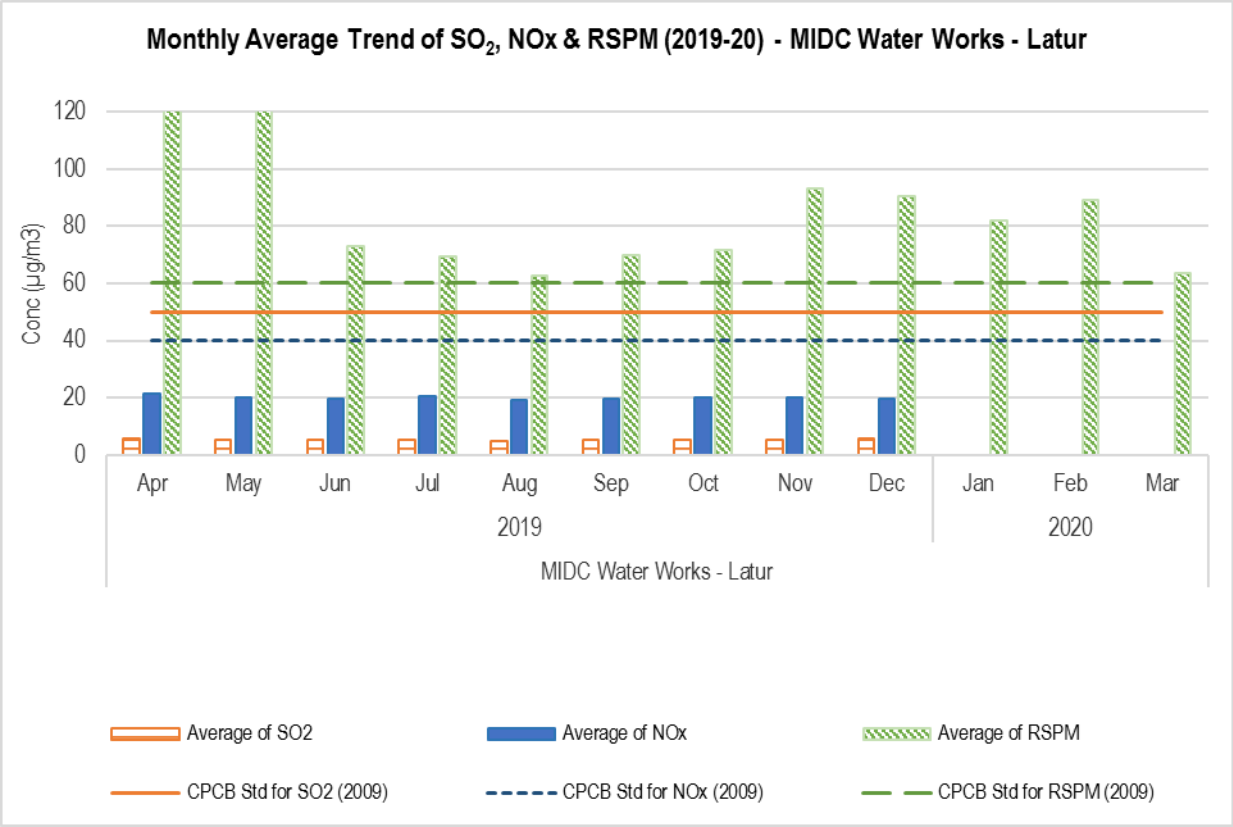



**Figure No. 59: Monthly average reading recorded at MIDC Water Works – Latur**

**Table No. 32: Data for Annual average trend of $SO_2$, NOx, and RSPM at MIDC Water Works - Latur**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| MIDC Water Works - Latur | 08-09 | 4 | 22 | 77 |
| | 09-10 | 7 | 22 | 76 |
| | 10-11 | 6 | 15 | 95 |
| | 11-12 | 6 | 16 | 99 |
| | 12-13 | 8 | 19 | 82 |
| | 13-14 | 6 | 16 | 88 |
| | 14-15 | 5 | 14 | 81 |
| | 16-17 | 5 | 18 | 70 |
| | 17-18 | 6 | 21 | 84 |
| | 18-19 | 5 | 22 | 87 |
| | 19-20 | 5 | 20 | 85 |

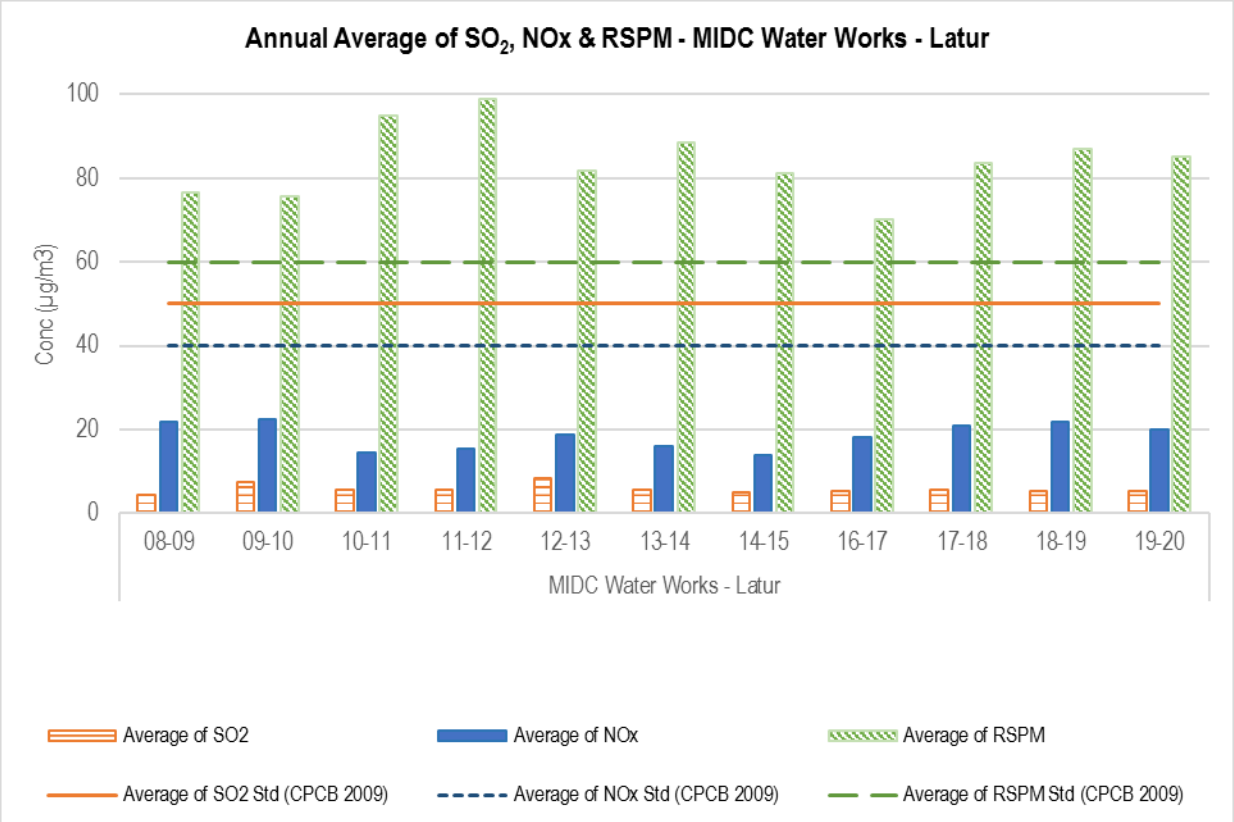



**Figure No. 60: Annual average trend of $SO_2$, NOx, and RSPM at MIDC Water Works - Latur**

## Latur - Shyam Nagar - Kshewraj Vidyalaya

**Table No. 33: Data for Monthly average reading recorded at Shyam Nagar-Kshewraj Vidyalaya**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Shyam Nagar-Kshewraj Vidyalaya** | 2019 | Apr | 6 | 21 | 121 |
| | | May | 6 | 20 | 109 |
| | | Jun | 5 | 20 | 90 |
| | | Jul | 5 | 20 | 72 |
| | | Aug | 5 | 19 | 66 |
| | | Sep | 5 | 20 | 72 |
| | | Oct | 5 | 20 | 77 |
| | | Nov | 5 | 20 | 85 |
| | | Dec | 5 | 20 | 88 |
| | 2020 | Jan | | | 83 |
| | | Feb | | | 88 |
| | | Mar | | | 64 |

**Data was not available for $SO_2$ and NOx for January 2020- March 2020*

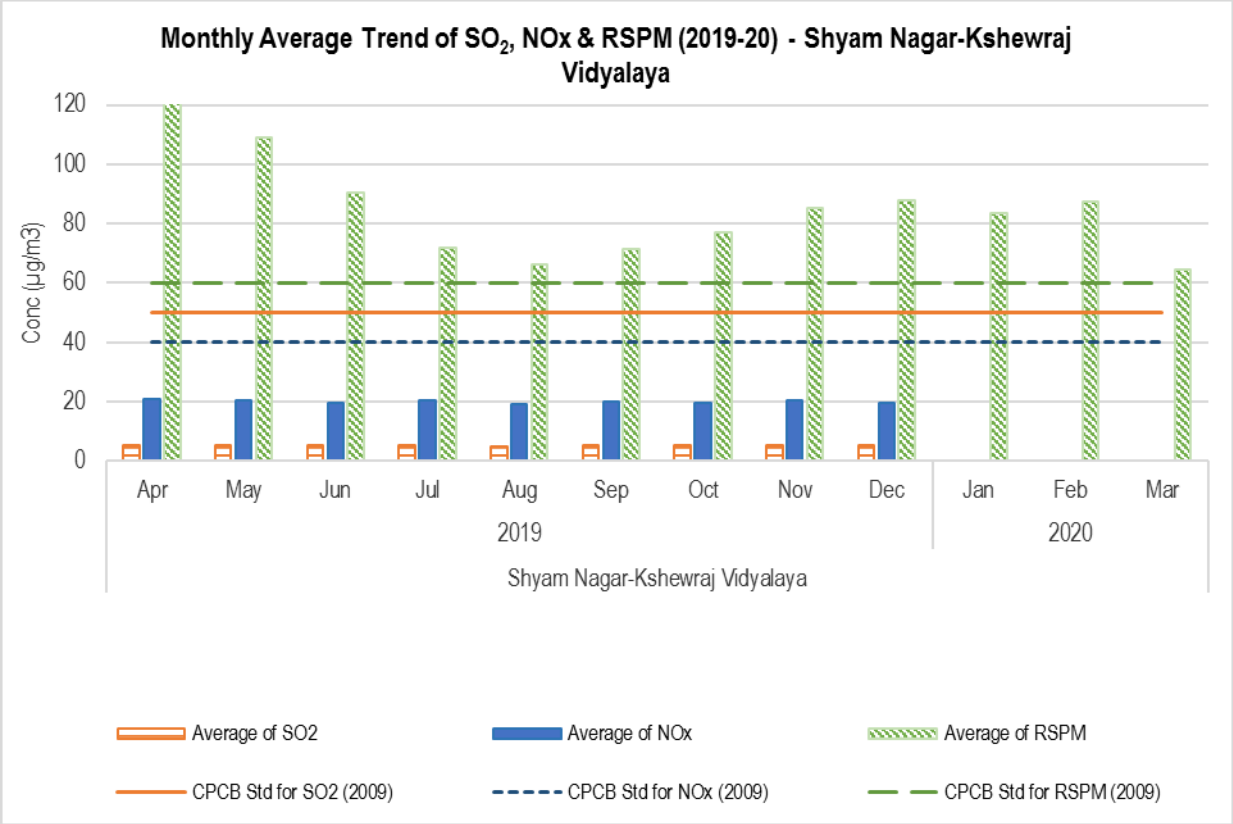



**Figure No. 61: Monthly average reading recorded at Shyam Nagar-Kshewraj Vidyalaya**

**Table No. 34: Data for Annual average trend of $SO_2$, NOx, and RSPM at Shyam Nagar-Kshewraj Vidyalaya**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Shyam Nagar-Kshewraj Vidyalaya | 08-09 | 3 | 16 | 99 |
| | 09-10 | 6 | 19 | 123 |
| | 10-11 | 6 | 13 | 139 |
| | 11-12 | 6 | 14 | 124 |
| | 12-13 | 7 | 19 | 105 |
| | 13-14 | 7 | 17 | 95 |
| | 14-15 | 5 | 14 | 89 |
| | 15-16 | 5 | 15 | 85 |
| | 16-17 | 5 | 18 | 72 |
| | 17-18 | 6 | 21 | 84 |
| | 18-19 | 5 | 21 | 89 |
| | 19-20 | 5 | 20 | 84 |

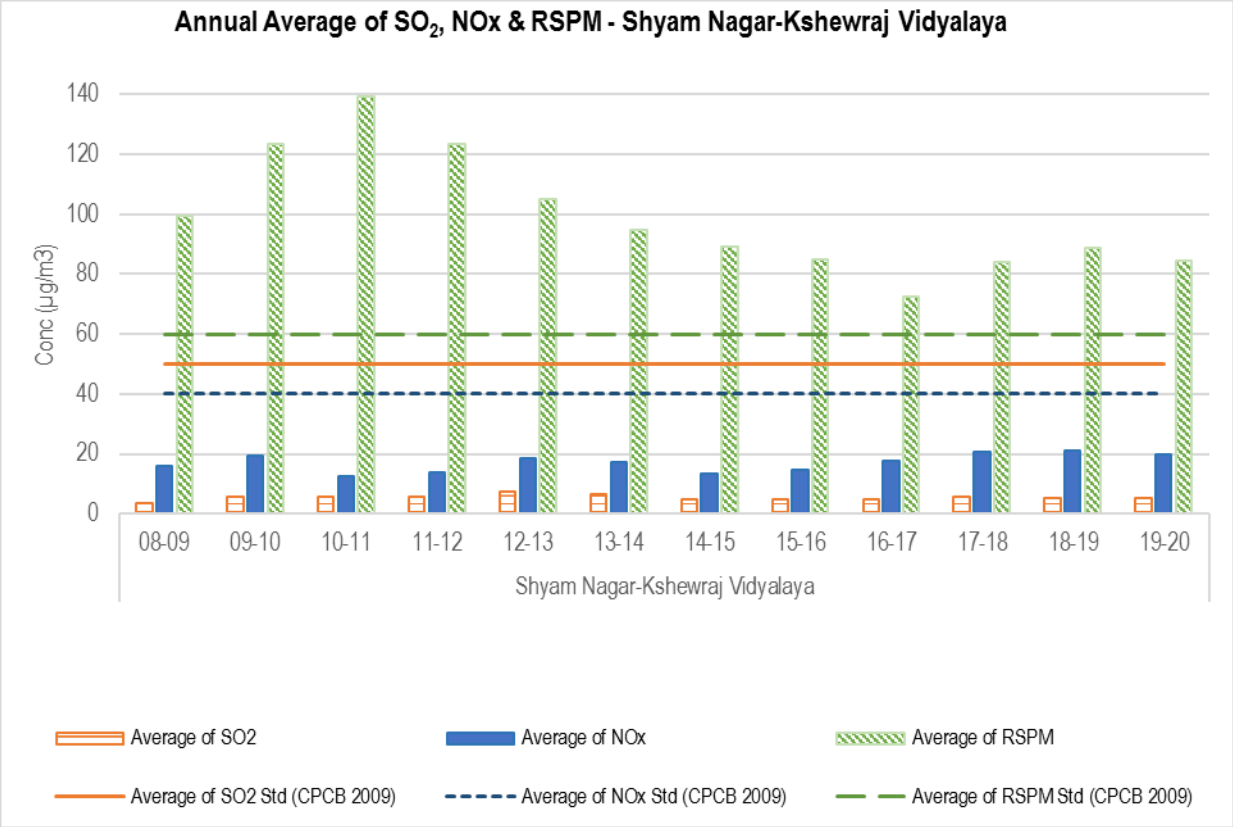



**Figure No. 62: Annual average trend of $SO_2$, NOx, and RSPM at Shyam Nagar-Kshewraj Vidyalaya**

# Latur - Ganj Golai - Sidhheshwar Bank

**Table No. 35: Data for Monthly average reading recorded at Ganj Golai- Sidhheshwar Bank**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Ganj Golai - Sidhheshwar Bank** | 2019 | Apr | 6 | 21 | 120 |
| | | May | 6 | 20 | 100 |
| | | Jun | 5 | 20 | 96 |
| | | Jul | 5 | 20 | 70 |
| | | Aug | 5 | 19 | 62 |
| | | Sep | 5 | 20 | 70 |
| | | Oct | 5 | 19 | 73 |
| | | Nov | 5 | 20 | 87 |
| | | Dec | 5 | 19 | 88 |
| | 2020 | Jan | | | 86 |
| | | Feb | | | 89 |
| | | Mar | | | 65 |

**Data was not available for $SO_2$ and NOx for January 2020 – March 2020*

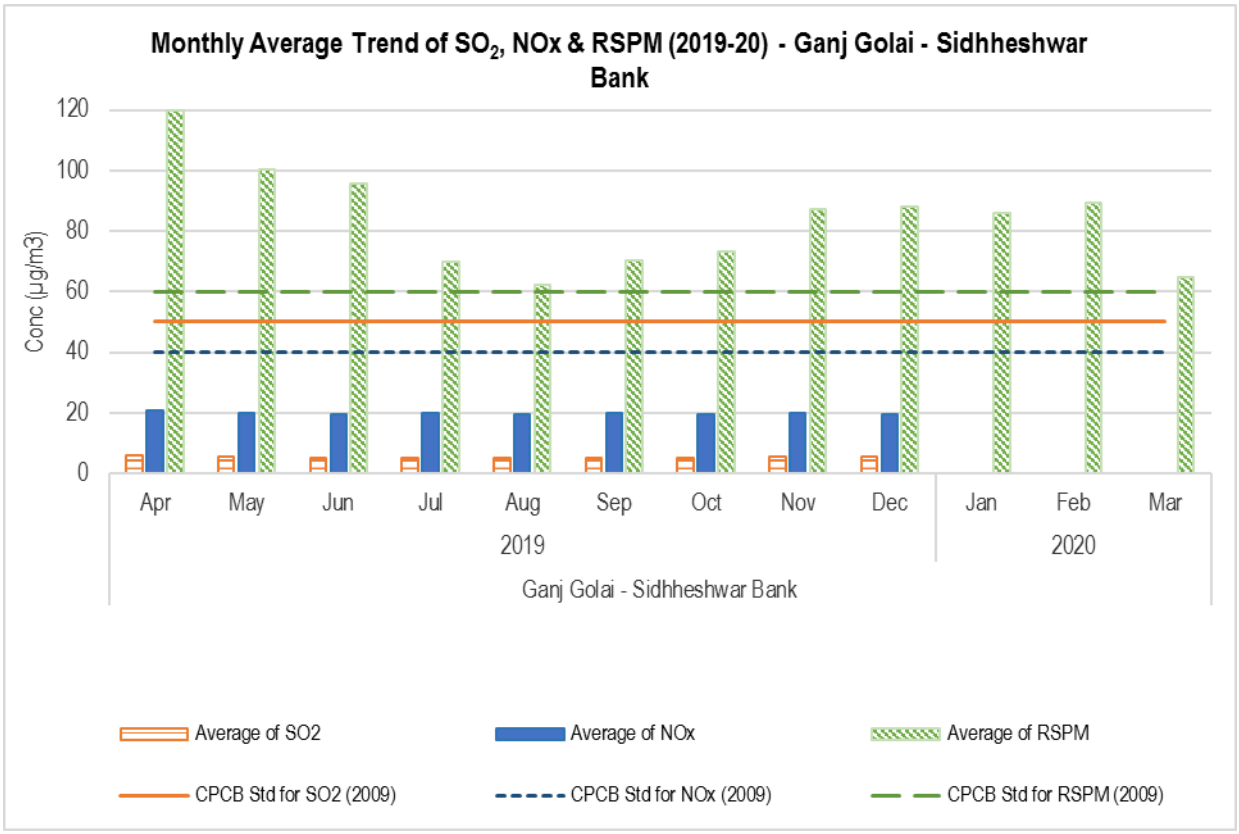



**Figure No. 63: Monthly average reading recorded at Ganj Golai- Sidhheshwar Bank**

**Table No. 36: Data for Annual average trend of $SO_2$, NOx, and RSPM at Ganj Golai- Sidhheshwar Bank**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Ganj Golai - Sidhheshwar Bank | 08-09 | 4 | 22 | 122 |
| | 09-10 | 6 | 26 | 144 |
| | 10-11 | 6 | 16 | 124 |
| | 11-12 | 6 | 17 | 140 |
| | 12-13 | 8 | 20 | 132 |
| | 13-14 | 7 | 18 | 107 |
| | 14-15 | 5 | 14 | 73 |
| | 15-16 | 5 | 17 | 80 |
| | 16-17 | 6 | 18 | 65 |
| | 17-18 | 6 | 21 | 78 |
| | 18-19 | 5 | 22 | 89 |
| | 19-20 | 5 | 20 | 83 |

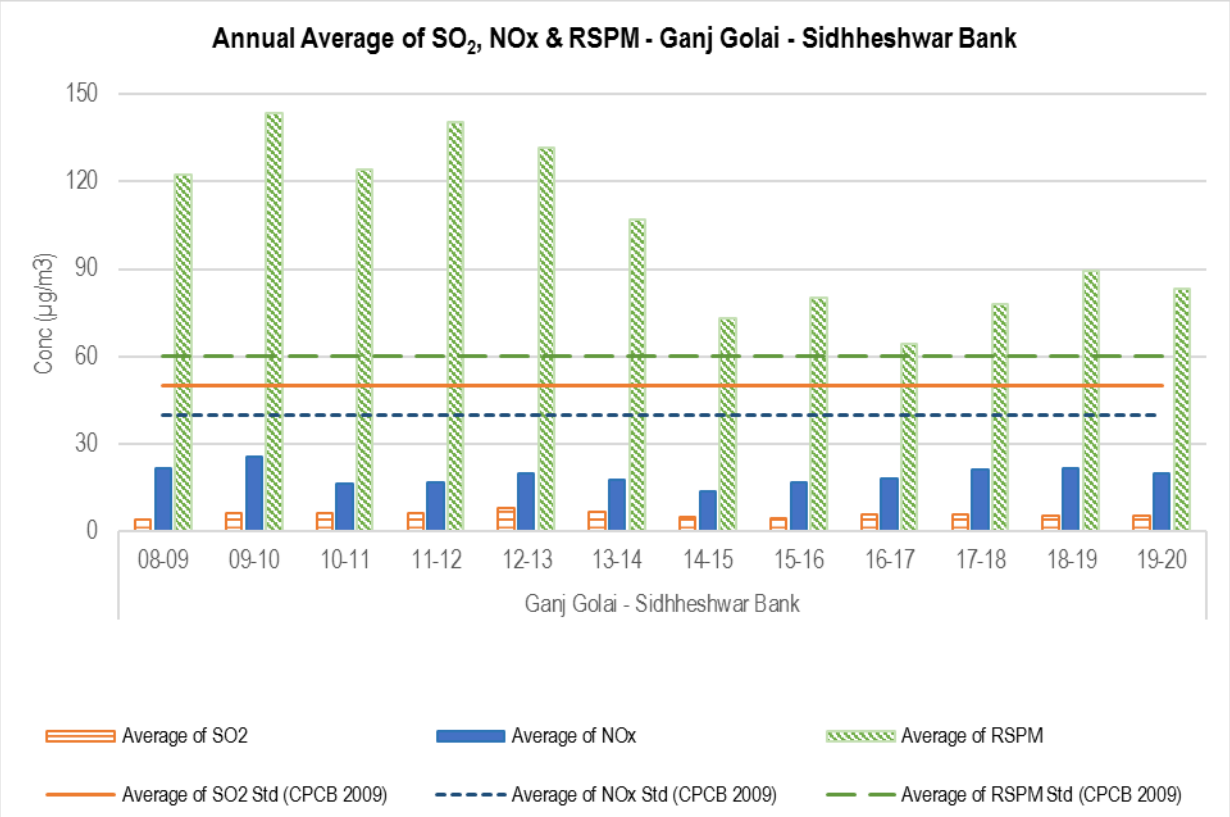
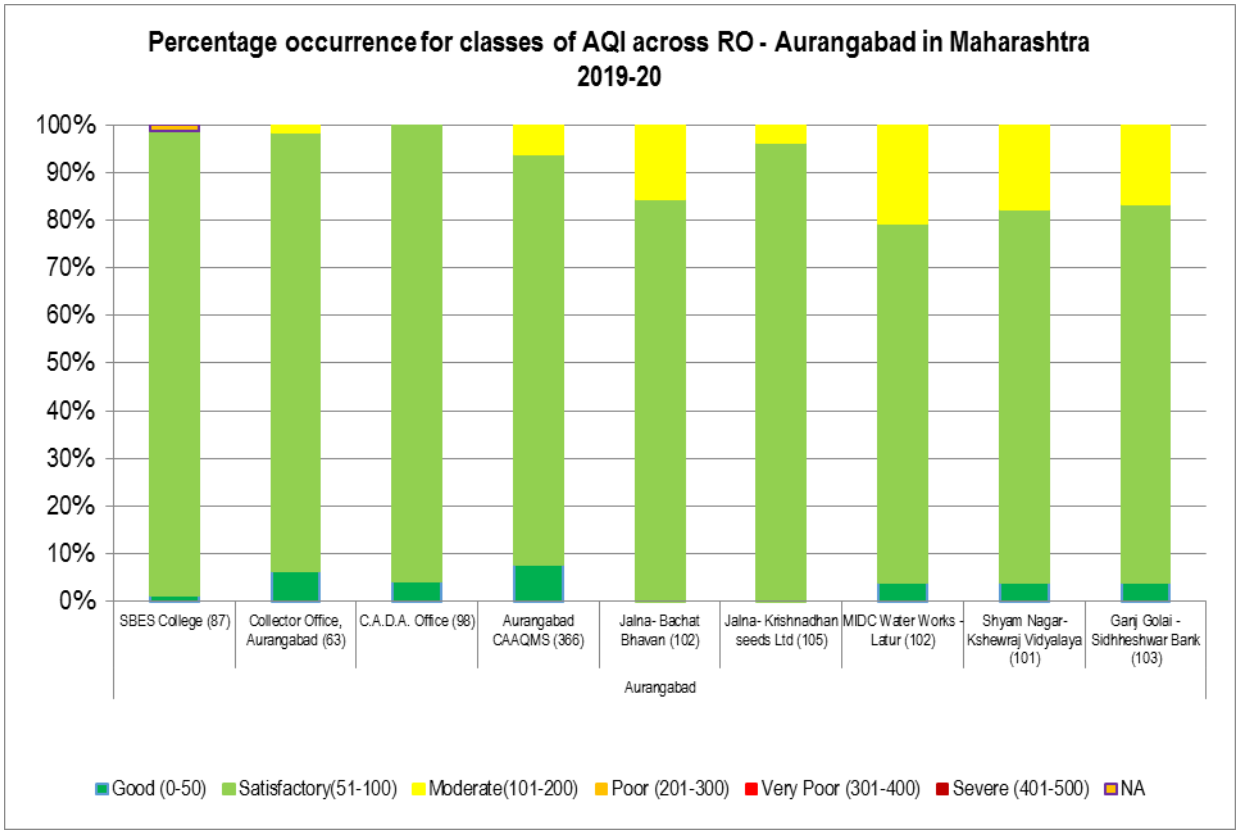


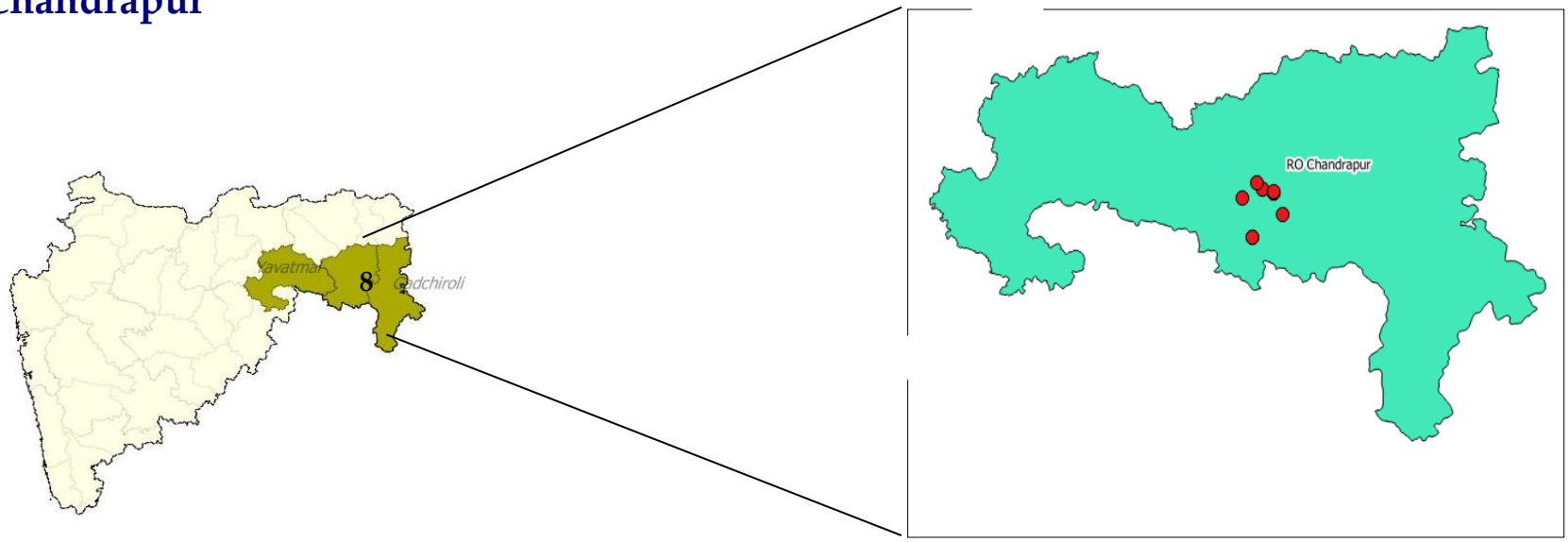

**Figure No. 64: Annual average trend of $SO_2$, NOx, and RSPM at Ganj Golai- Sidhheshwar Bank**

**Table No. 37: Percentage exceedance of pollutants at Aurangabad RO**

| Station Name | Total Observation | No. of times exceedance occurred | | | % Exceedance | | |
|---|---|---|---|---|---|---|---|
| | | $SO_2$ | NOx | RSPM | $SO_2$ | NOx | RSPM |
| SBES College | 87 | | | | | | |
| Collector Office, Aurangabad | 63 | | | 1 | | | 2 |
| C.A.D.A. Office | 98 | | | | | | |
| Aurangabad CAAQMS | 366 | | 2 | 21 | | 1 | 6 |
| Jalna- Bachat Bhavan | 102 | | | 16 | | | 16 |
| Jalna- Krishnadhan seeds Ltd | 105 | | | 4 | | | 4 |
| MIDC Water Works - Latur | 102 | | | 21 | | | 21 |
| Shyam Nagar-Kshewraj Vidyalaya | 101 | | | 18 | | | 18 |
| Ganj Golai - Sidhheshwar Bank | 103 | | | 17 | | | 17 |



# RO – Chandrapur




| MPCB RO | Region | Station code | Station name | Type | Latitude (deg) | Longitude (deg) |
|---|---|---|---|---|---|---|
| Chandrapur | Chandrapur | 267 | Ghuggus | Residential | 19° 56' 23.0" N | 79° 06' 50.9" E |
| | Chandrapur | 281 | Chandrapur - MIDC | Industrial | 19° 58' 58.3" N | 79° 13' 54.7" E |
| | Chandrapur | 396 | Chandrapur - SRO MPCB | Residential | 19° 57' 55.9" N | 79° 17' 59.1" E |
| | Chandrapur | 638 | Tadali MIDC | Industrial | 20° 00' 59.6" N | 79° 11' 51.5" E |
| | Chandrapur | 639 | Ballarshah | Residential | 19° 51' 11.8" N | 79° 20' 55.7" E |
| | Chandrapur | 640 | Rajura | Industrial | 19° 44' 11.7" N | 79° 10' 29.5" E |
| | Chandrapur | | Chandrapur CAAQMS | Industrial | 19° 57' 44.67"N | 79° 17' 57.81"E |
| | Chandrapur | | Udyog Bhavan CAAQMS | Commercial | 19° 57' 45.72"N | 79° 17' 54.96"E |

# Chandrapur - Ghuggus

**Table No. 38: Data for Monthly average reading recorded at Ghuggus - Chandrapur**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | *50* | *40* | *60* |
| **Ghuggus** | 2019 | Apr | 4 | 21 | 303 |
| | | May | 4 | 31 | 283 |
| | | Jun | 5 | 36 | 294 |
| | | Jul | 4 | 24 | 210 |
| | | Aug | 5 | 29 | 135 |
| | | Sep | 4 | 30 | 106 |
| | | Oct | 4 | 24 | 186 |
| | | Nov | 4 | 24 | 158 |
| | | Dec | 5 | 23 | 204 |
| | 2020 | Jan | 4 | 28 | 166 |
| | | Feb | 4 | 32 | 175 |
| | | Mar | 4 | 21 | 220 |

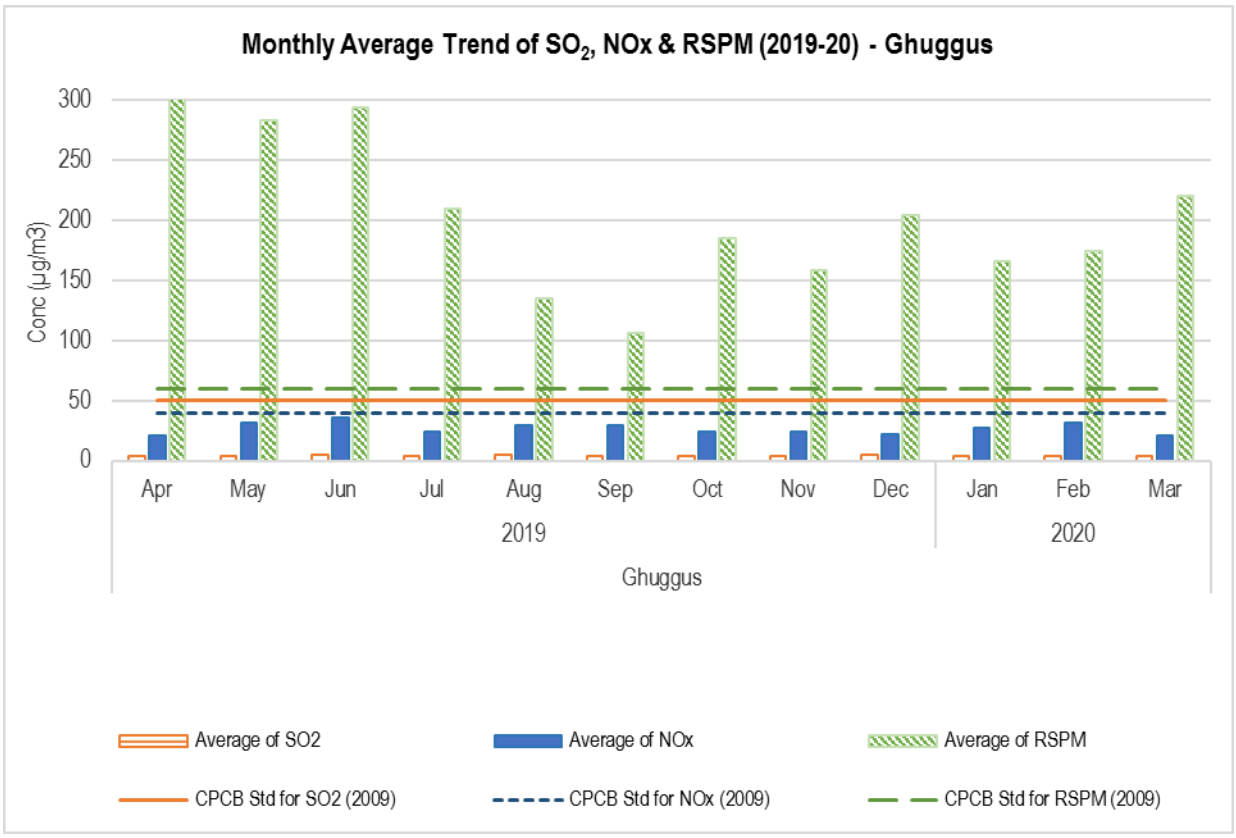



**Figure No. 65: Monthly average reading recorded at Ghuggus - Chandrapur**

**Table No. 39: Data for Annual average trend of $SO_2$, NOx, and RSPM at Ghuggus - Chandrapur**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Ghuggus | 04-05 | 18 | 28 | 80 |
| | 05-06 | 21 | 31 | 131 |
| | 06-07 | 31 | 39 | 139 |
| | 07-08 | 36 | 53 | 186 |
| | 08-09 | 34 | 54 | 172 |
| | 09-10 | 46 | 32 | 180 |
| | 10-11 | 23 | 24 | 211 |
| | 11-12 | 18 | 21 | 206 |
| | 12-13 | 11 | 13 | 207 |
| | 13-14 | 9 | 19 | 174 |
| | 14-15 | 9 | 14 | 140 |
| | 15-16 | 4 | 17 | 180 |
| | 16-17 | 4 | 25 | 242 |
| | 17-18 | 4 | 26 | 298 |
| | 18-19 | 4 | 29 | 175 |
| | 19-20 | 4 | 27 | 204 |

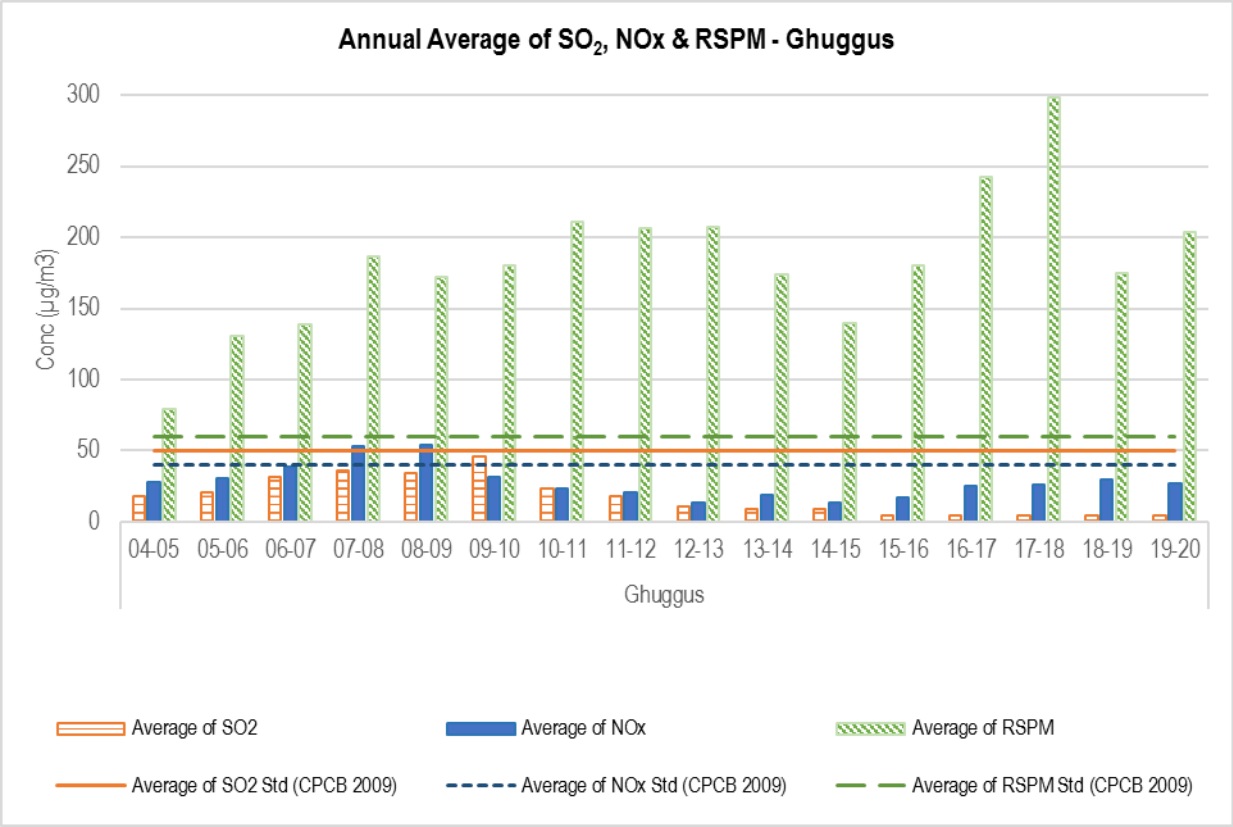



**Figure No. 66: Annual average trend of $SO_2$, NOx, and RSPM at Ghuggus - Chandrapur**

# Chandrapur - Chandrapur - MIDC

**Table No. 40: Data for Monthly average reading recorded at Chandrapur - MIDC**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Chandrapur - MIDC** | 2019 | Apr | 4 | 24 | 105 |
| | | May | 4 | 30 | 105 |
| | | Jun | 4 | 36 | 110 |
| | | Jul | 4 | 25 | 82 |
| | | Aug | 5 | 28 | 65 |
| | | Sep | 4 | 29 | 71 |
| | | Oct | 4 | 23 | 82 |
| | | Nov | 4 | 28 | 71 |
| | | Dec | 4 | 23 | 97 |
| | 2020 | Jan | 5 | 25 | 98 |
| | | Feb | 4 | 28 | 88 |
| | | Mar | 4 | 24 | 97 |

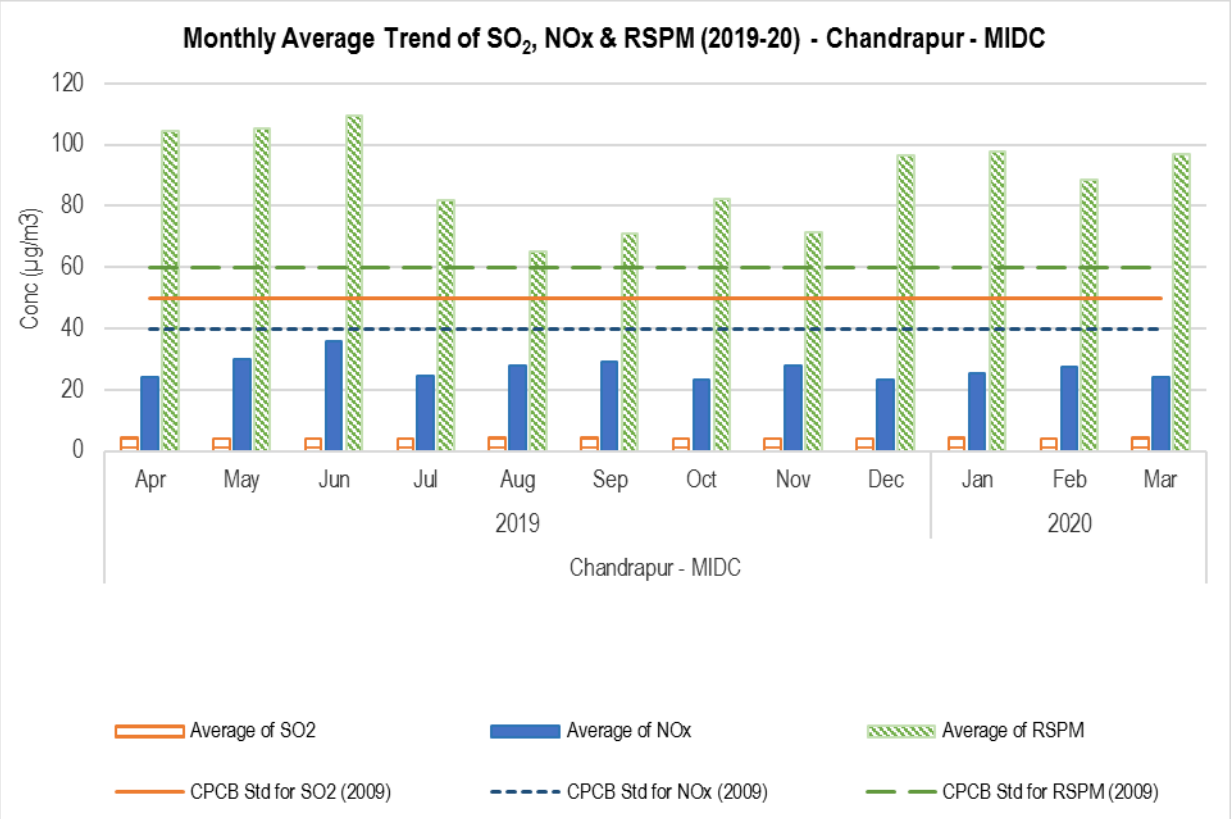



**Figure No. 67: Monthly average reading recorded at Chandrapur – MIDC**

**Table No. 41: Data for Annual average trend of $SO_2$, NOx, and RSPM at Chandrapur - MIDC**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Chandrapur - MIDC | 04-05 | 25 | 37 | 110 |
| | 05-06 | 26 | 37 | 130 |
| | 06-07 | 38 | 41 | 123 |
| | 07-08 | 37 | 50 | 125 |
| | 08-09 | 34 | 53 | 148 |
| | 09-10 | 63 | 31 | 141 |
| | 10-11 | 25 | 25 | 150 |
| | 11-12 | 21 | 35 | 131 |
| | 12-13 | 14 | 17 | 105 |
| | 13-14 | 18 | 27 | 60 |
| | 14-15 | 14 | 30 | 70 |
| | 15-16 | 7 | 26 | 75 |
| | 16-17 | 4 | 34 | 77 |
| | 17-18 | 4 | 28 | 74 |
| | 18-19 | 4 | 31 | 90 |
| | 19-20 | 4 | 27 | 89 |

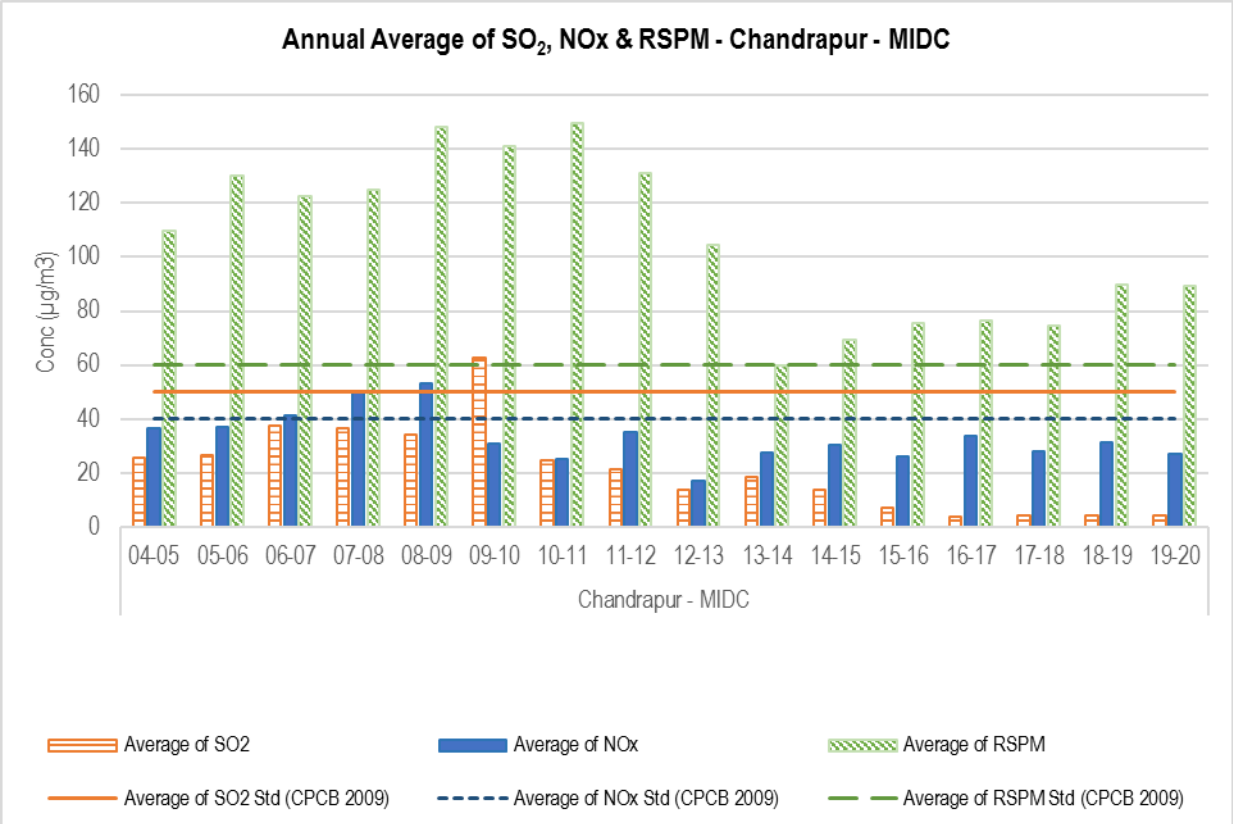



**Figure No. 68: Annual average trend of $SO_2$, NOx, and RSPM at Chandrapur – MIDC**

# Chandrapur - Chandrapur- SRO MPCB

**Table No. 42: Data for Monthly average reading recorded at Chandrapur- SRO MPCB**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | *50* | *40* | *60* |
| **Chandrapur - SRO MPCB** | 2019 | Apr | 4 | 27 | 83 |
| | | Jul | 4 | 25 | 70 |
| | | Aug | 4 | 36 | 54 |
| | | Sep | 4 | 29 | 57 |

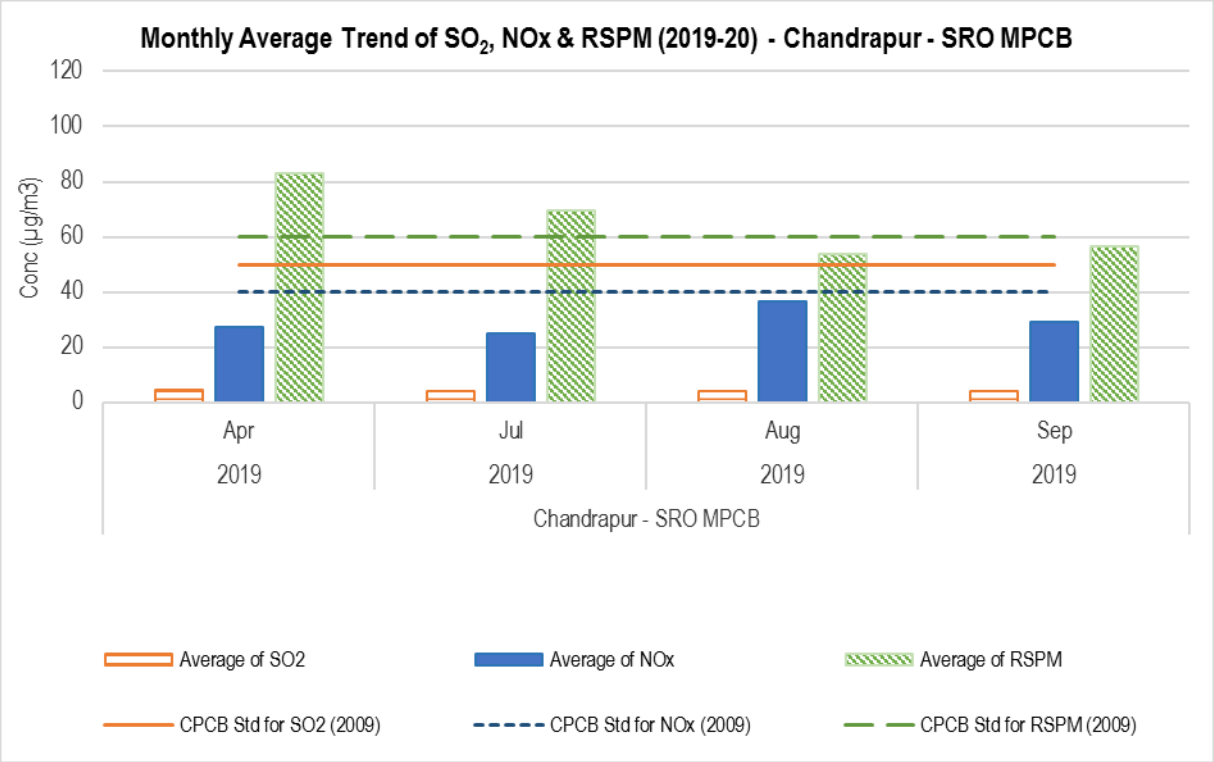



**Figure No. 69: Monthly average reading recorded at Chandrapur- SRO MPCB**

**Table No. 43: Data for Annual average trend of $SO_2$, NOx, and RSPM at Chandrapur - SRO MPCB**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | ***50*** | ***40*** | ***60*** |
| **Chandrapur - SRO MPCB** | 04-05 | 23 | 34 | 107 |
| | 05-06 | 20 | 30 | 116 |
| | 06-07 | 31 | 38 | 130 |
| | 07-08 | 30 | 46 | 161 |
| | 08-09 | 26 | 45 | 159 |
| | 09-10 | 41 | 35 | 74 |
| | 10-11 | 21 | 27 | 92 |
| | 11-12 | 18 | 31 | 66 |
| | 12-13 | 14 | 17 | 75 |
| | 13-14 | 10 | 26 | 66 |
| | 14-15 | 7 | 23 | 87 |
| | 15-16 | 4 | 20 | 70 |
| | 16-17 | 4 | 28 | 84 |
| | 17-18 | 4 | 29 | 90 |
| | 18-19 | 4 | 32 | 89 |
| | 19-20 | 4 | 29 | 68 |

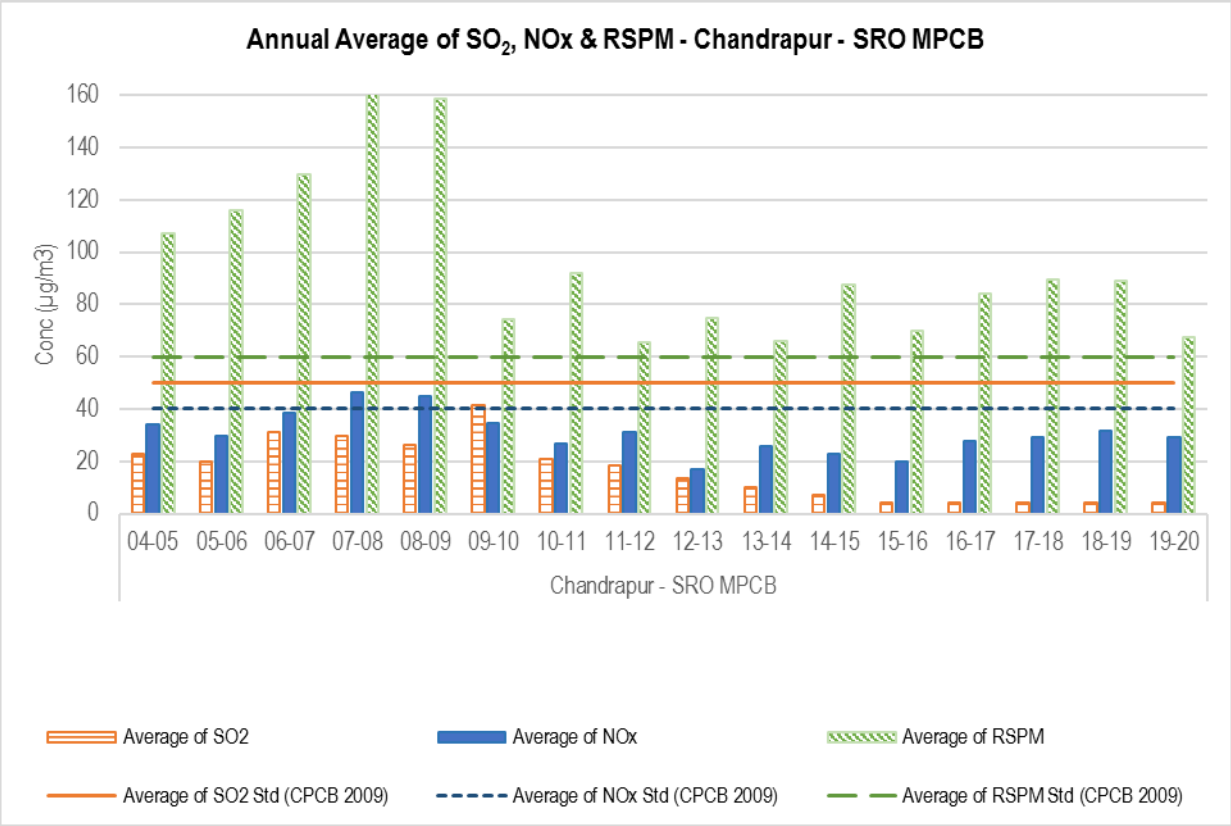



**Figure No. 70: Annual average trend of $SO_2$, NOx, and RSPM at Chandrapur - SRO MPCB**

# Chandrapur - Tadali MIDC

**Table No. 44: Data for Monthly average reading recorded at Tadali MIDC**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Tadali MIDC** | 2019 | Apr | 4 | 25 | 117 |
| | | May | 4 | 31 | 119 |
| | | Jun | 5 | 35 | 140 |
| | | Jul | 4 | 25 | 111 |
| | | Aug | 5 | 31 | 96 |
| | | Sep | 4 | 29 | 85 |
| | | Oct | 4 | 25 | 95 |
| | | Nov | 4 | 24 | 113 |
| | | Dec | 4 | 22 | 126 |
| | 2020 | Jan | 4 | 28 | 133 |
| | | Feb | 4 | 30 | 139 |
| | | Mar | 4 | 31 | 125 |

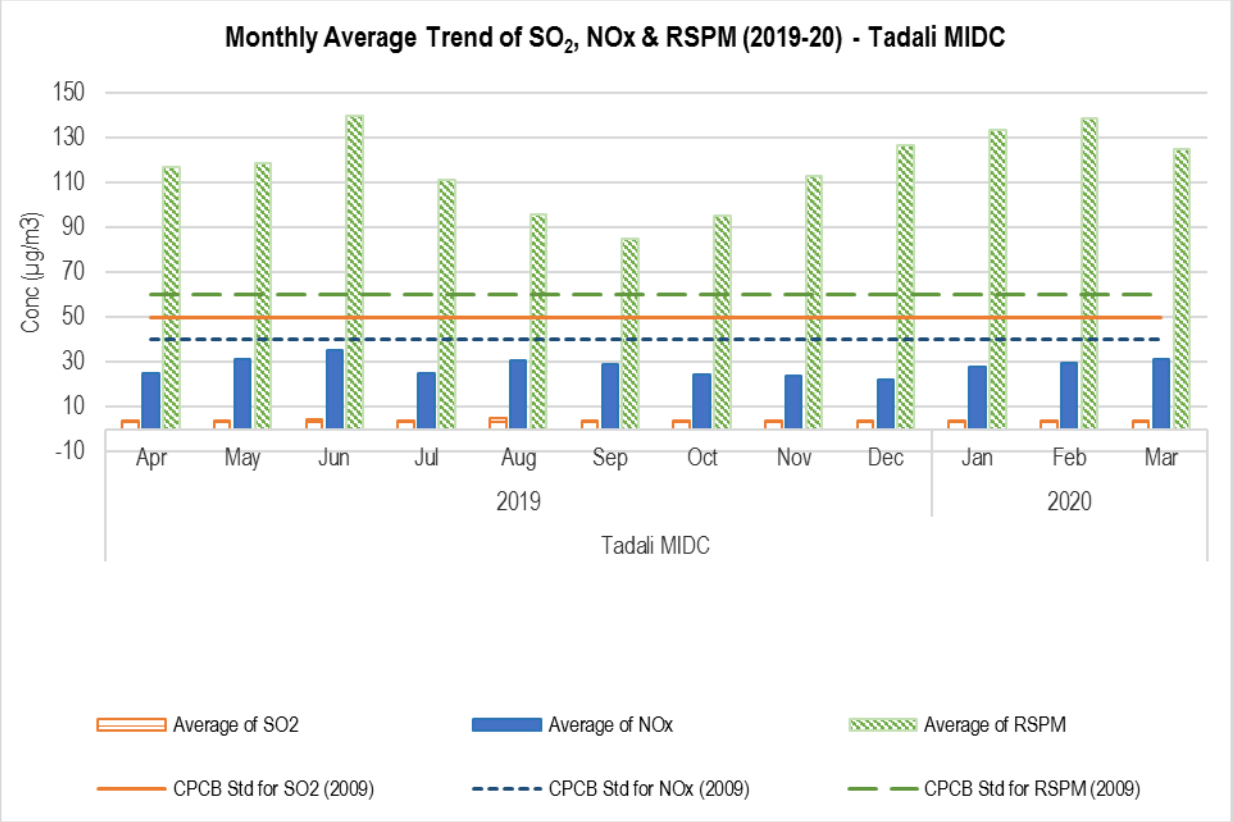



**Figure No. 71: Monthly average reading recorded at Tadali MIDC**

**Table No. 45: Data for Annual average trend of $SO_2$, NOx, and RSPM at Tadali MIDC**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Tadali MIDC | 09-10 | 29 | 19 | 169 |
| | 10-11 | 18 | 20 | 216 |
| | 11-12 | 16 | 18 | 151 |
| | 12-13 | 9 | 13 | 173 |
| | 13-14 | 7 | 16 | 195 |
| | 14-15 | 7 | 15 | 112 |
| | 15-16 | 4 | 20 | 58 |
| | 16-17 | 4 | 23 | 79 |
| | 17-18 | 4 | 27 | 110 |
| | 18-19 | 4 | 30 | 107 |
| | 19-20 | 4 | 28 | 116 |

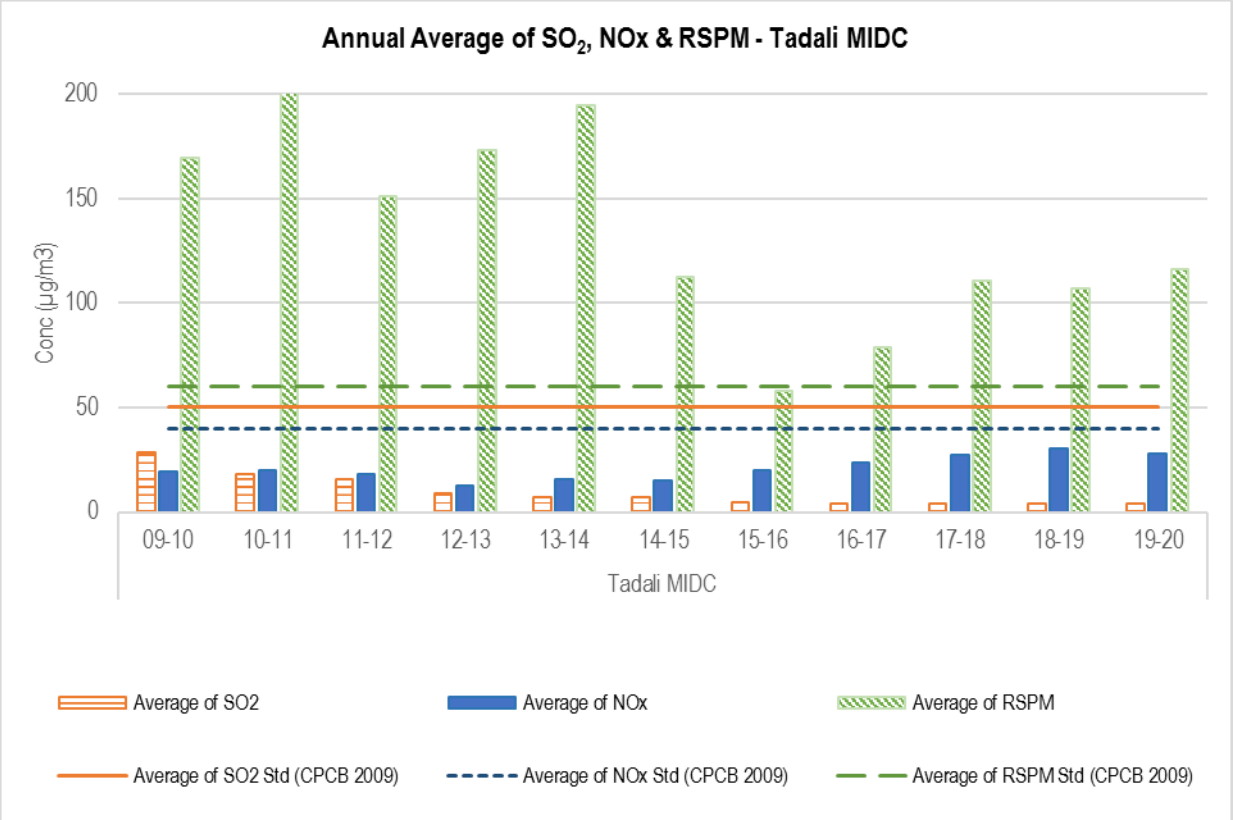



**Figure No. 72: Annual average trend of $SO_2$, NOx, and RSPM at Tadali MIDC**

## Chandrapur - Ballarshah

**Table No. 46: Data for Monthly average reading recorded at Ballarshah**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | *50* | *40* | *60* |
| **Ballarshah** | 2019 | Apr | 4 | 27 | 131 |
| | | May | 4 | 31 | 161 |
| | | Jun | 4 | 36 | 142 |
| | | Jul | 4 | 31 | 89 |
| | | Aug | 4 | 32 | 83 |
| | | Sep | 4 | 30 | 90 |
| | | Oct | 4 | 23 | 95 |
| | | Nov | 4 | 24 | 109 |
| | | Dec | 5 | 25 | 120 |
| | 2020 | Jan | 5 | 23 | 115 |
| | | Feb | 4 | 28 | 119 |
| | | Mar | 4 | 26 | 110 |

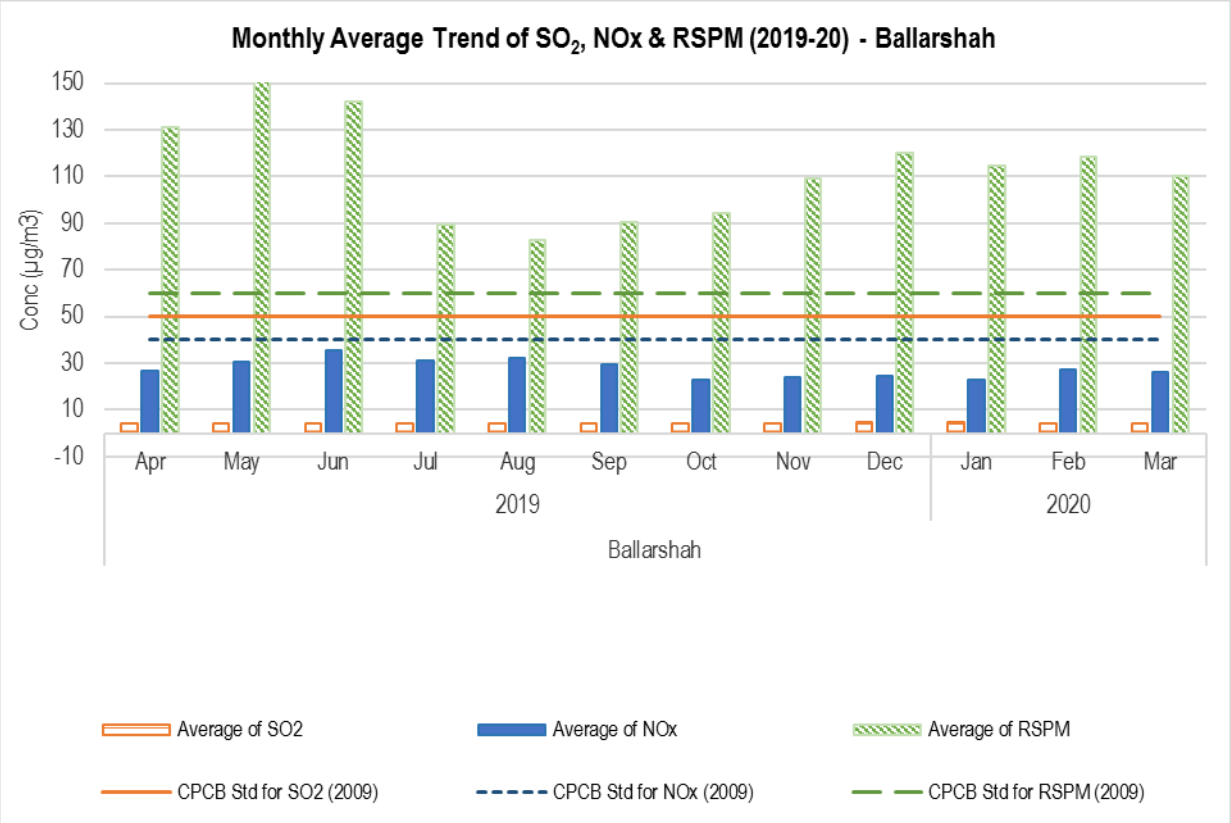



**Figure No. 73: Monthly average reading recorded at Ballarshah**

**Table No. 47: Data for Annual average trend of $SO_2$, NOx, and RSPM at Ballarshah**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| **Ballarshah** | 09-10 | 32 | 35 | 122 |
| | 10-11 | 17 | 32 | 129 |
| | 11-12 | 19 | 24 | 123 |
| | 12-13 | 9 | 19 | 192 |
| | 13-14 | 10 | 37 | 135 |
| | 14-15 | 10 | 48 | 130 |
| | 15-16 | 4 | 28 | 123 |
| | 16-17 | 4 | 32 | 108 |
| | 17-18 | 4 | 29 | 132 |
| | 18-19 | 4 | 33 | 120 |
| | 19-20 | 4 | 28 | 114 |

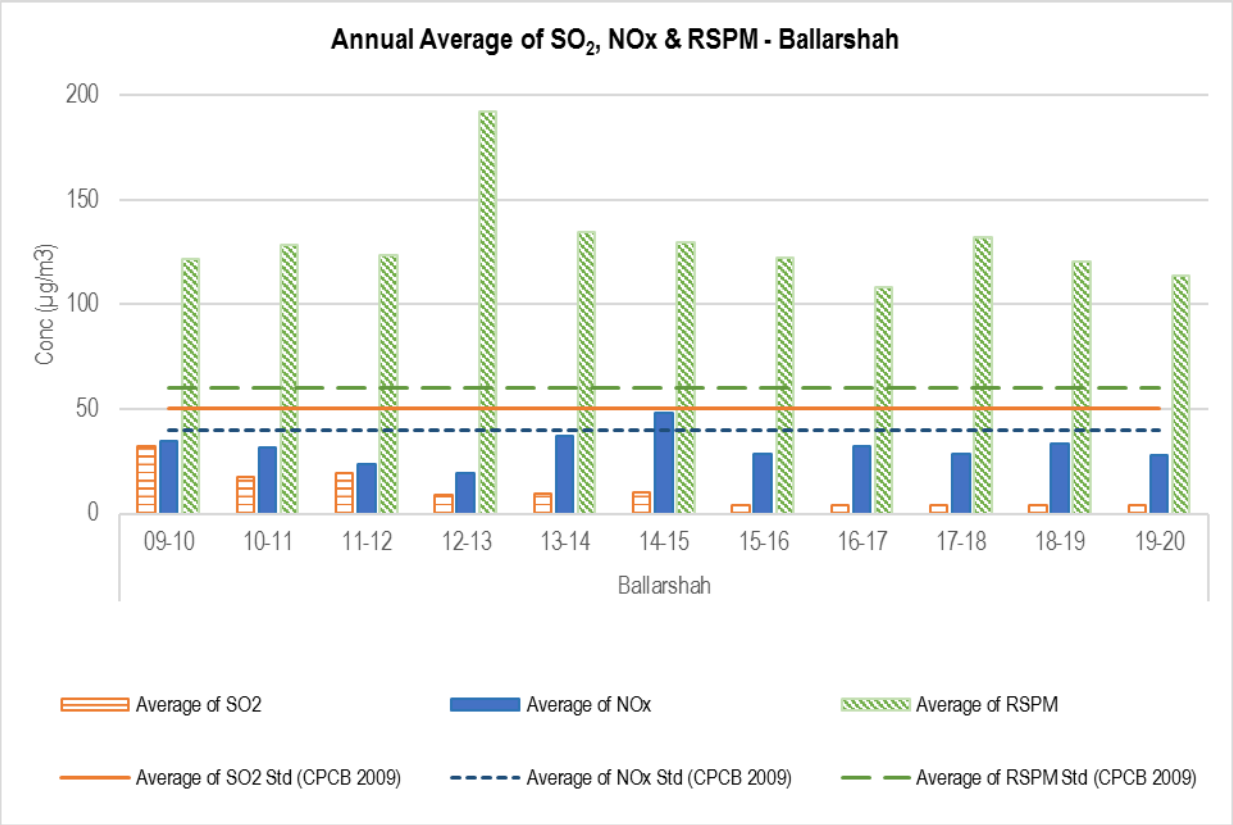



**Figure No. 74: Annual average trend of $SO_2$, NOx, and RSPM at Ballarshah**

## Chandrapur - Rajura

**Table No. 48: Data for Monthly average reading recorded at Rajura**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | *50* | *40* | *60* |
| **Rajura** | 2019 | Apr | 4 | 25 | 204 |
| | | May | 4 | 31 | 205 |
| | | Jun | 4 | 35 | 227 |
| | | Jul | 4 | 28 | 186 |
| | | Aug | 5 | 25 | 123 |
| | | Sep | 4 | 32 | 121 |
| | | Oct | 4 | 24 | 169 |
| | | Nov | 4 | 23 | 138 |
| | | Dec | 4 | 25 | 179 |
| | 2020 | Jan | 4 | 22 | 165 |
| | | Feb | 4 | 30 | 170 |
| | | Mar | 4 | 25 | 171 |

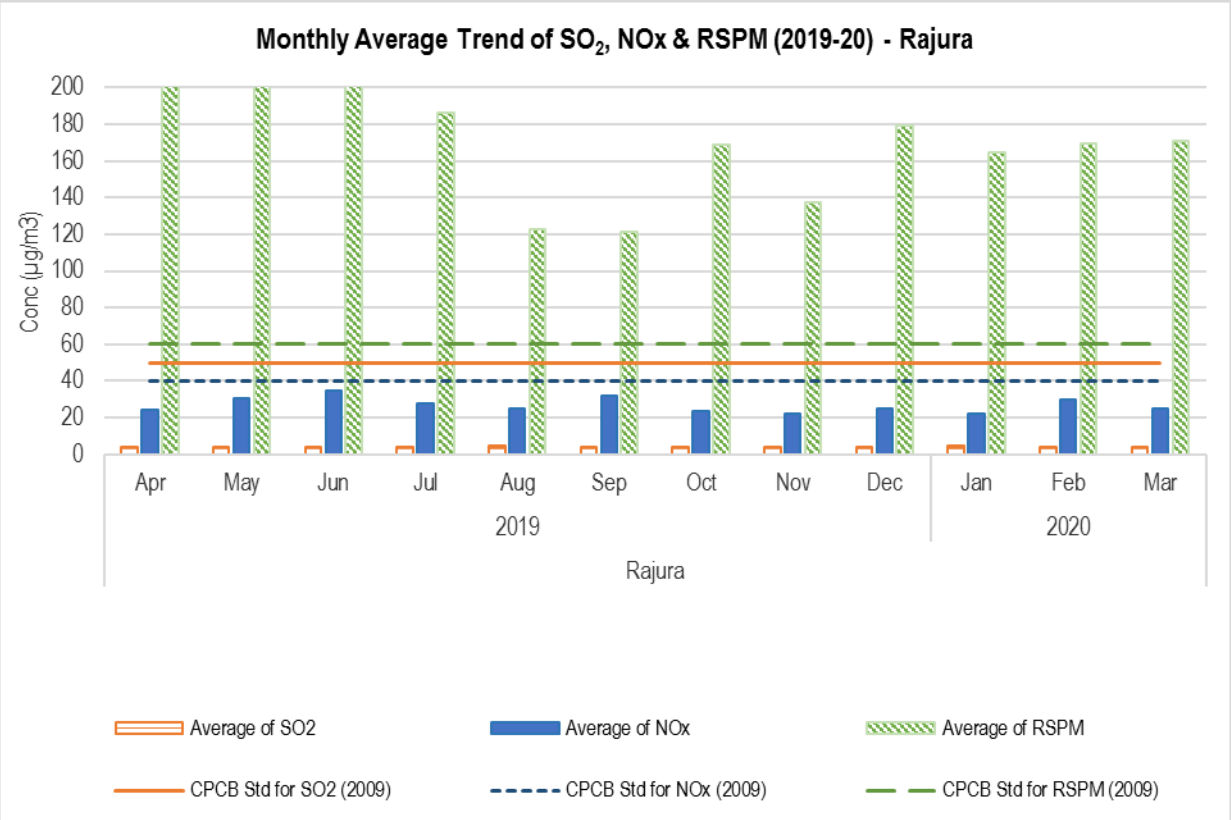



**Figure No. 75: Monthly average reading recorded at Rajura**

**Table No. 49: Data for Annual average trend of $SO_2$, NOx, and RSPM at Rajura**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Rajura | 09-10 | 34 | 37 | 119 |
| | 10-11 | 17 | 19 | 115 |
| | 11-12 | 16 | 19 | 159 |
| | 12-13 | 9 | 21 | 196 |
| | 13-14 | 10 | 31 | 145 |
| | 14-15 | 7 | 17 | 144 |
| | 15-16 | 4 | 17 | 127 |
| | 16-17 | 4 | 27 | 156 |
| | 17-18 | 4 | 27 | 185 |
| | 18-19 | 4 | 31 | 134 |
| | 19-20 | 4 | 27 | 171 |

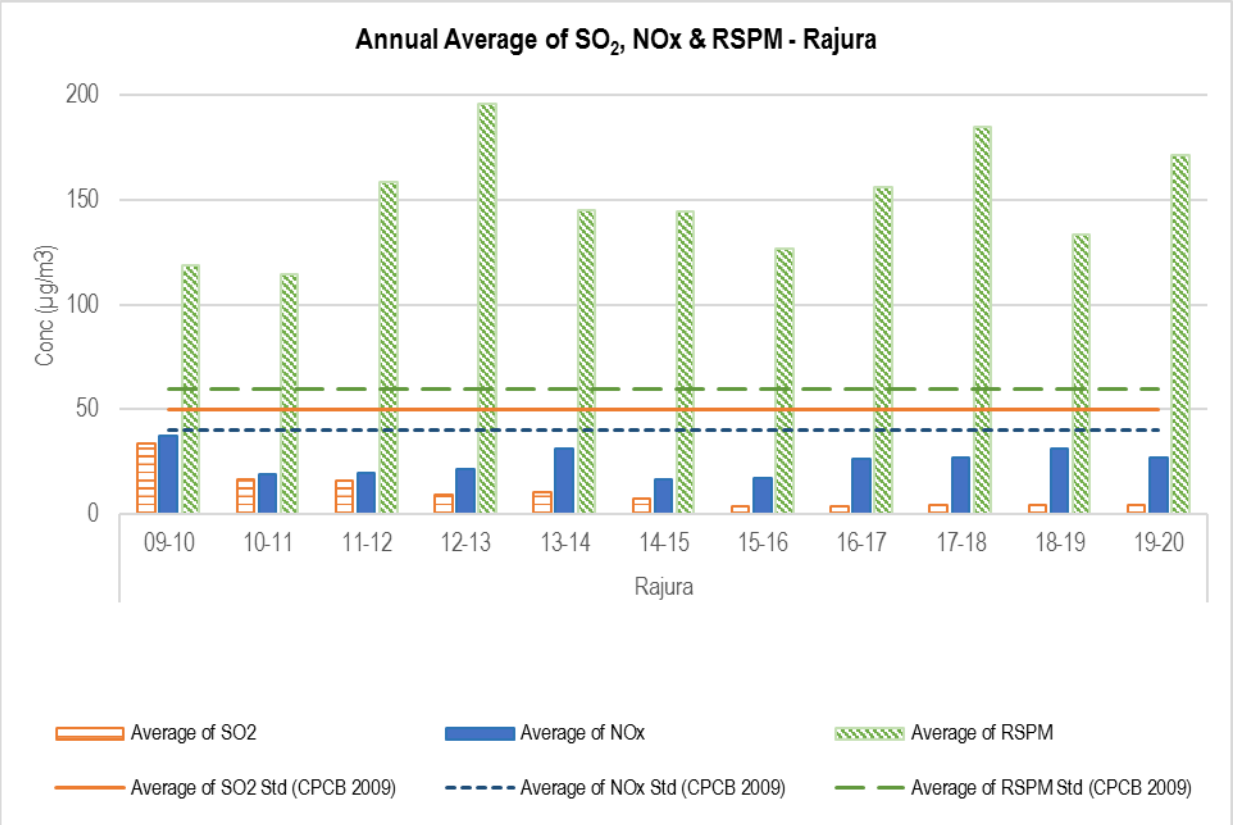


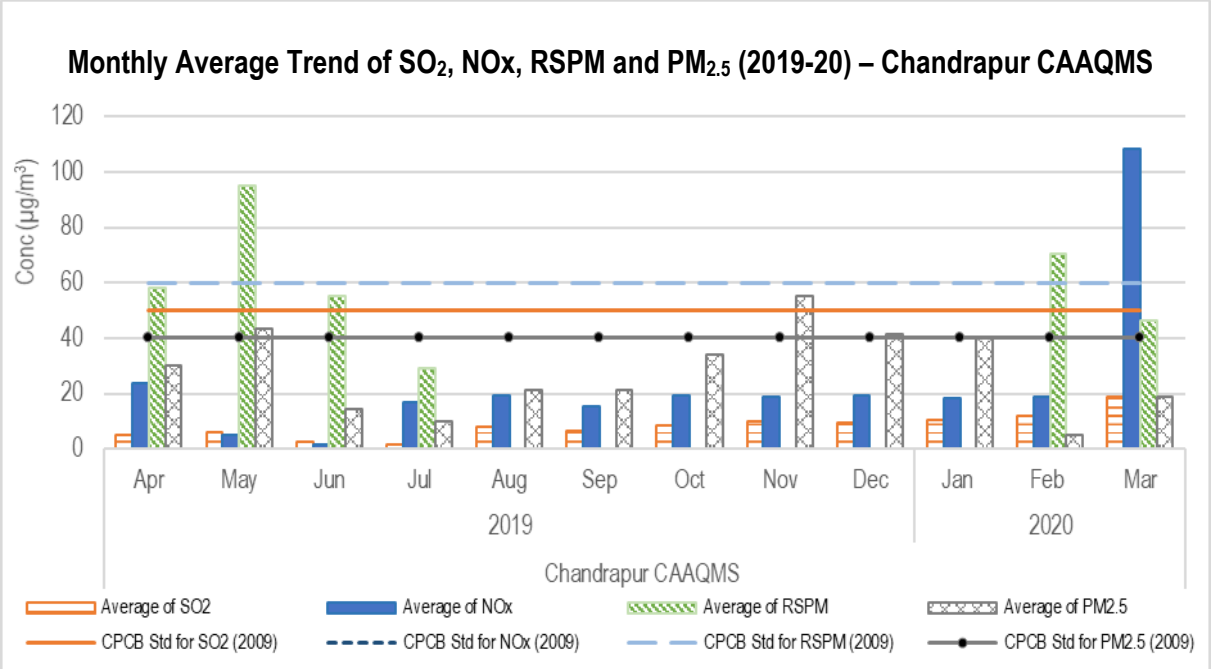

**Figure No. 76: Annual average trend of $SO_2$, NOx, and RSPM at Rajura**

# Chandrapur - Chandrapur CAAQMS

**Table No. 50: Data for Monthly average reading recorded at Chandrapur CAAQMS**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** | ***40*** |
| **Chandrapur CAAQMS** | 2019 | Apr | 5 | 24 | 58 | 30 |
| | | May | 6 | 5 | 95 | 44 |
| | | Jun | 2 | 2 | 55 | 14 |
| | | Jul | 2 | 17 | 29 | 10 |
| | | Aug | 8 | 19 | | 21 |
| | | Sep | 7 | 16 | | 21 |
| | | Oct | 8 | 19 | | 34 |
| | | Nov | 10 | 19 | | 55 |
| | | Dec | 10 | 19 | | 41 |
| | 2020 | Jan | 10 | 19 | | 40 |
| | | Feb | 12 | 19 | 70 | 5 |
| | | Mar | 19 | 108 | 46 | 19 |

