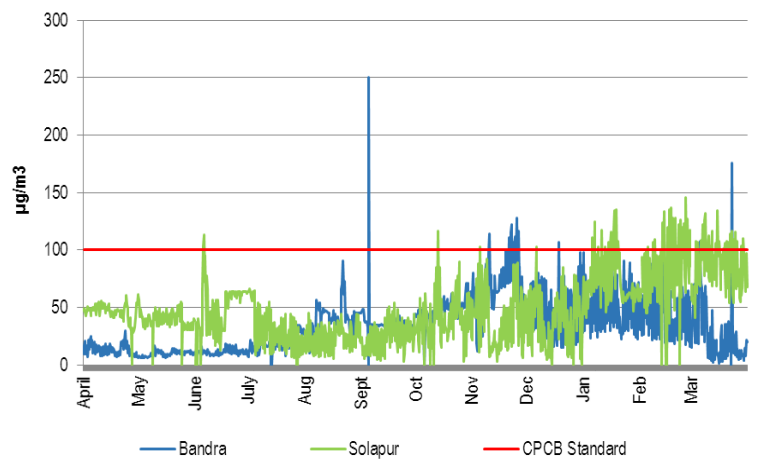# Air Quality Status of Maharashtra

2014-15

8 hourly Ozone concentration recorded at CAAQMS in Maharashtra

Maharashtra Pollution Control Board
महाराष्ट्र प्रदूषण नियंत्रण मंडळ

teri

The Energy & Resources Institute

Air Quality
Status of Maharashtra
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Prepared by

teri
The Energy and Resources Institute

...towards global
sustainable development

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PREFACE

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महाराष्ट्र प्रदूषण नियंत्रण मंडळ
MAHARASHTRA POLLUTION CONTROL BOARD

PREFACE

Maharashtra Pollution Control Board (MPCB) has established Ambient Air Quality Network in Maharashtra covering major cities to comply with the mandate of Air (Prevention & Control of Pollution) Act, 1981 and to disseminate status of air quality prevailing in the State of Maharashtra.

The Ambient air quality is monitored by the Board through manually operated stations at various locations in Maharashtra under National Ambient Air Quality Monitoring Program (NAMP) / State Ambient Air Quality Monitoring Program (SAMP) and Continuous Ambient Air Quality Monitoring Stations (CAAQMS) at Mumbai, Pune,Chandrapur and Solapur. The Air Quality data is regularly hosted on MPCB's website.

This report compiles and presents illustrative statistical data of the ambient air quality in Maharashtra for the fiscal year 2014-15 along with Air Quality status comparison of last few years. I trust this report will help all stake holders to take necessary mitigation measures.

This report is prepared by The Energy and Resources Institute (TERI), Western Regional Centre (WRC), Mumbai and I appreciate the efforts of Dr. Anjali Parasnis, *Associate Director*, TERI and Shri. Prathamesh Chourey *Associate Fellow*, TERI in preparing this report for the Board. I also acknowledge the monitoring agencies for their efforts in the field for monitoring work carried out to generate the air quality data. The contribution of Shri V.M. Motghare, *Joint Director* and Shri S.C. Kollur, *Scientific Officer*, MPCB is also appreciated.

(Dr. P Anbalagan, IAS)
Member Secretary

June' 2015

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TABLE OF CONTENTS

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 stations
CDP	Chandrapur
CH4	Methane
CIDCO	City and Industrial Development Corporation of Maharashtra Ltd
CO	Carbon monoxide
CO2	Carbon-di-oxide
CPCB	Central Pollution Control Board
GoM	Government of Maharashtra
H2	Hydrogen
He	Helium
IIT	Indian Institute of Technology
INAQS	Indian National Air Quality Standards
KOP	Kolhapur
Kr	Krypton
Max	Maximum
MIDC	Maharashtra Industrial Development Corporation
Min	Minimum
MPCB	Maharashtra Pollution Control Board
MVD	Motor Vehicle Department
N2	Nitrogen
NAAQM	National Ambient Air Quality Monitoring
NAAQS	National Ambient Air Quality Standards
NAMP	National Ambient Monitoring Programme
Ne	Neon
NEERI	National Environmental Engineering Research Institute
NGP	Nagpur

NHK	Nashik
NO_2	Oxides of Nitrogen
NOX	Nitrogen Oxides
NVM	Navi Mumbai
O_2	Oxygen
O_3	Ozone
Pb	Lead
PM	Particulate Matter
PM10	Particulate Matter less than 10 microns
PM2.5	Particulate Matter less than 2.5 microns
PUN	Pune
RGD	Raigad
RO	Regional Office
RSPM	Respirable Suspended Particulate Matter
SAMP	State Air Monitoring Program
SO_2	Sulphur dioxide
SPM	Suspended Particulate Matter
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

List of Figures

List of Tables

Executive Summary

Air Pollution occurs mainly due to anthropogenic interferences leading to change in composition of air. Currently, air pollution is a serious global issue which is highly attributed to rapid unsustainable development. The major sources of air pollution globally are emissions arising due to combustion of fossil fuels, mining and construction activities, industries like power plant, plastic and paint manufacturing, oil and petroleum refineries and so on. The point source contributors include factories, smoke stacks whereas non-point sources include vehicles, residential areas, agricultural operations and so on. Prolonged exposure to high air pollution levels is known to cause various health impacts like bronchitis, asthma, lung disorders and even brain damage. Furthermore air pollution is also known to affect the environment, causing acid rains damaging the vegetation, forests, water bodies and so on, affecting the ecosystem of that area. Hence in order to prevent such consequences, one needs to primarily monitor the concentration of air pollutants in the ambient air which would enable take necessary mitigation measures.

Maharashtra is the most urbanised and industrialised state of India, with more than 8 crore population (45% of total state population)[1] residing in urban areas and presence of more than 10% (22 thousand) of the total industries in India[2]. This situation of urbanization and industrialization induces energy consumption and subsequently increases combustion of fossil fuels to meet its demands for transportation and electricity generation. As per the data from Ministry of Petroleum & Natural Gas, Government of India the state consumed around 16,768 thousand tonnes of fossil fuels[3], the second highest in India after Gujarat in the year 2013-14. MPCB (Maharashtra Pollution Control Board) plays an important role in implementing a range of environmental legislation on air quality in the Maharashtra state. It monitors ambient air quality in the state at 72 locations where 65 are under NAMP (National Ambient Monitoring Programme), 4 under SAMP (State Ambient Monitoring Programme) and remaining 3 are Continuous AAQMS (Ambient Air quality monitoring stations). Parameters like SO_2 (Sulphur dioxide), NO_2 (Oxides of Nitrogen) and RSPM (Respirable Suspended Particulate Matter) are monitored by all AAQMS. Along with these parameters CO (Carbon monoxide), Ozone, Benzene are also monitored by CAAQMS (Continuous Ambient Air Quality Monitoring Stations).

The current report gives a comprehensive analysis of the data recorded by all the AAQMS in Maharashtra under MPCB during the financial year 2014-15. It gives a statistical overview of the data against CPCB standards which determines the status of air quality all across Maharashtra. It drafts the daily, monthly and annual data taking SO_2, NOx, RSPM, CO, Benzene and Ozone under consideration.

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[1] http://www.census2011.co.in/census/state/maharashtra.html

[2] MSME Development Institute, Govt of India ,*Industrial state profile of Maharashtra 2013-14*,pps 28

[3] Government Of India, *Indian Petroleum And Natural Gas Statistics 2013-14*, Ministry of Petroleum & Natural Gas, Economics And Statistics Division, New Delhi, Table V.5 State-wise Consumption of Major Petroleum Products During 2013-14 (Prov), pps 77

Sulphur dioxide

SO_2 concentrations for all AAQMS sites in Maharashtra were recorded under annual permissible standards except for the AAQMS site at Industrial area of CIDCO (Nanded) Aurangabad region which recorded annual SO_2 concentrations of about $82\mu g/m^3$ which is 1.6 times higher than the standards ($50\mu g/m^3$). The same region had recorded the highest annual SO_2 concentrations of $48\mu g/m^3$ in the last year. The region also violated the daily CPCB standard ($80\mu g/m^3$) and recorded highest daily average of about $88\mu g/m^3$ indicating high level of SO_2 pollution in that region. Although the areas in the Kalyan region, comprising of the MIDC areas of Dombivali, Ambernath and Badlapur, recorded SO_2 concentrations under the annual standards, these areas have consistently recorded annual average SO_2 levels just above $30\mu g/m^3$ from the past 5 years (Figure No. 1) and shows an increasing trend as compared to other regions in the state. Table No. 1 enlists the areas which recorded relatively high SO_2 levels in the year 2014-15.

Table No. 1: Regions with relatively high SO_2 concentrations in Maharashtra

Sr No.	MPCB RO	Region	Station Name	SO_2 ($\mu g/m^3$) *Standard* (50 $\mu g/m^3$)
1	Aurangabad	Nanded	Industrial Area CIDCO	82
2		Nanded	Mutha Chowk	39
3	Kalyan	Bhiwandi	Prematai Hall	31
4		Ulhasnagar	I.G.M hospital	30
5		Kalyan	MPCB RO Kalyan office	29
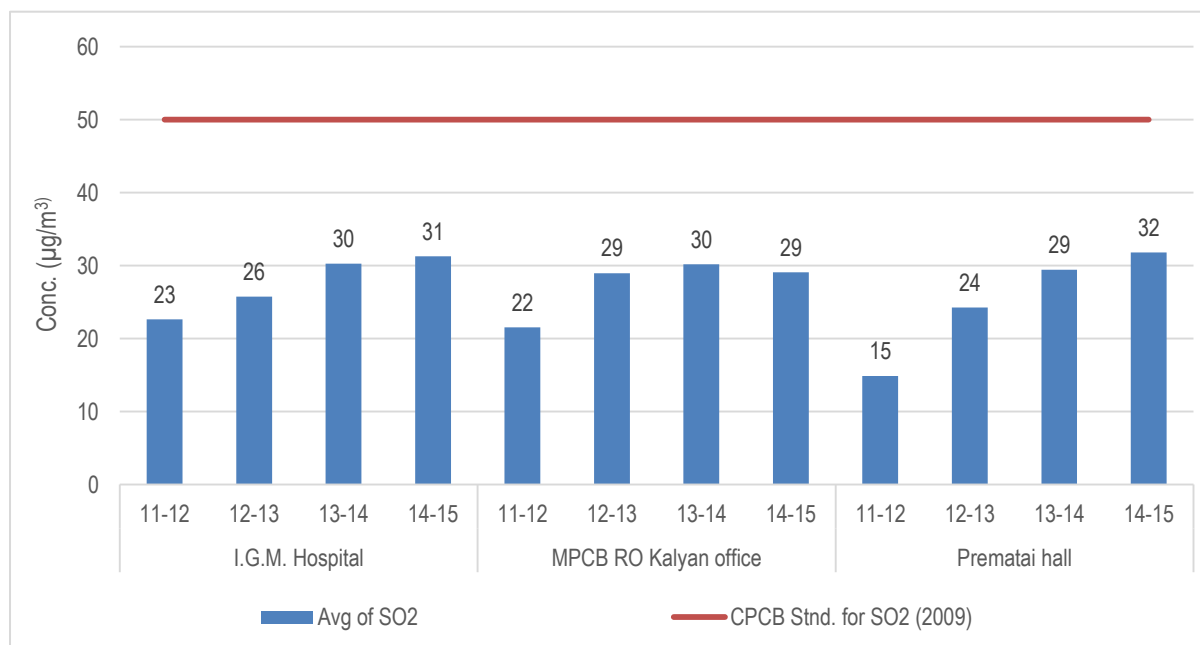
Figure No. 1: Increasing trend of SO2 levels in areas of Kalyan Region

Oxides of Nitrogen

Out of all 72 AAQMS in Maharashtra, the annual NOx concentration exceeded the annual standard ($40\mu/m^3$) at 28 areas while at 10 locations the concentrations were between 35-$40\mu g/m^3$.

Table No. 2 enlists ten areas which recorded highest NOx levels in Maharashtra in 2014-15.

The areas of Mumbai, Thane and Kalyan region recorded the annual averages for NOx concentrations more than 1.3 to 2.3 times the annual standards. The annual NOx concentrations at Sion AAQMS has been consistently violating the NOx standards for the past 10 years and in the year 2014-15 it recorded NOx concentrations of $90.7\mu g/m^3$ which is almost double the annual standards. Also the other AAQMS representing Mumbai region, the Bandra AAQMS, violated the annual standards at $52.2\mu g/m^3$. On certain days the NOx levels were recorded to be as high as $177\mu g/m^3$ (Sion) and $193\mu g/m^3$ (Bandra) which violates the daily standard ($80\mu g/m^3$) indicating high NOx pollution in these areas. High density traffic and vehicular emissions can be major source for NOx levels in this region.

The Kalyan and Thane region recorded NOx concentrations in range of $53-65\mu g/m^3$ during the last financial year. The I.G.M Hospital area in Kalyan region, identified as a sensitive area, recorded annual concentrations of $41\mu g/m^3$ which is more than double the standards set for sensitive areas ($20\mu g/m^3$). The NOx concentrations in Navi Mumbai region were recorded to be less than the standard as well as compared to last few years thus indicating improvement in the air quality for NOx pollution in Navi Mumbai. This is mainly attributed to completion of major road concretization work which has led to decongestion of traffic in Navi Mumbai.

Table No. 2: Top ten regions with high NOx concentrations across Maharashtra

Sr no.	MPCB RO	Region	Station Name	NOx($\mu g/m^3$) *Standard concentration ($40\ \mu g/m^3$)*
1	Mumbai	Mumbai	Sion	90.7
2	Aurangabad	Nanded	Industrial Area CIDCO	82.6
3	Kalyan	Dombivali	MIDC Dombivali	65
4	Thane	Thane	Naupada	62
5	Thane	Thane	Kopri	61
6	Kalyan	Dombivali	Dombivali	60
7	Thane	Thane	Glaxo	59
8	Kalyan	Ulhasnagar	Powai chowk	56
9	Kalyan	Ambernath	Ambernath	53
10	Mumbai	Mumbai	Bandra	52

Particulate Matter

In the year 2014-15, all AAQMS violated the annual ($60\mu g/m^3$) and daily standards ($100\mu g/m^3$) for PM_{10} pollutant and the top ten regions which recorded the highest PM_{10} concentrations are enlisted in **Table No. 3**. The stations of Aurangabad, Chandrapur and Navi Mumbai recorded highest RSPM concentration in the state. The Aurangabad region is severely affected by RSPM pollution and the Industrial area of CIDCO at Nanded recorded the highest in RSPM concentration ($186\mu g/m^3$), in Maharashtra followed by the areas represented by the AAQMS at Krishandan seeds ltd site in Jalna with $176 \mu g/m^3$ concentration of RSPM. Owing to the active presence of power plant, coal mining activities (Picture No. 1), traffic movement and so on in the Chandrapur region, the areas of Ghuggus ($148\mu g/m^3$) and Rajura ($142\mu g/m^3$) recorded RSPM levels almost 2.5 times the standards and were among the top 5 areas with high RSPM pollution. Similarly, 4 out of 6 AAQMS at Navi Mumbai recorded RSPM levels in range of $131-142\mu g/m^3$, which is almost double the standards and were amongst the top ten sites with highest RSPM pollution. Construction activities, quarry sites, stone crushing activities, emission from industries and vehicles and so on are the key sources contributing to RSPM pollution in this region.

Table No. 3: Regions with higher (top ten) RSPM concentrations across Maharashtra

Sr no.	MPCB RO	Region	Station Name	RSPM ($\mu g/m^3$) *Standard ($60\mu g/m^3$)*
1	Aurangabad	Nanded	Industrial area -CIDCO	186
2	Aurangabad	Jalna	Krishandhan seeds ltd	176
3	Chandrapur	Chandrapur	Ghuggus	148
4	Amravati	Akola	Akola engg college	146
5	Chandrapur	Chandrapur	Rajura	142
6	Navi Mumbai	Navi Mumbai	Taloja MIDC	142
7	Raigad	Panvel	Panvel water supply	136
8	Amravati	Amravati	Raj kamal chowk	134
9	Navi Mumbai	Navi Mumbai	Rabale	133
10	Navi Mumbai	Navi Mumbai	Nerul	131

Ozone and Carbon- Monoxide

The carbon-monoxide and ozone levels were recorded at the 3 CAAQMS in Maharashtra and owing to technical issues data was available for 2 CAAQMS. The Bandra and Solapur regions exceeded the 8 hourly standards ($2mg/m^3$) for more than 30% and 69% of the observations, respectively. The Bandra region exceeded the standards majorly during the summer season spread across April to July and drastically dropped in the peak monsoon season in the July month. While it is during the same monsoon season, that the Solapur region recorded CO concentrations well within the standards and increased concentrations of CO were recorded throughout the summer and winter seasons. As for the ozone concentrations, both the regions recorded reading within specified limits for more than 98% and 94% of the observations.

Picture No. 1: Mining activities resulting in high RSPM concentrations in Chandrapur Region

Air Quality Index

In the year 2014-15, more than 8,500 observations were recorded across all the AAQMS and almost 54% of the readings were recorded in category of "Good" and "Satisfactory" indicating that more than 54% of the observations met the daily standards for all the parameters. Majority of the readings (45%) were recorded in the "Moderate" category across Maharashtra. It was very seldom, less than 1% observations, that the air pollution was categorised in "Poor" or "Severe" category.

Conclusion

Out of the three criteria pollutants RSPM pollution is of major concern followed by NOx concentrations which was relatively high at a few locations. Highly polluted regions of Chandrapur, Kalyan and Navi Mumbai have recorded improvement in air quality in the year 2014-15, while the Industrial area of Nanded recorded significantly high level of pollution.

Introduction

Air is colourless, odourless, tasteless, gaseous mixture with varying amounts of moisture and particulate matter, enveloping the earth[4] and every living organism is dependent on air one way or the other for its survival. Pure air is a mixture of several gases which consists of about 78% nitrogen, 21% oxygen, and less than 1% of argon, carbon dioxide, and other gases — as well as varying amounts of water vapour[5]. It is necessary to maintain the levels of the gases present in the air in order to ensure a balance in the atmosphere. An average human adult at rest inhales and exhales about 7 or 8 litres of air per minute which totals to about 11,520 litres of air in a day[6].The ratio of inhaling and exhaling requirement of the person may sometimes change if there is a change in the composition of air. This change in the composition of air results in deteriorating the health of the human and may also prove to be harmful to plants and other organisms. The composition of air usually changes due to change in quantity of gases, dust, fumes or odour causing air pollution[7].

Air Pollution

Air is considered to be polluted when it contains certain substances in concentrations high enough and for duration long enough to cause harm or undesirable effects. As per the Air (Prevention and Control of Pollution) Act, 1981, the term "air pollutant" refers to any solid, liquid or gaseous substance present in the atmosphere in such concentration that may be or tend to be injurious to human beings or other living creatures or plants or property or environment[8].

Sources of air pollution are natural as well as manmade. Natural sources are majorly the volcanoes, forest fires and dust storm while the manmade sources are emission from industrial units like power-plants, refineries, sponge iron manufacturing, combustion of fuel in vehicles as well as households and road dust suspension. Pollutants can originate from point, non-point and mobile sources. Stationary objects which release pollutants are classified as point sources (eg factories, smoke stacks), non-point sources include residential, hospitals, waste disposal and agriculture operations while the mobile sources include transportation vehicles-cars, trucks, tractors, boats. Air pollutants are classified as:

1) **Primary pollutants**:

   Primary air pollutants are the ones that are emitted directly into the atmosphere by the sources (power-generating plants).

2) **Secondary pollutants**:

   Secondary air pollutants are the ones that are formed as a result of reactions between primary pollutants and other elements in the atmosphere

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[4]http://www.thefreedictionary.com/air
[5]http://www.bcairquality.ca/101/what-is-air.html
[6]http://health.howstuffworks.com/human-body/systems/respiratory/question98.htm
[7]http://www.epa.vic.gov.au/air/aq4kids/pollution.asp
[8]http://www.moef.nic.in/legis/air/air1.html

The National Ambient Air Quality Standards for six principal pollutants set by USEPA (United States Environmental Protection Agency) include –Sulphur dioxide, lead, nitrogen dioxide, carbon monoxide, Ozone, Particulate matter[9].The effects of these criteria pollutants have been drafted in Table No. 4. Air pollution is global issue contributing many diseases such as ischemia, myocardial infarction, stroke, chronic obstructive pulmonary disease and cancers.

Table No. 4: Major air pollutants, their sources and their effects on humans

Pollutants	Sources	Effects
Nitrogen dioxide (NOx)	Combustion processes (heating, power generation, and vehicles)	• Bronchitis in asthmatic children. • Reduced lung function
Particulate Matter (PM2.5, PM10)	Vehicles, industrial sources, domestic fuel burning, road dust re-suspension,	• Cardiovascular and respiratory diseases, • Lung cancer, • ALRI (Acute Lower Respiratory Infections)
Carbon monoxide (CO)	Incomplete fuel combustion (as in motor vehicles)	• Reduces the oxygen carrying capacity of blood, • Causes headaches, nausea, and dizziness • Can lead to death at high levels
Sulphur dioxide (SO$_2$)	Burning of sulphur-containing fuels for heating, power & vehicles.	• Affects respiratory system and lung function. Coughing, mucus secretion, asthma and chronic bronchitis. • Causes acid rain.
Lead (Pb)	Petrol and industry (such as smelting, and paint works).	• Affects brain development in children, • At very high doses leads to poisoning, • May lead to brain and organ damage.
Ozone (O$_3$) Tropospheric	Formed by the reaction ofNO$_X$and (VOCs) in sunlight	• Breathing problems, asthma, reduced lung function.

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[9]http://www.epa.gov/air/criteria.html

Maharashtra Pollution Control Board
महाराष्ट्र प्रदूषण नियंत्रण मंडळ

Challenges and initiatives in India

Increase in technological, industrial and agricultural advancement, along with the growing population, has exacerbated the deterioration of air quality, which is now a serious problem throughout the world. In India, rapidly growing cities, increasing traffic, growing energy consumption, waste production, fuel adultery, combustion of fire wood and traffic congestion[10]are often attributed as the key reasons for deteriorating air quality. Rapidly growing Indian cities are suffering from some of the worst air quality problems in the world.

To counter the problems associated with air pollution, the Government of India enacted the Air (prevention and control pollution) Act 1981.The act prescribes to combat air pollution by prohibiting the use of polluting fuels and substances as well as appliances that give rise to air pollution. Under this Act, the central government is empowered to take measures necessary to protect and improve the quality of the environment by setting standards for emissions and discharges; regulating the location of industries; management of hazardous wastes, and protection of public health and welfare.

Central Pollution Control Board

The CPCB (Central Pollution Control Board), a statutory organisation, was constituted in September, 1974 under the Water (Prevention and Control of Pollution) Act, 1974. Further, CPCB was entrusted with the powers and functions under the Air (Prevention and Control of Pollution) Act, 1981. The principal function of the CPCB, under the Air (Prevention and Control of Pollution) Act, 1981, is to improve the quality of air and to prevent, control or abate air pollution in the country.

CPCB initiated NAAQM (National Ambient Air Quality Monitoring) programme in the year 1984. Subsequently, expanding the network to have representation of various regions in the country, various stations under the programme were established nationwide. The program was subsequently renamed as NAMP (National Air Quality Monitoring Programme). In the year 2010-11 CPCB was executing NAMP for generating air quality database at 456 air quality motoring stations throughout the nation covering 190 cities in 26 States and 4 union territories[11]. Further, CPCB under the Air (Prevention and Control) Act has set the NAAQS (National Ambient Air Quality Standards) with the following objectives:

- To indicate the levels of air quality necessary with an adequate margin of safety to protect public health, vegetation and property

- To assist in establishing priorities for abatement and control of pollutant level

- To provide a uniform yardstick for assessing air quality at national level

- To indicate the need and extent of the monitoring programme

The revised National Ambient Air Quality Standards were notified on 18 November 2009. A copy of the Gazette is enclosed as Appendix A.

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[10]"Urban Air Pollution, Catching gasoline and diesel adulteration. The World Bank. 2002
[11] CPCB, 2011-12*National Ambient Air Quality Status & Trends In India-2010*, Chapter 1 Introduction, pg 3

Maharashtra Pollution Control Board

The Maharashtra State government in 1981 adopted the Water (Prevention and Control of Pollution) Act 1974 and under this MPCB (Maharashtra Pollution Control Board) was established in the year 1981.

MPCB has established 12 regional offices across the state to check and regulate the pollution level with necessary control measures.MPCB implements a range of environmental legislation in the state and functions under the administrative control of Environment Department, Government of Maharashtra.

The main functions of MPCB are:

- To plan comprehensive programs for the prevention, control or abatement of pollution and secure executions thereof,

- To collect and disseminate information relating to pollution and the prevention, control or abatement thereof,

- To inspect sewage or trade effluent treatment and disposal facilities, and air pollution control systems and to review plans, specification or any other data relating to the treatment plants, disposal systems and air pollution control systems in connection with the consent granted,

- To support and encourage developments in the fields of pollution control, waste recycle reuse, eco-friendly practices etc.

- To educate and guide entrepreneurs in improving the environment by suggesting appropriate pollution control technologies and techniques

- To create public awareness about clean and healthy environment and attending to public complaints regarding pollution.

The Air (Prevention and Control of Pollution) Act 1981 was adopted by the state of Maharashtra in1983 and the MPCB is functioning as the state board under section 5 of this Act. Following which MPCB has taken many initiatives to control, prevent and monitor air quality in the state of Maharashtra.

Being a highly industrialised, populated and urbanized state, Maharashtra has numerous air pollution sources, which has resulted in the deterioration of air quality in many cities. The state has a wide range of major industries involved in polluting activities like power plants, pharmaceuticals, petroleum, and manufacturing of fertilizers. Vehicular growth, construction activities, quarry sites and so on have augmented the deterioration of the air quality.

Hence, to keep a constant vigilance on the status of the air quality in the industrial influenced areas like Dombivali, Ambernath, Chandrapur and the exposure to the population in residential areas, MPCB has installed air quality monitoring stations in Maharashtra. The following section presents the highlights of the monitoring and the air quality recorded in the year 2014-15.

Air Quality Monitoring in Maharashtra

Ambient air quality monitoring network is designed to get spatial and temporal variation of ambient air concentrations for a wide range of pollutants that are considered relevant for evolving a strategic management plan. Monitoring locations are selected to represent different land use categories like kerbside, residential, industrial, commercial and so on, to capture air quality levels under different activity profiles. To have a continuous vigilance of the air quality in the different parts of the state MPCB has installed various AAQMS (Ambient Air Quality Monitoring Stations) in various regions of the state. The following section provides an overview of the status of AAQM (Ambient Air Quality Monitoring) in the year 2014-15.

Monitoring Network

AAQMS are added periodically to expand the network of monitoring stations. However due to operating challenges like maintenance issues, shortage of manpower and change of location, some monitoring stations are closed temporarily and the hence data may be unavailable for a particular station for that spell of time. In the year 2014-15, there were 72 active AAQMS in Maharashtra under NAMP (65), SAMP (4) and 3 CAAQMS. Apart from the CAAQMS, 6 stations in the cities of Nashik, Nagpur, Pune, Sion, Aurangabad and Chandrapur have a site with daily manual monitoring. As per data availability each year the corresponding tally of AAQMS is presented below in Figure No. 2.
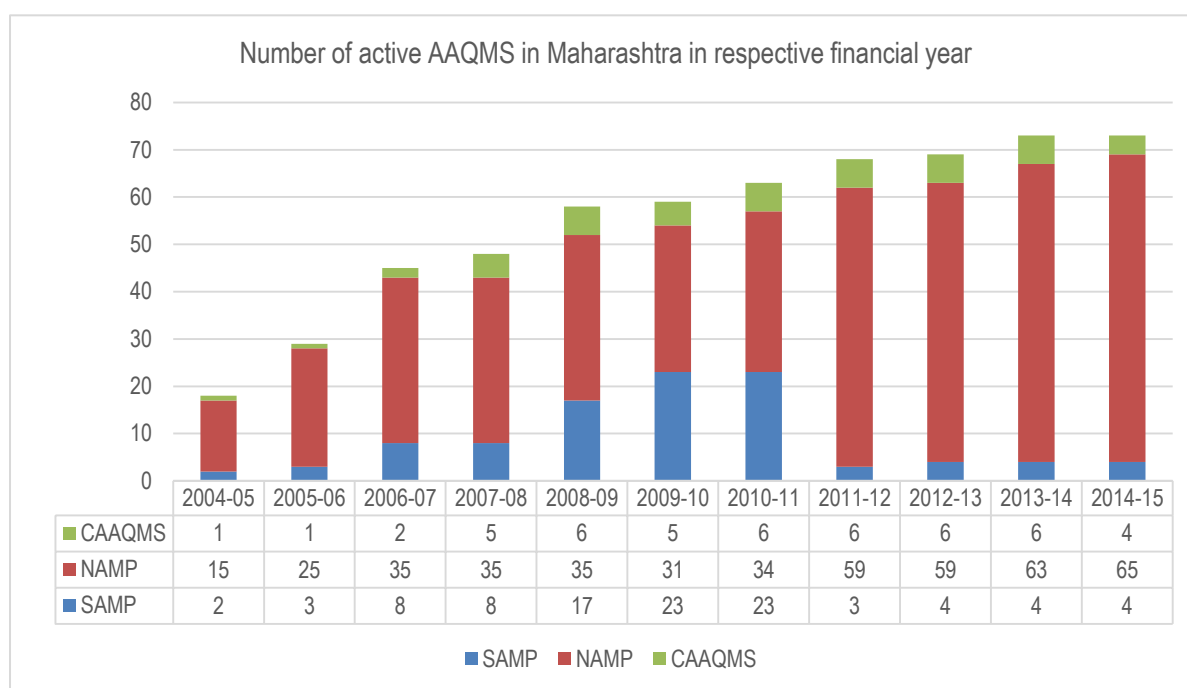
Figure No. 2: Number of active AAQMS in Maharashtra in respective financial year

Data Source: MPCB, 2015

Given that Maharashtra has very prominent industrial zones and is one of the highly populated states in the country air quality monitoring becomes essential at these locations. However, owing to the population growth and expansion of the cities the residential areas have now grown so large that they are now located in very close vicinity of the industrial belts. Some examples of the same are the residential areas in Navi Mumbai, Dombivali, Ambernath, where the residential zones are very close to the industrial areas. Hence, in a given region there is a mix of various types of monitoring stations representing various type of areas. MPCB-RO (Regional Office) wise tally of AAQMS operating in the year 2014-15 is presented in Table No. 5. The detailed list of the active stations is presented in Annex-I of this report. The jurisdiction boundaries and the tally of the AAQMS in each RO are presented in Map No. 1.