**Data was not available for RSPM from August 2019 – January 2020*




*CPCB standards for NOx and $PM_{2.5}$ are same, so the lines indicating them overlap and are not distinctly visible*

**Figure No. 77: Monthly average reading recorded at Chandrapur CAAQMS**

**Table No. 51: Data for Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Chandrapur CAAQMS**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|
| | | *50* | *40* | *60* | *40* |
| Chandrapur CAAQMS | 16-17 | 13 | 19 | 69 | |
| | 17-18 | 8 | 19 | 64 | |
| | 18-19 | 4 | 10 | 73 | |
| | 19-20 | 8 | 17 | 59 | 31 |

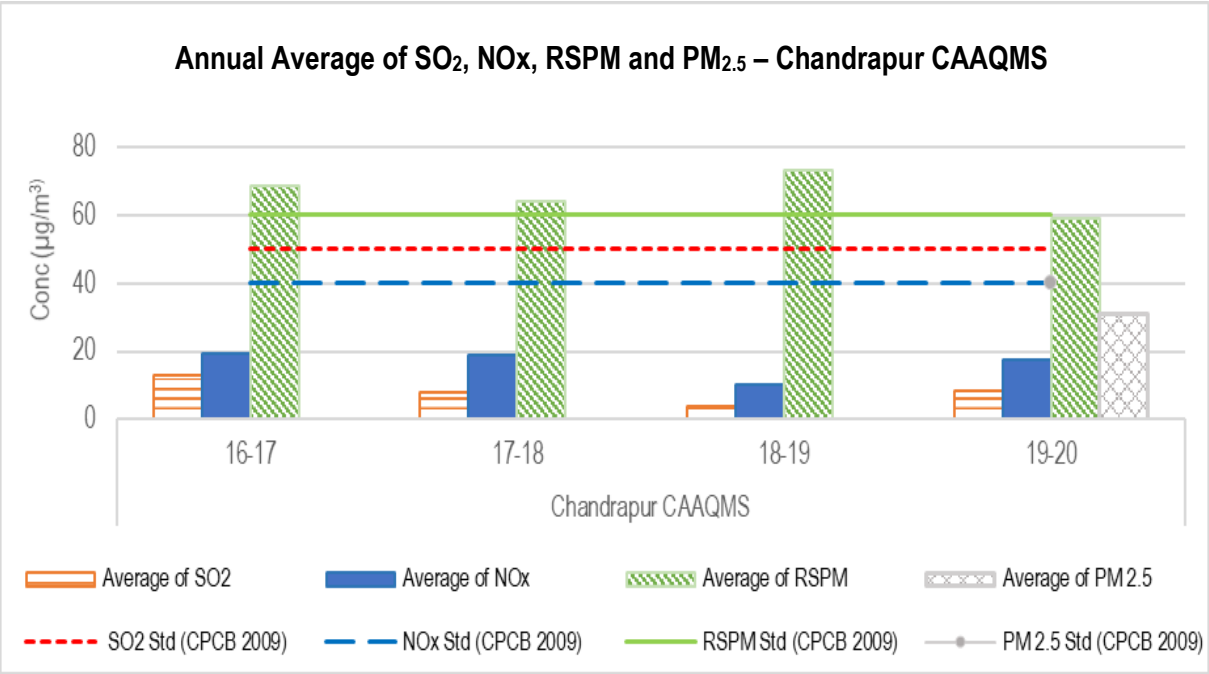
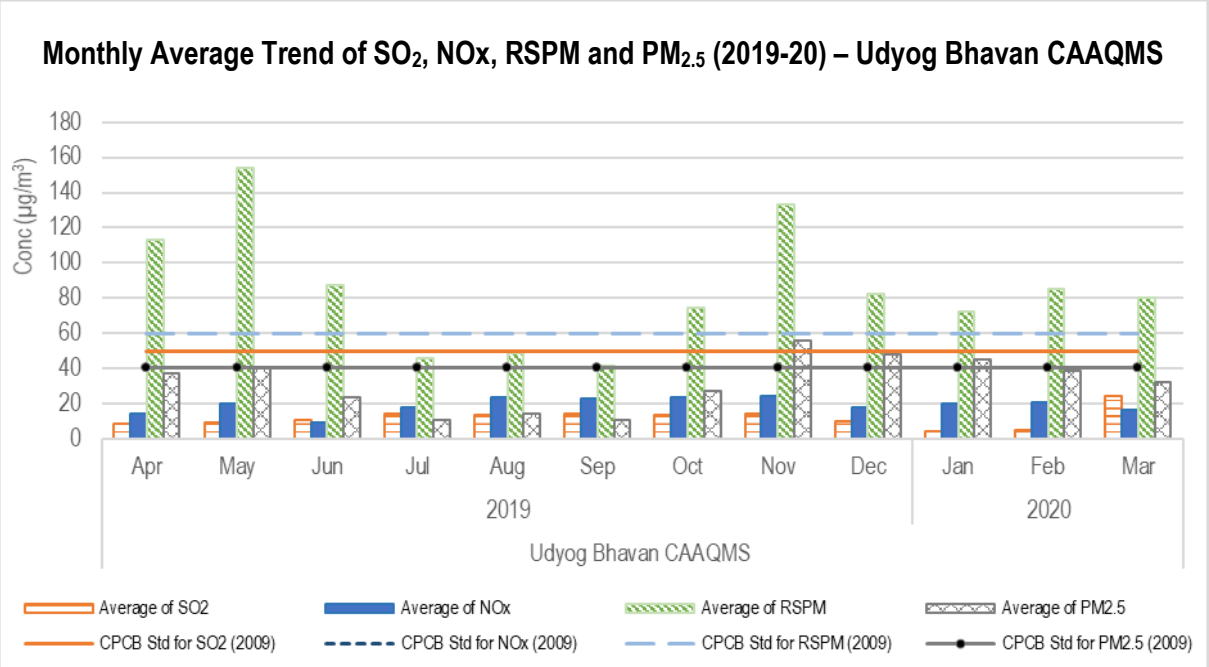



**Figure No. 78: Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Chandrapur CAAQMS**

# Chandrapur – Udyog Bhavan CAAQMS

**Table No. 52: Data for Monthly average reading recorded at Udyog Bhavan CAAQMS Chandrapur**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** | ***40*** |
| **Udyog Bhavan CAAQMS** | 2019 | Apr | 8 | 14 | 113 | 37 |
| | | May | 9 | 20 | 154 | 41 |
| | | Jun | 11 | 9 | 87 | 23 |
| | | Jul | 14 | 17 | 46 | 10 |
| | | Aug | 14 | 23 | 49 | 14 |
| | | Sep | 14 | 23 | 42 | 10 |
| | | Oct | 14 | 24 | 74 | 27 |
| | | Nov | 14 | 24 | 134 | 56 |
| | | Dec | 10 | 18 | 83 | 48 |
| | 2020 | Jan | 4 | 20 | 72 | 45 |
| | | Feb | 5 | 21 | 85 | 39 |
| | | Mar | 24 | 16 | 80 | 32 |




*CPCB standards for NOx and PM 2.5 are same, so the lines indicating them overlap and are not distinctly visible*

**Figure No. 79: Monthly average reading recorded at Udyog Bhavan CAAQMS, Chandrapur**

**Table No. 53: Data for Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Udyog Bhavan CAAQMS Chandrapur**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|
| | | *50* | *40* | *60* | *40* |
| Udyog Bhavan CAAQMS | 19-20 | 13 | 19 | 86 | 32 |

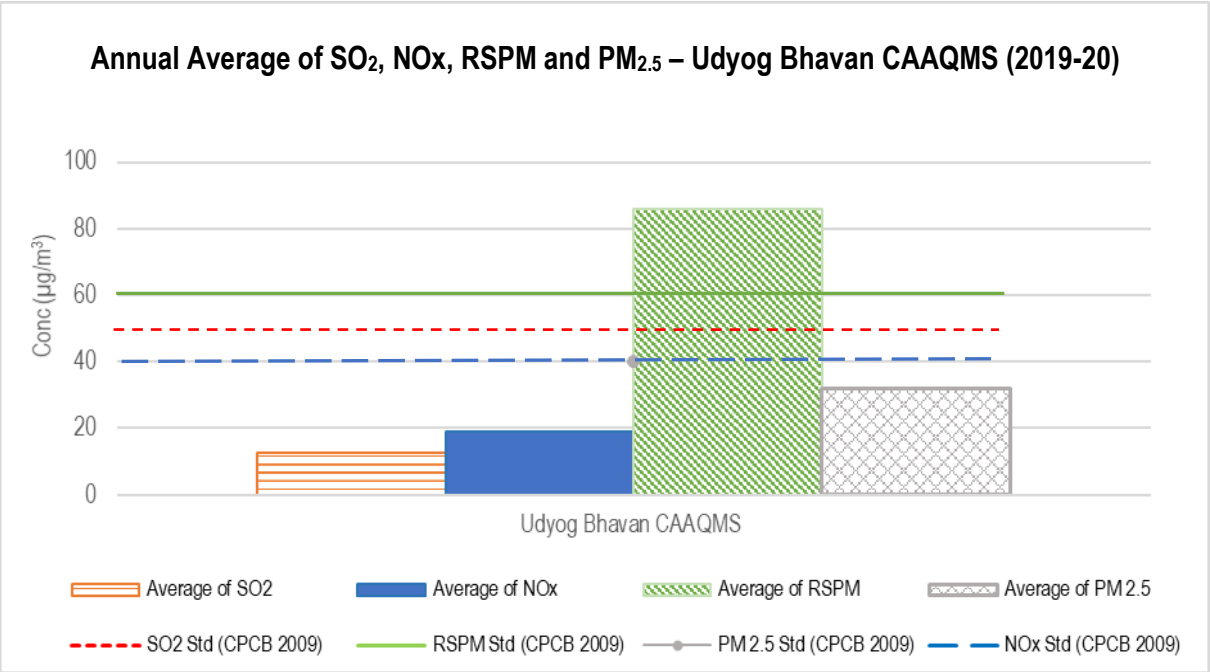
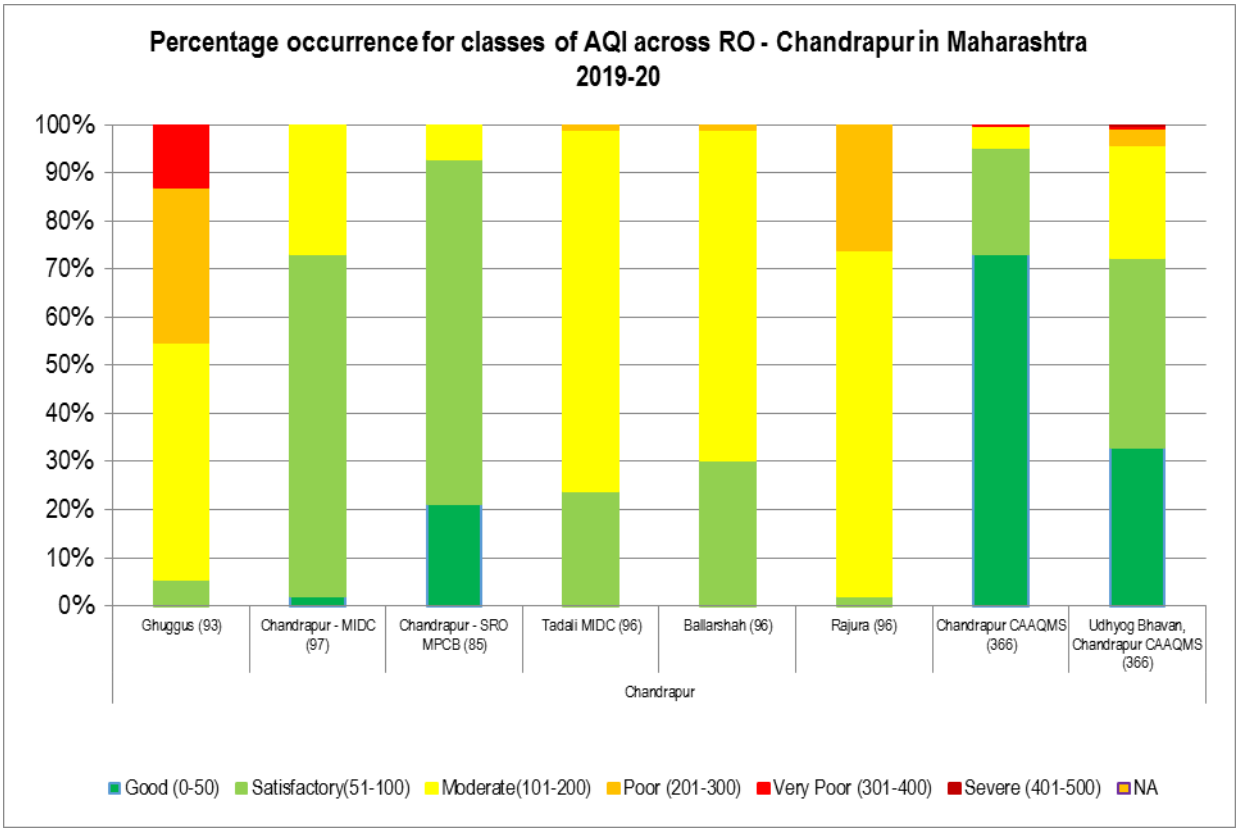


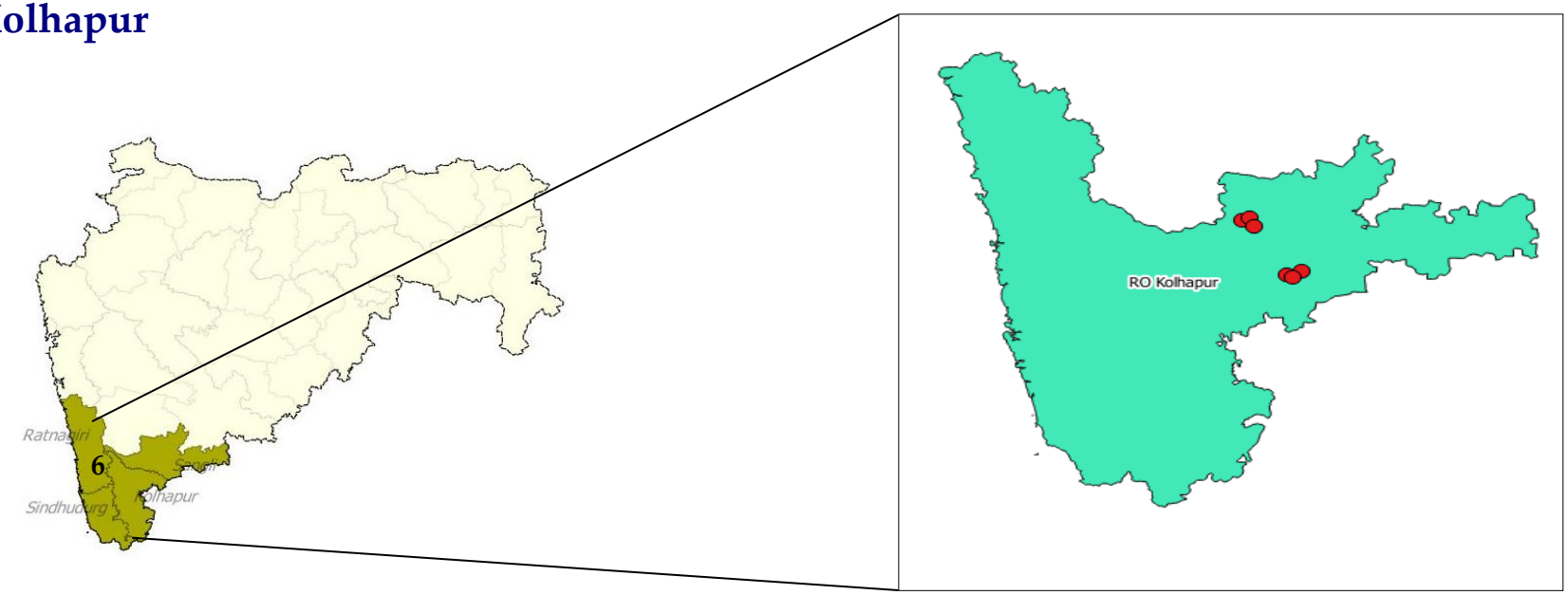

**Figure No. 80: Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Udyog Bhavan CAAQMS Chandrapur**

**Table No. 54: Percentage exceedance of pollutants at Chandrapur RO**

| Station Name | Total Observation | No. of times exceedance occurred | | | % Exceedance | | |
|---|---|---|---|---|---|---|---|
| | | $SO_2$ | NOx | RSPM | $SO_2$ | NOx | RSPM |
| Ghuggus | 93 | | | 88 | | | 95 |
| Chandrapur - MIDC | 97 | | | 26 | | | 27 |
| Chandrapur - SRO MPCB | 85 | | 1 | 6 | | 1 | 7 |
| Tadali MIDC | 96 | | | 73 | | | 76 |
| Ballarshah | 96 | | | 67 | | | 70 |
| Rajura | 96 | | | 94 | | | 98 |
| Chandrapur CAAQMS | 366 | | 3 | 15 | | 1 | 4 |
| Udyog Bhavan, Chandrapur CAAQMS | 363 | | | 124 | | | 34 |



# Ro - Kolhapur




| MPCB RO | Region | Station code | Station name | Type | Latitude (deg) | Longitude (deg) |
|---|---|---|---|---|---|---|
| Kolhapur | Kolhapur | 508 | Shivaji University Campus | Residential | 17° 07' 40.1" N | 74° 25' 16.9" E |
| | Kolhapur | 509 | Ruikar Trust | Rural and other areas | 17° 10' 25.4" N | 74° 24' 10.1" E |
| | Kolhapur | 510 | Mahadwar Road | Residential | 17° 09' 27.0" N | 74° 22' 10.6" E |
| | Sangli | 574 | Terrace of SRO-Sangli, Udyog Bhavan | Residential | 16° 51' 11.8" N | 74° 35' 28.9" E |
| | Sangli | 575 | Sangli-Miraj Primary Municipal school | Rural and other areas | 16° 51' 39.4" N | 74° 33' 52.5" E |
| | Sangli | 576 | Krishna Valley school | Industrial | 16° 52' 49.4" N | 74° 38' 02.3" E |

# Kolhapur - Shivaji University Campus

**Table No. 55: Data for Monthly average reading recorded at Shivaji University Campus**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | *50* | *40* | *60* |
| **Shivaji University campus** | 2019 | Apr | 12 | 22 | 70 |
| | | May | 14 | 22 | 65 |
| | | Jun | 10 | 14 | 53 |
| | | Jul | 8 | 12 | 48 |
| | | Aug | 8 | 13 | 51 |
| | | Sep | 10 | 20 | 60 |
| | | Oct | 11 | 20 | 57 |
| | | Nov | 11 | 17 | 54 |
| | | Dec | 12 | 18 | 56 |
| | 2020 | Jan | 18 | 34 | 74 |
| | | Feb | 16 | 30 | 67 |
| | | Mar | 13 | 18 | 64 |

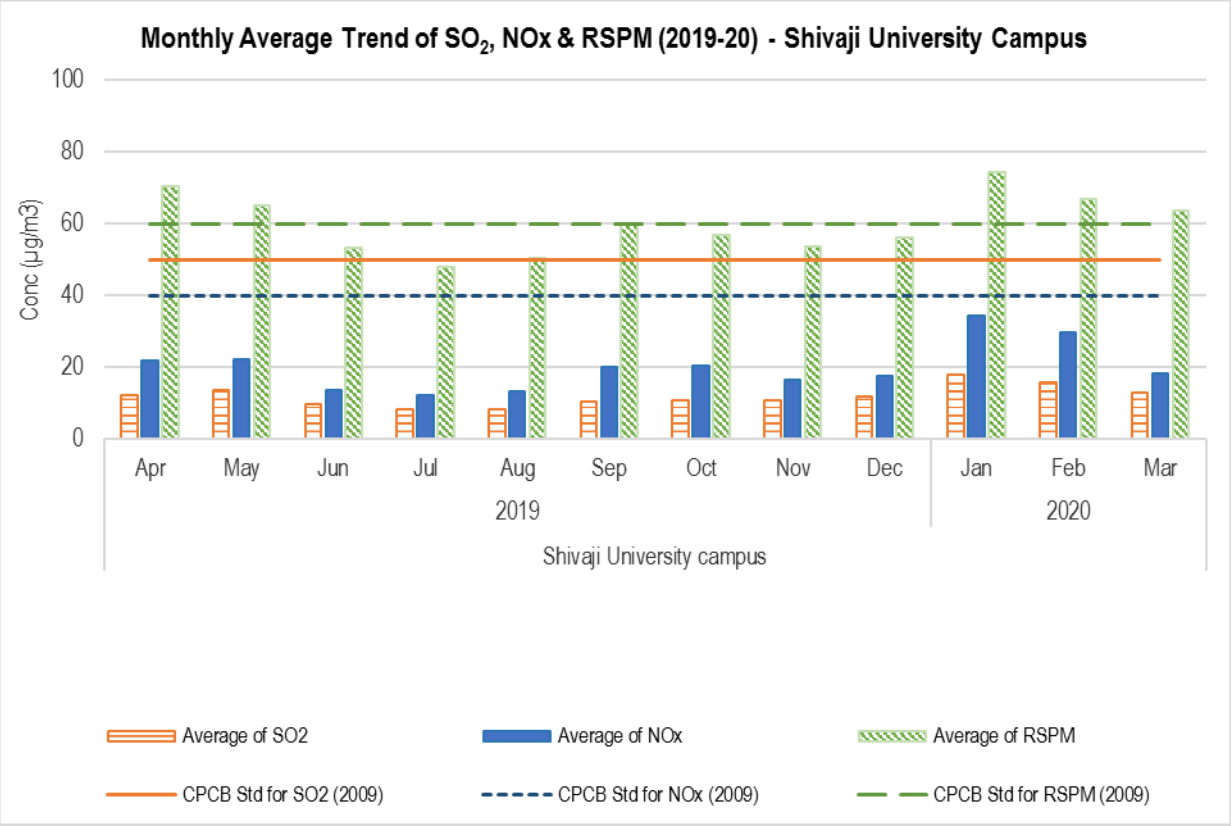



**Figure No. 81: Monthly average reading recorded at Shivaji University Campus**

**Table No. 56: Data for Annual average trend of $SO_2$, NOx, and RSPM at Shivaji University Campus**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Shivaji University Campus | 05-06 | 4 | 7 | 40 |
| | 06-07 | 5 | 7 | 44 |
| | 07-08 | 5 | 3 | 46 |
| | 08-09 | 8 | 10 | 62 |
| | 09-10 | 8 | 4 | 55 |
| | 10-11 | 9 | 9 | 56 |
| | 11-12 | 10 | 13 | 60 |
| | 12-13 | 12 | 18 | 61 |
| | 13-14 | 14 | 20 | 64 |
| | 14-15 | 12 | 22 | 60 |
| | 15-16 | 13 | 23 | 63 |
| | 16-17 | 11 | 21 | 61 |
| | 17-18 | 13 | 22 | 60 |
| | 18-19 | 12 | 20 | 60 |
| | 19-20 | 12 | 21 | 60 |

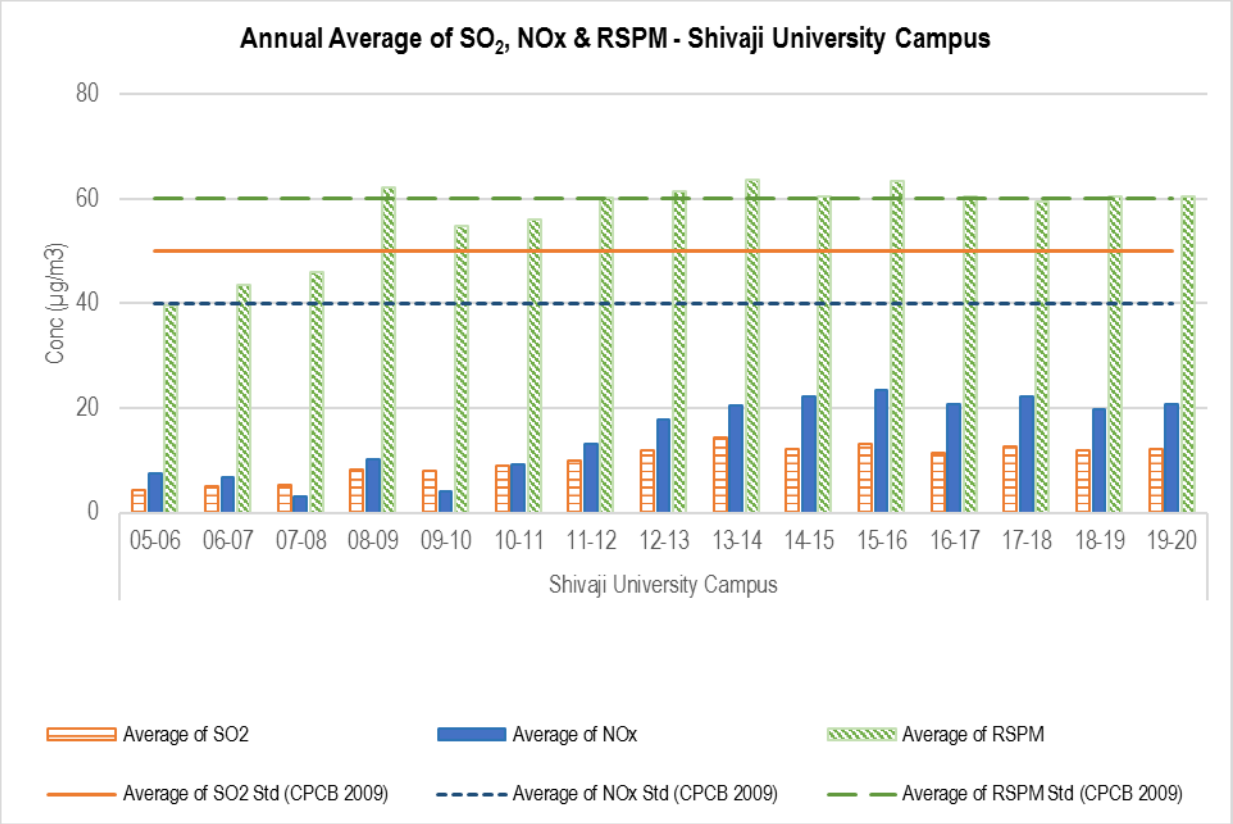



**Figure No. 82: Annual average trend of $SO_2$, NOx, and RSPM at Shivaji University Campus**

# Kolhapur - Ruikar Trust

**Table No. 57: Data for Monthly average reading recorded at Ruikar Trust - Kolhapur**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Ruikar Trust** | 2019 | Apr | 27 | 52 | 138 |
| | | May | 29 | 55 | 133 |
| | | Jun | 24 | 39 | 103 |
| | | Jul | 21 | 33 | 91 |
| | | Aug | 23 | 37 | 100 |
| | | Sep | 27 | 42 | 121 |
| | | Oct | 30 | 49 | 125 |
| | | Nov | 28 | 47 | 112 |
| | | Dec | 35 | 70 | 139 |
| | 2020 | Jan | 36 | 76 | 146 |
| | | Feb | 31 | 64 | 143 |
| | | Mar | 27 | 53 | 136 |

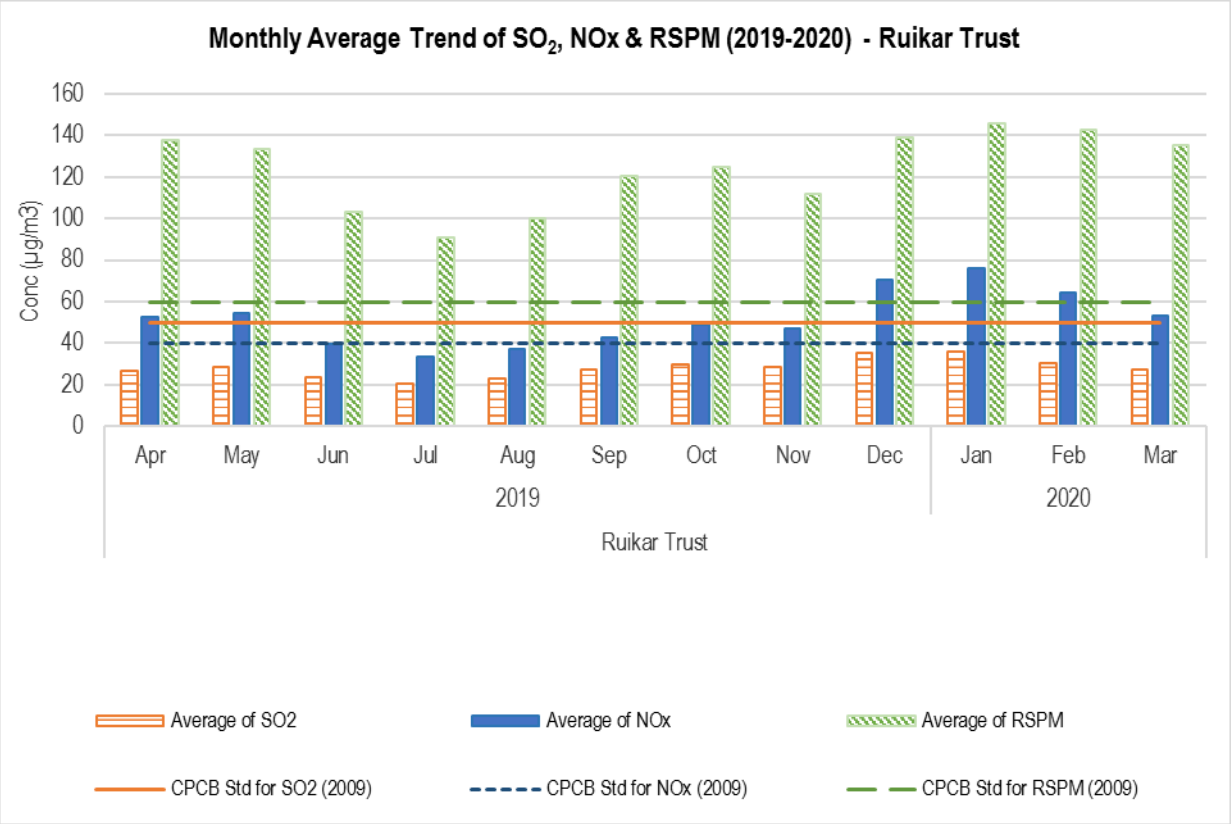



**Figure No. 83: Monthly average reading recorded at Ruikar Trust - Kolhapur**

**Table No. 58: Data for Annual average trend of $SO_2$, NOx, and RSPM at Ruikar Trust - Kolhapur**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | ***50*** | ***40*** | ***60*** |
| **Ruikar Trust** | 05-06 | 12 | 45 | 108 |
| | 06-07 | 11 | 39 | 96 |
| | 07-08 | 10 | 27 | 95 |
| | 08-09 | 16 | 27 | 100 |
| | 09-10 | 16 | 20 | 99 |
| | 10-11 | 21 | 27 | 105 |
| | 11-12 | 24 | 33 | 116 |
| | 12-13 | 27 | 42 | 159 |
| | 13-14 | 27 | 48 | 141 |
| | 14-15 | 28 | 50 | 118 |
| | 15-16 | 25 | 52 | 120 |
| | 16-17 | 29 | 53 | 120 |
| | 17-18 | 28 | 48 | 117 |
| | 18-19 | 26 | 46 | 114 |
| | 19-20 | 29 | 53 | 125 |

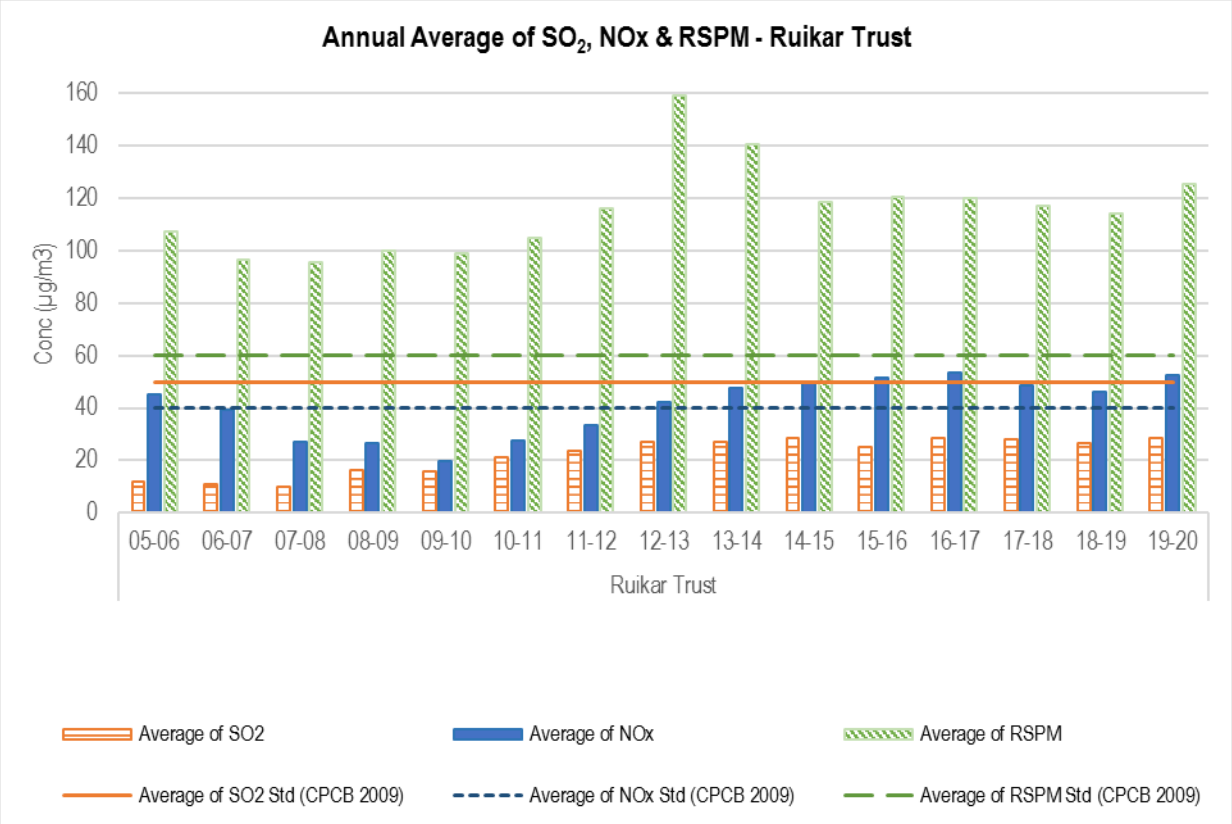



**Figure No. 84: Annual average trend of $SO_2$, NOx, and RSPM at Ruikar Trust – Kolhapur**

# Kolhapur - Mahadwar Road

**Table No. 59: Data for Monthly average reading recorded at Mahadwar Road**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Mahadwar Road** | 2019 | Apr | 23 | 44 | 118 |
| | | May | 24 | 42 | 106 |
| | | Jun | 19 | 28 | 84 |
| | | Jul | 15 | 20 | 69 |
| | | Aug | 16 | 23 | 79 |
| | | Sep | 20 | 31 | 83 |
| | | Oct | 21 | 32 | 88 |
| | | Nov | 24 | 38 | 95 |
| | | Dec | 28 | 54 | 113 |
| | 2020 | Jan | 28 | 62 | 121 |
| | | Feb | 26 | 54 | 114 |
| | | Mar | 22 | 44 | 105 |

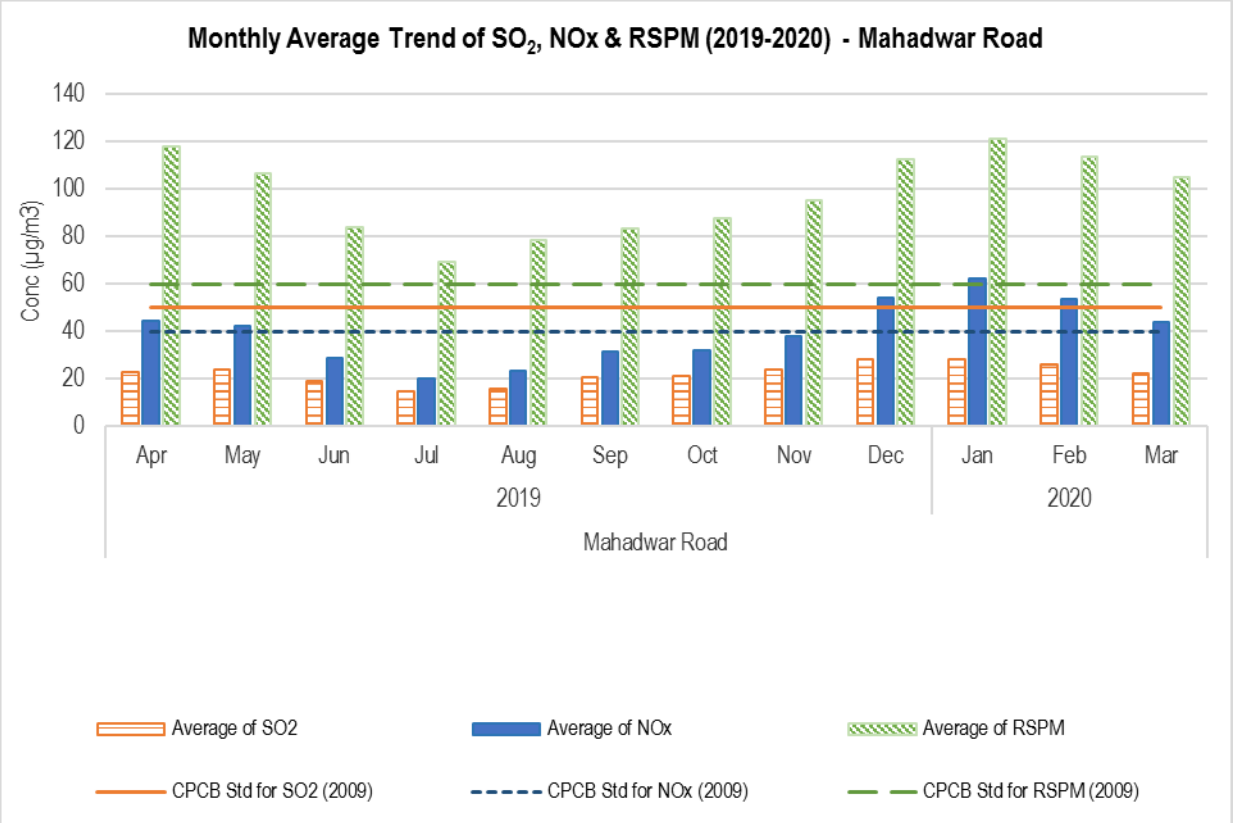



**Figure No. 85: Monthly average reading recorded at Mahadwar Road**

**Table No. 60: Data for Annual average trend of $SO_2$, NOx, and RSPM at Mahadwar Road**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Mahadwar Road | 05-06 | 8 | 28 | 69 |
| | 06-07 | 8 | 21 | 64 |
| | 07-08 | 8 | 11 | 75 |
| | 08-09 | 12 | 17 | 84 |
| | 09-10 | 13 | 15 | 86 |
| | 10-11 | 17 | 21 | 92 |
| | 11-12 | 20 | 26 | 102 |
| | 12-13 | 25 | 35 | 136 |
| | 13-14 | 23 | 37 | 113 |
| | 14-15 | 24 | 38 | 104 |
| | 15-16 | 21 | 40 | 106 |
| | 16-17 | 23 | 39 | 99 |
| | 17-18 | 21 | 36 | 90 |
| | 18-19 | 22 | 37 | 95 |
| | 19-20 | 23 | 40 | 99 |

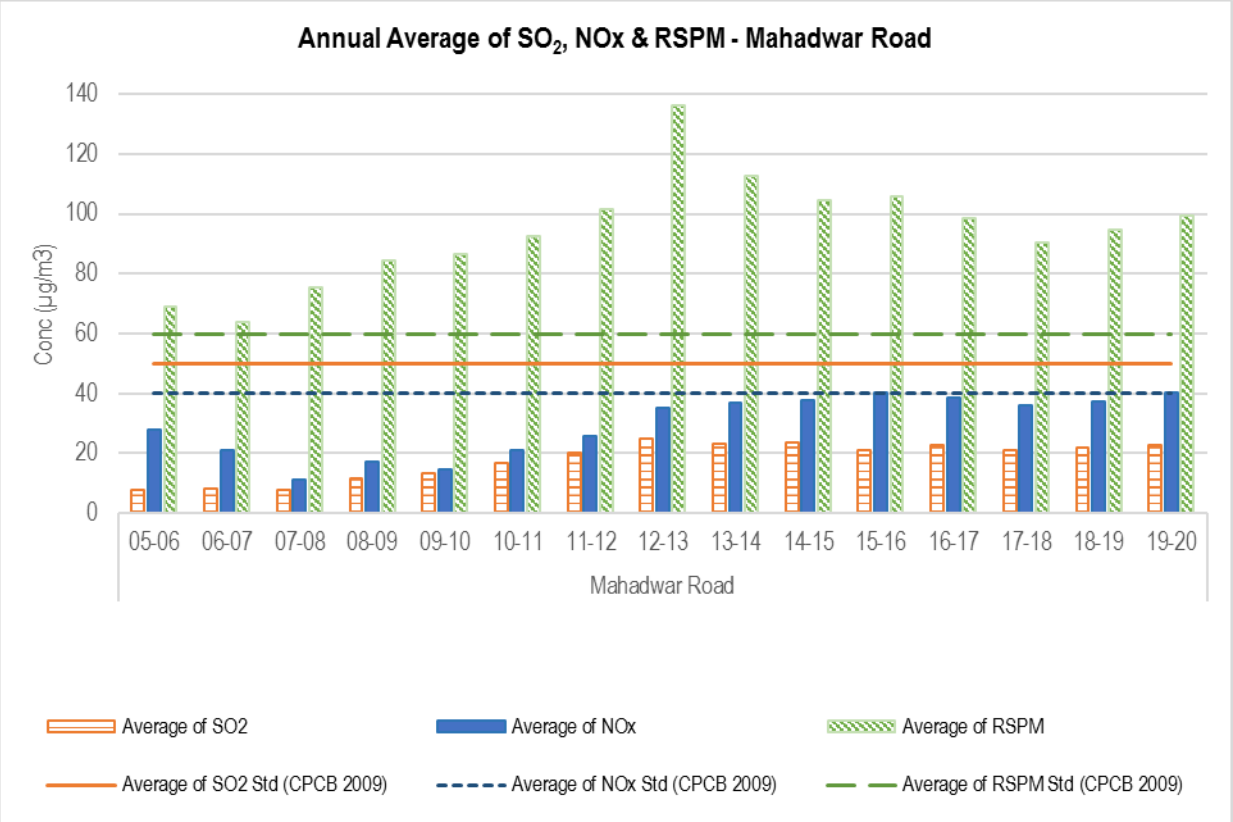



**Figure No. 86: Annual average trend of $SO_2$, NOx, and RSPM at Mahadwar Road**

## Sangli - Terrace of SRO – Sangli, Udyog Bhavan

**Table No. 61: Data for Monthly average reading recorded at Terrace of SRO – Sangli, Udyog Bhavan**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | *50* | *40* | *60* |
| Terrace of SRO-Sangli, Udyog Bhavan | 2019 | Apr | 9 | 38 | 66 |
| | | May | 9 | 27 | 58 |
| | | Jun | 9 | 29 | 55 |
| | | Jul | 8 | 25 | 25 |
| | | Aug | 8 | 20 | 24 |
| | | Sep | 8 | 21 | 26 |
| | | Oct | 8 | 27 | 32 |
| | | Nov | 9 | 34 | 57 |
| | | Dec | 10 | 47 | 86 |
| | 2020 | Jan | 11 | 58 | 129 |
| | | Feb | 10 | 51 | 117 |
| | | Mar | 8 | 40 | 86 |

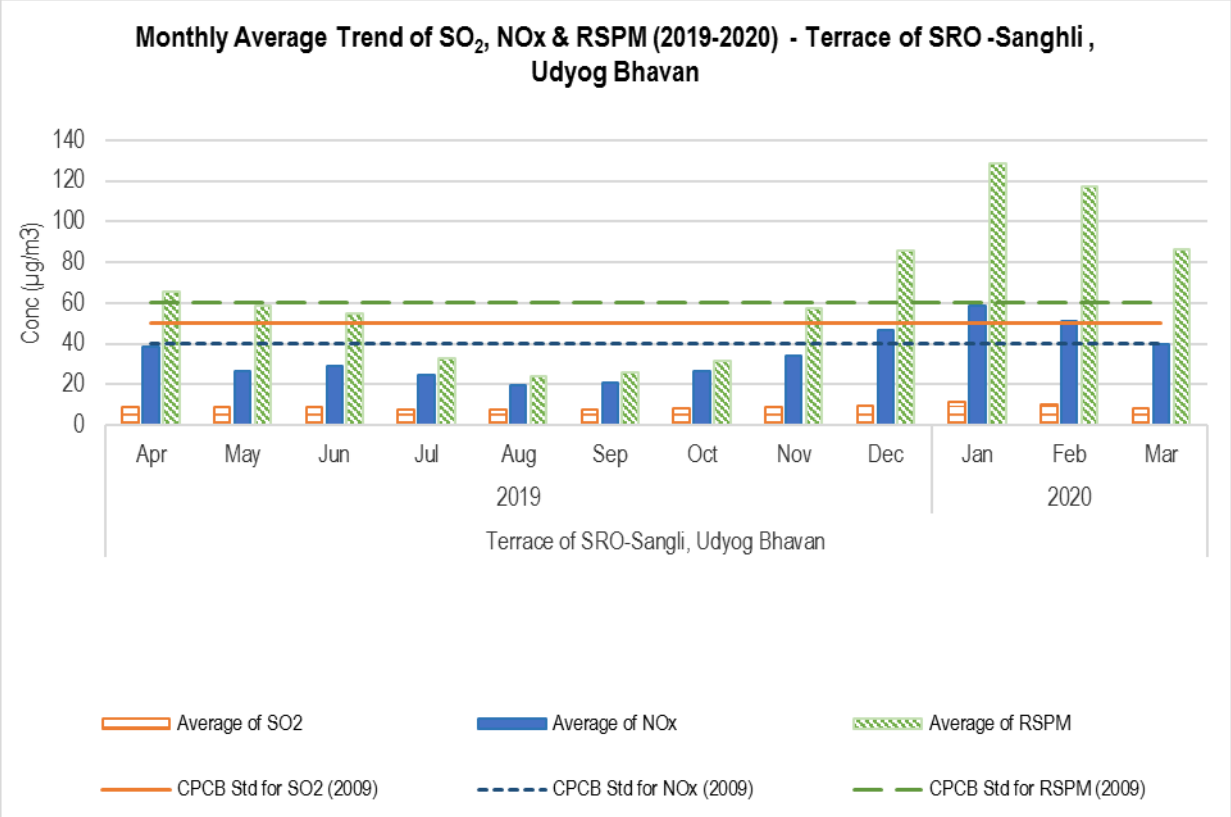



**Figure No. 87: Monthly average reading recorded at Terrace of SRO – Sangli, Udyog Bhavan**

**Table No. 62: Data for Annual average trend of $SO_2$, NOx, and RSPM at Terrace of SRO – Sangli, Udyog Bhavan**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Terrace of SRO-Sangli, Udyog Bhavan | 08-09 | 25 | 19 | 57 |
| | 09-10 | 22 | 27 | 54 |
| | 10-11 | 12 | 29 | 54 |
| | 11-12 | 10 | 36 | 63 |
| | 12-13 | 10 | 39 | 70 |
| | 13-14 | 9 | 34 | 69 |
| | 14-15 | 12 | 42 | 67 |
| | 15-16 | 10 | 38 | 82 |
| | 16-17 | 8 | 41 | 78 |
| | 17-18 | 9 | 35 | 83 |
| | 18-19 | 8 | 36 | 76 |
| | 19-20 | 9 | 34 | 61 |

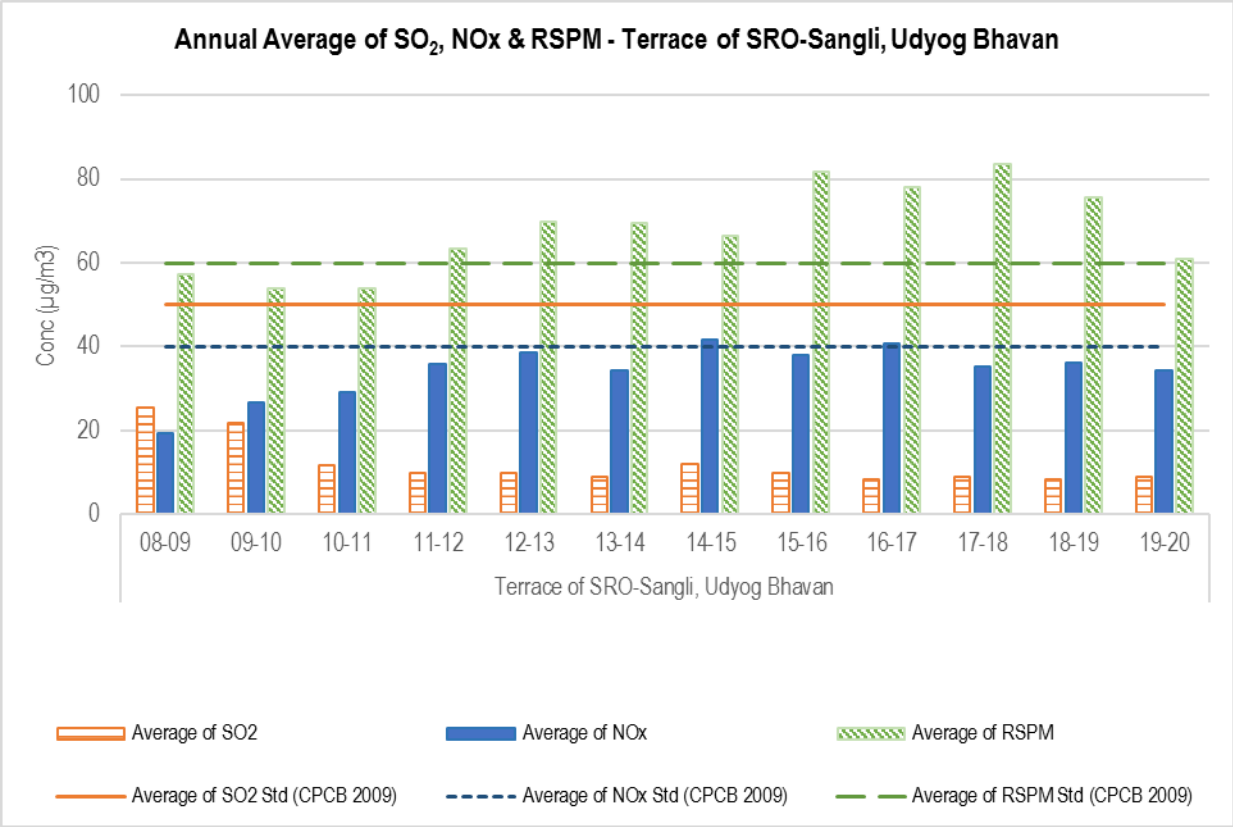



**Figure No. 88: Annual average trend of $SO_2$, NOx, and RSPM at Terrace of SRO – Sangli, Udyog Bhavan**

## Sangli - Sangli - Miraj Primary Municipal School

**Table No. 63: Data for Monthly average reading recorded at Sangli - Miraj Primary Municipal School**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Sangli-Miraj Primary Municipal School** | 2019 | Apr | 11 | 49 | 61 |
| | | May | 11 | 34 | 47 |
| | | Jun | 10 | 35 | 47 |
| | | Jul | 9 | 26 | 31 |
| | | Aug | 8 | 22 | 34 |
| | | Sep | 9 | 24 | 24 |
| | | Oct | 9 | 36 | 31 |
| | | Nov | 10 | 48 | 74 |
| | | Dec | 12 | 63 | 121 |
| | 2020 | Jan | 15 | 81 | 147 |
| | | Feb | 11 | 63 | 138 |
| | | Mar | 11 | 54 | 87 |

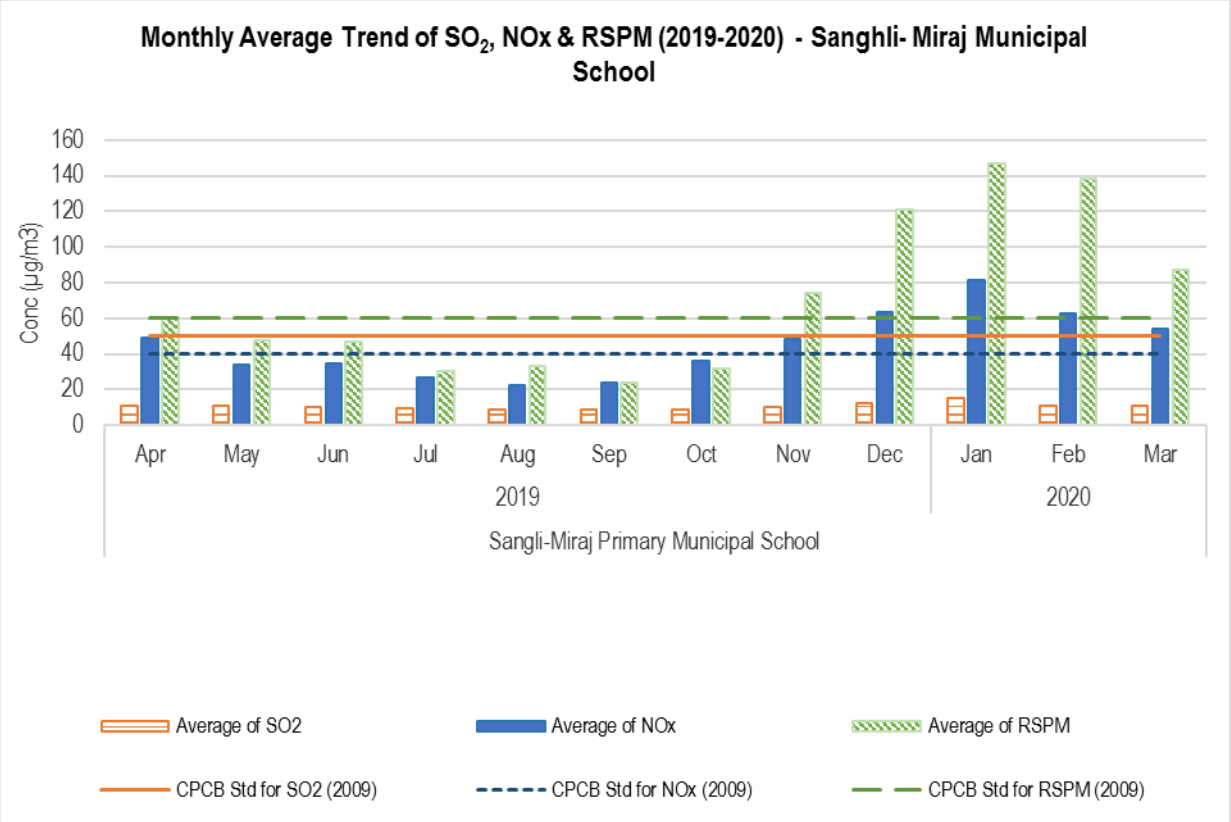



**Figure No. 89: Monthly average reading recorded at Sangli - Miraj Primary Municipal School**

**Table No. 64: Data for Annual average trend of $SO_2$, NOx, and RSPM at Sangli - Miraj Primary Municipal School**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | ***50*** | ***40*** | ***60*** |
| **Sangli-Miraj Primary Municipal school** | 08-09 | 22 | 23 | 87 |
| | 09-10 | 23 | 32 | 68 |
| | 10-11 | 13 | 32 | 69 |
| | 11-12 | 10 | 36 | 72 |
| | 12-13 | 11 | 44 | 79 |
| | 13-14 | 9 | 40 | 74 |
| | 14-15 | 13 | 48 | 91 |
| | 15-16 | 11 | 44 | 77 |
| | 16-17 | 9 | 44 | 72 |
| | 17-18 | 12 | 50 | 81 |
| | 18-19 | 10 | 47 | 80 |
| | 19-20 | 11 | 44 | 70 |

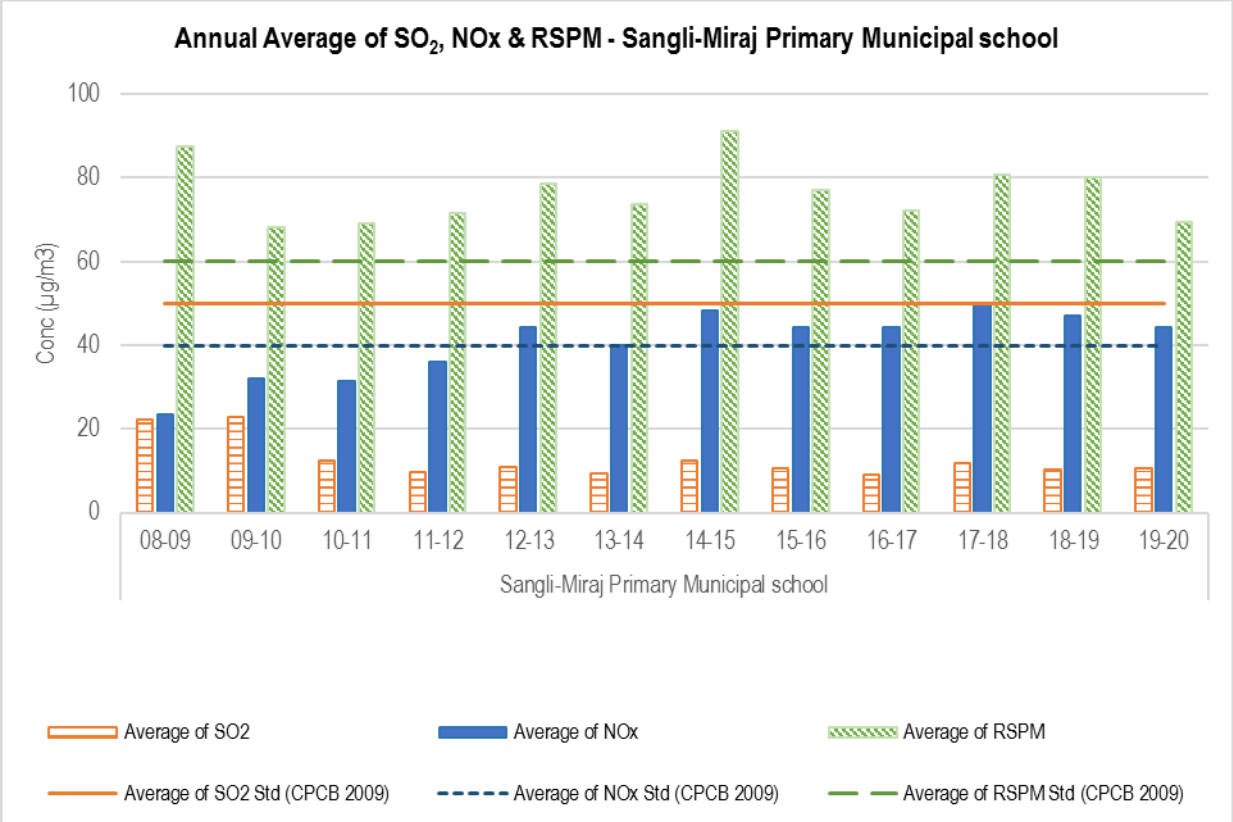



**Figure No. 90: Annual average trend of $SO_2$, NOx, and RSPM at Sangli - Miraj Primary Municipal School**

## Sangli - Krishna Valley School

**Table No. 65: Data for Monthly average reading recorded at Krishna Valley School**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Krishna valley School** | 2019 | Apr | 11 | 45 | 75 |
| | | May | 11 | 36 | 94 |
| | | Jun | 10 | 30 | 63 |
| | | Jul | 9 | 26 | 37 |
| | | Aug | 7 | 21 | 41 |
| | | Sep | 9 | 25 | 28 |
| | | Oct | 9 | 30 | 25 |
| | | Nov | 10 | 40 | 77 |
| | | Dec | 11 | 57 | 99 |
| | 2020 | Jan | 14 | 60 | 132 |
| | | Feb | 11 | 55 | 158 |
| | | Mar | 10 | 51 | 120 |

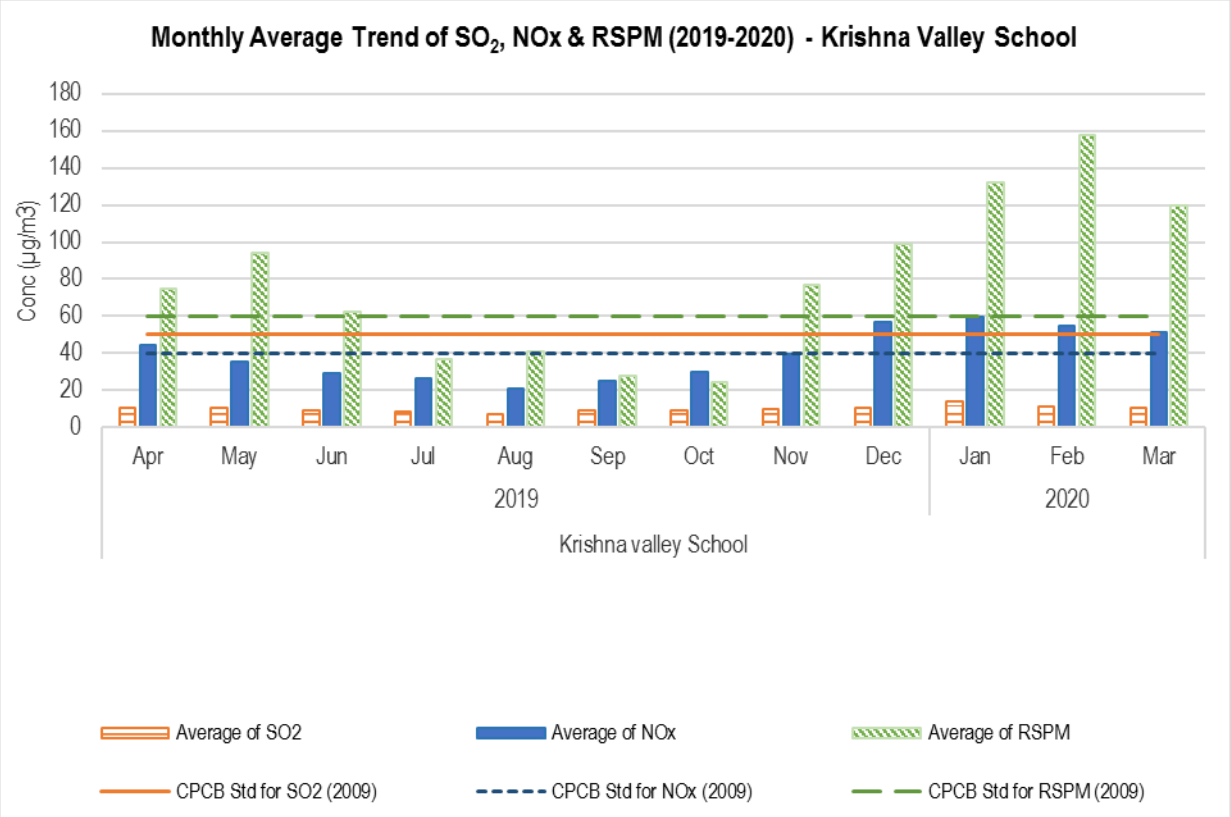



**Figure No. 91: Monthly average reading recorded at Krishna Valley School**

**Table No. 66: Data for Annual average trend of $SO_2$, NOx, and RSPM at Krishna Valley School**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Krishna Valley school | 08-09 | 26 | 21 | 71 |
| | 09-10 | 24 | 34 | 82 |
| | 10-11 | 12 | 30 | 75 |
| | 11-12 | 10 | 36 | 89 |
| | 12-13 | 12 | 43 | 97 |
| | 13-14 | 11 | 37 | 95 |
| | 14-15 | 13 | 44 | 103 |
| | 15-16 | 11 | 37 | 92 |
| | 16-17 | 9 | 35 | 76 |
| | 17-18 | 11 | 40 | 80 |
| | 18-19 | 10 | 40 | 83 |
| | 19-20 | 10 | 39 | 78 |

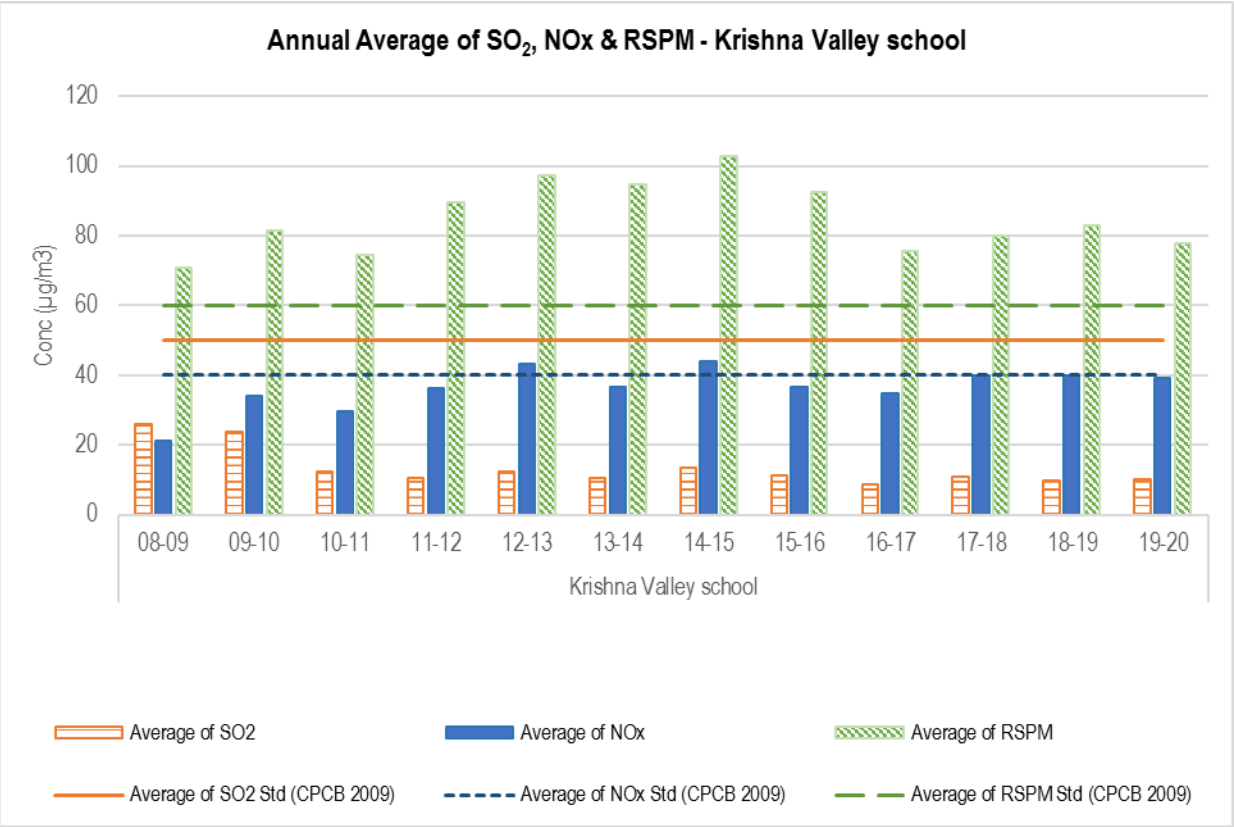
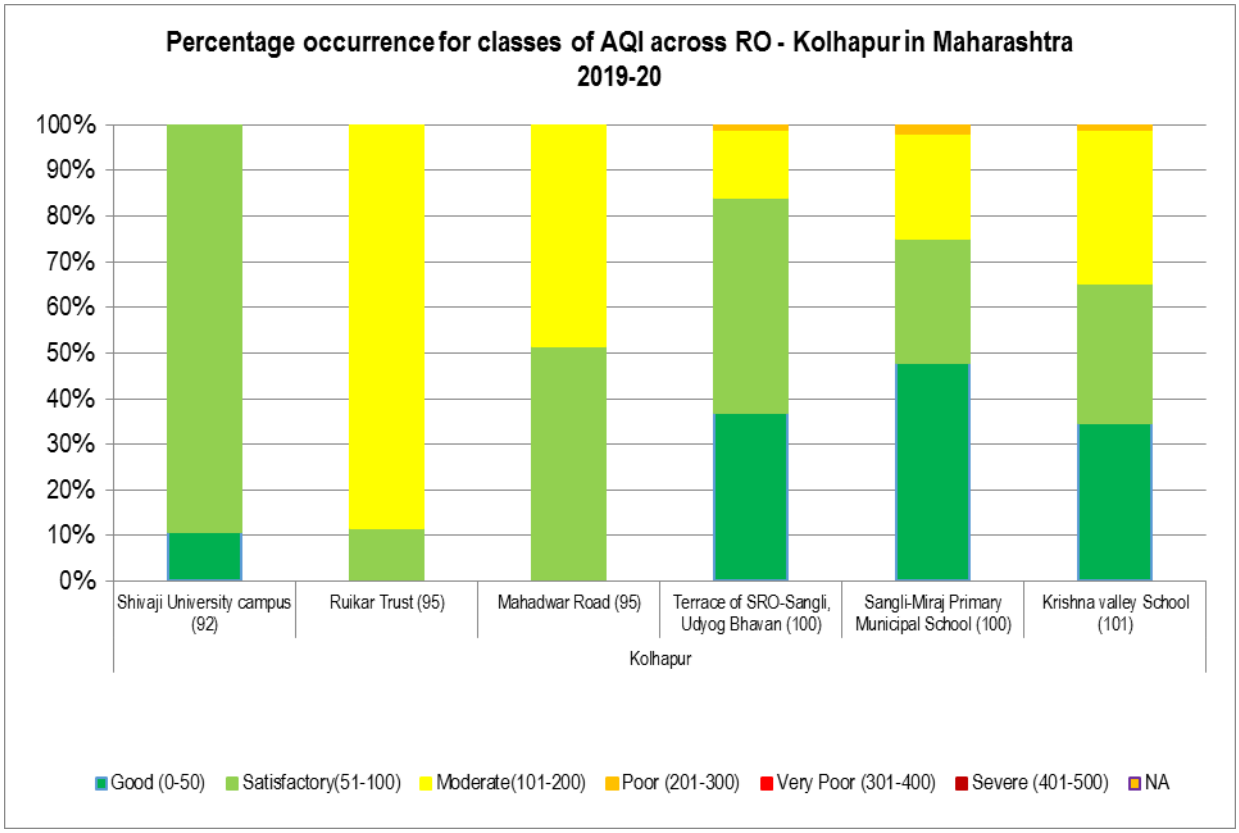


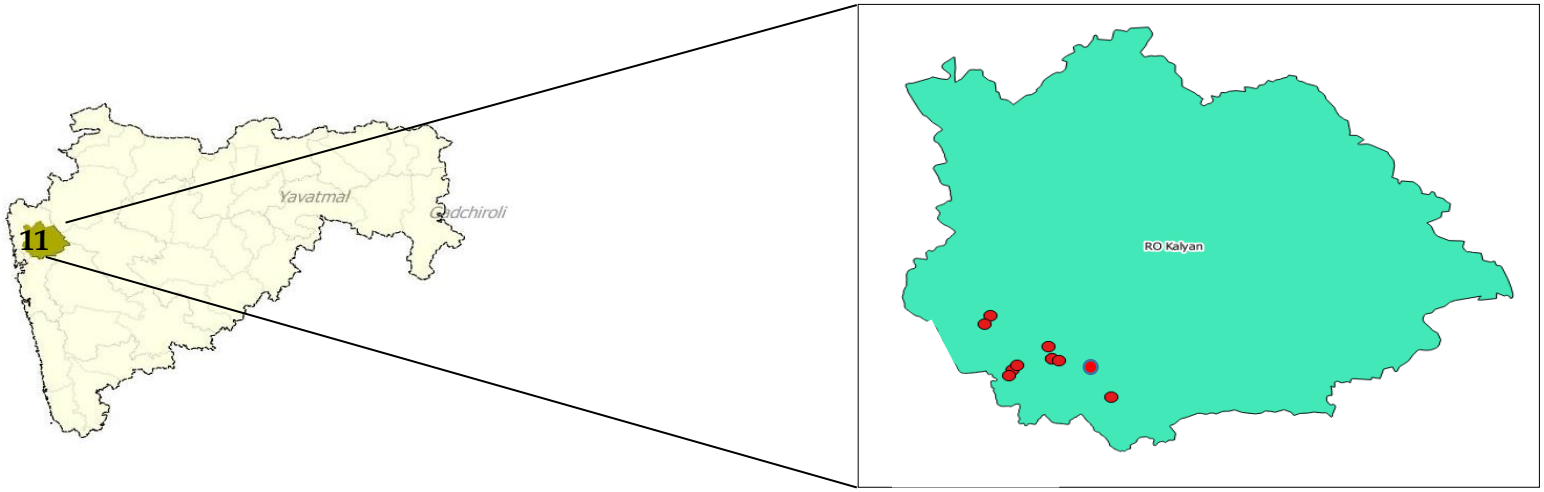

**Figure No. 92: Annual average trend of $SO_2$, NOx, and RSPM at Krishna Valley School**

**Table No. 67: Percentage exceedance of pollutants at Kolhapur RO**

| Station Name | Total Observation | No. of times exceedance occurred | | | % Exceedance | | |
|---|---|---|---|---|---|---|---|
| | | $SO_2$ | NOx | RSPM | $SO_2$ | NOx | RSPM |
| Shivaji University campus | 92 | | | | | | |
| Ruikar Trust | 95 | | 3 | 84 | | 3 | 88 |
| Mahadwar Road | 95 | | | 46 | | | 48 |
| Terrace of SRO-Sangli, Udyog Bhavan | 100 | | 2 | 16 | | 2 | 16 |
| Sangli-Miraj Primary Municipal School | 100 | | 4 | 25 | | 4 | 25 |
| Krishna valley School | 101 | | | 35 | | | 35 |



# RO - Kalyan




| MPCB RO | Region | Station code | Station name | Type | Latitude (deg) | Longitude (deg) |
|---|---|---|---|---|---|---|
| Kalyan | Ambernath | 445 | Ambernath | Rural and other areas | 19° 13' 26.2" N | 73° 09' 15.0" E |
| | Badlapur | 649 | Badlapur - BIWA House | Rural and other areas | 19° 09' 22.2" N | 73° 14' 16.0" E |
| | Bhiwandi | | I.G.M. Hospital | Rural and other areas | 19° 17' 57.2" N | 73° 04' 00.4" E |
| | Bhiwandi | | Prematai Hall | Commercial | 19° 17' 07.7" N | 73° 03' 27.8" E |
| | Dombivali | 265 | Dombivali | Industrial | 19° 12' 15.8" N | 73° 05' 53.9" E |
| | Dombivali | | MIDC Office Dombivali | Industrial | 19° 12' 47.0" N | 73° 06' 17.4" E |
| | Dombivali | | Dombivali CAAQMS | Industrial | 19° 11' 38.38"N | 73° 05' 32.35"E |
| | Kalyan | | Kalyan CAAQMS | Commercial/ Residential | 19° 31' 24.6"N | 73° 08' 30.84"E |
| | Kalyan | | MPCB RO Kalyan office | Commercial | 19° 14' 42.0" N | 73° 08' 58.6" E |
| | Ulhasnagar | 647 | Smt. CHM College Campus | Rural and other areas | 19° 13' 12.4" N | 73° 09' 51.3" E |
| | Ulhasnagar | 648 | Powai Chowk | Rural and other areas | 19° 13' 26.0" N | 73° 09' 16.2" E |

# Ambernath

**Table No. 68: Data for Monthly average reading recorded at Ambernath**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Ambernath** | 2019 | Apr | 26 | 70 | 119 |
| | | May | 24 | 65 | 99 |
| | | Jun | 26 | 50 | 73 |
| | | Jul | 22 | 72 | 50 |
| | | Aug | 24 | 55 | 59 |
| | | Sep | 29 | 60 | 58 |
| | | Oct | 31 | 48 | 84 |
| | | Nov | 35 | 49 | 111 |
| | | Dec | 26 | 54 | 92 |
| | 2020 | Jan | 22 | 48 | 81 |
| | | Feb | 24 | 61 | 92 |

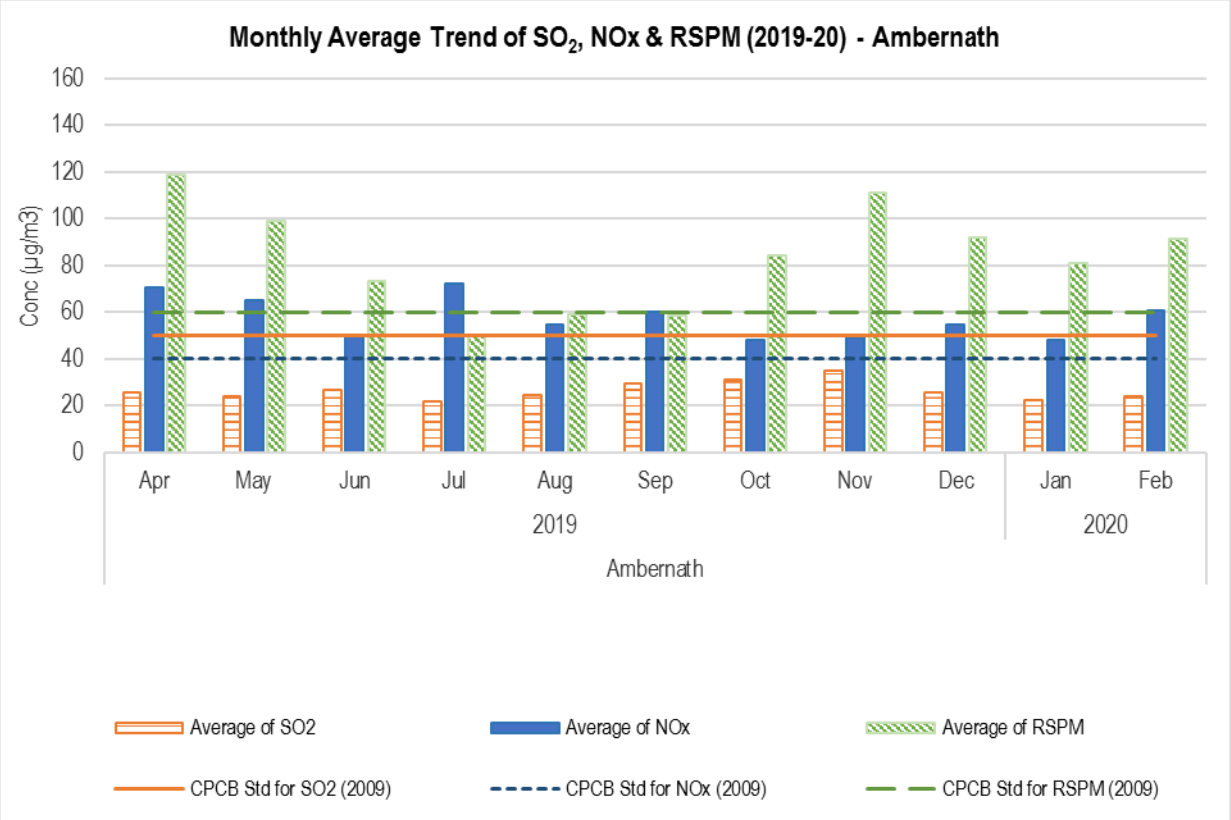



**Figure No. 93: Monthly average reading recorded at Ambernath**

**Table No. 69: Data for Annual average trend of $SO_2$, NOx, and RSPM at Ambernath**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | ***50*** | ***40*** | ***60*** |
| **Ambernath** | 04-05 | 31 | 36 | 97 |
| | 05-06 | 30 | 52 | 83 |
| | 06-07 | 24 | 44 | 93 |
| | 07-08 | 31 | 40 | 106 |
| | 08-09 | 29 | 53 | 70 |
| | 12-13 | 42 | 91 | 118 |
| | 13-14 | 31 | 64 | 111 |
| | 14-15 | 27 | 54 | 101 |
| | 15-16 | 22 | 58 | 111 |
| | 16-17 | 26 | 71 | 123 |
| | 17-18 | 24 | 72 | 259 |
| | 18-19 | 25 | 58 | 116 |
| | 19-20 | 26 | 58 | 83 |

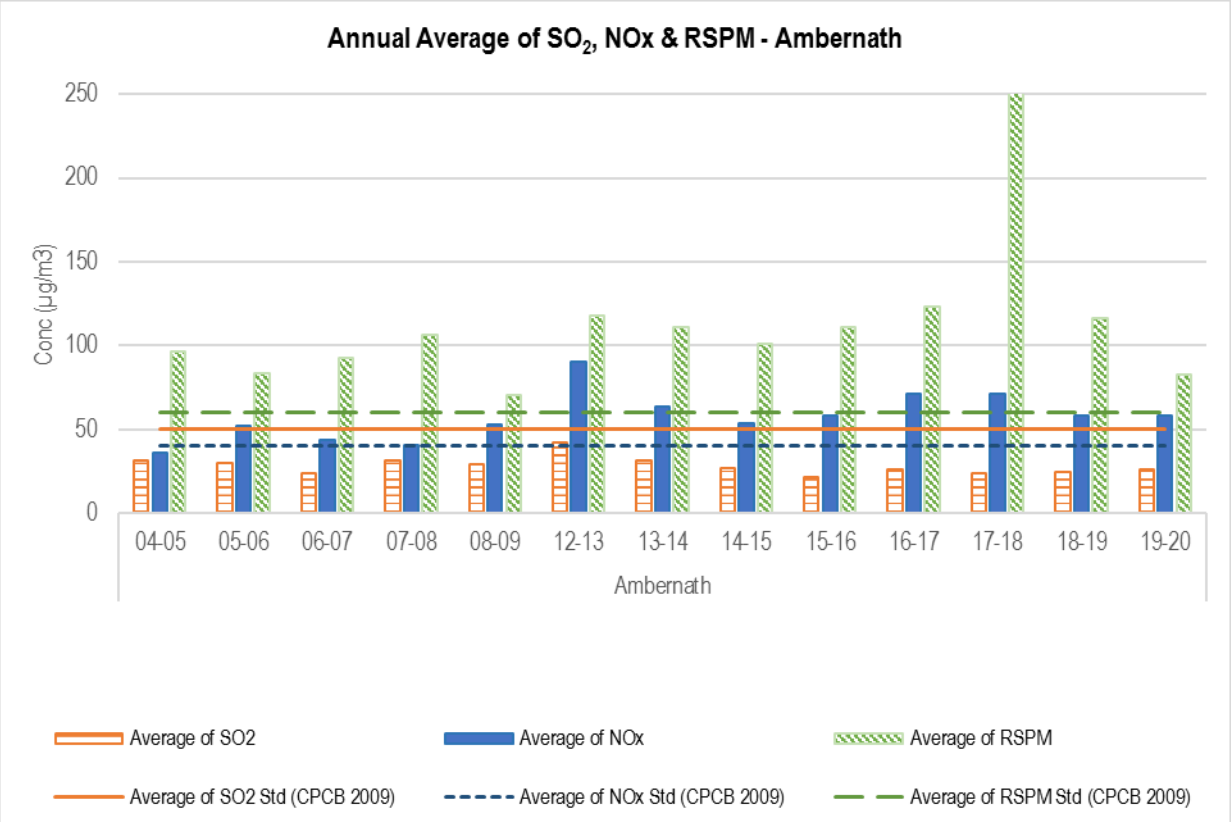



**Figure No. 94: Annual average trend of $SO_2$, NOx, and RSPM at Ambernath**

# Badlapur - Badlapur - BIWA House

**Table No. 70: Data for Monthly average reading recorded at Badlapur - BIWA House**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Badlapur - BIWA House** | 2019 | Apr | 36 | 64 | 119 |
| | | May | 23 | 60 | 98 |
| | | Jun | 25 | 62 | 79 |
| | | Jul | 24 | 63 | 72 |
| | | Aug | 29 | 55 | 51 |
| | | Sep | 26 | 57 | 79 |
| | | Oct | 26 | 56 | 98 |
| | | Nov | 30 | 54 | 111 |
| | | Dec | 28 | 58 | 100 |
| | 2020 | Jan | 22 | 54 | 90 |
| | | Feb | 23 | 57 | 102 |

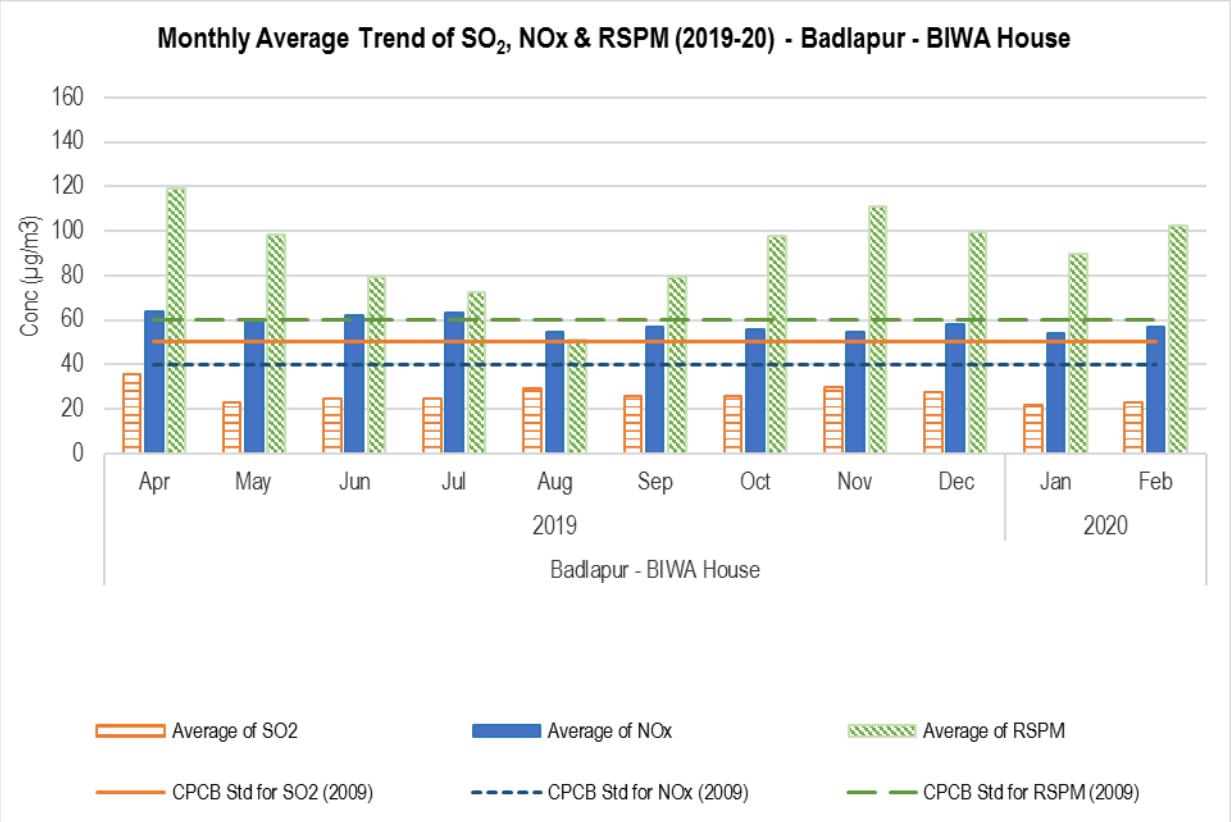



**Figure No. 95: Monthly average reading recorded at Badlapur - BIWA House**

**Table No. 71: Data for Annual average trend of $SO_2$, NOx, and RSPM at Badlapur - BIWA House**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Badlapur - BIWA House | 06-07 | 27 | 39 | 141 |
| | 07-08 | 30 | 42 | 93 |
| | 08-09 | 35 | 76 | 98 |
| | 09-10 | 55 | 85 | 103 |
| | 10-11 | 36 | 74 | 118 |
| | 11-12 | 41 | 68 | 121 |
| | 12-13 | 41 | 69 | 100 |
| | 13-14 | 35 | 49 | 96 |
| | 14-15 | 29 | 51 | 101 |
| | 15-16 | 23 | 61 | 113 |
| | 16-17 | 25 | 68 | 120 |
| | 17-18 | 31 | 73 | 239 |
| | 18-19 | 24 | 58 | 111 |
| | 19-20 | 26 | 58 | 91 |

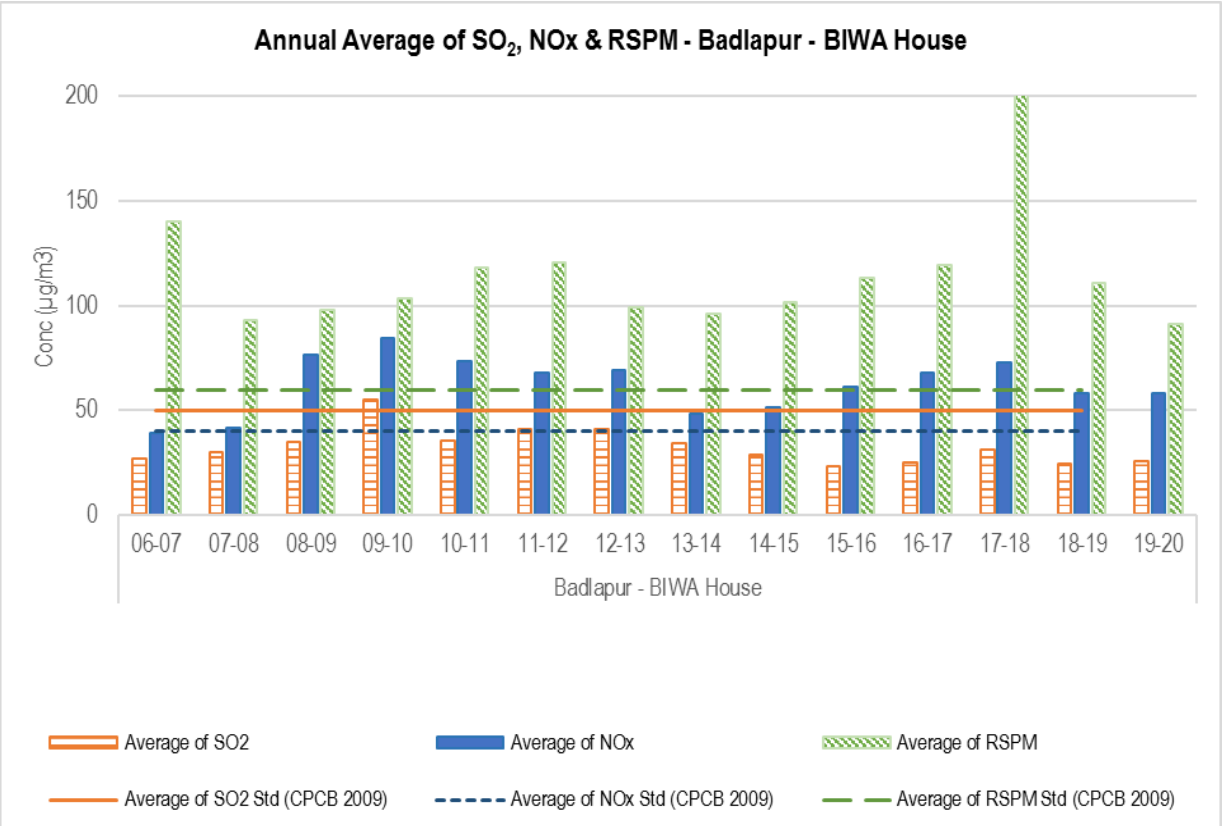



**Figure No. 96: Annual average trend of $SO_2$, NOx, and RSPM at Badlapur - BIWA House**

## Bhiwandi - IGM Hospital

**Table No. 72: Data for Monthly average reading recorded at IGM Hospital - Bhiwandi**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **I.G.M. Hospital** | 2019 | Apr | 34 | 44 | 67 |
| | | May | 27 | 36 | 68 |
| | | Jun | 30 | 43 | 63 |
| | | Jul | 30 | 43 | 76 |
| | | Aug | 36 | 51 | 67 |
| | | Sep | 35 | 47 | 66 |
| | | Oct | 30 | 43 | 76 |
| | | Nov | 35 | 44 | 67 |
| | | Dec | 35 | 43 | 66 |
| | 2020 | Jan | 32 | 45 | 66 |
| | | Feb | 34 | 44 | 67 |
| | | Mar | 21 | 32 | 47 |

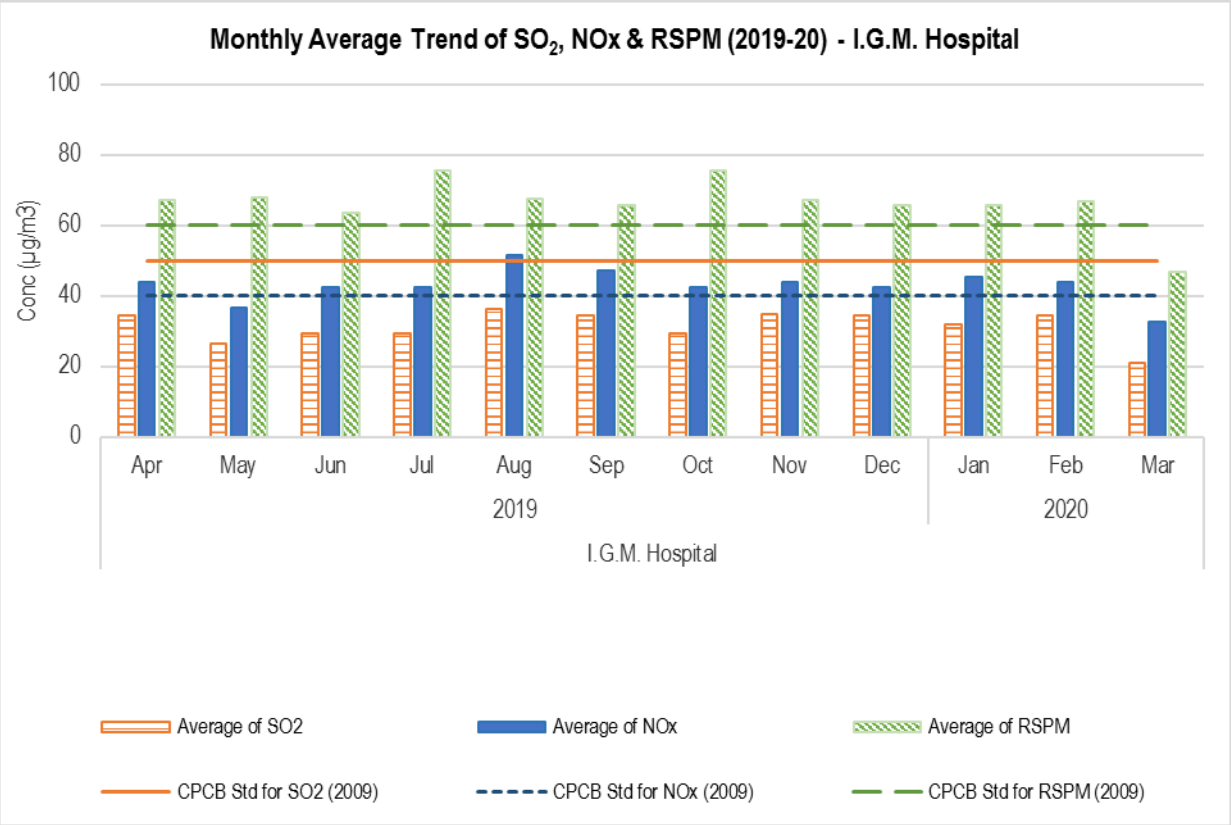



**Figure No. 97: Monthly average reading recorded at IGM Hospital - Bhiwandi**

**Table No. 73: Data for Annual average trend of $SO_2$, NOx, and RSPM at IGM Hospital - Bhiwandi**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| I.G.M. Hospital | 11-12 | 23 | 29 | 62 |
| | 12-13 | 26 | 35 | 63 |
| | 13-14 | 30 | 40 | 72 |
| | 14-15 | 32 | 42 | 72 |
| | 15-16 | 34 | 43 | 73 |
| | 16-17 | 33 | 45 | 71 |
| | 17-18 | 31 | 42 | 68 |
| | 18-19 | 33 | 44 | 70 |
| | 19-20 | 31 | 43 | 66 |

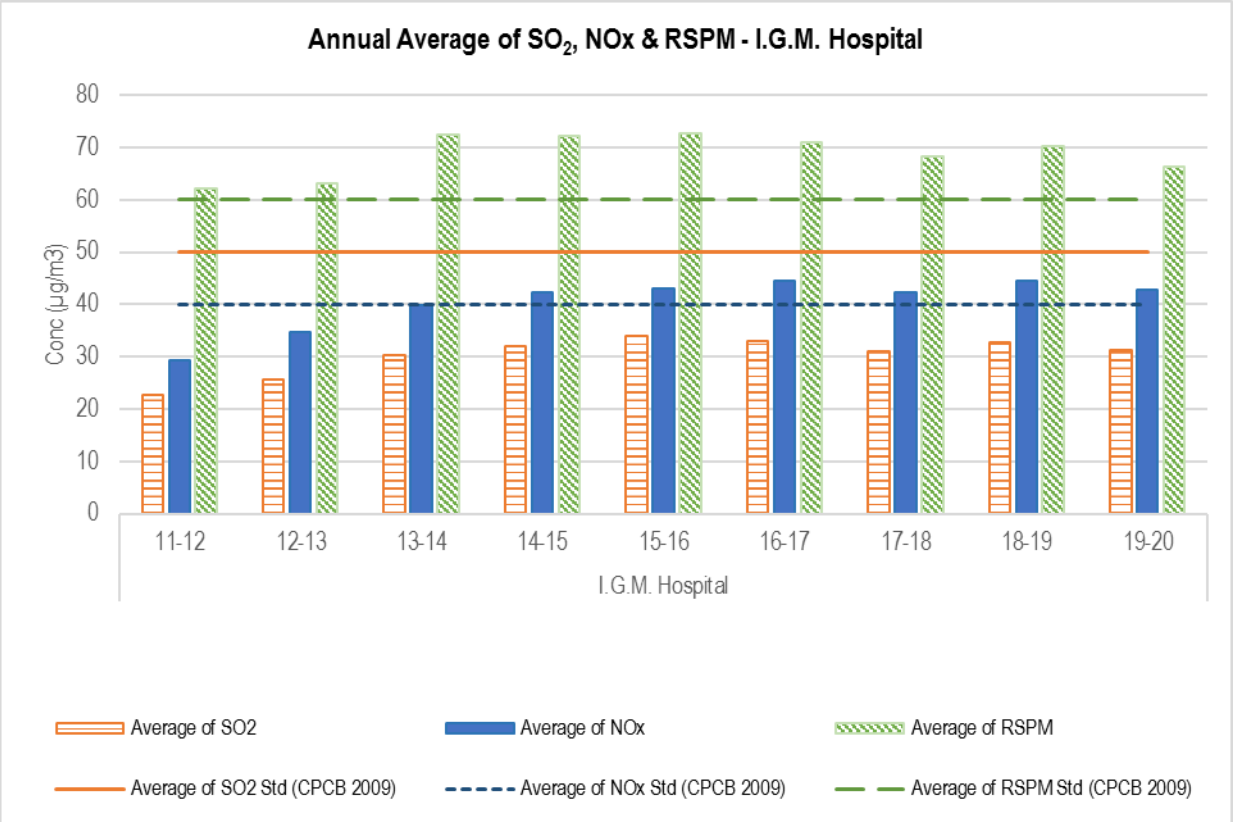



**Figure No. 98: Annual average trend of $SO_2$, NOx, and RSPM at IGM Hospital - Bhiwandi**

## Bhiwandi - Prematai Hall

**Table No. 74: Data for Monthly average reading recorded at Prematai Hall - Bhiwandi**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Prematai hall** | 2019 | Apr | 35 | 43 | 66 |
| | | May | 35 | 43 | 66 |
| | | Jun | 31 | 42 | 68 |
| | | Jul | 32 | 44 | 80 |
| | | Aug | 34 | 46 | 66 |
| | | Sep | 27 | 36 | 68 |
| | | Oct | 35 | 43 | 66 |
| | | Nov | 37 | 43 | 66 |
| | | Dec | 35 | 43 | 66 |
| | 2020 | Jan | 30 | 43 | 63 |
| | | Feb | 35 | 43 | 62 |
| | | Mar | 23 | 28 | 41 |

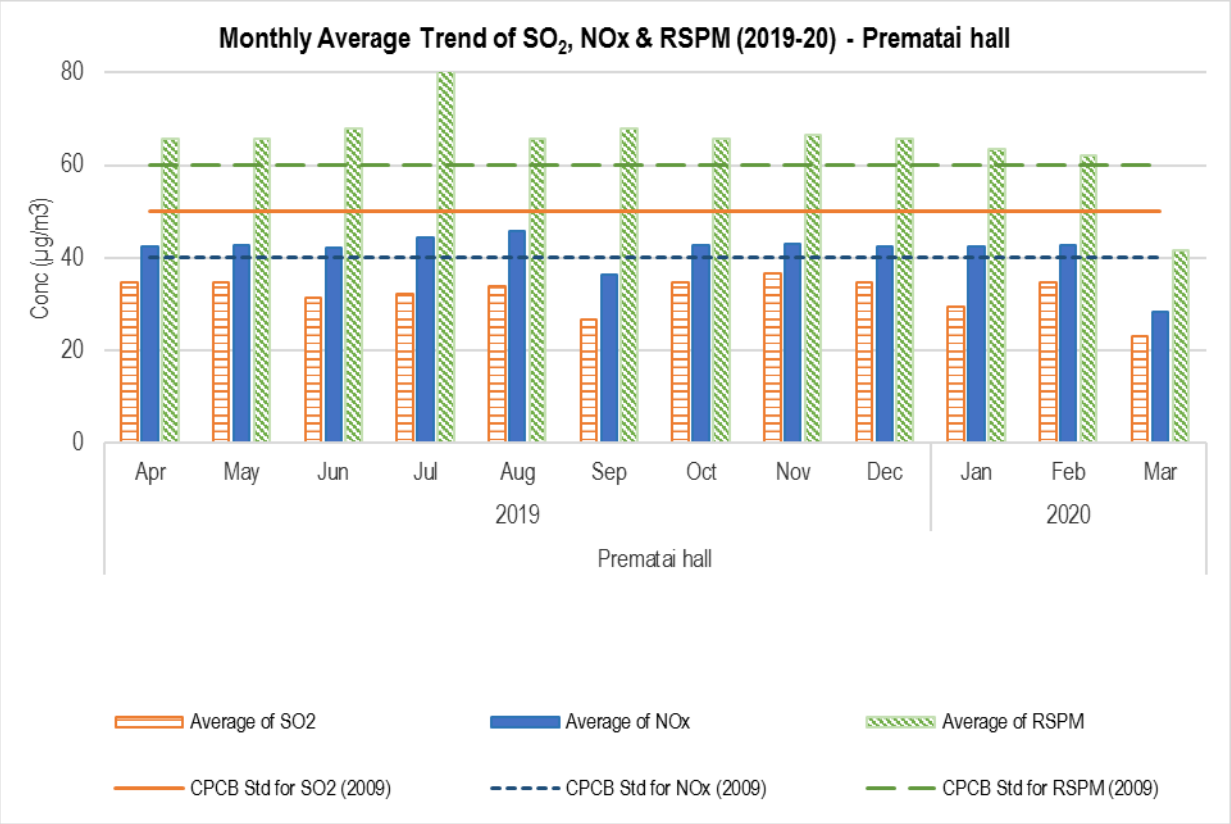



**Figure No. 99: Monthly average reading recorded at Prematai Hall - Bhiwandi**

**Table No. 75: Data for Annual average trend of $SO_2$, NOx, and RSPM at Prematai Hall - Bhiwandi**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | ***50*** | ***40*** | ***60*** |
| **Prematai hall** | 11-12 | 15 | 23 | 52 |
| | 12-13 | 24 | 33 | 59 |
| | 13-14 | 29 | 38 | 66 |
| | 14-15 | 32 | 42 | 71 |
| | 15-16 | 34 | 44 | 72 |
| | 16-17 | 33 | 42 | 70 |
| | 17-18 | 34 | 43 | 66 |
| | 18-19 | 33 | 45 | 67 |
| | 19-20 | 32 | 41 | 65 |

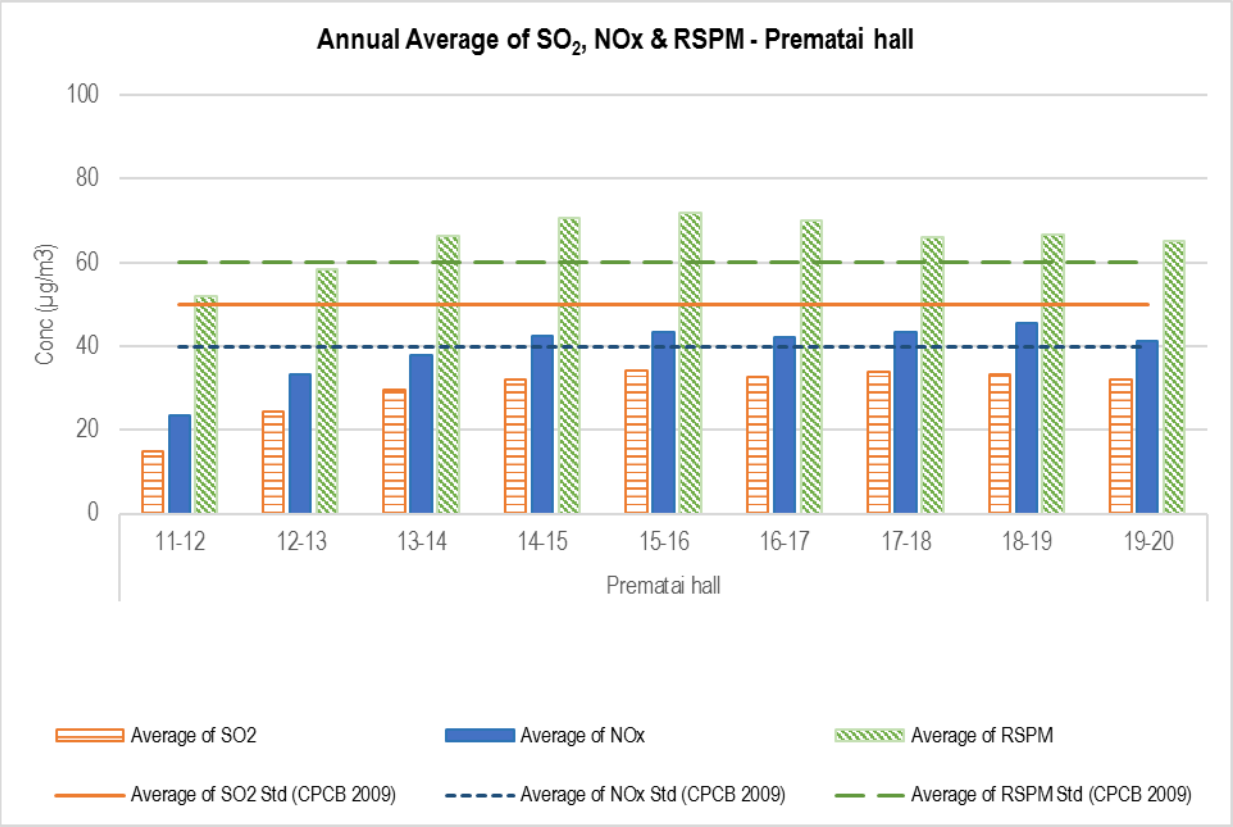



**Figure No. 100: Annual average trend of $SO_2$, NOx, and RSPM at Prematai Hall - Bhiwandi**

# Dombivali

**Table No. 76: Data for Monthly average reading recorded at Dombivali**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Dombivali** | 2019 | Apr | 27 | 73 | 109 |
| | | May | 23 | 66 | 119 |
| | | Jun | 23 | 61 | 70 |
| | | Jul | 24 | 58 | 79 |
| | | Aug | 29 | 55 | 79 |
| | | Sep | 30 | 72 | 115 |
| | | Oct | 37 | 67 | 100 |
| | | Nov | 33 | 40 | 102 |
| | | Dec | 26 | 51 | 103 |
| | 2020 | Jan | 26 | 62 | 96 |
| | | Feb | 26 | 66 | 114 |

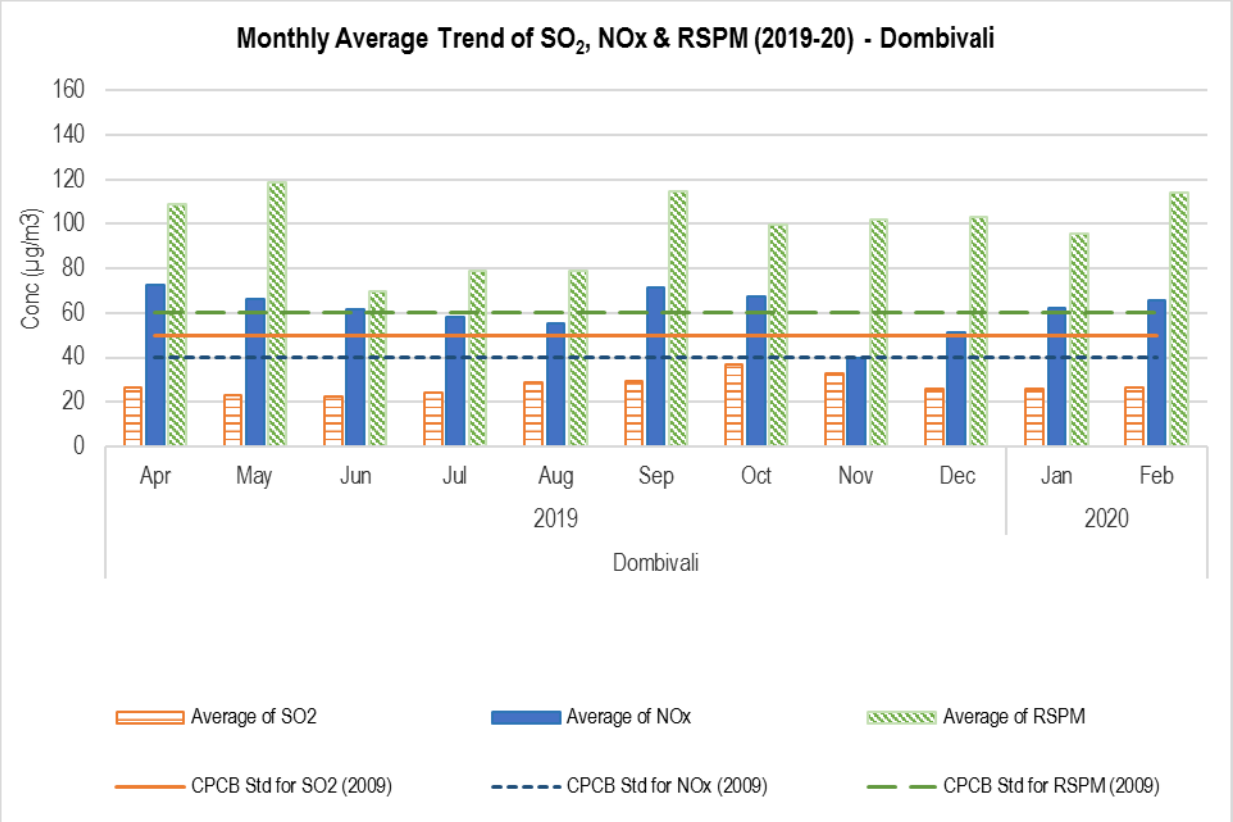



**Figure No. 101: Monthly average reading recorded at Dombivali**

**Table No. 77: Data for Annual average trend of $SO_2$, NOx, and RSPM at Dombivali**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | ***50*** | ***40*** | ***60*** |
| **Dombivali** | 04-05 | 42 | 38 | 71 |
| | 05-06 | 35 | 52 | 109 |
| | 06-07 | 24 | 38 | 120 |
| | 07-08 | 37 | 41 | 98 |
| | 08-09 | 34 | 55 | 68 |
| | 12-13 | 50 | 94 | 123 |
| | 13-14 | 35 | 66 | 111 |
| | 14-15 | 29 | 62 | 111 |
| | 15-16 | 23 | 58 | 112 |
| | 16-17 | 27 | 70 | 112 |
| | 17-18 | 26 | 77 | 248 |
| | 18-19 | 26 | 56 | 124 |
| | 19-20 | 27 | 61 | 98 |

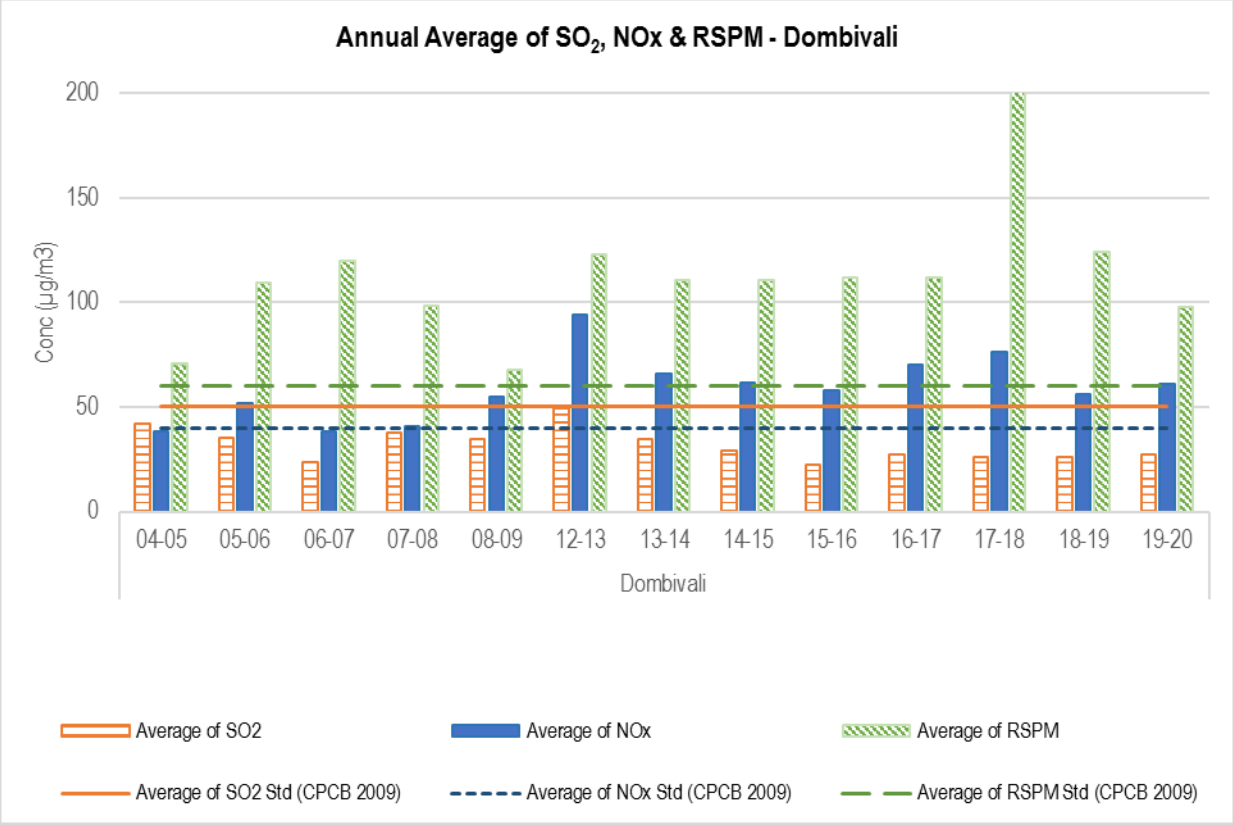



**Figure No. 102: Annual average trend of $SO_2$, NOx, and RSPM at Dombivali**

## Dombivali - MIDC Office Dombivali

**Table No. 78: Data for Monthly average reading recorded at MIDC Office - Dombivali**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **MIDC Office Dombivali** | 2019 | Apr | 27 | 73 | 109 |
| | | May | 28 | 72 | 91 |
| | | Jun | 22 | 54 | 109 |
| | | Jul | 23 | 68 | 60 |
| | | Aug | 26 | 63 | 66 |
| | | Sep | 33 | 74 | 64 |
| | | Oct | 36 | 72 | 125 |
| | | Nov | 33 | 66 | 110 |
| | | Dec | 26 | 63 | 121 |
| | 2020 | Jan | 25 | 57 | 93 |
| | | Feb | 27 | 63 | 112 |

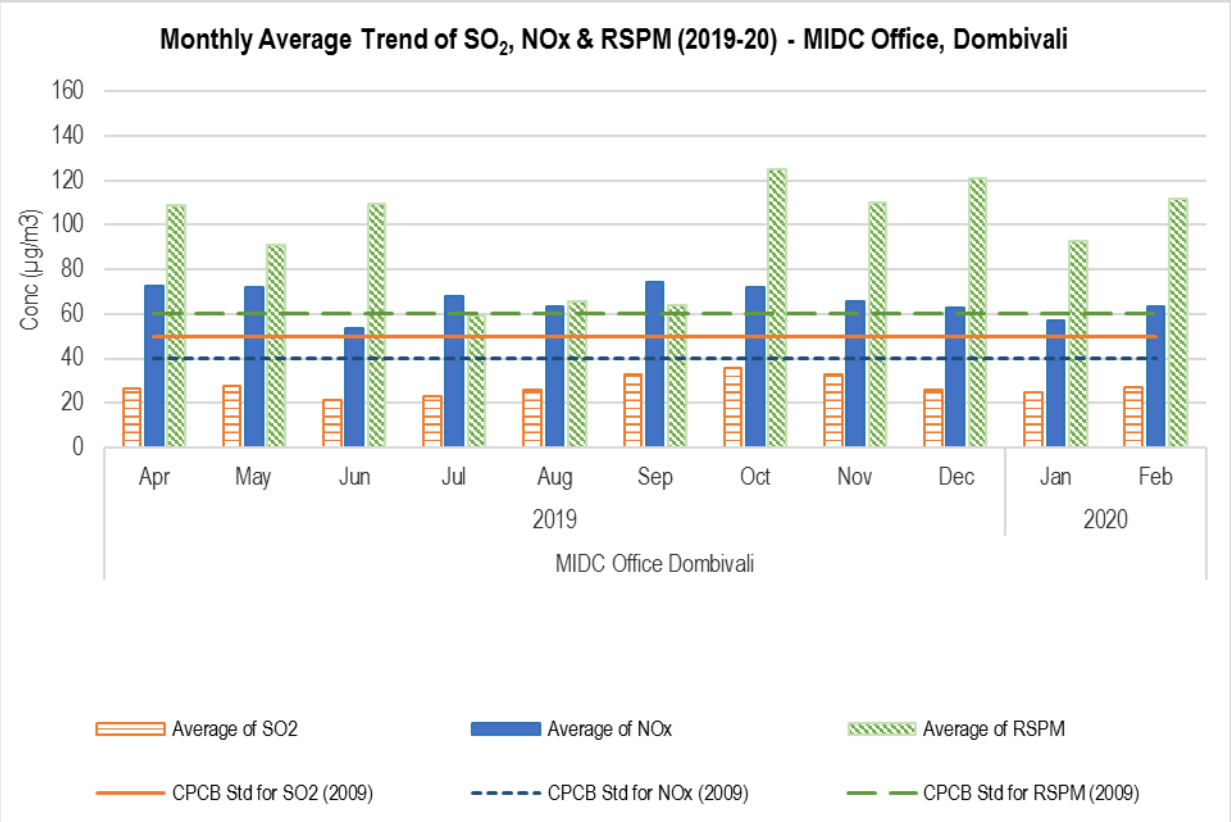



**Figure No. 103: Monthly average reading recorded at MIDC Office - Dombivali**

**Table No. 79: Data for Annual average trend of $SO_2$, NOx, and RSPM at MIDC Office - Dombivali**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| MIDC Office Dombivali | 12-13 | 37 | 61 | 86 |
| | 13-14 | 32 | 62 | 109 |
| | 14-15 | 29 | 67 | 124 |
| | 15-16 | 21 | 58 | 110 |
| | 16-17 | 26 | 69 | 120 |
| | 17-18 | 24 | 73 | 213 |
| | 18-19 | 26 | 59 | 120 |
| | 19-20 | 27 | 66 | 96 |

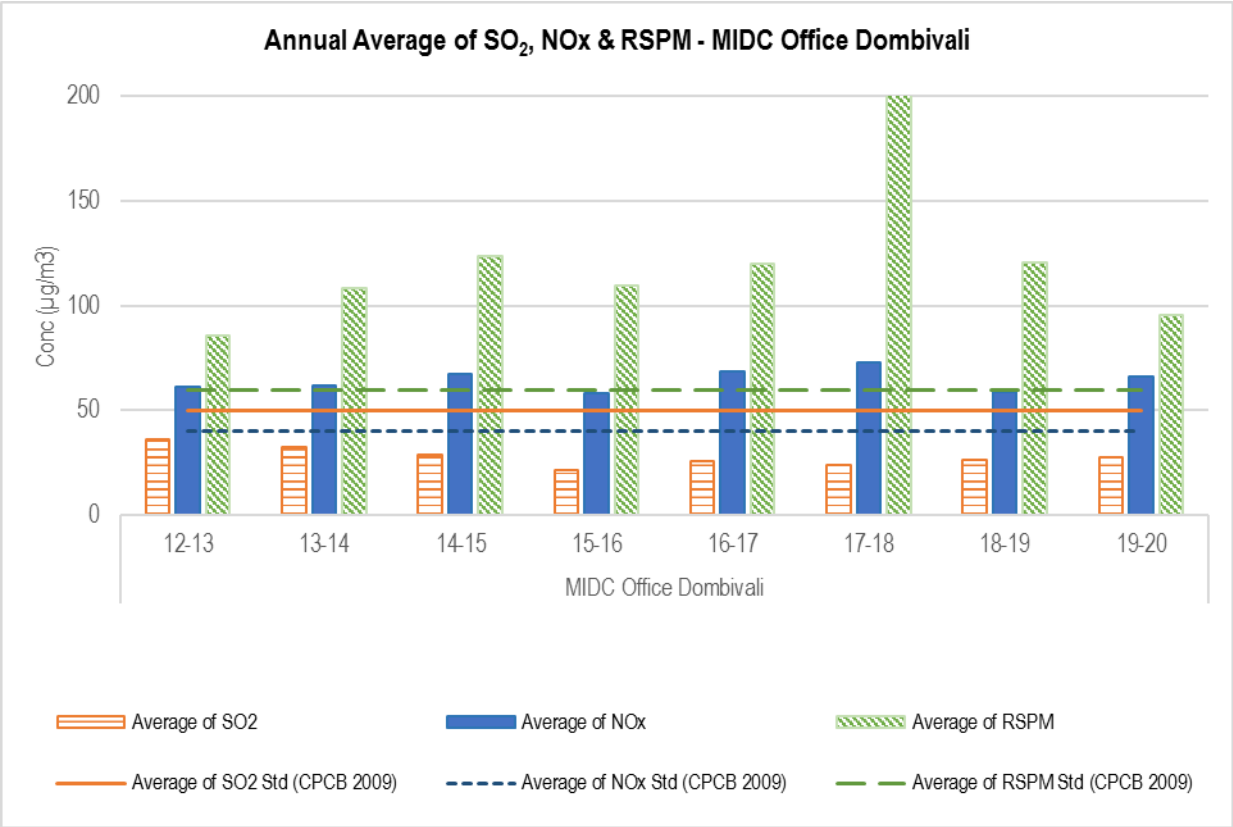
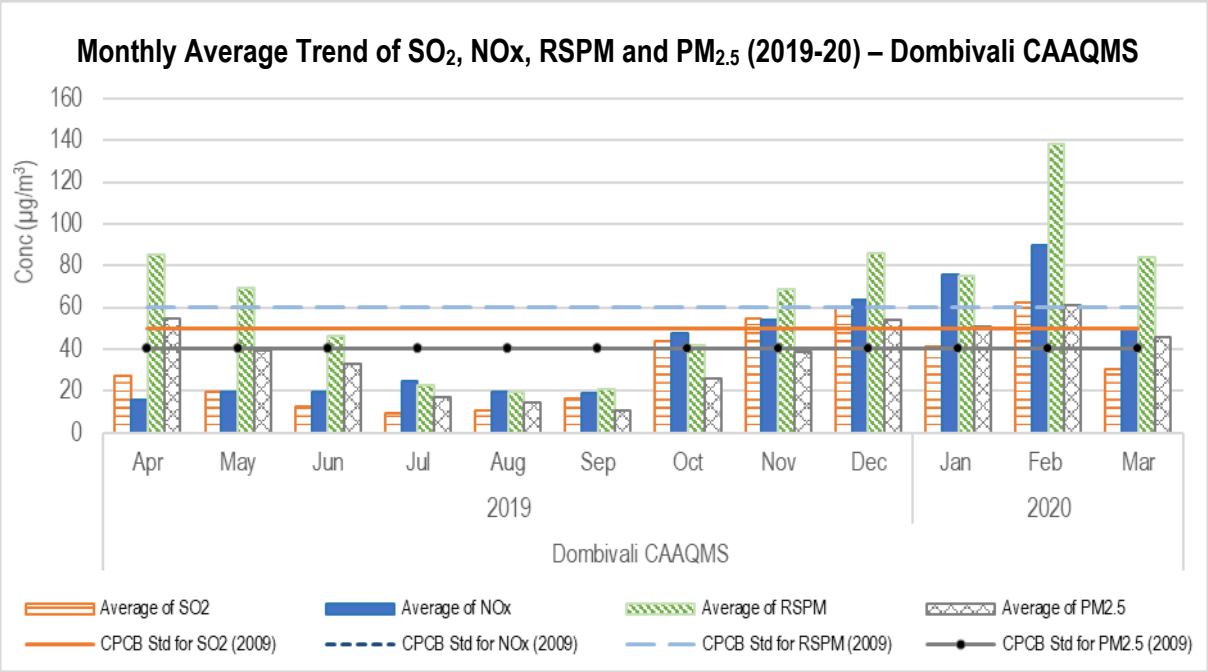



**Figure No. 104: Annual average trend of $SO_2$, NOx, and RSPM at MIDC Office - Dombivali**

# Dombivali - Dombivali CAAQMS

**Table No. 80: Data for Monthly average reading recorded at Dombivali CAAQMS**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** | ***40*** |
| **Dombivali CAAQMS** | 2019 | Apr | 27 | 16 | 86 | 55 |
| | | May | 20 | 20 | 70 | 40 |
| | | Jun | 13 | 20 | 46 | 33 |
| | | Jul | 9 | 25 | 23 | 17 |
| | | Aug | 11 | 20 | 20 | 15 |
| | | Sep | 16 | 19 | 21 | 11 |
| | | Oct | 44 | 48 | 42 | 26 |
| | | Nov | 54 | 54 | 69 | 39 |
| | | Dec | 60 | 64 | 86 | 54 |
| | 2020 | Jan | 41 | 76 | 75 | 51 |
| | | Feb | 62 | 90 | 138 | 61 |
| | | Mar | 31 | 50 | 84 | 46 |




*CPCB standards for NOx and PM 2.5 are same, so the lines indicating them overlap and are not distinctly visible*

**Figure No. 105: Monthly average reading recorded at Dombivali CAAQMS**

**Table No. 81: Data for Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Dombivali CAAQMS**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|
| | | ***50*** | ***40*** | ***60*** | ***40*** |
| **Dombivali CAAQMS** | 04-05 | 42 | 38 | 71 | |
| | 05-06 | 35 | 52 | 109 | |
| | 06-07 | 24 | 38 | 120 | |
| | 07-08 | 37 | 41 | 98 | |
| | 08-09 | 34 | 55 | 68 | |
| | 12-13 | 50 | 94 | 123 | |
| | 13-14 | 35 | 66 | 111 | |
| | 14-15 | 29 | 62 | 111 | |
| | 15-16 | 23 | 58 | 112 | |
| | 16-17 | 27 | 70 | 112 | |
| | 17-18 | 26 | 77 | 248 | |
| | 18-19 | 26 | 56 | 124 | |
| | 19-20 | 34 | 43 | 65 | 38 |

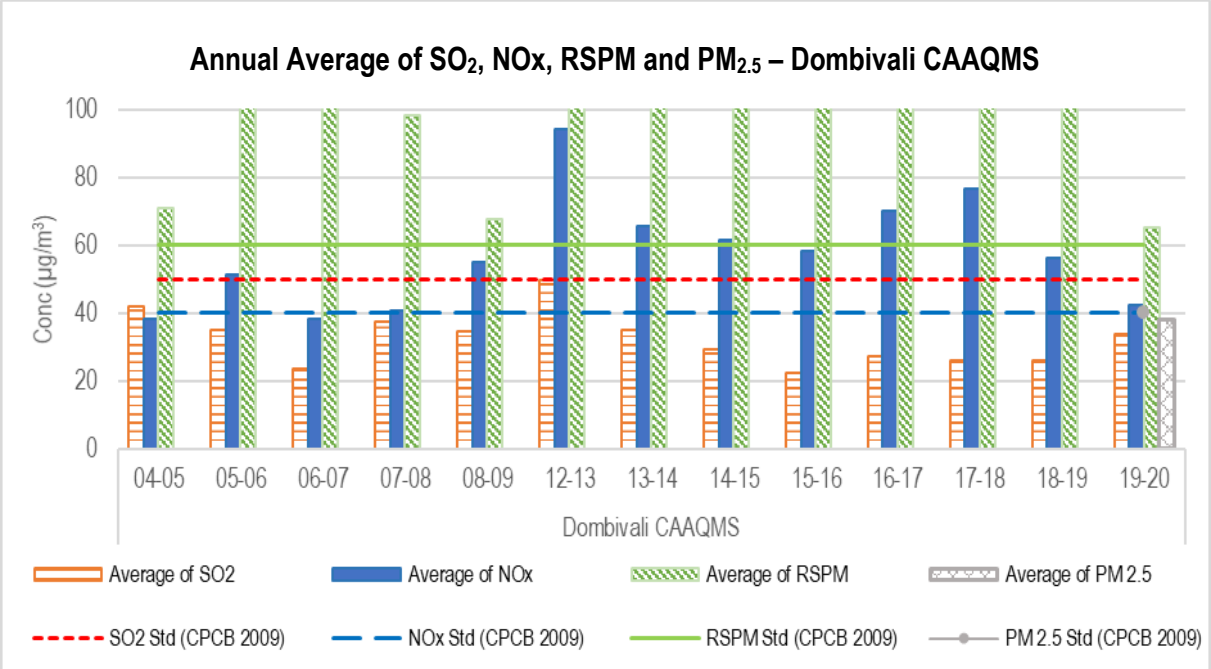
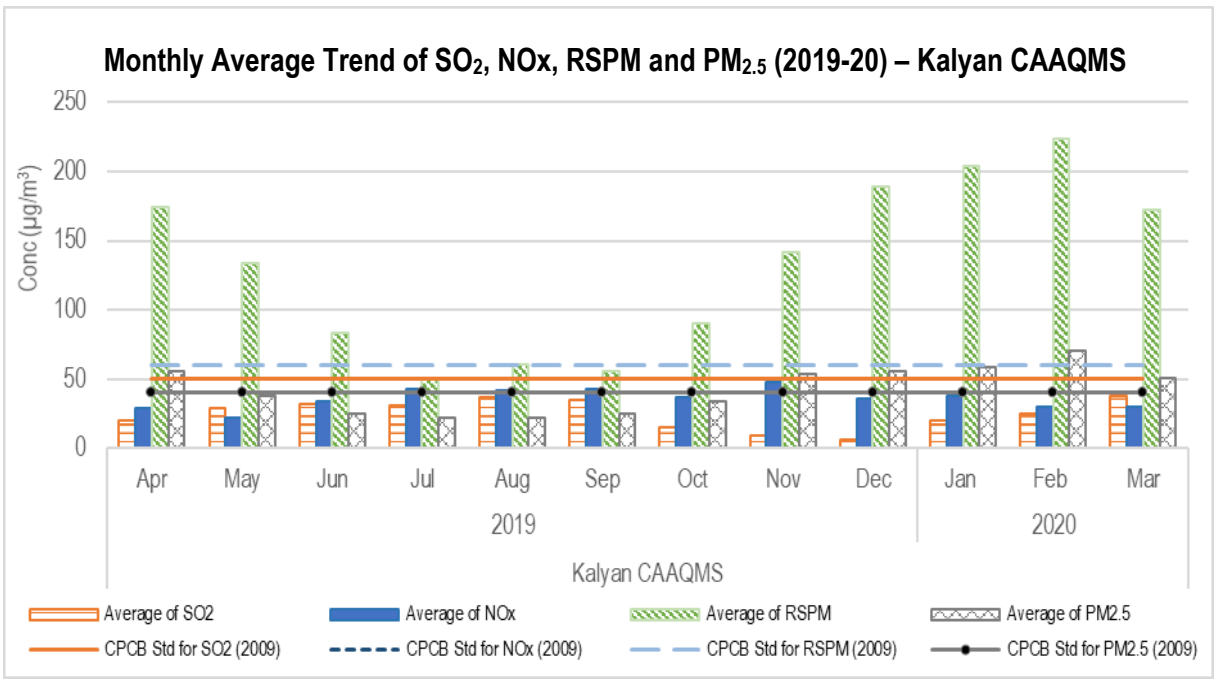



**Figure No. 106: Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Dombivali CAAQMS**

## *Kalyan - Kalyan CAAQMS*

**Table No. 82: Data for Monthly average reading recorded at Kalyan CAAQMS**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** | ***40*** |
| **Kalyan CAAQMS** | 2019 | Apr | 20 | 29 | 175 | 56 |
| | | May | 29 | 22 | 134 | 38 |
| | | Jun | 32 | 34 | 84 | 26 |
| | | Jul | 31 | 43 | 50 | 22 |
| | | Aug | 37 | 42 | 61 | 22 |
| | | Sep | 35 | 43 | 56 | 25 |
| | | Oct | 15 | 37 | 90 | 34 |
| | | Nov | 10 | 48 | 142 | 54 |
| | | Dec | 6 | 36 | 189 | 55 |
| | 2020 | Jan | 21 | 38 | 204 | 59 |
| | | Feb | 26 | 30 | 224 | 71 |
| | | Mar | 38 | 30 | 172 | 51 |




*CPCB standards for NOx and PM 2.5 are same, so the lines indicating them overlap and are not distinctly visible*

**Figure No. 107: Monthly average reading recorded at Kalyan CAAQMS**

**Table No. 83: Data for Annual average trend of $SO_2$, NOx, RSPM and PM 2.5 at Kalyan CAAQMS**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of PM 2.5 |
|---|---|---|---|---|---|
| | | *50* | *40* | *60* | *40* |
| **Kalyan CAAQMS** | 19-20 | 25 | 36 | 131 | 40 |

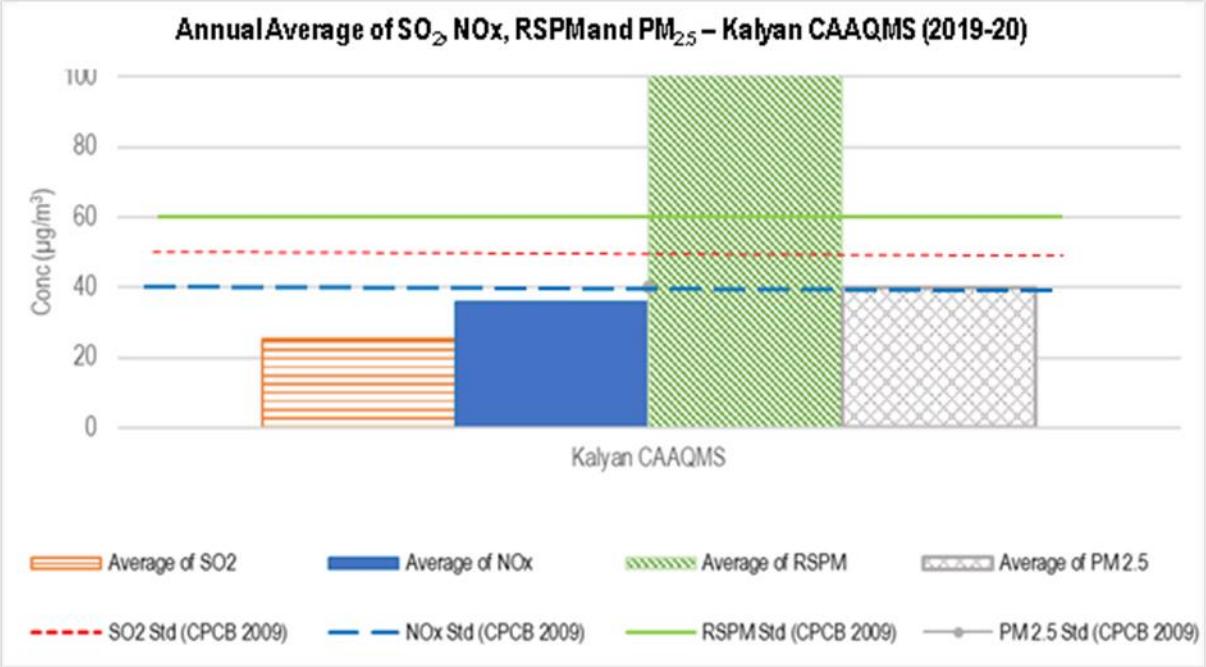



**Figure No. 108: Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Kalyan CAAQMS**

# Kalyan - MPCB RO Kalyan Office

**Table No. 84: Data for Monthly average reading recorded at MPCB RO Kalyan Office**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **MPCB RO Kalyan office** | 2019 | Apr | 32 | 36 | 69 |
| | | May | 35 | 44 | 67 |
| | | Jun | 32 | 45 | 66 |
| | | Jul | 32 | 44 | 80 |
| | | Aug | 35 | 46 | 67 |
| | | Sep | 34 | 44 | 67 |
| | | Oct | 27 | 36 | 68 |
| | | Nov | 29 | 43 | 68 |
| | | Dec | 32 | 37 | 69 |
| | 2020 | Jan | 41 | 43 | 63 |
| | | Feb | 41 | 43 | 63 |
| | | Mar | 22 | 32 | 47 |

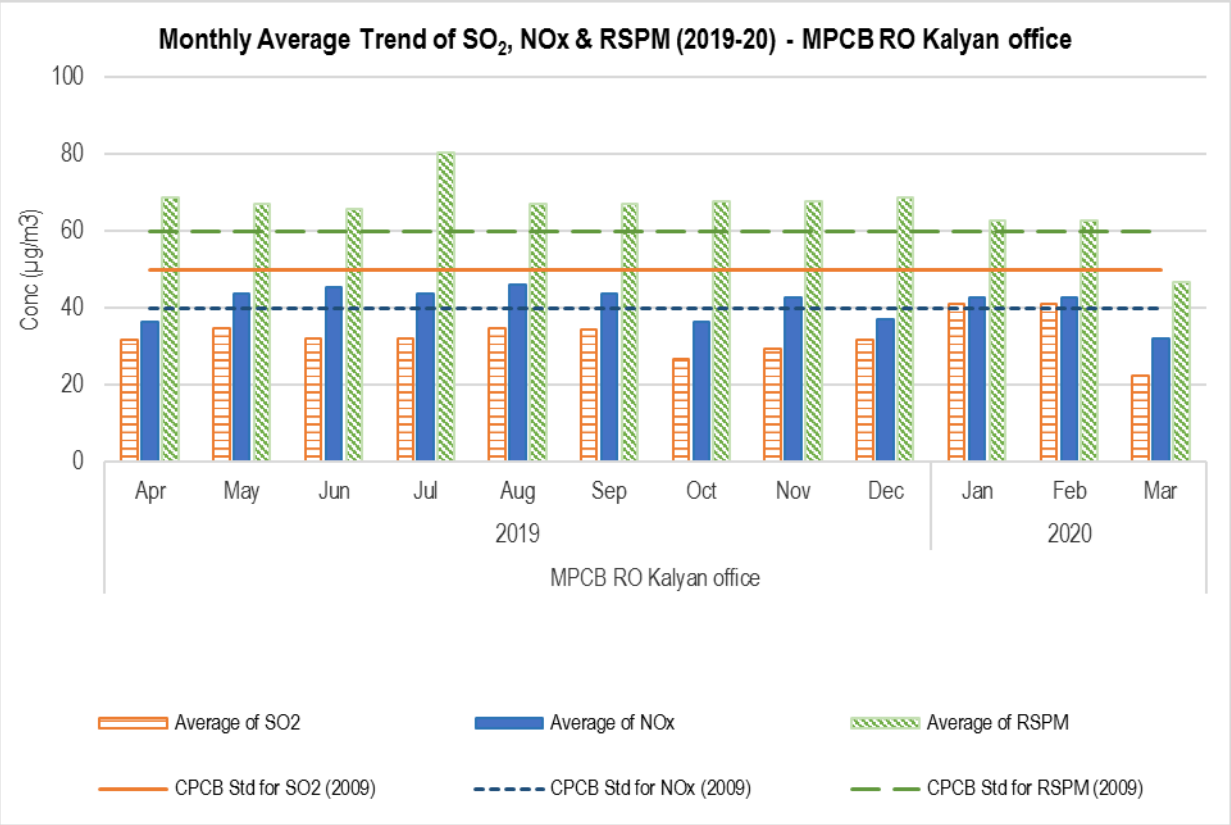



**Figure No. 109: Monthly average reading recorded at MPCB RO Kalyan Office**

**Table No. 85: Data for Annual average trend of $SO_2$, NOx, and RSPM at MPCB RO Kalyan Office**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | ***50*** | ***40*** | ***60*** |
| **MPCB RO Kalyan office** | 11-12 | 22 | 34 | 71 |
| | 12-13 | 29 | 38 | 65 |
| | 13-14 | 30 | 38 | 69 |
| | 14-15 | 30 | 37 | 71 |
| | 15-16 | 32 | 40 | 71 |
| | 16-17 | 33 | 41 | 69 |
| | 17-18 | 31 | 41 | 69 |
| | 18-19 | 29 | 41 | 65 |
| | 19-20 | 33 | 41 | 66 |

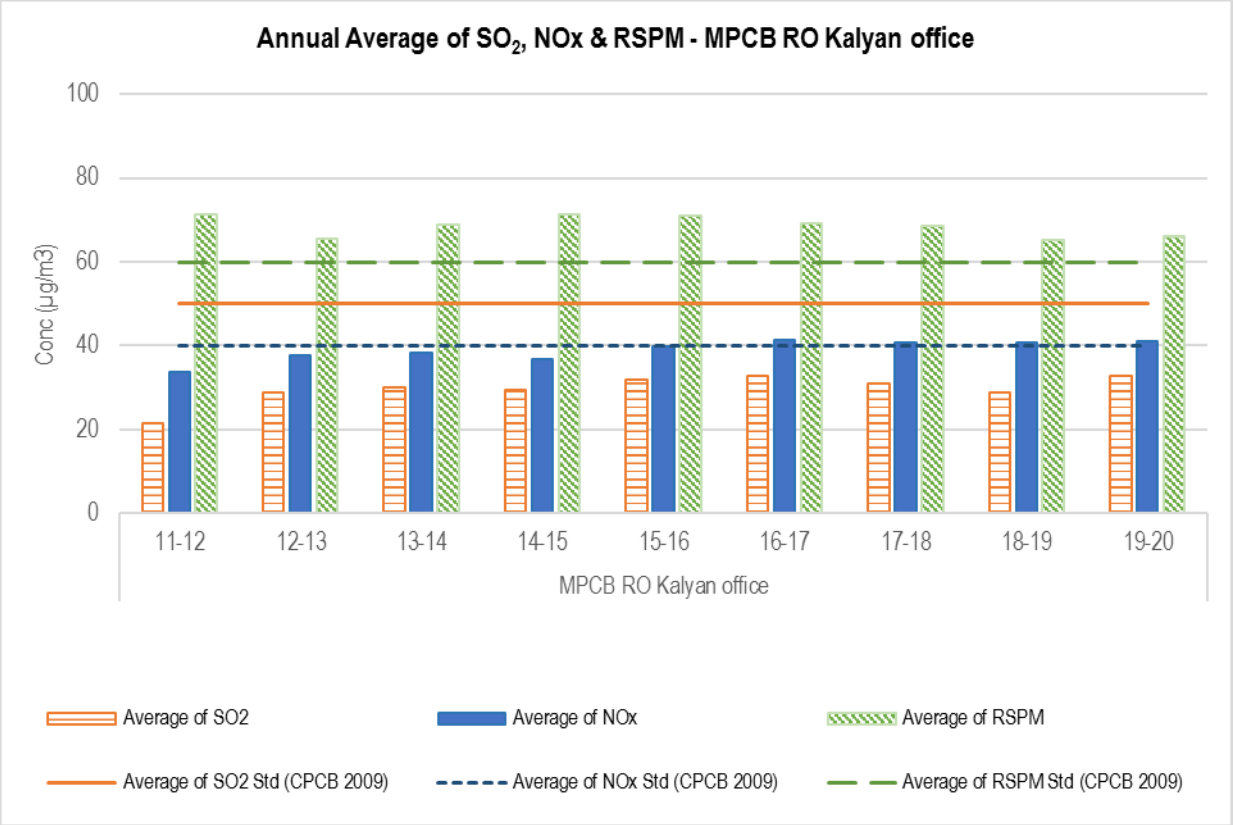



**Figure No. 110: Annual average trend of $SO_2$, NOx, and RSPM at MPCB RO Kalyan Office**

## Ulhasnagar - Smt. CHM College Campus

**Table No. 86: Data for Monthly average reading recorded at Smt. CHM College Campus, Ulhasnagar**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Smt. CHM College Campus** | 2019 | Apr | 20 | 48 | 63 |
| | | May | 20 | 46 | 61 |
| | | Jun | 22 | 49 | 51 |
| | | Jul | 22 | 57 | 75 |
| | | Aug | 18 | 39 | 66 |
| | | Sep | 20 | 40 | 45 |
| | | Oct | 24 | 41 | 51 |
| | | Nov | 25 | 46 | 88 |
| | | Dec | 21 | 43 | 90 |
| | 2020 | Jan | 20 | 43 | 88 |
| | | Feb | 20 | 53 | 96 |

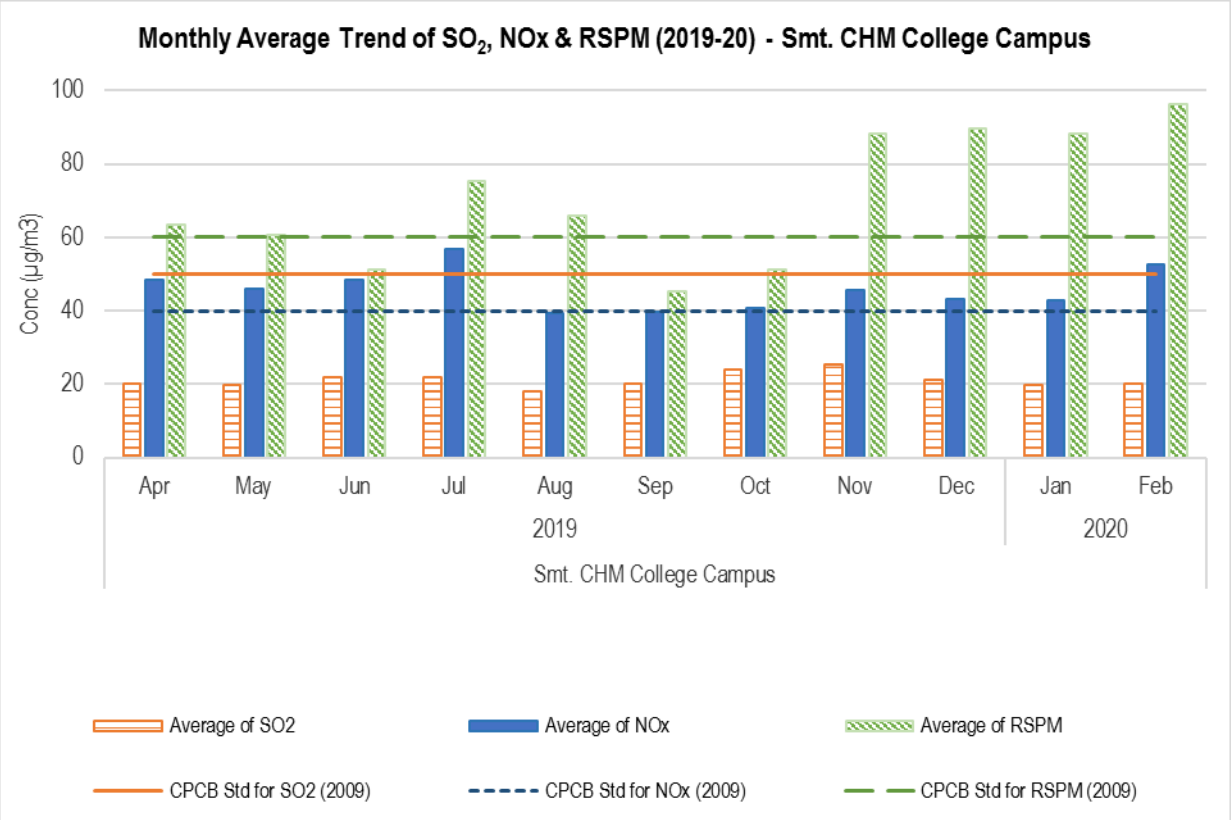



**Figure No. 111: Monthly average reading recorded at Smt. CHM College Campus, Ulhasnagar**

**Table No. 87: Data for Annual average trend of $SO_2$, NOx, and RSPM at Smt. CHM College Campus, Ulhasnagar**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | ***50*** | ***40*** | ***60*** |
| **Smt. CHM College Campus** | 06-07 | 28 | 46 | 159 |
| | 07-08 | 31 | 42 | 90 |
| | 08-09 | 30 | 57 | 87 |
| | 09-10 | 46 | 70 | 92 |
| | 10-11 | 30 | 61 | 99 |
| | 11-12 | 37 | 64 | 109 |
| | 12-13 | 34 | 58 | 85 |
| | 13-14 | 25 | 37 | 68 |
| | 14-15 | 22 | 42 | 82 |
| | 15-16 | 22 | 59 | 109 |
| | 16-17 | 23 | 62 | 110 |
| | 17-18 | 21 | 63 | 147 |
| | 18-19 | 20 | 52 | 95 |
| | 19-20 | 21 | 46 | 70 |

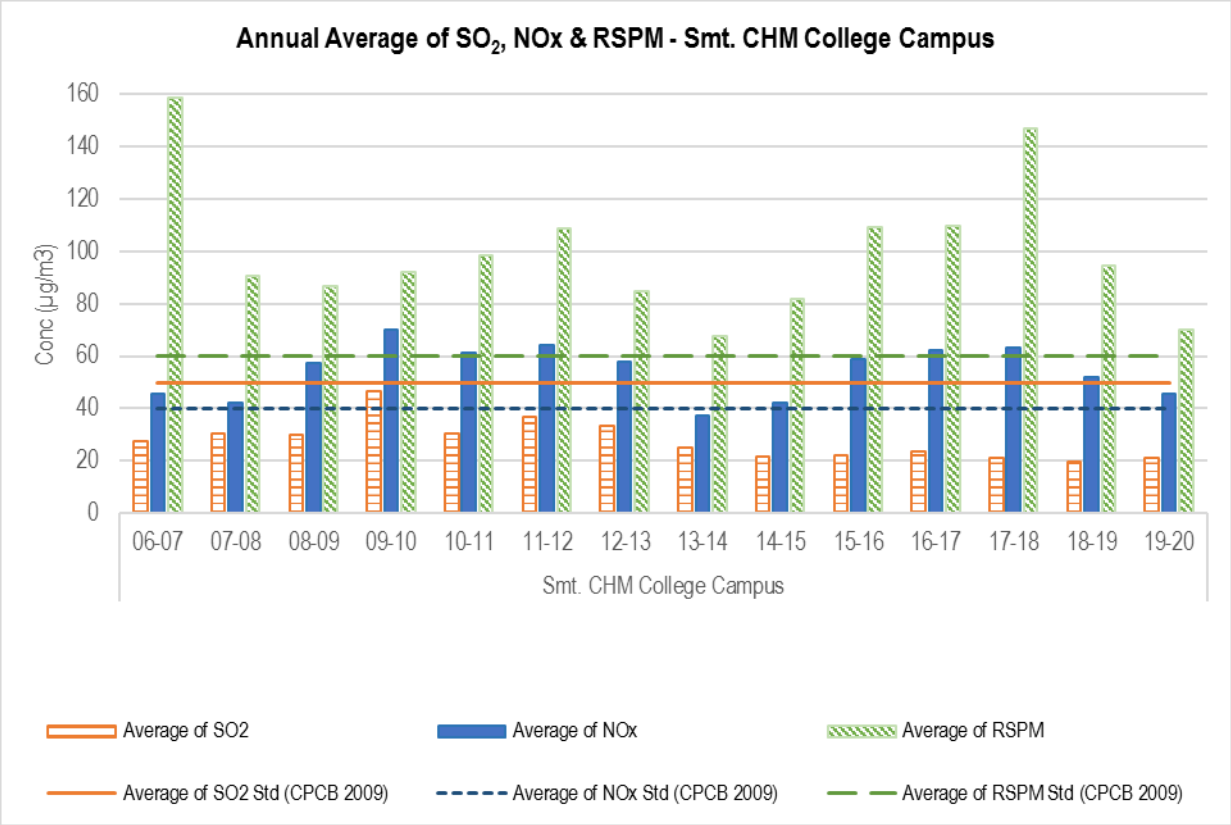



**Figure No. 112: Annual average trend of $SO_2$, NOx, and RSPM at Smt. CHM College Campus, Ulhasnagar**

# Ulhasnagar - Powai Chowk

**Table No. 88: Data for Monthly average reading recorded at Powai Chowk - Ulhasnagar**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Powai chowk** | 2019 | Apr | 26 | 76 | 123 |
| | | May | 24 | 66 | 110 |
| | | Jun | 30 | 76 | 84 |
| | | Jul | 26 | 60 | 86 |
| | | Aug | 26 | 53 | 78 |
| | | Sep | 26 | 64 | 74 |
| | | Oct | 30 | 52 | 108 |
| | | Nov | 31 | 56 | 107 |
| | | Dec | 24 | 61 | 97 |
| | 2020 | Jan | 22 | 57 | 95 |
| | | Feb | 25 | 59 | 103 |

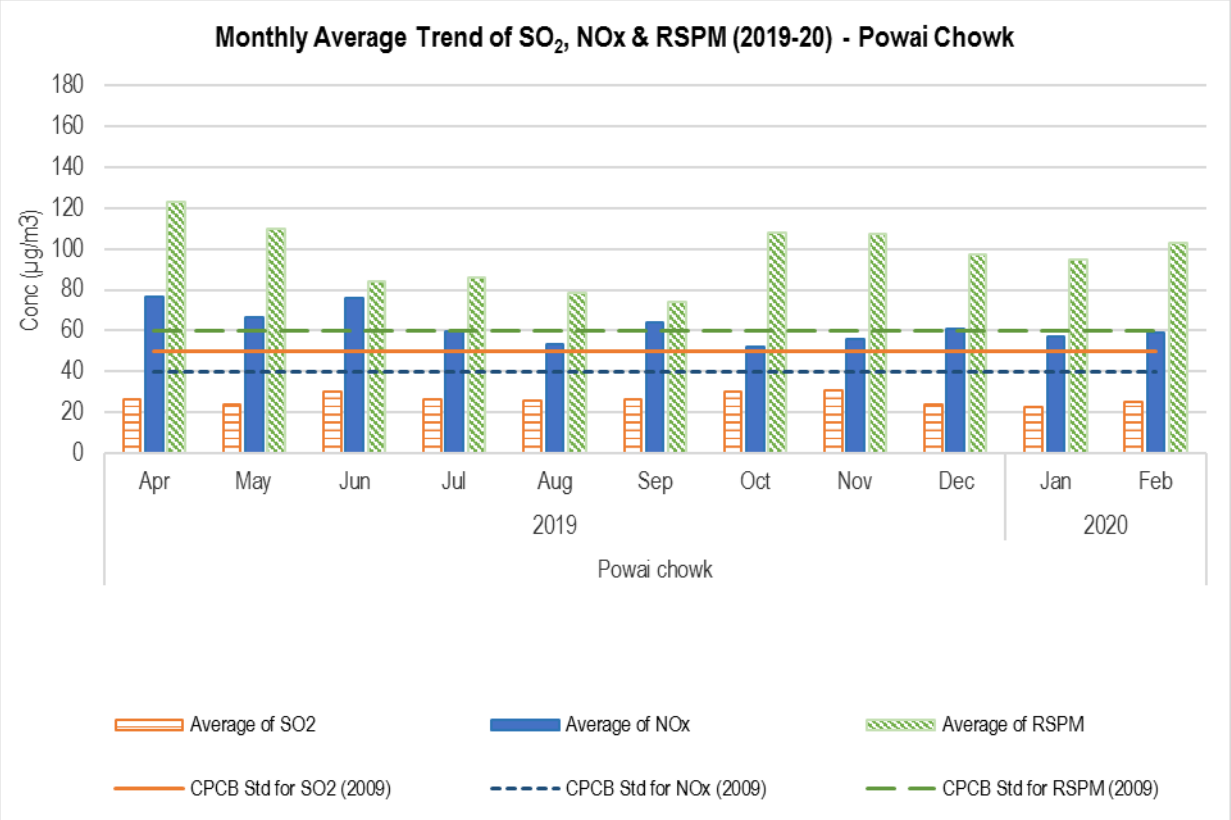



**Figure No. 113: Monthly average reading recorded at Powai Chowk - Ulhasnagar**

**Table No. 89: Data for Annual average trend of $SO_2$, NOx, and RSPM at Powai Chowk - Ulhasnagar**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Powai Chowk | 06-07 | 24 | 38 | 121 |
| | 07-08 | 25 | 37 | 91 |
| | 08-09 | 33 | 69 | 95 |
| | 09-10 | 53 | 96 | 119 |
| | 10-11 | 31 | 69 | 114 |
| | 11-12 | 43 | 74 | 122 |
| | 12-13 | 43 | 81 | 106 |
| | 13-14 | 33 | 58 | 99 |
| | 14-15 | 30 | 57 | 106 |
| | 15-16 | 25 | 67 | 126 |
| | 16-17 | 27 | 67 | 108 |
| | 17-18 | 28 | 78 | 240 |
| | 18-19 | 25 | 54 | 114 |
| | 19-20 | 26 | 62 | 97 |