Table No. 5: MPCB RO wise tally of active AAQMS (2014-15)

MPCB RO	Commercial	Industrial	Residential	Rural and other areas	Grand Total
Amravati	1	2	2	1	6
Aurangabad	1	3	6	1	11
Chandrapur		3	3		6
Kalyan	2	2		5	9
Kolhapur		2	4	2	8
Mumbai			2		2
Nagpur		1	2	1	4
Nashik		2	5		7
Navi Mumbai		3	2	1	6
Pune		1	6	1	8
Raigad			1		1
Thane		1	1	1	3
Grand Total	**4**	**20**	**34**	**13**	**71**

Data Source: MPCB, 2015
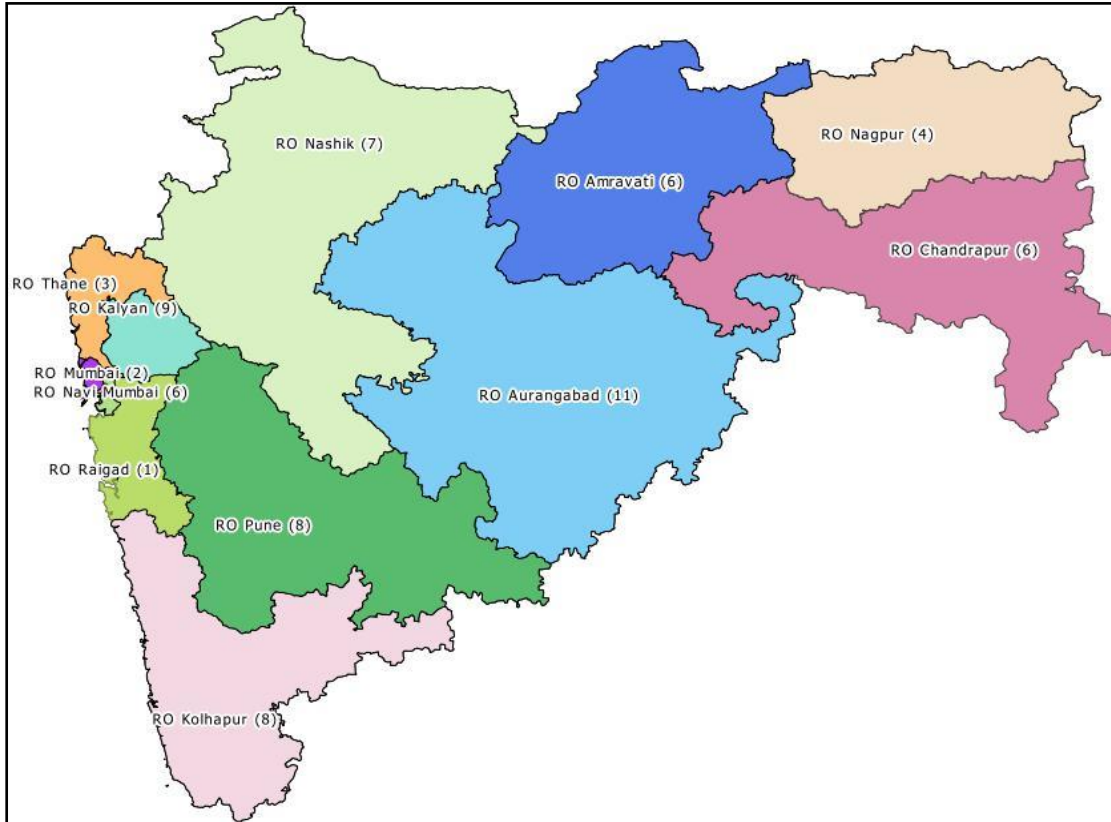
Map No. 1: Boundaries and tally of AAQMS in each RO of MPCB (2014-15)

Pollutants Monitored

SO_2 (Sulphur Dioxide), NO_X (Nitrogen Oxides) and RSPM (Respirable Suspended Particulate Matter) are regularly and consistently monitored across all the monitoring sites in Maharashtra under NAMP, SAMP and also at the CAAQMS. SPM (Suspended Particulate Matter) are bigger than coarse particles, they settle down fast and do not reach the respiratory tract and therefore they have less adverse effect on health[12]. As a result the standard for SPM have not been set as per revised NAAQS (2009).Although some monitoring stations do record the concentrations of SPM, this has not been considered for the statistical compilation.

Air Quality Monitoring Data

MPCB published the data recorded by all the monitoring sites in Maharashtra on its website. It also presents an interactive way to select the time series data for a particular monitoring station. The data sets recorded at the monitoring station for the year 2014-15 have been compiled in this report. A pollutant wise overview for the air quality recorded at the areas representing residential, industrial, commercial, rural & other areas and sensitive monitoring is presented in the following section. Monitoring station wise annual trend for the recent 5-7 years (as per data availability) and monthly trend for the year 2014-15 have been presented in Annex – II.

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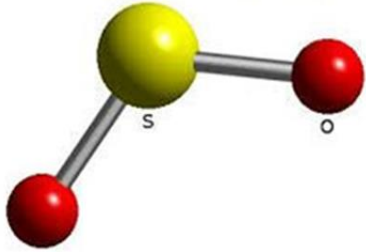
[12] CPCB 2012, *National Ambient Air Quality Status & Trends In India-2010,* Chapter 6, Pg 83

Status of Air Quality

Sulphur dioxide

Sulphur Dioxide (SO_2), a colourless gas with a pungent, irritating odour and taste belongs to the family of reactive oxides of sulphur. Sulphur dioxide is formed by two molecules of oxygen and one molecule of sulphur having covalent bond with angle of 119^0 [13].The natural source for SO_2 emissions are volcanoes while the manmade emission sources include industrial and vehicular emissions. It is also a precursor to particulate matter. Being polar in nature, it readily dissolves in water to give acidic solution which oxidizes to sulphuric acid and is transported by wind currents over hundreds of miles, and deposited as acid rain. Acid rain causes acidification of water bodies, corrosion to metals structures, skin diseases and so on. A recent incident (2014) in the Dombivali area in Maharashtra, India, witnessed the acid rain in form of 'green rain' where the rainwater collected was green in colour due to improper measures taken by few industries[14]. The molecular structure along with sources and effects are tabulated in Table No. 6.

Table No. 6: Molecular formula, sources and harmful impacts of Sulphur dioxide

	Common name	Molecular formula	Life span in air	Nature
	Sulphur dioxide	SO_2	4-10 days	Polar (soluble in water)
Molecular structure				
Sources	• **Natural**: Volcanoes, biological decay and forest fires • **Anthropogenic** :Fossil fuel combustion from industries and power plants, Smelting of metals, manufacture of sulphuric acid, incineration of refuse and production of elemental sulfur.			
Effects	• **Human Health**: Respiratory illness, asthma, chronic bronchitis, affects lung function, coughing, irritation to skin and eyes. • **Environment:** Acid rain			

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[13]AK Srivastava and PC Jain, *Chemistry*, Published by V.K Enterprises, 7.8 Oxides of sulphur, Pg 581
[14]http://www.niohenvis.nic.in/newsbulletin/Jan2014/Green%20rain%20in%20Dombivli.pdf

Trend in sulphur dioxide concentrations in Maharashtra
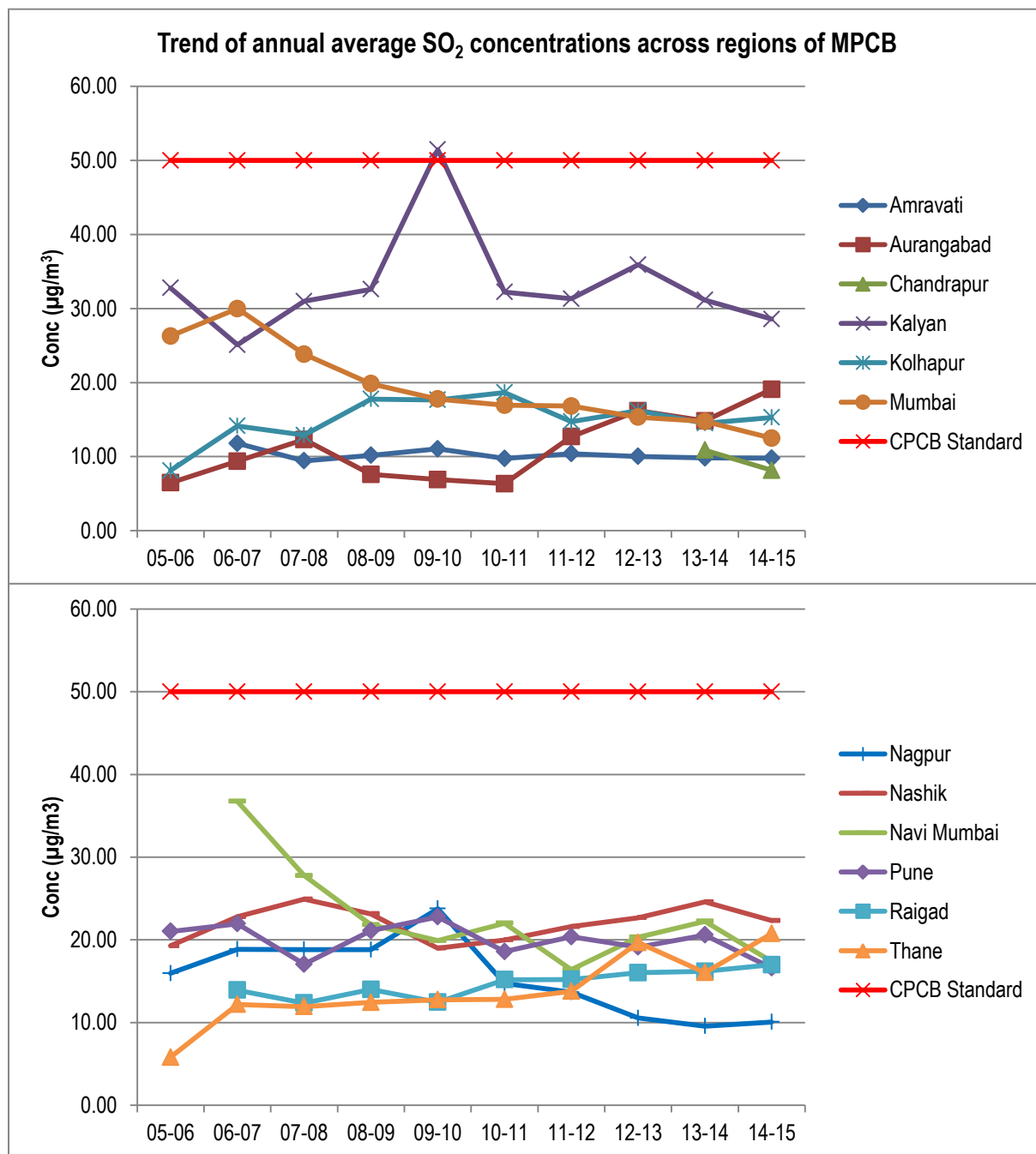
Figure No. 3: Trend in annual SO$_2$ concentrations across different regions

The SO_2 concentrations in Maharashtra have been below the annual standard (NAAQS 2009) across all the regions. As per the trend observed in Figure No. 3, Amravati, Kolhapur, Nagpur and Aurangabad regions are the cleanest for sulphur dioxide pollution. These regions have consistently, over the period of last 5 to 7 years, recorded annual SO_2 concentrations in the range of 10-15µg/m³. A declining trend in the sulphur dioxide pollution can be observed in Mumbai, Navi Mumbai and Chandrapur regions.

The Kalyan region, comprising of the MIDC areas of Dombivali, Ambernath and Badlapur has consistently recorded relatively high SO_2 concentrations as compared to other regions in the state. The region has recorded annual average SO_2 levels just above 30µg/m³ from the past 5 years. In the year 2009-10 a peak can be observed when the region exceeded the annual standards for the SO_2 concentrations. Although annual concentrations for the region are under control upon doing a station wise analysis, the specific area with higher SO_2 concentrations which may be influencing the annual average could shortlisted.

The regions of Aurangabad Thane and Raigad have recorded an increasing trend of SO_2 concentration. All these regions are rapidly getting urbanised and industrialised. Hence, although the SO_2 concentrations are under the annual standard, appropriate measure should be undertaken to keep the emissions under check in these regions.

The following section presents the status of SO_2 concentrations recorded at the active AAQMS representing industrial, residential, commercial and other areas in Maharashtra during the fiscal year 2014-15.

SO₂ concentrations in industrial areas

Table No. 7: Data for SO2 recorded at AAQMS representing industrial areas (2014- 15)

RO	Station name	Station code	Max of SOₓ	98th percentile	Average of SOₓ	Min of SOₓ
	CPCB Standard		*80*	*80*	*50*	*80*
AMR	MIDC Water Works - Akola	701	13	12.0	8.8	7.0
	Godhadiwala Private Limited	549	17	16.0	12.2	8.0
AUR	Jalna- Krishnadhan seeds Ltd	707	17	16.0	11.4	7.0
	MIDC Water Works - Latur	641	9	8.1	4.8	4.0
	Industrial Area CIDCO	705	88	88.0	81.6	37.0
CDP	Chandrapur - MIDC	281	58	39.0	12.8	4.0
	Tadali MIDC	638	21	19.1	7.0	3.0
	Rajura	640	23	17.0	7.1	3.0
KYN	Dombivali	265	79	74.8	28.0	6.0
	MIDC Office Dombivali	-	82	73.9	27.6	10.0
KOP	Chiplun - Water Treatment	490	12	12.0	10.2	4.0
	Krishna Valley school	576	26	24.0	13.4	5.0
NGP	MIDC Office, Hingna Road	288	29	14.9	11.0	6.0
NHK	MIDC Jalgaon	646	27	27.0	20.3	11.0
	MIDC Satpur - VIP	269	103	30.2	25.1	17.0
NVM	Rabale	491	33	25.2	18.5	10.0
	Mahape, MPCB-Nirmal Bhavan	493	37	25.9	18.2	10.0
	Taloja - MIDC Building	496	30	27.5	18.3	9.0
PUN	Bhosari	312	65	51.0	25.5	11.0
TNA	Balkum/Glaxo	-	33	32.1	20.2	9.0

Data Source: MPCB, 2015   **Units: µg/m³**
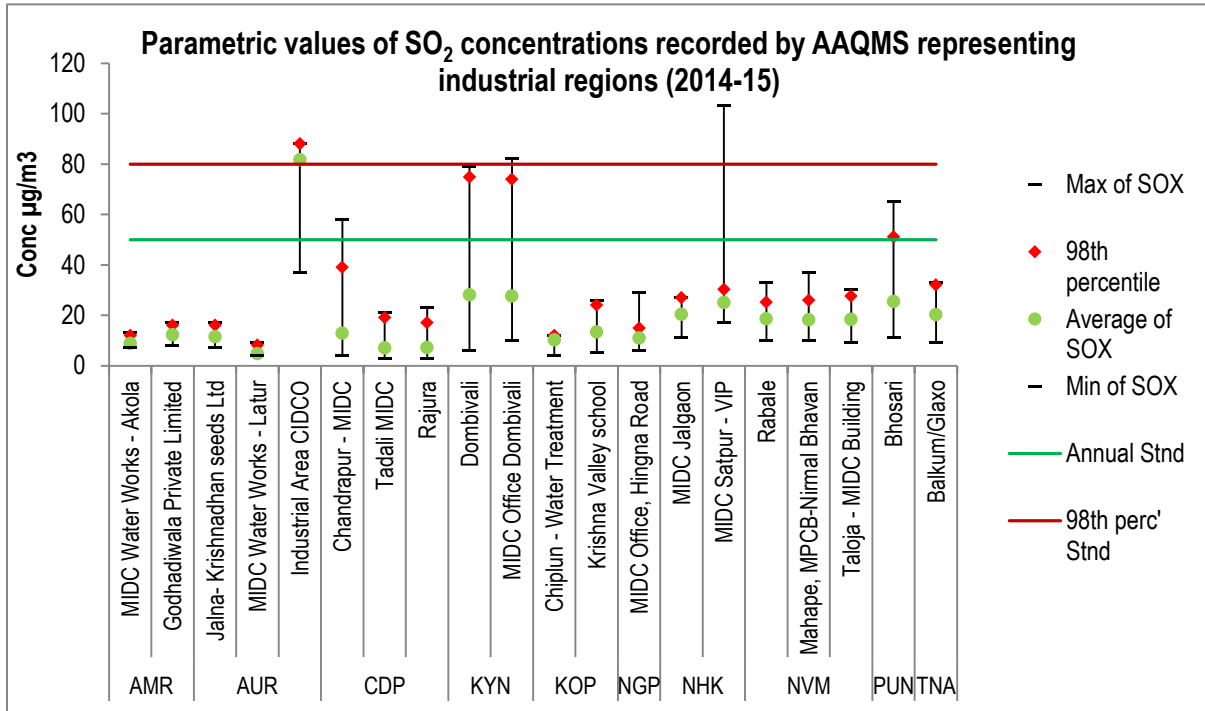
Figure No. 4: Parametric values of SO₂ concentrations recorded by AAQMS representing industrial regions (2014-15)

SO$_2$ concentrations were recorded under annual permissible standards across all the industrial areas which had an active AAQMS in 2014- 15 (Figure No. 4) except for the AAQMS site at Industrial area- CIDCO of Aurangabad region. The site consistently recorded the high level of SO$_2$ concentrations with 98th percentile of about 88µg/m^3 and the annual average of about 81.6µg/m^3 indicating that the annual concentrations violated not only the annual standards by almost 1.75 times but also exceeded the daily standards (80µg/m^3). Even the maximum value matches the 98 percentile which indicates that the SO$_2$ pollution levels were high throughout the year consistently making it one of the most polluted industrial areas for SO$_2$ pollution.

In case of the Dombivali MIDC area, which has consistently violated the SO$_2$ standards for the past three years, this year the areas were recorded with SO$_2$ concentrations well within the standards. However there have been some certain days with high SO$_2$ levels.

All the other AAQMS in MIDC areas of Maharashtra recorded SO$_2$ concentrations less than 35µg/m^3. Industrial areas in Amravati region were the cleanest in terms of SO$_2$ concentrations and even the maximum recorded SO$_2$ levels were under 17 µg/m^3. Similarly the AAQMS in the MIDC areas of Kolhapur, Nagpur, Navi Mumbai, Pune and Thane recorded low concentrations of SO$_2$ concentrations.

The AAQMS site at MIDC Satpur, in Nashik region recorded the highest SO$_2$ around 100 µg/m^3, however this is an outlier since the 98th percentile as well as the annual average concentrations were well within the respective standards.

SO₂ concentrations in residential areas

Table No. 8: Data for SO₂ recorded at AAQMS representing residential area (2014- 15)

RO	Station name	Station code	Max of SO$_X$	98th percentile	Average of SO$_X$	Min of SO$_X$
	CPCB Standard		*80*	*80*	*50*	*80*
AMR	LRT Commerce College	700	10	10.0	7.4	6.0
	Govt. College of Engineering	548	14	13.3	10.9	5.0
AUR	SBES College	511	46	21.0	13.0	7.0
	Collector Office, Aurangabad	512	23	15.0	10.0	6.0
	C.A.D.A. Office	513	37	18.0	11.9	7.0
	Jalna- Bachat Bhavan	706	19	17.0	9.3	5.0
	Shyam Nagar-Kshewraj Vidyalaya	642	8	7.0	4.7	4.0
	Ganeshnagar	703	38	38.0	28.0	24.0
CDP	Ghuggus	267	83	36.4	8.9	3.0
	Chandrapur - SRO MPCB	396	30	18.0	7.1	1.0
	Ballarshah	639	18	18.0	9.1	4.0
KOP	Chiplun - MIDC Chalkewadi	489	12	12.0	10.7	9.0
	Shivaji University Campus	508	18	17.0	12.4	6.0
	Mahadwar Road	510	36	35.1	23.9	9.0
	Terrace of SRO-Sangli, Udyog Bhavan	574	25	21.2	11.9	5.0
MUM	Bandra	-	38	34.0	16.2	4.0
	Sion	-	86	28.6	8.2	1.0
NGP	IOE North Ambazari road	287	17	16.1	10.4	6.0
	Civil lines Nagpur	711	13	13.0	9.6	7.0
NHK	Old B. J. Market	644	26	25.0	18.0	7.0
	Girna Water Tank	645	53	24.0	16.2	6.0
	RTO Colony	259	35	32.0	24.3	12.0
	NMC Nashik	280	34	33.1	24.7	5.0
	SRO Office Nashik	710	53	40.0	25.6	12.0
NVM	Nerul - DY Patil	492	25	23.0	17.0	9.0
	Kharghar - CIDCO Nodal Office	494	24	23.1	17.4	10.0
PUN	Swargate, Pune	381	47	40.0	22.2	12.0
	Pimpri-Chinchwad - BOB Building	708	56	46.0	22.0	11.0
	Karve Road - CAAQMS	-	53	25.0	15.3	4.0
	WIT Campus	299	16	16.0	14.4	14.0
	Saat Rasta- Chithale Clinic	300	16	15.1	14.4	13.0
	Solapur	-	19	16.0	9.1	7.0
RGD	Panvel- Water Supply Plant	495	25	23.0	17.1	10.0
TNA	Kopri	303	36	36.0	20.8	5.0

Data Source: MPCB, 2015 **Units: µg/m³**

Maharashtra Pollution Control Board
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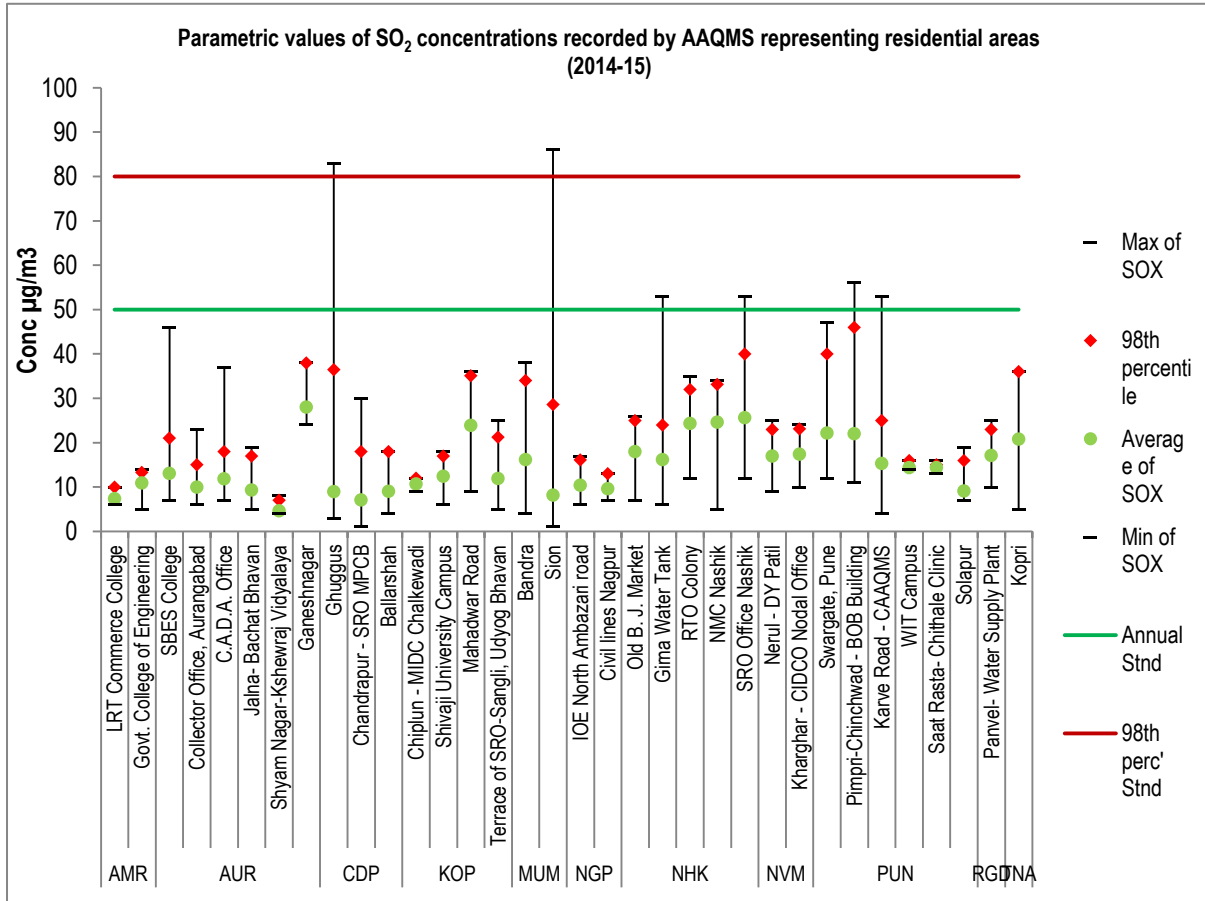
Figure No. 5: Parametric values of SO₂ concentrations recorded by AAQMS representing residential regions (2014-15)

As seen in Figure No. 5, all the AAQMS representing residential areas of Maharashtra were recorded clean for SO₂ pollution and recorded average concentrations below the annual standard (50μg/m³).

Although two stations (Ghuggus and Sion) recorded a maximum daily concentration above the standard limits (80μg/m³), the 98th percentile values were well within the standards indicating that the reading could either be outliers or a few days of high SO₂ polluting activities in the vicinity.

The regions of Amravati, Aurangabad, Kolhapur, Nagpur and Raigad recorded annual SO₂ concentrations below 25μg/m³ and even the highest concentrations were less than 45μg/m³, given this statistics we can conclude that the residential areas in Maharashtra are relatively non polluted for SO₂ pollution.

SO₂ concentrations in rural and other areas

Table No. 9: Data for SO₂ recorded at AAQMS representing rural and other area (2014- 15)

RO	Station name	Station code	Max of SO$_X$	98th percentile	Average of SO$_X$	Min of SO$_X$
	CPCB Standard		*80*	*80*	*50*	*80*
AMR	Raj Kamal Chowk	547	17	15.2	12.3	9.0
AUR	Ganj Golai - Sidhheshwar Bank	643	8	7.0	4.7	4.0
KYN	Ambernath	445	71	62.9	26.0	10.0
	Badlapur - BIWA House	649	68	62.0	27.4	8.0
	I.G.M. Hospital	-	39	38.0	31.3	5.0
	Smt. CHM College Campus	647	46	44.0	20.9	7.0
	Powai Chowk	648	74	72.0	30.2	10.0
KOP	Ruikar Trust	509	41	41.0	28.6	12.0
	Sangli-Miraj Primary Municipal school	575	32	23.0	12.5	4.0
NGP	Govt Polytechnic Col, Sadar	314	15	14.0	10.2	6.0
NVM	Airoli	-	60	32.6	16.8	2.0
PUN	Nal Stop	379	51	44.5	21.9	12.0
TNA	Naupada	304	35	33.0	21.2	10.0

Data Source: MPCB, 2015   **Units: μg/m³**

Note: I.G.M hospital is categorised as a sensitive type of monitoring zone by MPCB and the standards are 80 μg/m³ and 20 μg/m³ for 24 and annual averages.
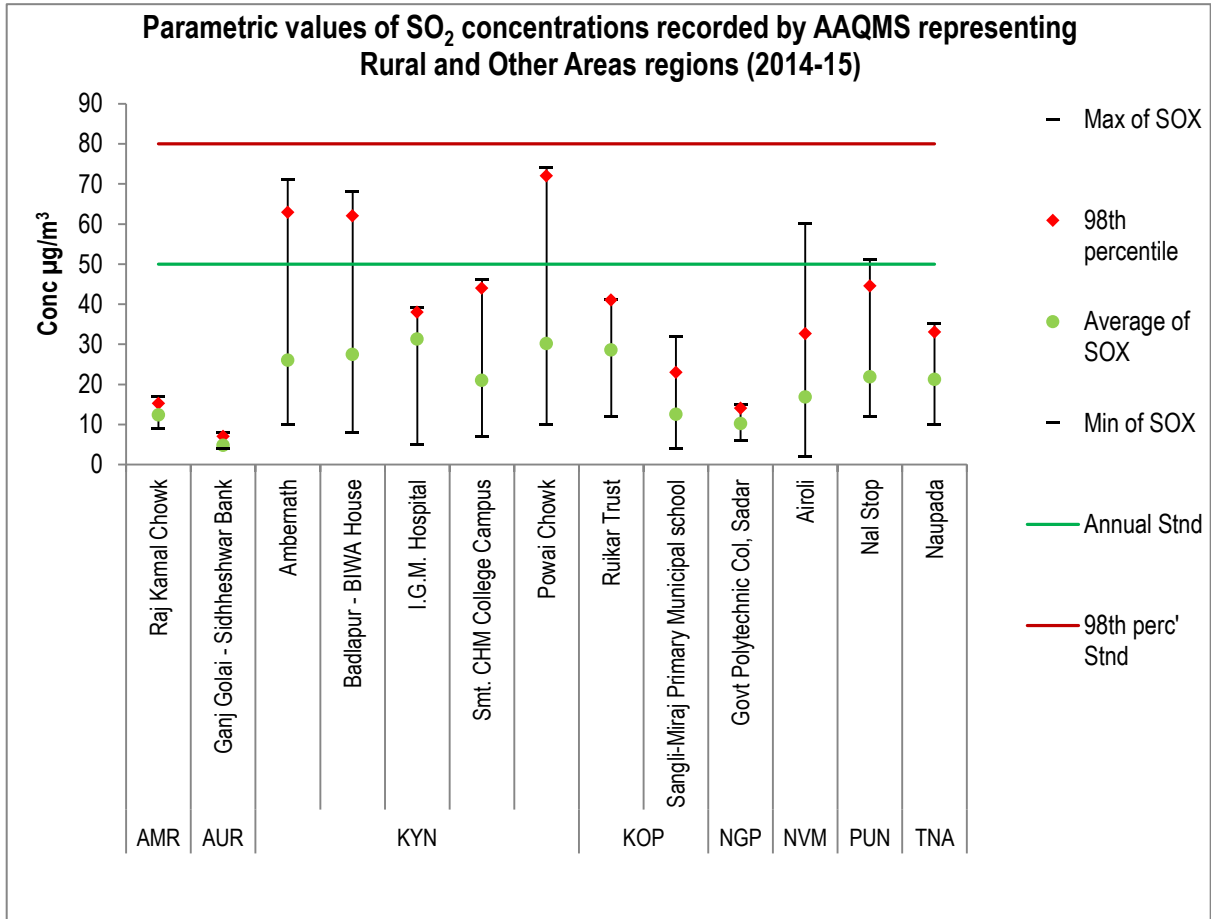
Figure No. 6: Parametric values of SO₂ concentrations recorded by AAQMS representing Rural and Other Areas regions (2014-15)

Note: I.G.M Hospital is categorized as a sensitive type of monitoring zone by MPCB

All the AAQMS representing areas categorized under rural and other type of areas in Maharashtra recorded the annual SO₂ well under the annual standards (50 µg/m³) (Figure No. 6). The maximum daily peak was observed at three AAQMS, namely Ambernath, Badlapur and Powai Chowk in the Kalyan region between 60 to 80 µg/m³, however the values are still below the 98th percentile standards (80 µg/m³).

Almost all the areas have recorded low SO₂ concentration, but Amravati, Aurangabad and Nagpur were amongst the cleanest in terms of SO₂ pollution.

SO₂ concentrations in commercial areas

Table No. 10: Data for SO₂ recorded at AAQMS representing commercial area (2014- 15)

RO	Station name	Station code	Max of SO₂	98th percentile	Average of SO₂	Min of SO₂
	CPCB Standard		*80*	*80*	*50*	*80*
AMR	Akola- College of Engg & Technology	702	12	11.0	8.3	6.0
AUR	Mutha Chowk	704	52	52.0	39.1	32.0
KYN	Prematai hall	-	36	36.0	31.8	23.0
	MPCB RO Kalyan office	-	39	38.3	29.1	5.0

Data Source: MPCB, 2015   **Units: µg/m³**
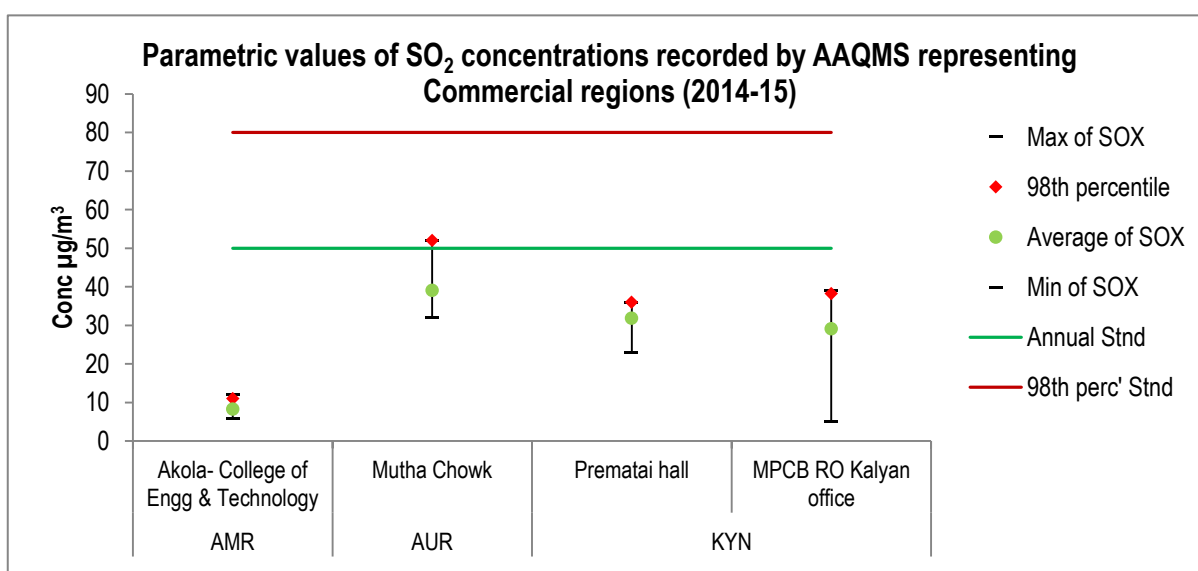
Figure No. 7: Parametric values of SO₂ concentrations recorded by AAQMS representing Commercial regions (2014-15)

Air quality monitored in commercial areas of Maharashtra was amongst the cleanest in terms of SO₂ pollution since all of AAQMS recorded annual average well below the annual standards (Figure No. 7). The maximum daily peak (52 µg/m³) was recorded at Mutha Chowk in Aurangabad but the annual average is well below the annual standards. Both the sites in Kalyan region recorded the annual concentrations between 30- 40 µg/m³. While the commercial area in Amravati region recorded the annual concentration of about 8.3µg/m³ and the SO₂ concentrations throughout the year ranged between 6 to 12 µg/m³ and recorded the cleanest for SO₂ pollution.

Oxides of Nitrogen

Nitrogen oxides (NOx) are a mixture of gases that are composed of nitrogen and oxygen. Two of the most toxicologically significant nitrogen oxides are nitric oxide (NO) and nitrogen dioxide (NO$_2$). The other component of the family includes nitrous oxide (N$_2$O) which is also known as laughing gas. Nitric oxide has no colour, odour, or taste and is non-toxic. In the air it gets rapidly oxidized to nitrogen dioxide. Nitrogen dioxide is a reddish-brown gas with a pungent, irritating odour. In the presence of sunlight the oxides of nitrogen react with the unburned hydrocarbons to form photochemical smog which causes damage to plants and is also detrimental to human health. These compounds play an important role in the atmospheric reactions that create ozone (O$_3$) and acid rain[15]. Nitrogen dioxide is known to irritate the lungs and increase susceptibility to respiratory infections. Direct acute effects of Nitrogen dioxide includes damage of the cell membranes in the lung tissues and causes constriction of the Lung way passages. Eye and nasal irritation along with pulmonary discomfort is commonly observed between concentrations of 15 to 25 ppm[16]. Table No. 11 summarises the highlights of the sources and effects of the oxides of nitrogen

Table No. 11: Molecular formula, sources and harmful impacts of oxides of nitrogen

Common name	Nitrogen dioxide	Nitric oxide	Nitrous oxide
Molecular formula	NO$_2$	NO	N$_2$O
Life span in air *	1-7 days	1-7 days	170 years
Nature	Polar	Polar	Polar
Molecular structure			
Sources	• *Natural:* Lighting, Forest fires and Bacterial activity • *Anthropogenic :*High temperature combustion (internal combustion engines, fossil fuel-fired power stations, industrial), Burning of Bio-mass and Fossil Fuels		
Effects	• *Human Health:* Irritation of nose and throat, Reduced lung function, Bronchitis in asthmatic children, visibility impairment, swelling of tissues in the throat and upper respiratory tract, reduced oxygenation of body tissues. • *Environment:* Acid rain, precursor for photochemical smog		

[15] Agency for Toxic Substances and Disease Registry, U.S. Departmentof health and human services, Public Health Service, (April 2002)

[16]R.Khan,*Review on effects of Particulates; Sulfur Dioxide and Nitrogen Dioxide on Human Health*, April (2014),Pg.71

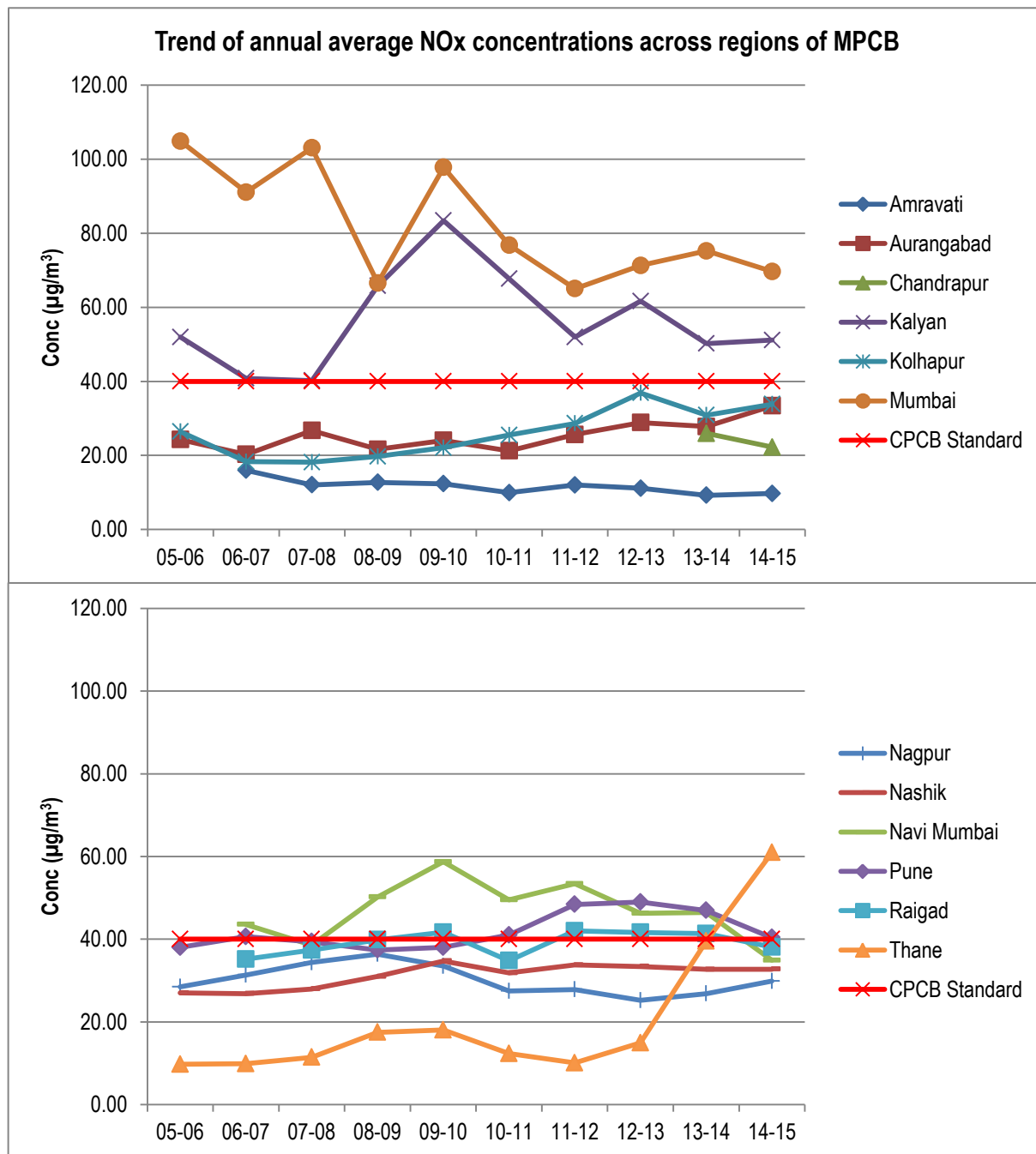# Trend in concentrations of oxides of nitrogen in Maharashtra

Figure No. 8: Trend in annual NOx concentrations across different regions

As seen in Figure No. 8, the NOx levels for Kolhapur, Aurangabad, Chandrapur, Amravati, Nashik and Nagpur are below the CPCB standards indicating that the air in those regions is less polluted with NOx pollution while the most urbanised and industrialised regions of the state like Mumbai, and Kalyan are the ones which are severely affected by high NO_X concentrations.

In the past ten years the Mumbai region has recorded annual NO_X concentrations in the range of 60-80μg/m^3 which is almost double than the annual standard (40μg/m^3). The Kalyan region which has major MIDC areas recorded the second highest annual concentrations for NO_X concentrations in range of 50-80μg/m^3 in the last five years. While in the Pune region, until 2009-10 the NO_X concentrations were below the annual standard, beyond which a steady trend in the increase of NO_X levels is observed and the annual NO_X concentration in Pune region has been around 50μg/m^3. Raigad region in the past three years has been a borderline case and violated the annual standard.

Although Navi Mumbai region was recorded with high NO_X concentrations until 2012-13, a decrease in the NOx levels has been observed over the past three years attaining average levels close to CPCB standards. A sudden increase in the NOx concentrations in the Thane region is very striking for the past two years reaching up to 60 μg/m^3 in 2014-15.

NO$_X$ concentrations in industrial areas

Table No. 12: Data for NO$_x$ recorded at AAQMS representing industrial areas (2014-15)

RO	Station name	Station code	Max of NOX	98th percentile	Average of NOX	Min of NOX
CPCB Standards			*80*	*80*	*40*	*80*
AMR	MIDC Water Works - Akola	701	14.0	14.0	10.3	8.0
	Godhadiwala Private Limited	549	18.0	17.3	13.9	9.0
AUR	Jalna- Krishnadhan seeds Ltd	707	40.0	39.0	30.8	19.0
	MIDC Water Works - Latur	641	27.0	25.2	13.8	9.0
	Industrial Area CIDCO	705	*91.0*	*91.0*	*82.6*	31.0
CDP	Chandrapur - MIDC	281	*95.0*	*90.9*	30.6	8.0
	Tadali MIDC	638	55.0	46.4	15.3	1.0
	Rajura	640	*90.0*	50.7	16.9	2.0
KYN	Dombivali	265	*185.0*	*175.2*	*60.4*	27.0
	MIDC Office Dombivali	-	*194.0*	*170.8*	*65.4*	27.0
KOP	Chiplun - Water Treatment	490	15.0	13.1	10.7	8.0
	Krishna Valley school	576	77.0	73.9	*43.9*	19.0
NGP	MIDC Office, Hingna Road	288	62.0	49.9	32.9	17.0
NHK	MIDC Jalgaon	646	57.0	57.0	*47.9*	32.0
	MIDC Satpur - VIP	269	56.0	41.5	26.7	15.0
NVM	Rabale	491	61.0	55.5	*40.7*	23.0
	Mahape, MPCB-Nirmal Bhavan	493	59.0	56.9	39.6	22.0
	Taloja - MIDC Building	496	61.0	56.4	*41.4*	25.0
PUN	Bhosari	312	*165.0*	*132.2*	*48.2*	16.0
TNA	Balkum/ Glaxo	-	76.0	73.1	*59.5*	44.0

Data source: MPCB, 2015   **Units: µg/m³**
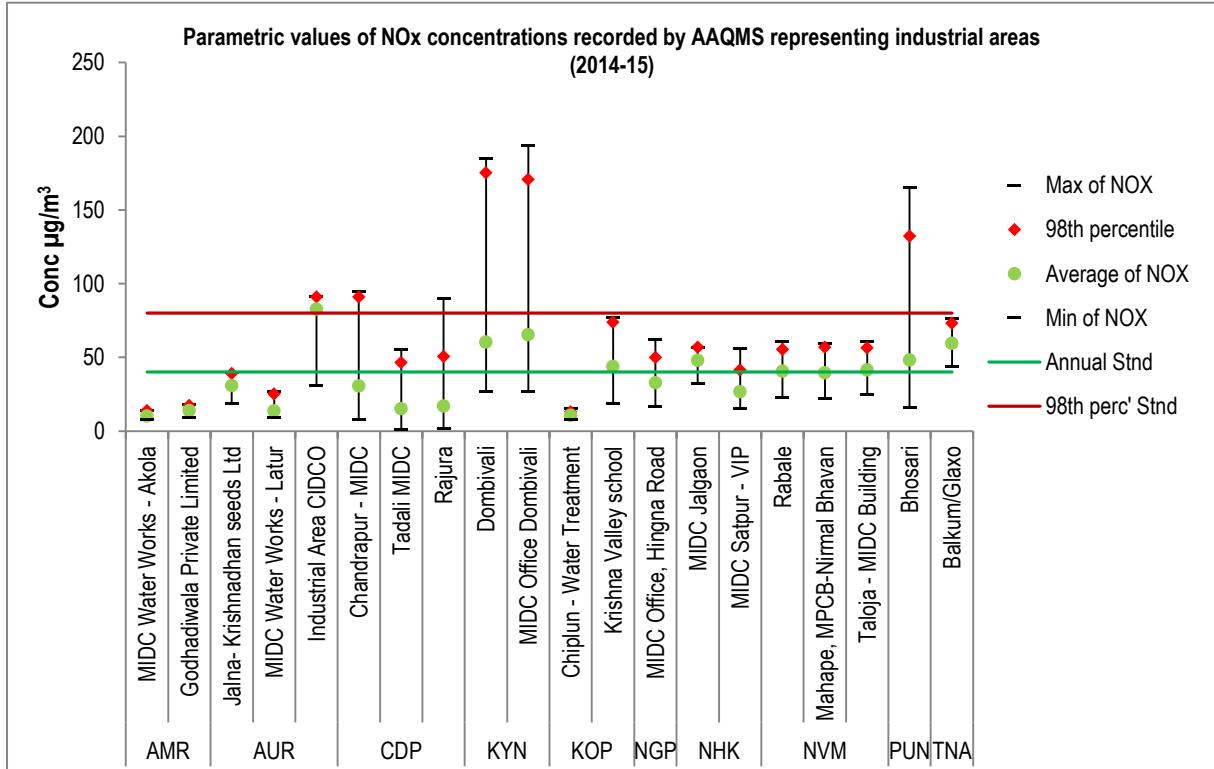
Figure No. 9: Parametric values of NOx concentrations recorded by AAQMS representing industrial areas (2014-15)

One may note from Figure No. 9 that a total of 9 out of 20 AAQMS representing industrial areas of Maharashtra exceeded the annual average NOx standard (40µg/m³).

Industrial area CIDCO of Aurangabad region recorded the highest annual average NOx concentrations of about 82.6µg/m³, almost double the respective standard indicating a high level of NOx pollution. Both the AAQMS in Dombivali MIDC area recorded annual NOx concentrations in range of 60 to 66 µg/m³ violating the annual standards. Also, these stations recorded the 98th percentile readings of more than 170µg/m³, which is almost double the prescribed daily standards (80µg/m³). The industrial area of Thane Balkum/Glaxo (59.5µg/m³), Bhosari (48.2µg/m³) in Pune region, MIDC Jalgaon (47.9 µg/m³) and Kolhapur region (43.9 µg/m³) also exceeded the annual standards.

The NOx concentrations for all stations of Navi Mumbai are just on the borderline, and the NOx levels have reduced as compared to the reading of the last year, where in all the AAQMS exceeded the average. Thus indicating the impacts of the positive actions taken by the concerned authorities.

Industrial areas of Amravati, Chandrapur and some of areas from Aurangabad were recorded clean with regard to NOx pollution.

NO$_X$ concentrations in residential areas

Table No. 13: Data for NO$_x$ recorded at AAQMS representing residential areas (2014-15)

RO	Station name	Station code	Max of NO$_X$	98th percentile	Average of NO$_X$	Min of NO$_X$
CPCB Standards			*80*	*80*	*40*	*80*
AMR	LRT Commerce College	700	12.0	12.0	8.4	7.0
	Govt. College of Engineering	548	16.0	15.3	12.5	6.0
AUR	SBES College	511	*81.0*	59.0	*42.7*	23.0
	Collector Office, Aurangabad	512	56.0	53.0	33.6	18.0
	C.A.D.A. Office	513	77.0	56.0	39.7	26.0
	Jalna- Bachat Bhavan	706	46.0	40.3	29.7	21.0
	Shyam Nagar-Kshewraj Vidyalaya	642	22.0	19.5	13.6	9.0
	Ganeshnagar	703	46.0	38.5	28.4	23.0
CDP	Ghuggus	267	72.0	44.0	15.4	2.0
	Chandrapur - SRO MPCB	396	*117.0*	53.9	23.0	4.0
	Ballarshah	639	*117.0*	*106.8*	*46.3*	9.0
KOP	Chiplun - MIDC Chalkewadi	489	12.0	12.0	10.6	9.0
	Shivaji University Campus	508	33.0	31.0	22.1	11.0
	Mahadwar Road	510	64.0	61.1	37.7	14.0
	Terrace of SRO-Sangli, Udyog Bhavan	574	*81.0*	76.3	*41.6*	15.0
MUM	Bandra	-	*267.0*	*193.4*	*52.2*	11.0
	Sion	-	*208.0*	*177.5*	*90.7*	5.0
NGP	IOE North Ambazari road	287	73.0	69.0	31.9	16.0
	Civil lines Nagpur	711	48.0	43.1	27.6	16.0
NHK	Old B. J. Market	644	51.0	49.0	*42.2*	24.0
	Girna Water Tank	645	49.0	49.0	38.7	17.0
	RTO Colony	259	50.0	31.8	26.1	9.0
	NMC Nashik	280	44.0	32.8	25.6	14.0
	SRO Office Nashik	710	45.0	36.2	26.2	17.0
NVM	Nerul - DY Patil	492	53.0	51.9	38.7	21.0
	Kharghar - CIDCO Nodal Office	494	54.0	53.0	38.8	17.0
PUN	Swargate, Pune	381	*167.0*	*117.8*	*50.5*	16.0
	Pimpri-Chinchwad - BOB Building	708	*155.0*	*118.6*	*44.9*	16.0
	Karve Road - CAAQMS	-	*89.0*	76.0	36.1	9.0
	WIT Campus	299	39.0	37.1	33.9	23.0
	Saat Rasta- Chithale Clinic	300	44.0	37.1	34.7	25.0
	Solapur	-	*99.0*	67.3	37.9	8.0
RGD	Panvel- Water Supply Plant	495	57.0	54.0	38.4	15.0
TNA	Kopri	303	76.0	73.2	*61.5*	44.0

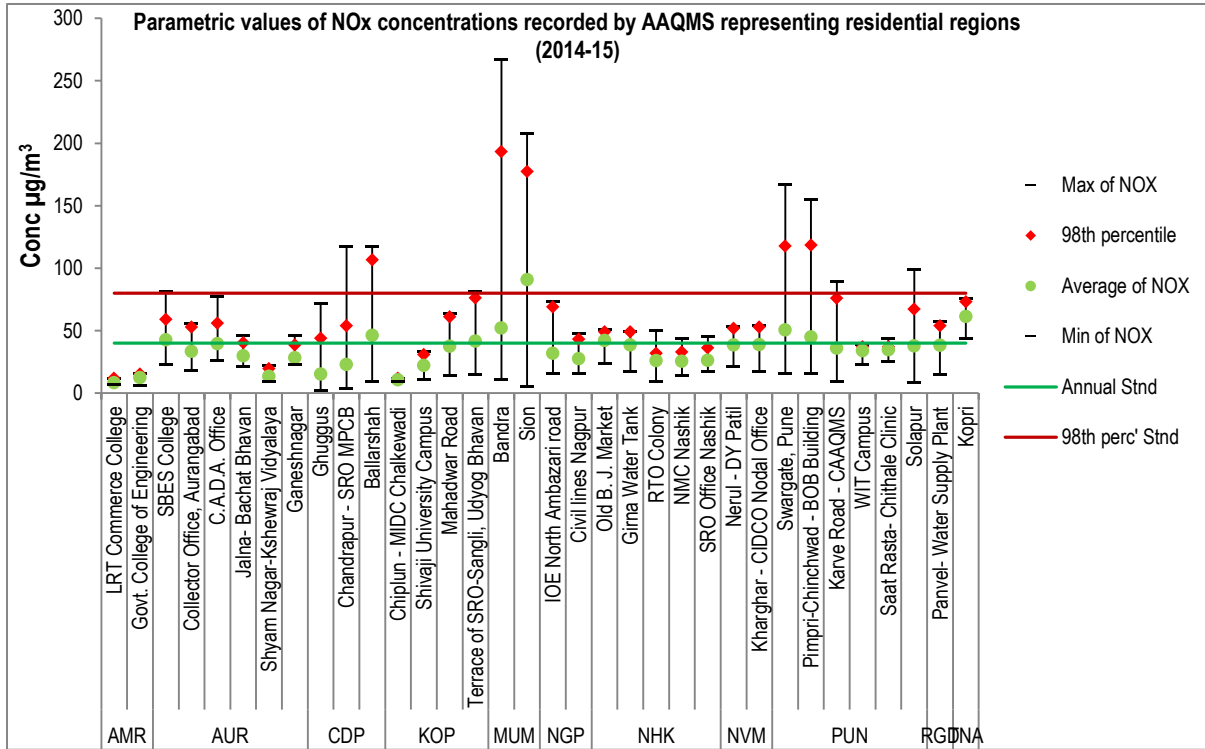**Data source: MPCB, 2015**   .....   **Units: µg/m³**

Figure No. 10: Parametric values of NOx concentrations recorded by AAQMS representing residential areas (2014-15)

Around 9 stations out of 35 AAQMS representing residential areas exceeded the annual standards for NOx concentrations (40 μg/m³) (Figure No. 10).

The AAQMS representing Mumbai and Thane region recorded the highest NOx concentrations at Sion (90.7μg/m³), Bandra (52.2μg/m³) and Thane (61.05μg/m³), which is almost 1.5 to 2 times the annual standard indicating high pollution level in this area. Rest of the 8 stations in the areas of Pune, Aurangabad, Thane and Chandrapur areas violated the average annual standards and recorded annual concentrations in the range of 40- 65 μg/m³.

The highest 98 percentile NOx concentrations were recorded at Bandra (193.4μg/m³) and Sion (177.5μg/m³), exceeding the standard of 80μg/m³ by almost 2.5 times. Similarly many dayas were recorded with high NOx pollution in Pimpri Chinchwad (118.6μg/m³), Pune (Swargate 117.8μg/m³) and Ballarshah (106.8μg/m³). This could be attributed to the dense vehicular population and industrial activities in those areas.

Residential areas in Amravati & Nagpur and parts of Aurangabad, Chandrapur, Nashik and Pune show less pollution of NOx compared to the standards.

NO$_X$ concentrations in rural and other areas

Table No. 14: Data for NO$_x$ recorded at AAQMS representing rural and other areas (2014-15)

RO	Station name	Station code	Max of NO$_x$	98th percentile	Average of NO$_x$	Min of NO$_x$
CPCB Standards			*80*	*80*	*40*	*80*
AMR	Raj Kamal Chowk	547	20.0	18.2	13.8	10.0
AUR	Ganj Golai - Sidhheshwar Bank	643	24.0	21.0	13.7	9.0
KYN	Ambernath	445	*122.0*	*114.8*	*52.6*	25.0
	Badlapur - BIWA House	649	*134.0*	*126.8*	*50.4*	26.0
	I.G.M. Hospital	-	53.0	53.0	*41.0*	28.0
	Smt. CHM College Campus	647	*121.0*	77.0	*42.1*	19.0
	Powai Chowk	648	*144.0*	*128.6*	*56.5*	26.0
KOP	Ruikar Trust	509	*83.0*	78.2	*50.0*	17.0
	Sangli-Miraj Primary Municipal school	575	*107.0*	*94.9*	*48.3*	16.0
NGP	Govt Polytechnic Col, Sadar	314	62.0	52.0	31.0	15.0
NVM	Airoli	-	*83.0*	56.3	28.4	2.0
PUN	Nal Stop	379	*130.0*	*110.7*	*48.6*	15.0
TNA	Naupada	304	75.0	74.0	*61.8*	48.0

Data source: MPCB, 2015 ..... **Units: μg/m³**

Note: I.G.M hospital is categorised as a sensitive type of monitoring zone by MPCB and the standards are 80 μg/m³ and 20 μg/m³ for 24 and annual averages.
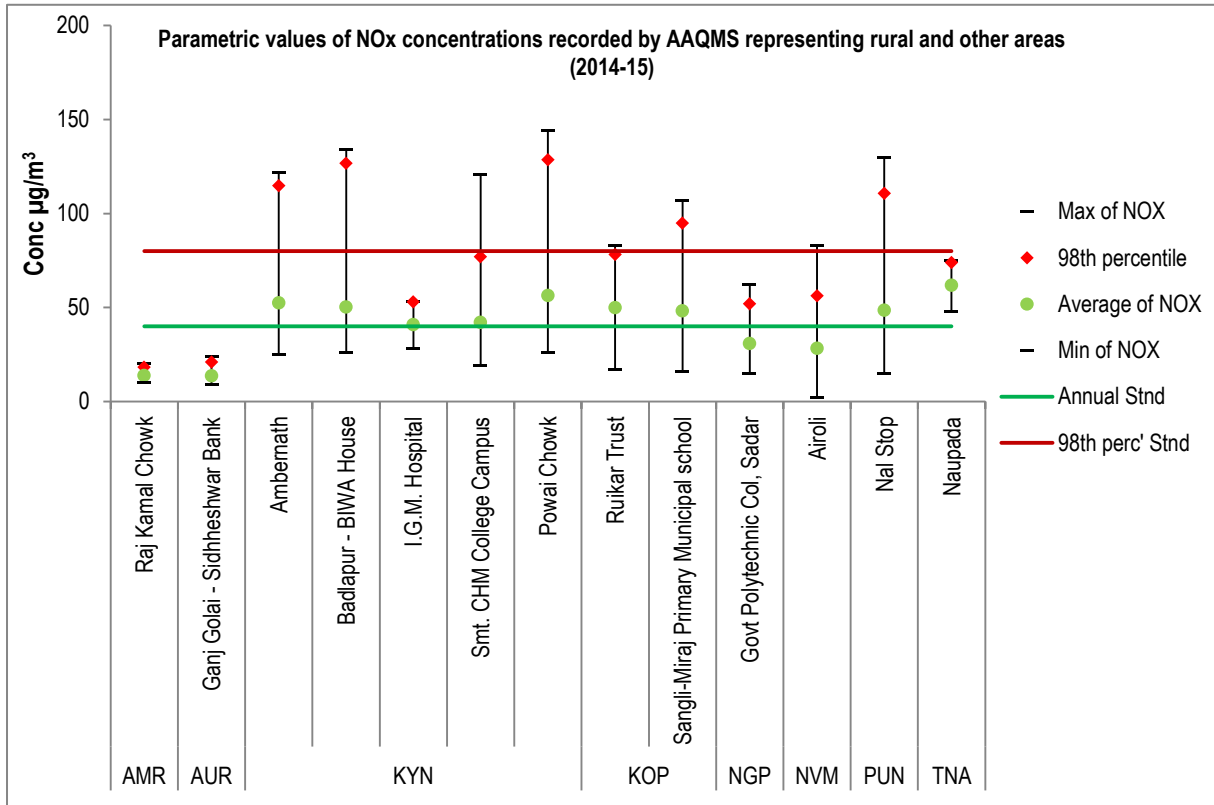
Figure No. 11: Parametric values of NOx concentrations recorded by AAQMS representing rural and other areas (2014-15)

Out of the all the stations, presented in Figure No. 11, representing rural and other areas, 9 AAQMS were found to be exceeding the annual average standards for NOx concentrations (40 μg/m^3). All the AAQMS in Kalyan, Kolhapur, Pune and Thane regions exceeded levels of NOx. Naupada station from Thane region records the highest concentrations of NOx (61.8μg/m^3) followed by Powai Chowk from Kalyan region (56.5μg/m^3) and other stations from Kalyan, Kolhapur and Thane.