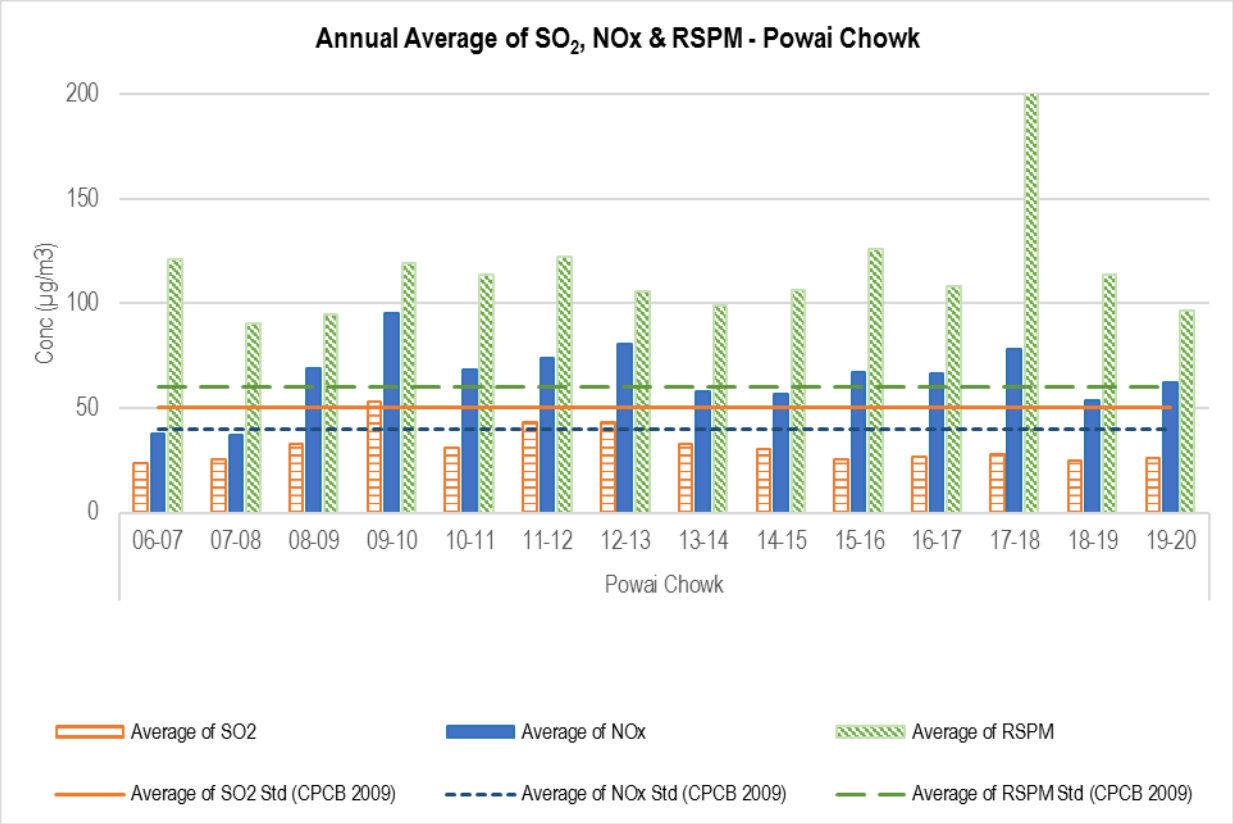
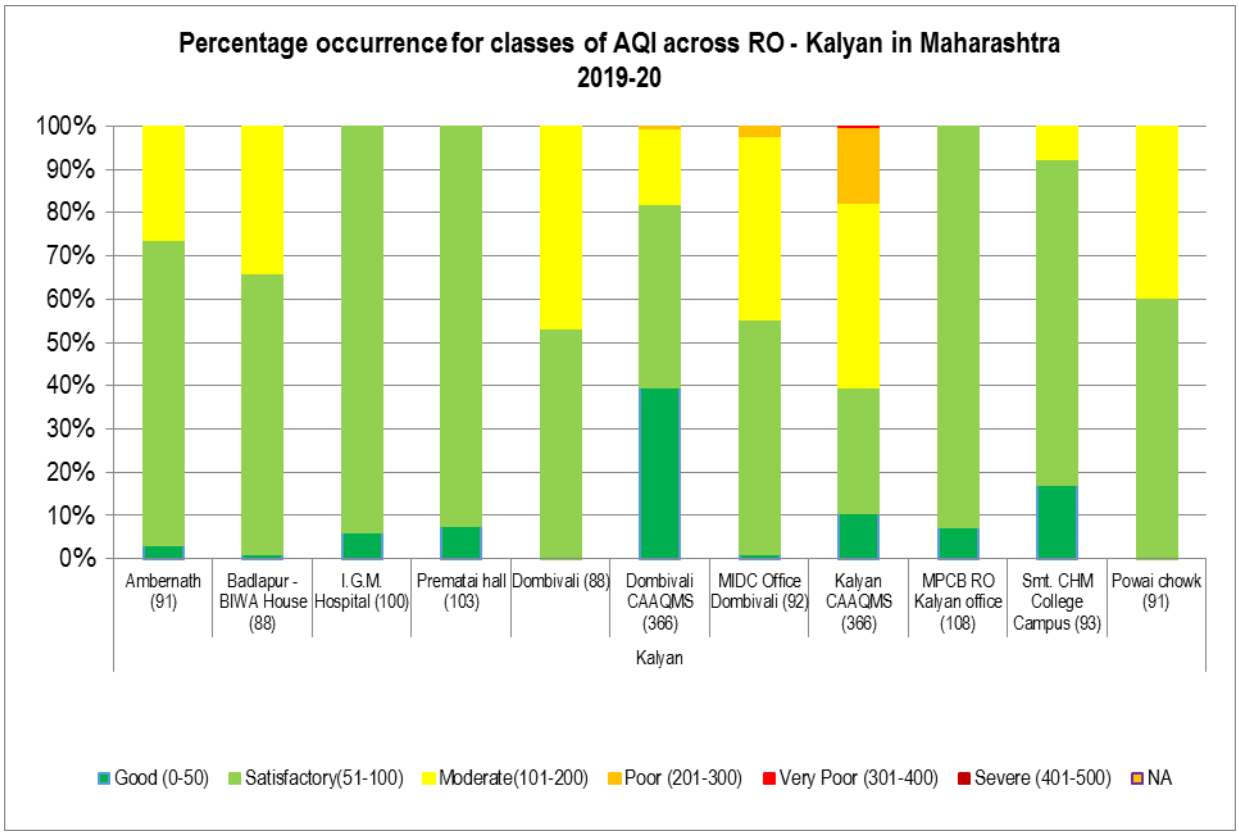


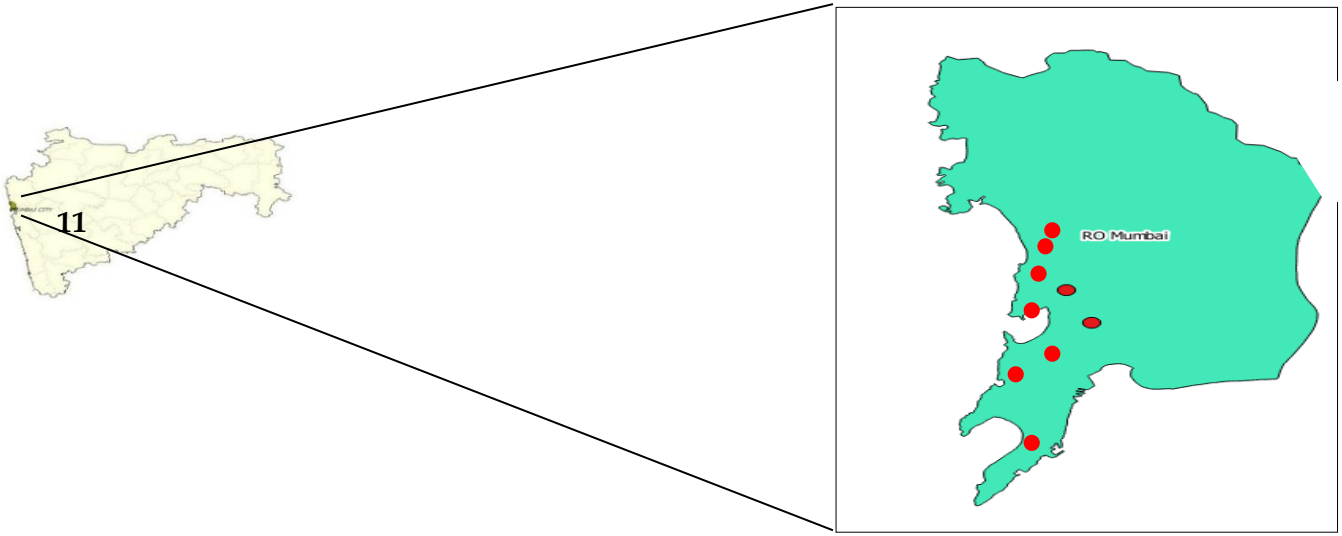

**Figure No. 114: Annual average trend of $SO_2$, NOx, and RSPM at Powai Chowk - Ulhasnagar**

**Table No. 90: Percentage exceedance of pollutants at Kalyan RO**

| Station Name | Total Observation | No. of times exceedance occurred | | | % Exceedance | | |
|---|---|---|---|---|---|---|---|
| | | $SO_2$ | NOx | RSPM | $SO_2$ | NOx | RSPM |
| Ambernath | 91 | | 8 | 24 | | 9 | 26 |
| Badlapur - BIWA House | 88 | | 9 | 30 | | 10 | 34 |
| I.G.M. Hospital | 100 | | | | | | |
| Prematai hall | 103 | | | | | | |
| Dombivali | 88 | | 8 | 41 | | 9 | 47 |
| MIDC Office Dombivali | 92 | | 11 | 41 | | 12 | 45 |
| Dombivali CAAQMS | 366 | 28 | 49 | 57 | 8 | 13 | 16 |
| Kalyan CAAQMS | 366 | 3 | 6 | 225 | 1 | 2 | 61 |
| MPCB RO Kalyan office | 108 | | | | | | |
| Smt. CHM College Campus | 93 | | 1 | 7 | | 1 | 8 |
| Powai chowk | 91 | | 10 | 36 | | 11 | 40 |



# RO - Mumbai

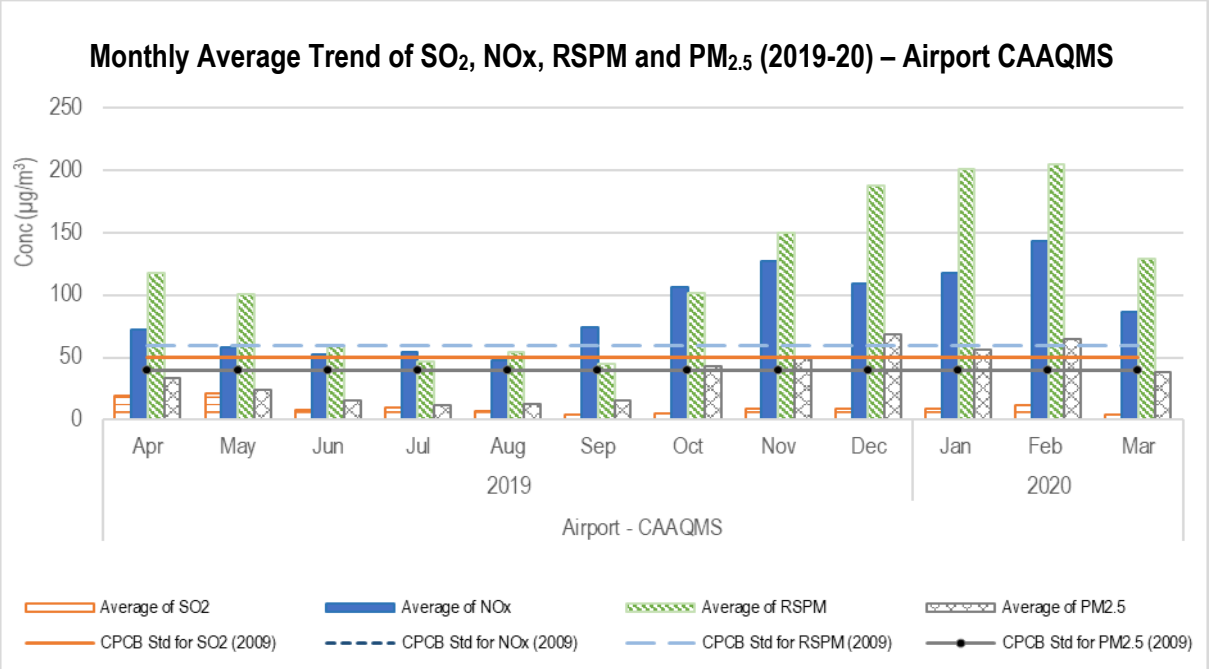



| MPCB RO | Region | Station code | Station name | Type | Latitude (deg) | Longitude (deg) |
|---|---|---|---|---|---|---|
| Mumbai | Mumbai | | Airport CAAQMS | Commercial | 19° 6' 1.44'' N | 72° 52' 34.68'' E |
| | Mumbai | | Bandra CAAQMS | Residential | 19° 03' 47.1" N | 72° 50' 47.2" E |
| | Mumbai | | Borivali CAAQMS | Residential | 19° 14' 44.16'' N | 72° 51' 54.36'' E |
| | Mumbai | | Colaba CAAQMS | Commercial | 18° 54' 28.08'' N | 72° 49' 11.64'' E |
| | Mumbai | | Kandivali CAAQMS | Industrial/ Commercial | 19° 12' 16.056'' N | 72° 51' 54'' E |
| | Mumbai | | Kurla CAAQMS | Commercial | 19° 5' 10.68'' N | 72° 53' 19.68'' E |
| | Mumbai | | Mulund CAAQMS | Industrial cum commercial | 19° 10' 30.36'' N | 72° 56' 31.2 '' E |
| | Mumbai | | Powai CAAQMS | Residential / Commercial | 19° 8' 0.24'' N | 72° 54' 47.52'' E |
| | Mumbai | 441 | Sion CAAQMS | Residential | 19° 02' 07.9" N | 72° 51' 35.3" E |
| | Mumbai | | Vile Parle CAAQMS | Commercial | 19° 6' 34.2'' N | 72° 50' 7.08'' E |
| | Mumbai | | Worli CAAQMS | Residential / Commercial | 18° 35' 37.32'' N | 72° 29' 7.44'' E |

# Mumbai – Airport CAAQMS

**Table No. 91: Data for Monthly average reading recorded at Airport CAAQMS**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** | ***40*** |
| **Airport - CAAQMS** | 2019 | Apr | 19 | 72 | 118 | 33 |
| | | May | 21 | 58 | 101 | 24 |
| | | Jun | 8 | 52 | 59 | 16 |
| | | Jul | 10 | 54 | 47 | 12 |
| | | Aug | 7 | 48 | 54 | 13 |
| | | Sep | 5 | 74 | 44 | 15 |
| | | Oct | 5 | 106 | 102 | 43 |
| | | Nov | 9 | 127 | 149 | 49 |
| | | Dec | 9 | 109 | 188 | 68 |
| | 2020 | Jan | 9 | 118 | 201 | 57 |
| | | Feb | 12 | 143 | 205 | 65 |
| | | Mar | 4 | 86 | 129 | 38 |




*CPCB standards for NOx and $PM_{2.5}$ are same, so the lines indicating them overlap and are not distinctly visible*

**Figure No. 115: Monthly average reading recorded at Airport CAAQMS**

**Table No. 92: Data for Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Airport CAAQMS**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|
| | | *50* | *40* | *60* | *40* |
| Airport CAAQMS | 19-20 | 10 | 87 | 116 | 30 |

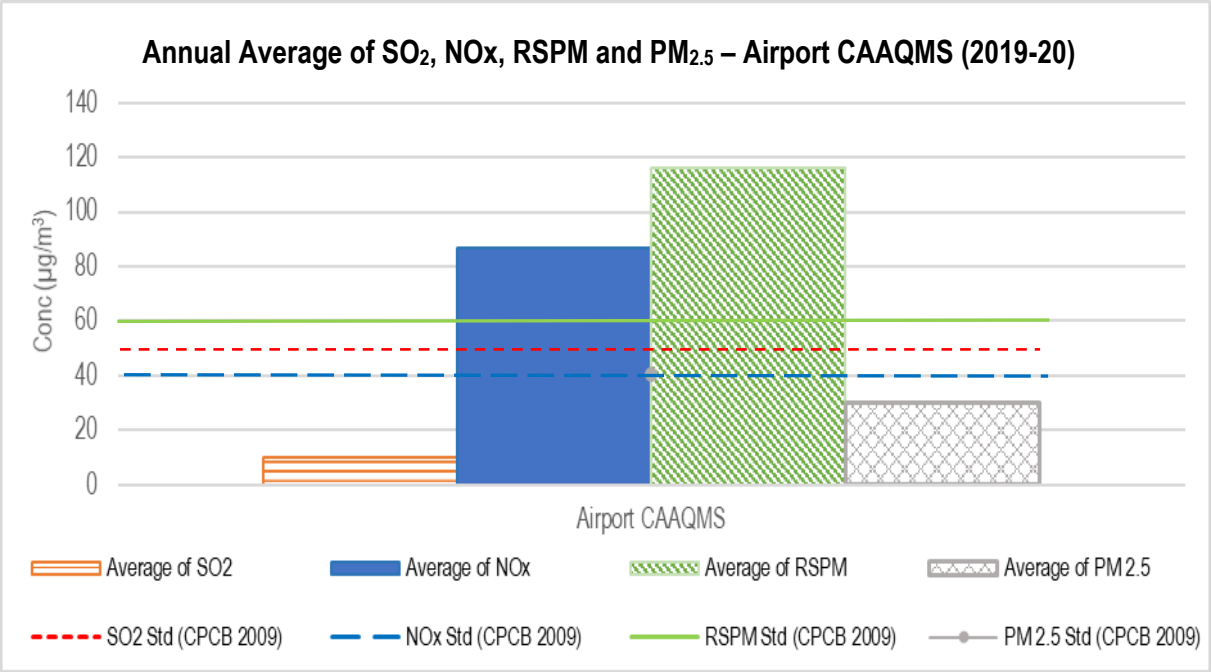
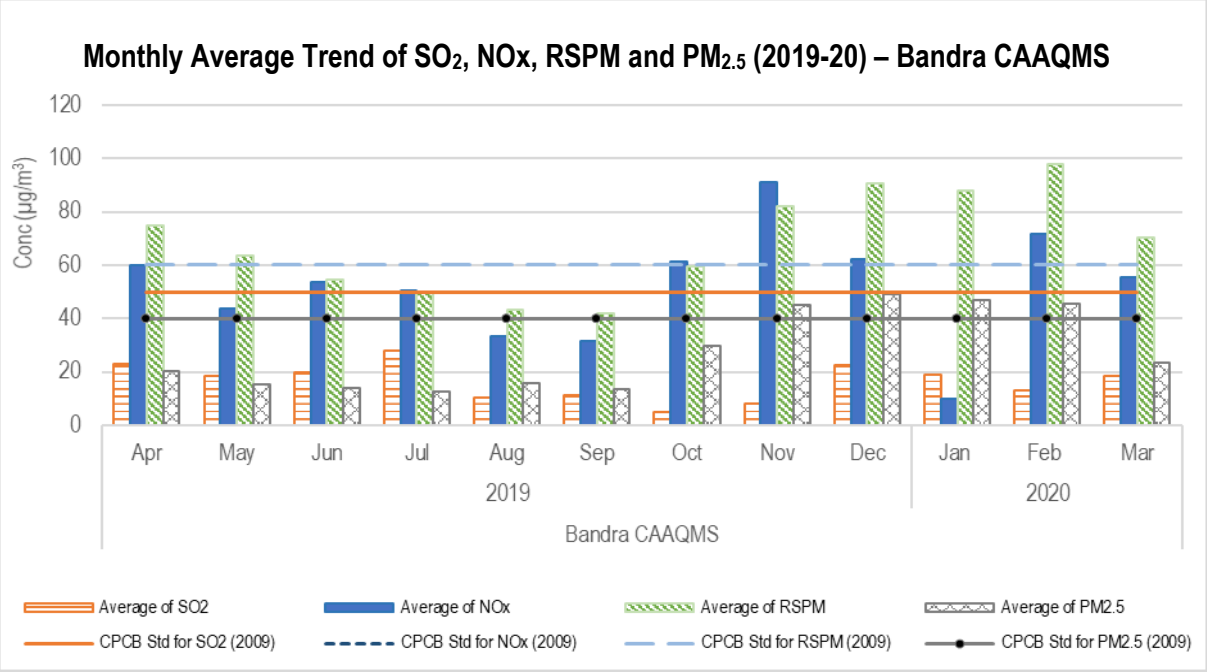



**Figure No. 116: Annual average trend of $SO_2$, NOx, and RSPM and $PM_{2.5}$ at Airport CAAQMS**

# Mumbai – Bandra CAAQMS

**Table No. 93: Data for Monthly average reading recorded at Bandra CAAQMS**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** | ***40*** |
| **Bandra CAAQMS** | 2019 | Apr | 23 | 60 | 75 | 21 |
| | | May | 19 | 44 | 64 | 15 |
| | | Jun | 20 | 53 | 55 | 14 |
| | | Jul | 28 | 51 | 50 | 13 |
| | | Aug | 11 | 33 | 43 | 16 |
| | | Sep | 11 | 32 | 42 | 13 |
| | | Oct | 5 | 61 | 60 | 30 |
| | | Nov | 8 | 91 | 82 | 45 |
| | | Dec | 23 | 62 | 91 | 49 |
| | 2020 | Jan | 19 | 10 | 88 | 47 |
| | | Feb | 13 | 72 | 98 | 46 |
| | | Mar | 19 | 55 | 70 | 24 |




*CPCB standards for NOx and $PM_{2.5}$ are same, so the lines indicating them overlap and are not distinctly visible*

**Figure No. 117: Monthly average reading recorded at Bandra CAAQMS**

**Table No. 94: Data for Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Bandra CAAQMS**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|
| | | ***50*** | ***40*** | ***60*** | ***40*** |
| **Bandra CAAQMS** | 07-08 | 19 | 59 | 158 | |
| | 08-09 | 19 | 60 | 137 | |
| | 09-10 | 17 | 90 | 140 | |
| | 10-11 | 19 | 48 | 116 | |
| | 11-12 | 21 | 65 | 131 | |
| | 12-13 | 18 | 48 | 116 | |
| | 13-14 | 20 | 49 | 106 | |
| | 14-15 | 16 | 52 | 114 | |
| | 15-16 | 18 | 49 | 93 | |
| | 16-17 | 13 | 40 | 122 | |
| | 17-18 | 14 | 49 | 106 | |
| | 18-19 | 19 | 66 | 111 | |
| | 19-20 | 16 | 52 | 68 | 28 |

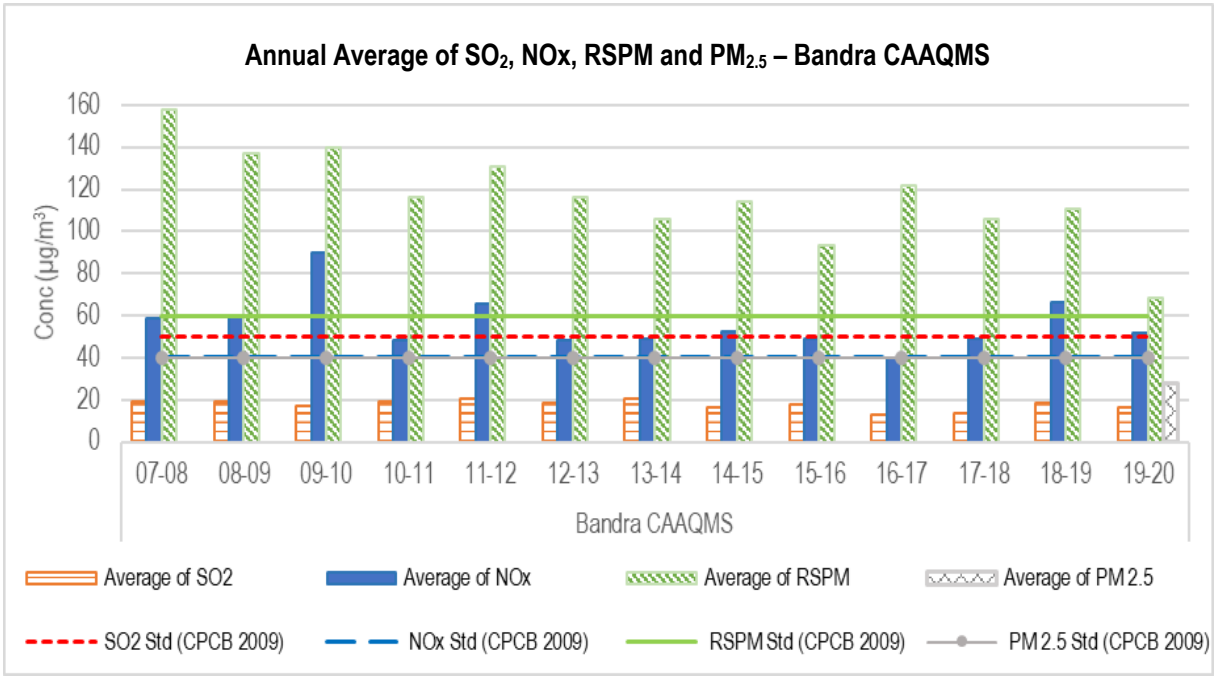
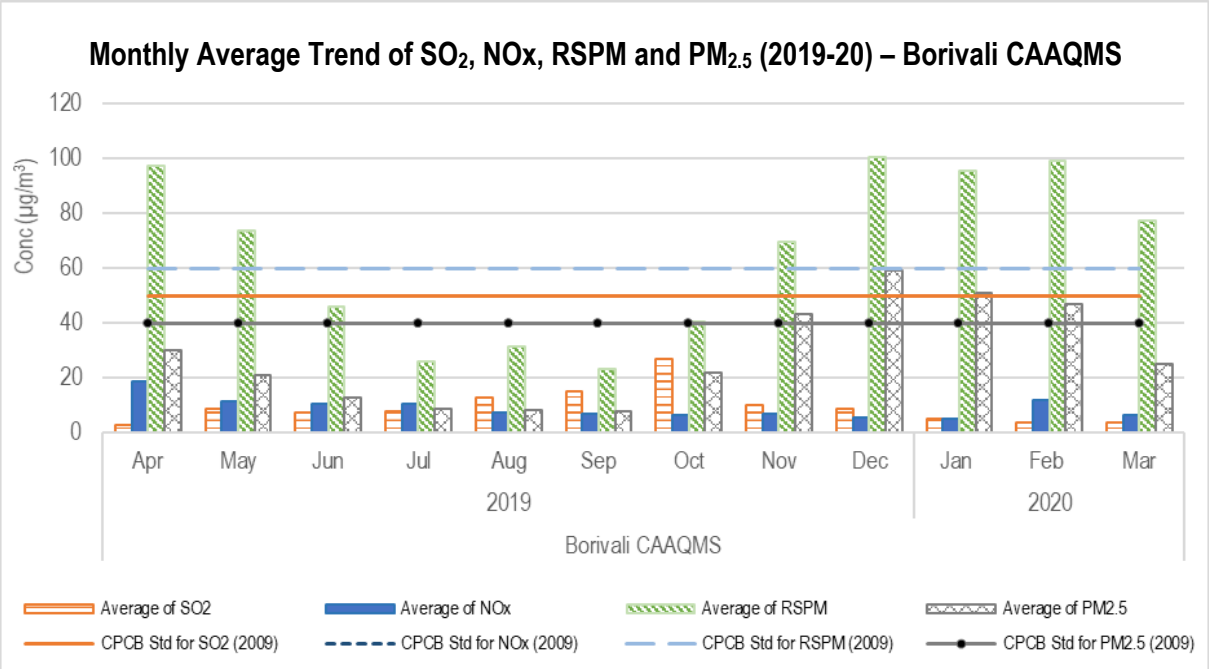



**Figure No. 118: Annual average trend of $SO_2$, NOx, and RSPM and $PM_{2.5}$ at Bandra CAAQMS**

## *Mumbai – Borivali CAAQMS*

**Table No. 95: Data for Monthly average reading recorded at Borivali CAAQMS**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** | ***40*** |
| **Borivali CAAQMS** | 2019 | Apr | 3 | 19 | 97 | 30 |
| | | May | 9 | 11 | 74 | 21 |
| | | Jun | 7 | 11 | 46 | 13 |
| | | Jul | 8 | 10 | 26 | 9 |
| | | Aug | 13 | 8 | 31 | 8 |
| | | Sep | 15 | 7 | 23 | 8 |
| | | Oct | 27 | 6 | 41 | 22 |
| | | Nov | 10 | 7 | 70 | 43 |
| | | Dec | 9 | 6 | 100 | 59 |
| | 2020 | Jan | 5 | 5 | 95 | 51 |
| | | Feb | 4 | 12 | 99 | 47 |
| | | Mar | 4 | 7 | 77 | 25 |




*CPCB standards for NOx and $PM_{2.5}$ are same, so the lines indicating them overlap and are not distinctly visible*

**Figure No. 119: Monthly average reading recorded at Borivali CAAQMS**

**Table No. 96: Data for Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Borivali CAAQMS**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|
| | | *50* | *40* | *60* | *40* |
| **Borivali CAAQMS** | 19-20 | 9 | 9 | 64 | 28 |

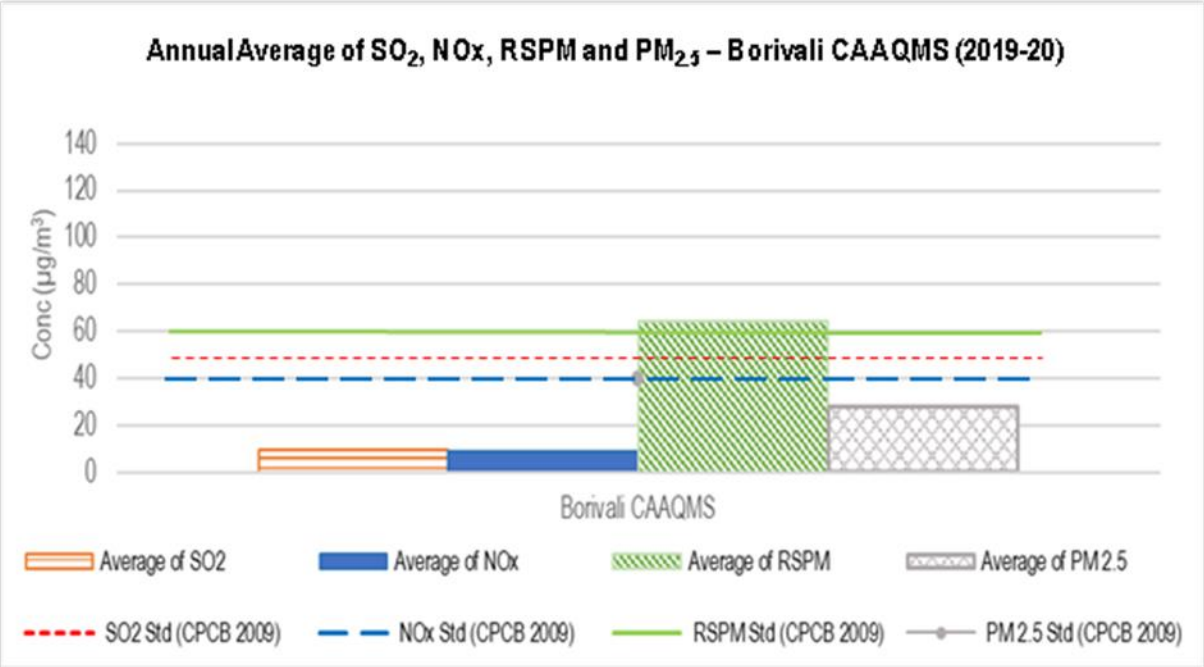
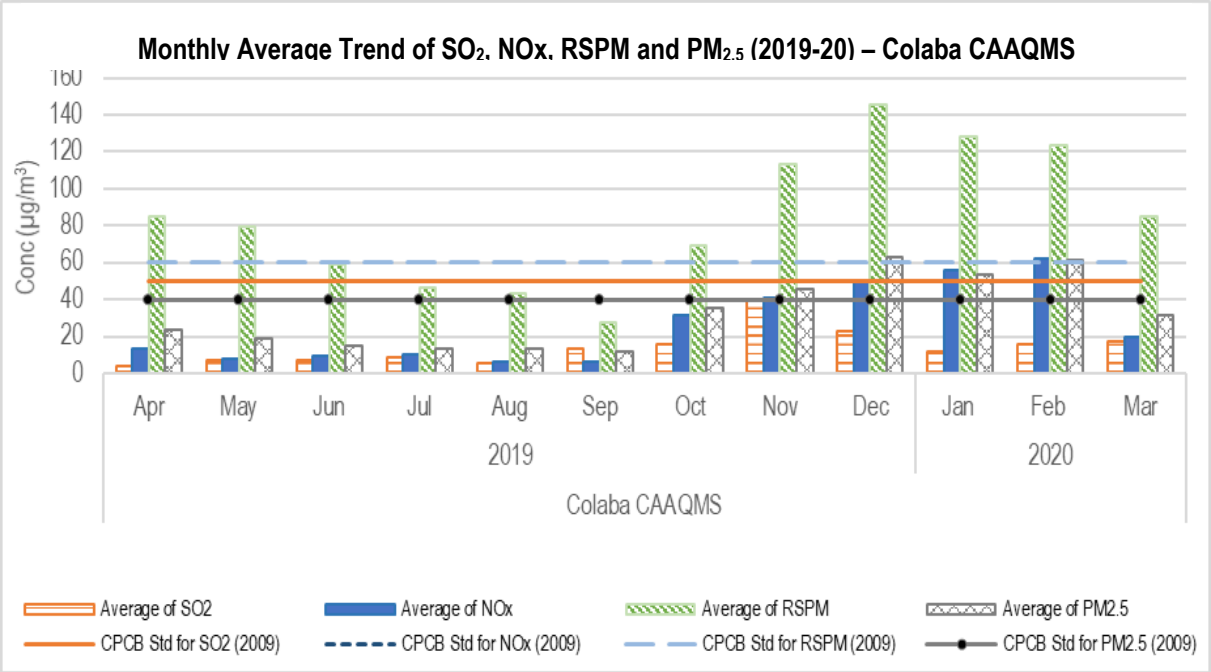



**Figure No. 120: Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Borivali CAAQMS**

## *Mumbai – Colaba CAAQMS*

**Table No. 97: Data for Monthly average reading recorded at Colaba CAAQMS**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** | ***40*** |
| **Colaba CAAQMS** | 2019 | Apr | 4 | 13 | 85 | 23 |
| | | May | 7 | 8 | 79 | 19 |
| | | Jun | 7 | 9 | 59 | 15 |
| | | Jul | 9 | 10 | 47 | 14 |
| | | Aug | 6 | 6 | 43 | 13 |
| | | Sep | 13 | 6 | 27 | 12 |
| | | Oct | 16 | 31 | 69 | 35 |
| | | Nov | 40 | 41 | 113 | 46 |
| | | Dec | 23 | 50 | 145 | 63 |
| | 2020 | Jan | 12 | 56 | 128 | 53 |
| | | Feb | 16 | 62 | 123 | 61 |
| | | Mar | 17 | 20 | 85 | 31 |




*CPCB standards for NOx and $PM_{2.5}$ are same, so the lines indicating them overlap and are not distinctly visible*

**Figure No. 121: Monthly average reading recorded at Colaba CAAQMS**

**Table No. 98: Data for Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Colaba CAAQMS**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|
| | | *50* | *40* | *60* | *40* |
| Colaba CAAQMS | 19-20 | 14 | 26 | 84 | 28 |

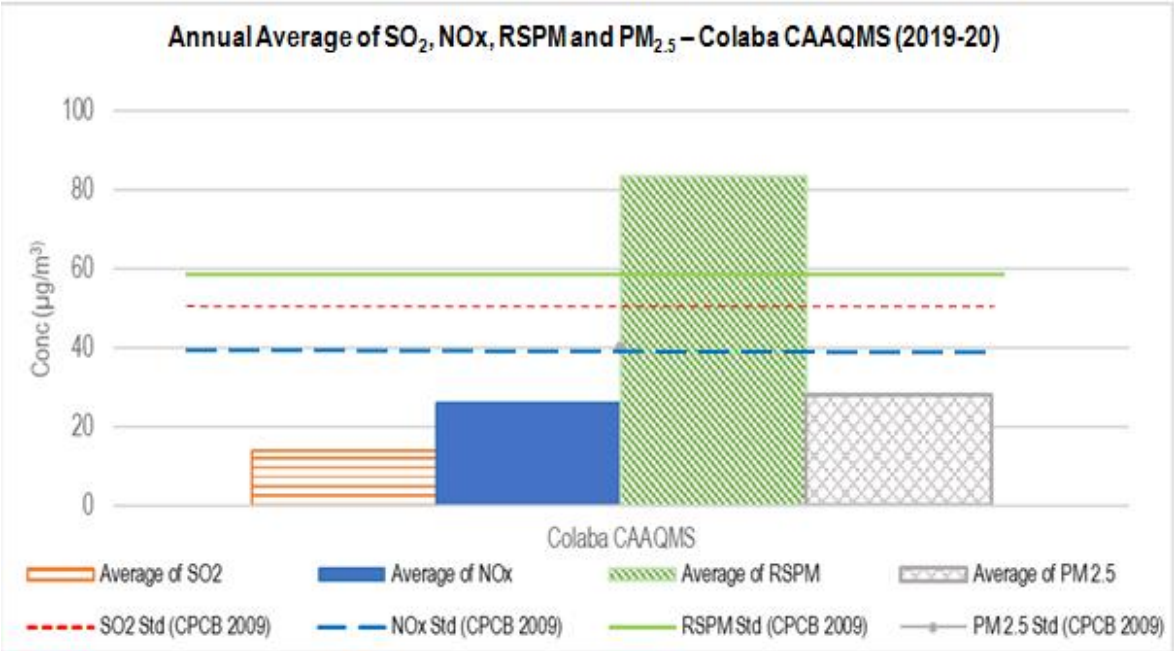
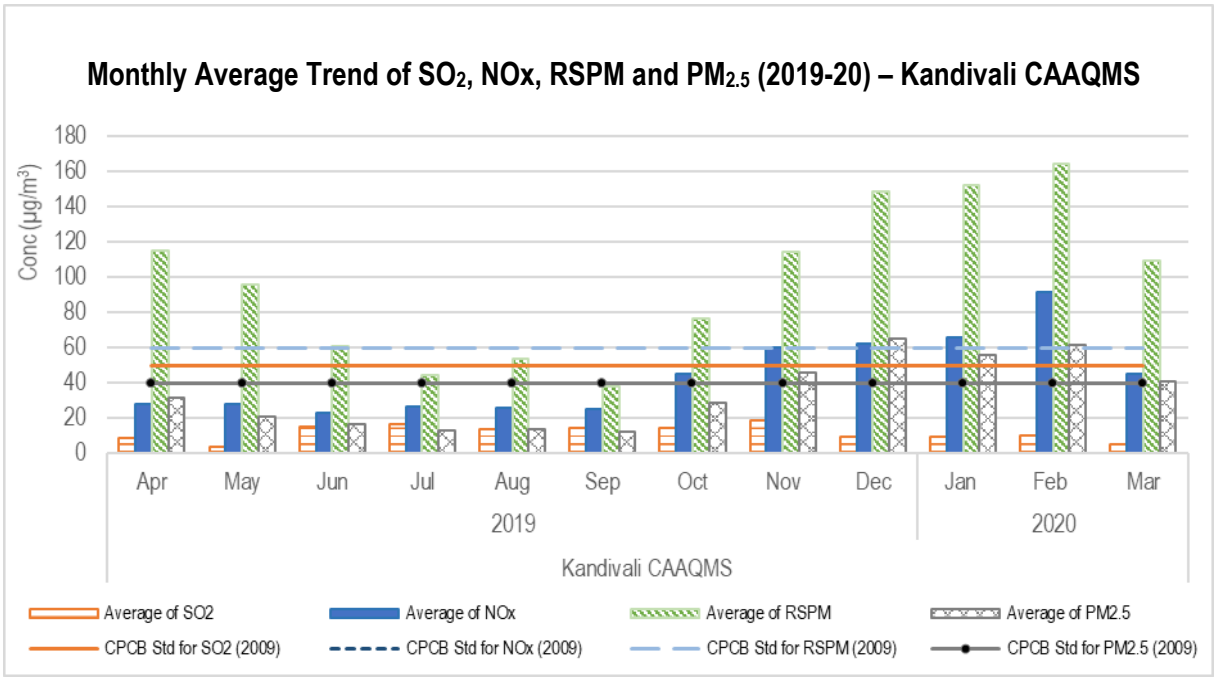



**Figure No. 122: Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Colaba CAAQMS**

## *Mumbai – Kandivali CAAQMS*

**Table No. 99: Data for Monthly average reading recorded at Kandivali CAAQMS**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** | ***40*** |
| **Kandivali CAAQMS** | 2019 | Apr | 9 | 28 | 115 | 32 |
| | | May | 4 | 28 | 96 | 21 |
| | | Jun | 16 | 23 | 61 | 17 |
| | | Jul | 17 | 27 | 44 | 13 |
| | | Aug | 14 | 26 | 54 | 14 |
| | | Sep | 14 | 25 | 38 | 13 |
| | | Oct | 15 | 45 | 76 | 29 |
| | | Nov | 19 | 60 | 115 | 46 |
| | | Dec | 9 | 62 | 148 | 65 |
| | 2020 | Jan | 10 | 66 | 152 | 56 |
| | | Feb | 10 | 91 | 164 | 61 |
| | | Mar | 5 | 45 | 110 | 41 |




*CPCB standards for NOx and $PM_{2.5}$ are same, so the lines indicating them overlap and are not distinctly visible*

**Figure No. 123: Monthly average reading recorded at Kandivali CAAQMS**

**Table No. 100: Data for Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Kandivali CAAQMS**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|
| | | *50* | *40* | *60* | *40* |
| Kandivali CAAQMS | 19-20 | 12 | 44 | 98 | 33 |

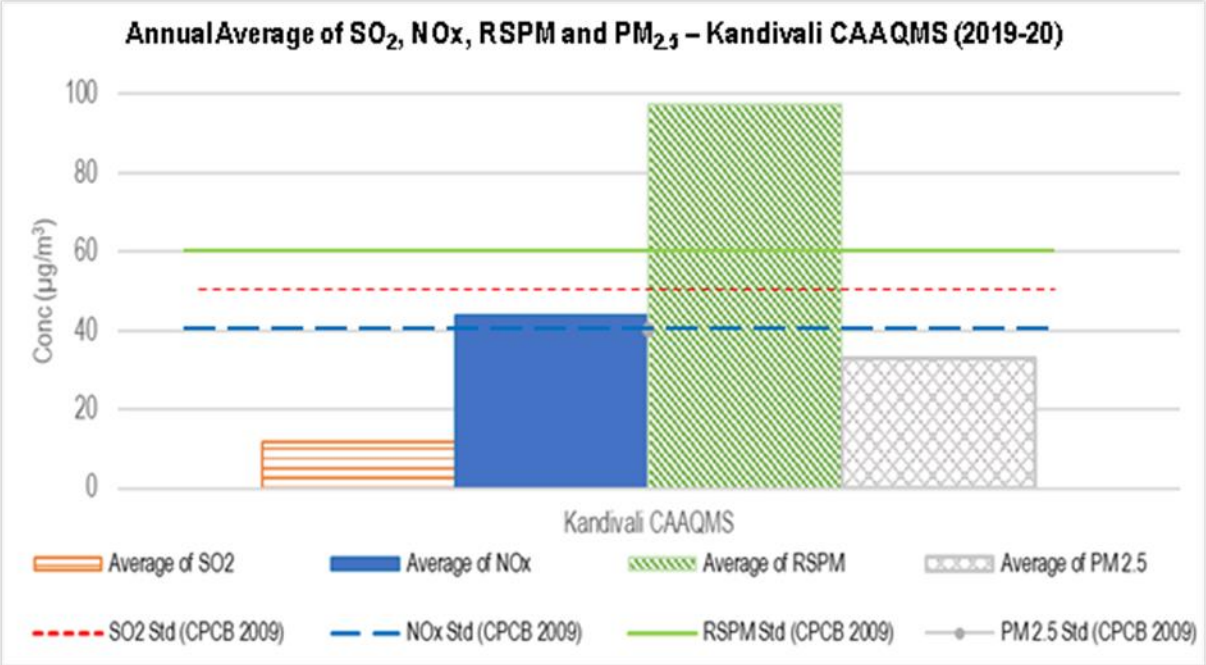
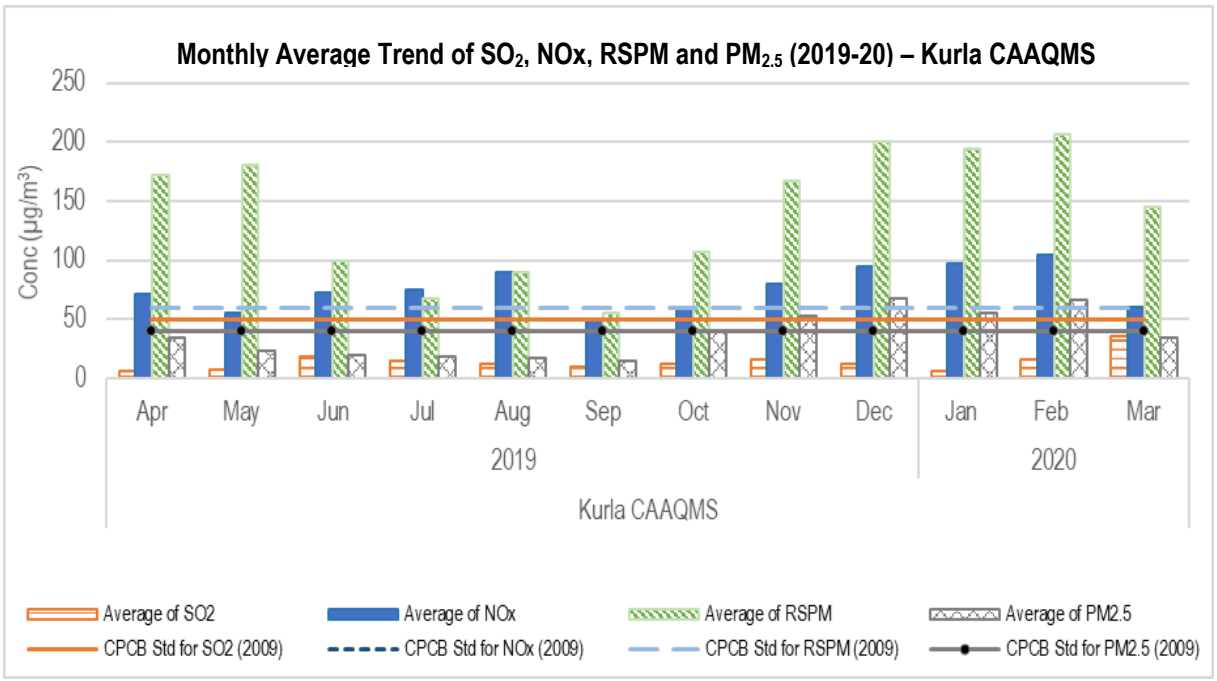



**Figure No. 124: Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Kandivali CAAQMS**

## *Mumbai – Kurla CAAQMS*

**Table No. 101: Data for Monthly average reading recorded at Kurla CAAQMS**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** | ***40*** |
| **Kurla CAAQMS** | 2019 | Apr | 7 | 71 | 172 | 35 |
| | | May | 7 | 56 | 180 | 23 |
| | | Jun | 18 | 73 | 100 | 19 |
| | | Jul | 15 | 75 | 68 | 18 |
| | | Aug | 12 | 90 | 90 | 17 |
| | | Sep | 10 | 51 | 55 | 15 |
| | | Oct | 12 | 59 | 107 | 40 |
| | | Nov | 16 | 80 | 167 | 53 |
| | | Dec | 13 | 94 | 200 | 68 |
| | 2020 | Jan | 6 | 97 | 194 | 55 |
| | | Feb | 16 | 104 | 207 | 66 |
| | | Mar | 35 | 60 | 145 | 34 |




*CPCB standards for NOx and $PM_{2.5}$ are same, so the lines indicating them overlap and are not distinctly visible*

**Figure No. 125: Monthly average reading recorded at Kurla CAAQMS**

**Table No. 102: Data for Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Kurla CAAQMS**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|
| | | *50* | *40* | *60* | *40* |
| Kurla CAAQMS | 19-20 | 14 | 76 | 140 | 32 |

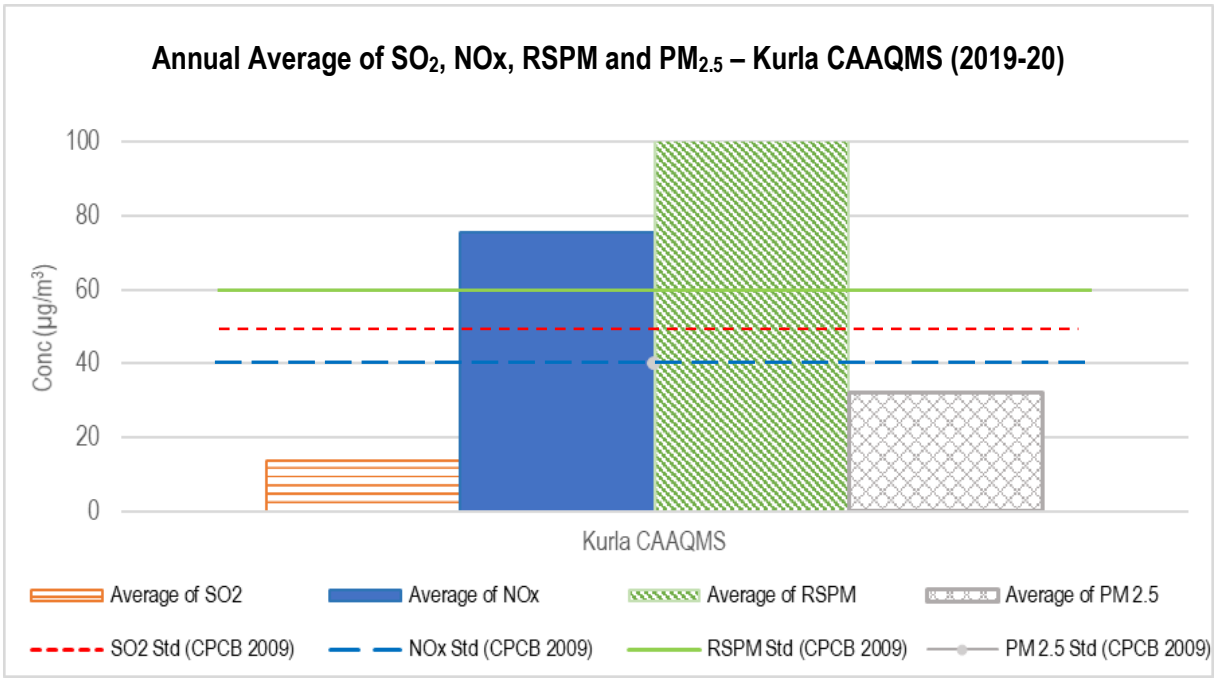
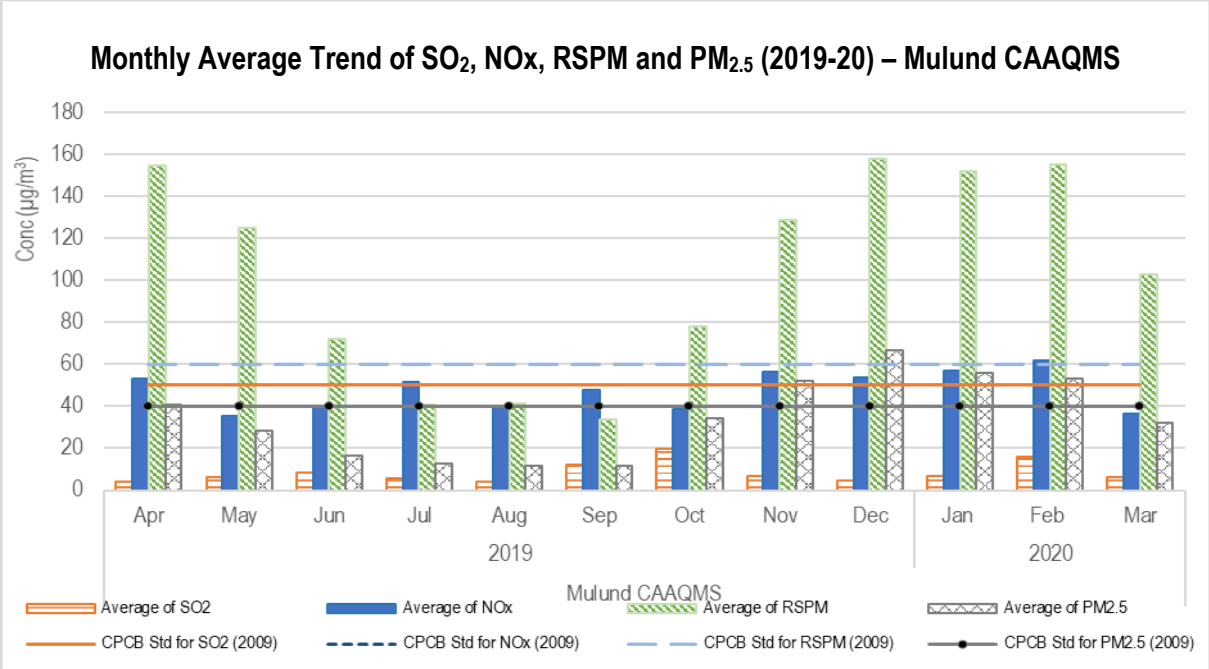



**Figure No. 126: Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Kurla CAAQMS**

## *Mumbai – Mulund CAAQMS*

**Table No. 103: Data for Monthly average reading recorded at Mulund CAAQMS**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** | ***40*** |
| **Mulund CAAQMS** | 2019 | Apr | 4 | 53 | 154 | 41 |
| | | May | 6 | 35 | 125 | 28 |
| | | Jun | 8 | 40 | 72 | 17 |
| | | Jul | 5 | 52 | 41 | 13 |
| | | Aug | 4 | 40 | 41 | 12 |
| | | Sep | 12 | 48 | 34 | 12 |
| | | Oct | 20 | 38 | 78 | 34 |
| | | Nov | 6 | 57 | 128 | 52 |
| | | Dec | 4 | 53 | 158 | 67 |
| | 2020 | Jan | 7 | 57 | 152 | 56 |
| | | Feb | 16 | 62 | 155 | 53 |
| | | Mar | 6 | 36 | 103 | 32 |




*CPCB standards for NOx and $PM_{2.5}$ are same, so the lines indicating them overlap and are not distinctly visible*

**Figure No. 127: Monthly average reading recorded at Mulund CAAQMS**

**Table No. 104: Data for Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Mulund CAAQMS**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|
| | | *50* | *40* | *60* | *40* |
| Mulund CAAQMS | 19-20 | 8 | 47 | 103 | 33 |

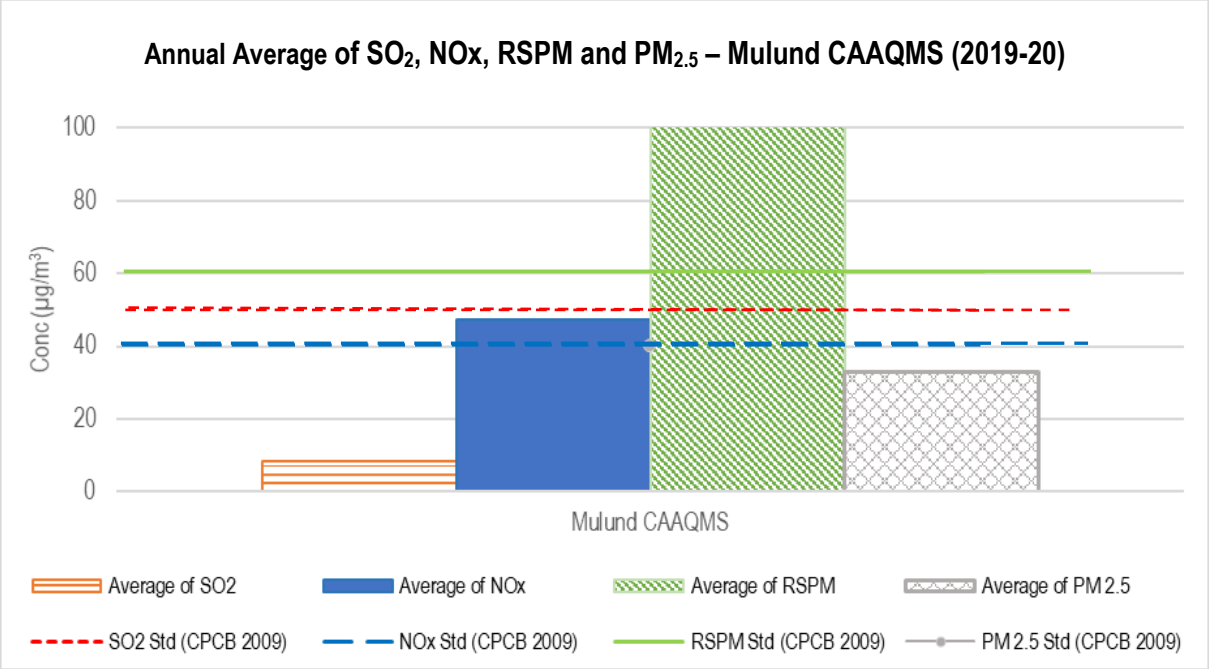
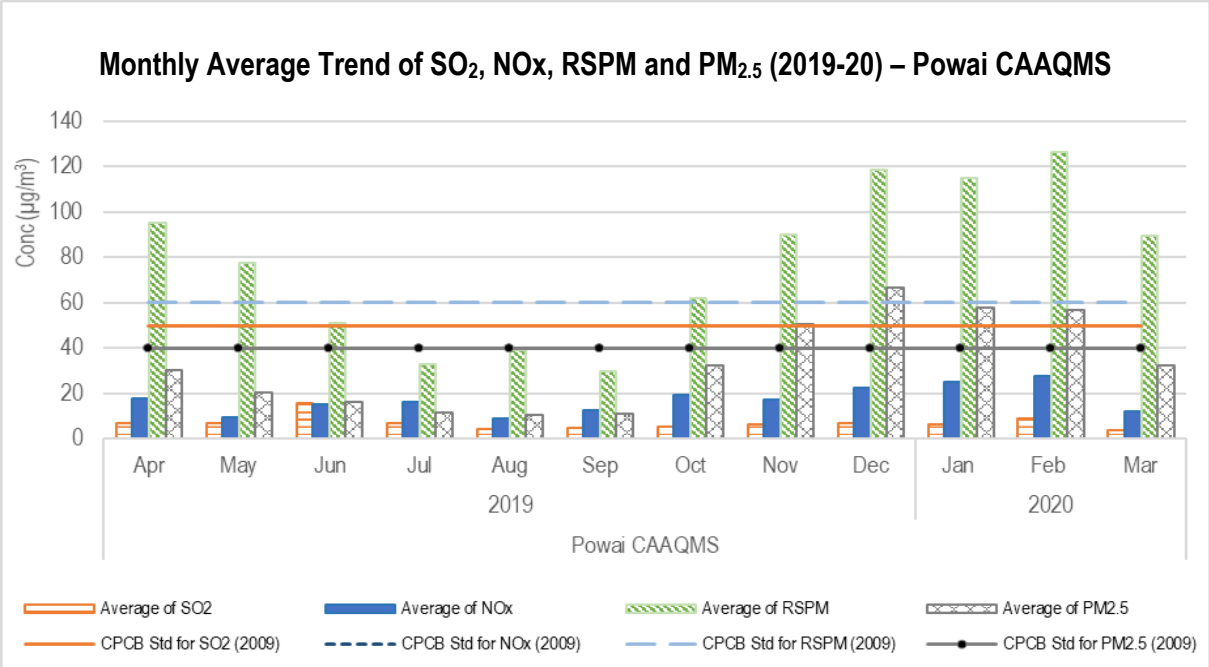



**Figure No. 128: Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Mulund CAAQMS**

## *Mumbai – Powai CAAQMS*

**Table No. 105: Data for Monthly average reading recorded at Powai CAAQMS**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** | ***40*** |
| **Powai CAAQMS** | 2019 | Apr | 7 | 18 | 95 | 30 |
| | | May | 7 | 9 | 77 | 21 |
| | | Jun | 16 | 15 | 51 | 16 |
| | | Jul | 7 | 16 | 33 | 12 |
| | | Aug | 4 | 9 | 39 | 10 |
| | | Sep | 5 | 13 | 30 | 11 |
| | | Oct | 6 | 19 | 62 | 32 |
| | | Nov | 7 | 17 | 90 | 50 |
| | | Dec | 7 | 22 | 119 | 66 |
| | 2020 | Jan | 7 | 25 | 115 | 58 |
| | | Feb | 9 | 28 | 127 | 57 |
| | | Mar | 4 | 12 | 90 | 32 |




*CPCB standards for NOx and $PM_{2.5}$ are same, so the lines indicating them overlap and are not distinctly visible*

**Figure No. 129: Monthly average reading recorded at Powai CAAQMS**

**Table No. 106: Data for Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Powai CAAQMS**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|
| | | *50* | *40* | *60* | *40* |
| **Powai CAAQMS** | 19-20 | 7 | 17 | *77* | 31 |

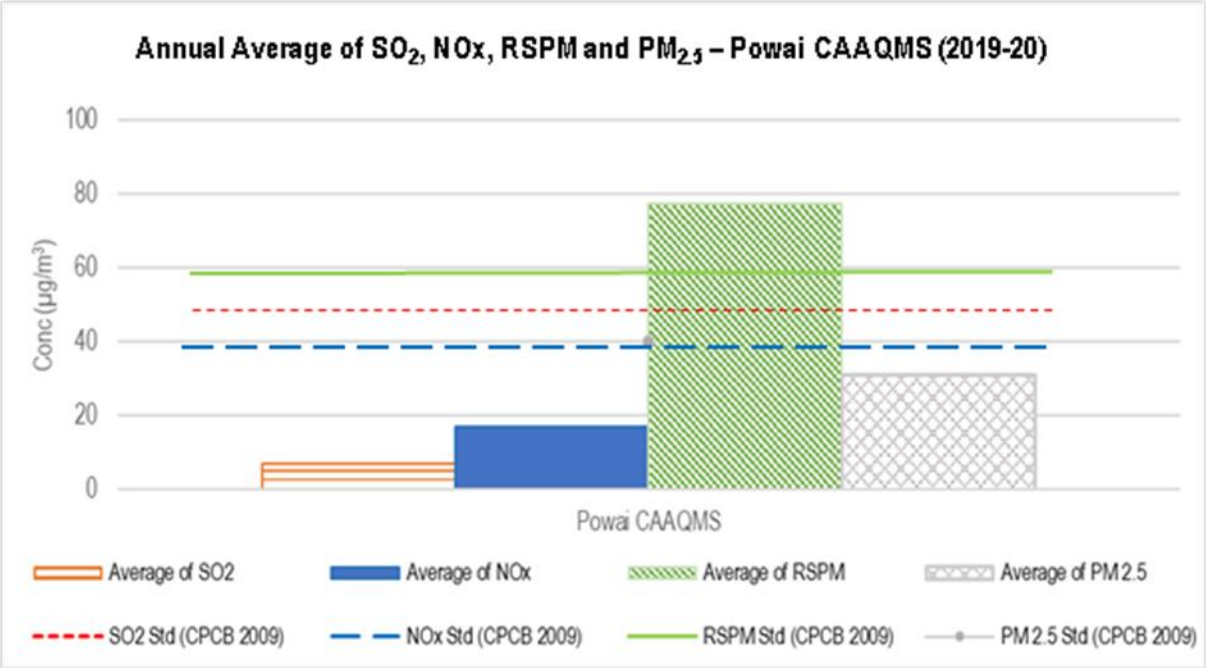
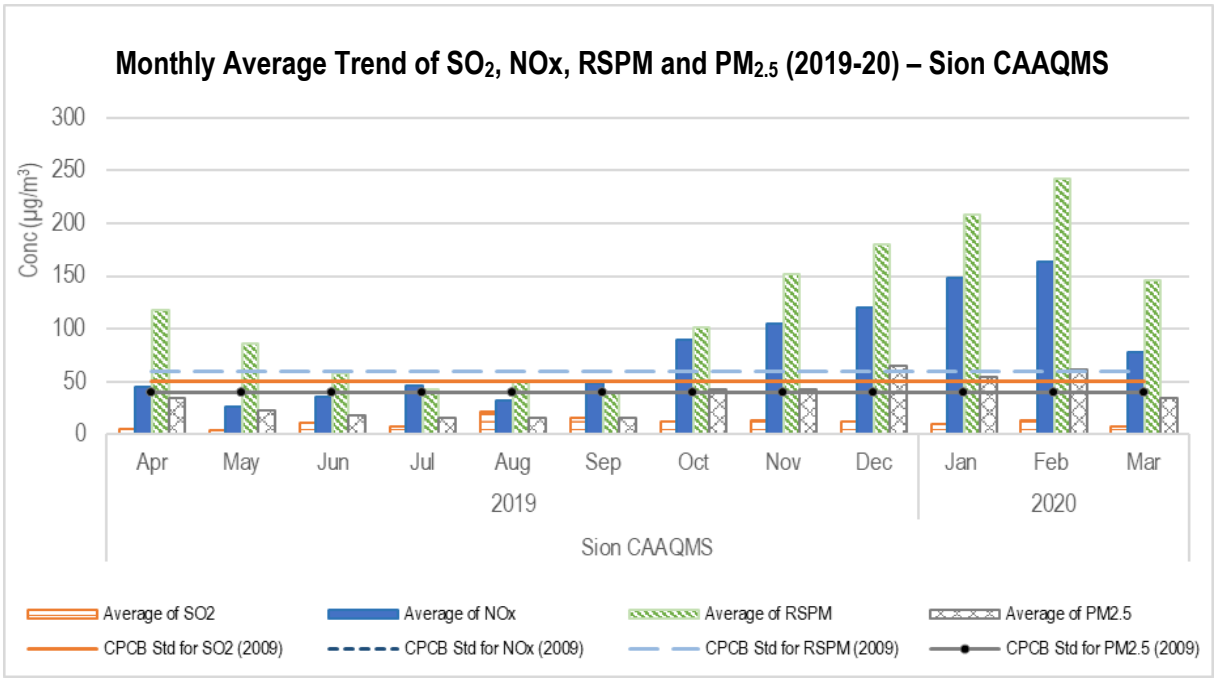



**Figure No. 130: Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Powai CAAQMS**

# Mumbai – Sion CAAQMS

**Table No. 107: Data for Monthly average reading recorded at Sion CAAQMS**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** | ***40*** |
| **Sion CAAQMS** | 2019 | Apr | 5 | 45 | 118 | 35 |
| | | May | 4 | 26 | 86 | 23 |
| | | Jun | 11 | 35 | 58 | 19 |
| | | Jul | 8 | 47 | 43 | 15 |
| | | Aug | 21 | 32 | 49 | 15 |
| | | Sep | 16 | 49 | 39 | 15 |
| | | Oct | 12 | 90 | 101 | 42 |
| | | Nov | 13 | 105 | 152 | 43 |
| | | Dec | 12 | 120 | 180 | 65 |
| | 2020 | Jan | 10 | 148 | 208 | 54 |
| | | Feb | 13 | 163 | 243 | 61 |
| | | Mar | 7 | 78 | 146 | 35 |




*CPCB standards for NOx and $PM_{2.5}$ are same, so the lines indicating them overlap and are not distinctly visible*

**Figure No. 131: Monthly average reading recorded at Sion CAAQMS**

**Table No. 108: Data for Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Sion CAAQMS**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|
| | | *50* | *40* | *60* | *40* |
| Sion CAAQMS | 04-05 | 21 | 67 | 197 | |
| | 05-06 | 26 | 105 | 231 | |
| | 06-07 | 30 | 91 | 255 | |
| | 07-08 | 28 | 139 | 295 | |
| | 08-09 | 24 | 97 | 202 | |
| | 09-10 | 18 | 109 | 223 | |
| | 10-11 | 14 | 116 | 181 | |
| | 11-12 | 10 | 66 | 150 | |
| | 12-13 | 11 | 106 | 136 | |
| | 13-14 | 8 | 108 | 131 | |
| | 14-15 | 8 | 91 | 117 | |
| | 15-16 | 14 | 81 | 148 | |
| | 16-17 | 8 | 83 | 149 | |
| | 17-18 | 6 | 77 | 148 | |
| | 18-19 | 5 | 83 | 147 | |
| | 19-20 | 11 | 79 | 120 | 31 |

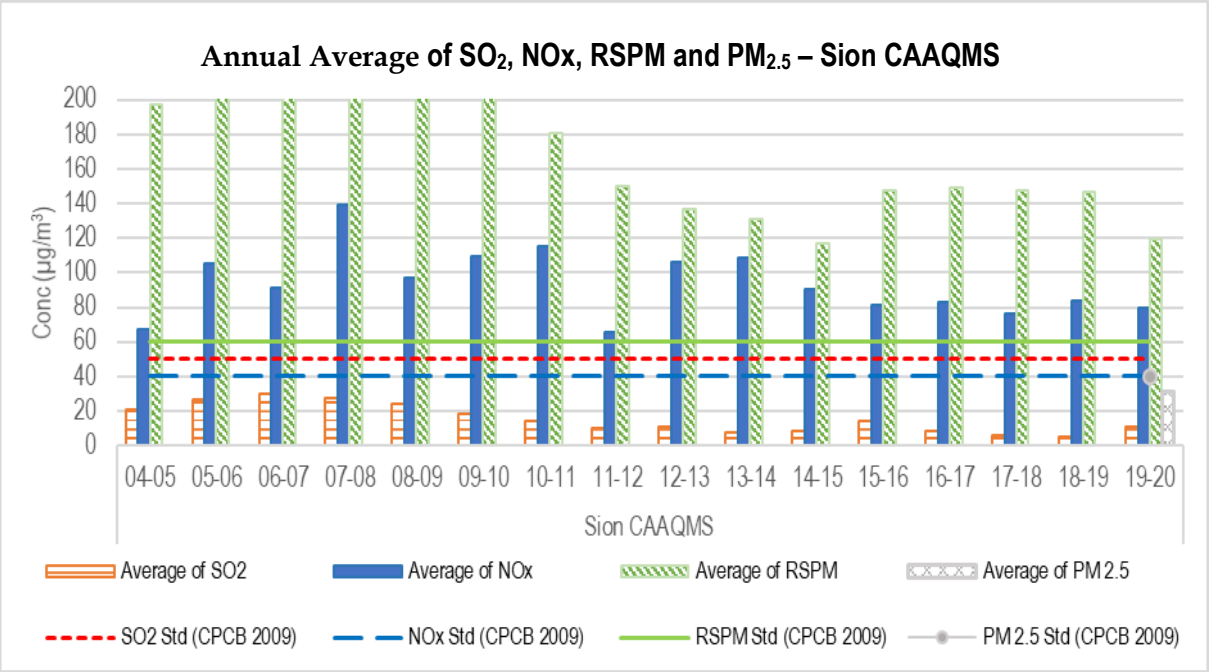
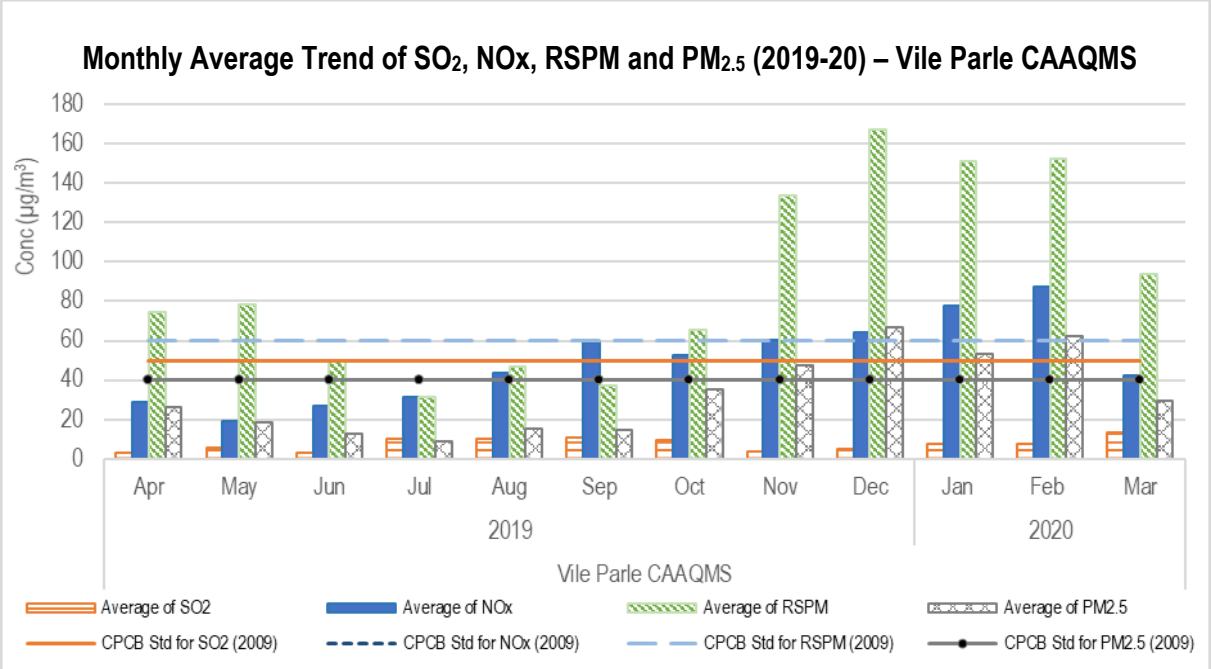



**Figure No. 132: Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Sion CAAQMS**

# Mumbai - Vile Parle CAAQMS

**Table No. 109: Data for Monthly average reading recorded at Vile Parle CAAQMS**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** | ***40*** |
| **Vile Parle CAAQMS** | 2019 | Apr | 3 | 29 | 74 | 26 |
| | | May | 6 | 19 | 78 | 18 |
| | | Jun | 3 | 27 | 49 | 13 |
| | | Jul | 10 | 32 | 31 | 9 |
| | | Aug | 10 | 44 | 47 | 15 |
| | | Sep | 11 | 59 | 37 | 15 |
| | | Oct | 9 | 53 | 66 | 35 |
| | | Nov | 3 | 61 | 133 | 48 |
| | | Dec | 5 | 64 | 167 | 67 |
| | 2020 | Jan | 8 | 78 | 151 | 53 |
| | | Feb | 8 | 87 | 153 | 62 |
| | | Mar | 13 | 42 | 94 | 29 |




*CPCB standards for NOx and $PM_{2.5}$ are same, so the lines indicating them overlap and are not distinctly visible*

**Figure No. 133: Monthly average reading recorded at Vile Parle CAAQMS**

**Table No. 110: Data for Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Vile Parle CAAQMS**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|
| | | *50* | *40* | *60* | *40* |
| Vile Parle CAAQMS | 19-20 | 8 | 49 | 90 | 28 |

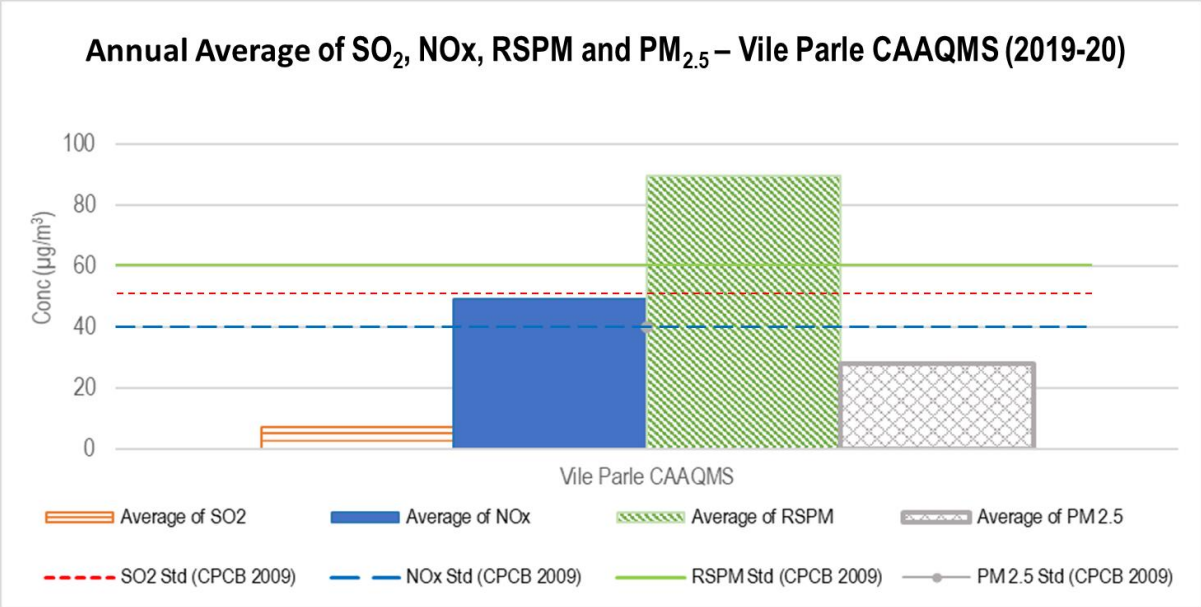
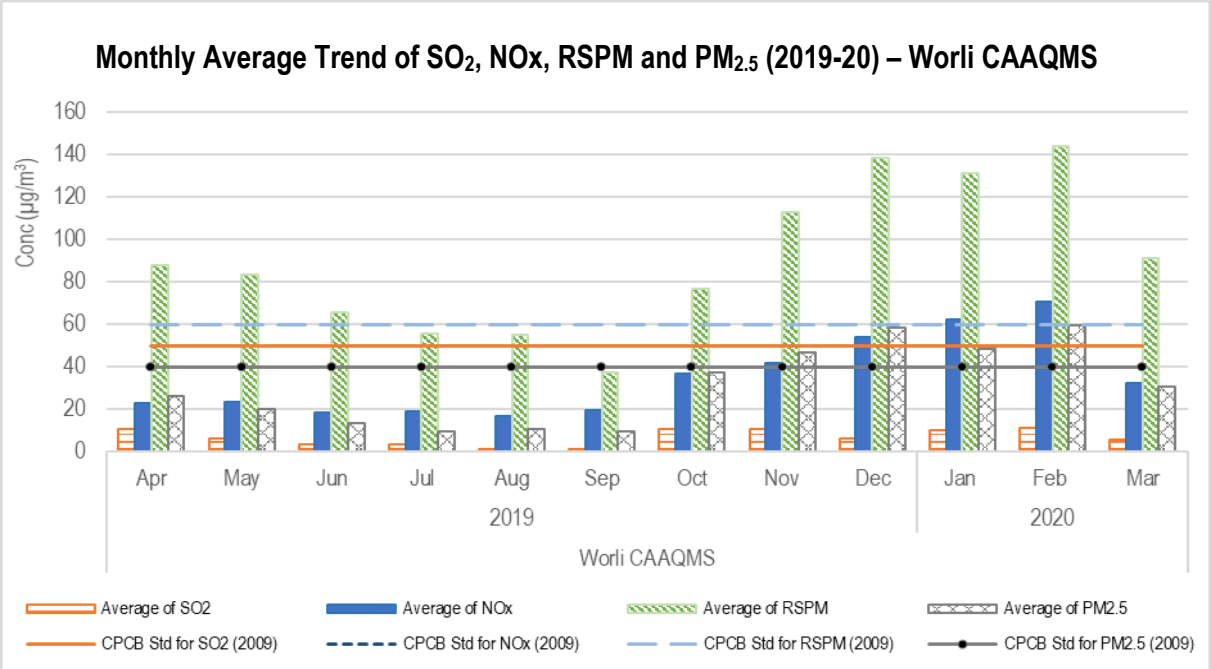



**Figure No. 134: Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Vile Parle CAAQMS**

# Mumbai - Worli CAAQMS

**Table No. 111: Data for Monthly average reading recorded at Worli CAAQMS**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** | ***40*** |
| **Worli CAAQMS** | 2019 | Apr | 11 | 23 | 88 | 26 |
| | | May | 6 | 24 | 83 | 20 |
| | | Jun | 3 | 18 | 66 | 13 |
| | | Jul | 4 | 19 | 56 | 9 |
| | | Aug | 2 | 17 | 55 | 11 |
| | | Sep | 2 | 19 | 37 | 10 |
| | | Oct | 11 | 37 | 77 | 37 |
| | | Nov | 11 | 42 | 113 | 47 |
| | | Dec | 6 | 54 | 138 | 59 |
| | 2020 | Jan | 10 | 62 | 131 | 48 |
| | | Feb | 11 | 71 | 144 | 60 |
| | | Mar | 6 | 32 | 91 | 31 |




*CPCB standards for NOx and $PM_{2.5}$ are same, so the lines indicating them overlap and are not distinctly visible*

**Figure No. 135: Monthly average reading recorded at Worli CAAQMS**

**Table No. 112: Data for Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Worli CAAQMS**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|
| | | *50* | *40* | *60* | *40* |
| **Worli CAAQMS** | 19-20 | 7 | 35 | 90 | 26 |

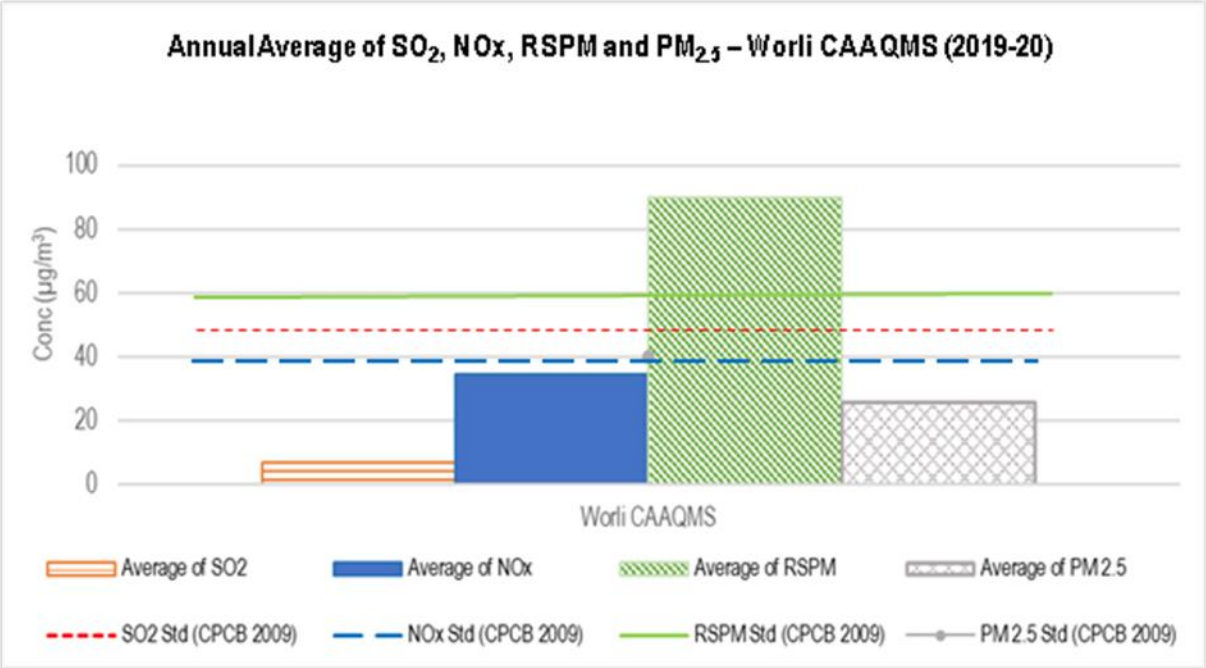
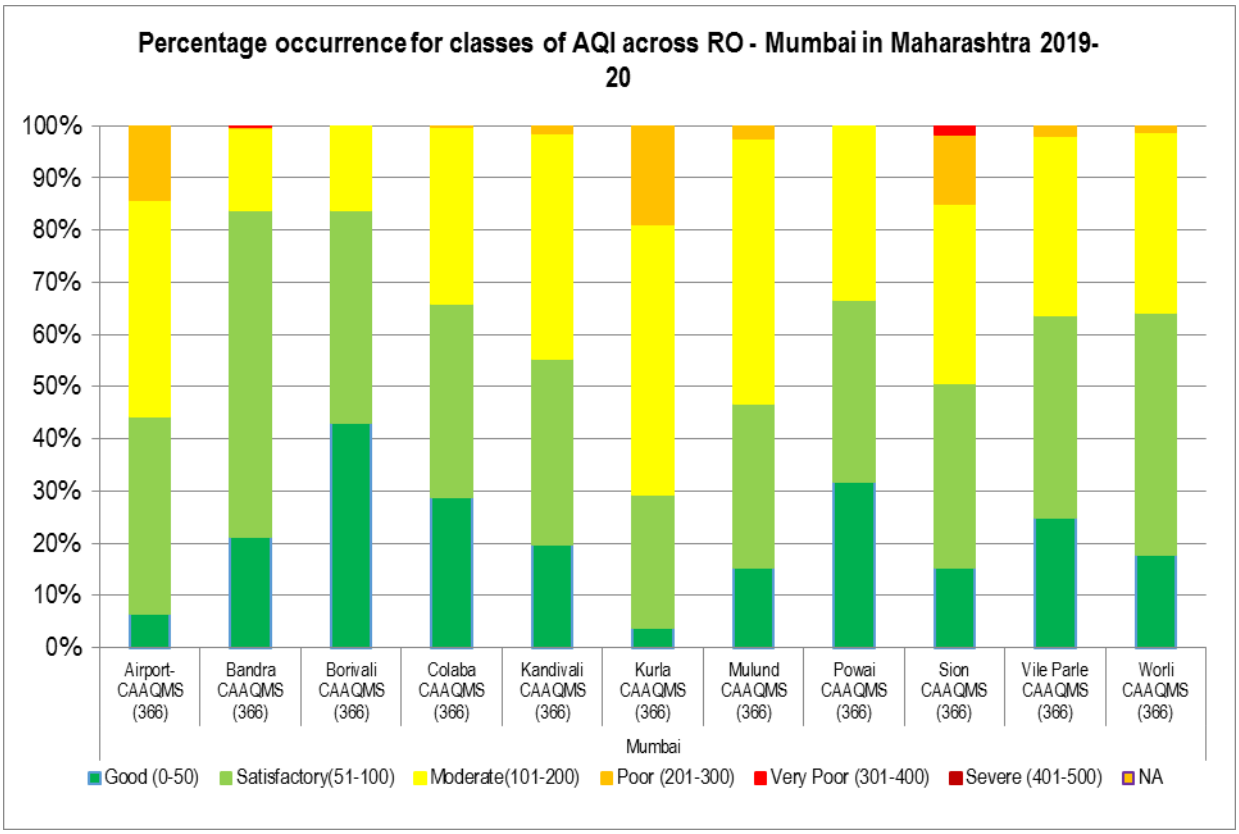


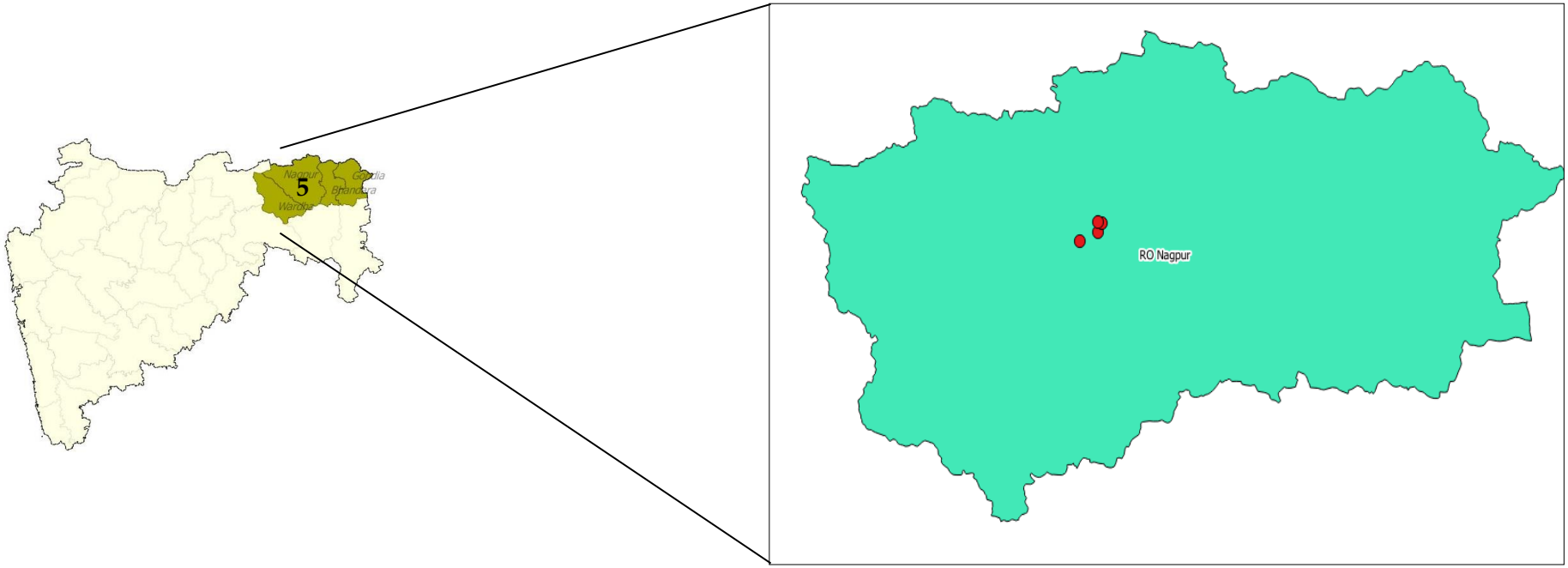

**Figure No. 136: Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Worli CAAQMS**

**Table No. 113: Percentage exceedance of pollutants at Mumbai RO**

| Station Name | Total Observation | No. of times exceedance occurred | | | % Exceedance | | |
|---|---|---|---|---|---|---|---|
| | | $SO_2$ | NOx | RSPM | $SO_2$ | NOx | RSPM |
| Airport - CAAQMS | 366 | | 181 | 193 | | 49 | 53 |
| Bandra CAAQMS | 366 | 11 | 58 | 48 | 3 | 16 | 13 |
| Borivali CAAQMS | 366 | 2 | 2 | 73 | 1 | 1 | 20 |
| Colaba CAAQMS | 366 | 1 | 10 | 125 | | 3 | 34 |
| Kandivali CAAQMS | 366 | | 38 | 163 | | 10 | 45 |
| Kurla CAAQMS | 366 | 5 | 144 | 253 | 1 | 39 | 69 |
| Mulund CAAQMS | 366 | | 9 | 195 | | 2 | 53 |
| Powai CAAQMS | 366 | | | 123 | | | 34 |
| Sion CAAQMS | 366 | 8 | 160 | 183 | 2 | 44 | 50 |
| Vile Parle CAAQMS | 366 | | 44 | 136 | 0 | 12 | 37 |
| Worli CAAQMS | 366 | | 14 | 131 | 0 | 4 | 36 |



# RO – Nagpur




| MPCB RO | Region | Station code | Station name | Type | Latitude (deg) | Longitude (deg) |
|---|---|---|---|---|---|---|
| Nagpur | Nagpur | 287 | IOE North Ambazari road | Residential | 21° 08' 10.0" N | 79° 04' 08.5" E |
| | Nagpur | 288 | MIDC Office, Hingna Road | Industrial | 21° 06' 35.5" N | 79° 00' 27.2" E |
| | Nagpur | 314 | Govt Polytechnic Col, Sadar | Rural and other areas | 21° 09' 47.6" N | 79° 04' 57.6" E |
| | Nagpur | 711 | Civil lines Nagpur | Residential | 21° 09' 28.6" N | 79° 04' 12.1" E |
| | Nagpur | | Nagpur CAAQMS | Commercial | 21° 09'03.61"N | 79° 04' 06.00"E |

# Nagpur - IOE North Ambazari road

**Table No. 114: Data for Monthly average reading recorded at IOE North Ambazari road**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **IOE North Ambazari Road** | 2019 | Apr | 15 | 45 | 93 |
| | | May | 12 | 38 | 84 |
| | | Jun | 12 | 36 | 88 |
| | | Jul | 12 | 38 | 116 |
| | | Aug | 11 | 33 | 99 |
| | | Sep | 12 | 37 | 101 |
| | | Oct | 12 | 38 | 73 |
| | | Nov | 14 | 41 | 129 |
| | | Dec | 17 | 43 | 133 |
| | 2020 | Jan | 14 | 41 | 148 |
| | | Feb | 13 | 38 | 126 |
| | | Mar | 10 | 30 | 124 |

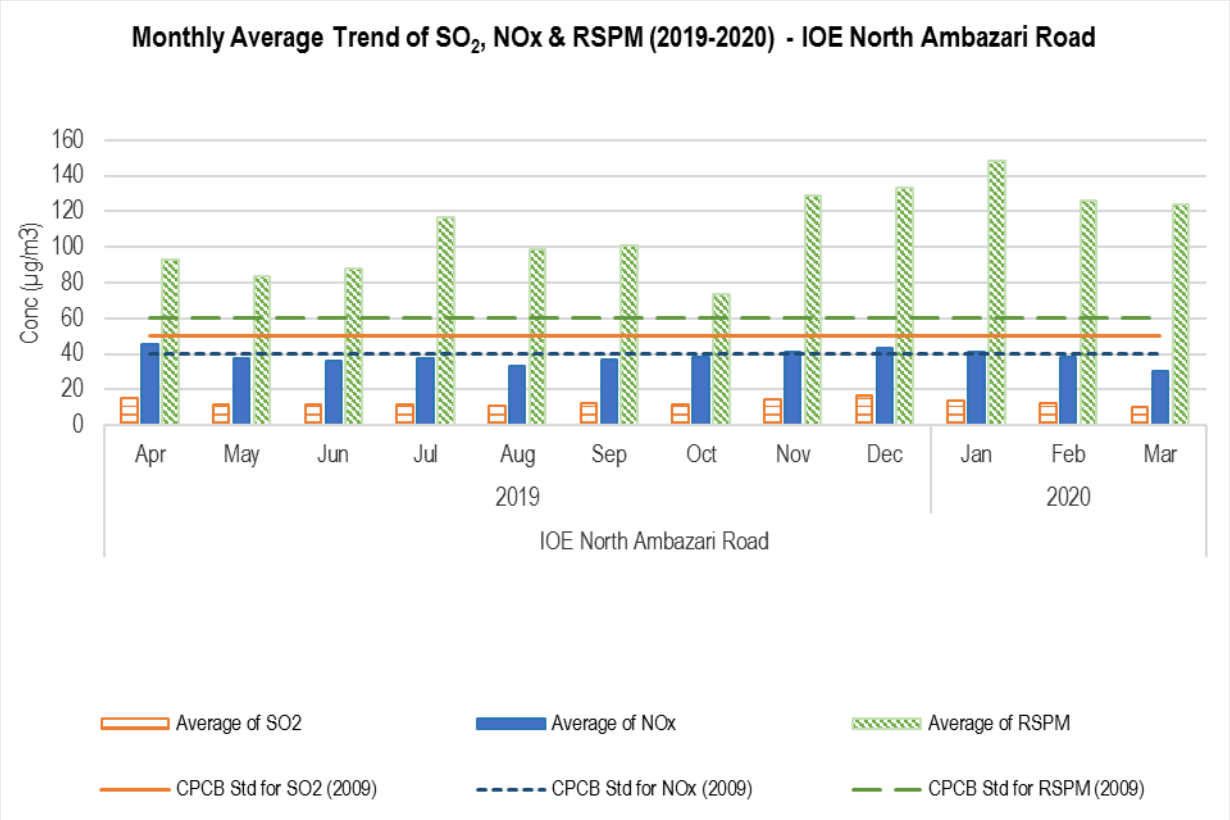



**Figure No. 137: Monthly average reading recorded at IOE North Ambazari road**

**Table No. 115: Data for Annual average trend of $SO_2$, NOx, and RSPM at IOE North Ambazari Road**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| IOE North Ambazari road | 04-05 | 8 | 21 | 52 |
| | 05-06 | 9 | 30 | 44 |
| | 06-07 | 10 | 27 | 66 |
| | 07-08 | 8 | 22 | 125 |
| | 08-09 | 8 | 30 | 114 |
| | 09-10 | 10 | 36 | 109 |
| | 10-11 | 10 | 33 | 96 |
| | 11-12 | 10 | 34 | 84 |
| | 12-13 | 11 | 39 | 96 |
| | 13-14 | 10 | 29 | 90 |
| | 14-15 | 10 | 32 | 106 |
| | 15-16 | 10 | 31 | 101 |
| | 16-17 | 10 | 31 | 92 |
| | 17-18 | 11 | 33 | 95 |
| | 18-19 | 13 | 39 | 111 |
| | 19-20 | 13 | 39 | 111 |

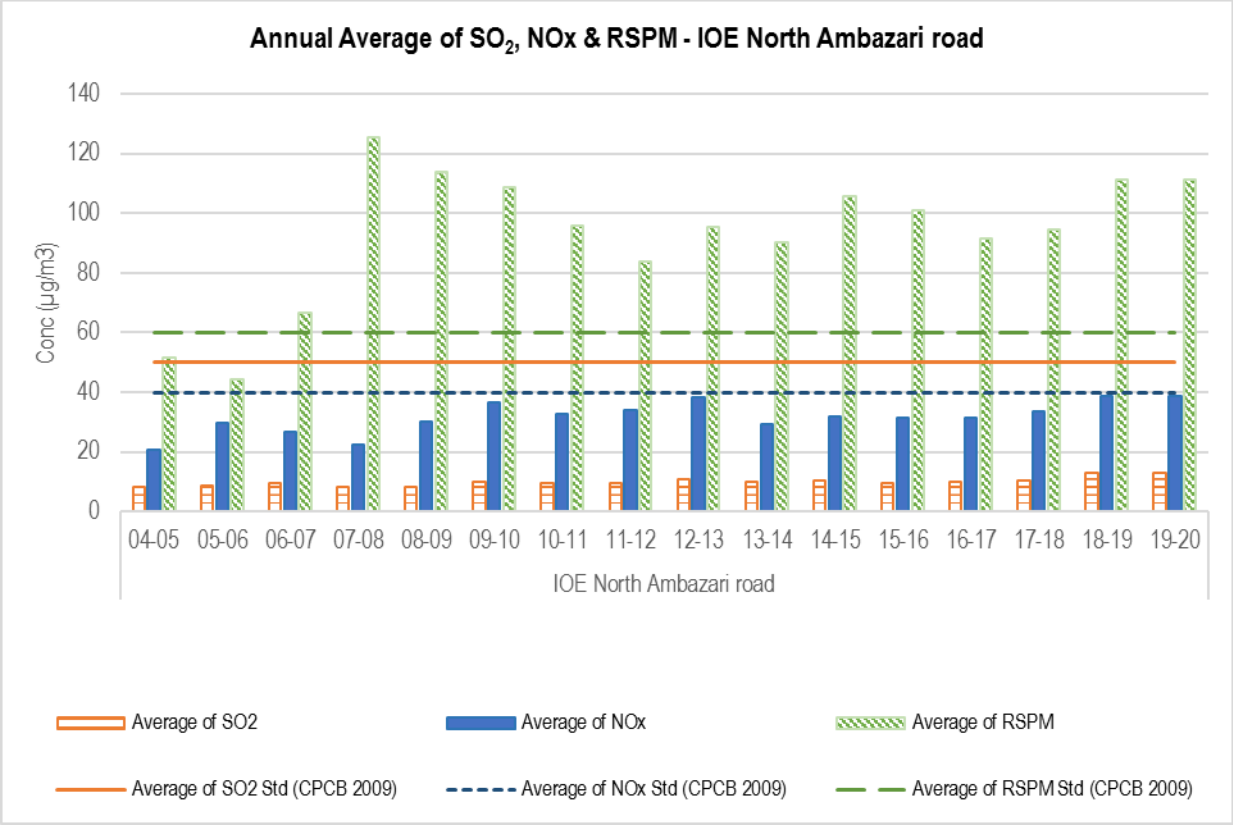



**Figure No. 138: Annual average trend of $SO_2$, NOx, and RSPM at IOE North Ambazari road**

# Nagpur - MIDC Office, Hingna Road

**Table No. 116: Data for Monthly average reading recorded at MIDC Office, Hingna Road**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **MIDC Office, Hingna Road** | 2019 | Apr | 16 | 48 | 111 |
| | | May | 12 | 37 | 96 |
| | | Jun | 13 | 41 | 89 |
| | | Jul | 13 | 40 | 106 |
| | | Aug | 13 | 39 | 104 |
| | | Sep | 13 | 39 | 111 |
| | | Oct | 13 | 41 | 105 |
| | | Nov | 15 | 43 | 154 |
| | | Dec | 16 | 43 | 129 |
| | 2020 | Jan | 17 | 44 | 139 |
| | | Feb | 14 | 40 | 121 |
| | | Mar | 12 | 34 | 135 |

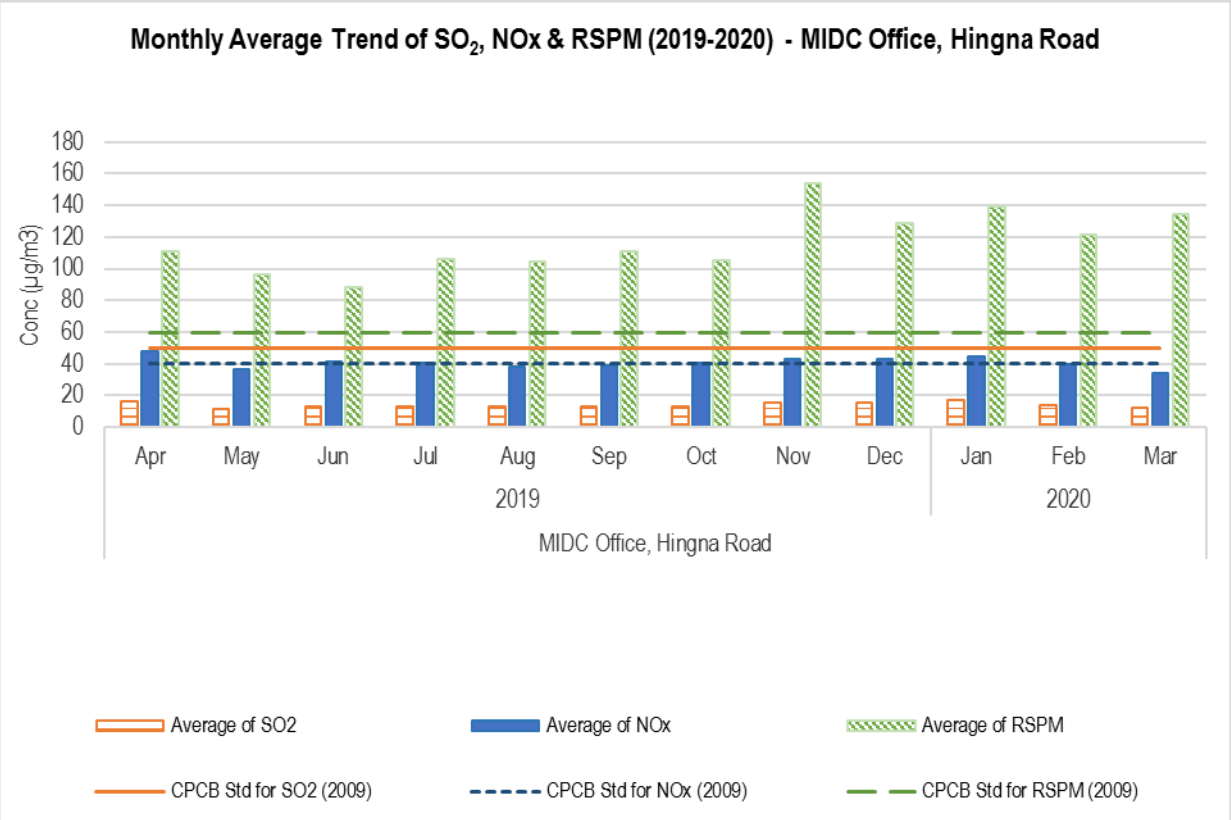



**Figure No. 139: Monthly average reading recorded at MIDC Office, Hingna Road**

**Table No. 117: Data for Annual average trend of $SO_2$, NOx, and RSPM at MIDC Office, Hingna Road**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| MIDC Office, Hingna Road | 04-05 | 9 | 22 | 51 |
| | 05-06 | 10 | 34 | 40 |
| | 06-07 | 9 | 25 | 90 |
| | 07-08 | 9 | 24 | 160 |
| | 08-09 | 9 | 30 | 118 |
| | 09-10 | 10 | 38 | 128 |
| | 10-11 | 10 | 34 | 113 |
| | 11-12 | 10 | 35 | 105 |
| | 12-13 | 11 | 41 | 125 |
| | 13-14 | 10 | 31 | 119 |
| | 14-15 | 11 | 33 | 129 |
| | 15-16 | 10 | 32 | 110 |
| | 16-17 | 10 | 33 | 101 |
| | 17-18 | 11 | 34 | 98 |
| | 18-19 | 13 | 39 | 118 |
| | 19-20 | 14 | 41 | 116 |

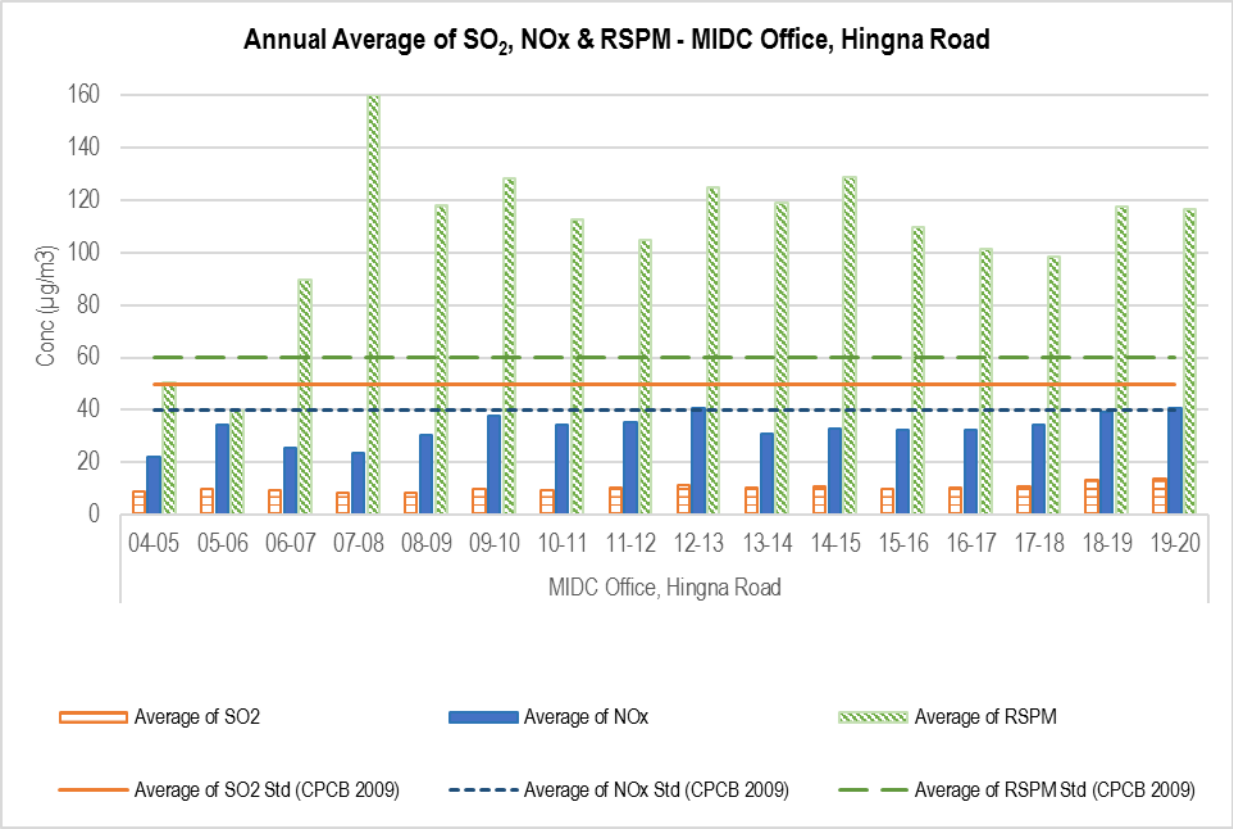



**Figure No. 140: Annual average trend of $SO_2$, NOx, and RSPM at MIDC Office, Hingna Road**

# Nagpur - Govt. Polytechnic Col, Sadar

**Table No. 118: Data for Monthly average reading recorded at Govt. Polytechnic Col, Sadar**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Govt Polytechnic Col, Sadar** | 2019 | Apr | 14 | 42 | 97 |
| | | May | 12 | 38 | 84 |
| | | Jun | 12 | 38 | 79 |
| | | Jul | 12 | 37 | 96 |
| | | Aug | 11 | 36 | 98 |
| | | Sep | 14 | 40 | 109 |
| | | Oct | 12 | 38 | 97 |
| | | Nov | 15 | 44 | 137 |
| | | Dec | 16 | 44 | 130 |
| | 2020 | Jan | 15 | 43 | 142 |
| | | Feb | 13 | 39 | 128 |
| | | Mar | 11 | 34 | 108 |

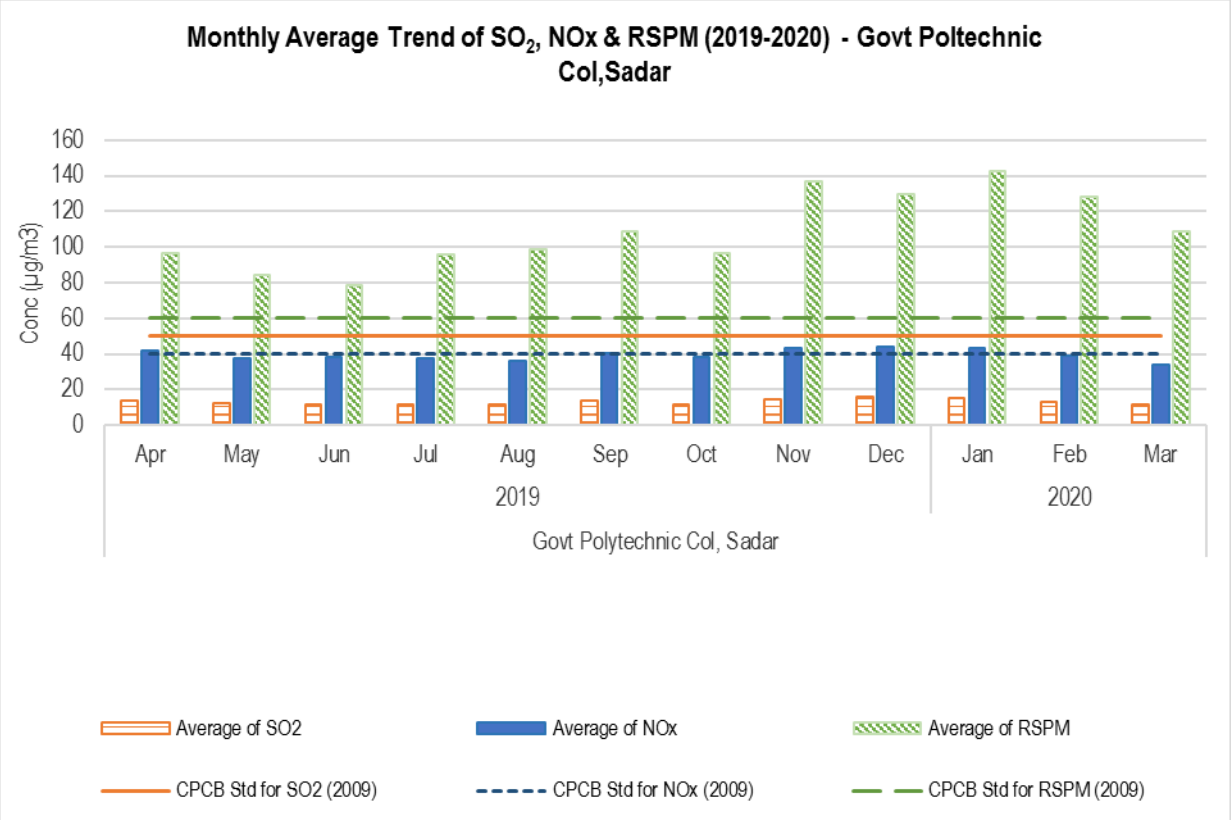



**Figure No. 141: Monthly average reading recorded at Govt. Polytechnic Col, Sadar**

**Table No. 119: Data for Annual average trend of $SO_2$, NOx, and RSPM at Govt. Polytechnic Col, Sadar**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Govt Polytechnic College, Sadar | 04-05 | 9 | 21 | 45 |
| | 05-06 | 9 | 32 | 52 |
| | 06-07 | 9 | 26 | 70 |
| | 07-08 | 8 | 21 | 107 |
| | 08-09 | 8 | 27 | 101 |
| | 09-10 | 9 | 31 | 93 |
| | 10-11 | 9 | 30 | 87 |
| | 11-12 | 9 | 30 | 80 |
| | 12-13 | 10 | 35 | 82 |
| | 13-14 | 9 | 28 | 92 |
| | 14-15 | 10 | 31 | 103 |
| | 15-16 | 10 | 33 | 91 |
| | 16-17 | 10 | 30 | 93 |
| | 17-18 | 10 | 34 | 91 |
| | 18-19 | 13 | 38 | 109 |
| | 19-20 | 13 | 40 | 110 |

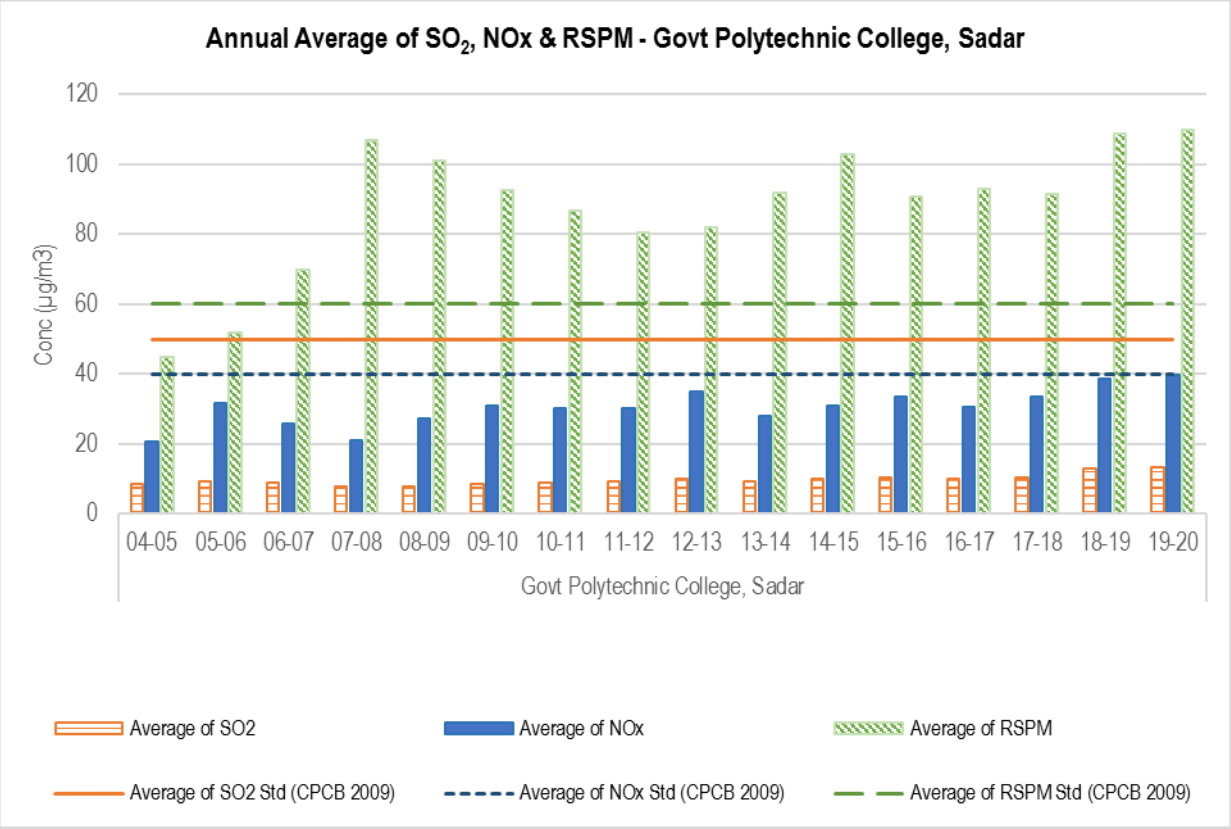



**Figure No. 142: Annual average trend of $SO_2$, NOx, and RSPM at Govt. Polytechnic Col, Sadar**

# Nagpur - Nagpur Civil Lines

**Table No. 120: Data for Monthly average reading recorded at Civil Lines Nagpur**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Civil lines Nagpur** | 2019 | Apr | 14 | 42 | 70 |
| | | May | 11 | 34 | 64 |
| | | Jun | 12 | 36 | 66 |
| | | Jul | 11 | 34 | 61 |
| | | Aug | 11 | 35 | 68 |
| | | Sep | 12 | 36 | 74 |
| | | Oct | 11 | 36 | 87 |
| | | Nov | 13 | 41 | 87 |
| | | Dec | 14 | 41 | 77 |
| | 2020 | Jan | 14 | 40 | 77 |
| | | Feb | 13 | 38 | 66 |
| | | Mar | 11 | 33 | 70 |

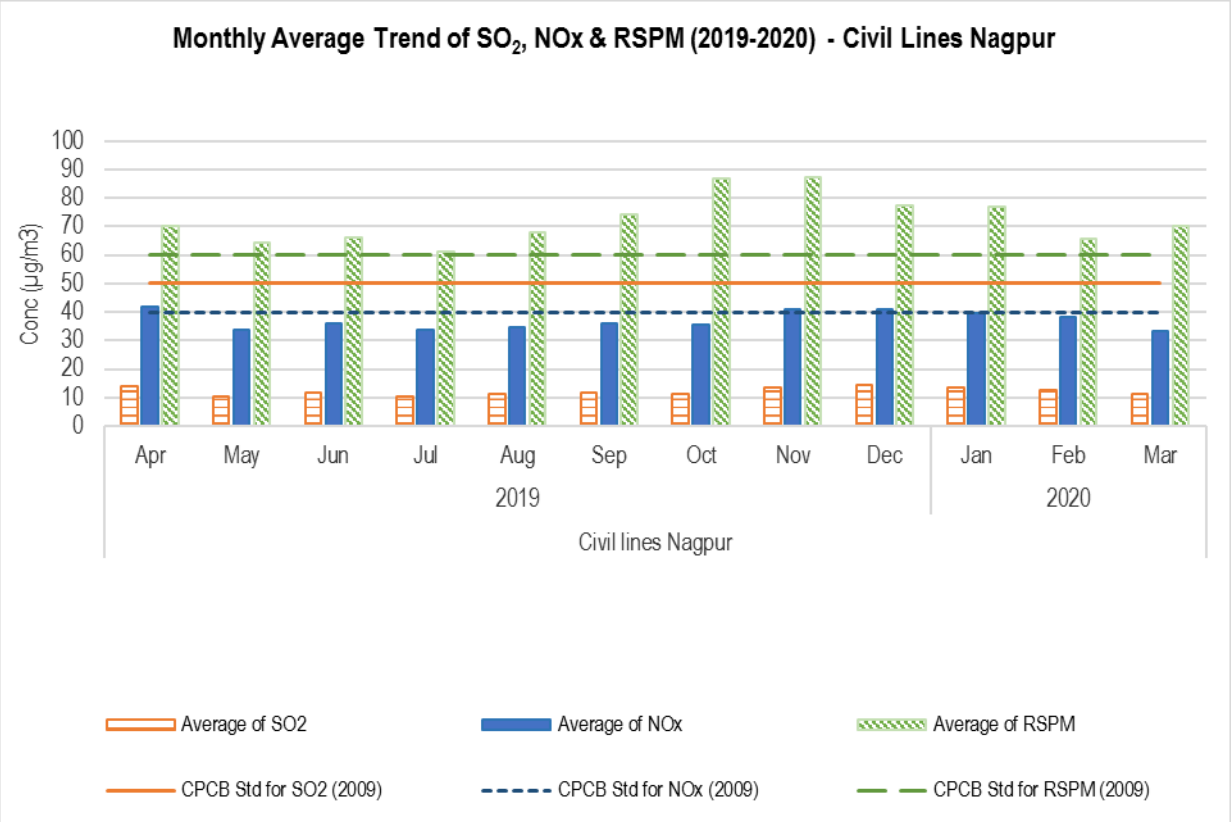



**Figure No. 143: Monthly average reading recorded at Civil Lines Nagpur**

**Table No. 121: Data for Annual average trend of $SO_2$, NOx, and RSPM at Civil Lines Nagpur**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Civil lines Nagpur | 04-05 | 17 | 25 | 53 |
| | 05-06 | 15 | 22 | 66 |
| | 06-07 | 14 | 28 | 76 |
| | 07-08 | 14 | 30 | 70 |
| | 08-09 | 18 | 31 | 84 |
| | 09-10 | 13 | 35 | 85 |
| | 10-11 | 9 | 28 | 66 |
| | 11-12 | 9 | 26 | 55 |
| | 12-13 | 9 | 30 | 54 |
| | 13-14 | 9 | 24 | 61 |
| | 14-15 | 10 | 28 | 62 |
| | 15-16 | 9 | 29 | 54 |
| | 16-17 | 9 | 27 | 62 |
| | 17-18 | 10 | 30 | 61 |
| | 18-19 | 11 | 34 | 71 |
| | 19-20 | 12 | 37 | 73 |

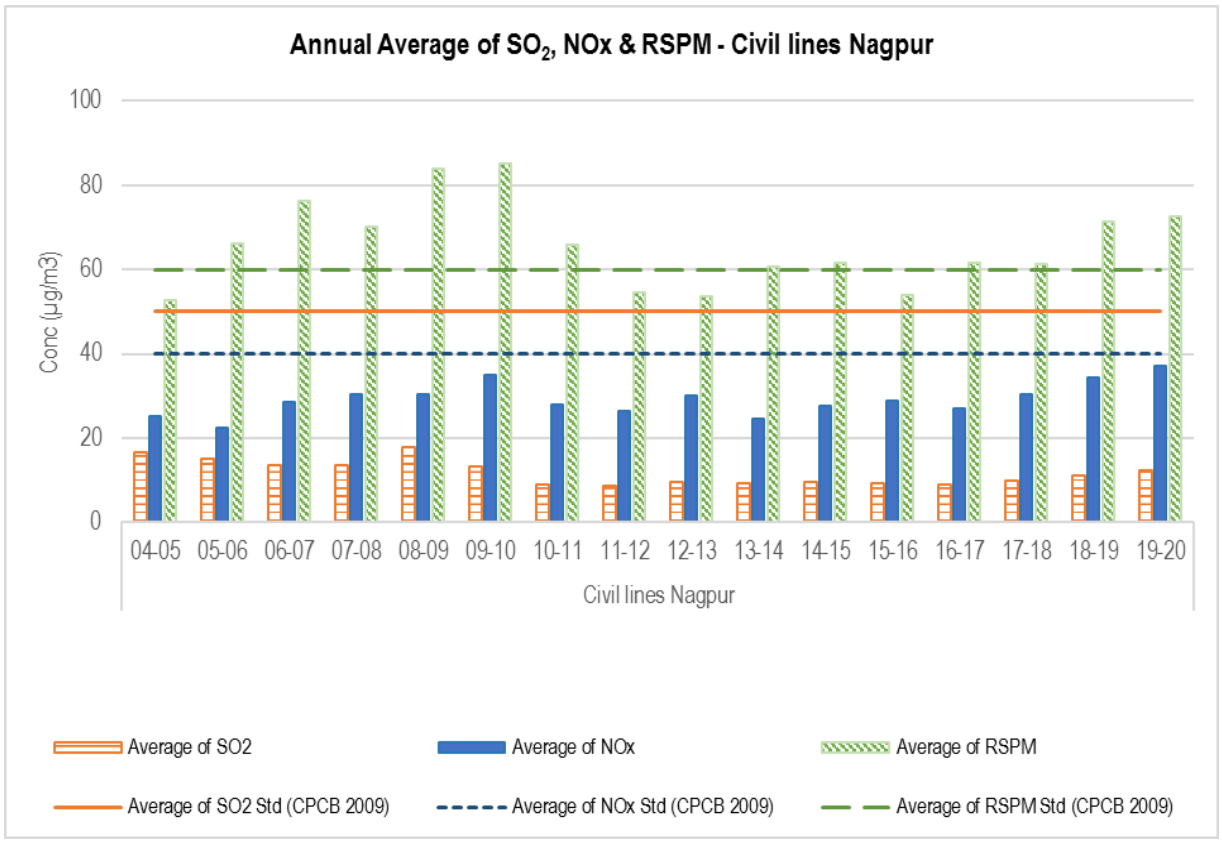
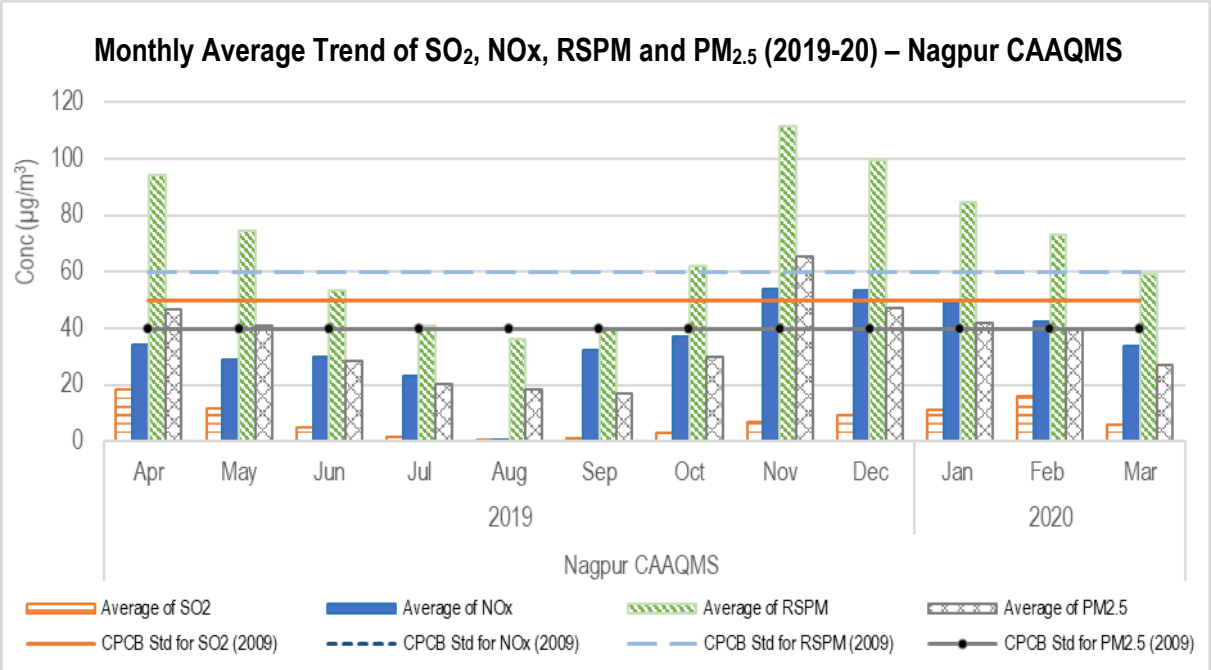



**Figure No. 144: Annual average trend of $SO_2$, NOx, and RSPM at Civil Lines Nagpur**

# Nagpur - Nagpur CAAQMS

**Table No. 122: Data for Monthly average reading recorded at Nagpur CAAQMS**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** | ***40*** |
| **Nagpur CAAQMS** | 2019 | Apr | 18 | 34 | 94 | 47 |
| | | May | 12 | 29 | 75 | 41 |
| | | Jun | 5 | 30 | 54 | 28 |
| | | Jul | 1 | 23 | 41 | 20 |
| | | Aug | 1 | 0 | 36 | 18 |
| | | Sep | 1 | 32 | 40 | 17 |
| | | Oct | 3 | 37 | 62 | 30 |
| | | Nov | 7 | 54 | 112 | 65 |
| | | Dec | 9 | 53 | 99 | 47 |
| | 2020 | Jan | 11 | 49 | 85 | 42 |
| | | Feb | 16 | 43 | 73 | 40 |
| | | Mar | 6 | 34 | 59 | 27 |




*CPCB standards for NOx and $PM_{2.5}$ are same, so the lines indicating them overlap and are not distinctly*

**Figure No. 145: Monthly average reading recorded at Nagpur CAAQMS**

**Table No. 123: Data for Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Nagpur CAAQMS**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|
| | | *50* | *40* | *60* | *40* |
| Nagpur CAAQMS | 16-17 | 10 | 42 | 71 | |
| | 17-18 | 9 | 19 | 70 | |
| | 18-19 | 11 | 38 | 88 | |
| | 19-20 | 8 | 35 | 69 | 34 |

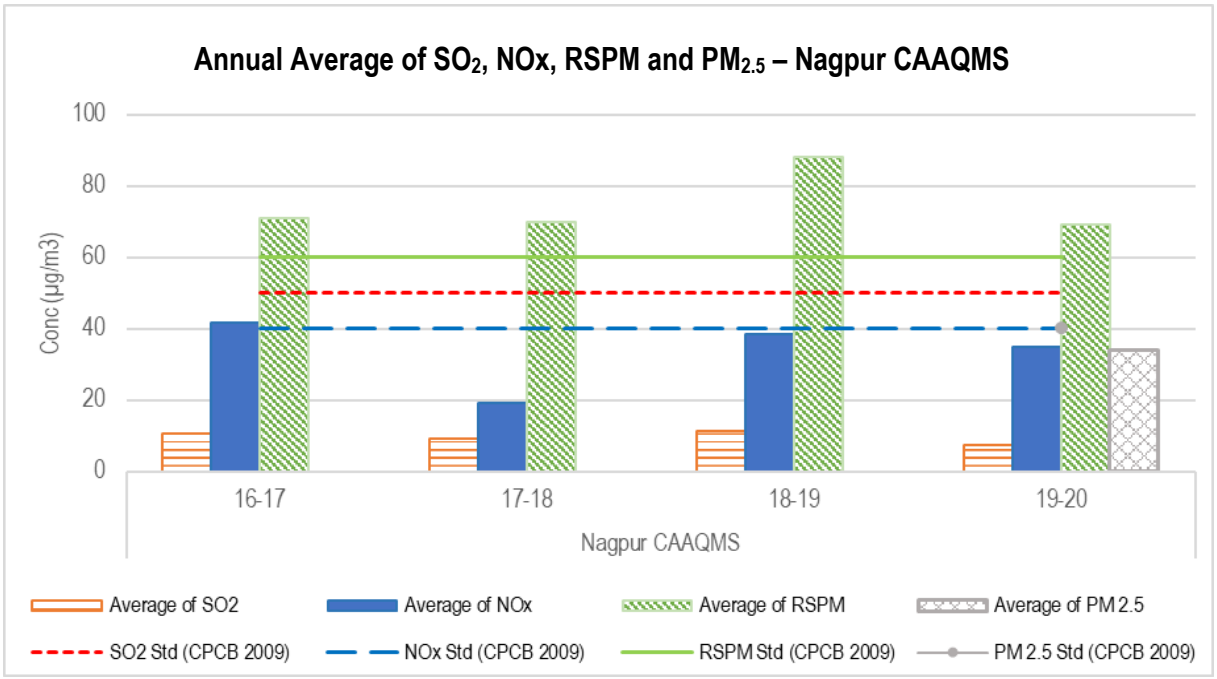
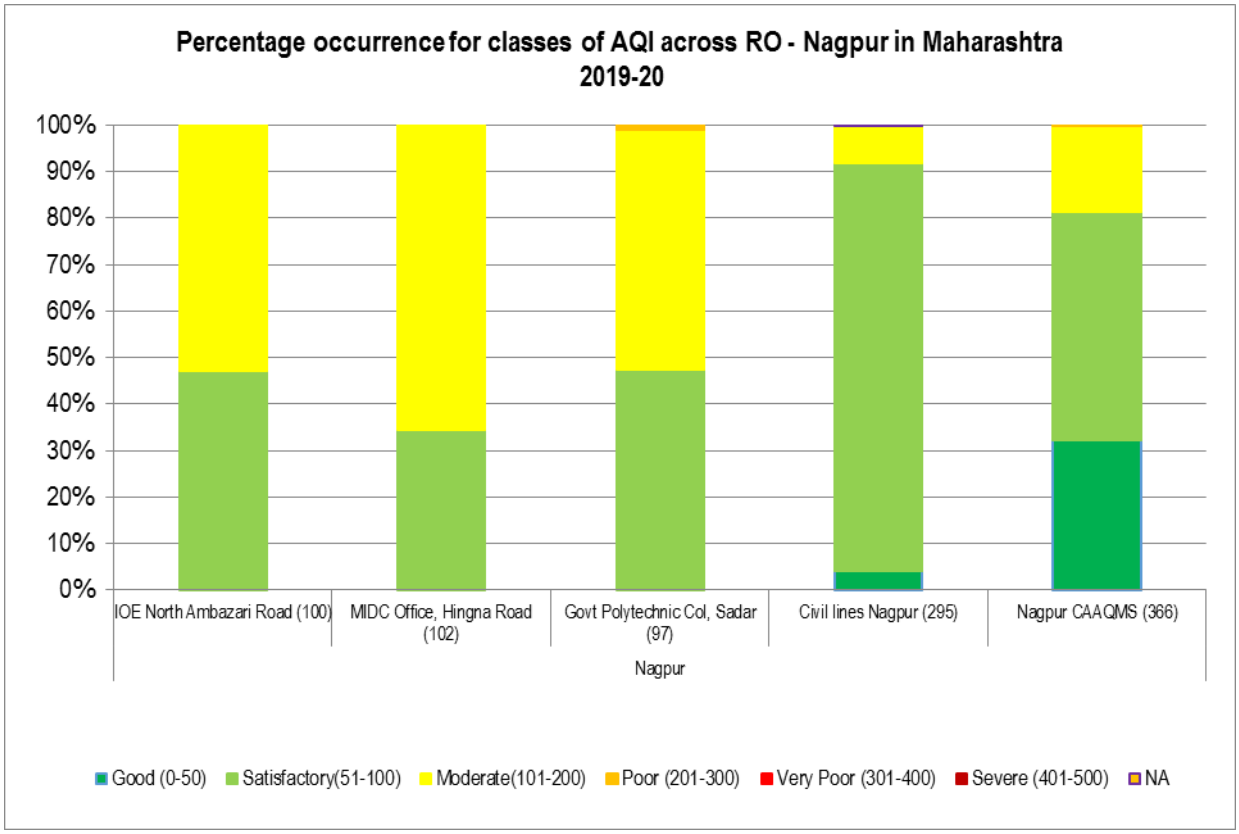


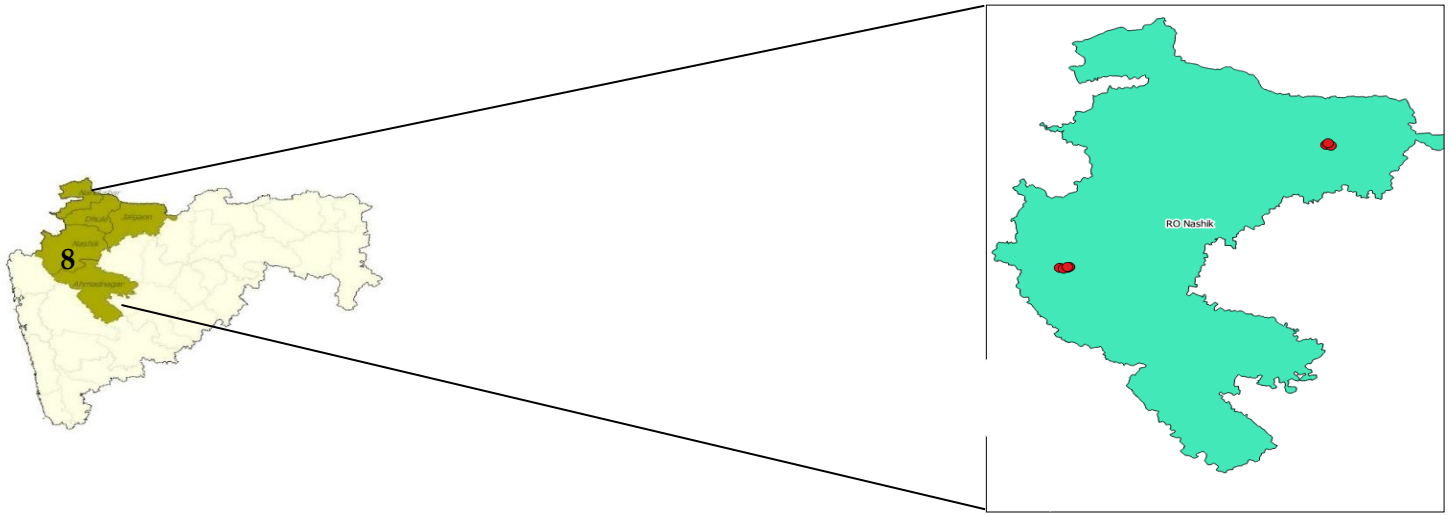

**Figure No. 146: Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Nagpur CAAQMS**

**Table No. 124: Percentage exceedance of pollutants at Nagpur RO**

| Station Name | Total Observation | No. of times exceedance occurred | | | % Exceedance | | |
|---|---|---|---|---|---|---|---|
| | | $SO_2$ | NOx | RSPM | $SO_2$ | NOx | RSPM |
| IOE North Ambazari Road | 100 | | | 53 | | | 53 |
| MIDC Office, Hingna Road | 102 | | | 67 | | | 66 |
| Govt Polytechnic Col, Sadar | 97 | | | 51 | | | 53 |
| Civil lines Nagpur | 295 | | | 23 | | | 8 |
| Nagpur CAAQMS | 366 | | 7 | 66 | | 2 | 18 |



# RO - Nashik




| MPCB RO | Region | Station code | Station name | Type | Latitude (deg) | Longitude (deg) |
|---|---|---|---|---|---|---|
| Nashik | Jalgaon | 644 | Old B. J. Market | Residential | 21° 00' 37.2" N | 75° 34' 01.4" E |
| | Jalgaon | 645 | Girna Water Tank | Residential | 20° 59' 49.3" N | 75° 33' 04.7" E |
| | Jalgaon | 646 | MIDC Jalgaon | Industrial | 20° 59' 20.2" N | 75° 35' 04.1" E |
| | Nashik | 259 | RTO Colony | Residential | 19° 59' 48.9" N | 73° 46' 35.3" E |
| | Nashik | 269 | MIDC Satpur - VIP | Industrial | 19° 59' 54.2" N | 73° 43' 41.2" E |
| | Nashik | 280 | NMC Nashik | Residential | 20° 00' 00.0" N | 73° 46' 36.2" E |
| | Nashik | 710 | SRO Office Nashik | Residential | 19° 59' 32.9" N | 73° 45' 01.1" E |
| | Nashik | | Nashik CAAQMS | Commercial | 20° 00'26.51"N | 73° 46' 42.56"E |

# Jalgaon - Old B. J. Market

**Table No. 125: Data for Monthly average reading recorded at Old B. J. Market**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | *50* | *40* | *60* |
| **Old B. J. Market** | 2019 | Apr | 12 | 34 | 63 |
| | | May | 13 | 32 | 59 |
| | | Jun | 11 | 31 | 55 |
| | | Jul | 9 | 29 | 53 |
| | | Aug | 10 | 29 | 59 |
| | | Sep | 12 | 32 | 58 |
| | | Oct | 13 | 33 | 66 |
| | | Nov | 12 | 32 | 57 |
| | | Dec | 13 | 33 | 56 |
| | 2020 | Jan | 13 | 33 | 55 |
| | | Feb | 13 | 34 | 56 |
| | | Mar | 12 | 29 | 48 |

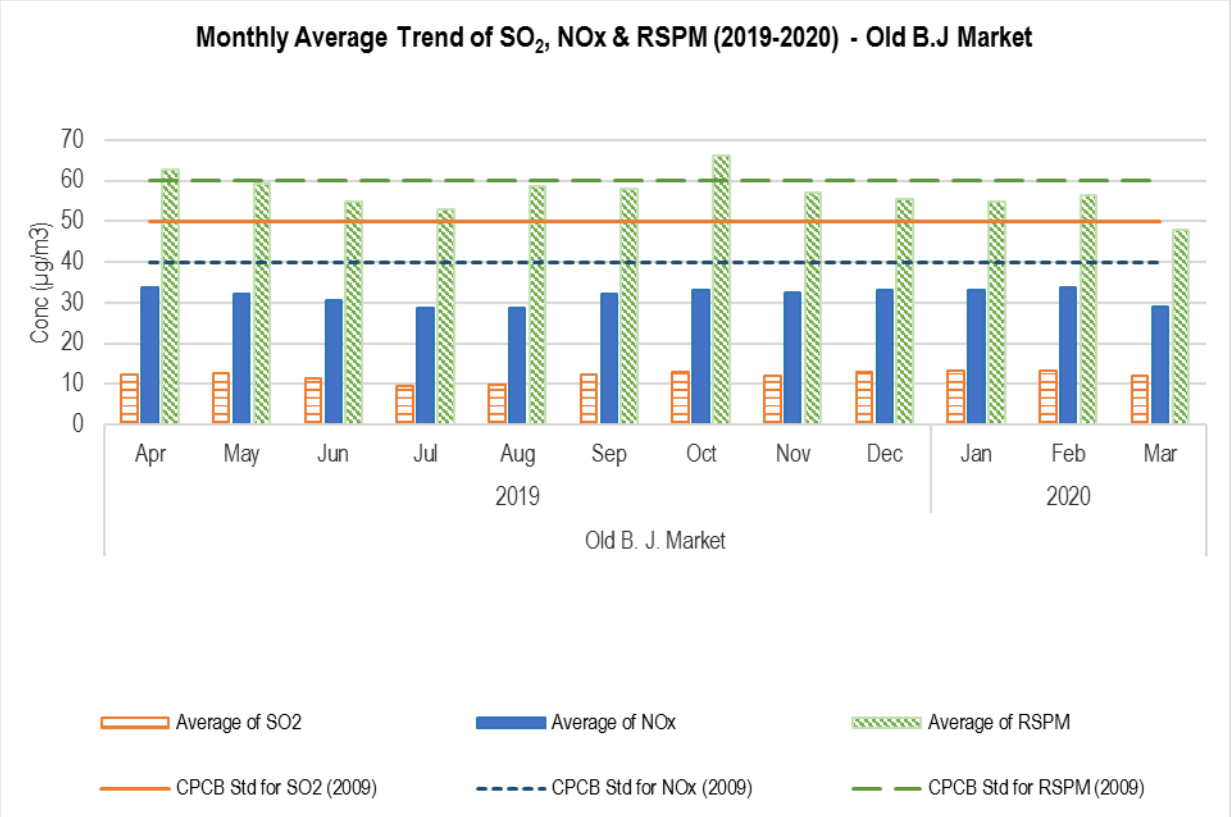



**Figure No. 147: Monthly average reading recorded at Old B. J. Market**

**Table No. 126: Data for Annual average trend of $SO_2$, NOx, and RSPM at Old B. J. Market**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Old B. J. Market | 08-09 | 14 | 48 | 117 |
| | 09-10 | 15 | 45 | 109 |
| | 10-11 | 18 | 45 | 122 |
| | 11-12 | 16 | 43 | 111 |
| | 12-13 | 18 | 44 | 123 |
| | 13-14 | 19 | 41 | 118 |
| | 14-15 | 18 | 42 | 111 |
| | 15-16 | 14 | 38 | 108 |
| | 16-17 | 14 | 36 | 96 |
| | 17-18 | 13 | 30 | 72 |
| | 18-19 | 13 | 34 | 72 |
| | 19-20 | 12 | 32 | 57 |

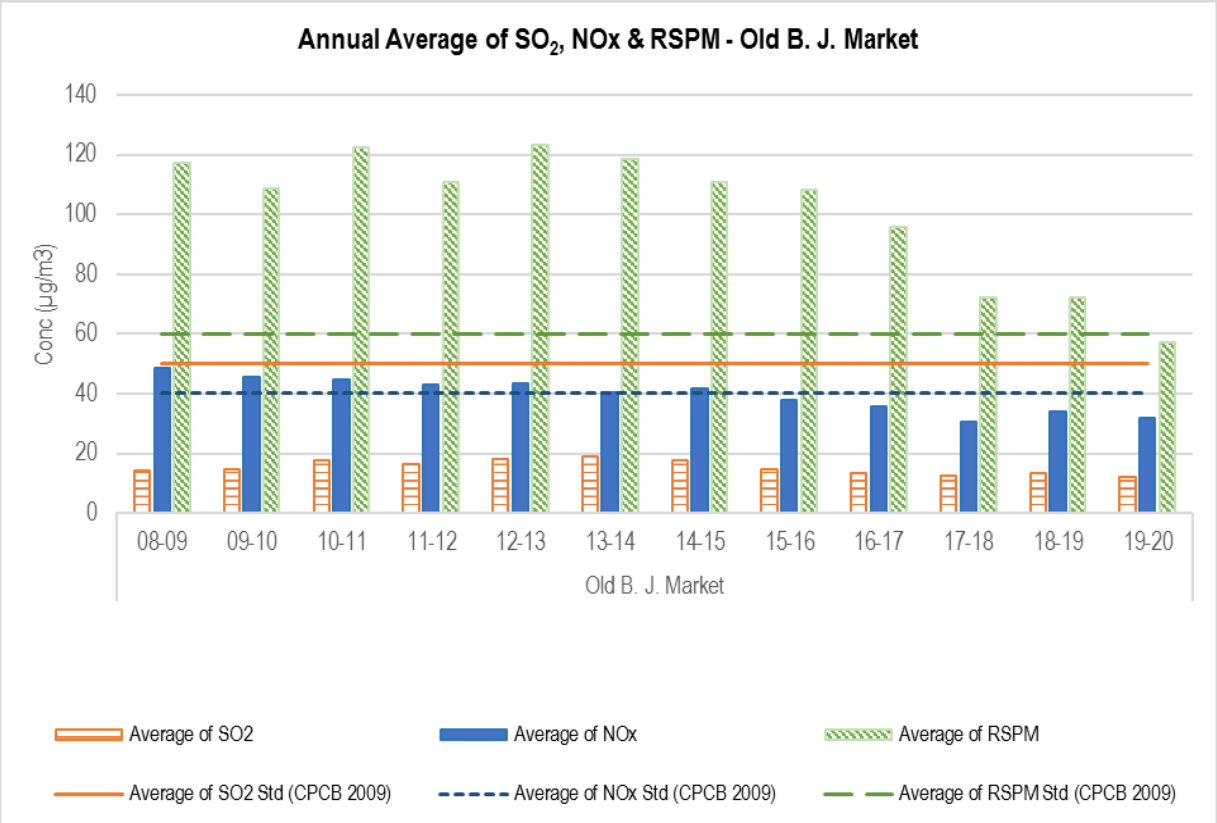



**Figure No. 148: Annual average trend of $SO_2$, NOx, and RSPM at Old B. J. Market**

## Jalgaon - Girna Water Tank

**Table No. 127: Data for Monthly average reading recorded at Girna Water Tank**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | *50* | *40* | *60* |
| Girna Water Tank | 2019 | Apr | 13 | 32 | 54 |
| | | May | 13 | 32 | 56 |
| | | Jun | 11 | 30 | 53 |
| | | Jul | 10 | 28 | 51 |
| | | Aug | 10 | 29 | 57 |
| | | Sep | 12 | 32 | 60 |
| | | Oct | 12 | 33 | 66 |
| | | Nov | 12 | 32 | 57 |
| | | Dec | 13 | 33 | 55 |
| | 2020 | Jan | 13 | 33 | 55 |
| | | Feb | 13 | 33 | 56 |
| | | Mar | 12 | 30 | 49 |

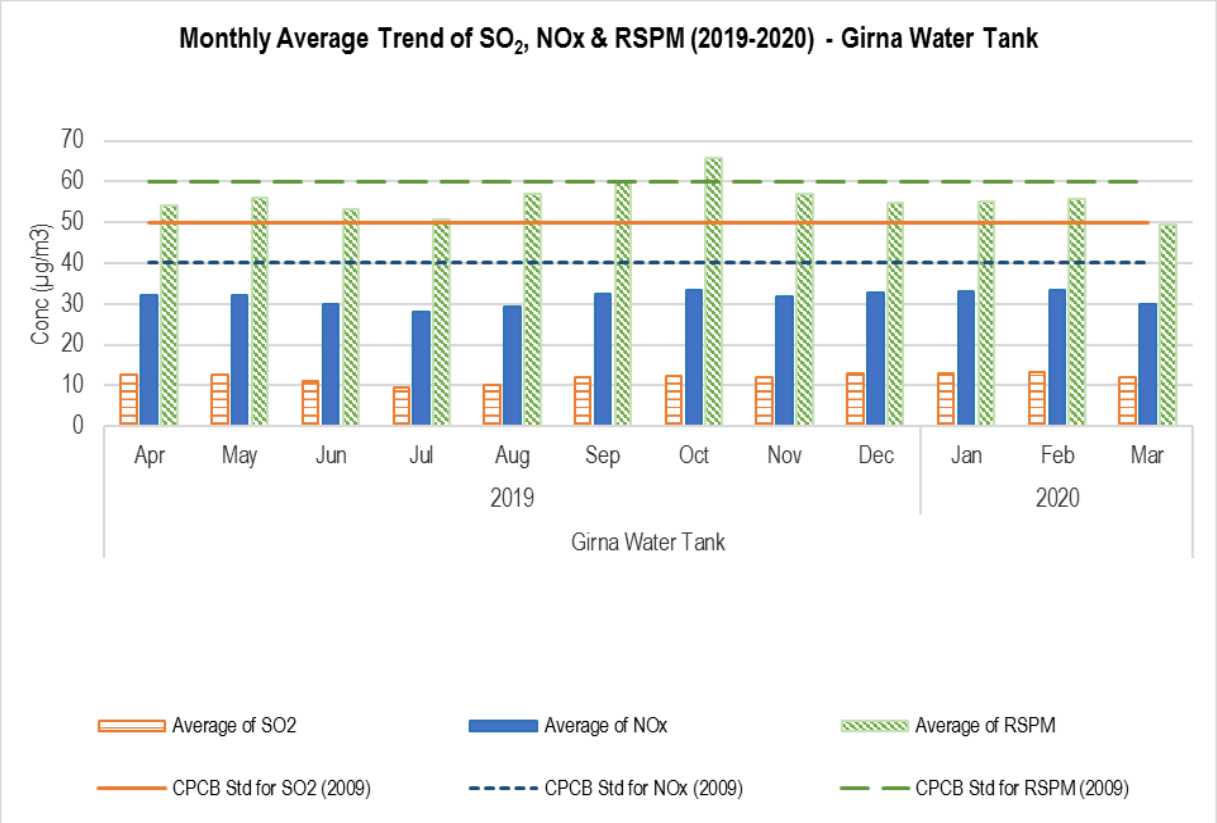



**Figure No. 149: Monthly average reading recorded at Girna Water Tank**

**Table No. 128: Data for Annual average trend of $SO_2$, NOx, and RSPM at Girna Water Tank**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Girna Water Tank | 08-09 | 11 | 40 | 102 |
| | 09-10 | 13 | 43 | 110 |
| | 10-11 | 16 | 42 | 122 |
| | 11-12 | 13 | 38 | 116 |
| | 12-13 | 16 | 40 | 124 |
| | 13-14 | 17 | 37 | 116 |
| | 14-15 | 16 | 39 | 112 |
| | 15-16 | 13 | 33 | 103 |
| | 16-17 | 13 | 34 | 92 |
| | 17-18 | 12 | 29 | 70 |
| | 18-19 | 13 | 33 | 69 |
| | 19-20 | 12 | 32 | 55 |

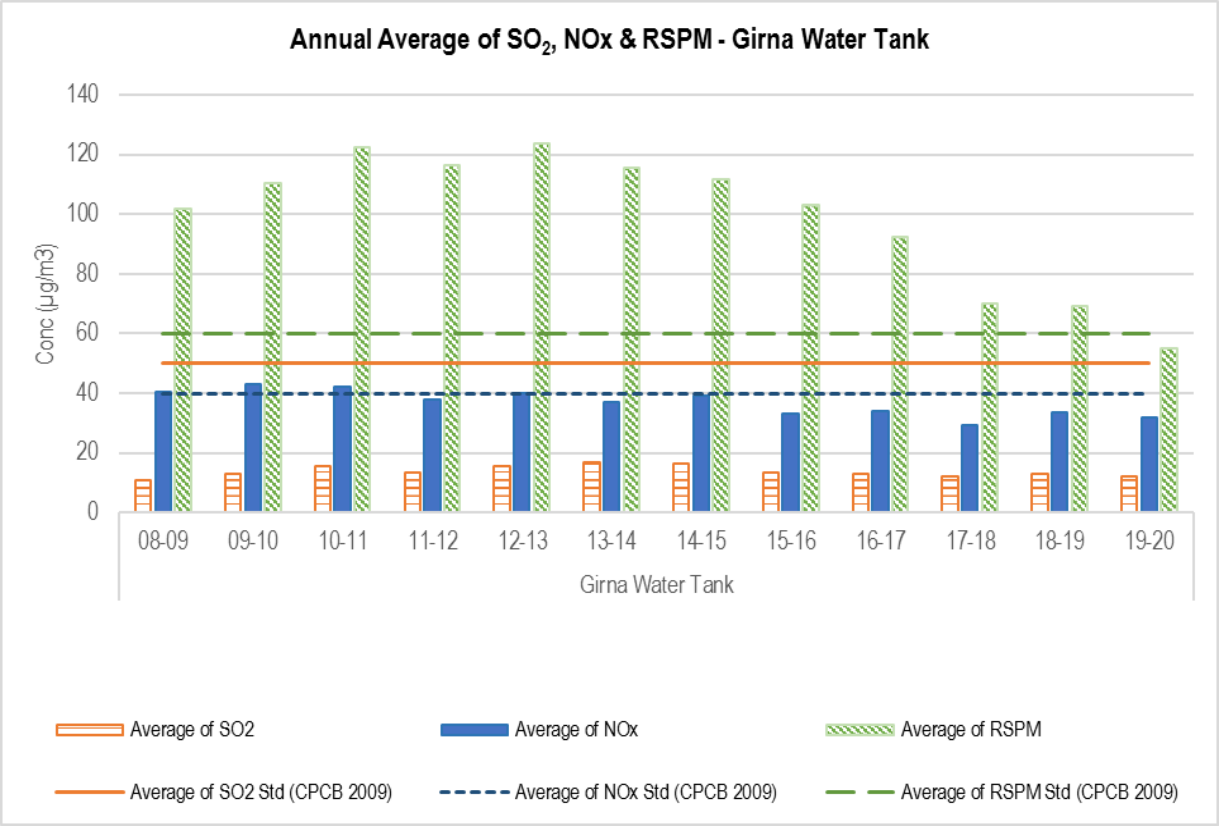



**Figure No. 150: Annual average trend of $SO_2$, NOx, and RSPM at Girna Water Tank**

# Jalgaon - MIDC Jalgaon

**Table No. 129: Data for Monthly average reading recorded at MIDC Jalgaon**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | *50* | *40* | *60* |
| **MIDC Jalgaon** | 2019 | Apr | 13 | 35 | 65 |
| | | May | 13 | 34 | 66 |
| | | Jun | 11 | 31 | 53 |
| | | Jul | 9 | 29 | 50 |
| | | Aug | 10 | 28 | 53 |
| | | Sep | 12 | 32 | 59 |
| | | Oct | 13 | 34 | 67 |
| | | Nov | 12 | 33 | 58 |
| | | Dec | 13 | 33 | 56 |
| | 2020 | Jan | 14 | 34 | 56 |
| | | Feb | 14 | 35 | 57 |
| | | Mar | 12 | 29 | 50 |

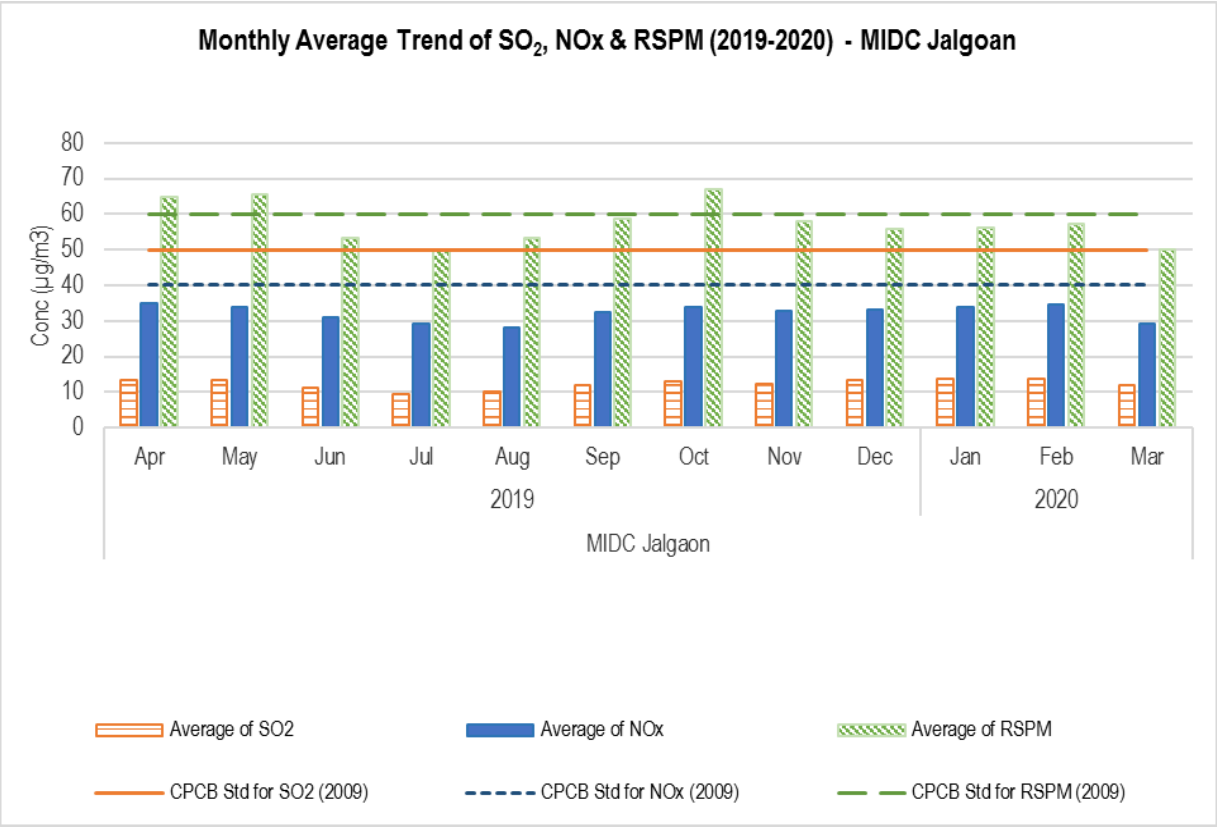



**Figure No. 151: Monthly average reading recorded at MIDC Jalgaon**

**Table No. 130: Data for Annual average trend of $SO_2$, NOx, and RSPM at MIDC Jalgaon**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| MIDC Jalgaon | 08-09 | 15 | 54 | 120 |
| | 09-10 | 16 | 49 | 120 |
| | 10-11 | 22 | 51 | 142 |
| | 11-12 | 22 | 49 | 137 |
| | 12-13 | 24 | 51 | 150 |
| | 13-14 | 23 | 45 | 132 |
| | 14-15 | 20 | 48 | 125 |
| | 15-16 | 16 | 41 | 114 |
| | 16-17 | 14 | 37 | 100 |
| | 17-18 | 13 | 32 | 78 |
| | 18-19 | 14 | 35 | 75 |
| | 19-20 | 12 | 32 | 58 |

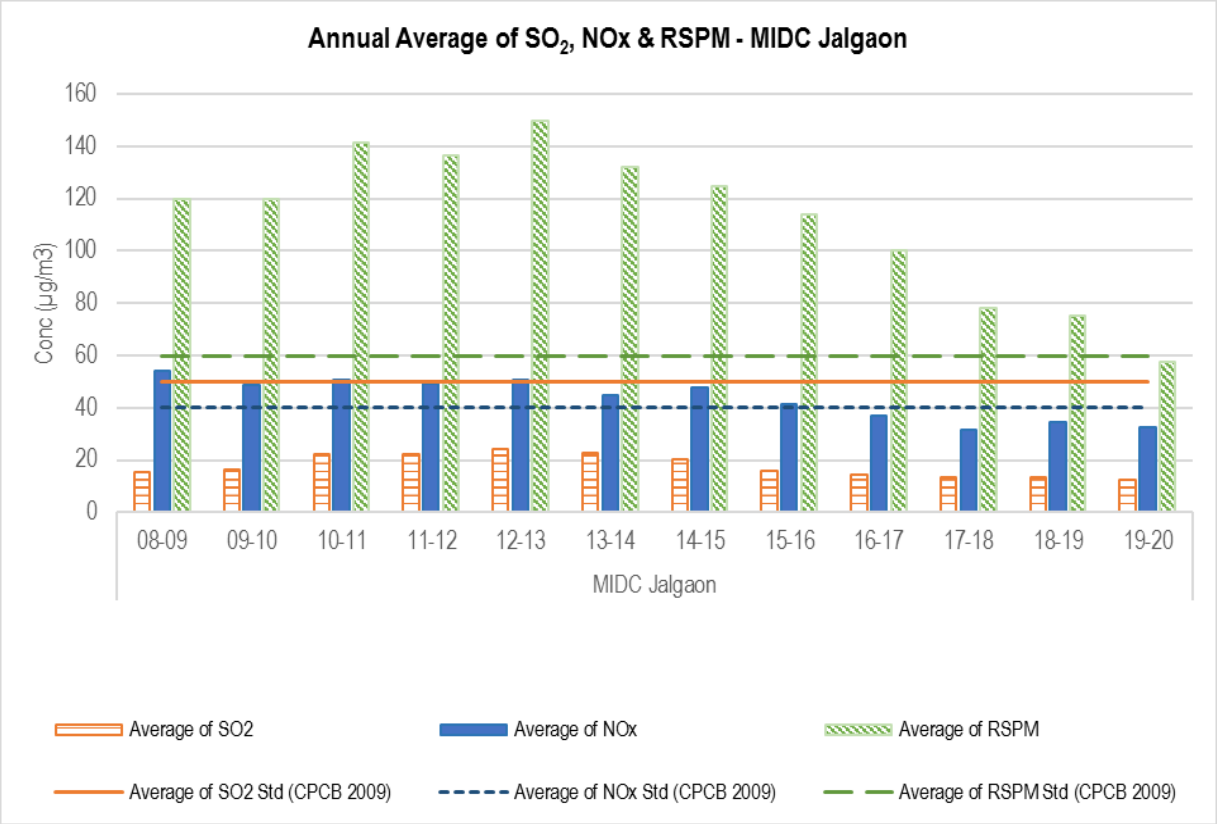



**Figure No. 152: Annual average trend of $SO_2$, NOx, and RSPM at MIDC Jalgaon**

# Nashik - RTO Colony

**Table No. 131: Data for Monthly average reading recorded at RTO Colony**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **RTO Colony** | 2019 | Apr | 12 | 26 | 86 |
| | | May | 14 | 15 | 103 |
| | | Jun | 14 | 25 | 71 |
| | | Jul | 7 | 23 | 60 |
| | | Aug | 3 | 7 | 38 |
| | | Sep | 9 | 23 | 44 |
| | | Oct | 8 | 20 | 39 |
| | | Nov | 10 | 24 | 48 |
| | | Dec | 7 | 21 | 52 |
| | 2020 | Jan | 14 | 31 | 43 |
| | | Feb | 9 | 28 | 46 |
| | | Mar | 4 | 30 | 47 |