Out of the 5 station in which violated the NO$_X$ standards in the Kalyan area, AAQMS at Powai Chowk recorded the highest 98 percentile NOx levels at 128.6μg/m^3 as compared to the daily standard of 80 μg/m^3. I.G.M Hospital area, in Kalyan region recorded annual concentrations of 41μg/m^3 which is more than double the standards set for sensitive areas (20μg/m^3).

Navi Mumbai, Nagpur, Aurangabad and Amravati regions display reading below the annual average indicating good air quality.

NO$_X$ concentrations in commercial areas

Table No. 15: Data for NO$_x$ recorded at AAQMS representing commercial areas (2014-15)

RO	Station name	Station code	Max of NO$_x$	98th percentile	Average of NO$_x$	Min of NO$_x$
CPCB Standards			*80*	*80*	*40*	*80*
AMR	Akola- College of Engg & Technology	702	13.0	13.0	9.5	7.0
AUR	Mutha Chowk	704	44.0	42.3	32.9	29.0
KYN	Prematai hall	-	48.0	48.0	*42.2*	33.0
	MPCB RO Kalyan office	-	45.0	45.0	36.3	31.0

..... Units: µg/m³
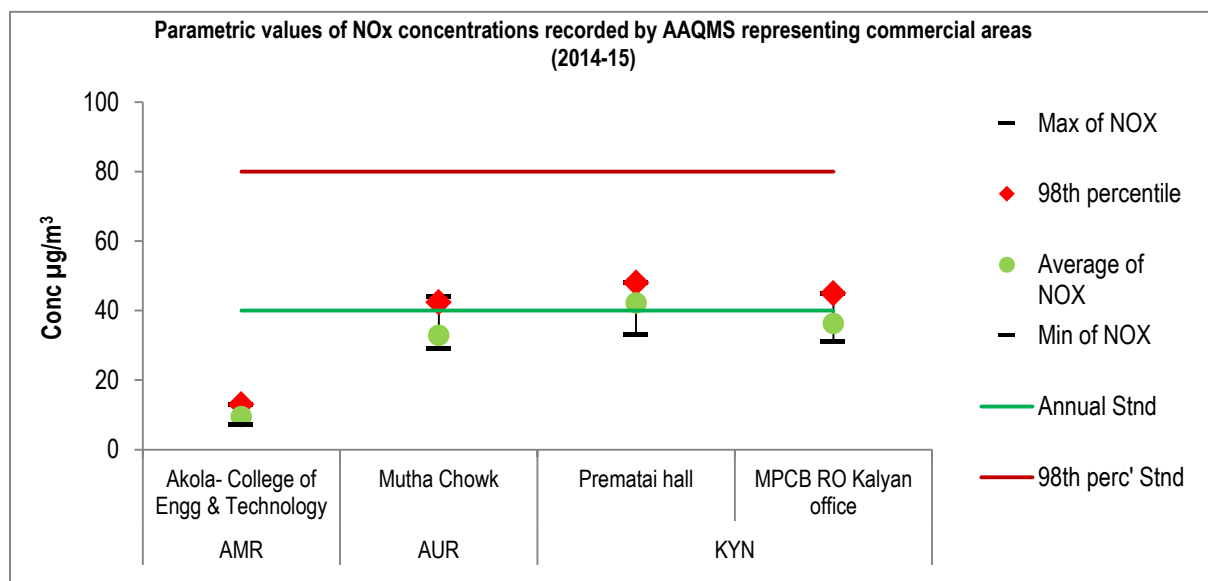
Figure No. 12: Parametric values of NOx concentrations recorded by AAQMS representing commercial areas (2014-15)

It can be clearly observed from

Figure No. 12 that all the stations representing commercial areas, recorded NOx concentrations below the annual standards for NOx (40 µg/m³) except for the AAQMS representing the region near Prematai hall at Bhiwandi, Kalyan region (42.2µg/m³) which is almost at par with the standards and hence could be categorised as a borderline category.

Amravati region recorded the lowest concentration of NOx levels which indicates the commercial area of Amravati region to be cleanest area compared with the other AAQMS representing commercial areas in the state.

Particulate Matter

Particulate matter (PM) is a complex mixture of extremely small particles and liquid droplets made up of a number of components, including acids (nitrates and sulphates), organic chemicals, metals, and soil or dust particles[17]. PM generally includes a fine fraction of particles ranging between 10-2.5 μm 10 times finer than the hair follicle (Table No. 16). PM is described using terms based on the complexity and the importance of particle size in determining exposure and human dose.PM can be directly emitted into the atmosphere because some natural and anthropogenic processes or formed secondarily from precursor gases. Today, PM emissions are highly regulated in most countries due to the environmental concerns. PM's are also responsible in affecting the climate of the earth by changing the amount of radiation retained in the earth's system.

Table No. 16: Relative size sources and harmful impacts of PM$_{2.5}$ and PM$_{10}$

Common name	Respirable Suspended Particulate Matter (RSPM)		
Size in microns	PM$_{2.5}$&PM$_{10}$	**Nature**	Non Polar[18]
Relative Comparison	Source:[19]		
Major sources	• **Natural:** Volcanoes, Dust storms, Forest and grassland fires, Living vegetation, and Sea spray • **Anthropogenic:** Power plants and industrial processes, Vehicular traffic, Domestic coal burning, Industrial and Municipal waste incinerators		
Effects	• **Human Health:** premature death, aggravated asthma, acute respiratory symptoms including aggravated coughing and difficult or painful breathing, chronic bronchitis and decreased lung function. • **Vegetation**: Can clog stomatal openings of plants and interfere with photosynthesis functions.		

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[17]US Environmental Protection Agency: *http://www.epa.gov/pm/*

[18]Dasgupta et al. *Fine Particulates in Ambient Air And Its Organic Component*

[19]US Environmental Protection Agency: *http://www.epa.gov/nheerl/humanstudies/images/PM2.5%20scale-large.jpg*

Trend in concentrations of Particulate Matter in Maharashtra
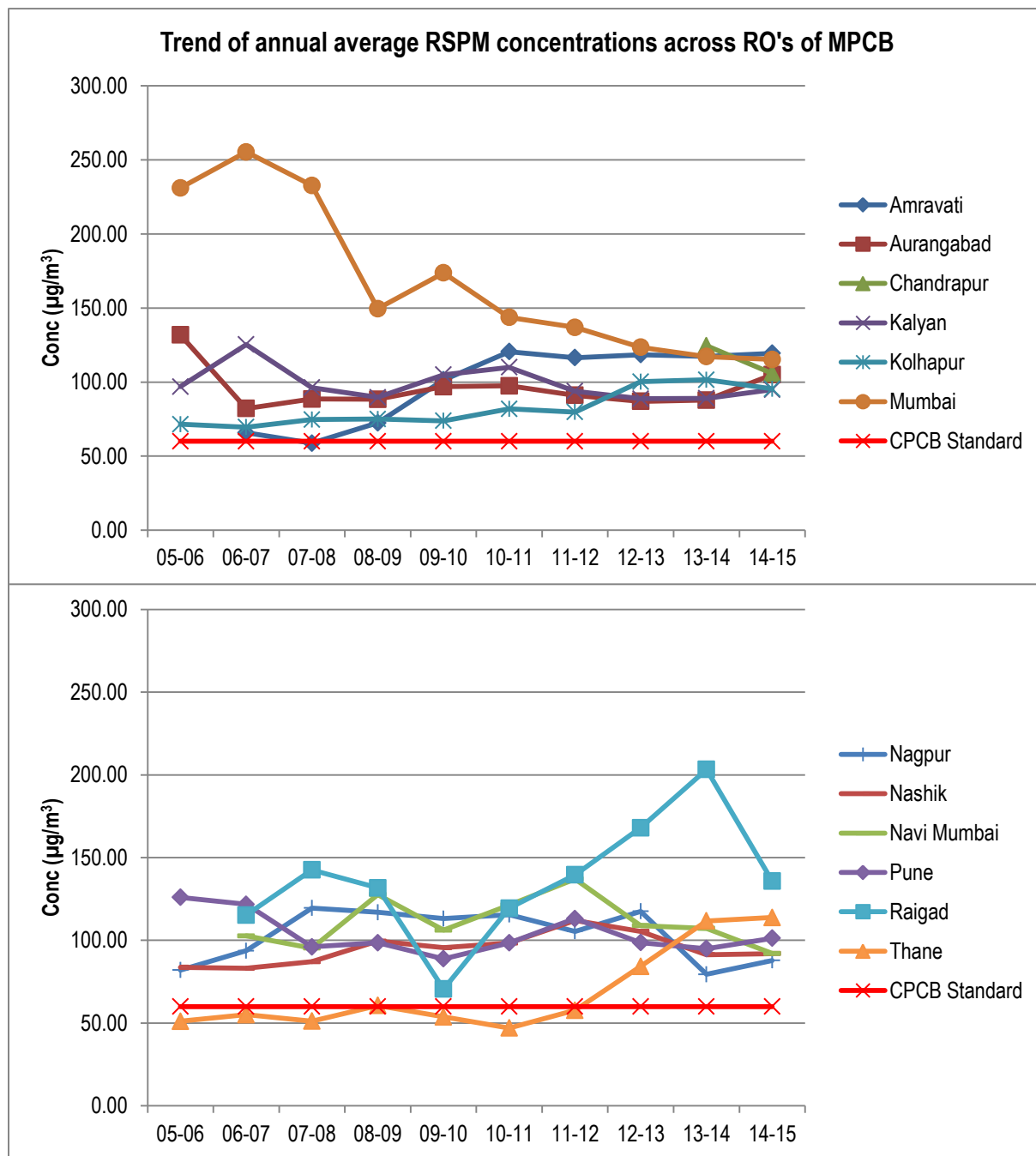

Figure No. 13: Trend in annual RSPM concentrations across different regions

The PM concentrations across all the regions in Maharashtra have been very high (Figure No. 13) and have consistently exceeded the standards (100µg/m^3) from the past decade. Even the regions with low SO_2 and NO_X concentrations have recorded high RSPM concentration.

Mumbai and Chandrapur regions are amongst the most highly polluted regions for RSPM concentrations. Although one may note a declining trend in RSPM concentrations in Mumbai region, the annual concentrations across the past ten years have been almost two to three times the annual standard. The Chandrapur region has also recorded high RSPM concentrations in the range of 100-150µg/m^3. The Chandrapur region has major power plants, cement manufacturing and coal mining activities. These activities could be attributed to high RSPM concentrations in the region.

Thane and Raigad have in the past three years recorded an inclining trend for annual RSPM concentrations. Wheareas, the RSPM concentrations in the Nagpur and Nashik regions have been in the range of 80-100µg/m^3. The type wise performance for RSPM concentrations recorded by the AAQMS in Maharashtra active in the year 2014-15 have been presented in the following section.

RSPM concentrations in industrial areas

Table No. 17: Data for RSPM recorded at AAQMS representing industrial areas (2014-15)

RO	Station name	Station code	Max of RSPM	98th percentile	Average of RSPM	Min of RSPM
CPCB standards			100	100	60	100
AMR	MIDC Water Works - Akola	701	165.0	162.0	129.2	30.0
	Godhadiwala Private Limited	549	146.0	139.3	108.0	76.0
AUR	Jalna- Krishnadhan seeds Ltd	707	475.0	368.0	175.7	37.0
	MIDC Water Works - Latur	641	162.0	148.2	79.9	32.0
	Industrial Area CIDCO	705	245.0	238.3	185.6	122.0
CDP	Chandrapur - MIDC	281	198.0	169.4	70.9	32.0
	Tadali MIDC	638	343.0	324.4	106.8	10.0
	Rajura	640	359.0	328.2	142.1	28.0
KYN	Dombivali	265	319.0	304.4	109.7	58.0
	MIDC Office Dombivali	-	335.0	296.6	121.1	57.0
KOP	Chiplun - Water Treatment	490	215.0	200.1	117.4	57.0
	Krishna Valley school	576	252.0	225.5	102.9	25.0
NGP	MIDC Office, Hingna Road	288	276.0	219.9	128.6	46.0
NHK	MIDC Jalgaon	646	146.0	144.0	124.2	65.0
	MIDC Satpur - VIP	269	272.0	144.1	78.9	31.0
NVM	Rabale	491	378.0	216.4	133.2	46.0
	Mahape, MPCB-Nirmal Bhavan	493	245.0	208.9	120.5	14.0
	Taloja - MIDC Building	496	436.0	264.0	141.8	56.0
PUN	Bhosari	312	242.0	225.5	103.4	12.0
TNA	Balkum/Glaxo	-	307.0	224.8	130.8	30.0

Data Source: MPCB, 2015   **Units: μg/m³**
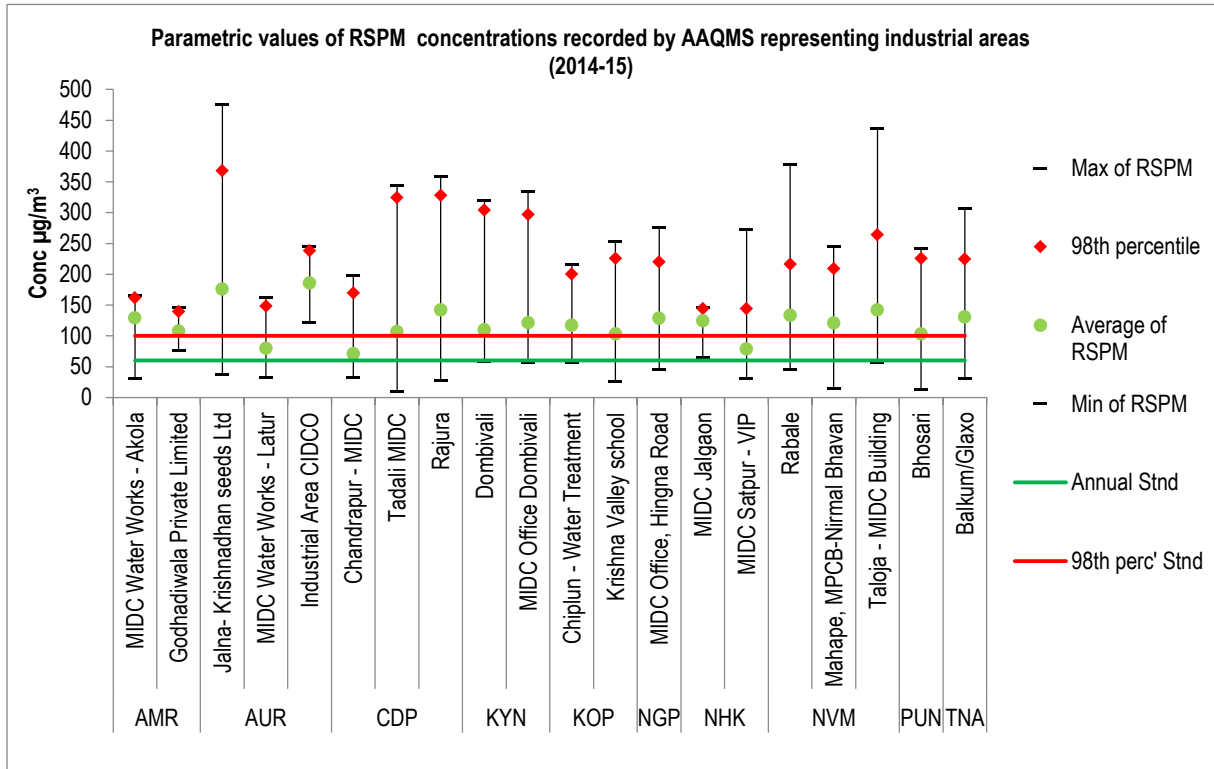
Figure No. 14 Parametric values of RSPM concentrations recorded by AAQMS representing industrial areas (2014-15)

Data Source: MPCB, May 2015

As seen in Figure No. 14 all the AAQM sites representing industrial areas violated the annual and daily standards prescribed by CPCB ($60\mu g/m^3$). In the year 2014-15 the MIDC areas of Aurangabad region recorded the highest annual average RSPM concentrations and all the three AAQMS recorded RSPM concentration in the range of 70 – 185 $\mu g/m^3$. The lowest concentration of annual average concentration of RSPM was recorded at Chandrapur MIDC ($70\mu g/m^3$), but still the value exceeds the annual average. The area represented by Krishnadhan seeds ltd located at Jalna (Aurangabad region) recorded the highest daily RSPM concentration of $475\mu g/m^3$ amongst all industrial area in Maharashtra.

Just like the scenario for concentrations of RSPM, all the 98 percentile values are also exceeding the standards (100 $\mu g/m^3$). The highest 98 percentile value was recorded in the area monitored by the AAQMS at Jalna- Krishidhan Seeds Ltd of Aurangabad regions (368 $\mu g/m^3$) with the value exceeding 3.6 times the standard value. The AAQMS stations of Chandrapur–Rajura, Tadali MIDC and MIDC records the next highest 98th percentile readings in range of 160-350$\mu g/m^3$. The lowest observation was recorded at the area represented by the AAQMS site at Godhhadiwala Private of Amravati region (139.3 $\mu g/m^3$).

This indicates the need to undertake some serious measures in order to reduce the RSPM pollution in the industrial area of Maharashtra.

RSPM concentrations in residential areas

Table No. 18: Data for RSPM recorded at AAQMS representing residential areas (2014-15)

RO	Station name	Station code	Max of RSPM	98th percentile	Average of RSPM	Min of RSPM
CPCB Standards			100	100	60	100
AMR	LRT Commerce College	700	144.0	137.4	116.7	97.0
	Govt. College of Engineering	548	108.0	104.6	75.3	42.0
AUR	SBES College	511	203.0	185.0	97.0	27.0
	Collector Office, Aurangabad	512	153.0	131.7	78.0	26.0
	C.A.D.A. Office	513	161.0	153.9	79.1	15.0
	Jalna- Bachat Bhavan	706	262.0	195.0	99.4	17.0
	Shyam Nagar-Kshewraj Vidyalaya	642	246.0	158.0	89.4	32.0
	Ganeshnagar	703	136.0	126.1	90.9	33.0
CDP	Ghuggus	267	312.0	296.3	148.4	9.0
	Chandrapur - SRO MPCB	396	207.0	176.9	87.3	3.0
	Ballarshah	639	312.0	307.2	130.8	26.0
KOP	Chiplun - MIDC Chalkewadi	489	211.0	198.3	118.2	61.0
	Shivaji University Campus	508	89.0	87.0	60.4	34.0
	Mahadwar Road	510	169.0	163.3	105.2	51.0
	Terrace of SRO-Sangli, Udyog Bhavan	574	261.0	179.9	66.6	15.0
MUM	Bandra	-	224.0	193.0	114.2	30.0
	Sion	-	390.0	247.7	116.5	36.0
NGP	IOE North Ambazari road	287	235.0	208.3	105.6	45.0
	Civil lines Nagpur	711	113.0	88.5	61.5	27.0
NHK	Old B. J. Market	644	142.0	138.0	111.2	52.0
	Girna Water Tank	645	136.0	132.0	110.9	46.0
	RTO Colony	259	175.0	142.1	76.7	35.0
	NMC Nashik	280	172.0	138.0	76.9	32.0
	SRO Office Nashik	710	221.0	148.3	72.9	27.0
NVM	Nerul - DY Patil	492	384.0	310.0	131.0	40.0
	Kharghar - CIDCO Nodal Office	494	238.0	230.3	127.9	29.0
PUN	Swargate, Pune	381	268.0	179.9	88.2	8.0
	Pimpri-Chinchwad - BOB Building	708	272.0	241.6	96.2	17.0
	Karve Road - CAAQMS	-	280.0	245.0	123.0	25.0
	WIT Campus	299	92.0	87.4	76.9	65.0
	Saat Rasta- Chithale Clinic	300	100.0	100.0	78.3	65.0
	Solapur	-	248.0	215.6	104.3	22.0
RGD	Panvel- Water Supply Plant	495	297.0	269.7	136.1	46.0
TNA	Kopri	303	323.0	168.6	106.4	18.0

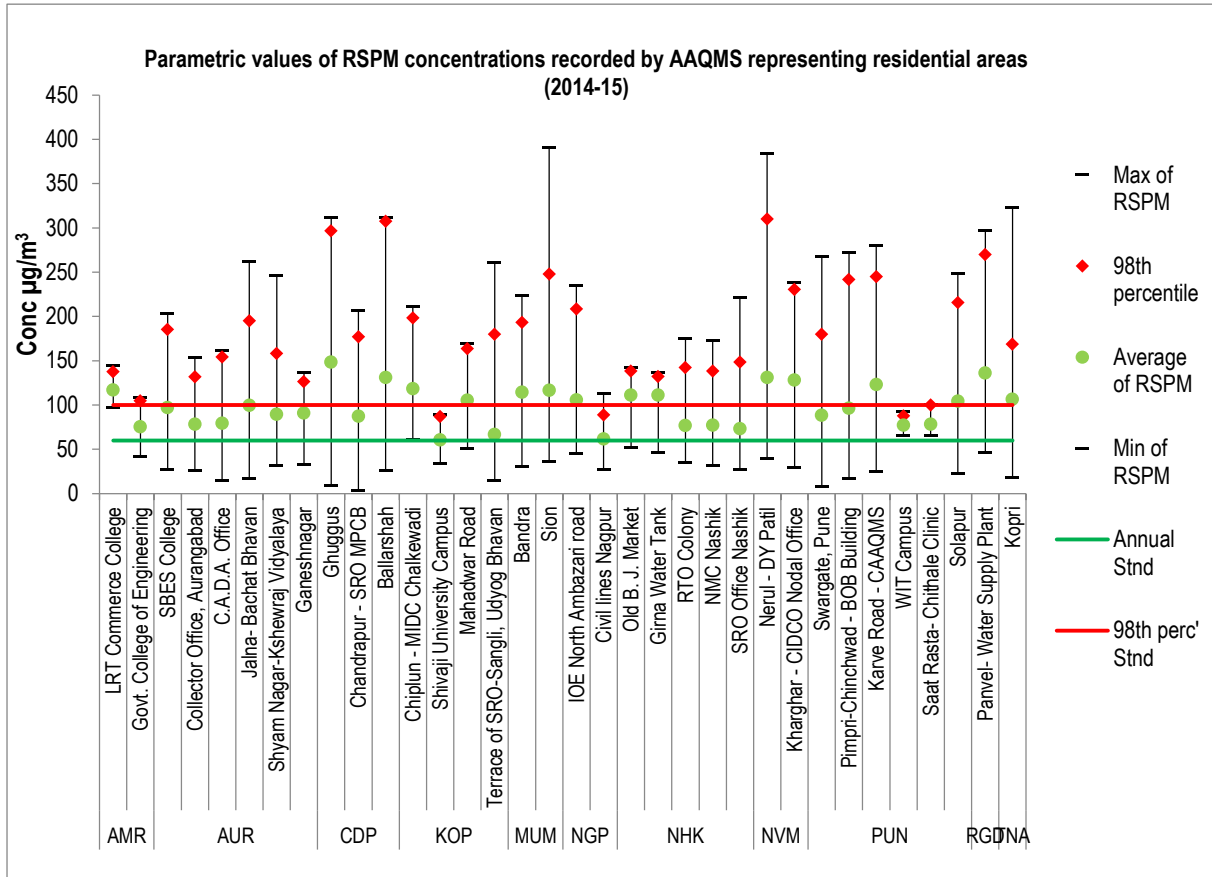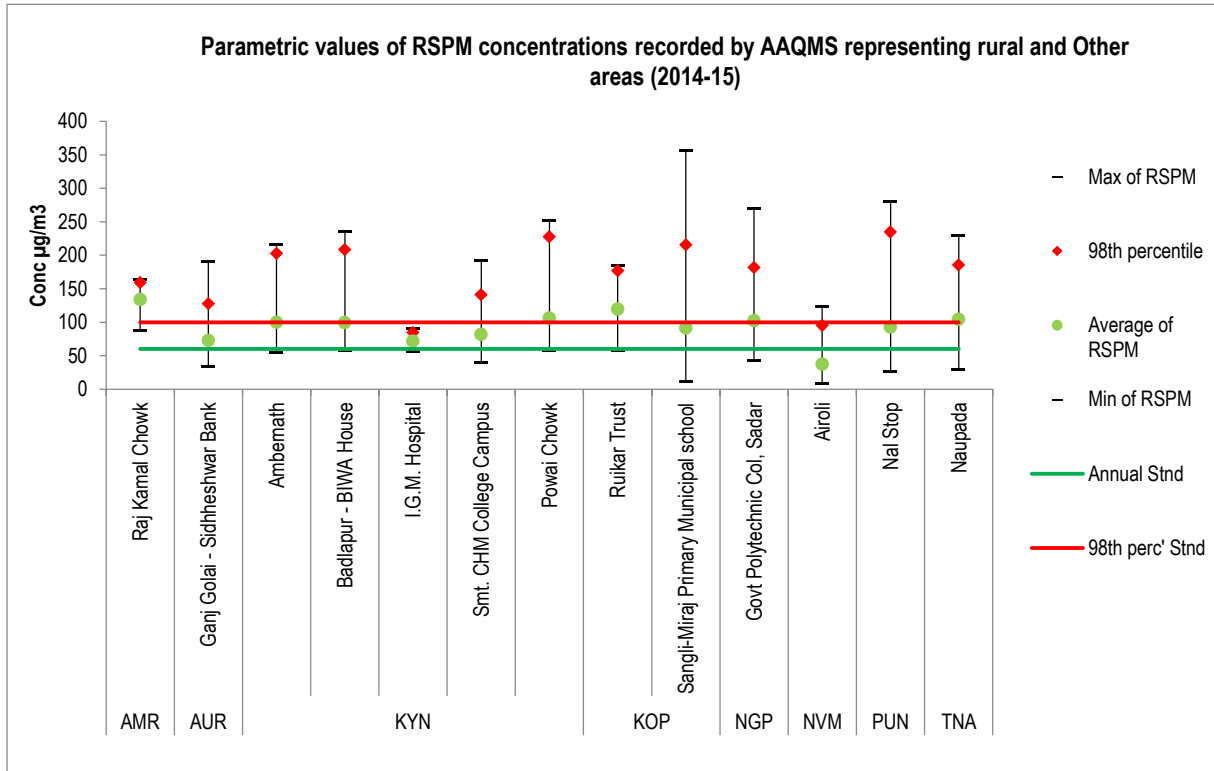**Data Source: MPCB, 2015**   **....**   **Units: µg/m³**

Figure No. 15: Parametric values of RSPM concentrations recorded by AAQMS representing residential areas (2014-15)

Data Source: MPCB, May 2015

All the AAQMS representing residential areas (Figure No. 15) exceeded both the annual as well as daily concentration of RSPM except Shivaji University Campus of Kolhapur region with record of 60.4µg/m³, almost at par with the annual average standard for RSPM concentration (60µg/m³). The Ghuggus area (148µg/m³) in Chandrapur region ranks highest with annual average concentration of RSPM almost 2.5 times the standards, among the residential AAQMS sites. The Mumbai and Navi Mumbai region recorded RSPM concentrations between 100-130µg/m³, which is almost twice the standards.

As for the daily standards the AAQMS at Nerul- DY Patil, in Navi Mumbai region recorded the highest 98 percentile concentration (310µg/m³) which is almost thrice the levels of the standards (100 µg/m³) followed by Ballarshah (307.2 µg/m³) and Ghuggus (296.3 µg/m³) stations from Chandrapur region. This could be attributed to various activities like stone quarries, traffic movement and meteorological conditions in case of Navi Mumbai while the presence of coal mines, power-plant, cement industries and so on in Chandrapur area.

RSPM concentrations in rural and other areas

Table No. 19: Data for RSPM recorded at AAQMS representing rural and other types of areas (2014-15)

| RO	Station name	Station code	Max of RSPM	98th percentile	Average of RSPM	Min of RSPM
CPCB standards			100	100	60	100
AMR	Raj Kamal Chowk	547	164.0	159.1	133.9	87.0
AUR	Ganj Golai - Sidhheshwar Bank	643	190.0	127.6	72.6	33.0
KYN	Ambernath	445	216.0	202.7	99.9	55.0
	Badlapur - BIWA House	649	236.0	208.6	99.5	57.0
	I.G.M. Hospital	-	90.0	84.6	71.7	56.0
	Smt. CHM College Campus	647	192.0	141.0	81.9	40.0
	Powai Chowk	648	252.0	227.5	106.2	57.0
KOP	Ruikar Trust	509	185.0	177.1	119.7	58.0
	Sangli-Miraj Primary Municipal school	575	357.0	215.8	91.3	12.0
NGP	Govt Polytechnic Col, Sadar	314	270.0	181.8	102.6	42.0
NVM	Airoli	-	123.0	95.3	37.5	8.0
PUN	Nal Stop	379	281.0	235.1	92.8	27.0
TNA	Naupada	304	230.0	185.8	104.2	29.0

Data Source: MPCB, 2015 .... **Units: μg/m³**

Figure No. 16 Parametric values of RSPM concentrations recorded by AAQMS representing rural and other areas (2014-15)

Data Source: MPCB, May 2015

As seen in Figure No. 16 almost all AAQMS, under rural and other areas exceeded the annual average standard (60μg/m³), except for Airoli station from Navi Mumbai which has recorded the lowest concentration of annual RSPM as 37μg/m3 lying within the limit set by CPCB (60 μg/m³). The AAQMS site at Raj Kamal Chowk in Amravati region recorded annual concentration of about 133μg/m³ ranking highest among all the areas. This is followed by the area represented by the AAQMS at Ruikar Trust in Kolhapur with annual RSPM concentration of 119μg/m³ which had recorded the highest RSPM concentration in year 2013-14.

The 98th percentile value also exceeded the standards (100 μg/m³) by all the stations except for Airoli in Navi Mumbai (95.3 μg/m³) and I.G.M hospital in Kalyan region (84.6μg/m³). The highest 98 percentile value was recorded at Nal Stop (235.1μg/m³) in Pune region which was recorded to be almost double the standards (100 μg/m³). This is mainly due to the heavy vehicular congestion present in that area. The AAQMS site at Sangli- Miraj Primary Municipal School recorded the highest daily peak (357 μg/m³) compared to all other stations in Maharashtra which is almost 3.5 times the annual average for concentration of RSPM.