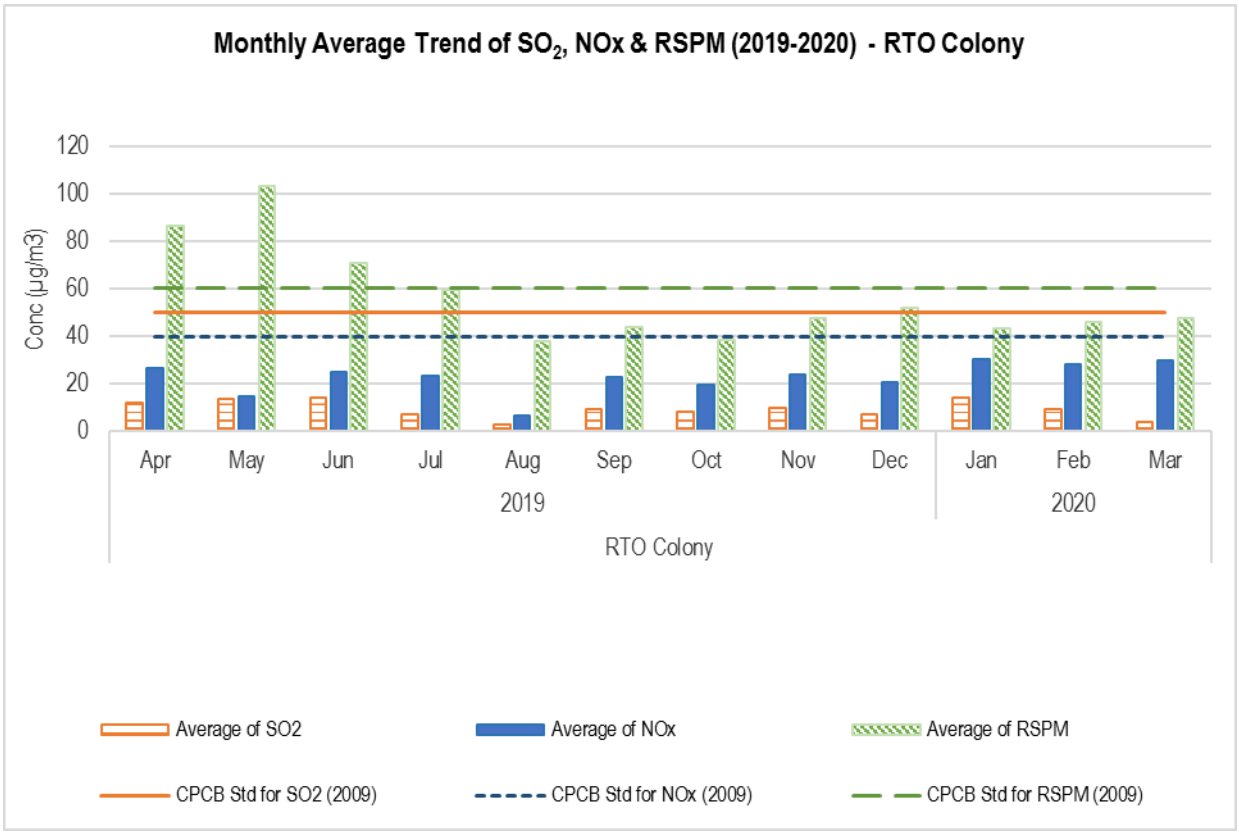



**Figure No. 153: Monthly average reading recorded at RTO Colony**

**Table No. 132: Data for Annual average trend of $SO_2$, NOx, and RSPM at RTO Colony**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| RTO Colony | 04-05 | 33 | 25 | 79 |
| | 05-06 | 29 | 25 | 92 |
| | 06-07 | 32 | 26 | 51 |
| | 07-08 | 34 | 27 | 42 |
| | 08-09 | 26 | 25 | 88 |
| | 09-10 | 21 | 29 | 81 |
| | 10-11 | 21 | 23 | 75 |
| | 11-12 | 24 | 28 | 98 |
| | 12-13 | 25 | 27 | 90 |
| | 13-14 | 28 | 28 | 71 |
| | 14-15 | 24 | 26 | 77 |
| | 15-16 | 14 | 23 | 73 |
| | 16-17 | 12 | 25 | 83 |
| | 17-18 | 10 | 20 | 93 |
| | 18-19 | 12 | 23 | 76 |
| | 19-20 | 9 | 22 | 58 |

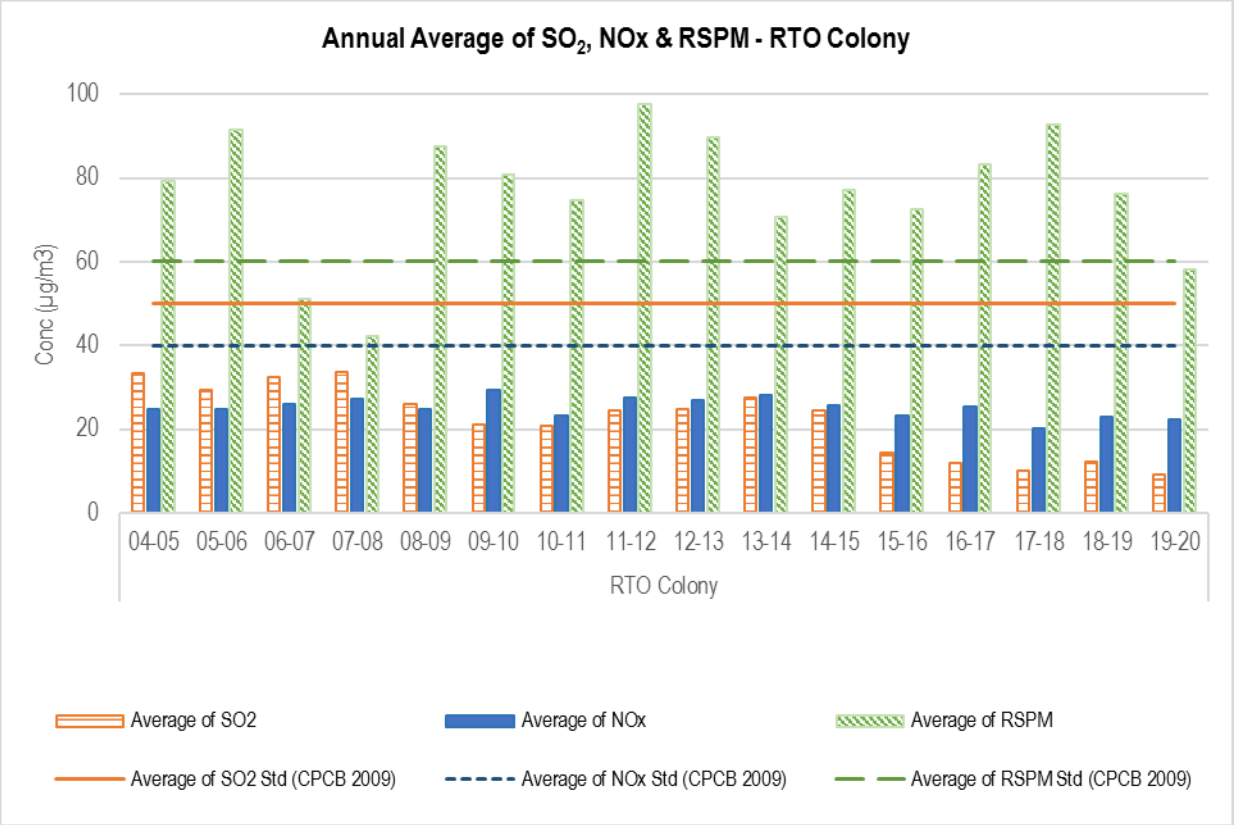



**Figure No. 154: Annual average trend of $SO_2$, NOx, and RSPM at RTO Colony**

# Nashik - MIDC Satpur - VIP

**Table No. 133: Data for Monthly average reading recorded at MIDC Satpur - VIP**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | *50* | *40* | *60* |
| MIDC Satpur - VIP | 2019 | Apr | 13 | 28 | 89 |
| | | May | 14 | 16 | 92 |
| | | Jun | 14 | 24 | 70 |
| | | Jul | 6 | 24 | 62 |
| | | Aug | 3 | 8 | 39 |
| | | Sep | 8 | 22 | 44 |
| | | Oct | 7 | 19 | 38 |
| | | Nov | 9 | 25 | 48 |
| | | Dec | 8 | 19 | 56 |
| | 2020 | Jan | 8 | 25 | 39 |
| | | Feb | 8 | 28 | 51 |
| | | Mar | 4 | 29 | 49 |

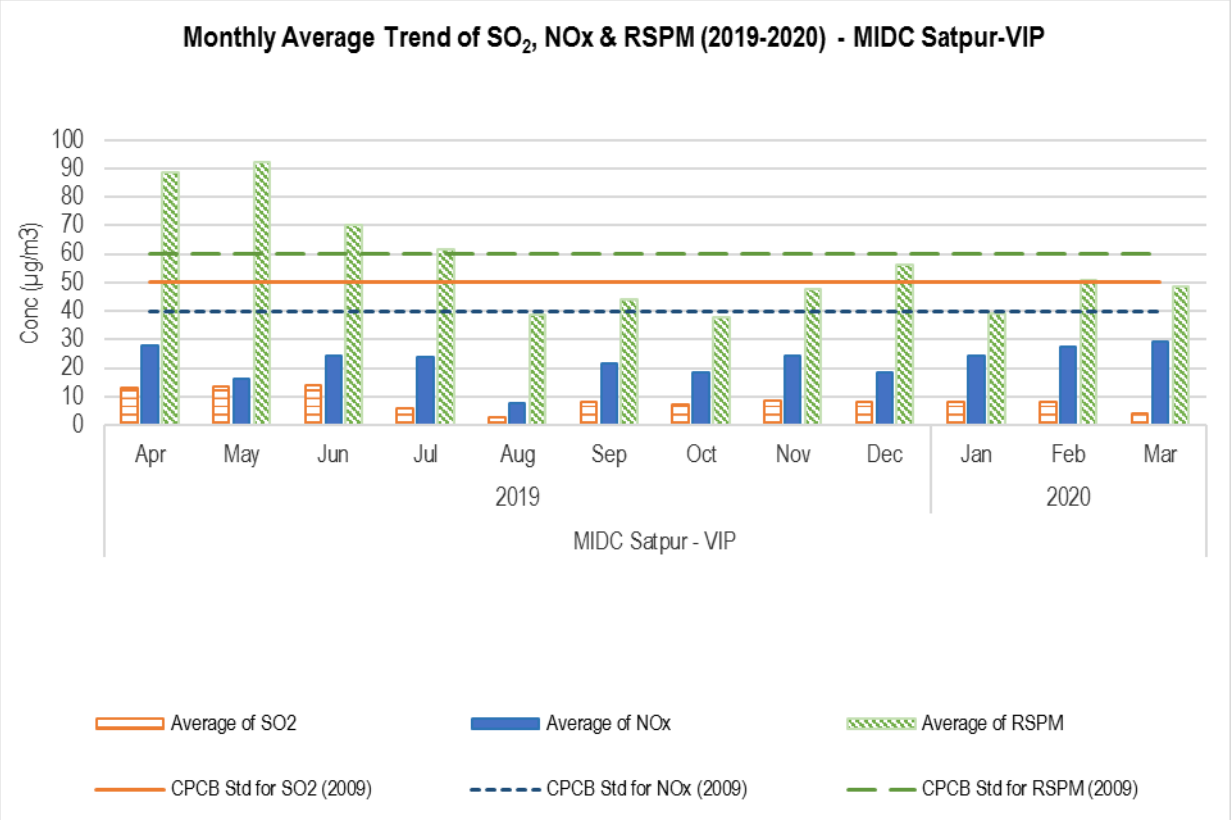



**Figure No. 155: Monthly average reading recorded at MIDC Satpur - VIP**

**Table No. 134: Data for Annual average trend of $SO_2$, NOx, and RSPM at MIDC Satpur - VIP**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| MIDC Satpur - VIP | 04-05 | 36 | 27 | 90 |
| | 05-06 | 33 | 28 | 98 |
| | 06-07 | 34 | 28 | 58 |
| | 07-08 | 41 | 34 | 52 |
| | 08-09 | 30 | 27 | 91 |
| | 09-10 | 23 | 29 | 85 |
| | 10-11 | 23 | 25 | 70 |
| | 11-12 | 25 | 28 | 98 |
| | 12-13 | 25 | 27 | 92 |
| | 13-14 | 27 | 28 | 71 |
| | 14-15 | 25 | 26 | 80 |
| | 15-16 | 14 | 22 | 78 |
| | 16-17 | 11 | 24 | 88 |
| | 17-18 | 10 | 19 | 81 |
| | 18-19 | 12 | 24 | 78 |
| | 19-20 | 9 | 22 | 57 |

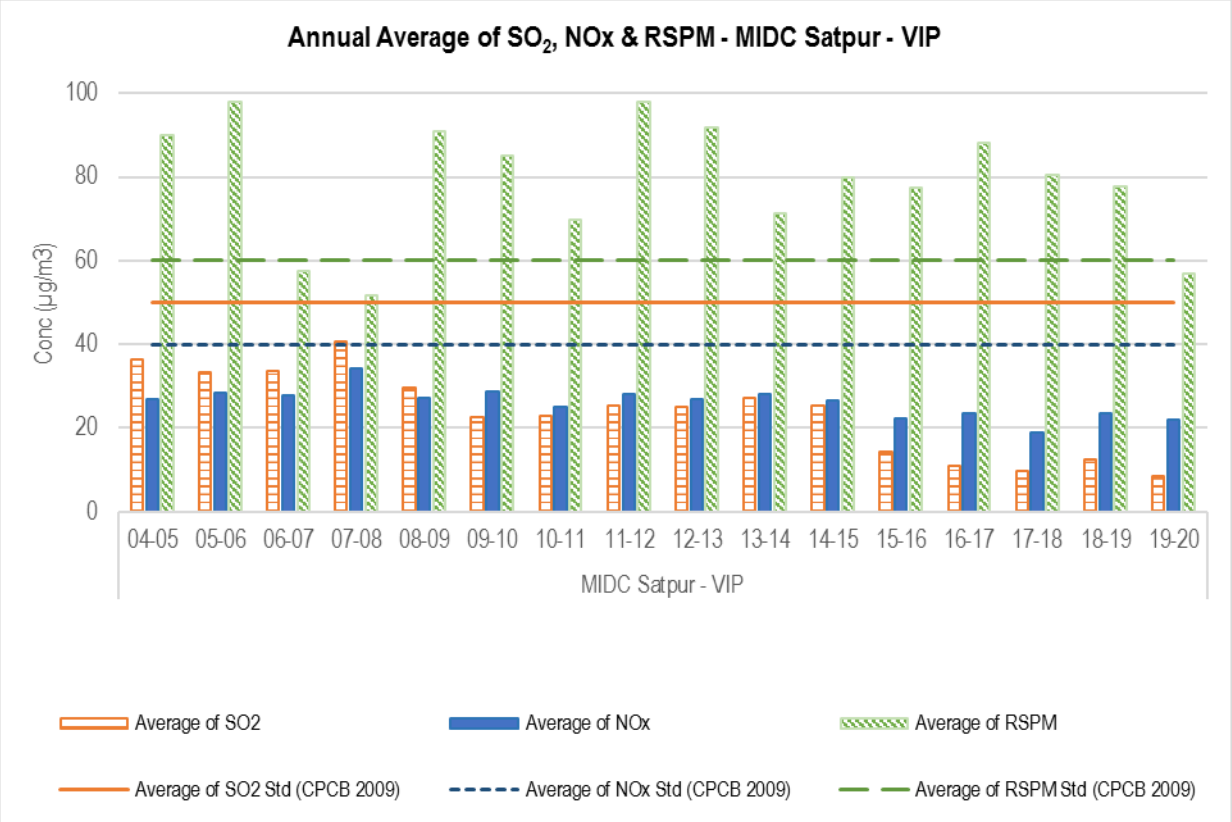



**Figure No. 156: Annual average trend of $SO_2$, NOx, and RSPM at MIDC Satpur - VIP**

# Nashik - NMC Nashik

**Table No. 135: Data for Monthly average reading recorded at NMC Nashik**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | *50* | *40* | *60* |
| NMC Nashik | 2019 | Apr | 12 | 27 | 89 |
| | | May | 13 | 18 | 84 |
| | | Jun | 13 | 25 | 67 |
| | | Jul | 7 | 22 | 57 |
| | | Aug | 3 | 8 | 40 |
| | | Sep | 10 | 23 | 41 |
| | | Oct | 7 | 19 | 40 |
| | | Nov | 8 | 22 | 54 |
| | | Dec | 8 | 19 | 50 |
| | 2020 | Jan | 9 | 23 | 36 |
| | | Feb | 10 | 27 | 43 |
| | | Mar | 5 | 30 | 47 |

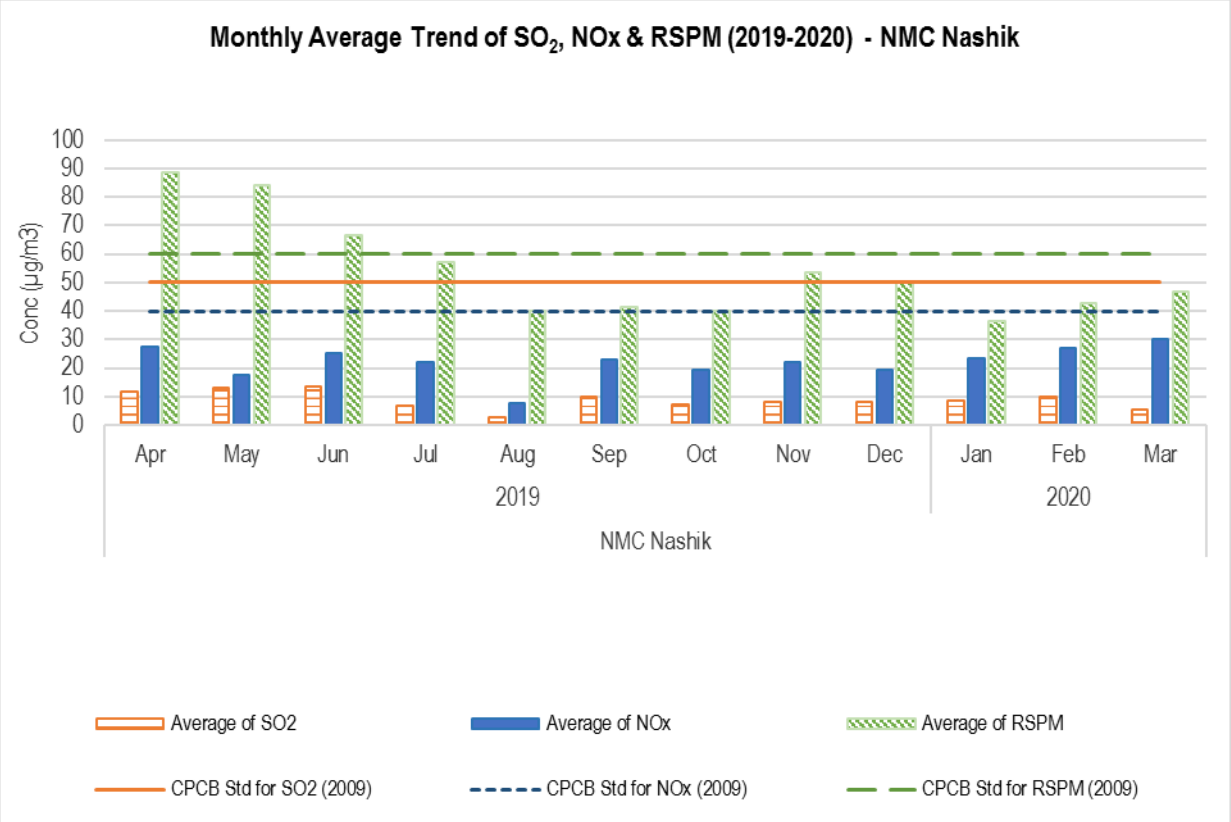



**Figure No. 157: Monthly average reading recorded at NMC Nashik**

**Table No. 136: Data for Annual average trend of $SO_2$, NOx, and RSPM at NMC Nashik**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| NMC Nashik | 13-14 | 28 | 28 | 70 |
| | 14-15 | 25 | 26 | 78 |
| | 15-16 | 15 | 24 | 94 |
| | 16-17 | 12 | 26 | 97 |
| | 17-18 | 10 | 20 | 100 |
| | 18-19 | 12 | 23 | 77 |
| | 19-20 | 9 | 22 | 54 |

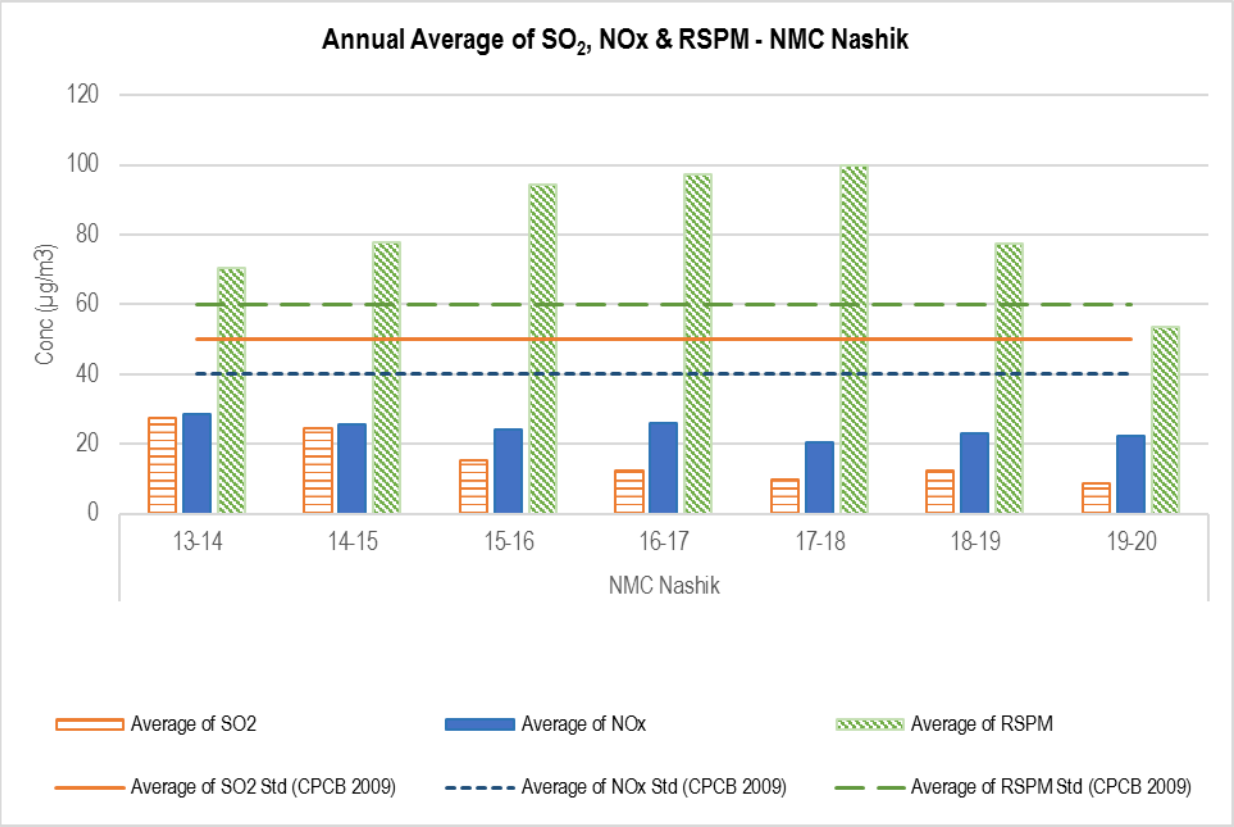



**Figure No. 158: Annual average trend of $SO_2$, NOx, and RSPM at NMC Nashik**

# Nashik - SRO Office Nashik

**Table No. 137: Data for Monthly average reading recorded a SRO Office Nashik**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | *50* | *40* | *60* |
| SRO Office Nashik | 2019 | Apr | 8 | 26 | 78 |
| | | May | 15 | 16 | 74 |
| | | Jun | 13 | 25 | 67 |
| | | Jul | 7 | 22 | 55 |
| | | Aug | 3 | 8 | 39 |
| | | Sep | 9 | 22 | 39 |
| | | Oct | 7 | 18 | 36 |
| | | Nov | 8 | 21 | 47 |
| | | Dec | 7 | 17 | 47 |
| | 2020 | Jan | 8 | 23 | 40 |
| | | Feb | 10 | 27 | 47 |
| | | Mar | 4 | 28 | 47 |

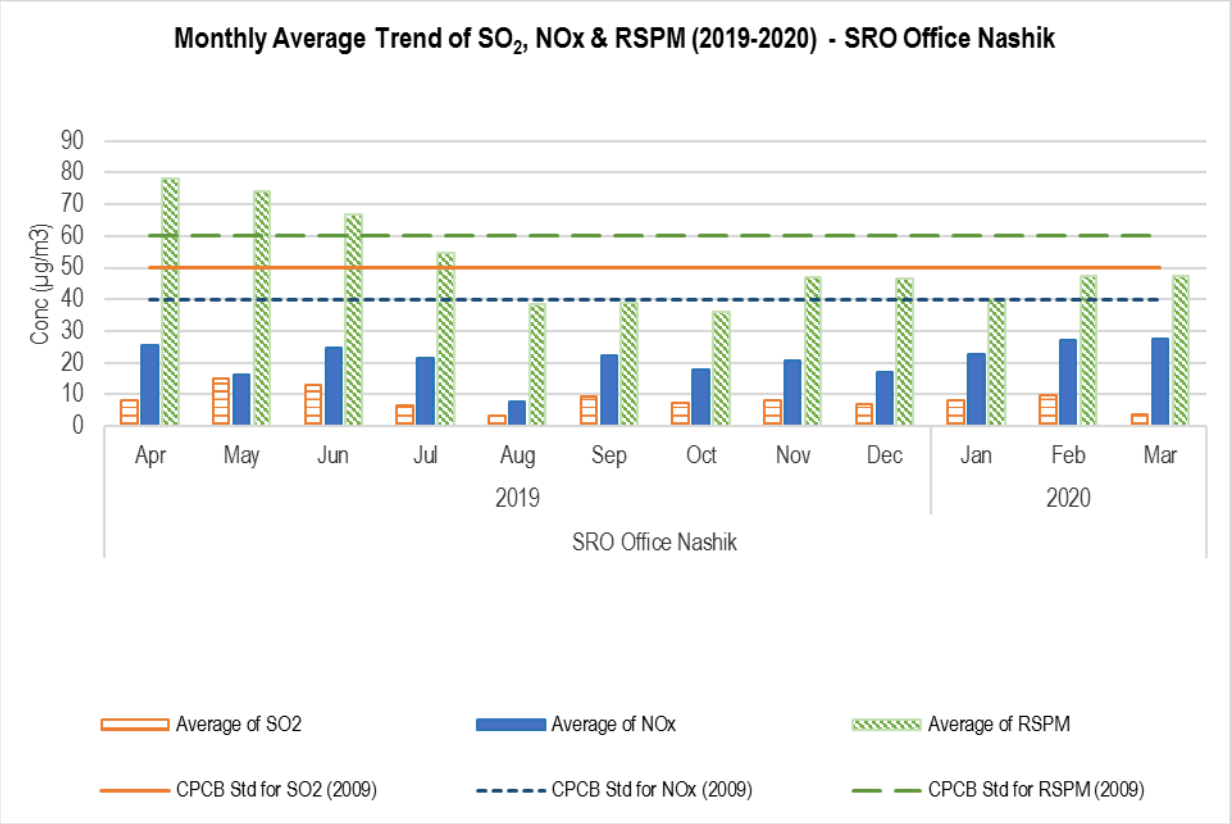



**Figure No. 159: Monthly average reading recorded at SRO Office Nashik**

**Table No. 138: Data for Annual average trend of $SO_2$, NOx, and RSPM at SRO Office Nashik**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| SRO Office Nashik | 04-05 | 19 | 31 | 69 |
| | 05-06 | 14 | 27 | 78 |
| | 06-07 | 16 | 27 | 102 |
| | 07-08 | 17 | 26 | 114 |
| | 08-09 | 23 | 29 | 104 |
| | 09-10 | 21 | 27 | 86 |
| | 10-11 | 20 | 23 | 85 |
| | 11-12 | 24 | 28 | 114 |
| | 12-13 | 24 | 27 | 90 |
| | 13-14 | 28 | 28 | 78 |
| | 14-15 | 26 | 26 | 73 |
| | 15-16 | 15 | 24 | 76 |
| | 16-17 | 11 | 26 | 72 |
| | 17-18 | 10 | 21 | 80 |
| | 18-19 | 12 | 23 | 73 |
| | 19-20 | 8 | 21 | 51 |

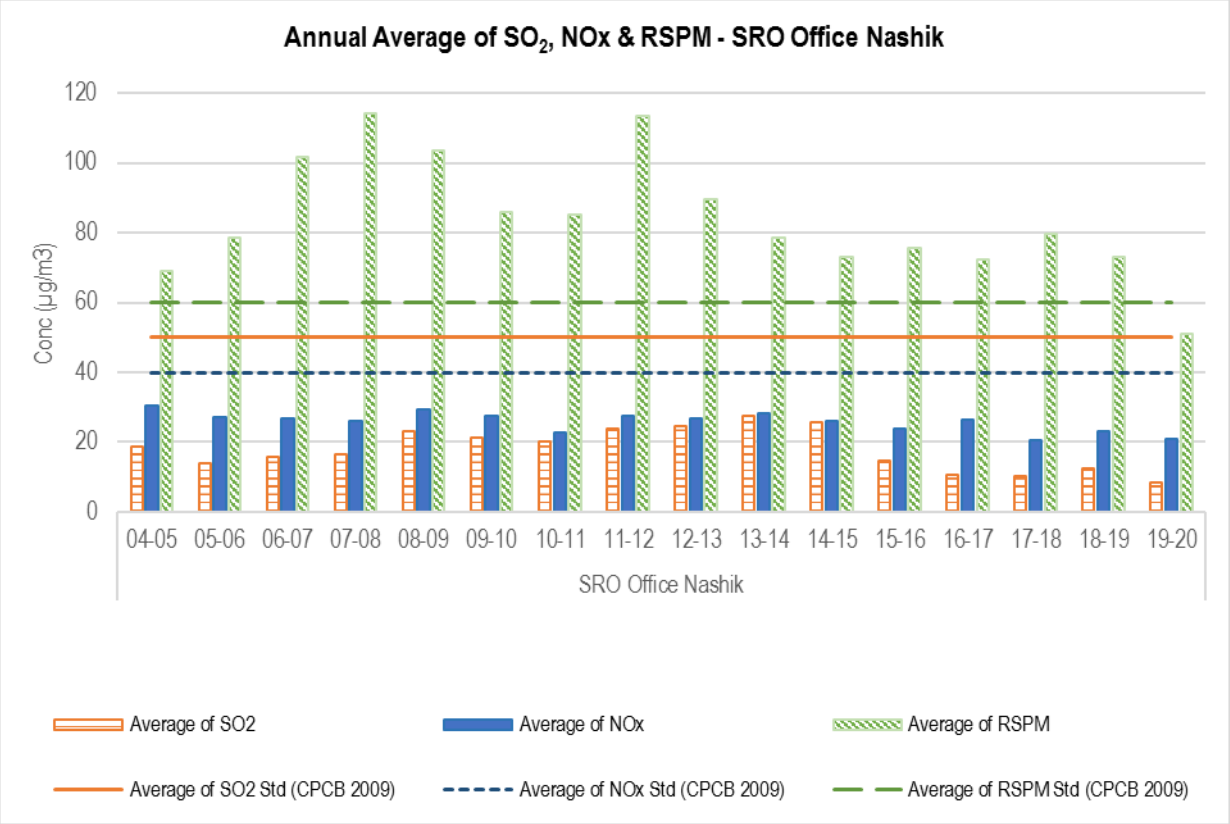
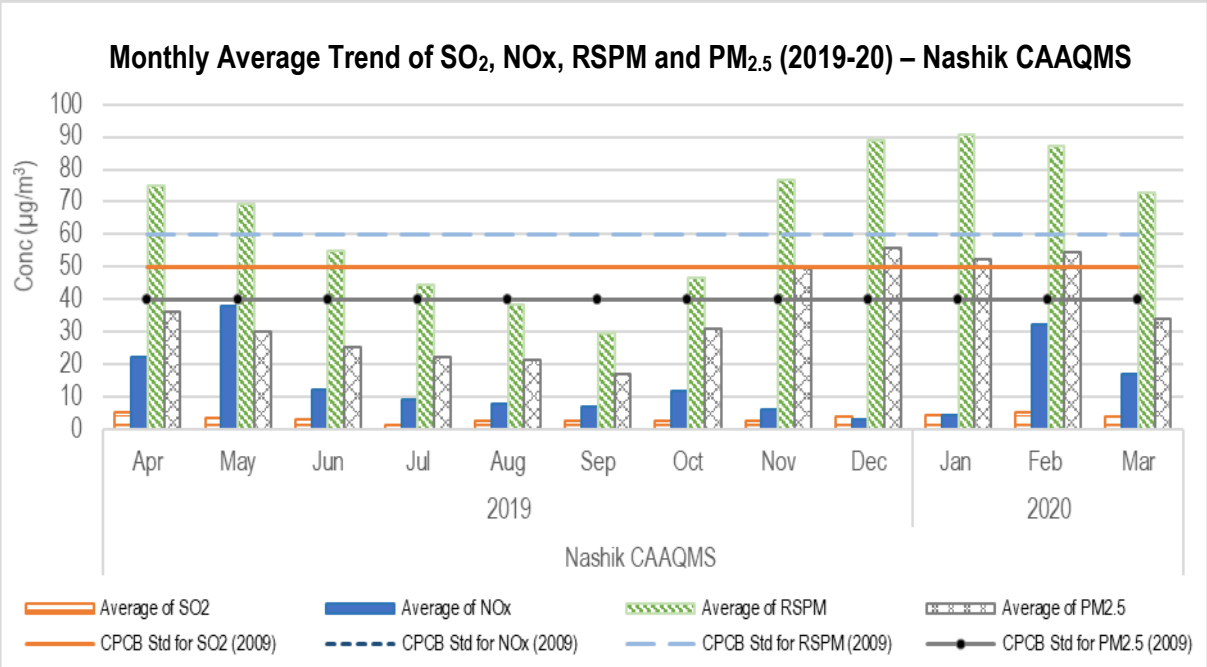



**Figure No. 160: Annual average trend of $SO_2$, NOx, and RSPM at SRO Office Nashik**

# Nashik - Nashik CAAQMS

**Table No. 139: Data for Monthly average reading recorded at Nashik CAAQMS**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| | | | *50* | *40* | *60* | *40* |
| Nashik CAAQMS | 2019 | Apr | 5 | 22 | 75 | 36 |
| | | May | 3 | 38 | 69 | 30 |
| | | Jun | 3 | 12 | 55 | 25 |
| | | Jul | 2 | 9 | 44 | 22 |
| | | Aug | 3 | 8 | 38 | 21 |
| | | Sep | 2 | 7 | 30 | 17 |
| | | Oct | 3 | 12 | 47 | 31 |
| | | Nov | 3 | 6 | 77 | 50 |
| | | Dec | 4 | 3 | 89 | 56 |
| | 2020 | Jan | 4 | 4 | 91 | 52 |
| | | Feb | 5 | 32 | 87 | 55 |
| | | Mar | 4 | 17 | 73 | 34 |




*CPCB standards for NOx and $PM_{2.5}$ are same, so the lines indicating them overlap and are not distinctly*

**Figure No. 161: Monthly average reading recorded at Nashik CAAQMS**

**Table No. 140: Data for Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Nashik CAAQMS**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|
| | | *50* | *40* | *60* | *40* |
| Nashik CAAQMS | 16-17 | 6 | 33 | 64 | |
| | 17-18 | 5 | 17 | 63 | |
| | 18-19 | 5 | 19 | 70 | |
| | 19-20 | 3 | 14 | 65 | 36 |

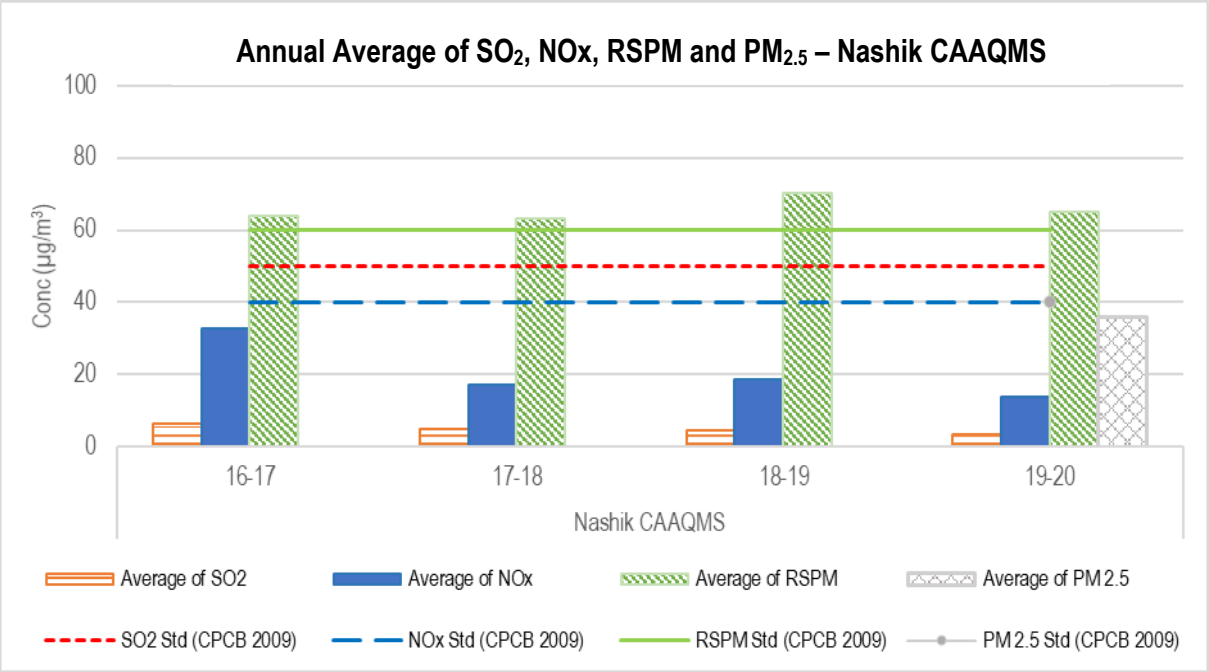
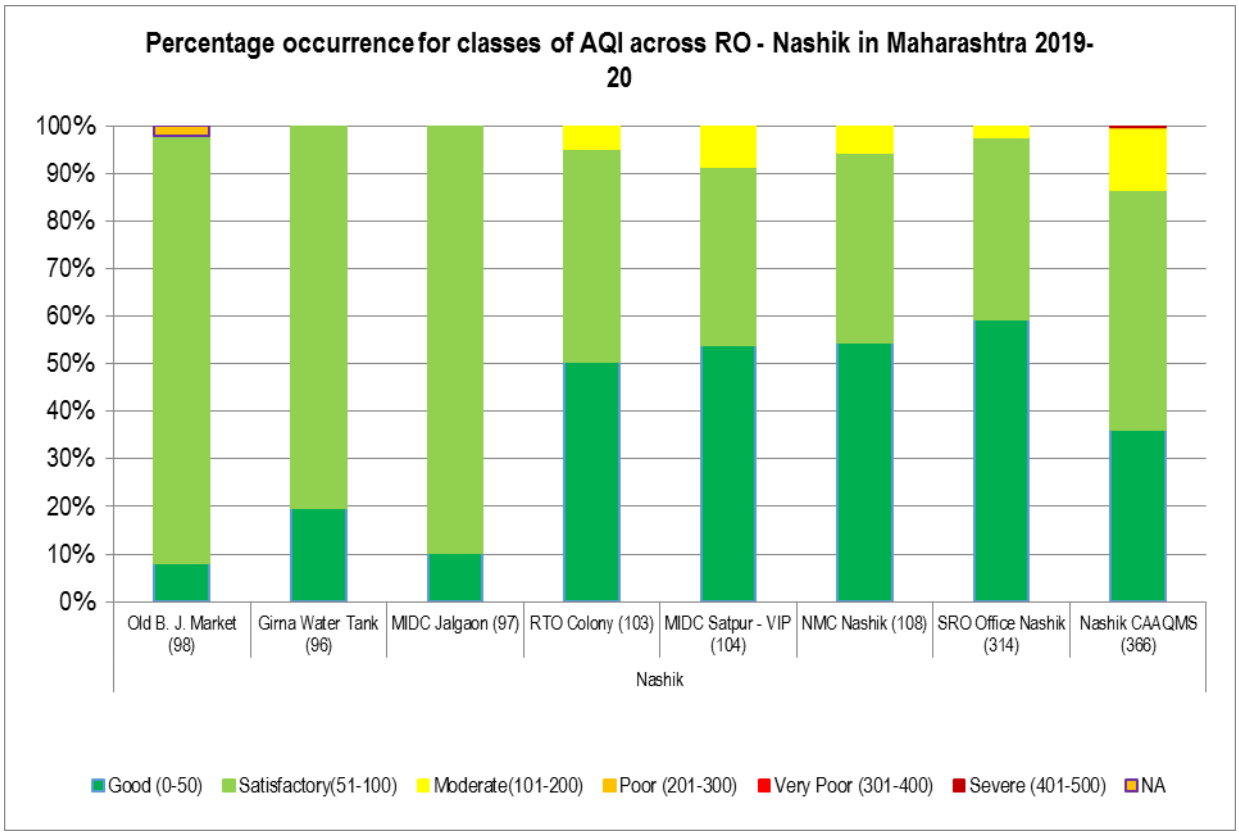


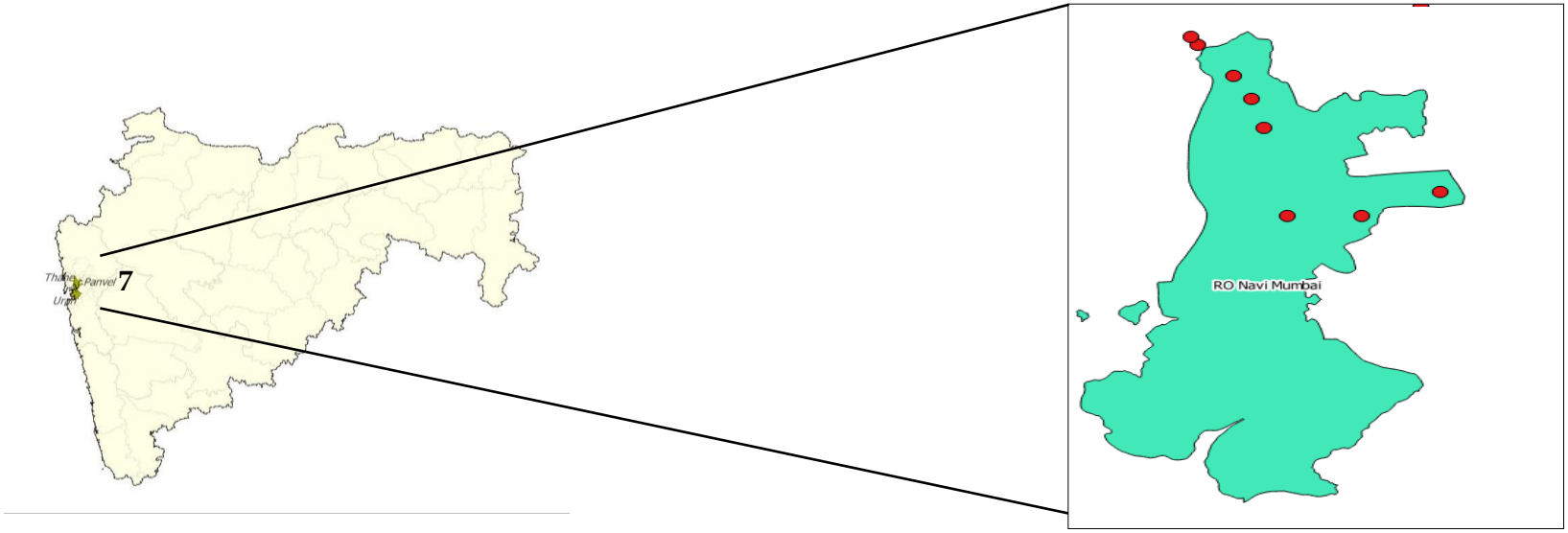

**Figure No. 162: Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Nashik CAAQMS**

**Table No. 141: Percentage exceedance of pollutants at Nashik RO**

| Station Name | Total Observation | No. of times exceedance occurred | | | % Exceedance | | |
|---|---|---|---|---|---|---|---|
| | | $SO_2$ | NOx | RSPM | $SO_2$ | NOx | RSPM |
| Old B. J. Market | 98 | | | | | | |
| Girna Water Tank | 96 | | | | | | |
| MIDC Jalgaon | 97 | | | | | | |
| RTO Colony | 103 | | | 5 | | | 5 |
| MIDC Satpur - VIP | 104 | | | 9 | | | 9 |
| NMC Nashik | 108 | | | 6 | | | 6 |
| SRO Office Nashik | 314 | | | 7 | | | 2 |
| Nashik CAAQMS | 366 | | 4 | 46 | | 1 | 13 |



# RO – Navi Mumbai




| Region | Station code | Station name | Type | Latitude (deg) | Longitude (deg) |
|---|---|---|---|---|---|
| Navi Mumbai | 491 | Rabale | Industrial | 19° 08' 15.2" N | 73° 00' 13.1" E |
| Navi Mumbai | 492 | Nerul - DY Patil | Residential | 19° 02' 28.1" N | 73° 01' 29.5" E |
| Navi Mumbai | | Nerul CAAQMS | Residential | 19° 0' 34.2" N | 73° 06' 29.52" E |
| Navi Mumbai | 493 | Mahape, MPCB-Nirmal Bhavan | Industrial | 19° 06' 49.0" N | 73° 00' 40.1" E |
| Navi Mumbai | | Mahape CAAQMS | Industrial | 19° 6' 48.6" N | 73° 0'39.96" E |
| Taloja | 494 | Kharghar - CIDCO Nodal Office | Residential | 19° 02' 29.4" N | 73° 04' 11.8" E |
| Taloja | 496 | Taloja - MIDC Building | Industrial | 19° 03' 40.0" N | 73° 06' 58.6" E |

# Navi Mumbai - Rabale

**Table No. 142: Data for Monthly average reading recorded at Rabale**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| Rabale | 2019 | Apr | 20 | 60 | 59 |
| | | May | 20 | 60 | 59 |
| | | Jun | 17 | 43 | 49 |
| | | Jul | 15 | 41 | 56 |
| | | Aug | 14 | 40 | 58 |
| | | Sep | 18 | 41 | 57 |
| | | Oct | 17 | 43 | 59 |
| | | Nov | 16 | 41 | 55 |
| | | Dec | 14 | 43 | 60 |
| | 2020 | Jan | 16 | 57 | 61 |
| | | Feb | 16 | 37 | 61 |

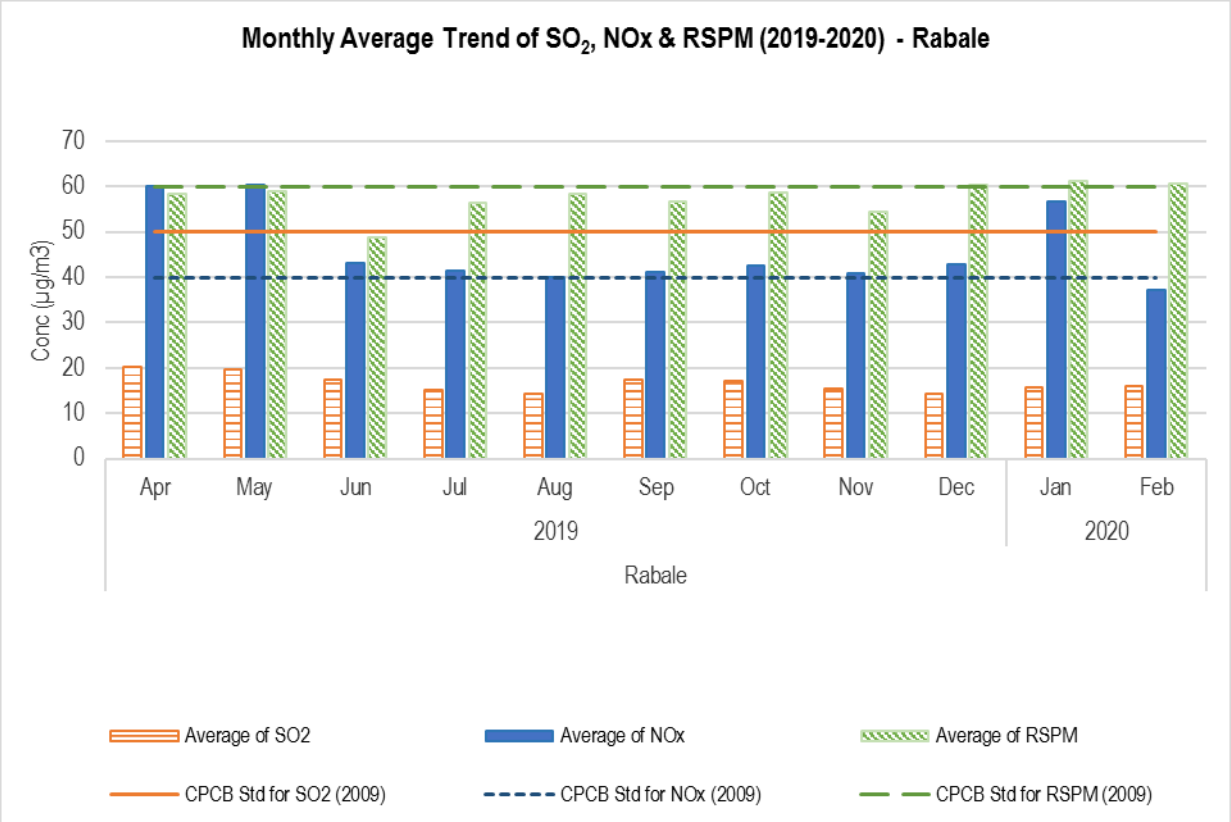



**Figure No. 163: Monthly average reading recorded at Rabale**

**Table No. 143: Data for Annual average trend of $SO_2$, NOx, and RSPM at Rabale**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | ***50*** | ***40*** | ***60*** |
| **Rabale** | 06-07 | 25 | 31 | 106 |
| | 07-08 | 12 | 27 | 79 |
| | 08-09 | 16 | 31 | 94 |
| | 09-10 | 13 | 36 | 83 |
| | 10-11 | 22 | 43 | 125 |
| | 11-12 | 18 | 47 | 100 |
| | 12-13 | 18 | 46 | 71 |
| | 13-14 | 18 | 44 | 90 |
| | 14-15 | 18 | 40 | 132 |
| | 15-16 | 21 | 48 | 131 |
| | 16-17 | 20 | 44 | 107 |
| | 17-18 | 23 | 46 | 112 |
| | 18-19 | 19 | 46 | 54 |
| | 19-20 | 17 | 46 | 58 |

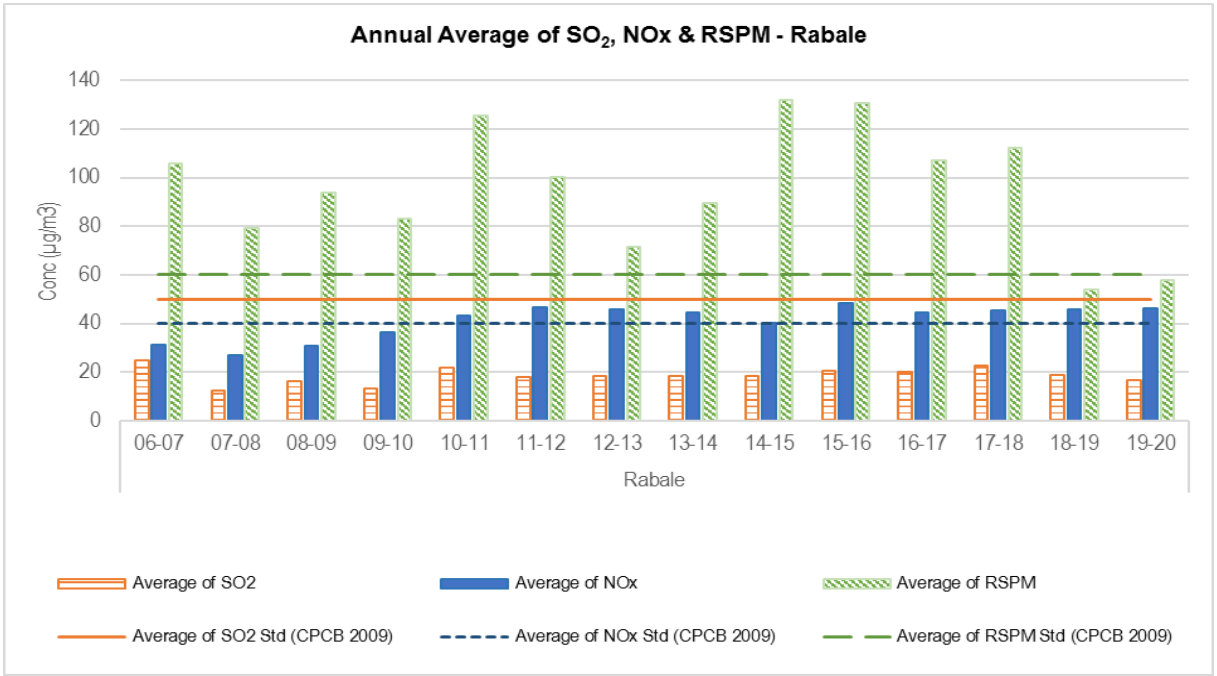



**Figure No. 164: Annual average trend of $SO_2$, NOx, and RSPM at Rabale**

# Navi Mumbai - Nerul – DY Patil

**Table No. 144: Data for Monthly average reading recorded at Nerul – DY Patil**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Nerul - DY Patil** | 2019 | Apr | 20 | 49 | 56 |
| | | May | 20 | 51 | 60 |
| | | Jun | 18 | 42 | 63 |
| | | Jul | 16 | 38 | 54 |
| | | Aug | 14 | 35 | 58 |
| | | Sep | 17 | 36 | 58 |
| | | Oct | 18 | 38 | 54 |
| | | Nov | 15 | 41 | 48 |
| | | Dec | 15 | 42 | 45 |
| | 2020 | Jan | 16 | 54 | 46 |
| | | Feb | 14 | 33 | 46 |

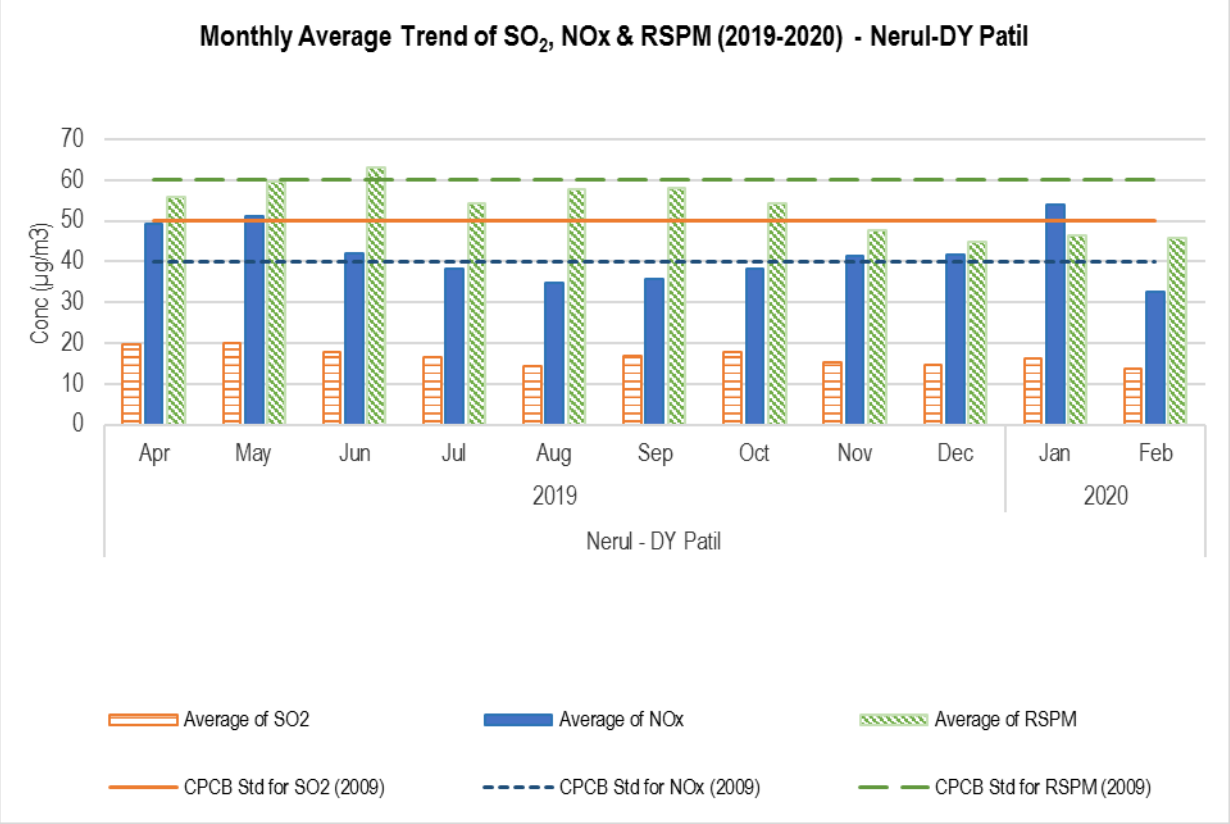



**Figure No. 165: Monthly average reading recorded at Nerul – DY Patil**

**Table No. 145: Data for Annual average trend of $SO_2$, NOx, and RSPM at Nerul – DY Patil**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Nerul - DY Patil | 06-07 | 25 | 31 | 107 |
| | 07-08 | 17 | 33 | 90 |
| | 08-09 | 20 | 40 | 98 |
| | 09-10 | 10 | 37 | 71 |
| | 10-11 | 14 | 33 | 119 |
| | 11-12 | 15 | 43 | 118 |
| | 12-13 | 15 | 40 | 95 |
| | 13-14 | 17 | 41 | 109 |
| | 14-15 | 17 | 38 | 131 |
| | 15-16 | 17 | 41 | 136 |
| | 16-17 | 18 | 41 | 96 |
| | 17-18 | 21 | 43 | 116 |
| | 18-19 | 18 | 44 | 60 |
| | 19-20 | 17 | 42 | 53 |

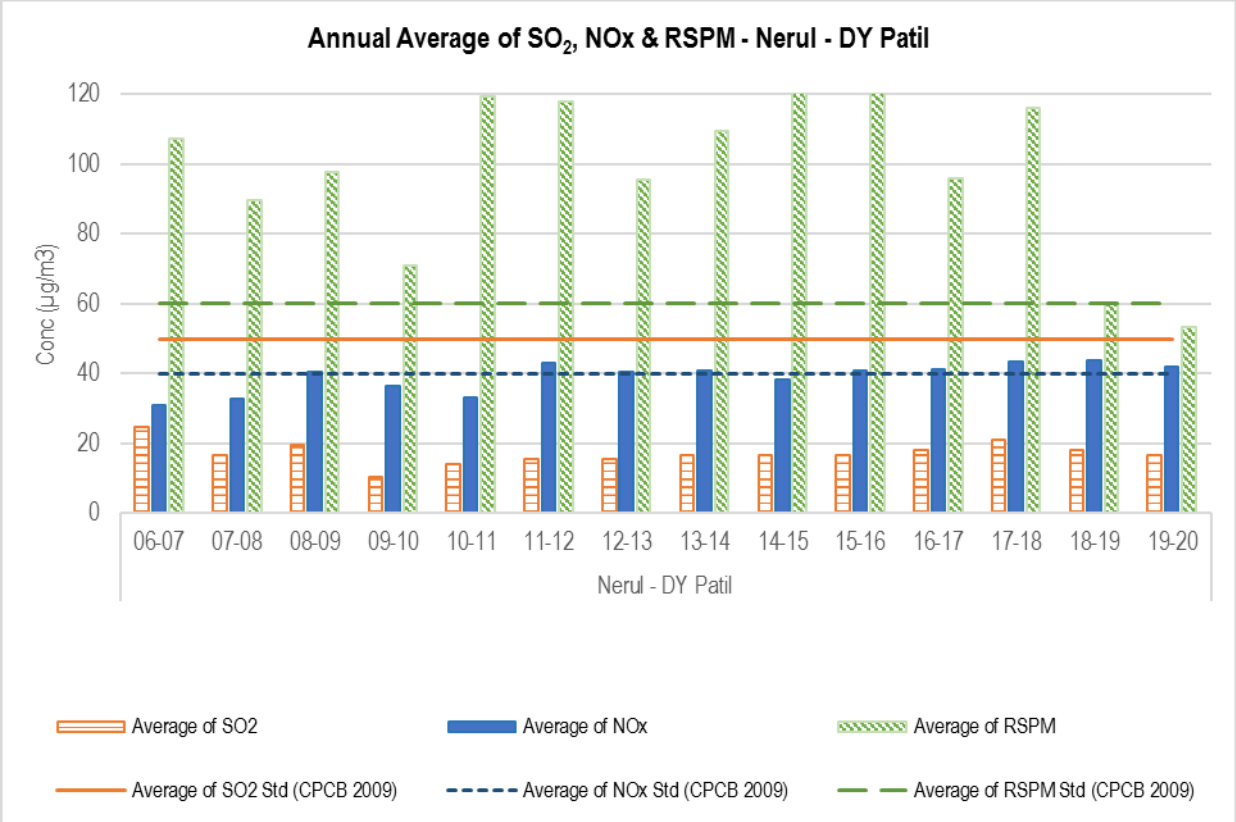
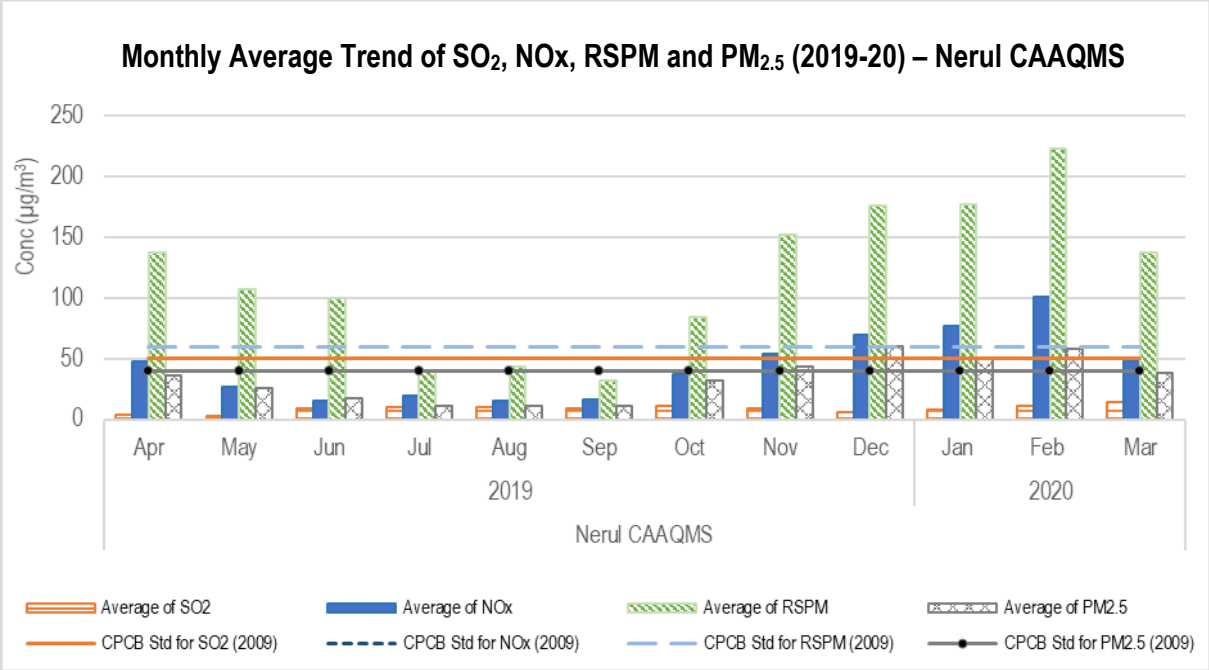



**Figure No. 166: Annual average trend of $SO_2$, NOx, and RSPM at Nerul – DY Patil**

# Navi Mumbai - Nerul CAAQMS

**Table No. 146: Data for Monthly average reading recorded at Nerul CAAQMS**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** | ***40*** |
| **Nerul CAAQMS** | 2019 | Apr | 4 | 48 | 137 | 36 |
| | | May | 3 | 27 | 107 | 26 |
| | | Jun | 9 | 16 | 99 | 18 |
| | | Jul | 10 | 19 | 40 | 11 |
| | | Aug | 10 | 16 | 44 | 11 |
| | | Sep | 10 | 16 | 32 | 11 |
| | | Oct | 12 | 37 | 84 | 32 |
| | | Nov | 9 | 54 | 152 | 43 |
| | | Dec | 6 | 69 | 176 | 60 |
| | 2020 | Jan | 8 | 77 | 177 | 51 |
| | | Feb | 11 | 101 | 223 | 58 |
| | | Mar | 14 | 48 | 137 | 38 |




*CPCB standards for NOx and $PM_{2.5}$ are same, so the lines indicating them overlap and are not distinctly*

**Figure No. 167: Monthly average reading recorded at Nerul CAAQMS**

**Table No. 147: Data for Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Nerul CAAQMS**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|
| | | *50* | *40* | *60* | *40* |
| Nerul CAAQMS | 19-20 | 9 | 44 | 117 | 29 |

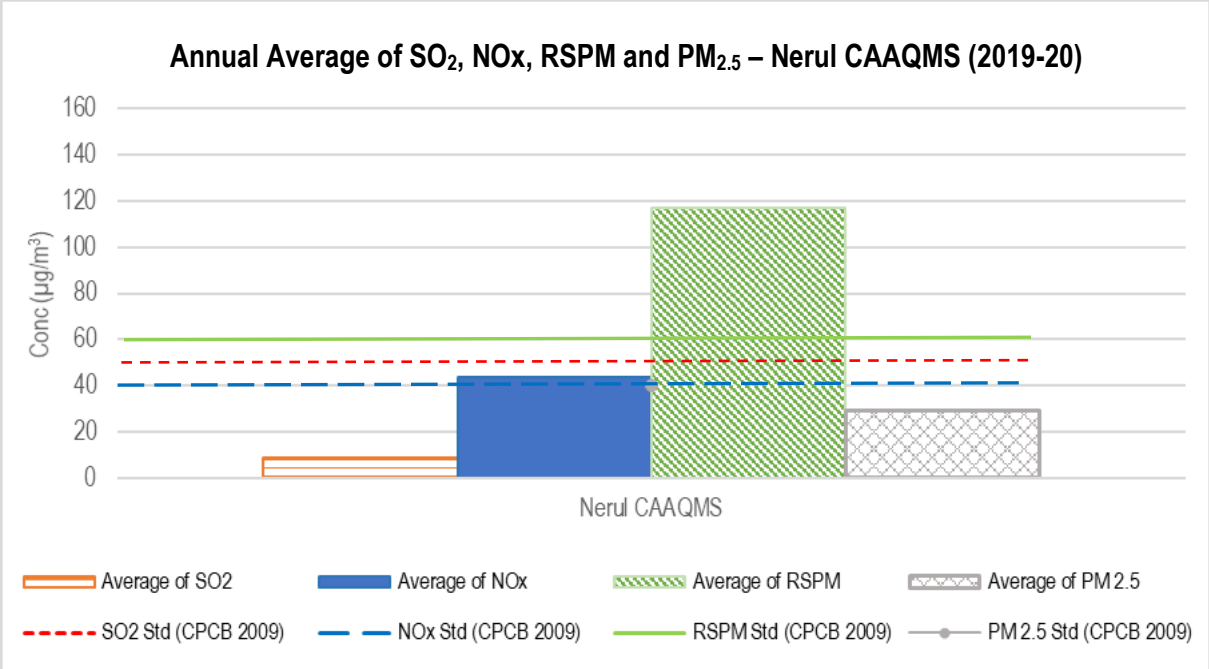



**Figure No. 168: Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Nerul CAAQMS**

# Navi Mumbai - Mahape, MPCB Nirmal Bhavan

**Table No. 148: Data for Monthly average reading recorded at Mahape, MPCB Nirmal Bhavan**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Mahape, MPCB-Nirmal Bhavan** | 2019 | Apr | 20 | 56 | 52 |
| | | May | 21 | 54 | 53 |
| | | Jun | 18 | 53 | 55 |
| | | Jul | 15 | 46 | 53 |
| | | Aug | 16 | 41 | 59 |
| | | Sep | 19 | 42 | 59 |
| | | Oct | 17 | 41 | 56 |
| | | Nov | 17 | 42 | 55 |
| | | Dec | 15 | 44 | 63 |
| | 2020 | Jan | 14 | 51 | 60 |
| | | Feb | 15 | 38 | 64 |

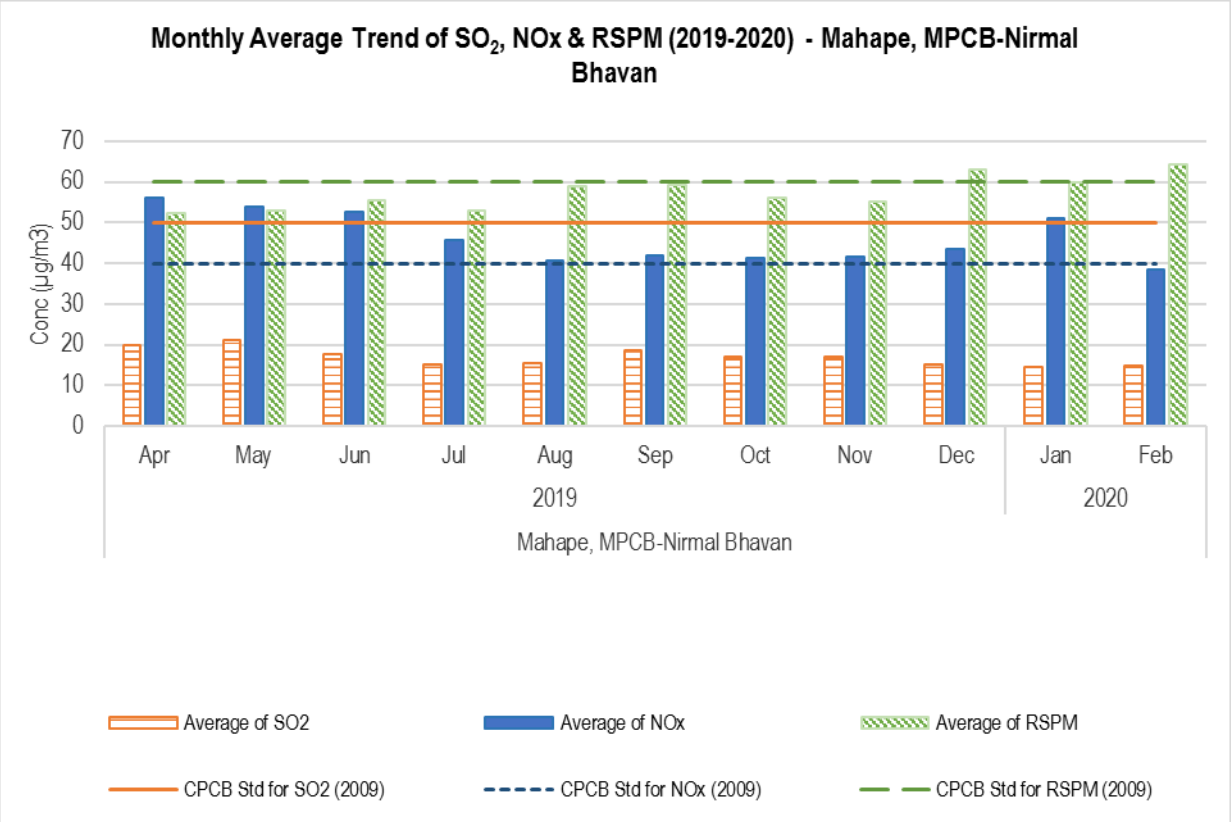



**Figure No. 169: Monthly average reading recorded at Mahape, MPCB Nirmal Bhavan**

**Table No. 149: Data for Annual average trend of $SO_2$, NOx, and RSPM at Mahape, MPCB Nirmal Bhavan**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Mahape, MPCB-Nirmal Bhavan | 06-07 | 37 | 27 | 106 |
| | 07-08 | 17 | 32 | 94 |
| | 08-09 | 22 | 43 | 131 |
| | 09-10 | 15 | 42 | 95 |
| | 10-11 | 22 | 41 | 101 |
| | 11-12 | 17 | 44 | 133 |
| | 12-13 | 18 | 45 | 121 |
| | 13-14 | 18 | 45 | 182 |
| | 14-15 | 18 | 40 | 131 |
| | 15-16 | 20 | 43 | 85 |
| | 16-17 | 21 | 46 | 91 |
| | 17-18 | 24 | 45 | 87 |
| | 18-19 | 19 | 46 | 53 |
| | 19-20 | 17 | 46 | 57 |

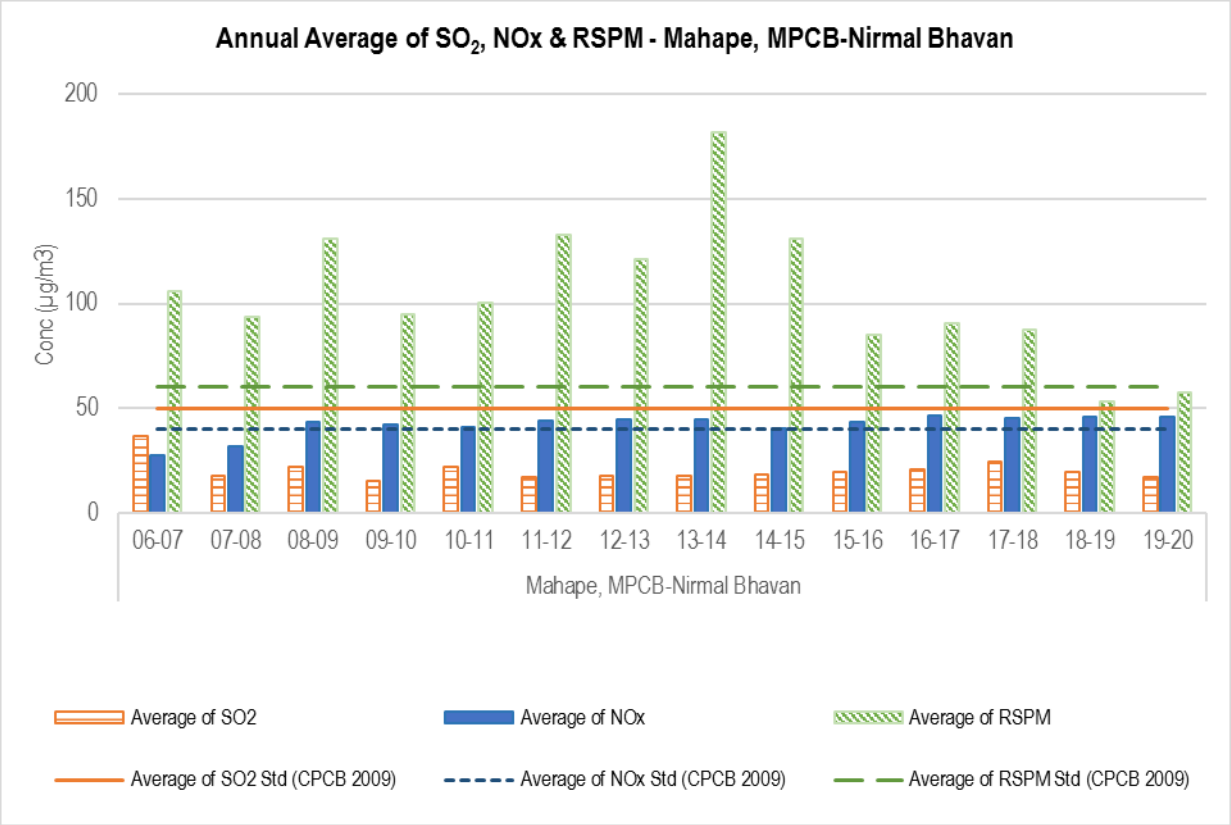
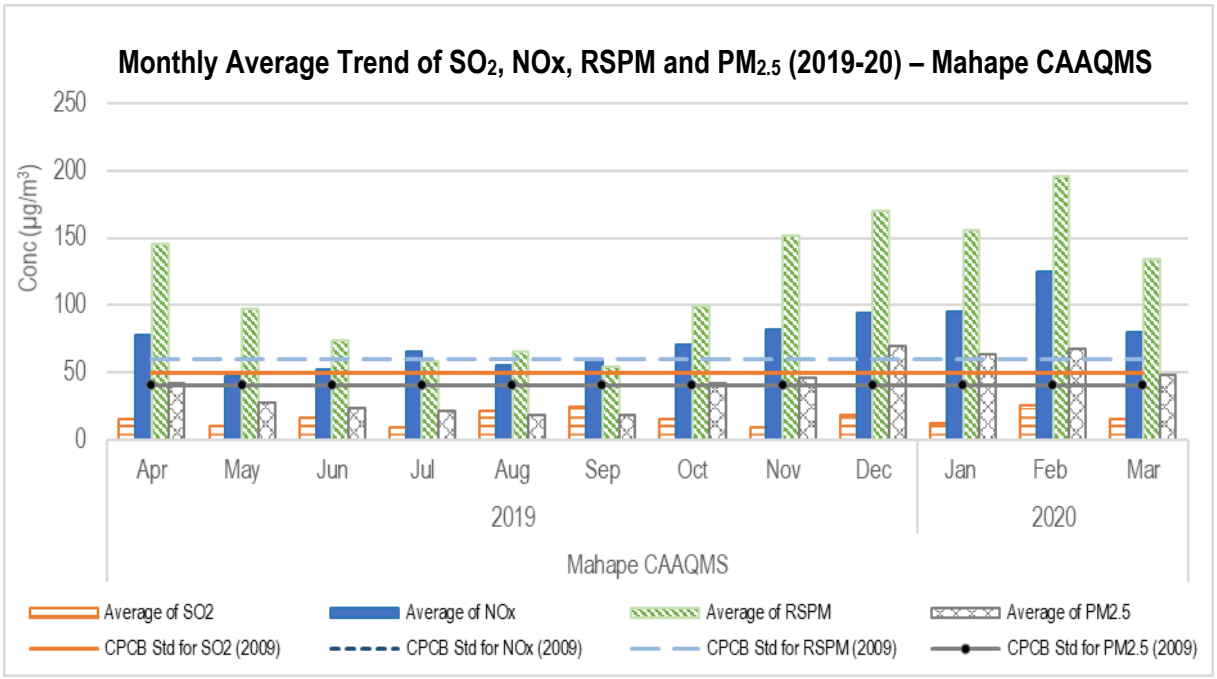



**Figure No. 170: Annual average trend of $SO_2$, NOx, and RSPM at Mahape, MPCB Nirmal Bhavan**

# Navi Mumbai – Mahape CAAQMS

**Table No. 150: Data for Monthly average reading recorded at Mahape CAAQMS**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** | ***40*** |
| **Mahape CAAQMS** | 2019 | Apr | 15 | 78 | 146 | 42 |
| | | May | 10 | 47 | 98 | 27 |
| | | Jun | 17 | 52 | 74 | 23 |
| | | Jul | 10 | 66 | 58 | 21 |
| | | Aug | 21 | 56 | 66 | 18 |
| | | Sep | 24 | 59 | 54 | 19 |
| | | Oct | 15 | 71 | 100 | 41 |
| | | Nov | 9 | 82 | 152 | 46 |
| | | Dec | 18 | 95 | 170 | 70 |
| | 2020 | Jan | 12 | 95 | 156 | 64 |
| | | Feb | 25 | 125 | 196 | 67 |
| | | Mar | 15 | 80 | 134 | 48 |




*CPCB standards for NOx and $PM_{2.5}$ are same, so the lines indicating them overlap and are not distinctly*

**Figure No. 171: Monthly average reading recorded at Mahape CAAQMS**

**Table No. 151: Data for Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Mahape CAAQMS**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|
| | | *50* | *40* | *60* | *40* |
| Mahape CAAQMS | 19-20 | 16 | 75 | 117 | 35 |