RSPM concentrations in commercial areas

Table No. 20: Data for RSPM recorded at AAQMS representing commercial areas (2014-15)

RO	Station name	Station code	Max of RSPM	98th percentile	Average of RSPM	Min of RSPM
CPCB standards			100	100	60	100
AMR	Akola- College of Engg & Technology	702	177.0	175.2	146.0	110.0
AUR	Mutha Chowk	704	178.0	176.3	128.0	51.0
KYN	Prematai hall	-	88.0	85.4	70.4	59.0
	MPCB RO Kalyan office	-	90.0	87.6	71.4	60.0

Data Source: MPCB, 2015   **Units: μg/m³**
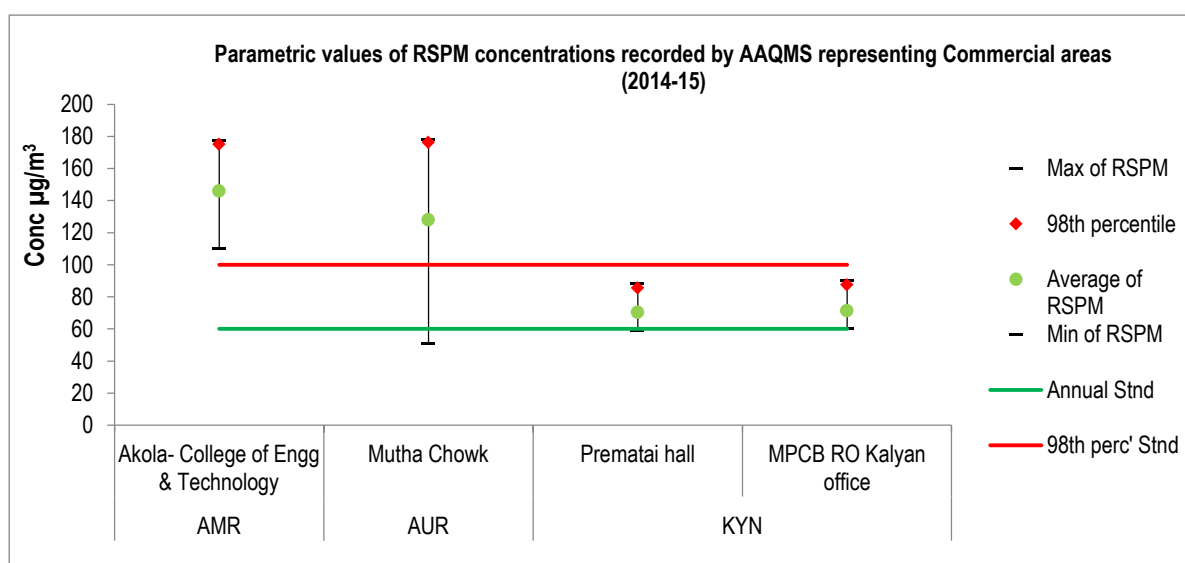
Figure No. 17 Parametric values of RSPM concentrations recorded by AAQMS representing commercial areas (2014-15)

Data Source: MPCB, 2015

The average annual concentration of RSPM in commercial areas of all AAQMS in Maharashtra exceeds the permissible limit prescribed by CPCB (60μg/m³). As seen in Figure No. 17 the highest concentration of annual RSPM was observed at Akola College of engineering with record of 146μg/m³. The AAQMS at Aurangabad (178μg/m3) and Amravati (177μg/m3) recorded the highest daily concentration of RSPM. Even though the Prematai hall of Kalyan region shows lowest annual (70μg/m³) and daily (88μg/m3) concentration of RSPM, it is still above the annual standards.
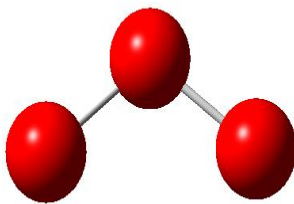
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Ozone

Ozone (O₃), a pale blue gas molecule, is composed of three oxygen atoms and has a pungent smell. The ozone layer found high in the upper atmosphere (stratosphere) shields us from much of the sun's ultraviolet radiation. However, ozone found at the ground level (troposphere), breathable packet, is an air pollutant and causes serious health problems. Ozone is not emitted directly into the air, but is created by chemical reactions between oxides of nitrogen (NOx) and volatile organic compounds (VOC) in the presence of sunlight. Emissions from industrial facilities and electric utilities, motor vehicle exhaust, gasoline vapours, and chemical solvents are some of the major sources of NOx and VOC.

Breathing ozone can trigger a variety of health problems. Ozone penetrates deeper into the parts of the lungs that are more vulnerable to injury. Ozone makes people more sensitive to allergens, which are the most common triggers for asthma attacks.[20]Ground level ozone can also have harmful effects on sensitive vegetation and ecosystems .The sources and effects of ozone are drafted below in Table No. 21.

Table No. 21: Molecular formula, sources and harmful impacts of Ozone

	Common name	Molecular formula	Life span in air	Nature
	Ozone	O₃	22 +/- 2days[21]	Polar
Molecular structure				
Sources	*Ozone precursors come from fuel combustion from automobiles; oil based and paint industries, power plant, oil refineries, and electronic equipment such as photocopiers.*			
Effects	• *Human Health: Reduce lung function, respiratory illness, premature death, asthma, bronchitis, heart attack, and other cardiopulmonary problems.* • *Environment: Photochemical Smog*			

[20]United States Air and Radiation EPA-452/K-99-001&Environmental Protection Washington, DC 20460 July 1999Agency*Smog-Who does it hurt*, *Page2.*

[21] O. Cooper, ESRL, *Tropospheric Ozone Global distribution and Radiative Forcing*(2007), Slide 5
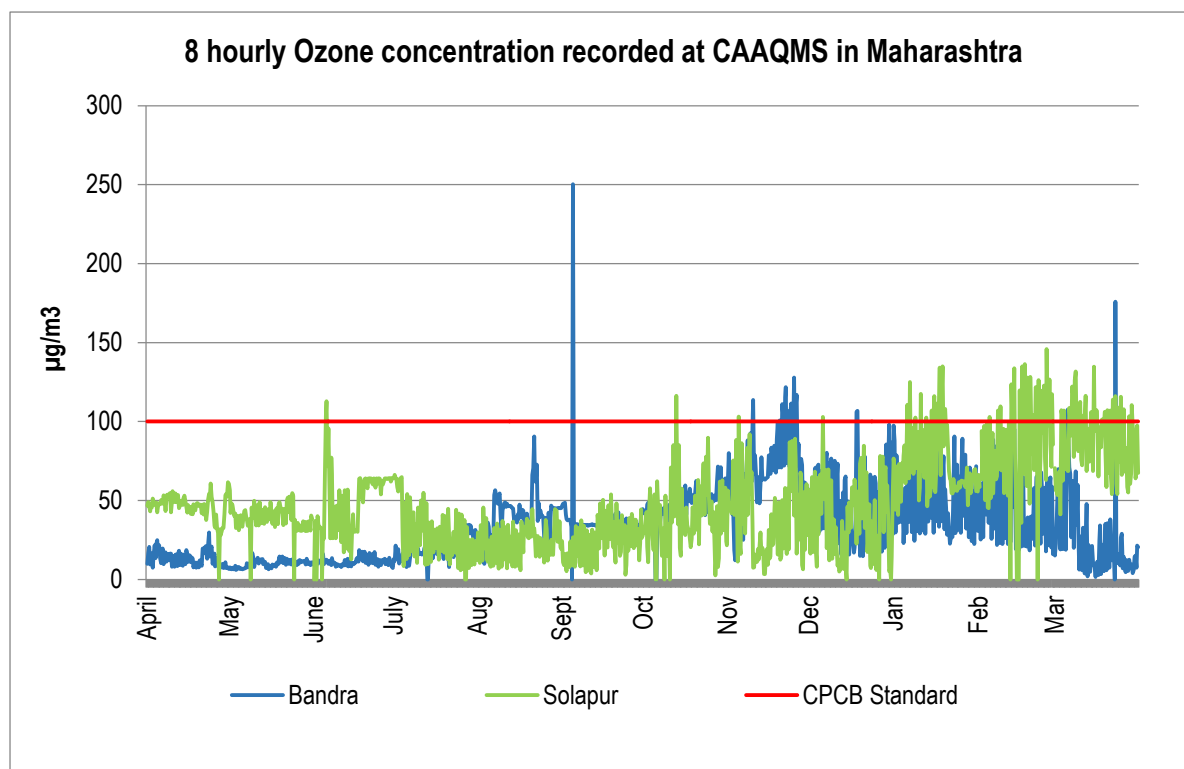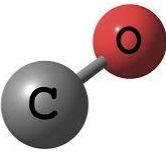
Figure No. 18: 8 hourly Ozone concentration recorded at CAAQMS in Maharashtra

The ozone concentrations were recorded by the CAAQMS in Maharashtra and the regions of Bandra and Solapur recorded more than 1094 and 1092 observations for 8 hourly concentrations in the year 2014-15. As per the data both the regions were recorded clean for ozone pollution for more than 98% and 94% of the times (Figure No. 18). The highest ozone concentrations of 250μg/m^3 and 145 μg/m^3 were recorded at Bandra and Solapur respectively, which could be outliers for both the regions. The Solapur region recorded high ozone concentrations between January and March (winter season) while the Bandra region recorded high ozone concentrations between October to December months.

Carbon Monoxide

Carbon monoxide (CO) is a colourless, odourless, tasteless, non-irritating, and poisonous gas consisting of one carbon and oxygen atom, connected by a triple bond (Table No. 22). CO is produced when carbon-based fuels undergo incomplete combustion. The largest proportion of these emissions are produced as exhausts of internal combustion engines, especially by motor vehicles with petrol engines. Carbon monoxide a shelf life of about 2 months and eventually, carbon monoxide reacts with other compounds in the atmosphere thus converting to carbon dioxide[22]. Human activities are attributed to the release of about 60% of the carbon monoxide whereas natural processes account for the remaining 40%[23]. The most important health effects associated with exposure to CO is due to its strong bond with the haemoglobin molecule, forming carboxy haemoglobin (COHb) which is then incapable of releasing oxygen to the tissue such as the heart and the brain.[24] At low concentrations (10 ppm) CO pollutant affects cardiovascular activities, nervous system and respiration, which may lead to unconsciousness and also death after prolonged exposures. Studies have recorded death due to acute exposure to high concentration of CO (>500ppm)[25].

Table No. 22: Molecular formula, sources and harmful impacts of Carbon monoxide

	Common name	Molecular formula	Life span in air	Nature
	Carbon Monoxide	CO	2 months	Polar
Molecular structure				
Sources	• **Natural**: Volcanoes and forest fires • **Anthropogenic :**Emissions from automobiles, coal- gas- or oil-fired heating or power generating plants, combustion of waste in municipal and other incinerators, burning of forest and agricultural materials, smoldering coal refuse material			
Effects	• **Human Health:** dizziness, nausea (feeling sick) and vomiting, tiredness and confusion, stomach pain, shortness of breath and difficulty in breathing, Blue baby syndrome.			

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[22] U.S. Department of Health And Human Services Public Health Service Agency for Toxic Substances and Disease Registry, Toxicological Profile For Carbon Monoxide ,Page 2

[23] WHO Environmental Health Criteria 213: Carbon Monoxide (second edition),Sources of carbon monoxide.Page38

[24] **T.** Greiner, Department of Agricultural and Biosystems Engineering, Iowa State University, Carbon Monoxide Poisoning: Dangers, Detection, Response, and Poisoning (AEN-193)

[25] M. Fierro, The University of Arizona, College of Public Health, Adverse Health Effects Of Exposure To Ambient Carbon Monoxide (September 2001),Page 4
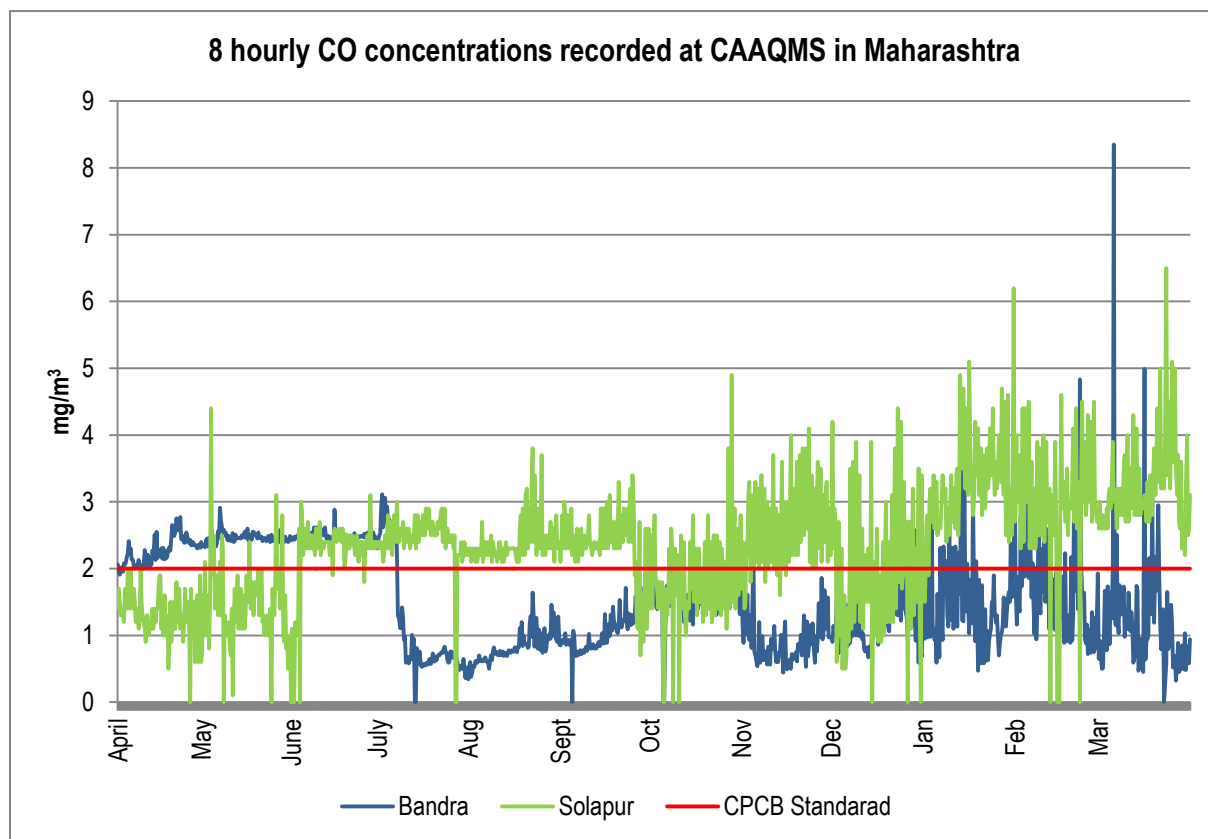
Figure No. 19: 8 hourly CO concentrations recorded at CAAQMS in Maharashtra

The CO concentrations are recorded at the CAAQMS sites in Maharashtra on a real time basis. CPCB has set 8 hourly and hourly standards for the CO pollutant.

For the year 2014-15 1085 and 1083 observations were recorded for 8 hourly CO concentrations at Bandra and Solapur (Figure No. 19) respectively. The Bandra region exceeded the 8 hourly standards ($2mg/m^3$) for more than 30% (333) observations while the Solapur region violated the standards for more than 69% (757) of the observations.

The Bandra region exceeded the standards majorly during the summer season spread across April to July and drastically dropped in the peak monsoon season in the July month. While it is during the same time that the Solpaur region recorded CO concentrations well within the standards and increased concentrations of CO were recorded throughout the monsoon and winter seasons.

National Air Quality Index

Air Quality Index (AQI) is a tool for effective communication on the status of the air quality to people. AQI transforms complex air quality data of various pollutants into a single index value, which are easy to understand. The categories of the AQI usually are expressed in terms of the air quality being Good, Bad, Poor or Very Poor based on the concentrations of various pollutants and their health impacts at various concentrations. The AQI is useful for reporting daily air quality and to gauge the pollution load. Most of the AQI developed by various agencies are within a range of 0 to 500 and higher value of AQI indicates high level of pollution. Depending upon 'doses of exposure' AQI is further divided into different classes of AQI, which present different health concerns. To make it easy to understand, the categories of AQI are assigned color codes. Various international environmental agencies such as US-EPA have developed their own set of mathematical algorithms to determine AQI, which are based on human exposure dose of air pollutants.

In order to develop a calculation of AQI specific to India, CPCB in consultation with IIT (Indian Institute of Technology) Kanpur, devised an AQI system after conducting a literature review, understanding the air quality monitoring procedures and protocols, INAQS (Indian National Air Quality Standards), and dose-response relationships of pollutants. In October 2014 CPCB published the report titled National Air Quality Index[26] and has elaborated the procedure of calculation and the subsequent categories of the AQI. There are six AQI categories, namely Good, Satisfactory, Moderately polluted, Poor, Very Poor, and Severe associated to various health adversaries (Table No. 23).

Table No. 23: Health advisories for various range of Air Quality Indices and respective colour codes

AQI	AQI Associated Health Impacts
Good (0–50)	Minimal Impact.
Satisfactory (51–100)	Minor breathing discomfort to sensitive people.
Moderate (101–200)	Breathing discomfort to the people with lung disease such as asthma and discomfort to people with heart disease, children and older adults.
Poor (201–300)	Breathing discomfort to people on prolonged exposure and discomfort to people with heart disease.
Very Poor (301–400)	Respiratory illness to the people on prolonged exposure specially in people with lung and heart diseases.
Severe (401-500)	Respiratory effects even on healthy people and serious health impacts on people with lung/heart diseases. The health impacts may be experienced even during light physical activity.

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[26] CPCB 2014, *National Air Quality Index*, Central Pollution Control Board, Ministry of Environment & Climate Change, Government of India

Calculation of AQI

Each of these categories is decided based on ambient concentration values of air pollutants and their likely health impacts (known as health breakpoints). AQ sub-index and health breakpoints 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 (upto 24-hours) NAAQS are prescribed. 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 $31\mu g/m^3$, 100 at concentration $60\mu g/m^3$, and 75 at concentration of $45\mu g/m^3$). 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. 24).

The worst sub-index is the AQI for that location. All the eight pollutants may not be monitored at all the locations. 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.

Table No. 24: 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+

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

where:
- I = the (Air Quality) index
- C = the pollutant concentration
- C_{low} = the concentration breakpoint that is $\leq C$
- C_{high} = the concentration breakpoint that is $\geq C$
- I_{low} = the index breakpoint corresponding to C_{low}
- I_{High} = the index breakpoint corresponding to C_{high}

AQI for 2014-15

An overview of the AQI for the reading recorded by the AAQMS in Maharashtra has been calculated using three parameters viz, SO_2, NOx and RSPM as per the calculation and AQI categories released by CPCB and IIT Kanpur in October 2014. After determining the sub-indices for a region the worst sub-index from the AAQMS has been considered as the AQI for the area represented by that AAQMS.

In the year 2014-15, more than 8,500 readings were recorded across all the AAQMS and almost 54% (Figure No. 20) of the readings were recorded in category of "Good" and "Satisfactory" indicating that more than 54% of the observations met the daily standards for all the parameters. Majority of the readings (45%) were recorded in the "Moderate" category across Maharashtra. It was very seldom that the air pollution was categorised in "Poor" or "Severe" category which was less than 1% and almost negligible.

As seen in Figure No. 21, The AAQMS in Solapur area recorded the cleanest Air quality in the state. Almost 100% of the readings in the city were recorded to be in the "Good" and "Satisfactory" category for two of its AAQMS while the third AAQMS (Solapur CAAQMS) recorded the air quality in the category of "Moderate" for the majority of the readings. The AAQMS which recorded the best air quality for more than 98% of the observations in the year 2014-15 included the AAQMS at Airoli (Navi Mumbai), Shivaji University (Kolhapur), Civil lines (Nagpur), BIWA house and MPCB RO Office (Kalyan). This indicates that the pollution levels for the SOx, NOx and RSPM represented by these AAQMS were well within the standards throughout the year.

The Chandrapur and Navi Mumbai regions recorded a few days with poor and severe air quality, while majority of the days were recorded with moderate air quality in those areas. As compared to the year 2013-14, where these regions had the maximum number of severe and poor air quality days, these regions have registered drastic improvement this year.
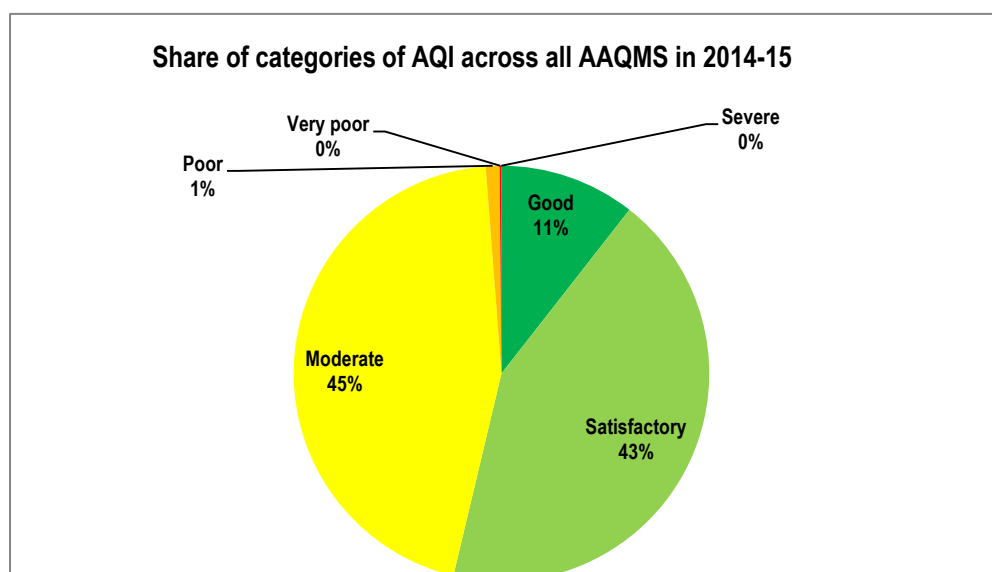
Figure No. 20: Share of categories of AQI across all AAQMS in 2014-15

Note: percentage value of Very poor and severe is rounded off and hence reflected as 0 in the graph

The Amravati region recorded majority of the readings in the "Moderate" category which is very similar to its profile in the last year (2013-14). There has been improvement in the air quality represented by the AAQMS at College of Engineering and Technology at Akola.

As for the Aurangabad region majority of the observations were recorded in the category of "Good" and "Moderate" for more than 65% of the observations recorded across all the AAQMS in the region. The industrial area represented by the AAQMS at Jalna Krishidhan seeds recorded "Good to satisfactory" for only 10% of the observations and "Moderate" air quality for more than 70% of the observations. The area also registered air quality of "poor" to severe category" for more than 15% of the observations. This is the area of concern in the Aurangabad region and needs further investigation.

The Chandrapur region, recorded "Good" and "Satisfactory" air quality for more than 50% of the observations while about 30 to 40 % observations were in the "Moderate" category. The area represented by the AAQMS at Ghuggus, Rajura and Ballarshah recorded certain days with high pollution levels.

The Chiplun area in Kolhapur region recorded "Satisfactory" and "Moderate" air quality for 30 and 70% of the observations and failed to record a single day with "Good" air quality. However, the Sangli area of the same region recorded "Good" and "Satisfactory air quality for atleast 60% of the monitoring days. The Kalyan region also recorded air quality in the Satisfactory and Moderate air quality except for 5-7% of the observations at the Dombivali area.

The areas of Mumbai, Thane and Navi Mumbai recorded "Good" and "Satisfactory" air quality for about 20 to 40% 16% of the observations. The AAMQS at Rabale and Nerul recorded some days of "Poor and Very Poor" air quality.

Figure No. 21: Percentage occurrence for the classes of AQI across AAQMS in Maharashtra - 2014-15
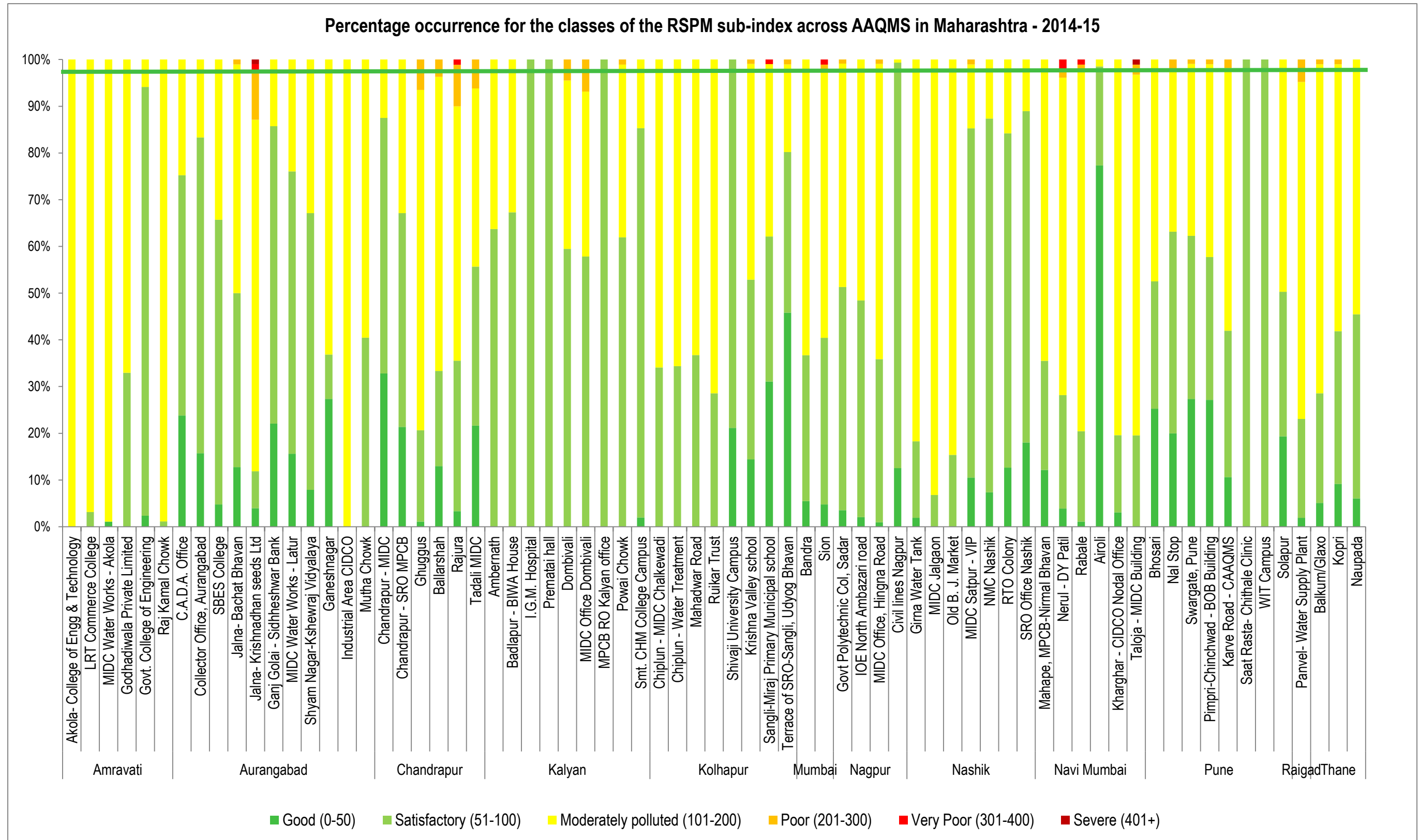
Figure No. 22: Percentage occurrence for the classes of the RSPM sub-index across AAQMS in Maharashtra - 2014-15
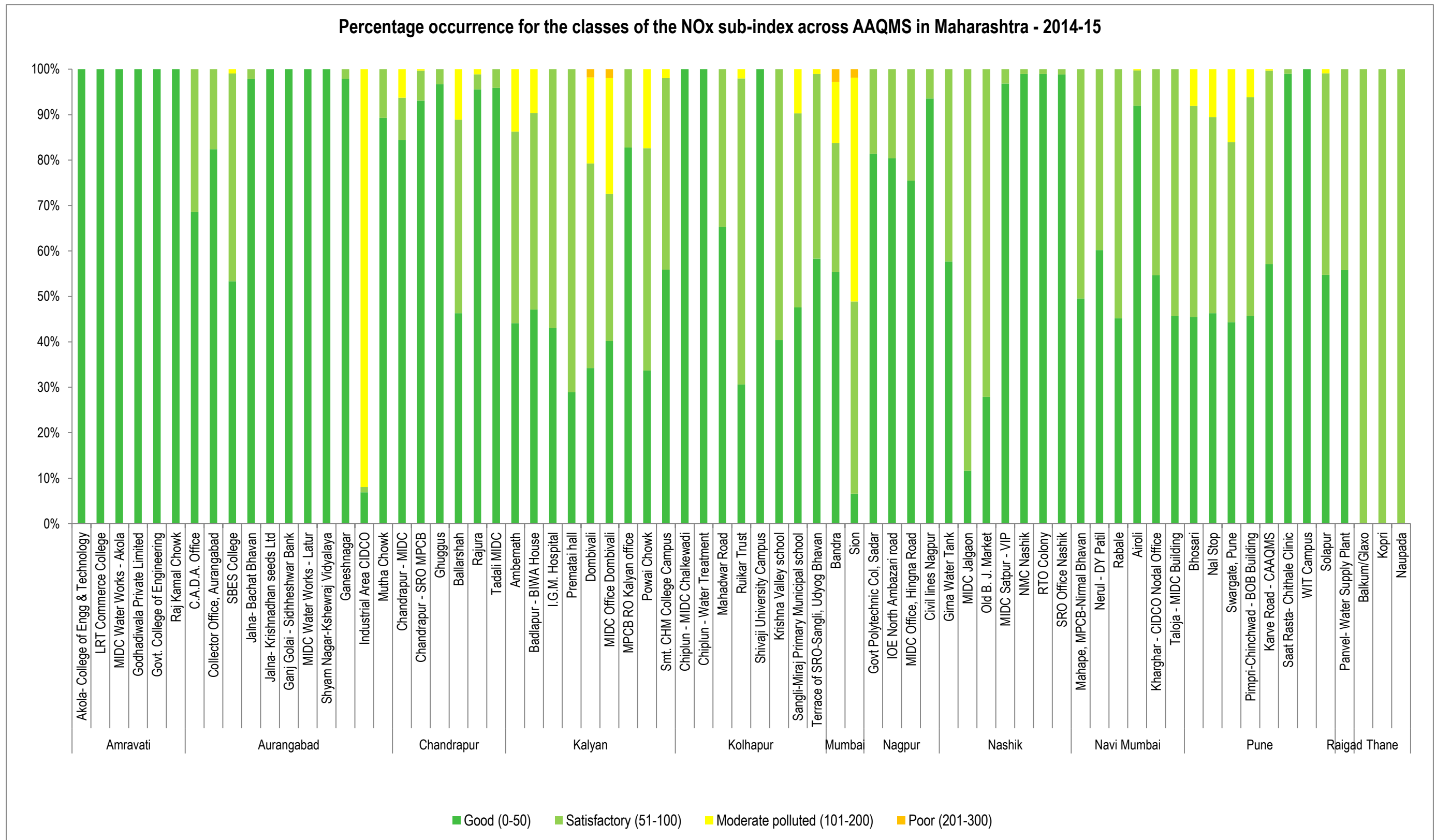
Figure No. 23: Percentage occurrence for the classes of the NOx sub-index across AAQMS in Maharashtra - 2014-15
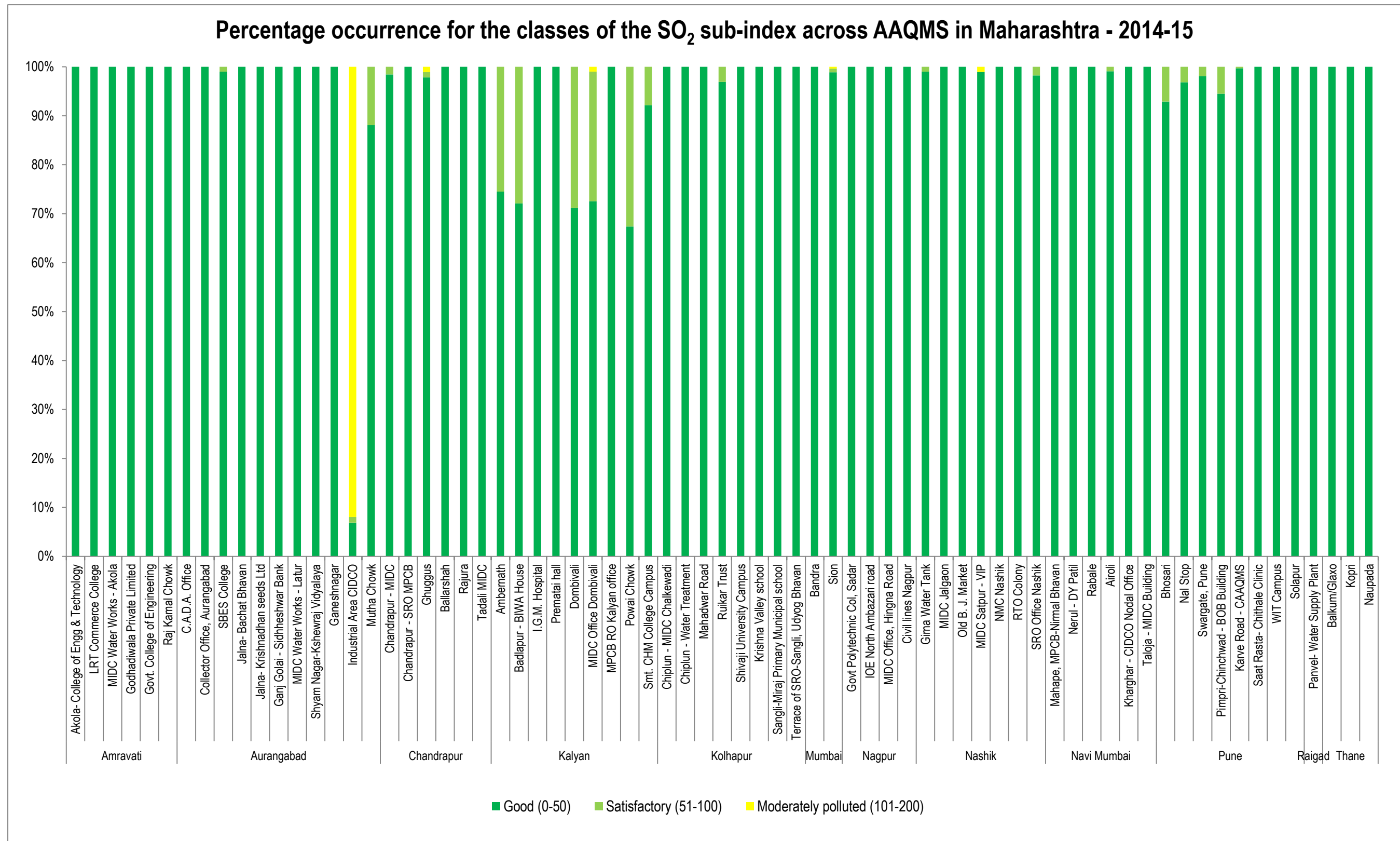
Figure No. 24: Percentage occurrence for the classes of the SO₂ sub-index across AAQMS in Maharashtra - 2014-15