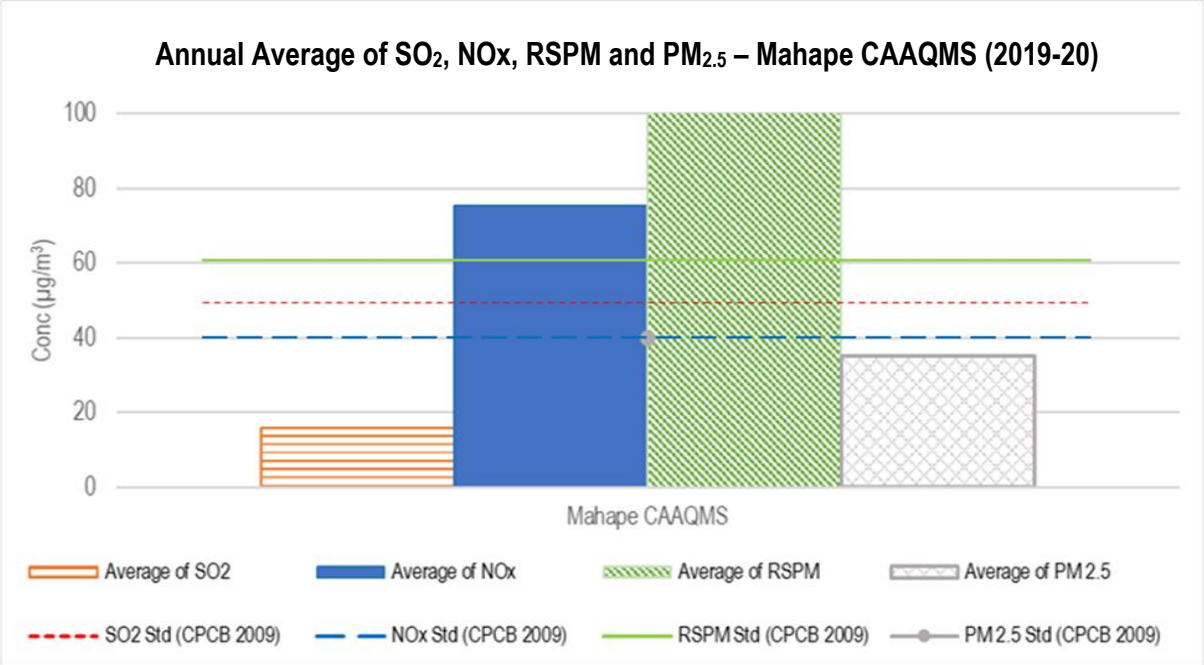



**Figure No. 172: Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Mahape CAAQMS**

## Taloja - Kharghar-CIDCO Nodal Office

**Table No. 152: Data for Monthly average reading recorded at Kharghar-CIDCO Nodal Office**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Kharghar - CIDCO Nodal Office** | 2019 | Apr | 20 | 59 | 58 |
| | | May | 20 | 59 | 63 |
| | | Jun | 18 | 41 | 49 |
| | | Jul | 15 | 43 | 50 |
| | | Aug | 15 | 42 | 50 |
| | | Sep | 17 | 40 | 54 |
| | | Oct | 18 | 43 | 54 |
| | | Nov | 16 | 44 | 52 |
| | | Dec | 15 | 42 | 51 |
| | 2020 | Jan | 16 | 50 | 47 |
| | | Feb | 15 | 35 | 48 |

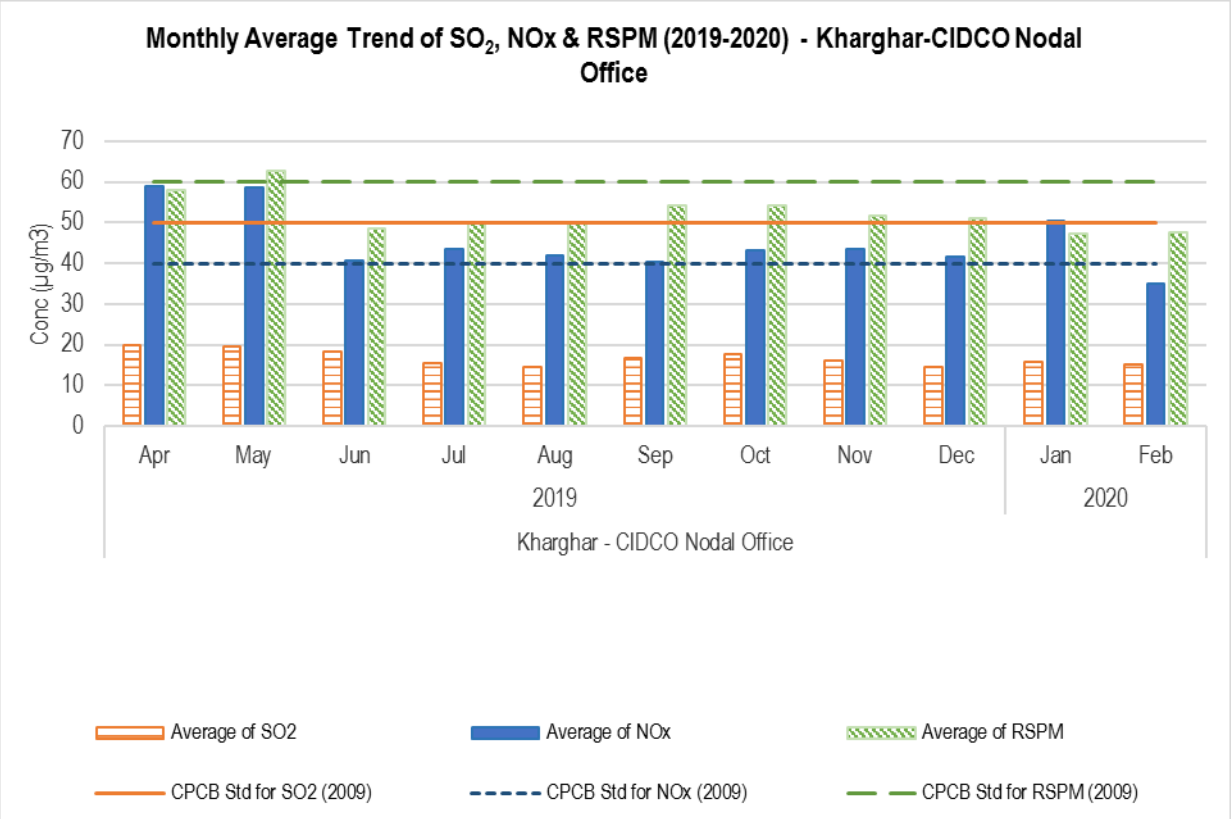



**Figure No. 173: Monthly average reading recorded at Kharghar-CIDCO Nodal Office**

**Table No. 153: Data for Annual average trend of $SO_2$, NOx, and RSPM at Kharghar-CIDCO Nodal Office**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Kharghar - CIDCO Nodal Office | 06-07 | 18 | 33 | 96 |
| | 07-08 | 10 | 31 | 108 |
| | 08-09 | 13 | 40 | 115 |
| | 09-10 | 10 | 35 | 75 |
| | 10-11 | 17 | 37 | 122 |
| | 11-12 | 16 | 43 | 122 |
| | 12-13 | 16 | 41 | 122 |
| | 13-14 | 17 | 42 | 125 |
| | 14-15 | 17 | 38 | 127 |
| | 15-16 | 17 | 41 | 116 |
| | 16-17 | 18 | 45 | 90 |
| | 17-18 | 22 | 44 | 91 |
| | 18-19 | 18 | 45 | 57 |
| | 19-20 | 17 | 45 | 52 |

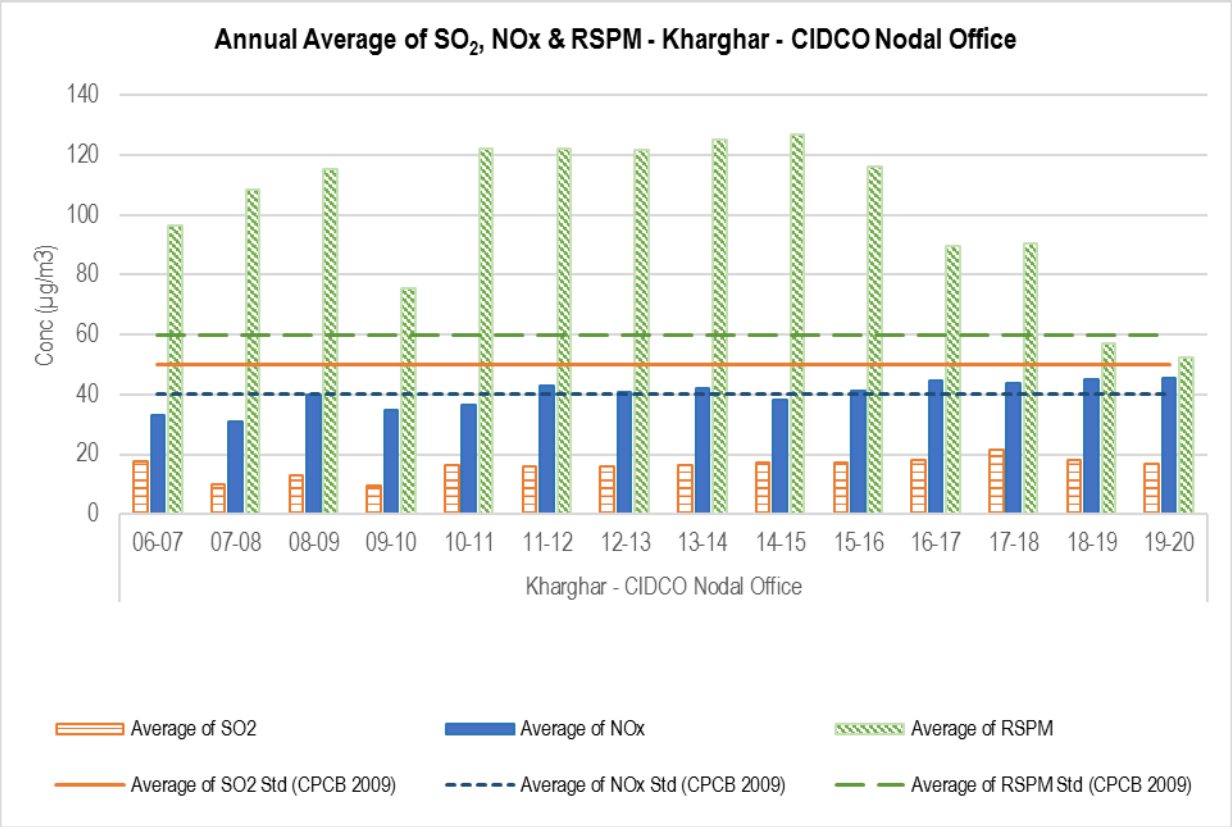



**Figure No. 174: Annual average trend of $SO_2$, NOx, and RSPM at Kharghar-CIDCO Nodal Office**

# Taloja - MIDC Building

**Table No. 154: Data for Monthly average reading recorded at Taloja - MIDC Building**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Taloja - MIDC building** | 2019 | Apr | 21 | 57 | 54 |
| | | May | 20 | 59 | 59 |
| | | Jun | 17 | 47 | 52 |
| | | Jul | 16 | 45 | 57 |
| | | Aug | 15 | 35 | 59 |
| | | Sep | 17 | 40 | 58 |
| | | Oct | 17 | 42 | 60 |
| | | Nov | 15 | 42 | 60 |
| | | Dec | 15 | 47 | 64 |
| | 2020 | Jan | 16 | 55 | 63 |
| | | Feb | 15 | 41 | 66 |

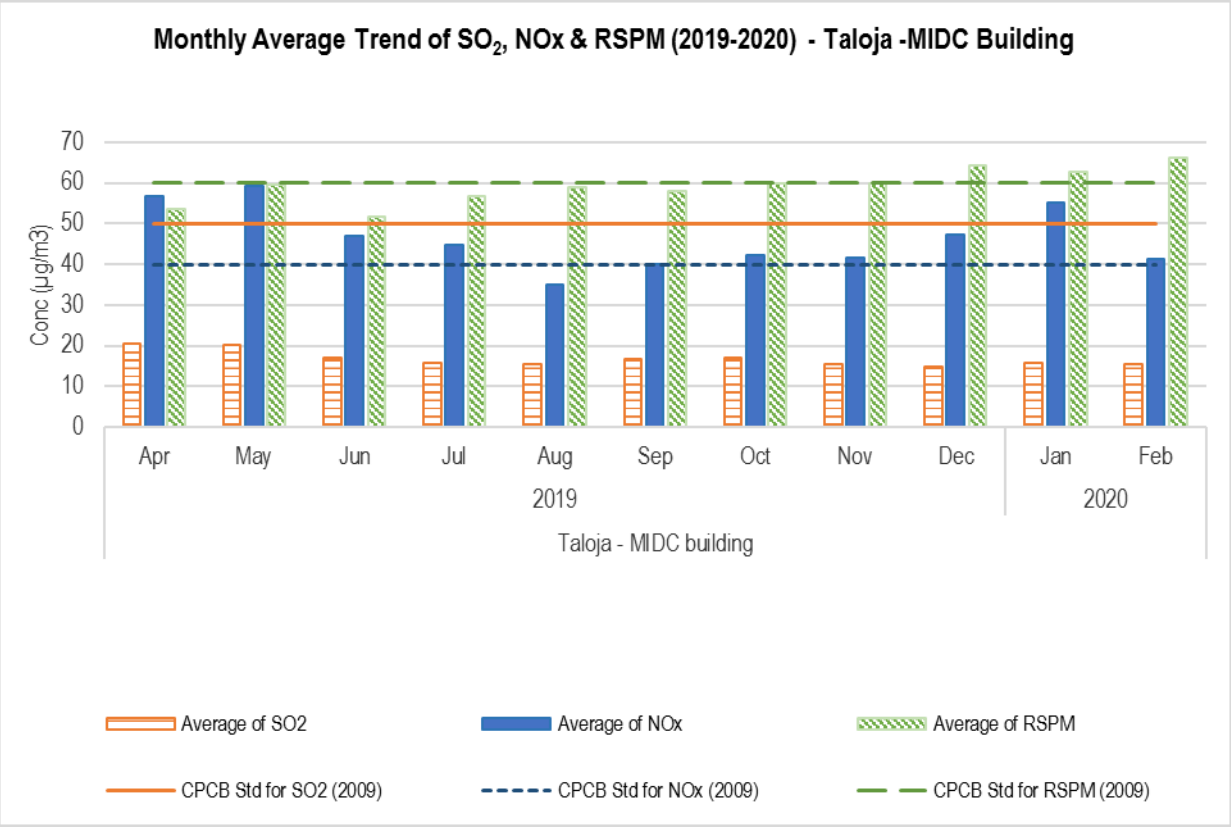



**Figure No. 175: Monthly average reading recorded at Taloja -MIDC Building**

**Table No. 155: Data for Annual average trend of $SO_2$, NOx, and RSPM at Taloja -MIDC Building**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Taloja - MIDC Building | 06-07 | 32 | 40 | 101 |
| | 07-08 | 22 | 39 | 113 |
| | 08-09 | 29 | 46 | 241 |
| | 09-10 | 23 | 55 | 200 |
| | 10-11 | 27 | 48 | 194 |
| | 11-12 | 20 | 51 | 148 |
| | 12-13 | 18 | 45 | 129 |
| | 13-14 | 19 | 47 | 187 |
| | 14-15 | 18 | 41 | 142 |
| | 15-16 | 21 | 47 | 148 |
| | 16-17 | 21 | 47 | 111 |
| | 17-18 | 23 | 47 | 105 |
| | 18-19 | 19 | 46 | 58 |
| | 19-20 | 17 | 47 | 59 |

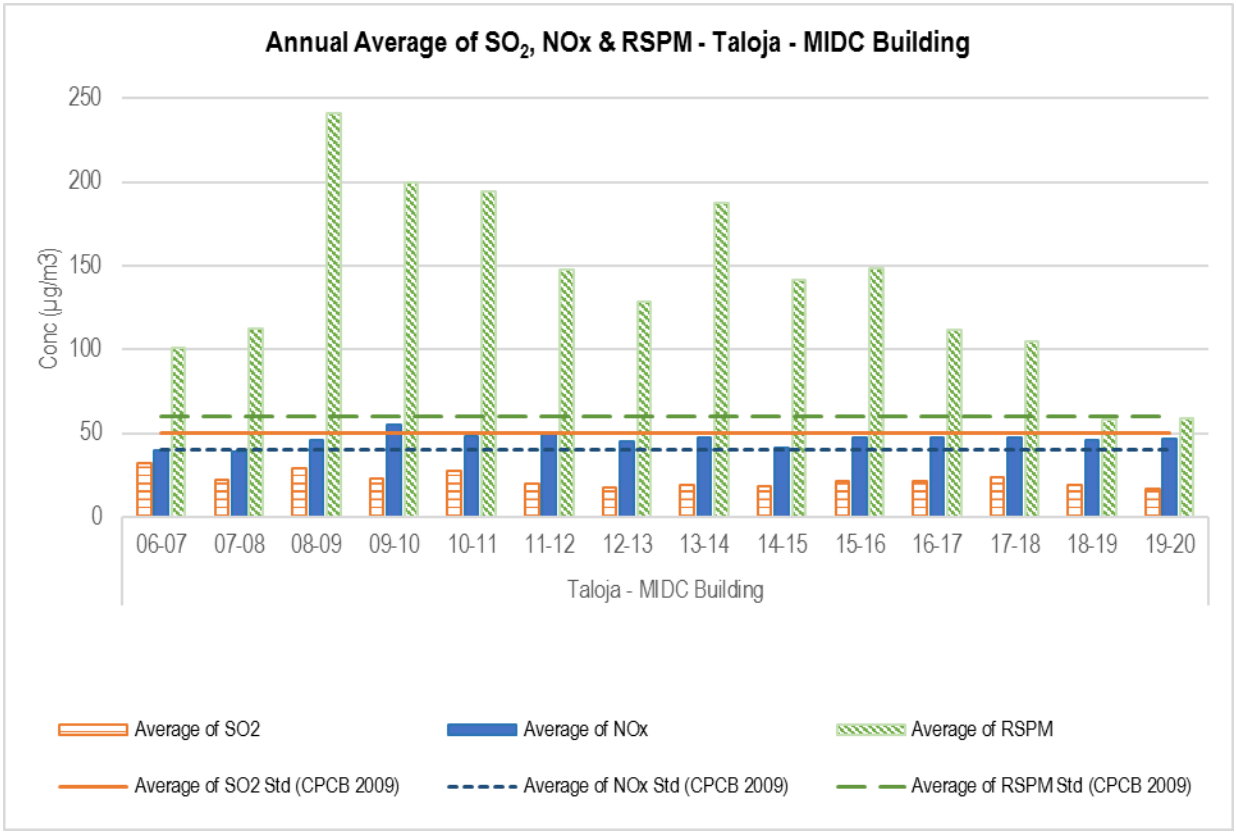
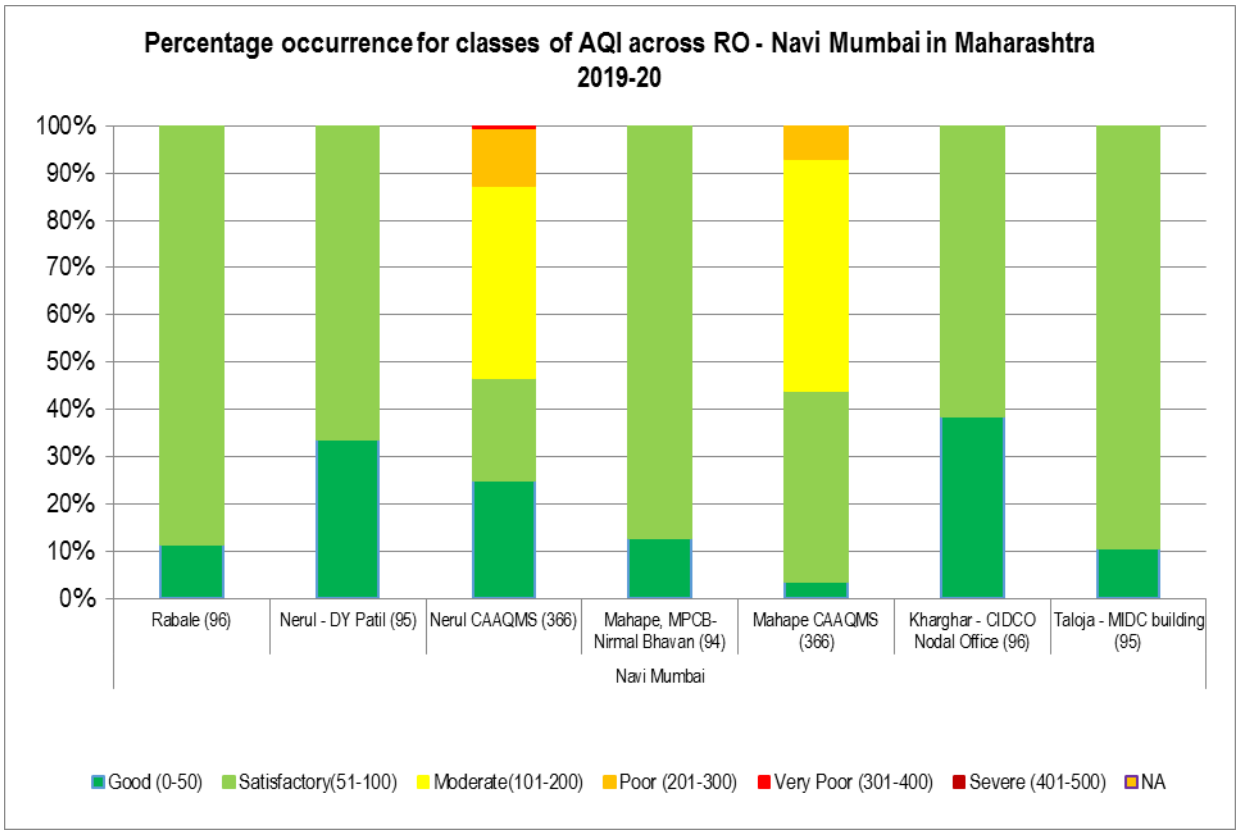


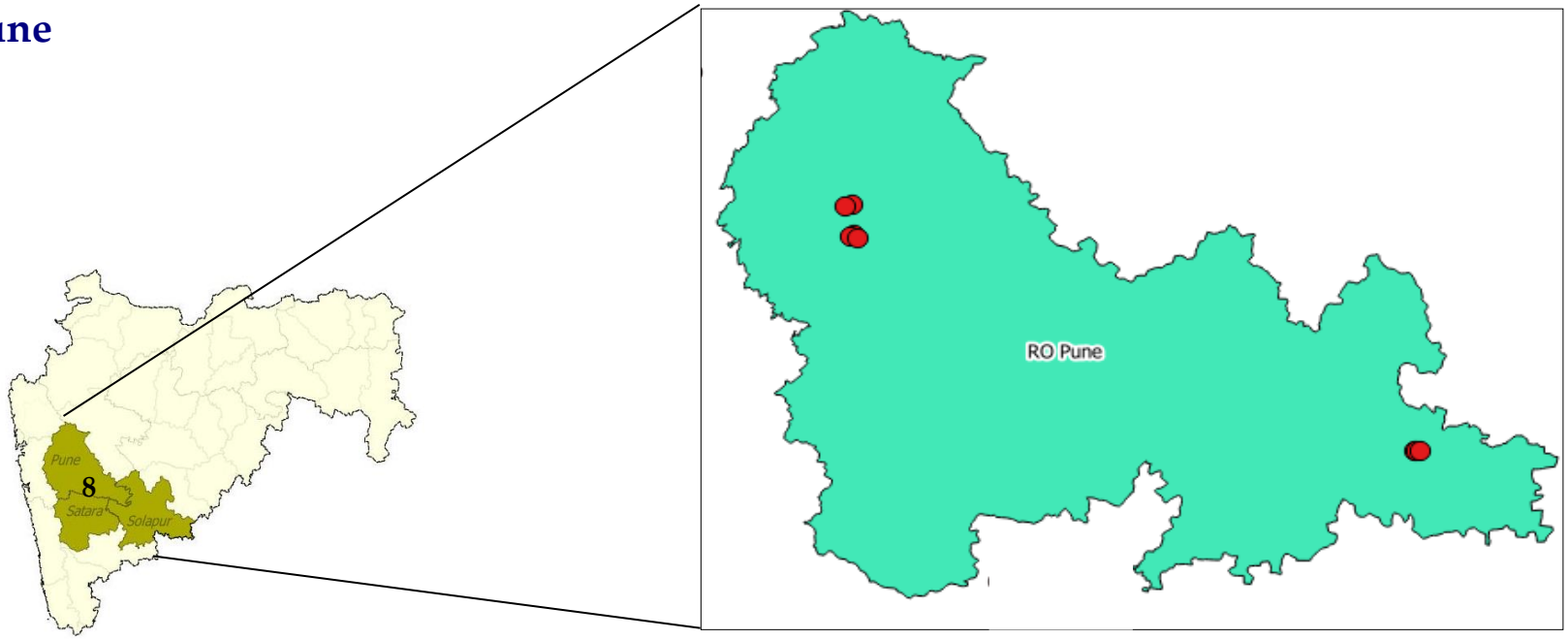

**Figure No. 176: Annual average trend of $SO_2$, NOx, and RSPM at Taloja -MIDC Building**

**Table No. 156: Percentage exceedance of pollutants at Navi Mumbai RO**

| Station Name | Total Observation | No. of times exceedance occurred | | | % Exceedance | | |
|---|---|---|---|---|---|---|---|
| | | $SO_2$ | NOx | RSPM | $SO_2$ | NOx | RSPM |
| Rabale | 96 | | | | | | |
| Nerul - DY Patil | 95 | | | | | | |
| Nerul CAAQMS | 366 | | 51 | 195 | | 14 | 53 |
| Mahape, MPCB-Nirmal Bhavan | 94 | | | | | | |
| Mahape CAAQMS | 366 | 1 | 131 | 203 | | 36 | 55 |
| Kharghar - CIDCO Nodal Office | 96 | | | | | | |
| Taloja - MIDC building | 95 | | | | | | |



## RO – Pune




| MPCB RO | Region | Station code | Station name | Type | Latitude (deg) | Longitude (deg) |
|---|---|---|---|---|---|---|
| Pune | Pune | 312 | Bhosari | Industrial | 18° 38' 04.1" N | 73° 49' 42.0" E |
| | Pune | 379 | Nal Stop | Rural and other areas | 18° 30' 25.2" N | 73° 49' 39.2" E |
| | Pune | 381 | Swargate, Pune | Residential | 18° 30' 12.6" N | 73° 51' 09.4" E |
| | Pune | 708 | Pimpri-Chinchwad - BOB Building | Residential | 18° 37' 41.0" N | 73° 48' 17.0" E |
| | Pune | | Karve Road - CAAQMS | Residential | 18° 30' 45.1" N | 73° 50' 22.6" E |
| | Solapur | 299 | WIT Campus | Residential | 17° 40' 06.6" N | 75° 55' 19.3" E |
| | Solapur | 300 | Saat Rasta- Chithale Clinic | Residential | 17° 39' 57.6" N | 75° 54' 23.4" E |
| | Solapur | | Solapur CAAQMS | Residential | 17° 40' 07.1" N | 75° 54' 05.2" E |

# Pune - Bhosari

**Table No. 157: Data for Monthly average reading recorded at Bhosari**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Bhosari** | 2019 | Apr | 35 | 77 | 86 |
| | | May | 31 | 63 | 98 |
| | | Jun | 22 | 35 | 81 |
| | | Jul | 20 | 52 | 36 |
| | | Dec | 18 | 54 | 132 |
| | 2020 | Jan | 16 | 55 | 187 |

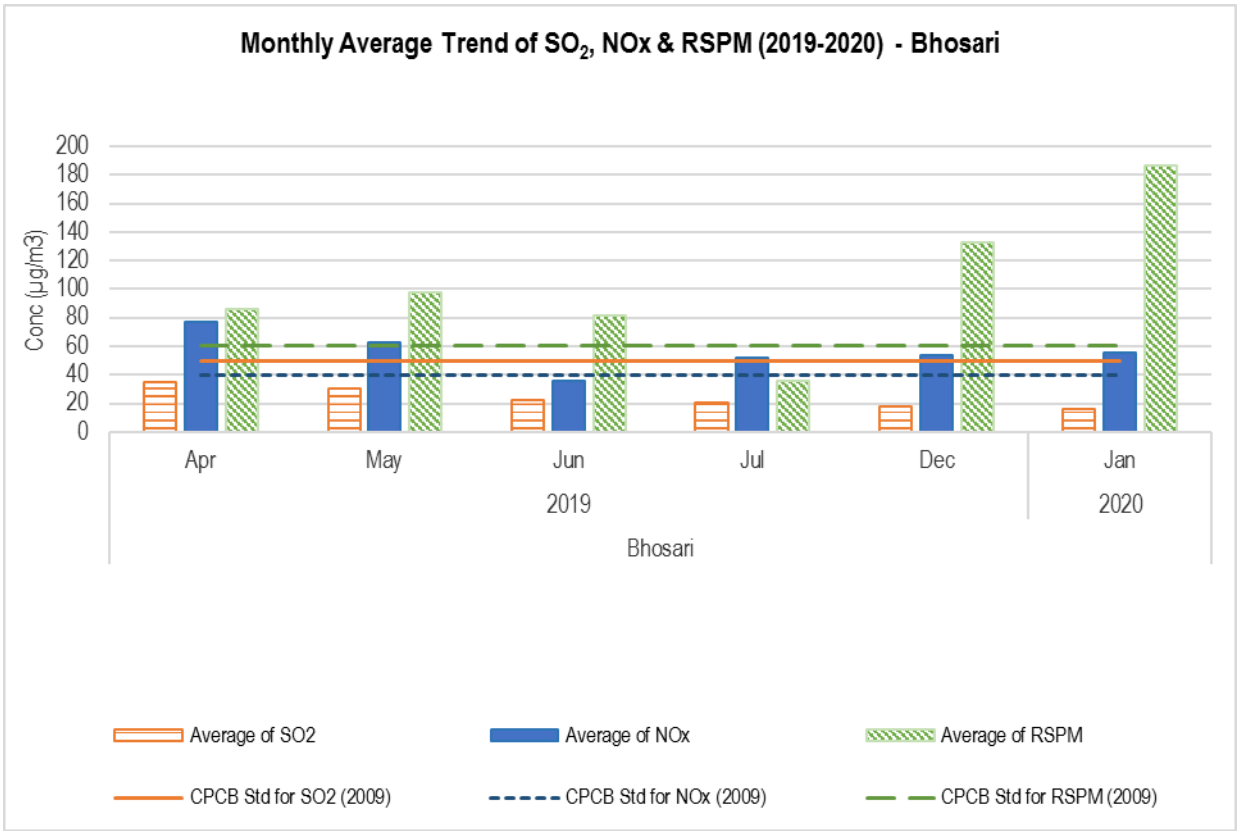



**Figure No. 177: Monthly average reading recorded at Bhosari**

**Table No. 158: Data for Annual average trend of $SO_2$, NOx, and RSPM at Bhosari**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| **Bhosari** | 05-06 | 27 | 42 | 144 |
| | 06-07 | 24 | 42 | 126 |
| | 07-08 | 20 | 42 | 111 |
| | 08-09 | 24 | 37 | 109 |
| | 09-10 | 42 | 36 | 88 |
| | 10-11 | 30 | 38 | 84 |
| | 11-12 | 37 | 49 | 130 |
| | 12-13 | 25 | 39 | 101 |
| | 13-14 | 23 | 35 | 93 |
| | 14-15 | 26 | 47 | 101 |
| | 15-16 | 31 | 50 | 97 |
| | 16-17 | 28 | 67 | 115 |
| | 17-18 | 24 | 58 | 112 |
| | 18-19 | 29 | 53 | 87 |
| | 19-20 | 24 | 57 | 108 |

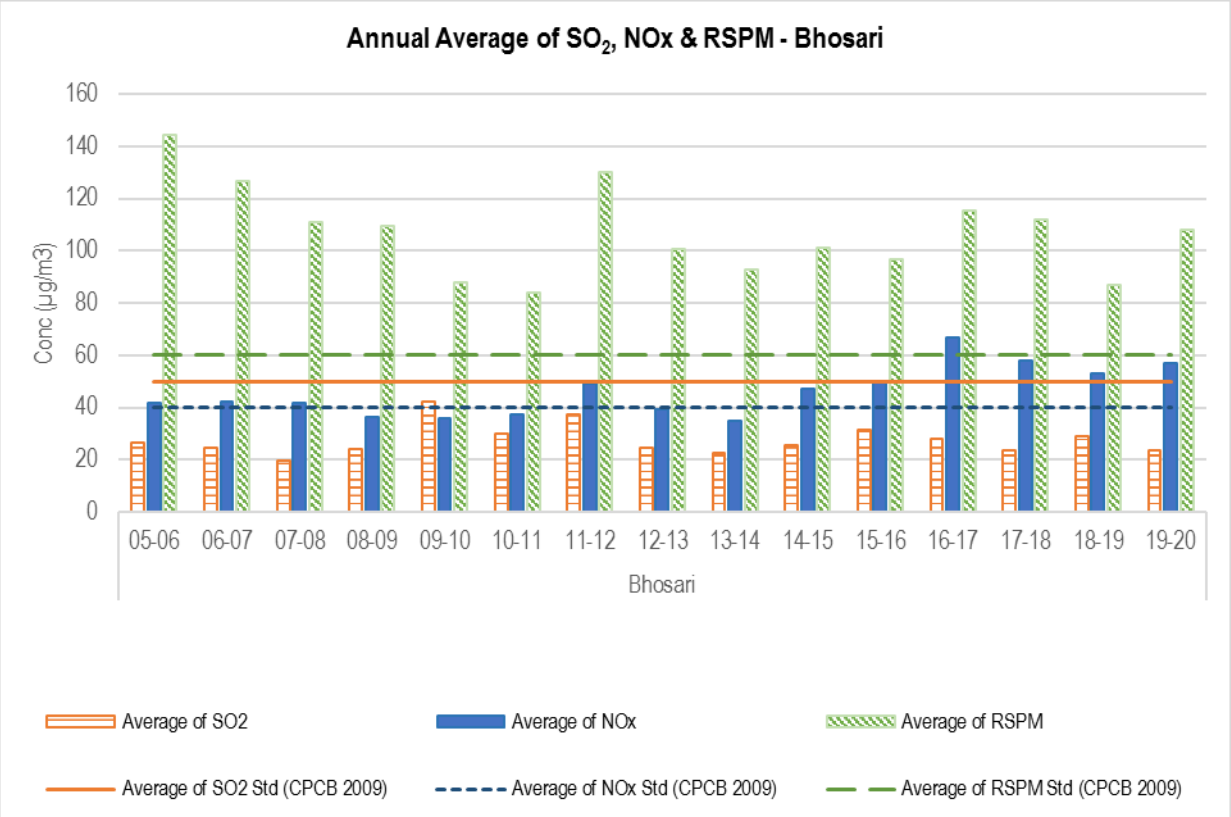



**Figure No. 178: Annual average trend of $SO_2$, NOx, and RSPM at Bhosari**

# Pune - Nal Stop

**Table No. 159: Data for Monthly average reading recorded at Nal Stop**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Nal Stop** | 2019 | Apr | 35 | 75 | 146 |
| | | May | 27 | 72 | 130 |
| | | Jun | 25 | 40 | 107 |
| | | Jul | 18 | 47 | 105 |
| | | Aug | 41 | 106 | 92 |
| | | Sep | 20 | 116 | 51 |
| | | Oct | 21 | 112 | 72 |
| | | Nov | 21 | 70 | 87 |
| | | Dec | 19 | 88 | 110 |
| | 2020 | Jan | 14 | 71 | 141 |

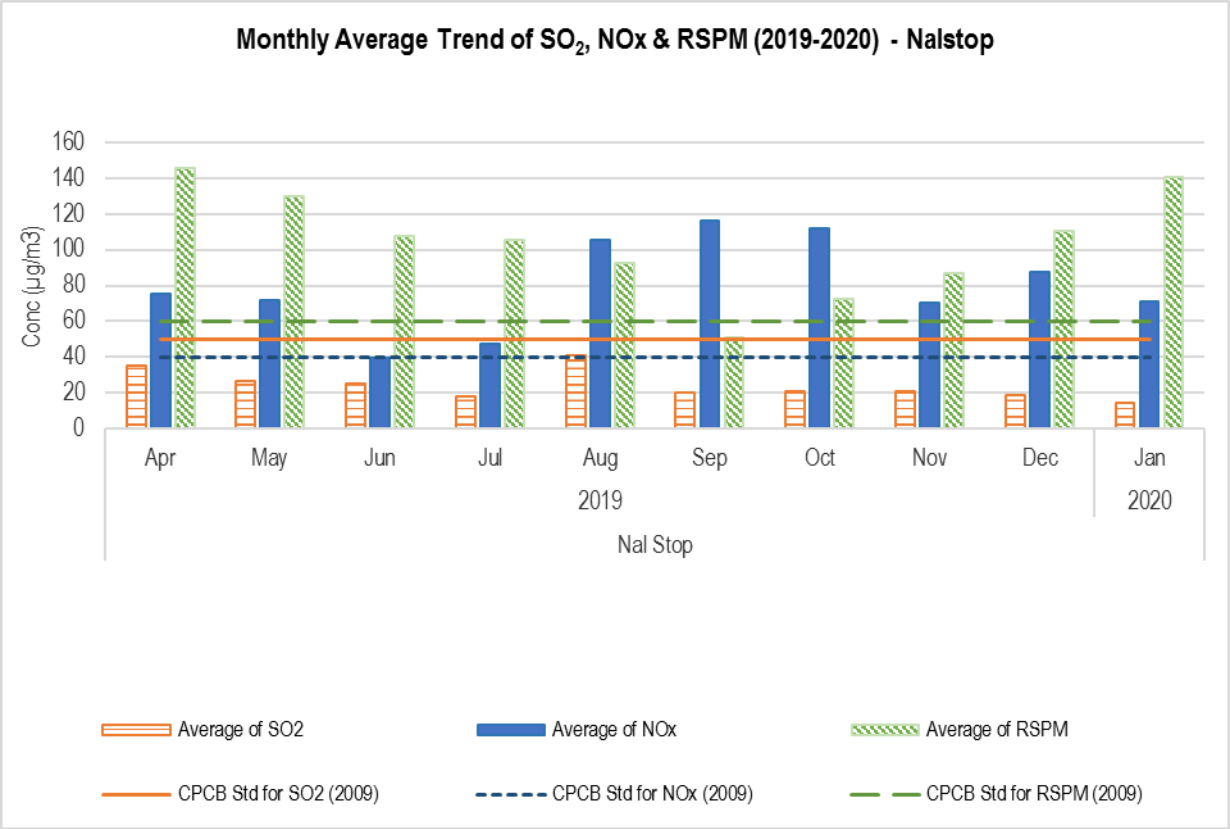



**Figure No. 179: Monthly average reading recorded at Nal Stop**

**Table No. 160: Data for Annual average trend of $SO_2$, NOx, and RSPM at Nal Stop**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | ***50*** | ***40*** | ***60*** |
| **Nal Stop** | 05-06 | 27 | 43 | 152 |
| | 06-07 | 23 | 42 | 129 |
| | 07-08 | 19 | 42 | 108 |
| | 08-09 | 21 | 41 | 91 |
| | 09-10 | 23 | 39 | 82 |
| | 10-11 | 21 | 43 | 88 |
| | 11-12 | 30 | 62 | 100 |
| | 12-13 | 19 | 45 | 82 |
| | 13-14 | 20 | 39 | 82 |
| | 14-15 | 22 | 48 | 92 |
| | 15-16 | 21 | 64 | 88 |
| | 16-17 | 23 | 78 | 107 |
| | 17-18 | 21 | 63 | 101 |
| | 18-19 | 28 | 59 | 105 |
| | 19-20 | 23 | 82 | 105 |

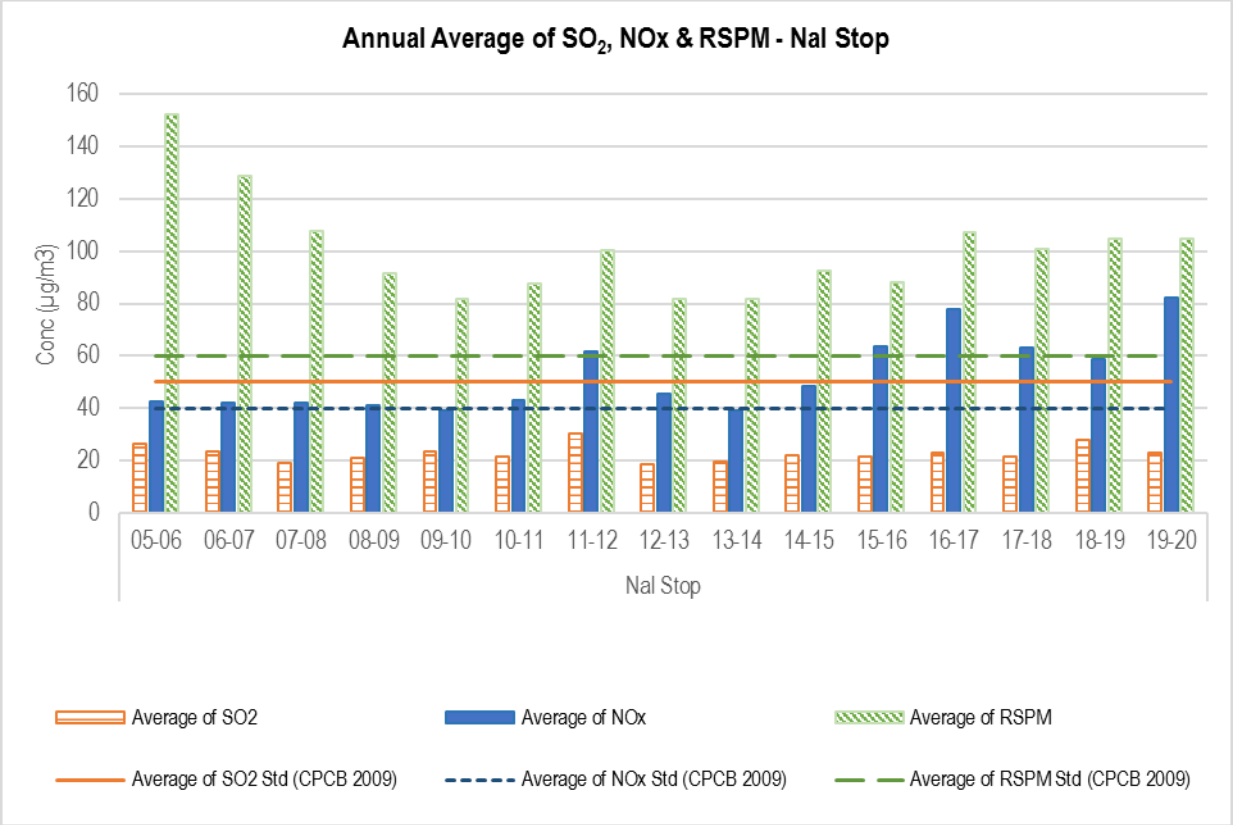



**Figure No. 180: Annual average trend of $SO_2$, NOx, and RSPM at Nal Stop**

## Pune - Swargate, Pune

**Table No. 161: Data for Monthly average reading recorded at Swargate, Pune**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | *50* | *40* | *60* |
| **Swargate, Pune** | 2020 | Jan | 19 | 65 | 114 |

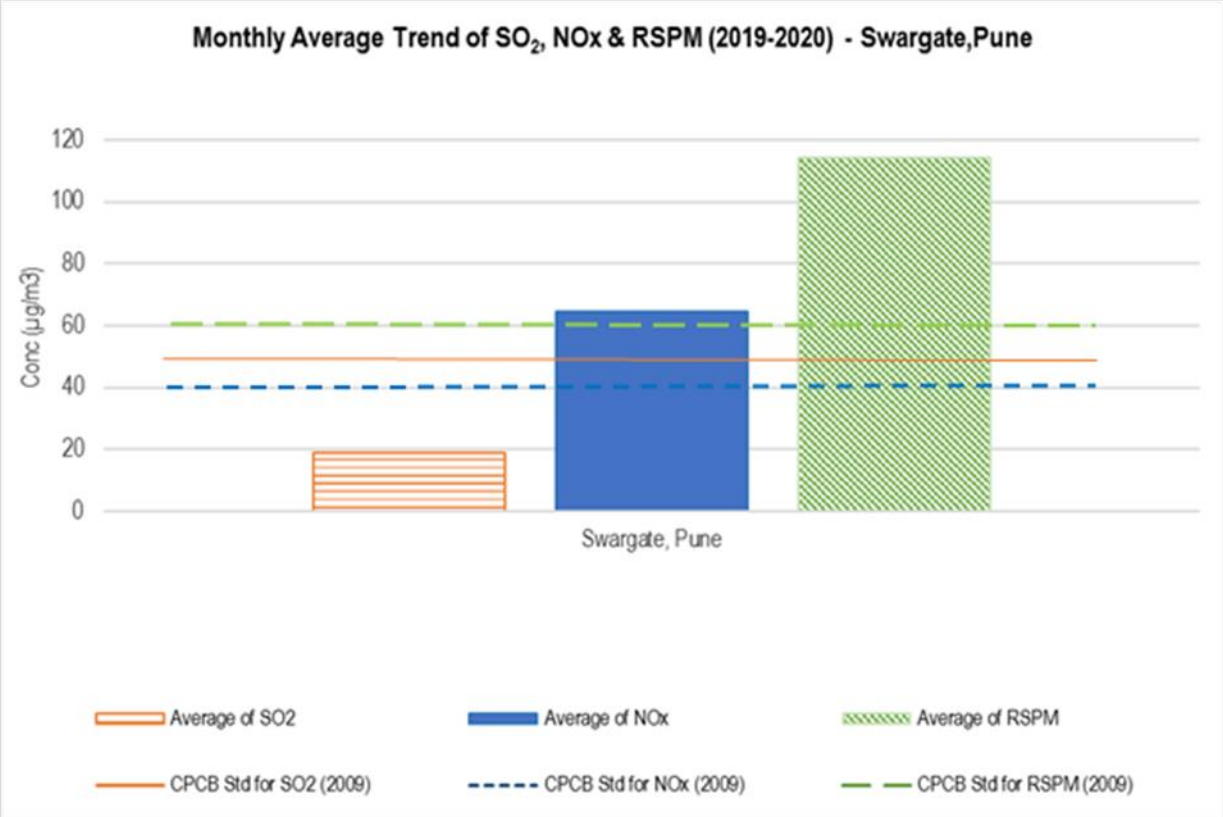



**Figure No. 181: Monthly average reading recorded at Swargate, Pune**

**Table No. 162: Data for Annual average trend of $SO_2$, NOx, and RSPM at Swargate, Pune**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | ***50*** | ***40*** | ***60*** |
| **Swargate, Pune** | 05-06 | 27 | 43 | 152 |
| | 06-07 | 25 | 43 | 138 |
| | 07-08 | 20 | 46 | 101 |
| | 08-09 | 23 | 44 | 100 |
| | 09-10 | 24 | 39 | 81 |
| | 10-11 | 23 | 50 | 80 |
| | 11-12 | 28 | 63 | 95 |
| | 12-13 | 19 | 53 | 75 |
| | 13-14 | 21 | 42 | 75 |
| | 14-15 | 22 | 50 | 87 |
| | 15-16 | 21 | 66 | 106 |
| | 16-17 | 22 | 84 | 95 |
| | 17-18 | 22 | 73 | 86 |
| | 18-19 | 29 | 54 | 76 |
| | 19-20 | 19 | 65 | 114 |

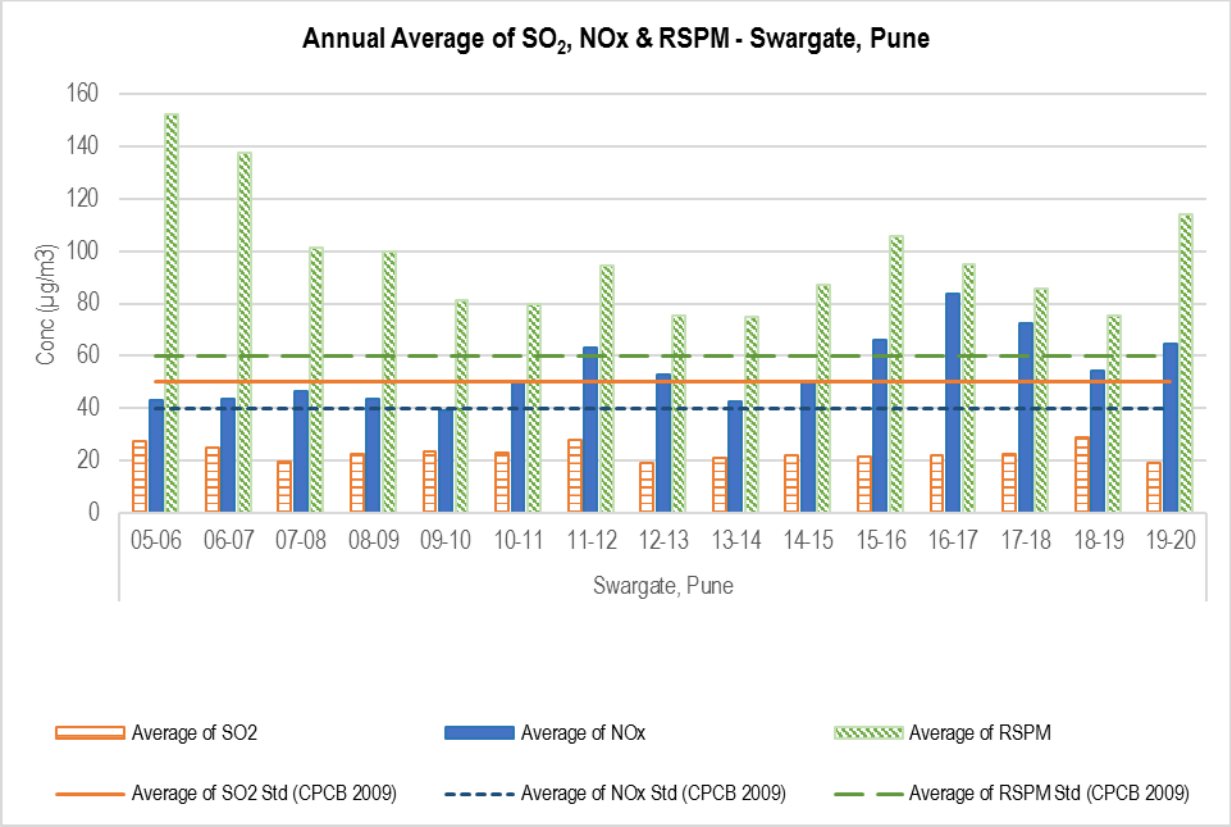



**Figure No. 182: Annual average trend of $SO_2$, NOx, and RSPM at Swargate, Pune**

# Pune - Pimpri - Chinchwad-BOB Building

**Table No. 163: Data for Monthly average reading recorded at Pimpri - Chinchwad-BOB Building**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Pimpri-Chinchwad - BOB Building** | 2019 | Apr | 33 | 77 | 84 |
| | | May | 31 | 59 | 67 |
| | | Jun | 21 | 39 | 59 |
| | | Jul | 19 | 46 | 45 |
| | | Aug | 33 | 88 | 49 |
| | | Sep | 29 | 103 | 45 |
| | | Oct | 22 | 70 | 49 |
| | | Nov | 18 | 71 | 61 |
| | | Dec | 15 | 83 | 108 |
| | 2020 | Jan | 15 | 70 | 118 |

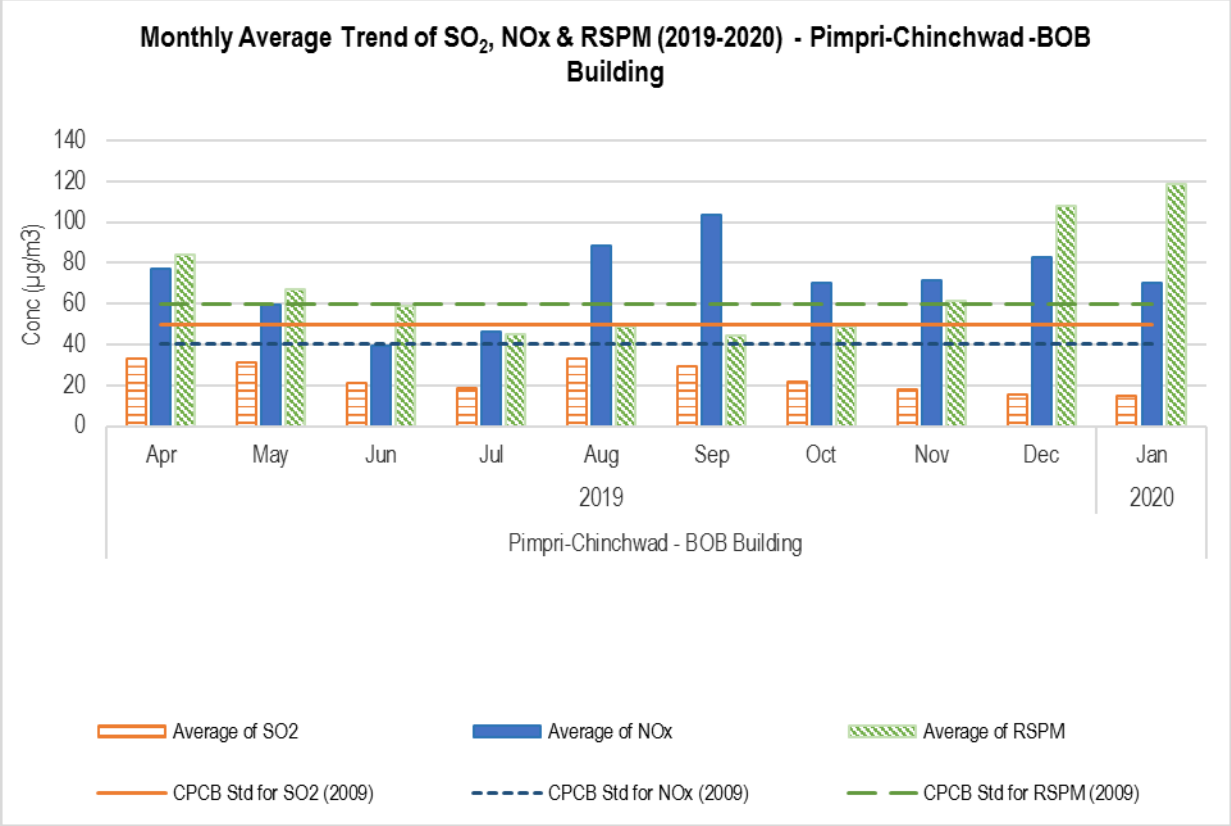



**Figure No. 183: Monthly average reading recorded at Pimpri - Chinchwad-BOB Building**

**Table No. 164: Data for Annual average trend of $SO_2$, NOx, and RSPM at Pimpri - Chinchwad-BOB Building**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | ***50*** | ***40*** | ***60*** |
| **Pimpri-Chinchwad - BOB Building** | 05-06 | 21 | 35 | 114 |
| | 06-07 | 24 | 42 | 127 |
| | 07-08 | 19 | 41 | 105 |
| | 08-09 | 23 | 39 | 96 |
| | 09-10 | 31 | 43 | 89 |
| | 10-11 | 26 | 49 | 86 |
| | 11-12 | 33 | 57 | 117 |
| | 12-13 | 20 | 49 | 84 |
| | 13-14 | 22 | 39 | 82 |
| | 14-15 | 22 | 44 | 94 |
| | 15-16 | 27 | 52 | 101 |
| | 16-17 | 27 | 72 | 87 |
| | 17-18 | 24 | 57 | 87 |
| | 18-19 | 28 | 52 | 72 |
| | 19-20 | 24 | 68 | 69 |

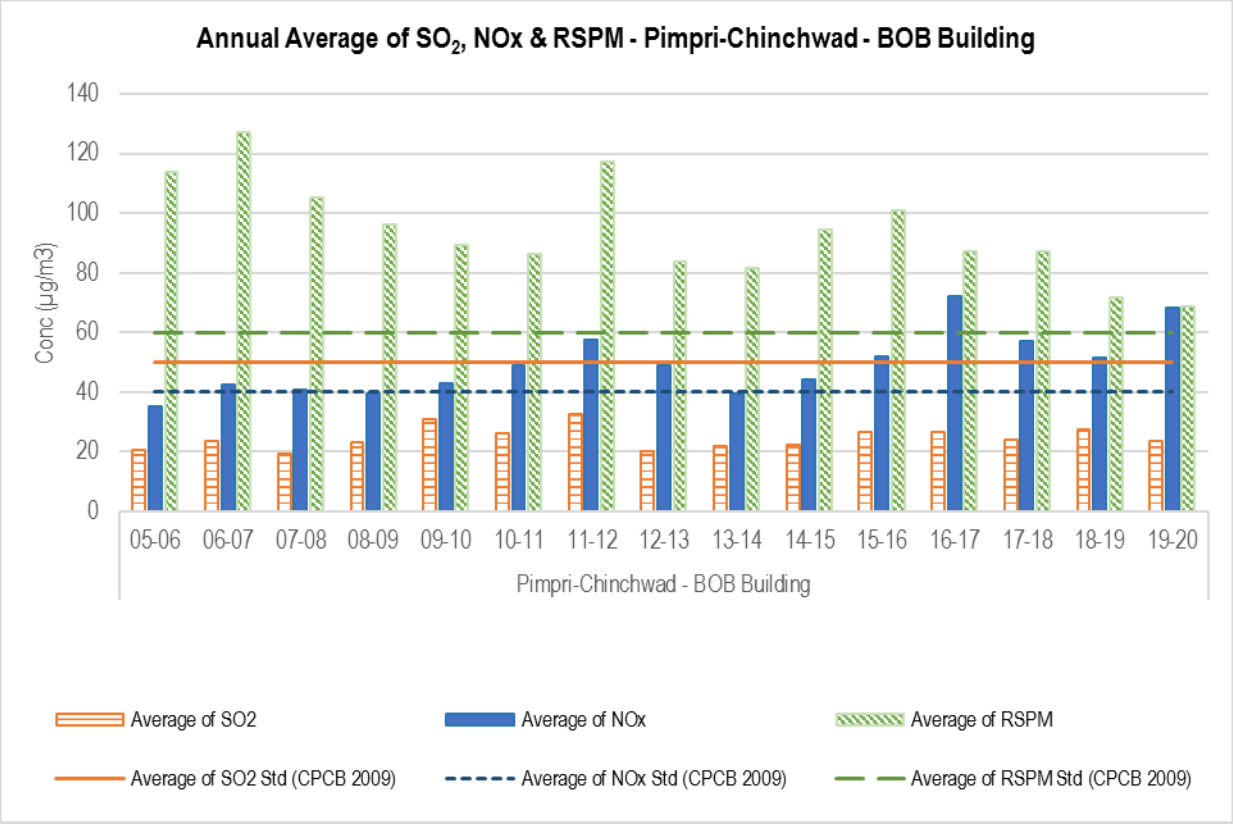
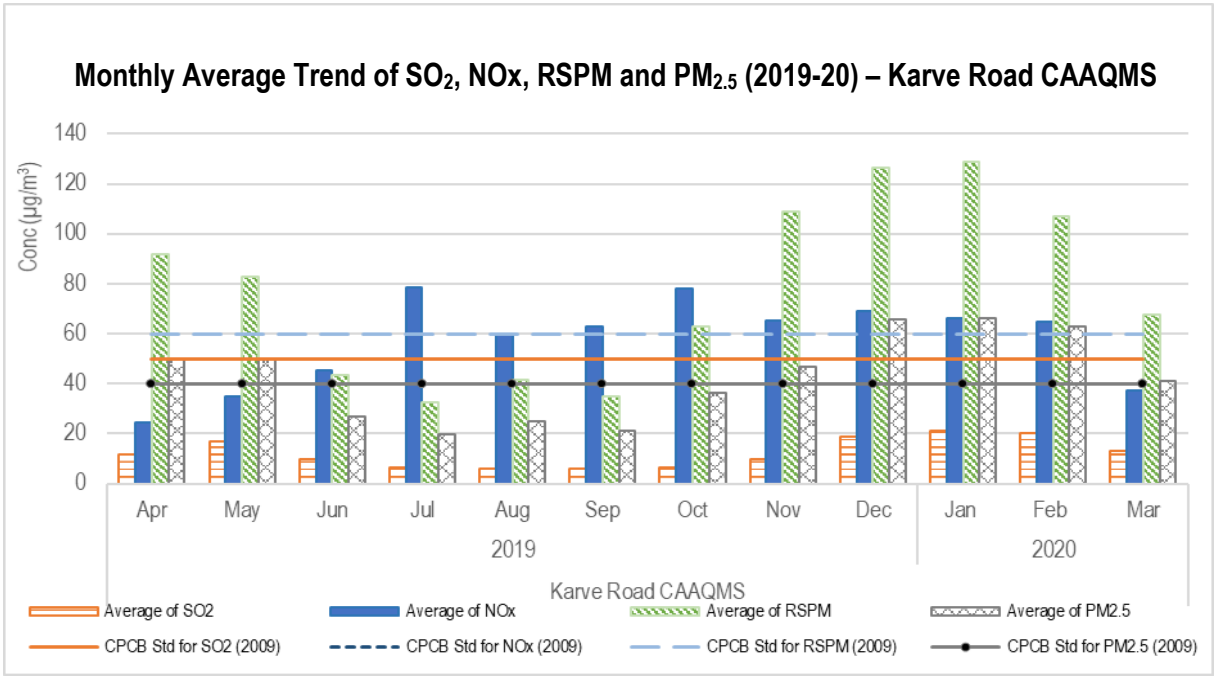



**Figure No. 184: Annual average trend of $SO_2$, NOx, and RSPM at Pimpri - Chinchwad-BOB Building**

# Pune - Karve Road - CAAQMS

**Table No. 165: Data for Monthly average reading recorded at Karve Road - CAAQMS**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** | ***40*** |
| **Karve Road CAAQMS** | 2019 | Apr | 12 | 24 | 92 | 50 |
| | | May | 17 | 35 | 83 | 50 |
| | | Jun | 10 | 45 | 43 | 27 |
| | | Jul | 6 | 78 | 32 | 19 |
| | | Aug | 6 | 59 | 41 | 25 |
| | | Sep | 6 | 63 | 35 | 21 |
| | | Oct | 6 | 78 | 63 | 36 |
| | | Nov | 10 | 65 | 109 | 47 |
| | | Dec | 19 | 69 | 126 | 65 |
| | 2020 | Jan | 21 | 66 | 129 | 66 |
| | | Feb | 20 | 65 | 107 | 63 |
| | | Mar | 13 | 37 | 68 | 41 |




*CPCB standards for NOx and $PM_{2.5}$ are same, so the lines indicating them overlap and are not distinctly*

**Figure No. 185: Monthly average reading recorded at Karve Road – CAAQMS**

**Table No. 166: Data for Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Karve Road - CAAQMS**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|
| | | *50* | *40* | *60* | *40* |
| Pune (Karve Road) CAAQMS | 07-08 | 13 | 43 | 71 | |
| | 08-09 | 25 | 39 | 121 | |
| | 09-10 | 11 | 35 | 109 | |
| | 10-11 | 12 | 39 | 128 | |
| | 11-12 | 11 | 49 | 131 | |
| | 12-13 | 22 | 66 | 124 | |
| | 13-14 | 27 | 70 | 121 | |
| | 14-15 | 15 | 36 | 123 | |
| | 15-16 | 25 | 57 | 138 | |
| | 16-17 | 18 | 77 | 79 | |
| | 17-18 | 24 | 46 | 73 | |
| | 18-19 | 14 | 38 | 98 | |
| | 19-20 | 12 | 57 | 77 | 40 |

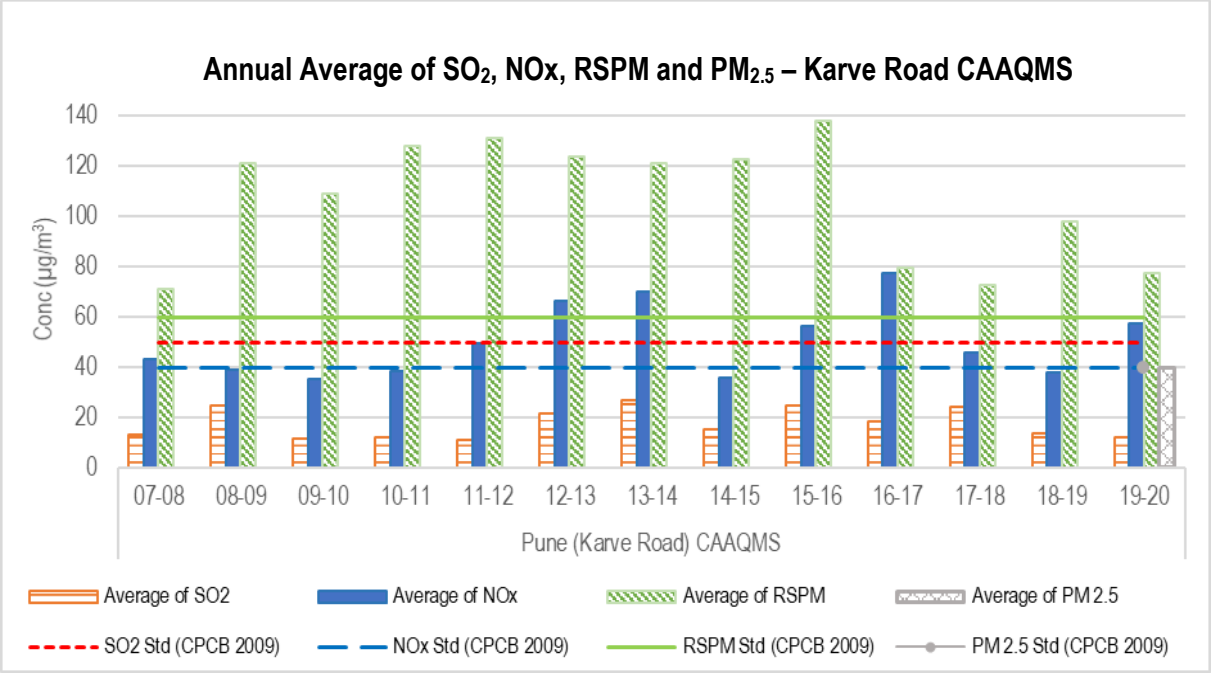



**Figure No. 186: Annual average trend of $SO_2$, NOx, and RSPM at Karve Road - CAAQMS**

# Solapur - WIT Campus

**Table No. 167: Data for Monthly average reading recorded at WIT Campus**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **WIT campus** | 2019 | Apr | 18 | 36 | 82 |
| | | May | 18 | 37 | 86 |
| | | Jun | 19 | 38 | 81 |
| | | Jul | 19 | 37 | 79 |
| | | Aug | 17 | 35 | 75 |
| | | Sep | 14 | 33 | 69 |
| | | Oct | 13 | 32 | 68 |
| | | Nov | 13 | 33 | 67 |
| | | Dec | 12 | 32 | 69 |
| | 2020 | Jan | 12 | 32 | 68 |
| | | Feb | 12 | 32 | 71 |
| | | Mar | 12 | 32 | 71 |

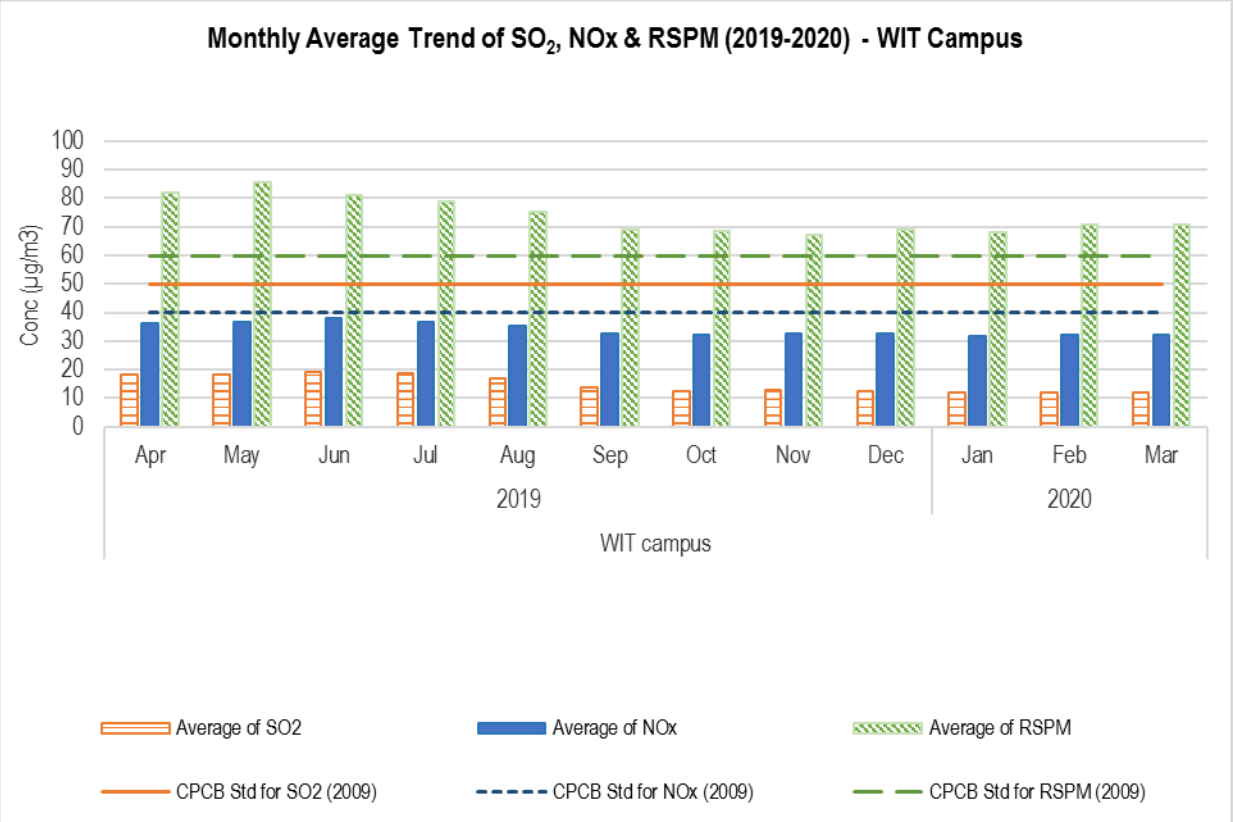



**Figure No. 187: Monthly average reading recorded at WIT Campus**

**Table No. 168: Data for Annual average trend of $SO_2$, NOx, and RSPM at WIT Campus**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| WIT Campus | 04-05 | 18 | 40 | 137 |
| | 05-06 | 17 | 37 | 115 |
| | 06-07 | 16 | 35 | 97 |
| | 07-08 | 17 | 34 | 86 |
| | 08-09 | 17 | 35 | 76 |
| | 09-10 | 17 | 35 | 71 |
| | 10-11 | 17 | 35 | 74 |
| | 11-12 | 17 | 35 | 77 |
| | 12-13 | 17 | 35 | 78 |
| | 13-14 | 15 | 35 | 84 |
| | 14-15 | 14 | 34 | 77 |
| | 15-16 | 13 | 35 | 76 |
| | 16-17 | 13 | 34 | 69 |
| | 17-18 | 14 | 33 | 65 |
| | 18-19 | 16 | 33 | 70 |
| | 19-20 | 15 | 34 | 74 |

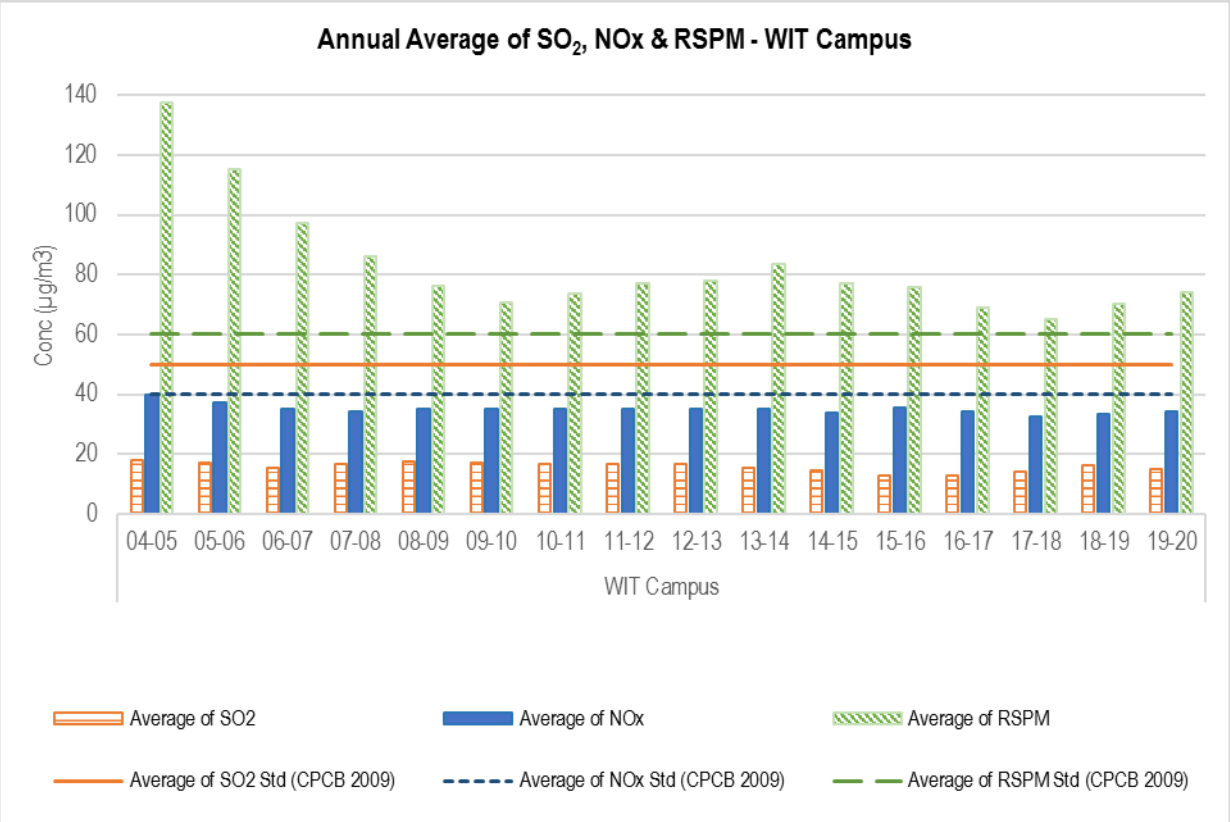



**Figure No. 188: Annual average trend of $SO_2$, NOx, and RSPM at WIT Campus**

## Solapur - Saat Rasta - Chithale Clinic

**Table No. 169: Data for Monthly average reading recorded at Saat Rasta - Chithale Clinic**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Saat Rasta- Chithale Clinic** | 2019 | Apr | 19 | 38 | 79 |
| | | May | 19 | 38 | 81 |
| | | Jun | 18 | 36 | 85 |
| | | Jul | 17 | 35 | 83 |
| | | Sep | 15 | 34 | 74 |
| | | Oct | 14 | 33 | 72 |
| | | Nov | 13 | 33 | 67 |
| | | Dec | 12 | 32 | 69 |
| | 2020 | Jan | 13 | 33 | 74 |
| | | Feb | 12 | 32 | 73 |
| | | Mar | 12 | 32 | 72 |

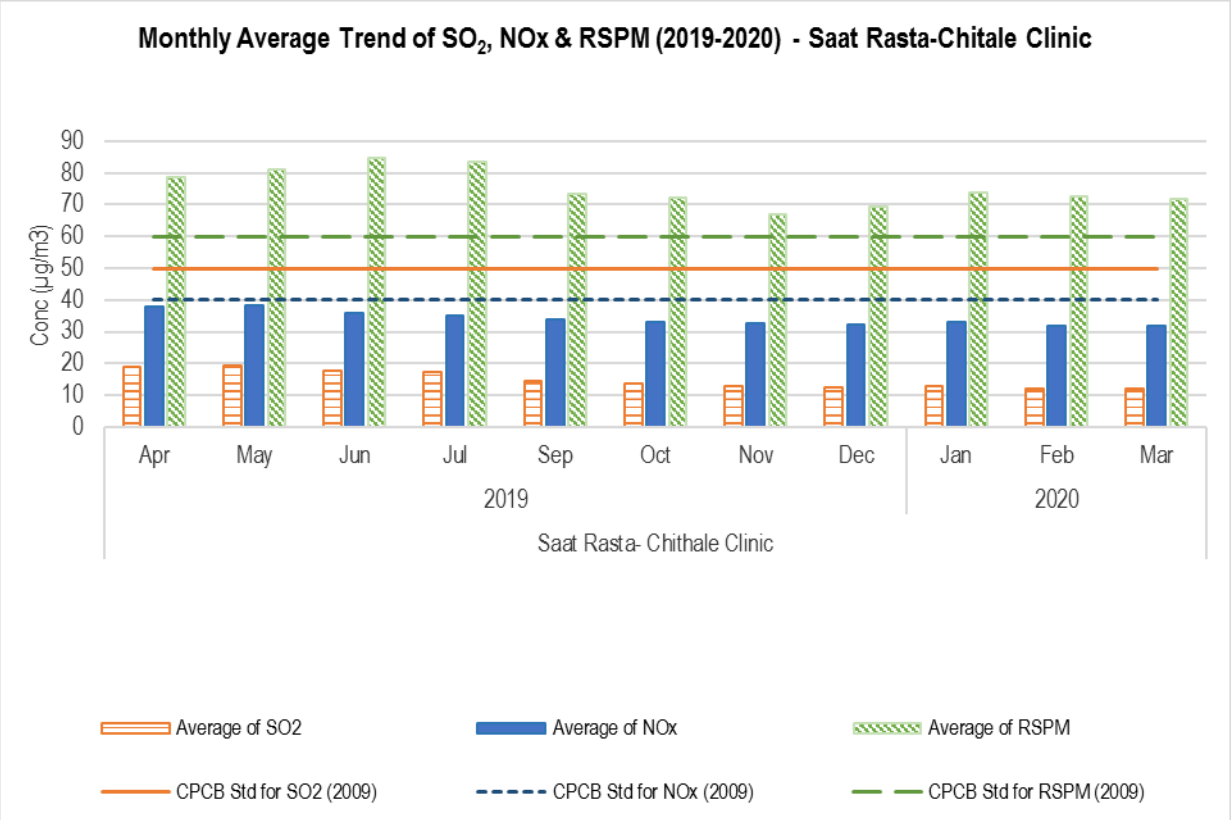



**Figure No. 189: Monthly average reading recorded at Saat Rasta - Chithale Clinic**

**Table No. 170: Data for Annual average trend of $SO_2$, NOx, and RSPM at Saat Rasta - Chithale Clinic**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Saat Rasta- Chithale Clinic | 04-05 | 18 | 40 | 144 |
| | 05-06 | 18 | 38 | 125 |
| | 06-07 | 17 | 36 | 107 |
| | 07-08 | 18 | 34 | 96 |
| | 08-09 | 18 | 36 | 74 |
| | 09-10 | 17 | 36 | 66 |
| | 10-11 | 17 | 34 | 69 |
| | 11-12 | 17 | 35 | 77 |
| | 12-13 | 17 | 35 | 81 |
| | 13-14 | 16 | 35 | 77 |
| | 14-15 | 14 | 35 | 78 |
| | 15-16 | 13 | 37 | 78 |
| | 16-17 | 13 | 35 | 70 |
| | 17-18 | 14 | 41 | 77 |
| | 18-19 | 16 | 33 | 71 |
| | 19-20 | 15 | 34 | 75 |

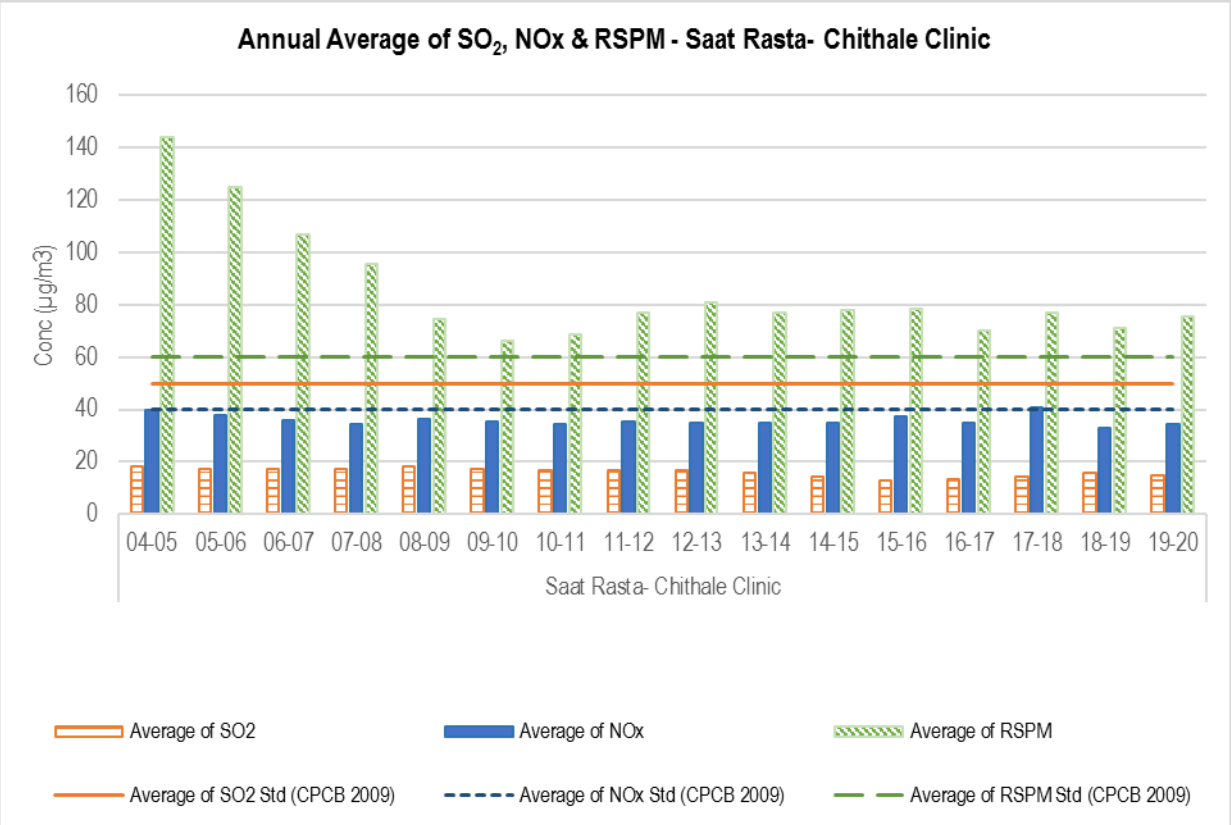
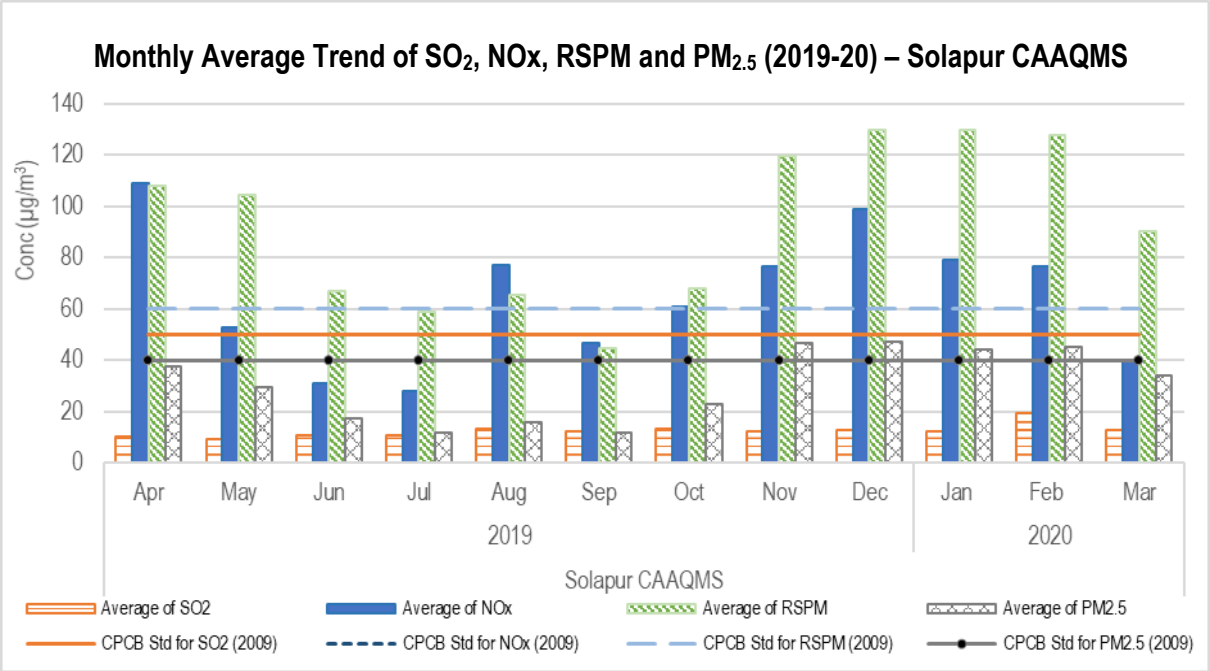



**Figure No. 190: Annual average trend of $SO_2$, NOx, and RSPM at Saat Rasta - Chithale Clinic**

# Solapur – Solapur CAAQMS

**Table No. 171: Data for Monthly average reading recorded at Solapur CAAQMS**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** | ***40*** |
| **Solapur CAAQMS** | 2019 | Apr | 10 | 109 | 108 | 38 |
| | | May | 9 | 53 | 104 | 29 |
| | | Jun | 11 | 31 | 67 | 17 |
| | | Jul | 11 | 28 | 59 | 12 |
| | | Aug | 13 | 195 | 65 | 16 |
| | | Sep | 12 | 47 | 45 | 12 |
| | | Oct | 13 | 61 | 68 | 23 |
| | | Nov | 12 | 77 | 120 | 46 |
| | | Dec | 13 | 99 | 130 | 47 |
| | 2020 | Jan | 12 | 79 | 130 | 44 |
| | | Feb | 20 | 77 | 128 | 45 |
| | | Mar | 13 | 40 | 90 | 34 |




*CPCB standards for NOx and $PM_{2.5}$ are same, so the lines indicating them overlap and are not distinctly*

**Figure No. 191: Monthly average reading recorded at Solapur CAAQMS**

**Table No. 172: Data for Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Solapur CAAQMS**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|
| | | *50* | *40* | *60* | |
| Solapur CAAQMS | 07-08 | 15 | 31 | 102 | |
| | 08-09 | 15 | 30 | 96 | |
| | 10-11 | 13 | 37 | 112 | |
| | 11-12 | 12 | 40 | 116 | |
| | 12-13 | 16 | 42 | 106 | |
| | 13-14 | 15 | 42 | 96 | |
| | 14-15 | 9 | 38 | 104 | |
| | 15-16 | 13 | 49 | 100 | |
| | 16-17 | 15 | 41 | 106 | |
| | 17-18 | 19 | 67 | 96 | |
| | 18-19 | 12 | 65 | 101 | |
| | 19-20 | 12 | 75 | 93 | 30 |

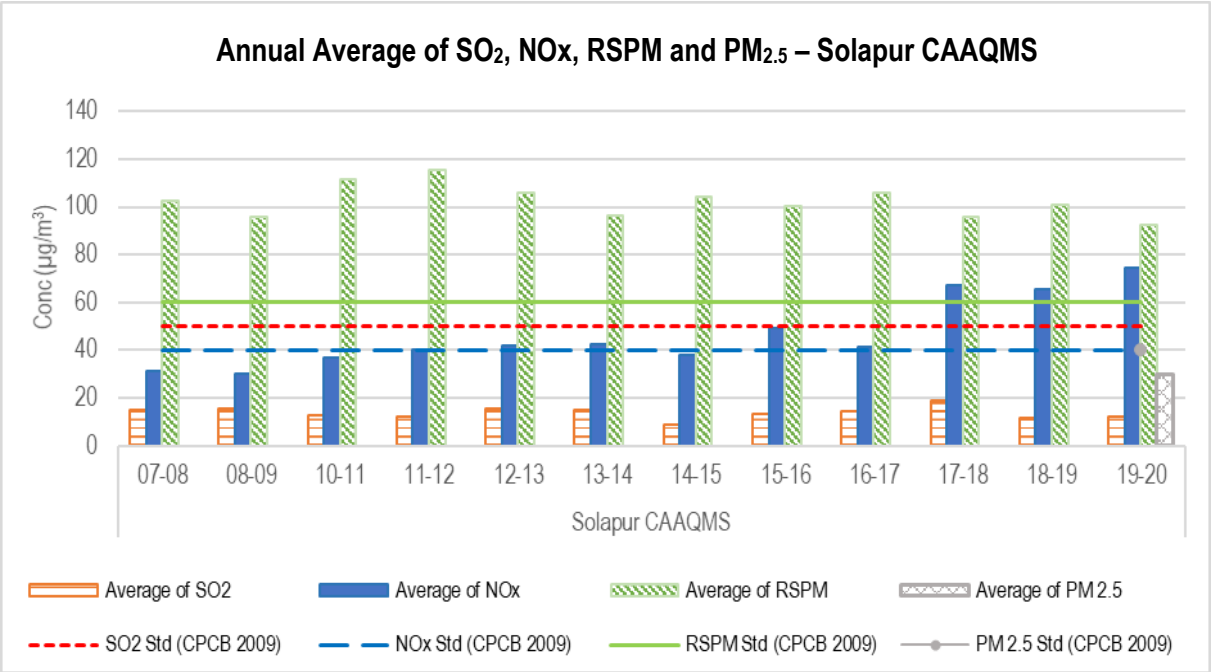
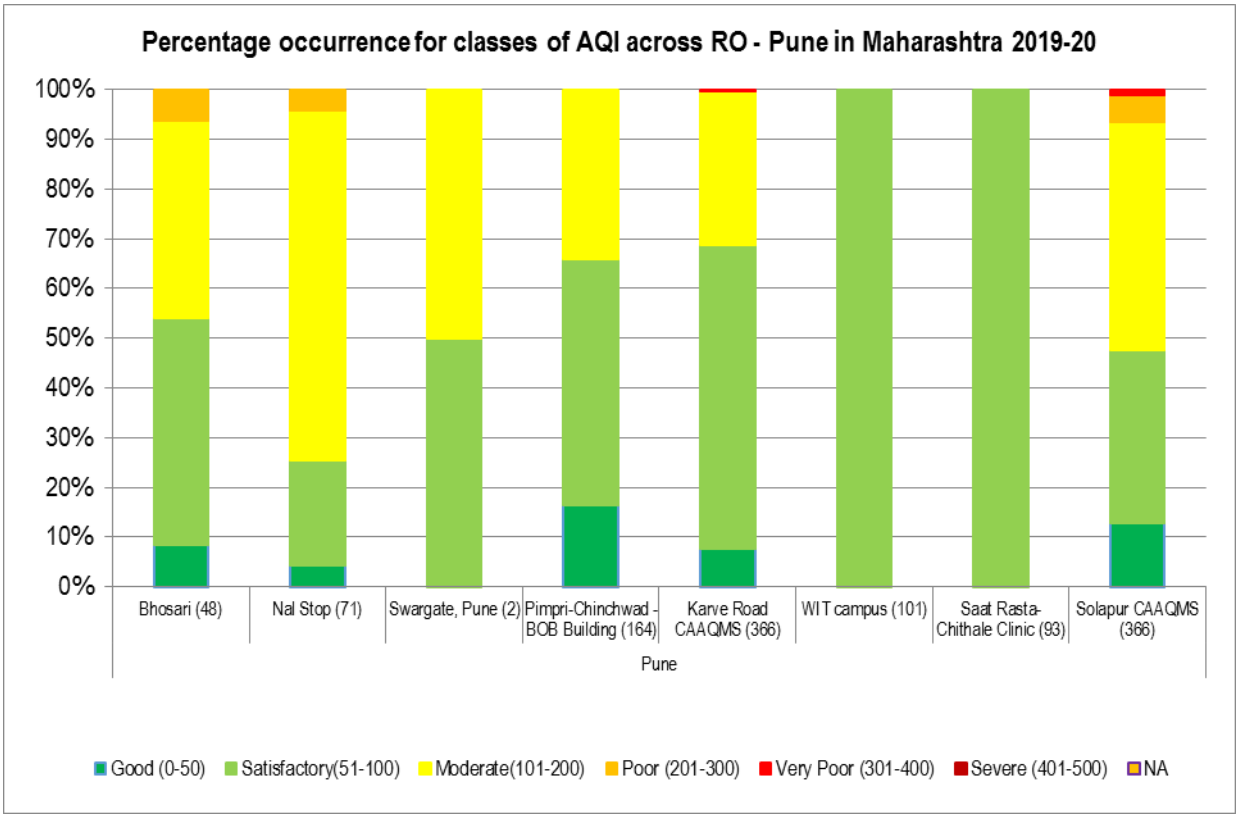


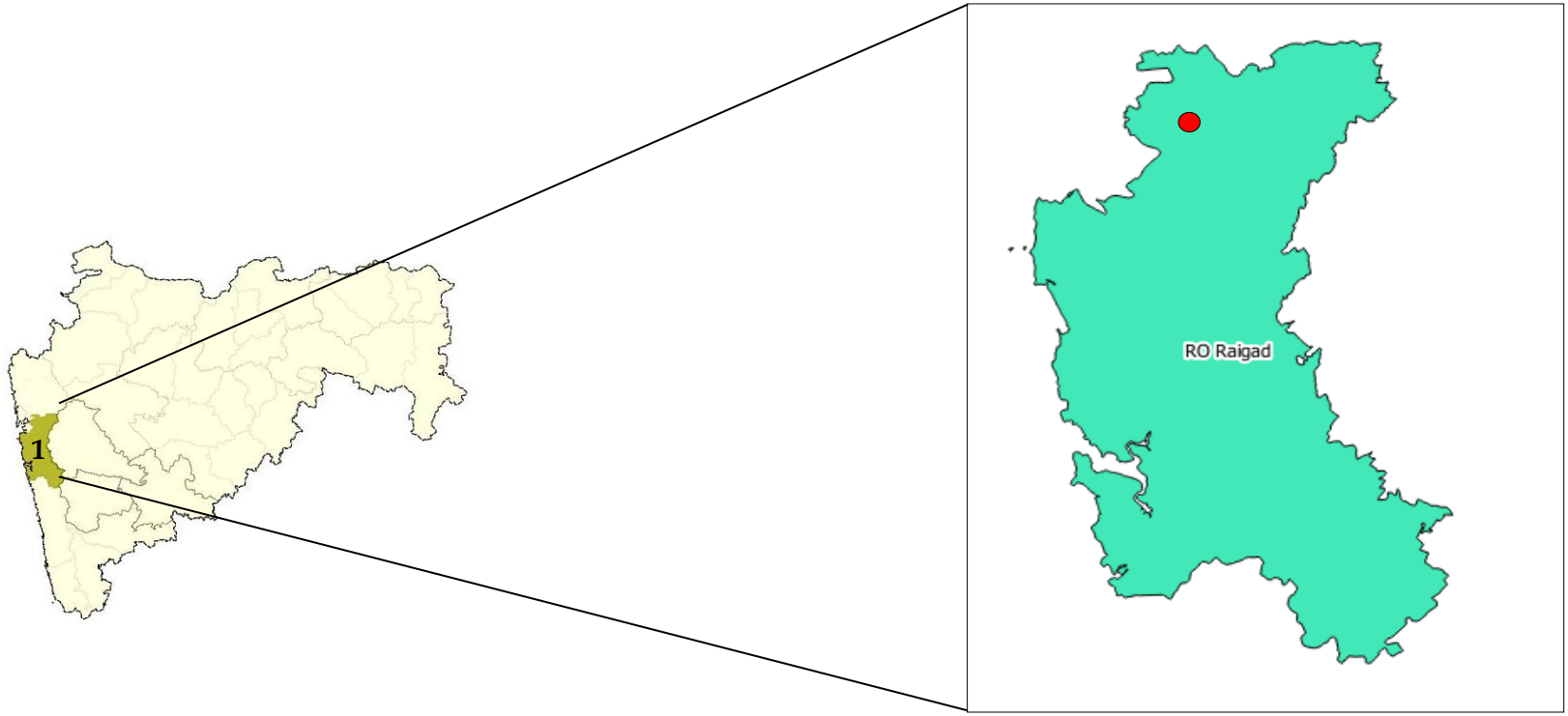

**Figure No. 192: Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Solapur CAAQMS**

**Table No. 173: Percentage exceedance of pollutants at Pune RO**

| Station Name | Total Observation | No. of times exceedance occurred | | | % Exceedance | | |
|---|---|---|---|---|---|---|---|
| | | $SO_2$ | NOx | RSPM | $SO_2$ | NOx | RSPM |
| Bhosari | 48 | | 6 | 22 | | 13 | 46 |
| Nal Stop | 71 | | 32 | 43 | | 45 | 61 |
| Swargate, Pune | 2 | | | 1 | | | 50 |
| Pimpri-Chinchwad - BOB Building | 164 | | 43 | 31 | | 26 | 19 |
| Karve Road CAAQMS | 366 | 1 | 13 | 113 | | 4 | 31 |
| WIT campus | 101 | | | | | | |
| Saat Rasta- Chithale Clinic | 93 | | | | | | |
| Solapur CAAQMS | 366 | | 108 | 167 | | 30 | 46 |



# RO - Raigad




| MPCB RO | Region | Station code | Station name | Type | Latitude (deg) | Longitude (deg) |
|---|---|---|---|---|---|---|
| Raigad | Panvel | 495 | Panvel- Water Supply Plant | Residential | 18° 59' 23.8" N | 73° 07' 03.5" E |

# Panvel - Panvel – Water Supply Plant

**Table No. 174: Data for Monthly average reading recorded at Panvel – Water Supply Plant**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Panvel- Water Supply Plant** | 2019 | Apr | 20 | 61 | 56 |
| | | May | 20 | 58 | 60 |
| | | Jun | 19 | 54 | 53 |
| | | Jul | 15 | 52 | 56 |
| | | Aug | 14 | 45 | 59 |
| | | Sep | 19 | 46 | 50 |
| | | Oct | 17 | 46 | 59 |
| | | Nov | 15 | 41 | 49 |
| | | Dec | 14 | 40 | 45 |
| | 2020 | Jan | 14 | 48 | 48 |
| | | Feb | 14 | 40 | 47 |

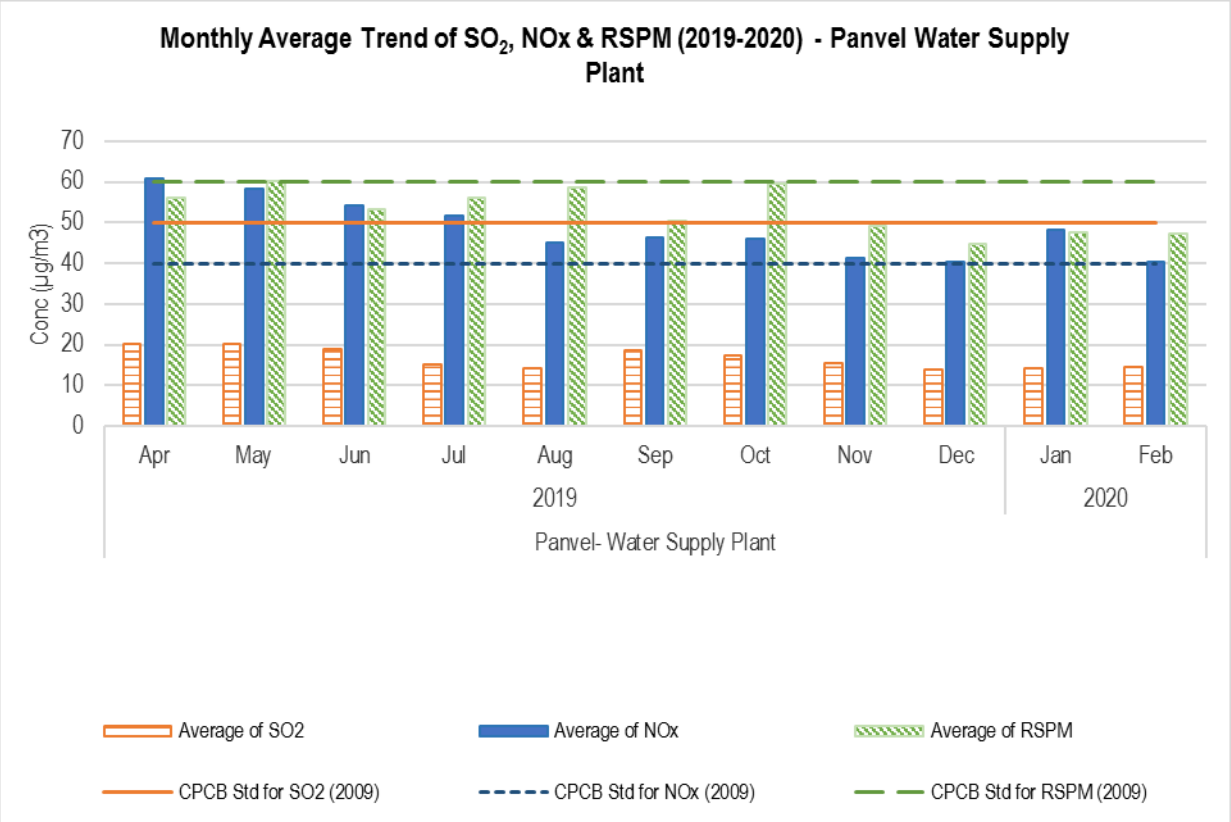



**Figure No. 193: Monthly average reading recorded at Panvel – Water Supply Plant**

**Table No. 175: Data for Annual average trend of $SO_2$, NOx, and RSPM at Panvel – Water Supply Plant**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Panvel- Water Supply Plant | 06-07 | 14 | 35 | 115 |
| | 07-08 | 12 | 37 | 143 |
| | 08-09 | 14 | 40 | 132 |
| | 09-10 | 12 | 42 | 71 |
| | 10-11 | 15 | 35 | 119 |
| | 11-12 | 15 | 42 | 140 |
| | 12-13 | 16 | 42 | 168 |
| | 13-14 | 16 | 41 | 203 |
| | 14-15 | 17 | 38 | 136 |
| | 15-16 | 18 | 43 | 137 |
| | 16-17 | 19 | 49 | 112 |
| | 17-18 | 22 | 47 | 104 |
| | 18-19 | 19 | 49 | 60 |
| | 19-20 | 17 | 48 | 53 |

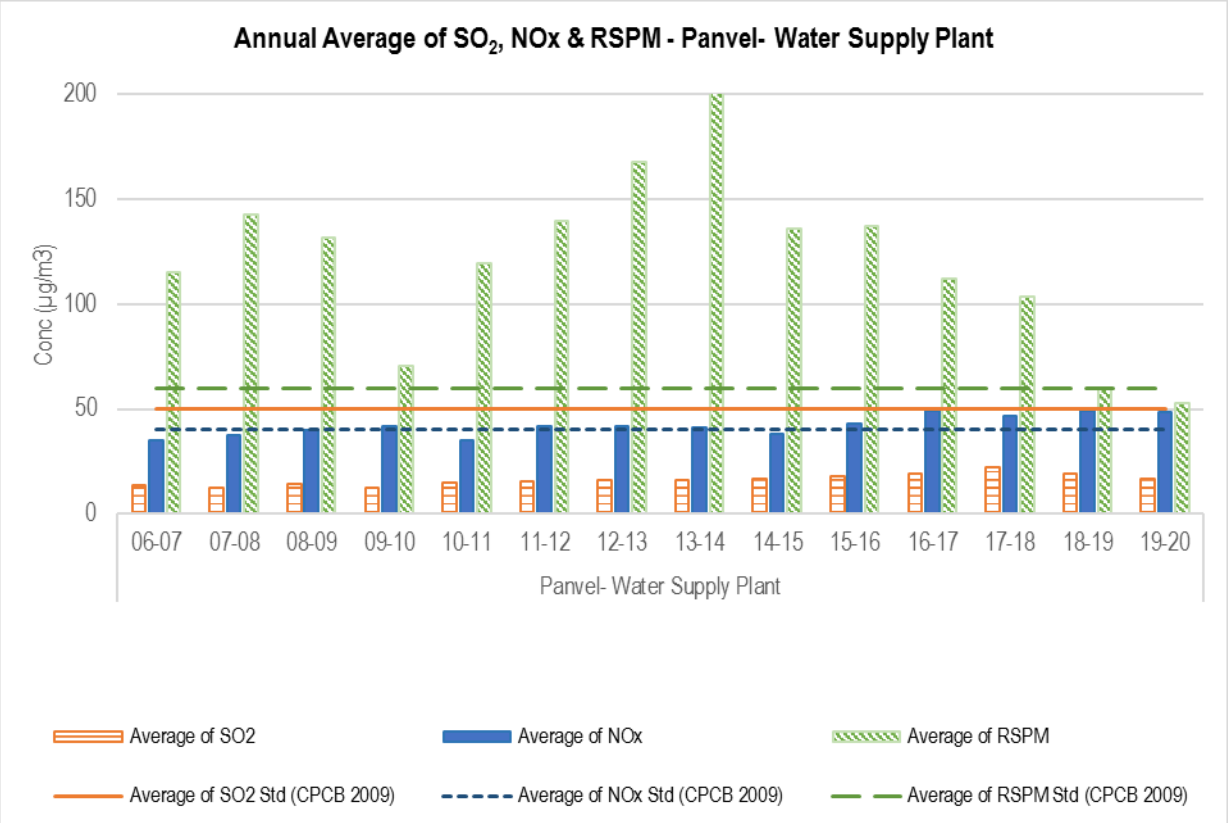
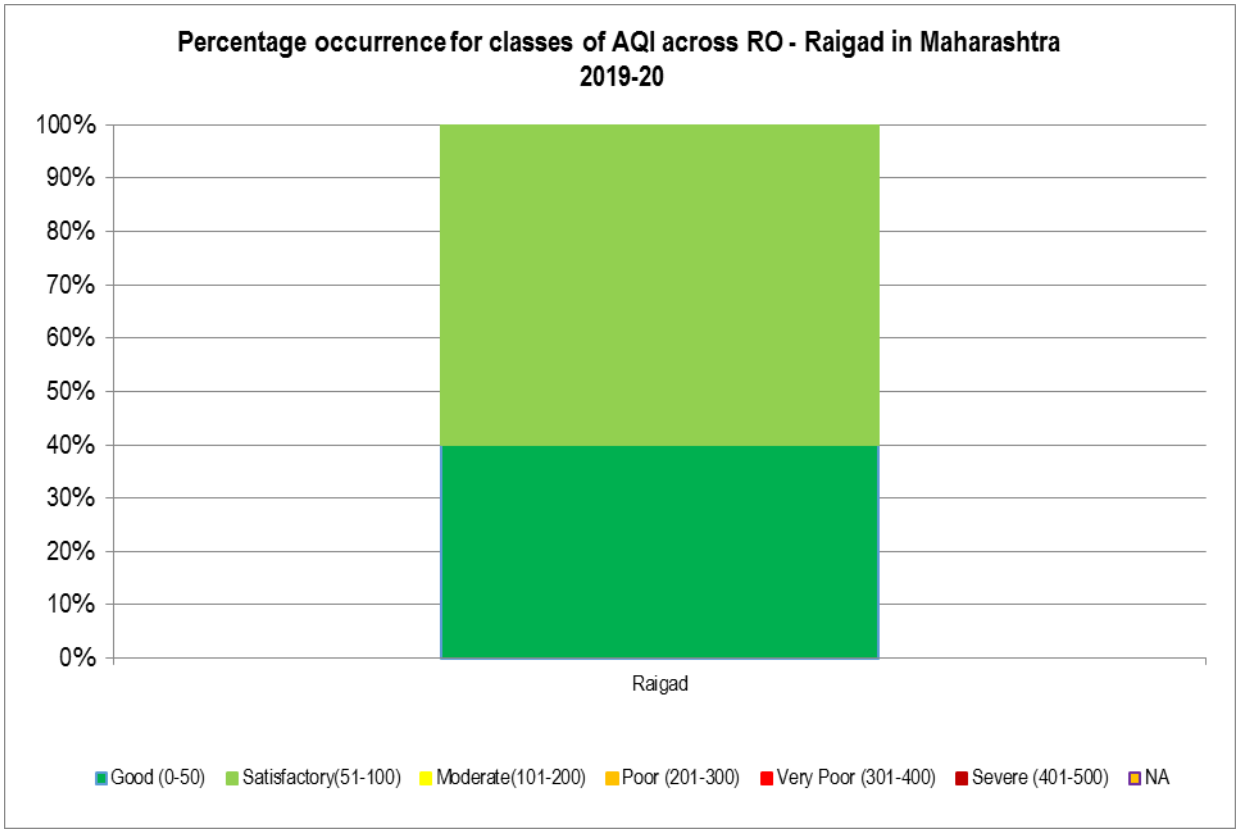


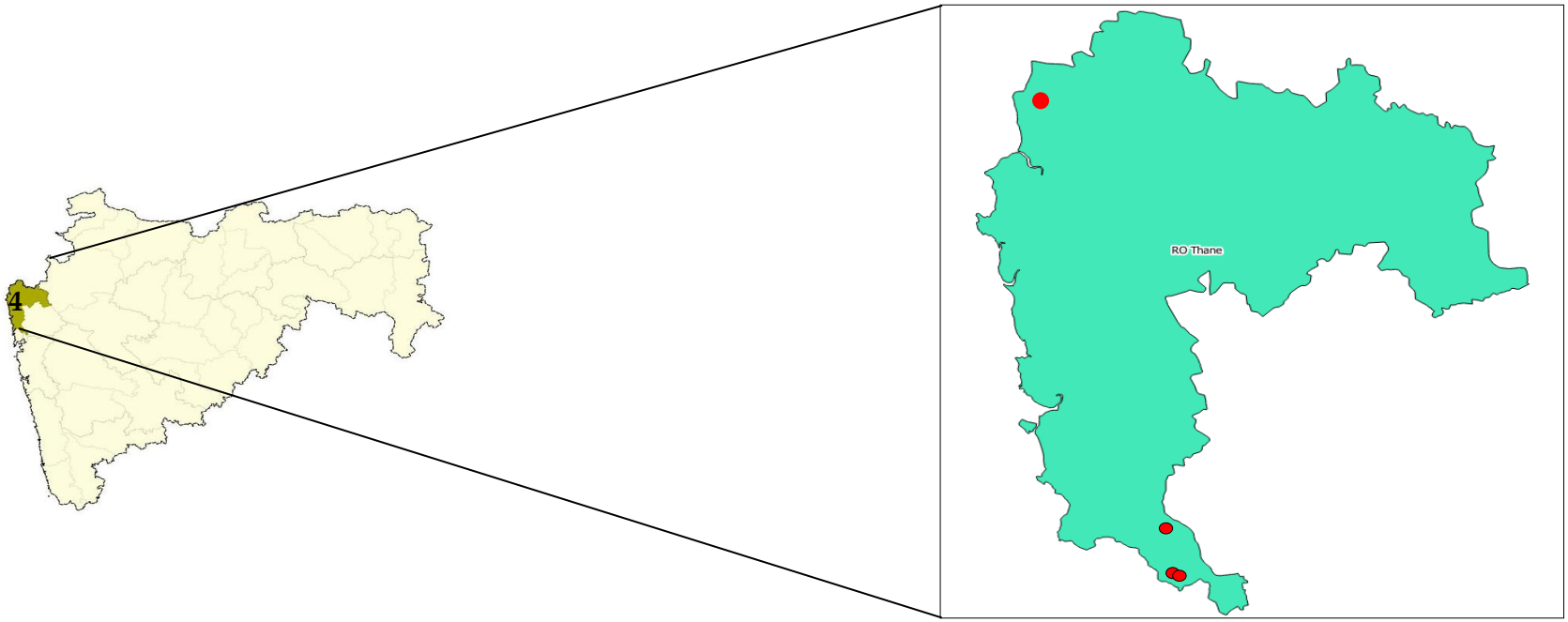

**Figure No. 194: Annual average trend of $SO_2$, NOx, and RSPM at Panvel – Water Supply Plant**

**Table No. 176: Percentage exceedance of pollutants at Raigad RO**

| Station Name | Total Observation | No. of times exceedance occurred | | | % Exceedance | | |
|---|---|---|---|---|---|---|---|
| | | $SO_2$ | NOx | RSPM | $SO_2$ | NOx | RSPM |
| Panvel- Water Supply Plant | 95 | 0 | 0 | 0 | 0 | 0 | 0 |



# RO - Thane




| MPCB RO | Region | Station code | Station name | Type | Latitude (deg) | Longitude (deg) |
|---|---|---|---|---|---|---|
| Thane | Thane | 303 | Kopri | Residential | 19° 10' 55.3" N | 72° 58' 17.1" E |
| | Thane | 304 | Naupada | Rural and other areas | 19° 11' 17.4" N | 72° 58' 04.1" E |
| | Thane | | Balkum/Glaxo | Industrial | 19° 13' 05.8" N | 72° 57' 59.7" E |
| | Thane | | Vasai CAAQMS | Commercial | 19°57′45.72″N | 79°17′54.96″E |

# Thane - Kopri

**Table No. 177: Data for Monthly average reading recorded at Kopri**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | *50* | *40* | *60* |
| **Kopri** | 2019 | Sep | 16 | 39 | 78 |
| | | Oct | 20 | 35 | 138 |
| | | Nov | 21 | 36 | 155 |
| | | Dec | 22 | 37 | 205 |
| | 2020 | Jan | 28 | 38 | 178 |
| | | Feb | 27 | 38 | 181 |
| | | Mar | 24 | 37 | 127 |

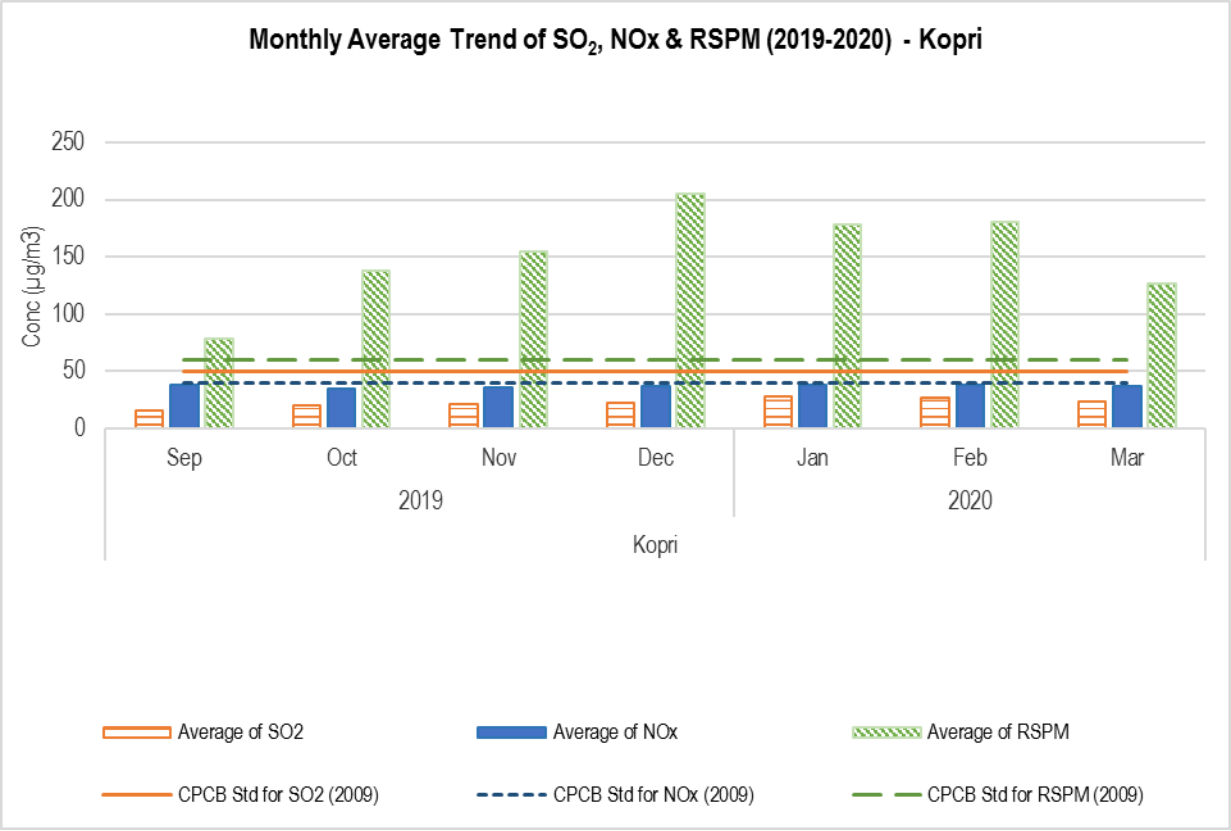



**Figure No. 195: Monthly average reading recorded at Kopri**

**Table No. 178: Data for Annual average trend of $SO_2$, NOx, and RSPM at Kopri**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Kopri | 04-05 | 8 | 11 | 45 |
| | 05-06 | 6 | 9 | 51 |
| | 06-07 | 12 | 10 | 51 |
| | 07-08 | 11 | 10 | 50 |
| | 08-09 | 11 | 16 | 60 |
| | 09-10 | 11 | 13 | 50 |
| | 10-11 | 12 | 11 | 46 |
| | 11-12 | 12 | 9 | 60 |
| | 12-13 | 20 | 15 | 86 |
| | 13-14 | 16 | 41 | 114 |
| | 14-15 | 21 | 61 | 106 |
| | 15-16 | 27 | 62 | 136 |
| | 16-17 | 18 | 59 | 117 |
| | 17-18 | 19 | 46 | 121 |
| | 18-19 | 17 | 49 | 75 |
| | 19-20 | 23 | 37 | 154 |

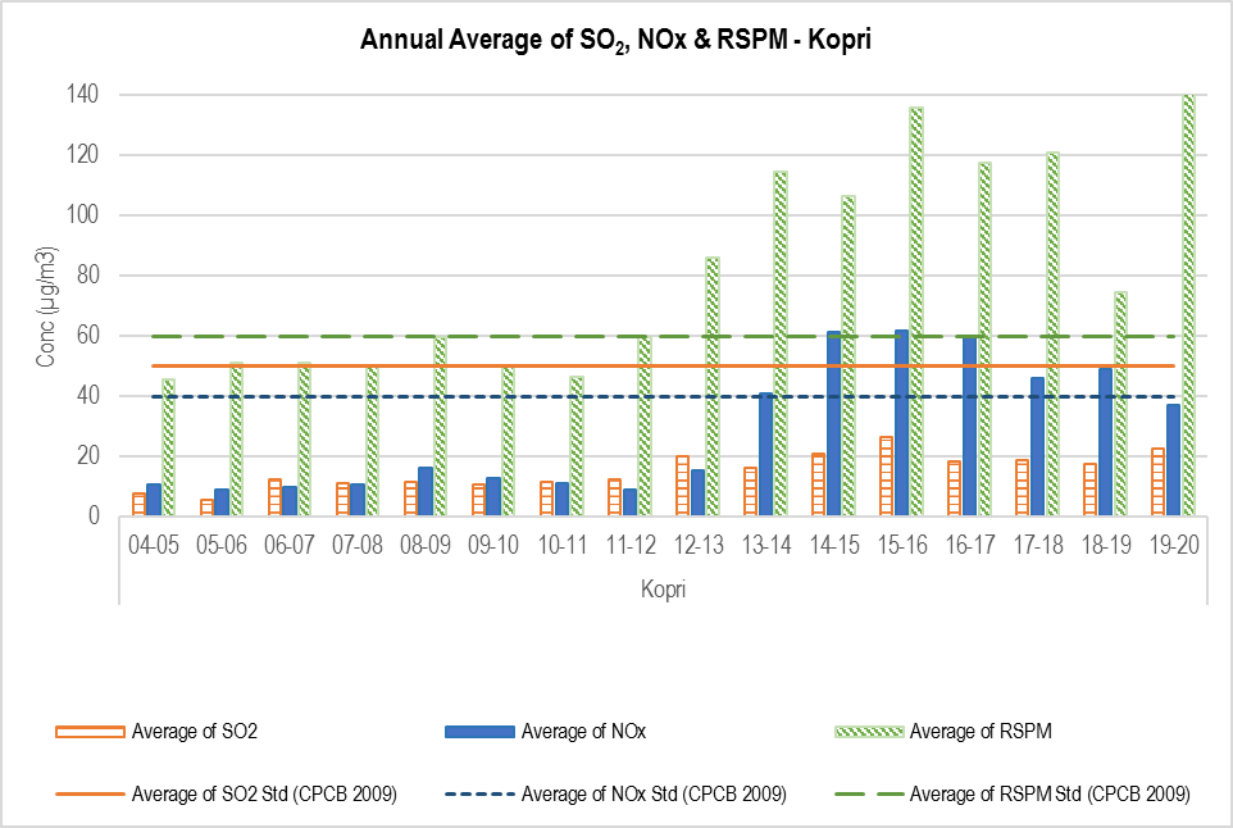



**Figure No. 196: Annual average trend of $SO_2$, NOx, and RSPM at Kopri**

## Thane - Naupada

**Table No. 179: Data for Monthly average reading recorded at Naupada**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Naupada** | 2019 | Sep | 26 | 41 | 133 |
| | | Oct | 20 | 35 | 159 |
| | | Nov | 26 | 39 | 150 |
| | | Dec | 30 | 41 | 176 |
| | 2020 | Jan | 28 | 39 | 164 |
| | | Feb | 29 | 39 | 159 |
| | | Mar | 24 | 37 | 112 |

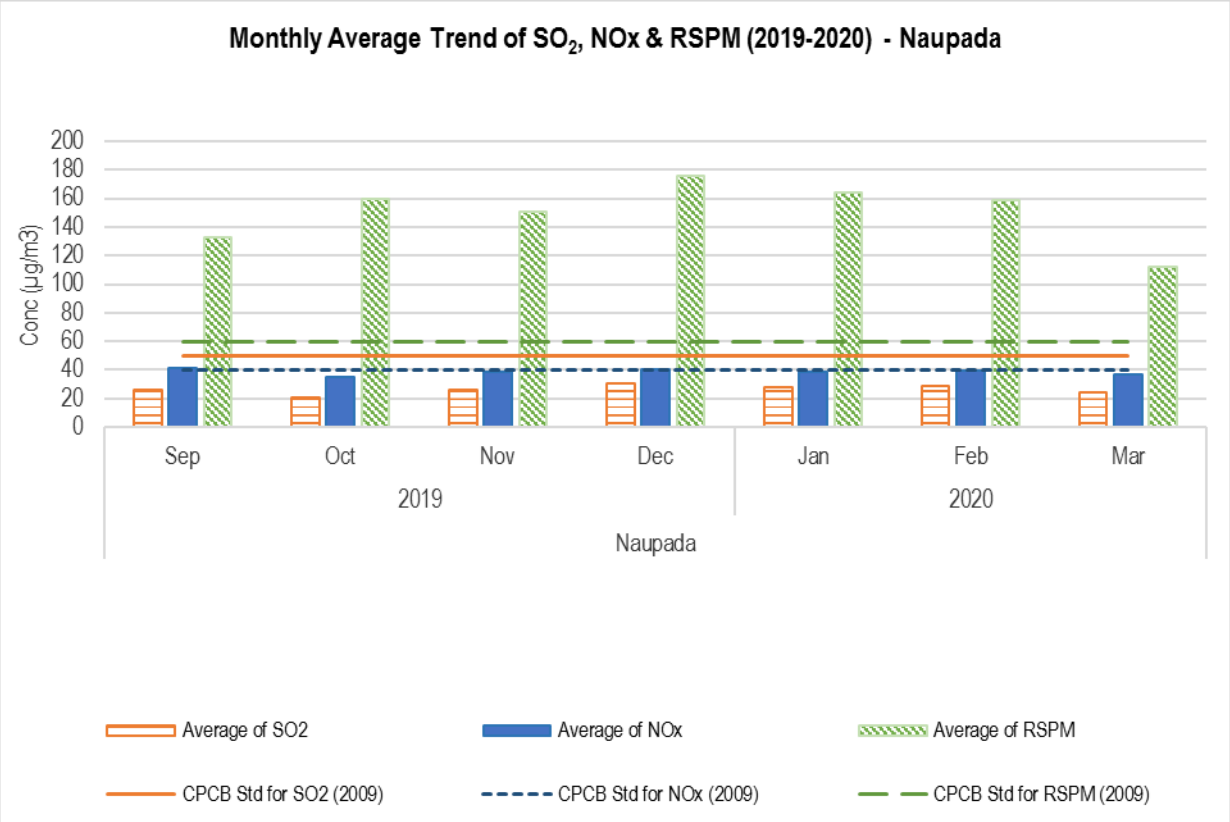



**Figure No. 197: Monthly average reading recorded at Naupada**

**Table No. 180: Data for Annual average trend of $SO_2$, NOx, and RSPM at Naupada**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| Naupada | 04-05 | 8 | 11 | 46 |
| | 05-06 | 6 | 10 | 51 |
| | 06-07 | 12 | 9 | 52 |
| | 07-08 | 11 | 10 | 50 |
| | 08-09 | 11 | 15 | 60 |
| | 09-10 | 14 | 21 | 55 |
| | 10-11 | 14 | 13 | 48 |
| | 11-12 | 13 | 10 | 56 |
| | 12-13 | 21 | 16 | 93 |
| | 13-14 | 17 | 43 | 113 |
| | 14-15 | 21 | 62 | 104 |
| | 15-16 | 28 | 63 | 102 |
| | 16-17 | 19 | 61 | 108 |
| | 17-18 | 19 | 48 | 119 |
| | 18-19 | 16 | 49 | 91 |
| | 19-20 | 26 | 39 | 153 |

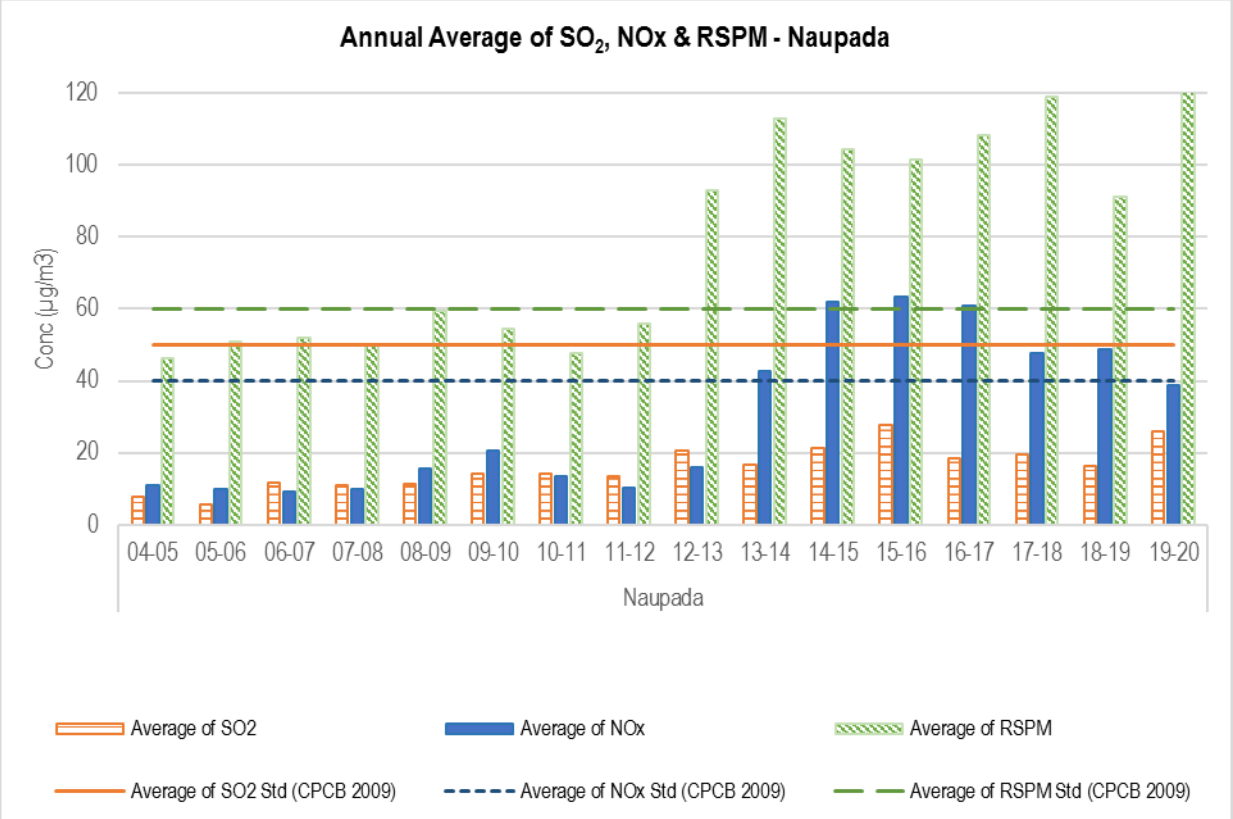



**Figure No. 198: Annual average trend of $SO_2$, NOx, and RSPM at Naupada**

## Thane - Balkum Glaxo

**Table No. 181: Data for Monthly average reading recorded at Balkum Glaxo**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** |
| **Balkum/Glaxo** | 2019 | Sep | 13 | 33 | 70 |
| | | Oct | 18 | 35 | 97 |
| | | Nov | 20 | 36 | 144 |
| | | Dec | 24 | 38 | 202 |
| | 2020 | Jan | 27 | 38 | 179 |
| | | Feb | 25 | 36 | 161 |
| | | Mar | 23 | 35 | 90 |

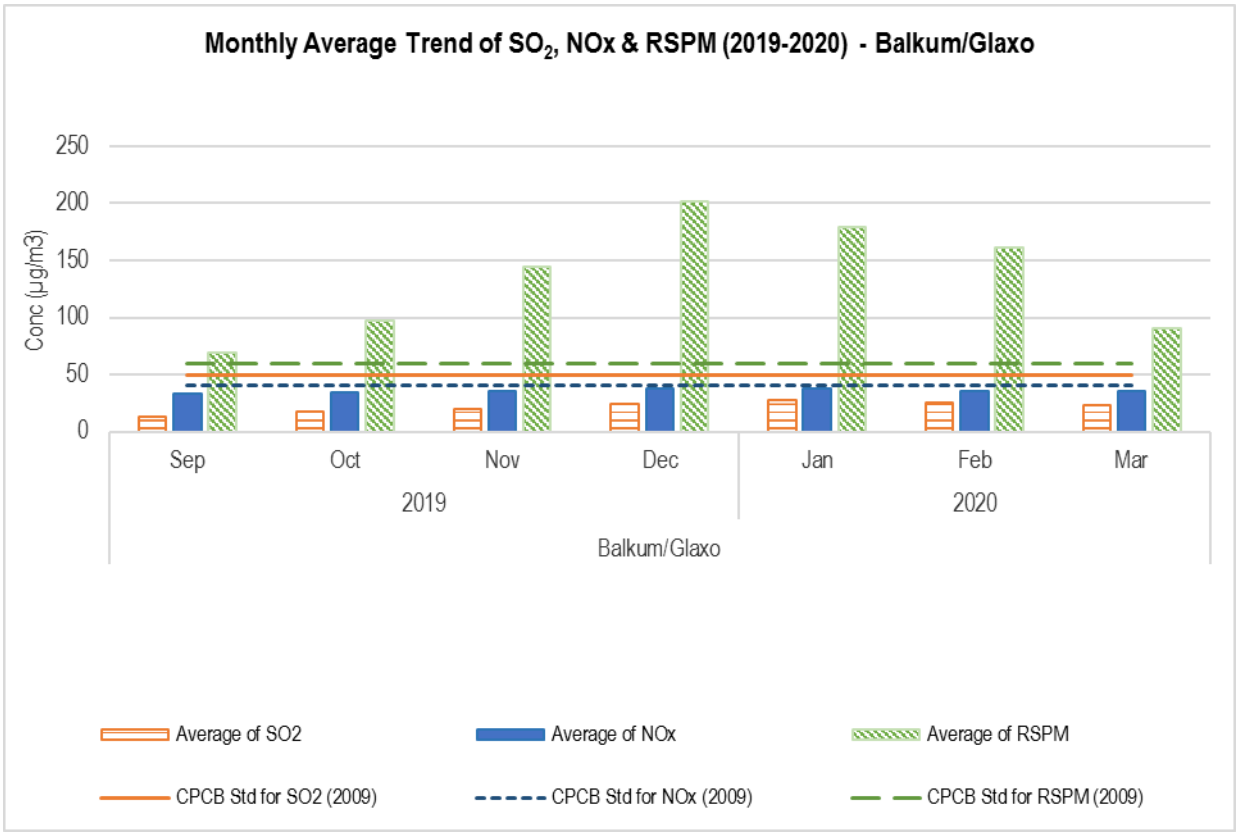



**Figure No. 199: Monthly average reading recorded at Balkum Glaxo**

**Table No. 182: Data for Annual average trend of $SO_2$, NOx, and RSPM at Balkum Glaxo**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM |
|---|---|---|---|---|
| | | *50* | *40* | *60* |
| **Balkum/Glaxo** | 13-14 | 15 | 34 | 107 |
| | 14-15 | 20 | 60 | 131 |
| | 15-16 | 24 | 58 | 132 |
| | 16-17 | 15 | 52 | 122 |
| | 17-18 | 15 | 35 | 136 |
| | 18-19 | 13 | 31 | 107 |
| | 19-20 | 21 | 36 | 140 |

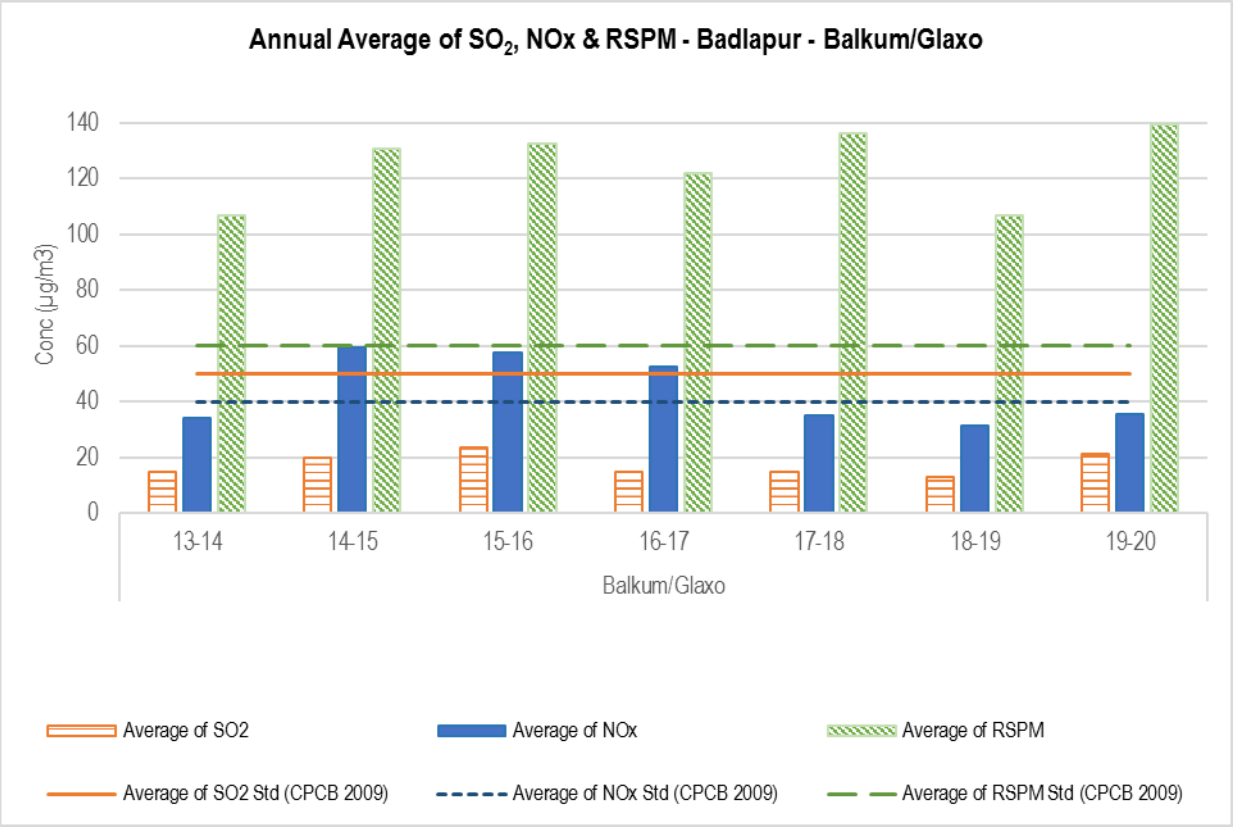


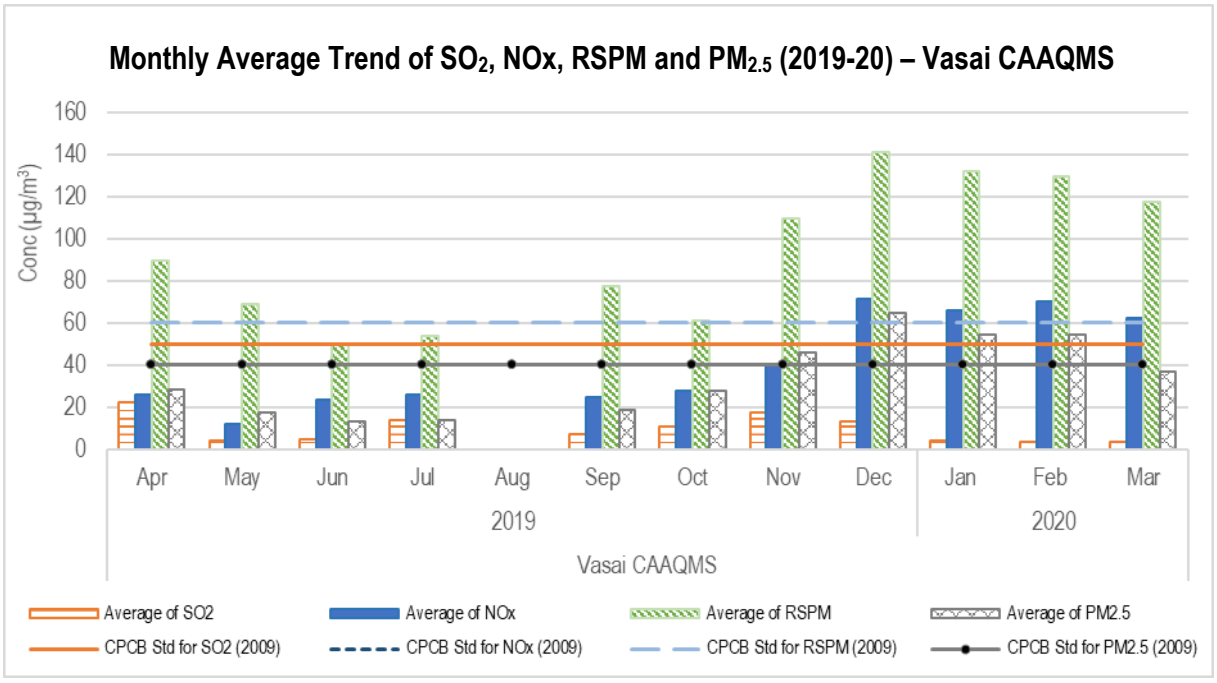

**Figure No. 200: Annual average trend of $SO_2$, NOx, and RSPM at Balkum Glaxo**

## Thane – Vasai CAAQMS

**Table No. 183: Data for Monthly average reading recorded at Vasai CAAQMS**

| Station Name | Year | Month | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| | | | ***50*** | ***40*** | ***60*** | ***40*** |
| **Vasai CAAQMS** | 2019 | Apr | 22 | 26 | 89 | 28 |
| | | May | 4 | 12 | 69 | 17 |
| | | Jun | 5 | 24 | 49 | 13 |
| | | Jul | 14 | 26 | 54 | 14 |
| | | Aug | | | | |
| | | Sep | 7 | 25 | 77 | 19 |
| | | Oct | 11 | 28 | 61 | 27 |
| | | Nov | 18 | 40 | 110 | 46 |
| | | Dec | 13 | 72 | 141 | 65 |
| | 2020 | Jan | 4 | 66 | 132 | 54 |
| | | Feb | 3 | 70 | 129 | 55 |
| | | Mar | 4 | 62 | 117 | 37 |

**Data was not available for $SO_2$, NOx and RSPM for the month of August 2019*




*CPCB standards for NOx and $PM_{2.5}$ are same, so the lines indicating them overlap and are not distinctly*

**Figure No. 201: Monthly average reading recorded at Vasai CAAQMS**

**Table No. 184: Data for Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Vasai CAAQMS**

| Station Name | Year | Average of $SO_2$ | Average of NOx | Average of RSPM | Average of $PM_{2.5}$ |
|---|---|---|---|---|---|
| | | *50* | *40* | *60* | *40* |
| Vasai CAAQMS | 19-20 | 9 | 41 | 93 | 30 |

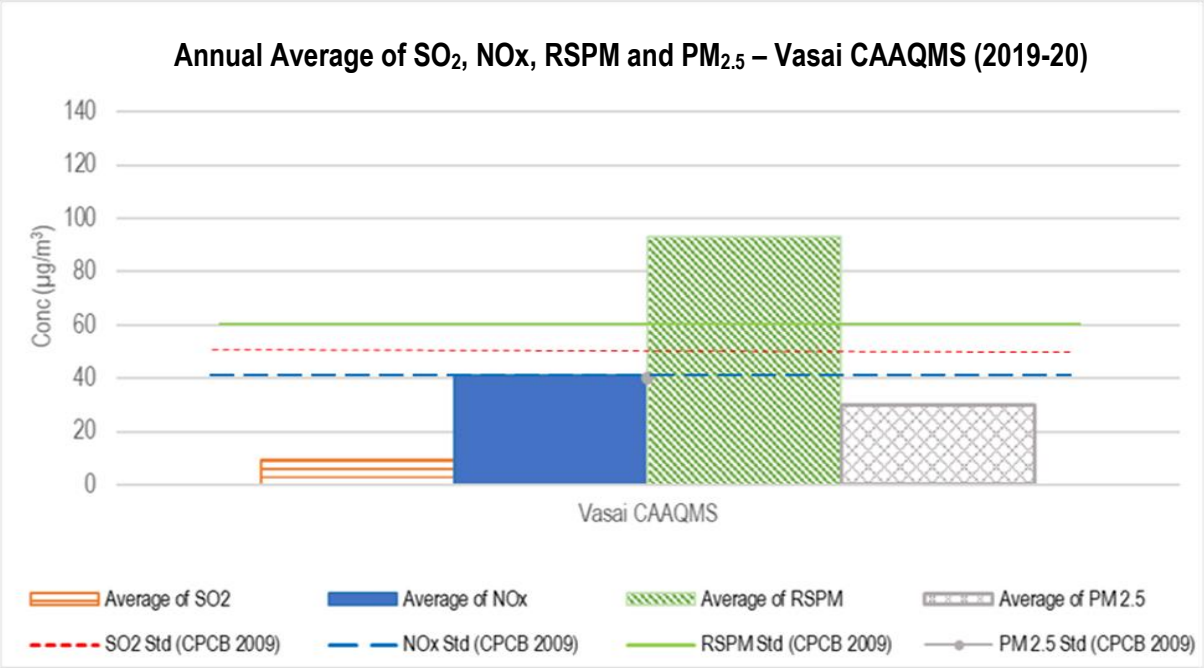
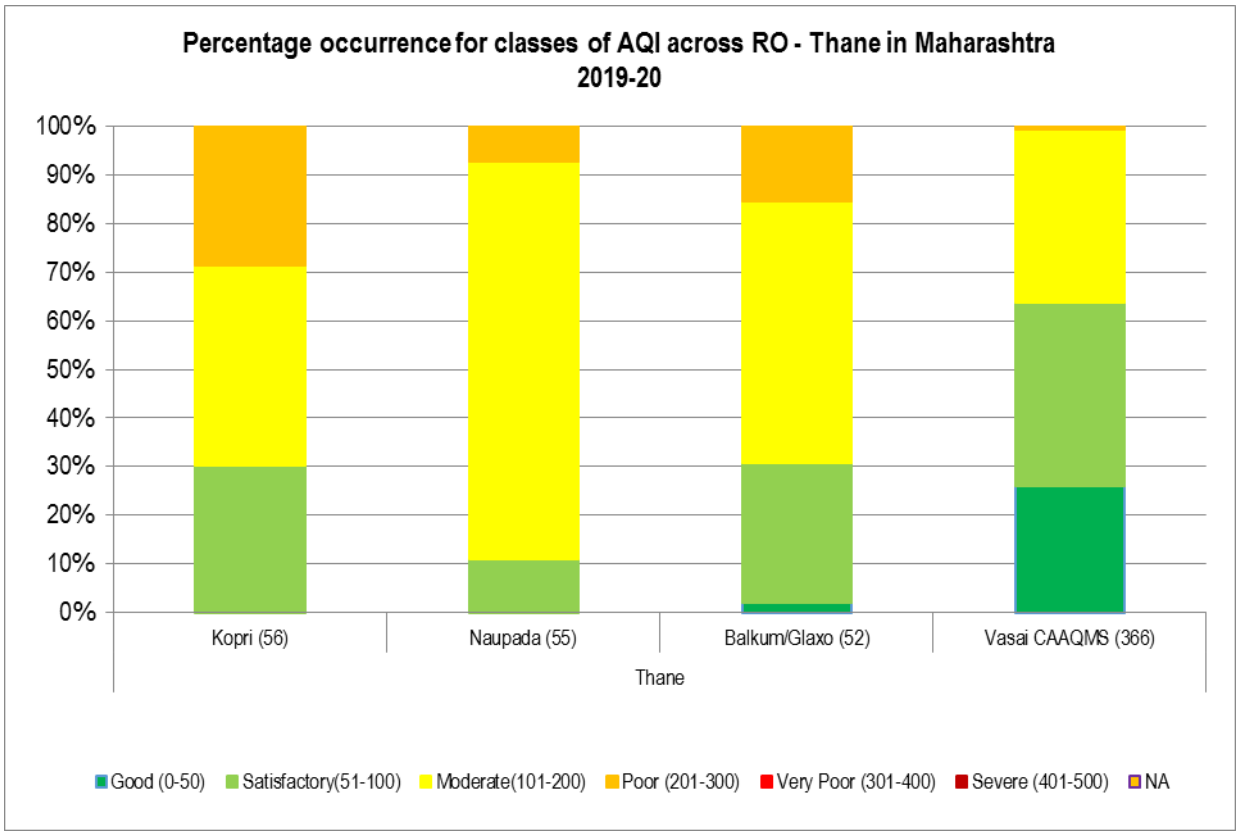



**Figure No. 202: Annual average trend of $SO_2$, NOx, RSPM and $PM_{2.5}$ at Vasai CAAQMS**

**Table No. 185: Percentage exceedance of pollutants at Thane RO**

| Station Name | Total Observation | No. of times exceedance occurred | | | % Exceedance | | |
|---|---|---|---|---|---|---|---|
| | | $SO_2$ | NOx | RSPM | $SO_2$ | NOx | RSPM |
| **Kopri** | 56 | | | 39 | | | 70 |
| **Naupada** | 55 | | | 49 | | | 89 |
| **Balkum/Glaxo** | 52 | | | 36 | | | 69 |
| **Vasai CAAQMS** | 366 | 31 | 52 | 173 | 8 | 14 | 47 |



# Annex -1 : List of Active AAQMS in Maharashtra (2019-2020)

| MPCB RO | Region | Station code | Station name | Program |
|---|---|---|---|---|
| Amravati | Akola | 700 | LRT Commerce College | NAMP |
| | Akola | 701 | MIDC Water Works - Akola | NAMP |
| | Akola | 702 | Akola- College of Engg & Technology | NAMP |
| | Amravati | 547 | Raj Kamal Chowk | NAMP |
| | Amravati | 548 | Govt. College of Engineering | NAMP |
| | Amravati | 549 | Godhadiwala Private Limited | NAMP |
| Aurangabad | Aurangabad | 511 | SBES College | NAMP |
| | Aurangabad | 512 | Collector Office, Aurangabad | NAMP |
| | Aurangabad | 513 | C.A.D.A. Office | NAMP |
| | Aurangabad | | Aurangabad CAAQMS | CAAQMS |
| | Jalna | 706 | Jalna- Bachat Bhavan | NAMP |
| | Jalna | 707 | Jalna- Krishnadhan seeds Ltd | NAMP |
| | Latur | 641 | MIDC Water Works - Latur | NAMP |
| | Latur | 642 | Shyam Nagar-Kshewraj Vidyalaya | NAMP |
| | Latur | 643 | Ganj Golai - Sidhheshwar Bank | NAMP |
| | Nanded | 703 | Ganeshnagar | NAMP |
| | Nanded | 704 | Mutha Chowk | NAMP |
| | Nanded | 705 | Industrial Area CIDCO | NAMP |
| Chandrapur | Chandrapur | 267 | Ghuggus | NAMP |
| | Chandrapur | 281 | Chandrapur - MIDC | NAMP |
| | Chandrapur | 396 | Chandrapur - SRO MPCB | NAMP |
| | Chandrapur | 638 | Tadali MIDC | NAMP |
| | Chandrapur | 639 | Ballarshah | NAMP |
| | Chandrapur | 640 | Rajura | NAMP |
| | Chandrapur | | Udhyog Bhavan | CAAQMS |

| MPCB RO | Region | Station code | Station name | Program |
|---|---|---|---|---|
| | Chandrapur | | Civil lines,Chandrapur | CAAQMS |
| Kalyan | Ambernath | 445 | Ambernath | NAMP |
| | Badlapur | 649 | Badlapur - BIWA House | NAMP |
| | Bhiwandi | 823 | I.G.M. Hospital | NAMP |
| | Bhiwandi | 822 | Prematai hall | NAMP |
| | Dombivali | 265 | Dombivali | NAMP |
| | Dombivali | - | MIDC Office Dombivali | SAMP |
| | Dombivali | | Dombivali CAAQMS | CAAQMS |
| | Kalyan | 824 | MPCB RO Kalyan office | NAMP |
| | Kalyan | | Kalyan CAAQMS | CAAQMS |
| | Ulhasnagar | 647 | Smt. CHM College Campus | NAMP |
| | Ulhasnagar | 648 | Powai Chowk | NAMP |
| Kolhapur | Kolhapur | 508 | Shivaji University Campus | NAMP |
| | Kolhapur | 509 | Ruikar Trust | NAMP |
| | Kolhapur | 510 | Mahadwar Road | NAMP |
| | Sangli | 574 | Terrace of SRO-Sangli, Udyog Bhavan | NAMP |
| | Sangli | 575 | Sangli-Miraj Primary Municipal school | NAMP |
| | Sangli | 576 | Krishna Valley school | NAMP |
| Mumbai | Mumbai | - | Bandra | CAAQMS |
| | Mumbai | 441 | Sion | NAMP |
| | Mumbai | | Airport | CAAQMS |
| | Mumbai | | Powai | CAAQMS |
| | Mumbai | | Mulund | CAAQMS |
| | Mumbai | | Worli | CAAQMS |
| | Mumbai | | Kandivali | CAAQMS |
| Mumbai | Mumbai | | Borivali | CAAQMS |
| | Mumbai | | Kurla | CAAQMS |
| | Mumbai | | Colaba | CAAQMS |
| | Mumbai | | Vile Parle | CAAQMS |

| MPCB RO | Region | Station code | Station name | Program |
|---|---|---|---|---|
| Nagpur | Nagpur | 287 | IOE North Ambazari road | NAMP |
| | Nagpur | 288 | MIDC Office, Hingna Road | NAMP |
| | Nagpur | 314 | Govt Polytechnic Col, Sadar | NAMP |
| | Nagpur | 711 | Civil lines Nagpur | NAMP |
| | Nagpur | | Nagpur CAAQMS | CAAQMS |
| Nashik | Jalgaon | 644 | Old B. J. Market | NAMP |
| | Jalgaon | 645 | Girna Water Tank | NAMP |
| | Jalgaon | 646 | MIDC Jalgaon | NAMP |
| | Nashik | 259 | RTO Colony | NAMP |
| | Nashik | 269 | MIDC Satpur - VIP | NAMP |
| | Nashik | 280 | NMC Nashik | NAMP |
| | Nashik | 710 | SRO Office Nashik | NAMP |
| | Nashik | | Nashik CAAQMS | CAAQMS |
| Navi Mumbai | Navi Mumbai | 491 | Rabale | NAMP |
| | Navi Mumbai | 492 | Nerul - DY Patil | NAMP |
| | Navi Mumbai | 493 | Mahape, MPCB-Nirmal Bhavan | NAMP |
| | Navi Mumbai | - | Nerul | CAAQMS |
| | Taloja | 494 | Kharghar - CIDCO Nodal Office | NAMP |
| | Taloja | 496 | Taloja - MIDC Building | NAMP |
| Pune | Pune | 312 | Bhosari | NAMP |
| | Pune | 379 | Nal Stop | NAMP |
| | Pune | 381 | Swargate, Pune | NAMP |
| | Pune | 708 | Pimpri-Chinchwad - BOB Building | NAMP |
| | Pune | - | Karve Road - CAAQMS | CAAQMS |
| | Solapur | 299 | WIT Campus | NAMP |
| | Solapur | 300 | Saat Rasta- Chithale Clinic | NAMP |
| | Solapur | | Solapur | CAAQMS |
| Raigad | Panvel | 495 | Panvel- Water Supply Plant | NAMP |
| Thane | Thane | 303 | Kopri | NAMP |

| MPCB RO | Region | Station code | Station name | Program |
|---|---|---|---|---|
| | Thane | 304 | Naupada | NAMP |
| | Thane | 305 | Balkum/Glaxo | NAMP |
| | Vasai | | Vasai | CAAQMS |

# Appendix –A: Revised NAAQS 2009

रजिस्ट्री सं० डी० एल०-33004/99 REGD. NO. D. L.-33004/99

भारत का राजपत्र
The Gazette of India

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सं. 217] नई दिल्ली, बुधवार, नवम्बर 18, 2009/कार्तिक 27, 1931
No. 217] NEW DELHI, WEDNESDAY, NOVEMBER 18, 2009/KARTIKA 27, 1931

राष्ट्रीय परिवेशी वायु गुणवत्ता मानक
केन्द्रीय प्रदूषण नियंत्रण बोर्ड
अधिसूचना
नई दिल्ली, 18 नवम्बर, 2009

सं. बी-29016/20/90/पी.सी.आई.-I.—वायु (प्रदूषण निवारण एवं नियंत्रण) अधिनियम, 1981 (1981 का 14) की धारा 16 की उपधारा (2) (एच) द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए तथा अधिसूचना संख्या का.आ. 384(ई), दिनांक 11 अप्रैल, 1994 और का.आ. 935 (ई) दिनांक 14 अक्टूबर, 1998 के अधिक्रमण में केन्द्रीय प्रदूषण नियंत्रण बोर्ड इसके द्वारा तत्काल प्रभाव से राष्ट्रीय परिवेशी वायु गुणवत्ता मानक अधिसूचित करता है, जो इस प्रकार है:-

राष्ट्रीय परिवेशी वायु गुणवत्ता मानक

| क्र. सं. | प्रदूषक | समय आधारित औसत | परिवेशी वायु में सान्द्रण | | |
|---|---|---|---|---|---|
| | | | औद्योगिक, शिक्षायशी, ग्रामीण और अन्य क्षेत्र | पारिस्थितिकी य संवेदनशील क्षेत्र (केन्द्र सरकार द्वारा अधिसूचित) | प्रबोधन की पद्धति |
| (1) | (2) | (3) | (4) | (5) | (6) |
| 1 | सल्फर डाई आक्साइड ($SO_2$), $\mu g/m^3$ | वार्षिक* | 50 | 20 | -उन्नत वेस्ट और गाईक |
| | | 24 घंटे** | 80 | 80 | -पराबैगनी परिदीप्ती |
| 2 | नाइट्रोजन डाई आक्साइड ($NO_2$), $\mu g/m^3$ | वार्षिक* | 40 | 30 | -उपांतरित जैकब और हॉचाइजर (सोडियम-आर्सेनाईट) |
| | | 24 घंटे** | 80 | 80 | -रसायनिक संदीप्ति |
| 3 | विविक्त पदार्थ (10माइक्रान से कम आकार)या $PM_{10}$, $\mu g/m^3$ | वार्षिक* | 60 | 60 | -हरात्मीक विश्लेषण |
| | | 24 घंटे** | 100 | 100 | -टेपम |
| | | | | | -बीटा तनुकरण पद्धति |

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| | | | | | |
|---|---|---|---|---|---|
| 4 | विविक्त पदार्थ (2.5 माइक्रान से कम आकार या $PM_{2.5}$, $\mu g/m^3$ | वार्षिक*<br>24 घंटे** | 40<br>60 | 40<br>60 | -हरात्मक विश्लेषण<br>-टोयम<br>-बीटा तनुकरण पद्धति |
| 5 | ओजोन ($O_3$)<br>$\mu g/m^3$ | 8 घंटे**<br>1 घंटा** | 100<br>180 | 100<br>180 | -पराबैगनी द्वीप्तिकाल<br>-रासायनिक संदीप्ति<br>-रासायनिक पद्धति |
| 6 | सीसा (Pb)<br>$\mu g/m^3$ | वार्षिक*<br>24 घंटे** | 0.50<br>1.0 | 0.50<br>1.0 | ई.पी.एम 2000 या समरूप फिल्टर पेपर का प्रयोग करके AAS/ICP पद्धति<br>-टेफलॉन फिल्टर पेपर का प्रयोग करते हुए ED-XRF |
| 7 | कार्बन मोनोक्साइड (CO)<br>$mg/m^3$ | 8 घंटे**<br>1 घंटा** | 02<br>04 | 02<br>04 | -अविपेक्षी अवरक्त (NDIR) स्पैक्ट्रम मापन |
| 8 | अमोनिया ($NH_3$)<br>$\mu g/m^3$ | वार्षिक*<br>24 घंटे** | 100<br>400 | 100<br>400 | -रासायनिक संदीप्ती<br>-इण्डोफिनॉल ब्ल्यू पद्धति |
| 9 | बैन्जीन ($C_6H_6$)<br>$\mu g/m^3$ | वार्षिक* | 05 | 05 | - गैस क्रोमेटोग्राफी आधारित सतत् विश्लेषक<br>-अधिशोषण तथा निशोषण के बाद गैस क्रोमेटोग्राफी |
| 10 | बैन्जो (ए) पाईरीन (BaP) केवल विविक्त कण,<br>$ng/m^3$ | वार्षिक* | 01 | 01 | -विलायक निष्कर्षण के बाद HPLC/GC द्वारा विश्लेषण |
| 11 | आर्सेनिक (As)<br>$ng/m^3$ | वार्षिक* | 06 | 06 | -असंवितरक अवरक्त स्पैक्ट्रामिती ई.पी.एम. 2000 या समरूप फिल्टर पेपर का प्रयोग करके ICP/AAS पद्धति |
| 12 | निकिल (Ni)<br>$ng/m^3$ | वार्षिक* | 20 | 20 | ई.पी.एम. 2000 या समरूप फिल्टर पेपर का प्रयोग करके ICP/AAS पद्धति |

* वर्ष में एक समान अंतरालों पर सप्ताह में दो बार प्रति 24 घंटे तक किसी एक स्थान विशेष पर लिये गये न्यूनतम 104 मापों का वार्षिक अंकगणीतीय औसत ।

** वर्ष में 98 प्रतिशत समय पर 24 घंटे या 8 घंटे या 1 घंटा के मानीटर मापमान, जो लागू हो , अनुपालन कये जाएंगे । दो प्रतिशत समय पर यह मापमान अधिक हो सकता है, किन्तु क्रमिक दो मानीटर करने के दिनों पर नहीं ।

टिप्पणी:

1. जब कभी और जहां भी किसी अपने-अपने प्रवर्ग के लिये दो क्रमिक प्रबोधन दिनों पर मापित मूल्य, उक्त विनिर्दिष्ट सीमा से अधिक हो तो इसे नियमित या निरंतर प्रबोधन तथा अतिरिक्त अन्वेषण करवाने के लिये पर्याप्त कारण समझा जायेगा ।

संत प्रसाद गौतम, अध्यक्ष

[विज्ञापन-III/4/184/09/असा.]

टिप्पणी: राष्ट्रीय परिवेशी वायु गुणवत्ता मानक संबंधी अधिसूचनाएँ, केन्द्रीय प्रदूषण नियंत्रण बोर्ड द्वारा भारत के राजपत्र आसाधरण में अधिसूचना संख्या का.आ. 384 (ई), दिनांक 11 अप्रैल, 1994 एवं का. आ. 935 (ई), दिनांक 14 अक्टूबर, 1998 द्वारा प्रकाशित की गयी थी ।

NATIONAL AMBIENT AIR QUALITY STANDARDS
CENTRAL POLLUTION CONTROL BOARD
NOTIFICATION
New Delhi, the 18th November, 2009

No. B-29016/20/90/PCI-L—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 supersession of the Notification No(s). S.O. 384(E), dated 11th April, 1994 and S.O. 935(E), dated 14th October, 1998, the Central Pollution Control Board hereby notify the National Ambient Air Quality Standards with immediate effect, namely:-

## NATIONAL AMBIENT AIR QUALITY STANDARDS

| S. No. | Pollutant | Time Weighted Average | Concentration in Ambient Air | | |
|---|---|---|---|---|---|
| | | | Industrial, Residential, Rural and Other Area | Ecologically Sensitive Area (notified by Central Government) | Methods of Measurement |
| (1) | (2) | (3) | (4) | (5) | (6) |
| 1 | Sulphur Dioxide ($SO_2$), µg/m³ | Annual* | 50 | 20 | - Improved West and Gaeke |
| | | 24 hours** | 80 | 80 | -Ultraviolet fluorescence |
| 2 | Nitrogen Dioxide ($NO_2$), µg/m³ | Annual* | 40 | 30 | - Modified Jacob & Hochheiser (Na-Arsenite) |
| | | 24 hours** | 80 | 80 | - Chemiluminescence |
| 3 | Particulate Matter (size less than 10µm) or $PM_{10}$ µg/m³ | Annual* | 60 | 60 | - Gravimetric<br>- TOEM |
| | | 24 hours** | 100 | 100 | - Beta attenuation |
| 4 | Particulate Matter (size less than 2.5µm) or $PM_{2.5}$ µg/m³ | Annual* | 40 | 40 | - Gravimetric<br>- TOEM |
| | | 24 hours** | 60 | 60 | - Beta attenuation |
| 5 | Ozone ($O_3$) µg/m³ | 8 hours** | 100 | 100 | - UV photometric<br>- Chemilminescence |
| | | 1 hour** | 180 | 180 | - Chemical Method |
| 6 | Lead (Pb) µg/m³ | Annual* | 0.50 | 0.50 | - AAS /ICP method after sampling on EPM 2000 or equivalent filter paper<br>- ED-XRF using Teflon filter |
| | | 24 hours** | 1.0 | 1.0 | |
| 7 | Carbon Monoxide (CO) mg/m³ | 8 hours** | 02 | 02 | - Non Dispersive Infra Red (NDIR) spectroscopy |
| | | 1 hour** | 04 | 04 | |
| 8 | Ammonia ($NH_3$) µg/m³ | Annual* | 100 | 100 | -Chemiluminescence<br>-Indophenol blue method |
| | | 24 hours** | 400 | 400 | |

| (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|
| 9 | Benzene ($C_6H_6$) $\mu g/m^3$ | Annual* | 05 | 05 | - Gas chromatography based continuous analyzer<br>- Adsorption and Desorption followed by GC analysis |
| 10 | Benzo(a)Pyrene (BaP) - particulate phase only, $ng/m^3$ | Annual* | 01 | 01 | - Solvent extraction followed by HPLC/GC analysis |
| 11 | Arsenic (As), $ng/m^3$ | Annual* | 06 | 06 | - AAS /ICP method after sampling on EPM 2000 or equivalent filter paper |
| 12 | Nickel (Ni), $ng/m^3$ | Annual* | 20 | 20 | - AAS /ICP method after sampling on EPM 2000 or equivalent filter paper |

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

** 24 hourly or 08 hourly or 01 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
[ADVT-III/4/184/09/Exty.]

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

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Maharashtra Pollution Control Board

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