Conclusion

In the year 2014-15, more than 8,500 monitoring days for the pollutants RSPM, SOx and NOx across 71 active AAQMS in Maharashtra. The quality of air in Maharashtra was "Good" to :Satisfactory" for more than six months of the year while the remaining six months of the year it was "Moderately Polluted". It was very seldom that the air pollution was categorised in "Poor" or "Severe" category which was less than 1% and almost negligible. Out of the three criteria pollutants RSPM pollution is of major concern as all the stations exceeded the annual standards as well as the daily standards.

SO_2 concentrations in Maharashtra are not that high and none of the AAQMS violated the annual standards except for the Industrial-area CIDCO at Nanded and recorded annual average of about 81.6µg/m³. The same region also exceed for NOx concentrations and recorded an annual average of 82.6µg/m³ which is almost double the standards. This area needs further investigation. As compared to the previous years the areas of Ambernath and Dombivali which violated the SO_2 standards were recorded clean for annual standards indicating reduction in SO_2 concentrations in those areas.

RSPM was found to exceed the annual standard at almost all the sites in the year 2014-15. The highest RSPM concentration were recorded in the Aurangabad region and the site which exceeded the SO_2 and NOx levels (Industrial-area CIDCO at Nanded) also recorded the highest PM concentration in the state with annual average of about 186µg/m³. Thi sis closely followed by the areas like Chandrapur and Navi Mumbai which are influenced with industries, mining activities, quarry sites and so on. Strict norms for the construction sector, appropriate maintenance of roads, responsible supervision at the quarry sites and so on should be regulated to minimize the dispersion of RSPM in the air. However as compared to the previous years the quality of air in Chandrapur area has shown improvement.

The annual NO_X concentrations exceeded the standard at 28 AAQMS, in the year 2014-15, which is three more as compared to the previous year. The NOx concentrations were found to be particularly high in urbanized areas like Mumbai, Thane and Kalyan. Traffic congestion and vehicular emissions could be attributed to increase in NO_X concentration in these areas. As compared to the last year the Navi Mumbai area has recorded reduction in NOx pollution.

Annex –I: List of AAQMS in Maharashtra – 2014-15

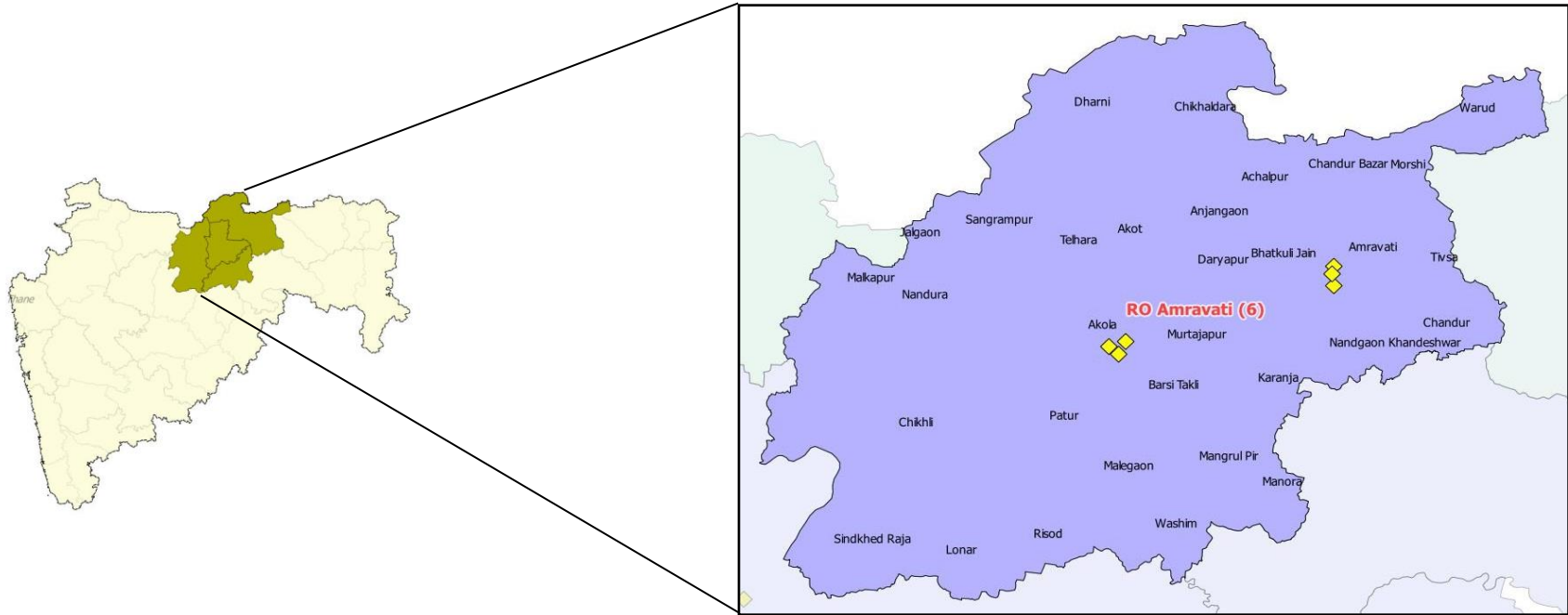| MPCB RO	Region	Station code	Station name	Location	Type	Program
Amravati	Akola	700	LRT Commerce College	Plot No. 10 Ranpise Nagar professor Colony	Residential	NAMP
		701	MIDC Water Works - Akola	Phase II, MIDC	Industrial	NAMP
		702	Akola- College of Engg & Technology	Akola	Commercial	NAMP
	Amravati	547	Raj Kamal Chowk	Vanita Samaj Building	Rural and other areas	NAMP
		548	Govt. College of Engineering	Terrace of Govt. Coll. Of Engi., Electronic & Computer Building Amravati	Residential	NAMP
		549	Godhadiwala Private Limited	Building of Apurva Oil Industries	Industrial	NAMP
Aurangabad	Aurangabad	511	SBES College	SBES College Campus,Aurangabad	Residential	NAMP
		512	Collector Office, Aurangabad	Collector Office	Residential	NAMP
		513	C.A.D.A. Office	C.A.D.A. Office , Garkheda Aurangabad	Residential	NAMP
	Jalna	706	Jalna- Bachat Bhavan	Bachat Bhavan Building Jalna	Residential	NAMP
		707	Jalna- Krishnadhan seeds Ltd	Krishna Dhan Compound Jalna	Industrial	NAMP
	Latur	641	MIDC Water Works - Latur	Latur	Industrial	NAMP
		642	Shyam Nagar-Kshewraj Vidyalaya	Latur	Residential	NAMP
		643	Ganj Golai - Sidhheshwar Bank	Ganjgolai, Latur	Rural and other areas	NAMP
	Nanded	703	Ganeshnagar	Nanded	Residential	NAMP

MPCB RO	Region	Station code	Station name	Location	Type	Program
		704	Mutha Chowk	Nanded	Commercial	NAMP
		705	Industrial Area CIDCO	Nanded	Industrial	NAMP
Chandrapur	Chandrapur	267	Ghuggus	Office of Grampanchayat Ghuggus	Residential	NAMP
		281	Chandrapur - MIDC	M/s Multiorganic Pvt. Ltd. Chandrapur	Industrial	NAMP
		396	Chandrapur - SRO MPCB	Office of Nagar Parishad Chandrapur Premises	Residential	NAMP
		638	Tadali MIDC	MIDC	Industrial	NAMP
		639	Ballarshah	Ballarpur	Residential	NAMP
		640	Rajura	Chandrapur	Industrial	NAMP
Kalyan	Ambernath	445	Ambernath	Ambernath Municipal Council Building , Ambernath	Rural and other areas	NAMP
	Badlapur	649	Badlapur - BIWA House	BIWA Office, Badlapur	Rural and other areas	NAMP
	Bhiwandi		I.G.M. Hospital	Bhiwandi	Rural and other areas	SAMP
			Prematai hall	Bhiwandi	Commercial	SAMP
	Dombivali	265	Dombivali	CETP, Phase- II MIDC, Dombivali	Industrial	NAMP
			MIDC Office Dombivali	Dombivali	Industrial	SAMP
	Kalyan		MPCB RO Kalyan office	Kalyan	Commercial	SAMP
	Ulhasnagar	647	Smt. CHM College Campus	CHM College Ulhasnagar	Rural and other areas	NAMP
		648	Powai Chowk	Octroi Naka	Rural and other areas	NAMP

MPCB RO	Region	Station code	Station name	Location	Type	Program
Kolhapur	Chiplun	489	Chiplun - MIDC Chalkewadi	MIDC Chalkewadi,Chiplun	Residential	NAMP
		490	Chiplun - Water Treatment	MIDC Water supply Plant Chiplun	Industrial	NAMP
	Kolhapur	508	Shivaji University Campus	Shivaji University Campus, Vidyanagar, Kolhapur	Residential	NAMP
		509	Ruikar Trust	Ruikar trust, Dhabhokar corner, Kolhapur	Rural and other areas	NAMP
		510	Mahadwar Road	Near Mahalaxmi temple ,Kolhapur	Residential	NAMP
	Sangli	574	Terrace of SRO-Sangli, Udyog Bhavan	Vishrambag, Sangli	Residential	NAMP
		575	Sangli-Miraj Primary Municipal school	Rajawada Chowk,Sangli	Rural and other areas	NAMP
		576	Krishna Valley school	MIDC Kupwad	Industrial	NAMP
Mumbai	Mumbai		Bandra	Govt. Polytechnique.Premises Kherwadi	Residential	NAMP
			Sion	Sion Hospital	Residential	NAMP
Nagpur	Nagpur	287	IOE North Ambazari road	Terrace of Institute of Engineering, North Ambazani road	Residential	NAMP
		288	MIDC Office, Hingna Road	MIDC office Hingna Road Nagpur	Industrial	NAMP
		314	Govt Polytechnic Col, Sadar	Govt. poly technique College , Sadar, Nagpur	Rural and other areas	NAMP
		711	Civil lines Nagpur	RO Office Nagpur Premises	Residential	NAMP
Nashik	Jalgaon	644	Old B. J. Market	Terrace of SRO building	Residential	NAMP
		645	Girna Water Tank	Ramanand Nagar	Residential	NAMP
		646	MIDC Jalgaon	Terrace of MIDC Office	Industrial	NAMP

MPCB RO	Region	Station code	Station name	Location	Type	Program
	Nashik	259	RTO Colony	RTO Colony Water Tank near Golf Club Nashik	Residential	NAMP
		269	MIDC Satpur - VIP	VIP industries ltd, MIDC satpur, Nashik	Industrial	NAMP
		280	NMC Nashik	Nashik Municipal Council Building, Nashik	Residential	NAMP
		710	SRO Office Nashik	Udyog Bhavan	Residential	NAMP
Navi Mumbai	Navi Mumbai	491	Rabale	T.B.I.A, Rabale	Industrial	NAMP
		492	Nerul - DY Patil	Dr.D.Y. Patil College Building Nerul	Residential	NAMP
		493	Mahape, MPCB-Nirmal Bhavan	Central lab Building, MPCB Navi Mumbai	Industrial	NAMP
			Airoli	Airoli fire station	Rural and other areas	NAMP
			Vashi	Fire Brigade compound, Vashi.	Residential	NAMP
	Taloja	494	Kharghar - CIDCO Nodal Office	Nimisha Hospital Sec-12 ,Kharghar	Residential	NAMP
		496	Taloja - MIDC Building	MIDC Common Facility Building	Industrial	NAMP
Pune	Pune	312	Bhosari	Maratha Chamber of commerce Building terrace	Industrial	NAMP
		379	Nal Stop	MSEB Office Nal Stop, Pune	Rural and other areas	NAMP
		381	Swargate, Pune	Terrace of Swargate police Chowky	Residential	NAMP
		708	Pimpri-Chinchwad - BOB Building	Pimpri-Chinchwad Municipal corporation	Residential	NAMP
			Karve Road - CAAQMS	PMC Zonal office	Residential	NAMP
	Solapur	299	WIT Campus	WIT Campus Ashok Chawk, Solapur	Residential	NAMP

MPCB RO	Region	Station code	Station name	Location	Type	Program
		300	Saat Rasta- Chithale Clinic	Saat Rasta Opp. ST Bus stand, Chitale Clinic Solapur	Residential	NAMP
			Solapur	Municipal Corporation Premises	Residential	NAMP
Raigad	Panvel	495	Panvel- Water Supply Plant	Panvel Water Supply Behind ST Stand	Residential	NAMP
Thane	Thane	303	Kopri	Old Thane Maternity Hospital , Kopri, Thane	Residential	NAMP
		304	Naupada	Thane M.C. Regional Office Naupada ,Shahu Market , Thane	Rural and other areas	NAMP
		305	Kolshet	M/s Clariant (chemical unit)Kolshet Thane	Industrial	NAMP
			Balkum/Glaxo	Industrial Premises of Glaxo Company, Pokharan Road No.2, Thane (W)	Industrial	NAMP

Maharashtra Pollution Control Board
महाराष्ट्र प्रदूषण नियंत्रण मंडळ

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Annex – II: Data recorded by AAQMS in Maharashtra 2014-15
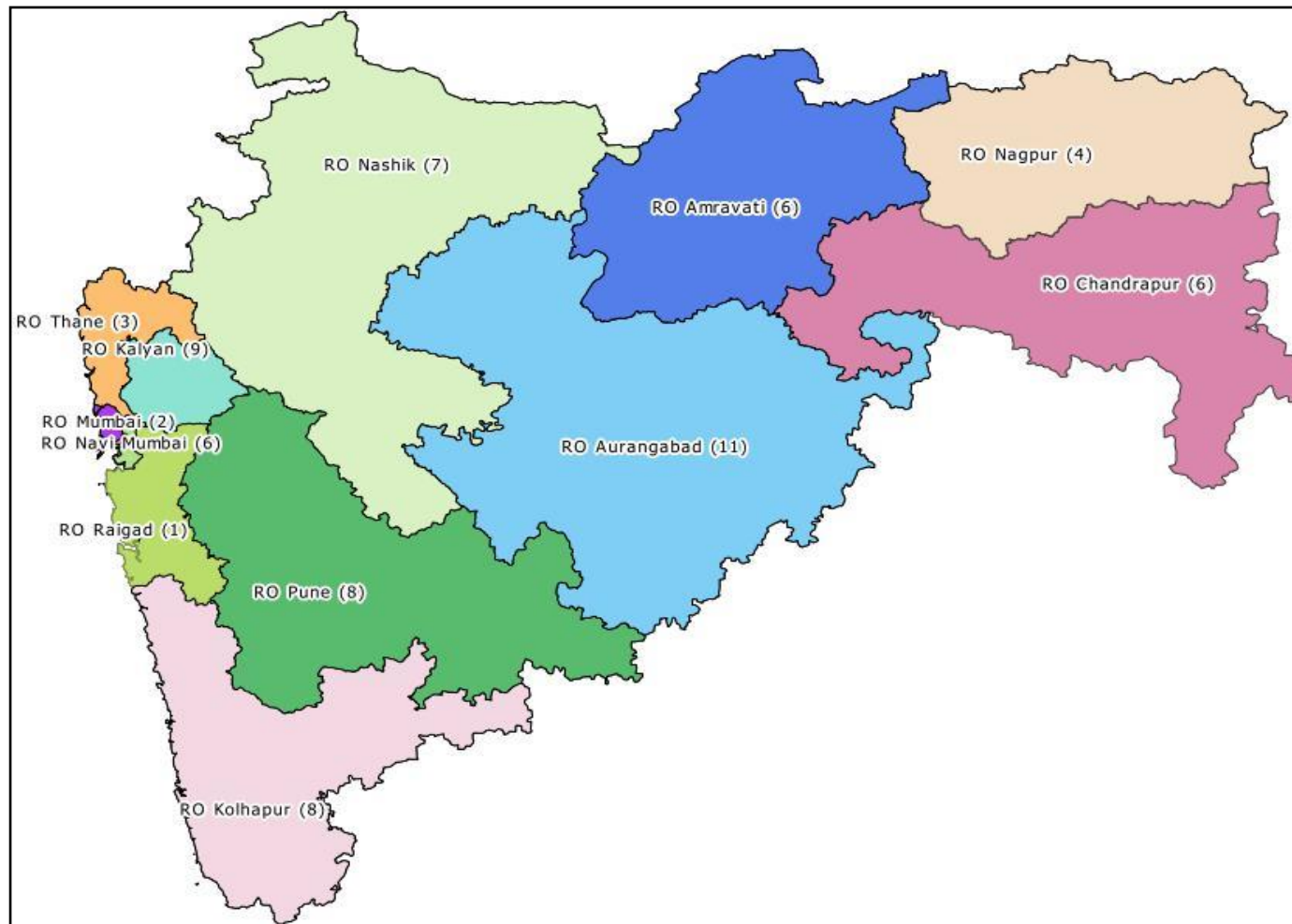
RO – Amravati

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. 25: Data for Monthly average reading recorded at LRT Commerce College. - Akola

FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NOx	SO₂
Apr	9	134	11	10
May	8	136	10	8
Jun	9	119	10	9
Jul				
Aug	8	104	8	7
Sep	10	103	8	7
Oct	8	112	8	7
Nov	8	115	8	7
Dec	9	113	8	7
Jan	8	115	7	7
Feb	8	117	8	7
Mar	10	117	8	6
	95	96.8	0.0	0.0
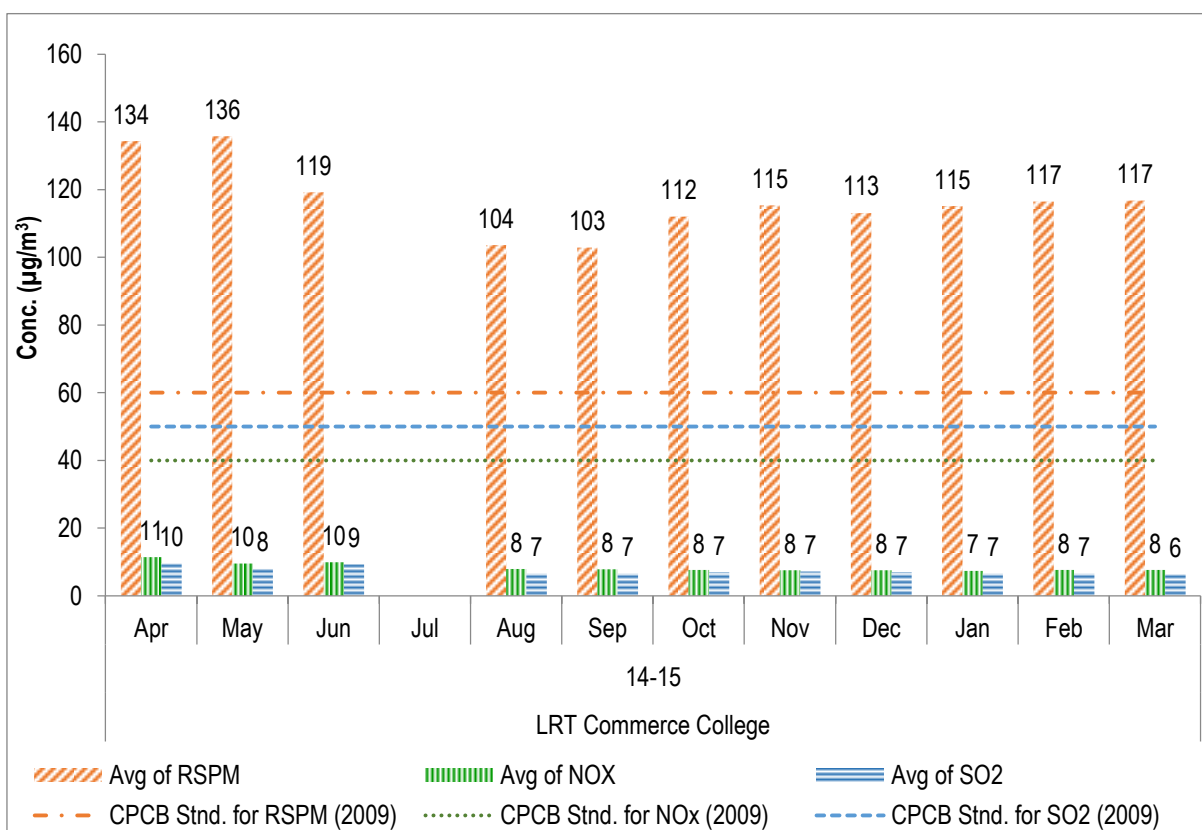
Figure No. 25: Monthly average reading recorded at LRT Commerce College. – Akola

Table No. 26: Data for Annual average trend of SO₂, NOₓ, and RSPM at LRT Commerce College. – Akola

Year	N	Annual average (µg/m³)		
		RSPM	NOX	SO₂
04-05				
05-06				
06-07				
07-08				
08-09				
09-10	24	87	2	6
10-11	88	107	3	6
11-12	86	125	7	7
12-13	102	126	8	8
13-14	66	122	3	7
14-15	95	117	8	7
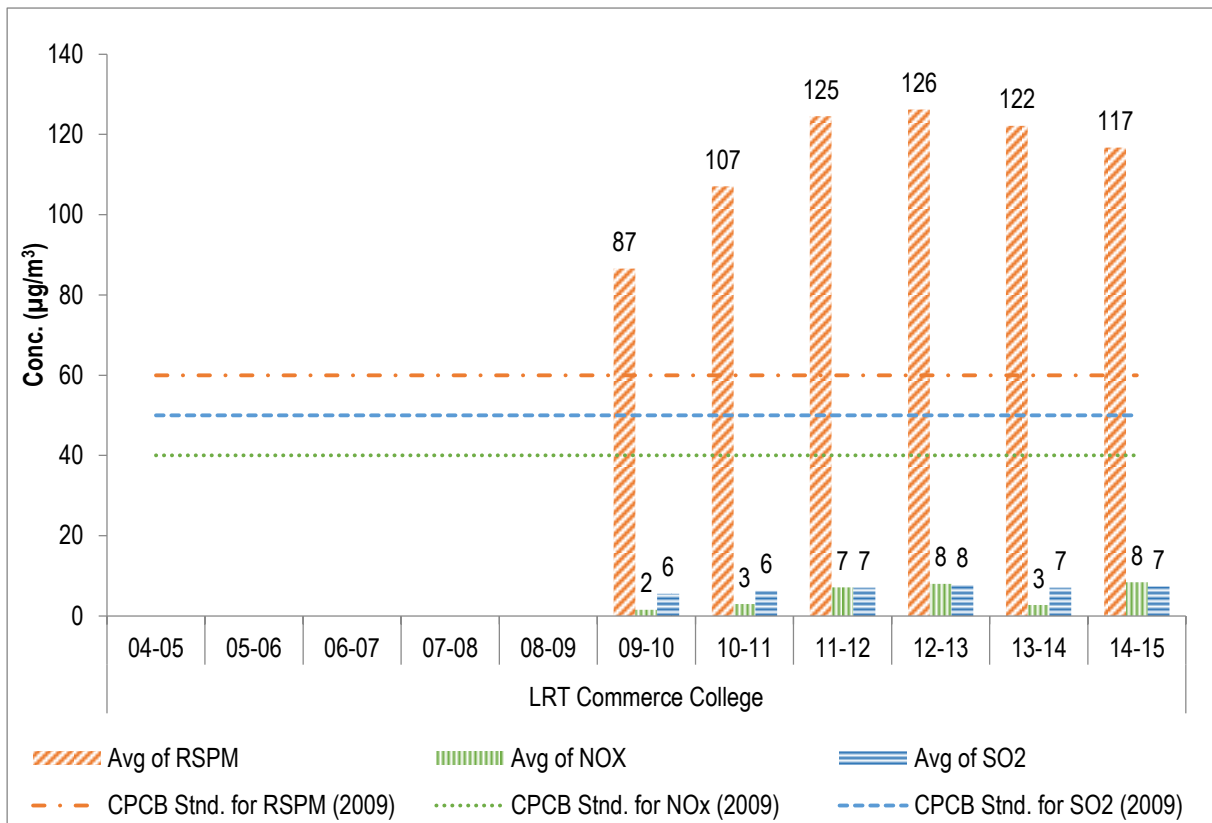
Figure No. 26: Annual average trend of SO₂, NOₓ, and RSPM at LRT Commerce College. – Akola

Akola - MIDC Water Works

Table No. 27: Data for Monthly average reading recorded at MIDC Water Works. - Akola

FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NO$_X$	SO$_2$
Apr	9	150	13	12
May	8	160	14	12
Jun	8	124	11	10
Jul				
Aug	8	120	8	8
Sep	8	119	9	8
Oct	10	126	9	8
Nov	8	125	10	8
Dec	9	125	10	8
Jan	9	127	9	8
Feb	8	117	10	8
Mar	8	128	10	8
93		98.9	0.0	0.0
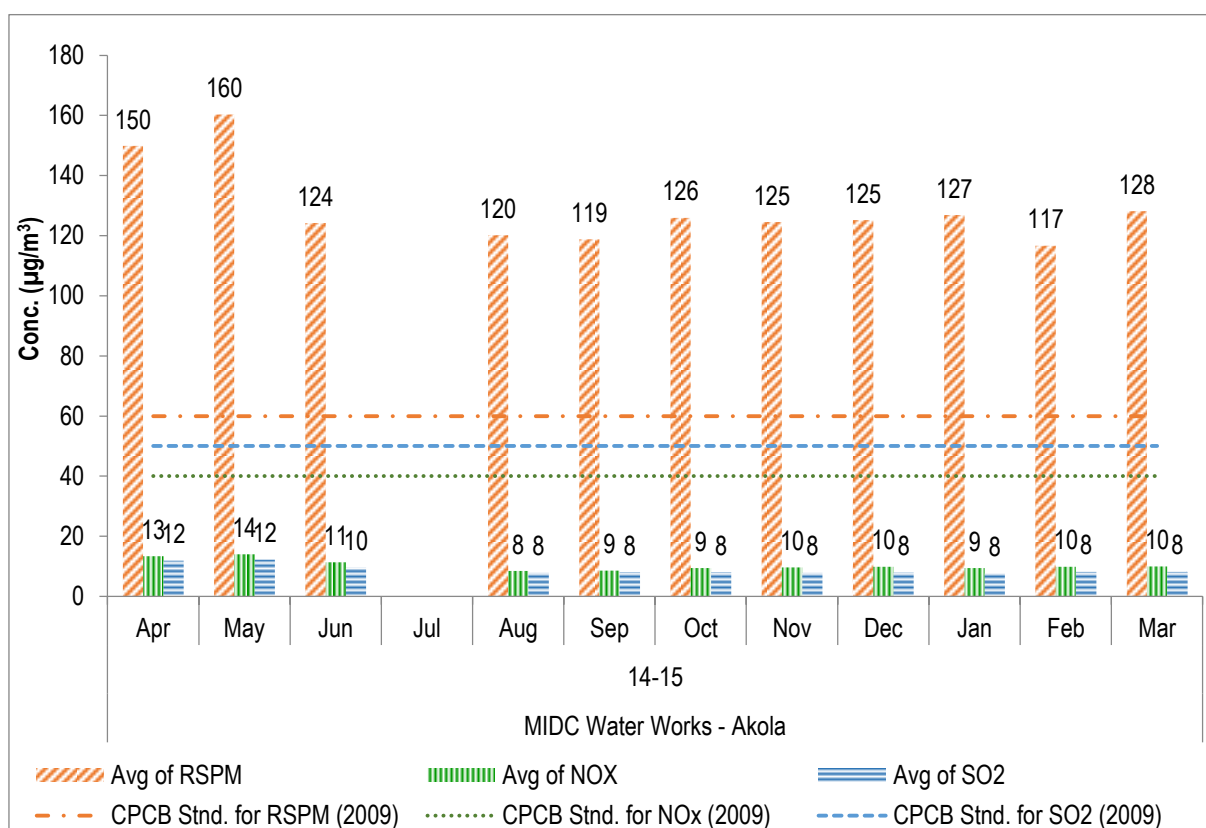
Figure No. 27: Monthly average reading recorded at MIDC Water Works. - Akola

Table No. 28: Data for Annual average trend of SO₂, NOₓ, and RSPM at MIDC Water Works. - Akola

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07				
07-08				
08-09				
09-10	1	88	10	8
10-11	84	131	7	9
11-12	94	141	11	10
12-13	110	142	11	10
13-14	65	136	7	9
14-15	93	129	10	9
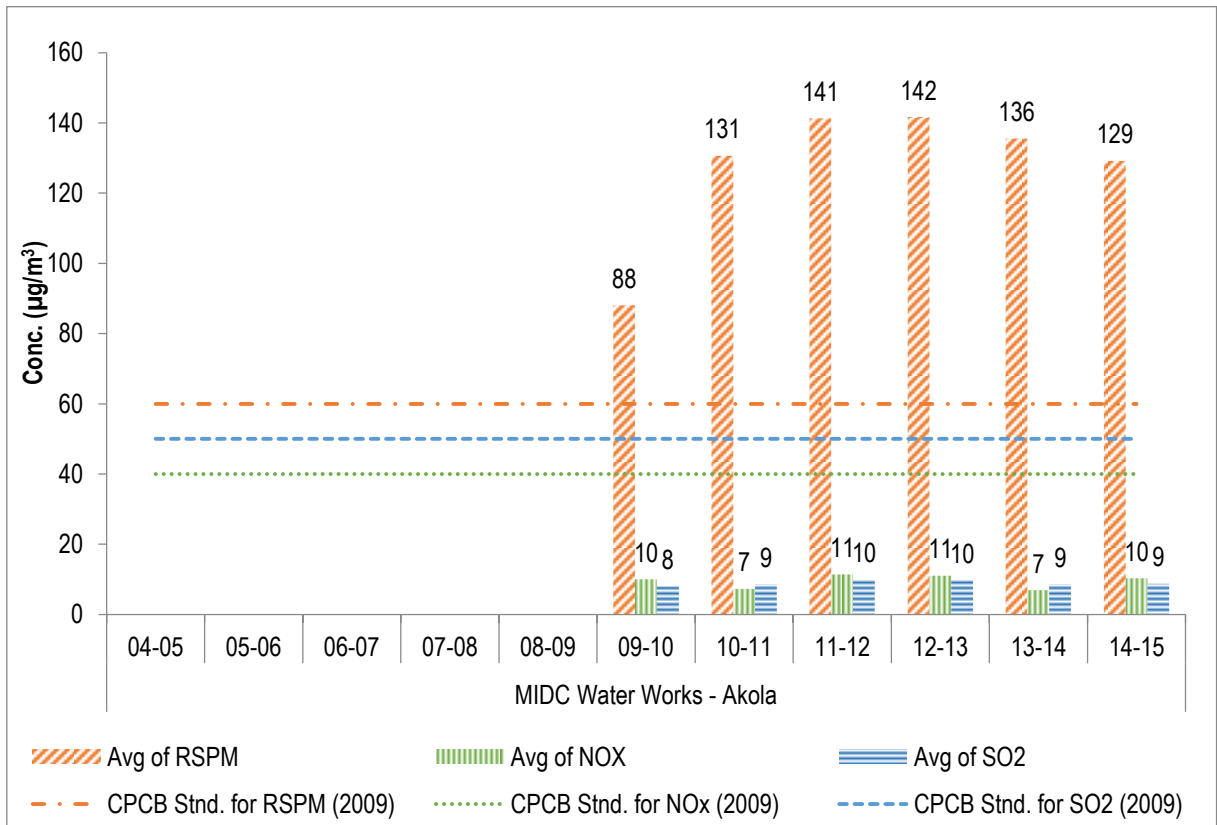
Figure No. 28: Annual average trend of SO₂, NOₓ, and RSPM at MIDC Water Works. - Akola

Akola – Akola College of Engg & Technology

Table No. 29: Data for Monthly average reading recorded at College of Engg & Technology Akola (Architecture Branch) - Akola

FY	N	Monthly average ($\mu g/m^3$)		
2014-15		**RSPM**	**NO$_X$**	**SO$_2$**
Apr	8	174	12	10
May	7	171	13	11
Jun	8	160	10	10
Jul				
Aug	10	125	9	8
Sep	8	118	8	7
Oct	9	144	8	8
Nov	9	144	9	7
Dec	8	142	10	8
Jan	10	145	9	8
Feb	8	145	9	8
Mar	8	147	9	8
	93	100.0	0.0	0.0
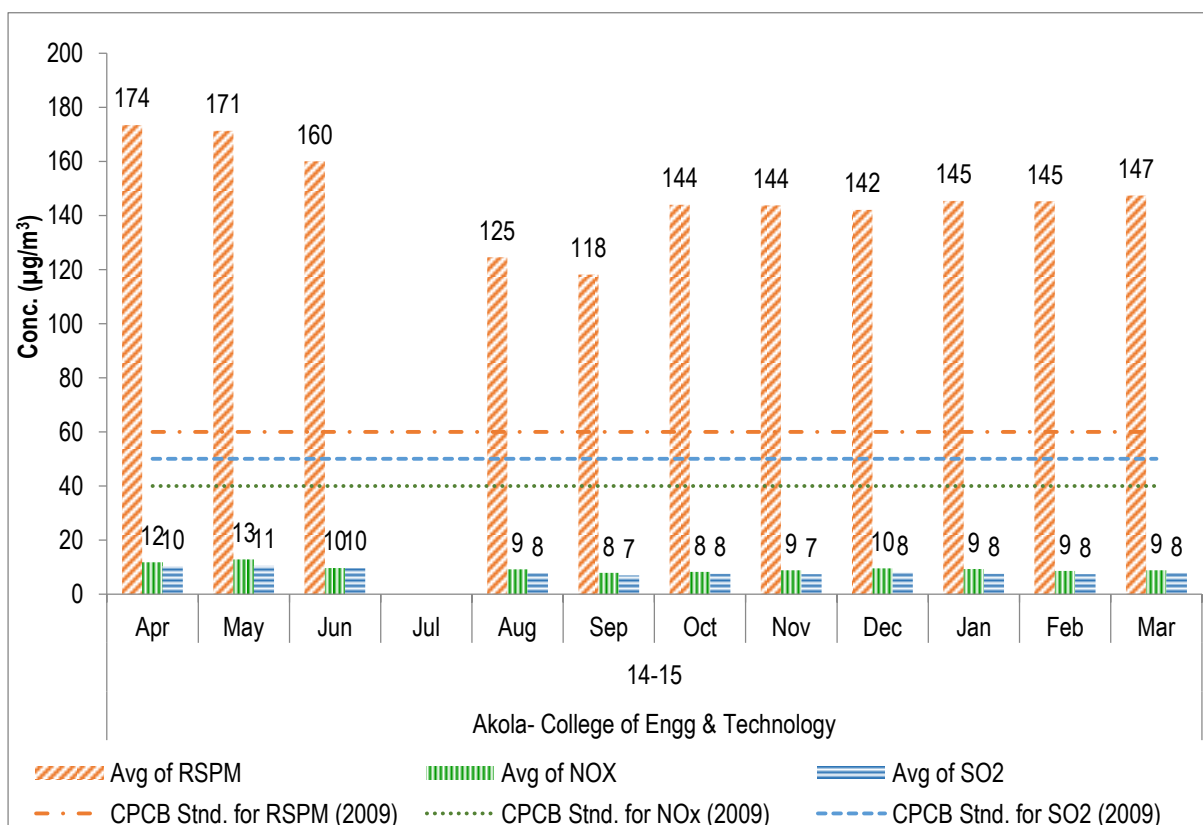
Figure No. 29: Monthly average reading recorded at College of Engg & Technology Akola (Architecture Branch) - Akola

Table No. 30: Data for Annual average trend of SO₂, NOₓ, and RSPM at College of Engg & Technology Akola (Architecture Branch) – Akola

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07				
07-08				
08-09				
09-10	26	117	2	6
10-11	74	142	5	7
11-12	92	150	9	9
12-13	97	151	8	9
13-14	66	149	6	8
14-15	93	146	9	8
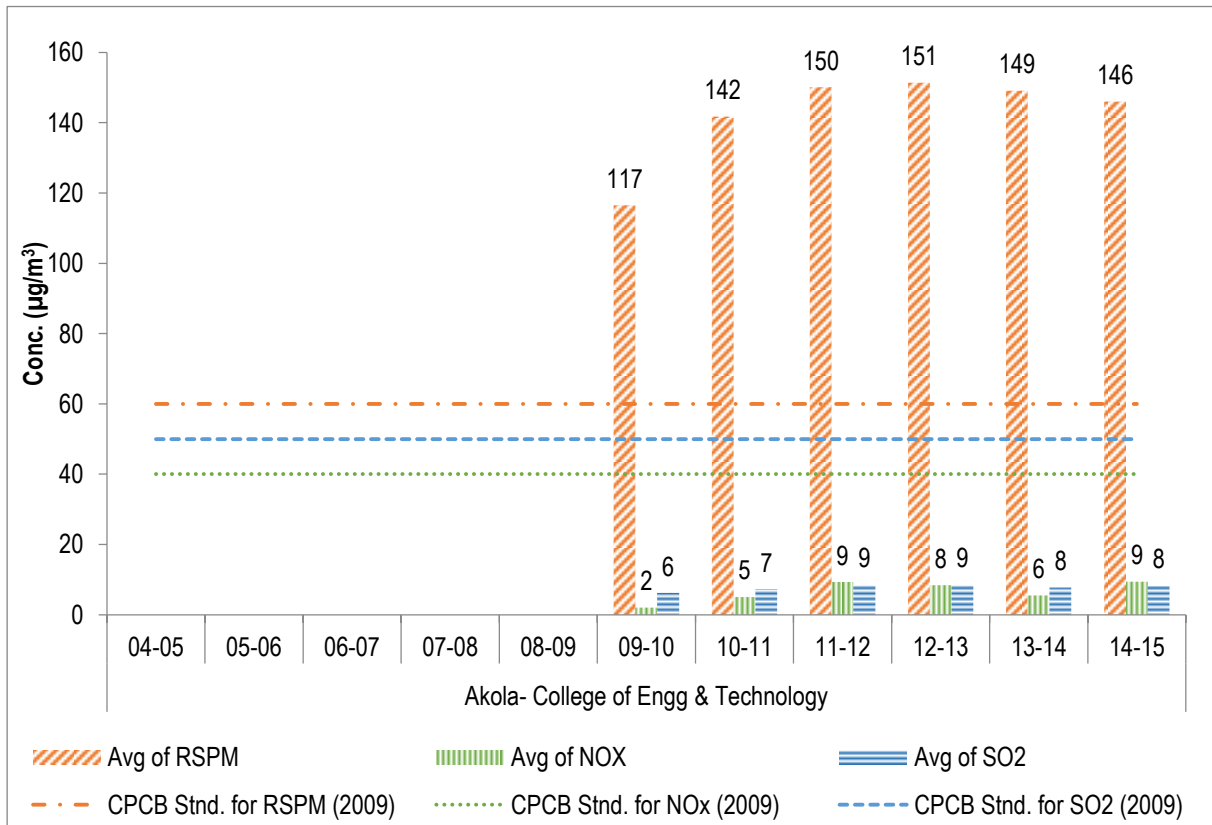
Figure No. 30: Annual average trend of SO₂, NOₓ, and RSPM at College of Engg & Technology Akola (Architecture Branch) – Akola

Amravati – Raj Kamal Chowk

Table No. 31: Data for Monthly average reading recorded at Raj Kamal Chowk. - Amravati

E	N	Monthly average (µg/m³)		
2014-15		RSPM	NO$_X$	SO$_2$
Apr	9	146	14	12
May	9	149	16	14
Jun	8	143	13	12
Jul				
Aug	9	121	13	11
Sep	7	124	13	12
Oct	7	121	13	12
Nov	9	125	13	12
Dec	9	123	13	12
Jan	7	143	14	13
Feb	8	137	13	12
Mar	8	140	15	13
	90	98.9	0.0	0.0
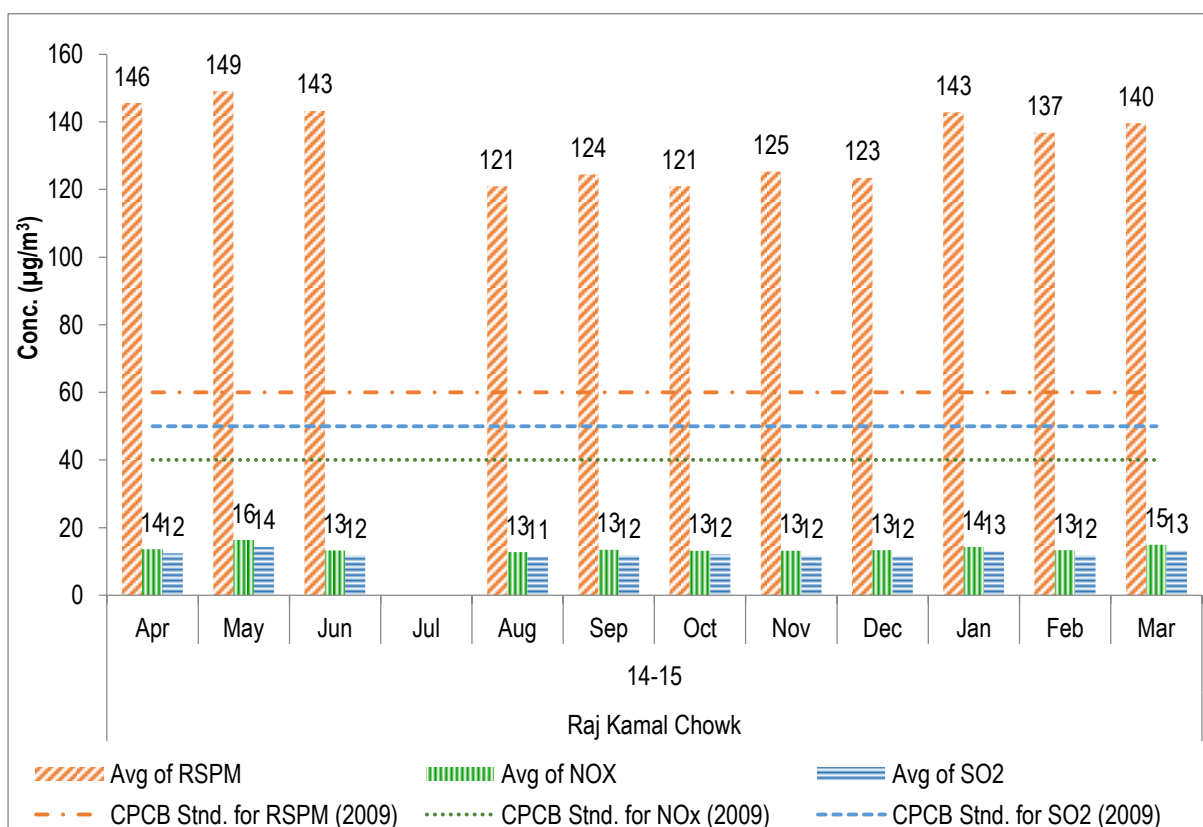
Figure No. 31: Monthly average reading recorded at Raj Kamal Chowk. - Amravati

Table No. 32: Annual average trend of SO$_2$, NO$_x$, and RSPM at Raj Kamal Chowk. - Amravati

Year	N	Annual average ($\mu g/m^3$)		
		RSPM	NO$_X$	SO$_2$
04-05				
05-06				
06-07	43	79	19	13
07-08	94	78	16	11
08-09	98	100	15	12
09-10	104	125	16	14
10-11	104	146	15	13
11-12	102	108	18	15
12-13	112	109	13	12
13-14	106	128	13	12
14-15	90	134	14	12
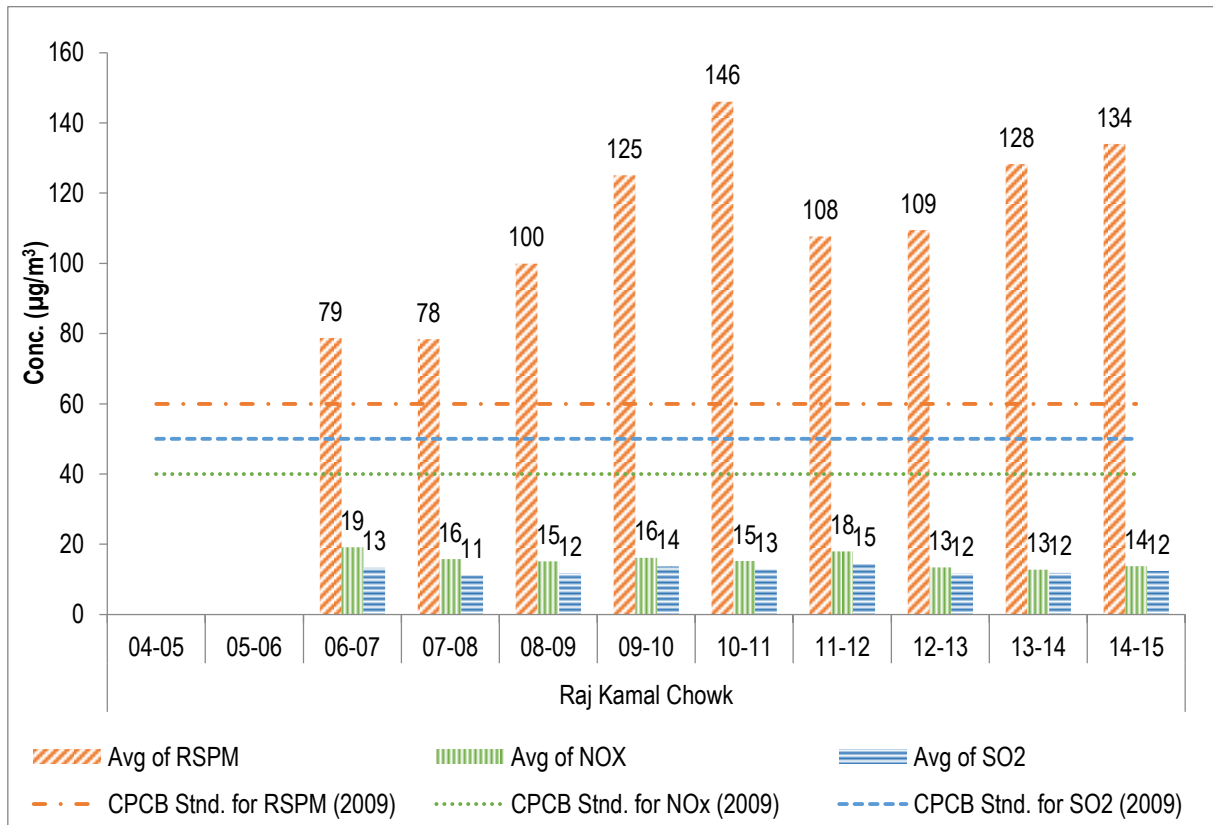
Figure No. 32: Annual average trend of SO$_2$, NO$_x$, and RSPM at Raj Kamal Chowk. - Amravati

Amravati – Govt. College of Engineering

Table No. 33: Data for Monthly average reading recorded at Govt. College of Engineering - Amravati

FY	N	Monthly average ($\mu g/m^3$)		
2014-15		RSPM	NO$_x$	SO$_2$
Apr	8	86	12	11
May	9	89	13	11
Jun	8	82	12	11
Jul				
Aug	7	58	13	10
Sep	8	61	11	10
Oct	9	77	13	12
Nov	7	73	13	11
Dec	4	75	13	12
Jan	8	75	12	10
Feb	8	70	13	11
Mar	9	78	13	11
	85	5.9	0.0	0.0
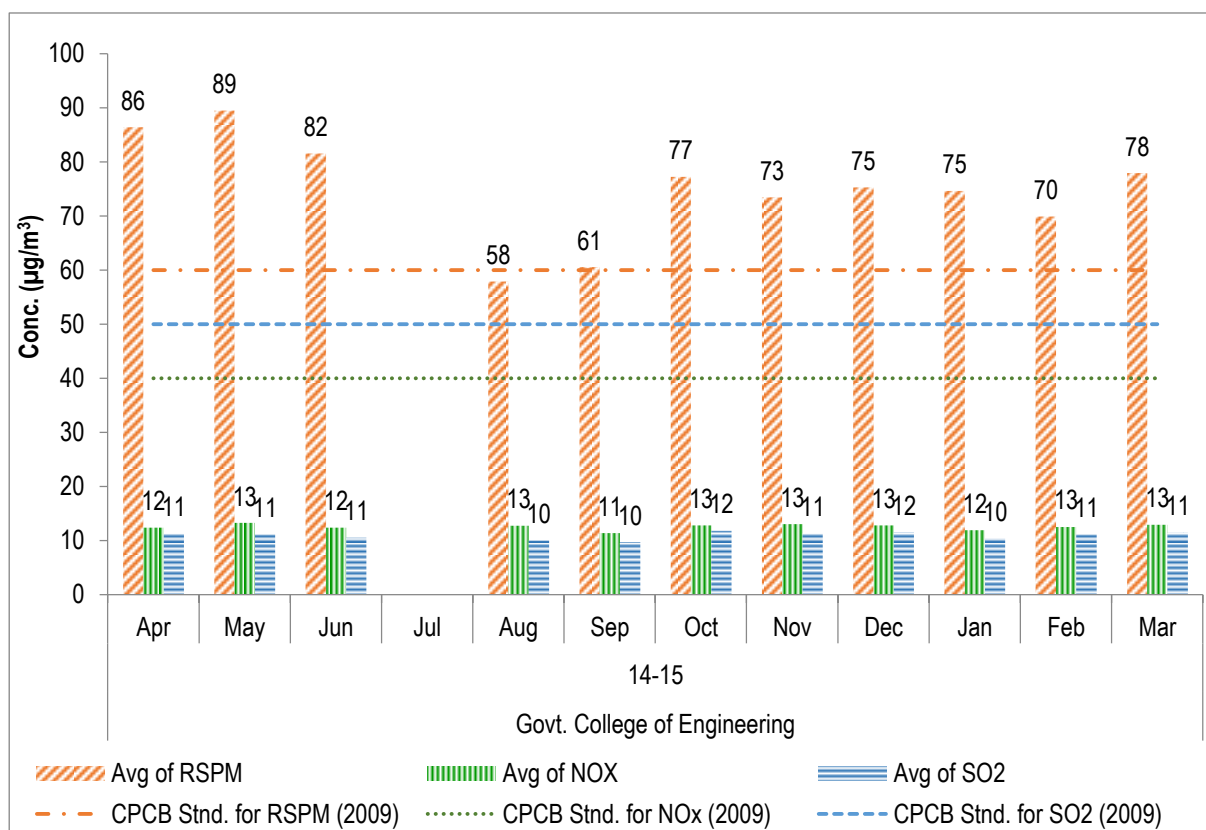
Figure No. 33: Monthly average reading recorded at Govt. College of Engineering - Amravati

Table No. 34: Data for Annual average trend of SO₂, NOₓ, and RSPM at Govt. College of Engineering - Amravati

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07	38	50	12	10
07-08	98	40	8	8
08-09	99	47	10	8
09-10	104	78	12	10
10-11	101	79	13	10
11-12	95	79	12	10
12-13	95	80	12	11
13-14	68	80	12	10
14-15	85	75	13	11
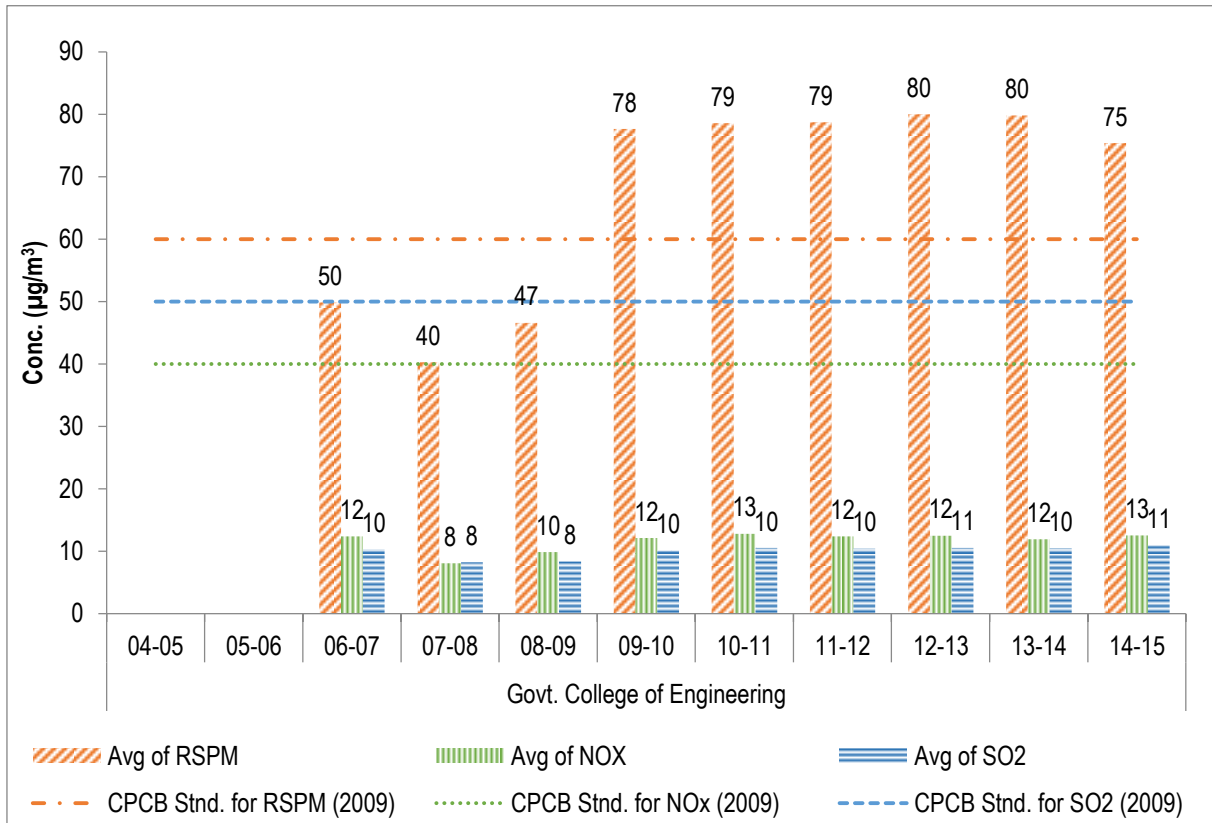
Figure No. 34: Annual average trend of SO₂, NOₓ, and RSPM at Govt. College of Engineering – Amravati

Amravati - Godhadiwala Private Limited

Table No. 35: Data for Monthly average reading recorded at Godhadiwala Private Limited - Amrawati

FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NOx	SO₂
Apr	9	124	15	13
May	8	130	16	14
Jun	8	116	14	12
Jul				
Aug	2	108	14	13
Sep	6	87	13	11
Oct	9	91	13	12
Nov	8	102	14	12
Dec	9	103	13	11
Jan	9	107	15	13
Feb	8	108	13	12
Mar	9	108	14	13
85		67.1	0.0	0.0
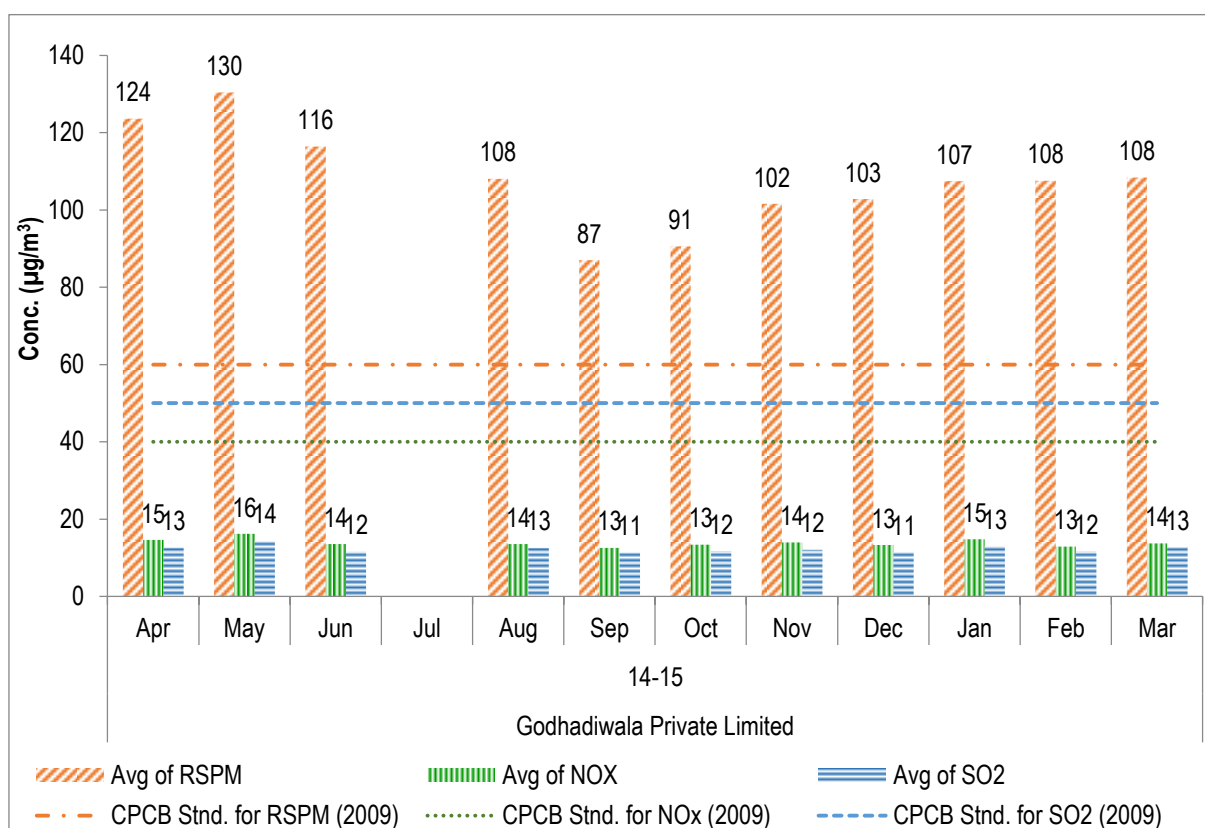
Figure No. 35: Monthly average reading recorded at Godhadiwala Private Limited Amrawati

Table No. 36: Data for Annual average trend of SO₂, NOₓ, and RSPM at Godhadiwala Private Limited - Amrawati

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07	40	67	16	12
07-08	98	58	12	9
08-09	98	71	13	10
09-10	103	102	14	12
10-11	84	125	14	12
11-12	98	100	13	11
12-13	104	101	13	12
13-14	95	94	12	11
14-15	85	108	14	12
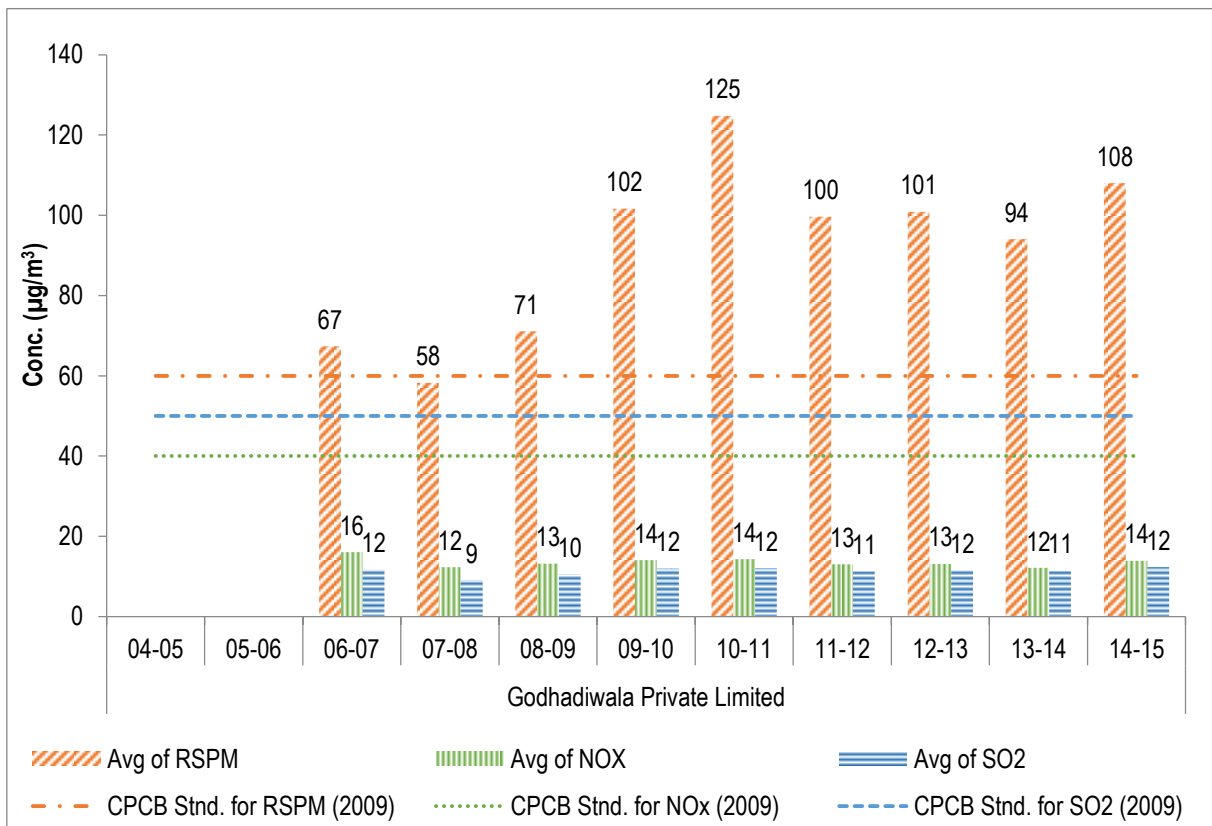
Figure No. 36: Annual average trend of SO₂, NOₓ, and RSPM at Godhadiwala Private Limited - Amrawati

% occurence for the classes for AQI across Amravati RO

Amravati

Legend:
- Good (0-50)
- Satisfactory (51-100)
- Moderately polluted (101-200)
- Poor (201-300)
- Very Poor (301-400)
- Severe (401+)
- Benchmark (98%)

Maharashtra Pollution Control Board
महाराष्ट्र प्रदूषण नियंत्रण मंडळ

teri
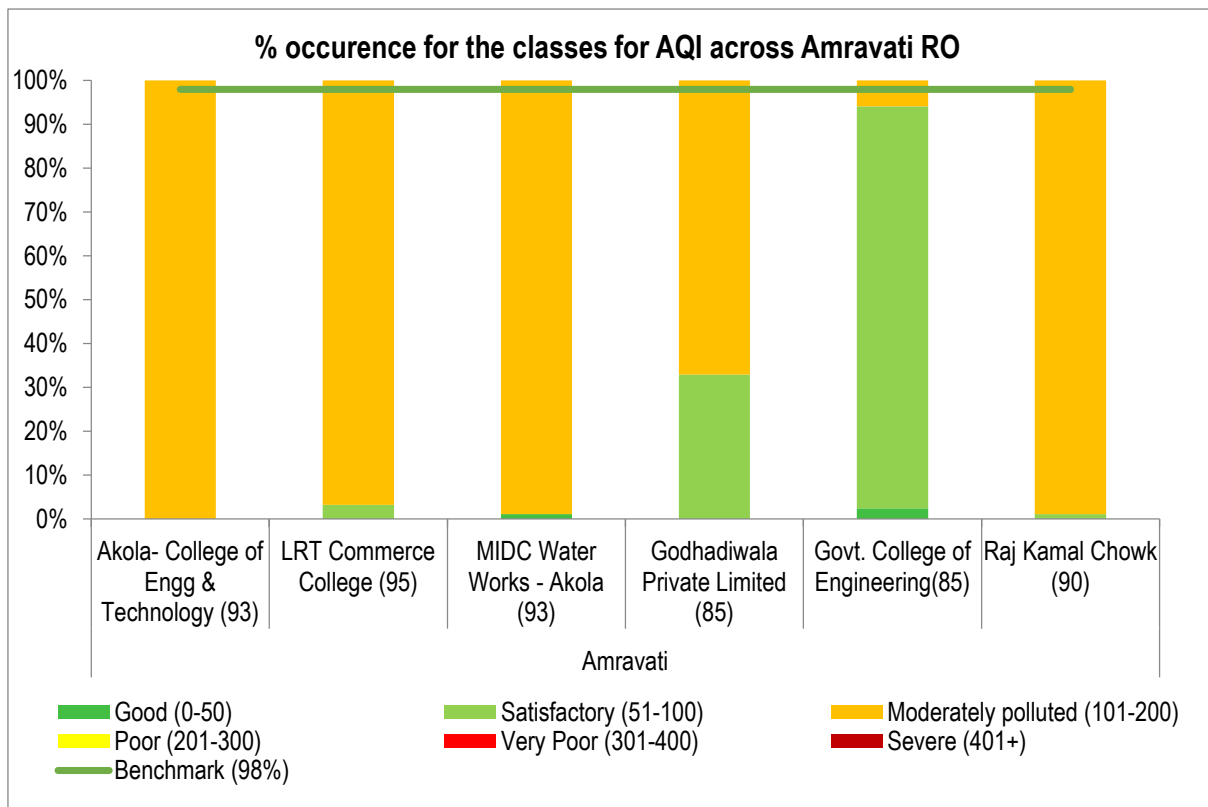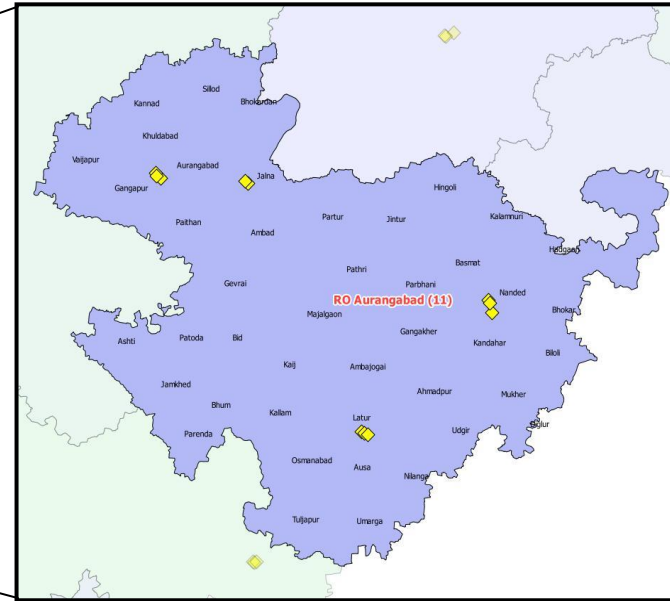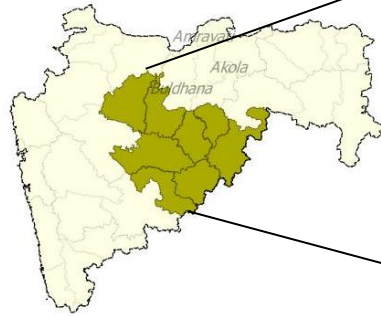
RO – Aurangabad

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
	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
	Nanded	703	Ganeshnagar	Residential	19° 10' 16.3" N	77° 17' 56.3" E
	Nanded	704	Mutha Chowk	Commercial	19° 09' 16.8" N	77° 18' 34.9" E
	Nanded	705	Industrial Area CIDCO	Industrial	19° 05' 48.2" N	77° 19' 17.9" E

Aurangabad – SBES College

Table No. 37: Data for Monthly average reading recorded at SBES College - Aurangabad

FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NOₓ	SO₂
Apr	9	104	37	11
May	9	81	43	11
Jun	8	78	39	11
Jul	10	60	38	10
Aug	9	80	32	8
Sep	8	74	39	11
Oct	12	105	44	15
Nov	8	99	40	12
Dec	9	147	54	18
Jan	9	138	54	19
Feb	6	110	50	17
Mar	8	88	44	14
105		34.3	1.0	0.0
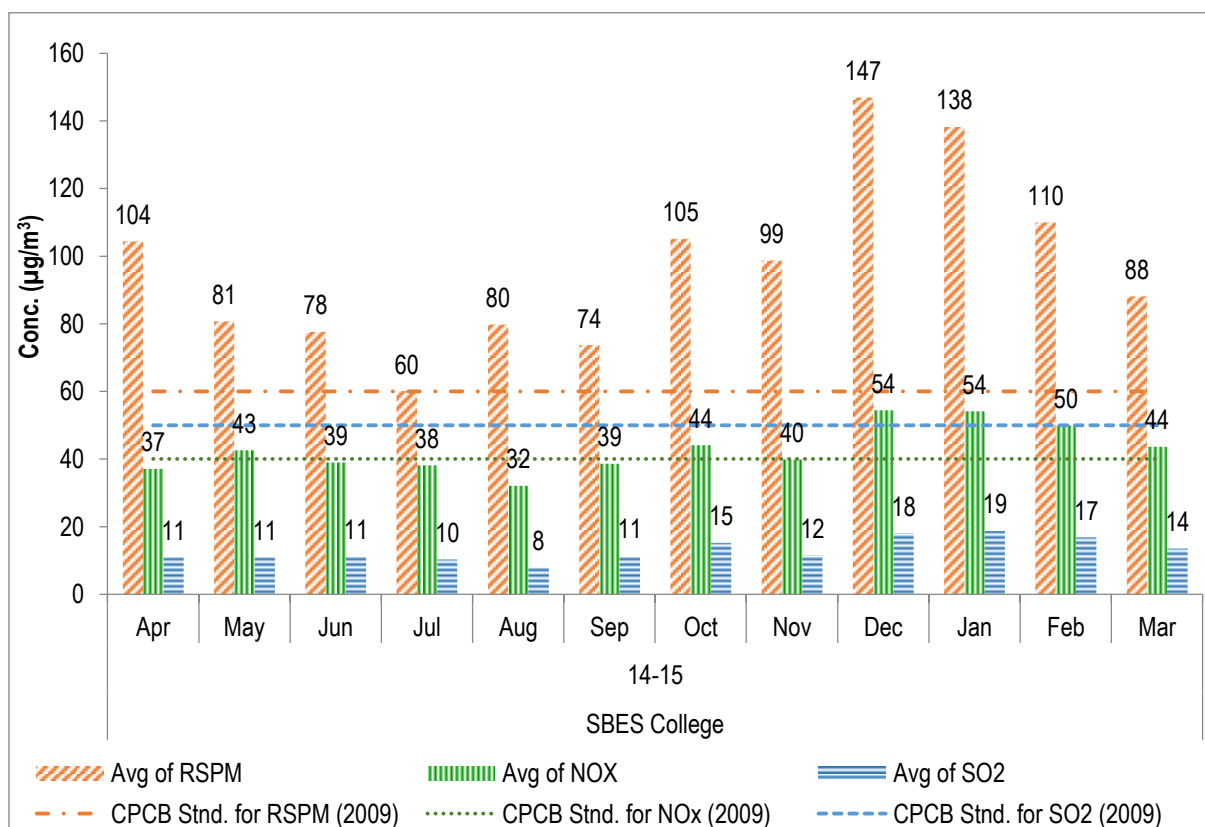
Figure No. 37: Monthly average reading recorded at SBES College - Aurangabad

Table No. 38: Data for Annual average trend of SO₂, NOₓ, and RSPM at SBES College - Aurangabad

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06	35	166	30	7
06-07	83	85	18	6
07-08	101	79	22	6
08-09	104	94	22	9
09-10	101	98	25	7
10-11	95	94	23	7
11-12	105	90	33	9
12-13	111	93	33	10
13-14	97	102	39	11
14-15	105	97	43	13
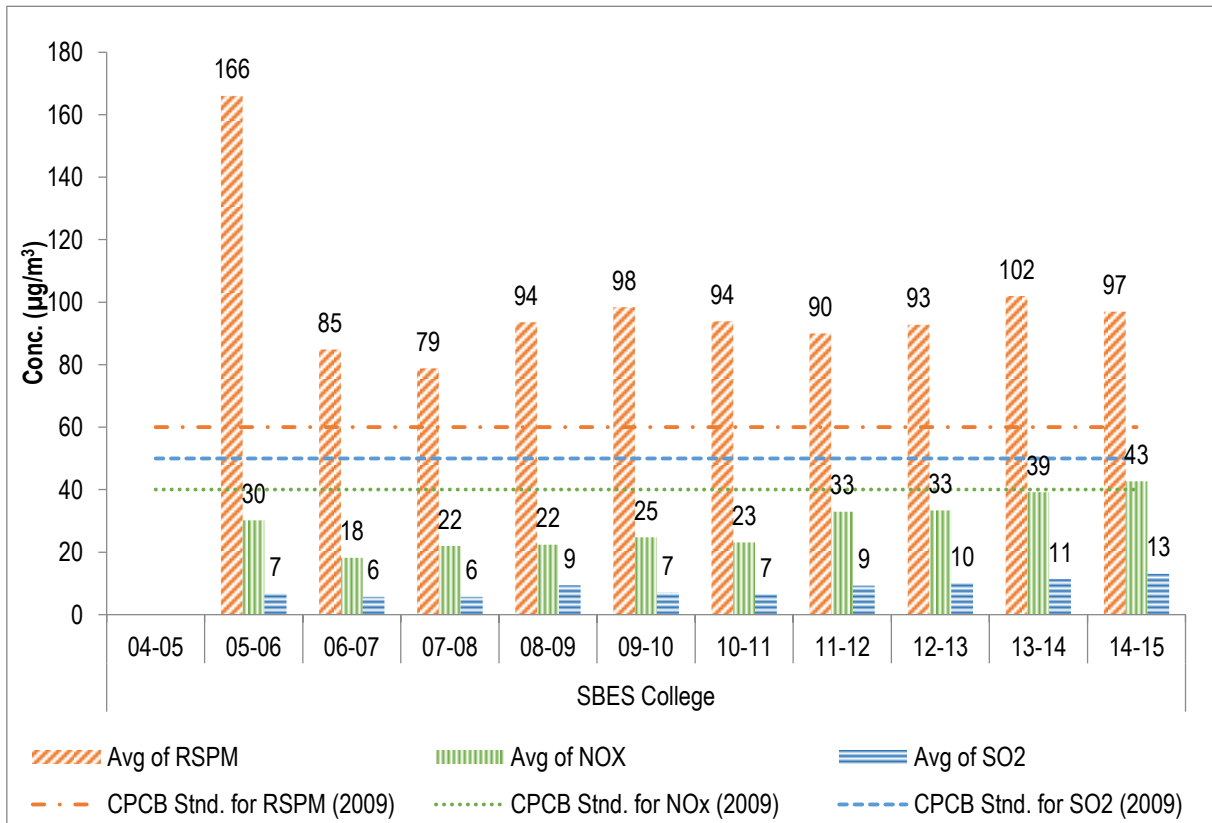
Figure No. 38: Annual average trend of SO₂, NOₓ, and RSPM at SBES College - Aurangabad

Aurangabad – Collector Office, Aurangabad

Table No. 39: Data for Monthly average reading recorded at Collector Office, Aurangabad

FY	N	Monthly average ($\mu g/m^3$)		
2014-15		RSPM	NO$_X$	SO$_2$
Apr	8	85	34	9
May	8	57	35	10
Jun	10	65	31	9
Jul	10	50	28	8
Aug	10	64	28	7
Sep	8	57	28	9
Oct	10	86	32	11
Nov	9	95	28	8
Dec	9	105	38	12
Jan	8	106	52	15
Feb	8	98	43	14
Mar	10	74	30	10
108		16.7	0.0	0.0
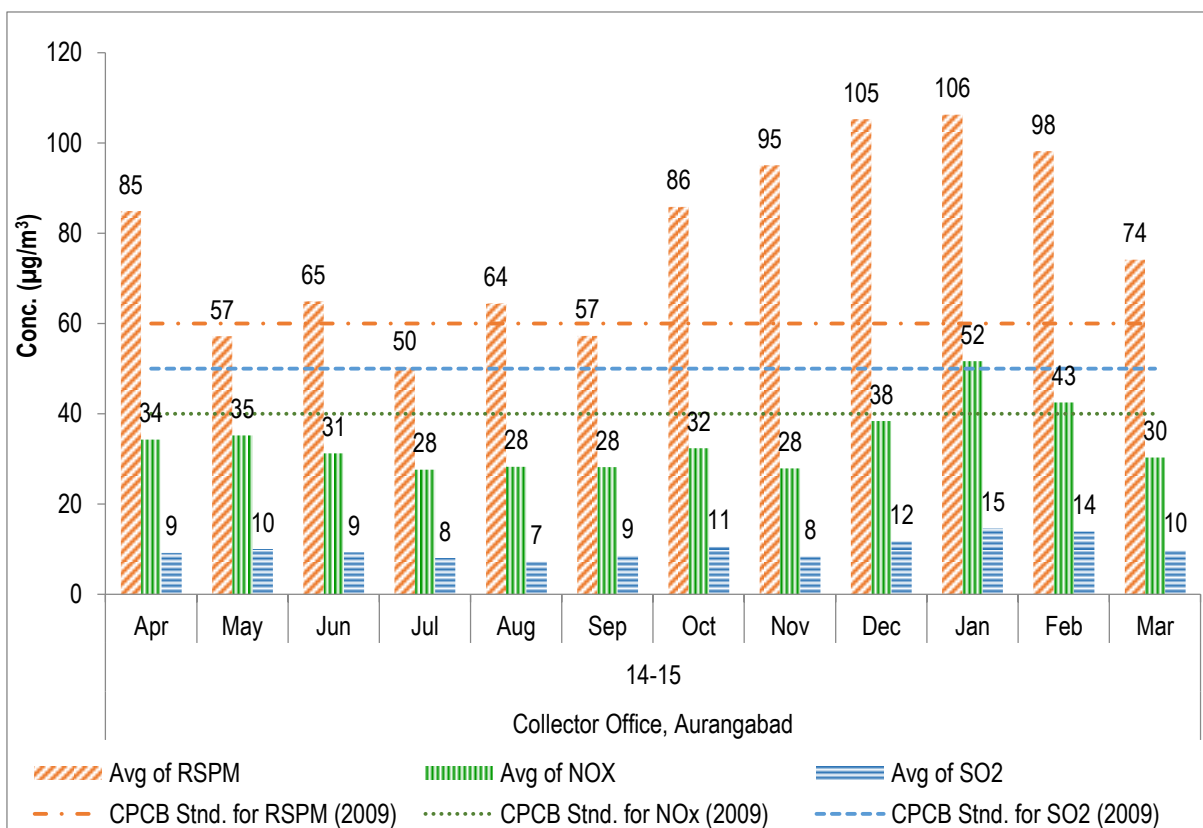
Figure No. 39: Monthly average reading recorded at Collector Office, Aurangabad

Table No. 40: Data for Annual average trend of SO₂, NOₓ, and RSPM at Collector Office, Aurangabad

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06	*34*	108	19	6
06-07	*87*	73	13	4
07-08	*100*	56	16	5
08-09	*96*	68	20	8
09-10	*101*	85	22	6
10-11	*100*	69	22	6
11-12	*104*	92	29	8
12-13	*101*	76	31	9
13-14	*99*	79	36	9
14-15	*108*	78	34	10
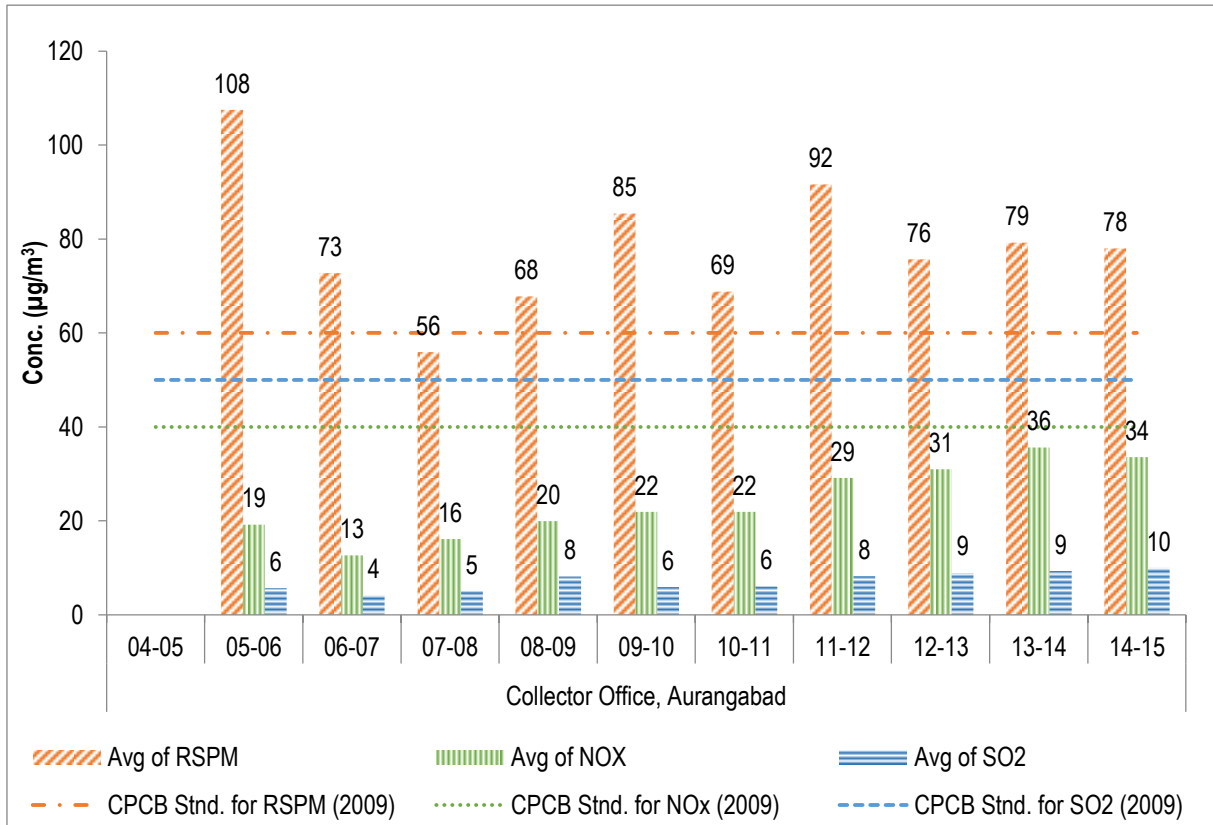
Figure No. 40: Annual average trend of SO₂, NOₓ, and RSPM at Collector Office, Aurangabad

Aurangabad – C.A.D.A. Office

Table No. 41: Data for Monthly average reading recorded at C.A.D.A. Office - Aurangabad

FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NO$_X$	SO$_2$
Apr	8	88	37	11
May	10	50	39	11
Jun	8	52	37	10
Jul	9	34	32	10
Aug	10	58	31	8
Sep	8	50	37	10
Oct	11	99	41	14
Nov	9	120	36	11
Dec	8	101	49	15
Jan	10	118	52	17
Feb	6	108	45	15
Mar	8	74	42	13
105		24.8	0.0	0.0
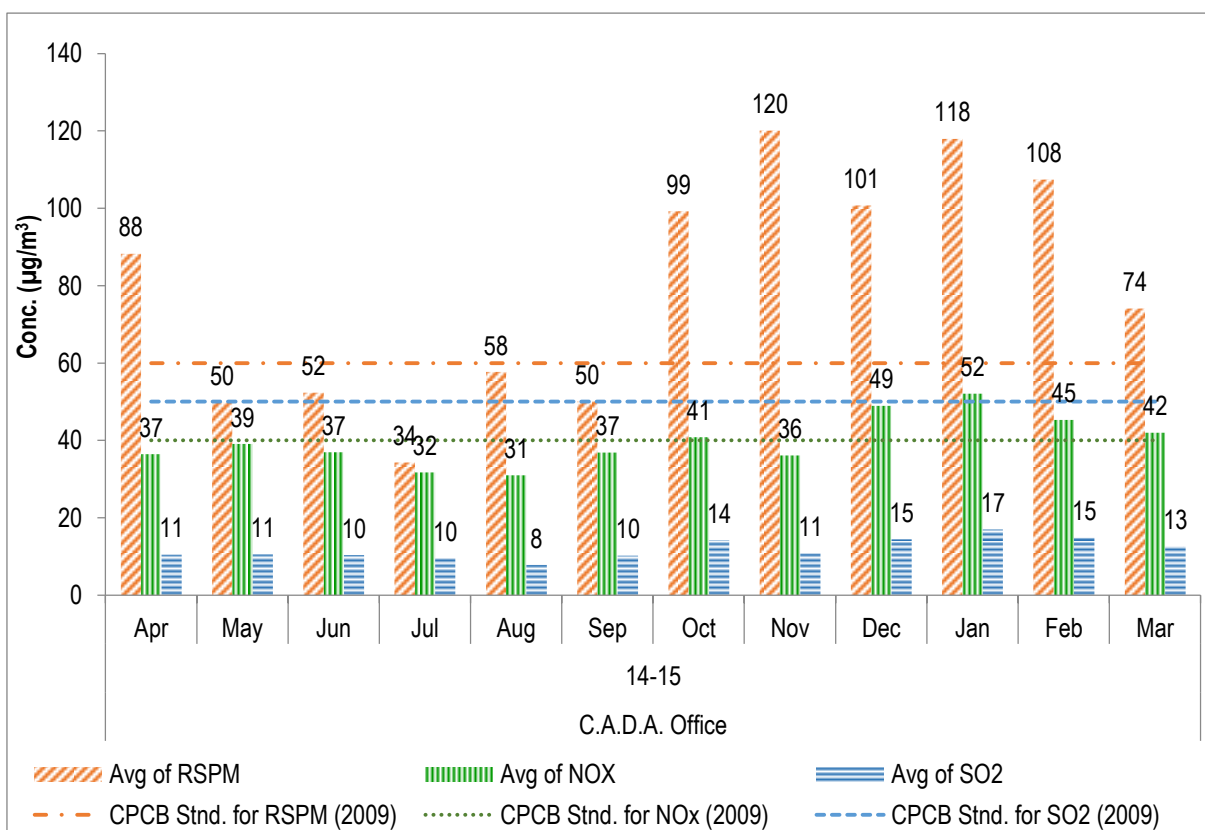
Figure No. 41: Monthly average reading recorded at C.A.D.A. Office - Aurangabad

Table No. 42: Data for Annual average trend of SO₂, NOₓ, and RSPM at C.A.D.A. Office - Aurangabad

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06	32	119	23	7
06-07	90	79	19	5
07-08	98	79	23	5
08-09	102	63	21	9
09-10	99	66	22	6
10-11	102	69	22	6
11-12	103	75	34	10
12-13	102	68	35	11
13-14	98	74	38	10
14-15	105	79	40	12
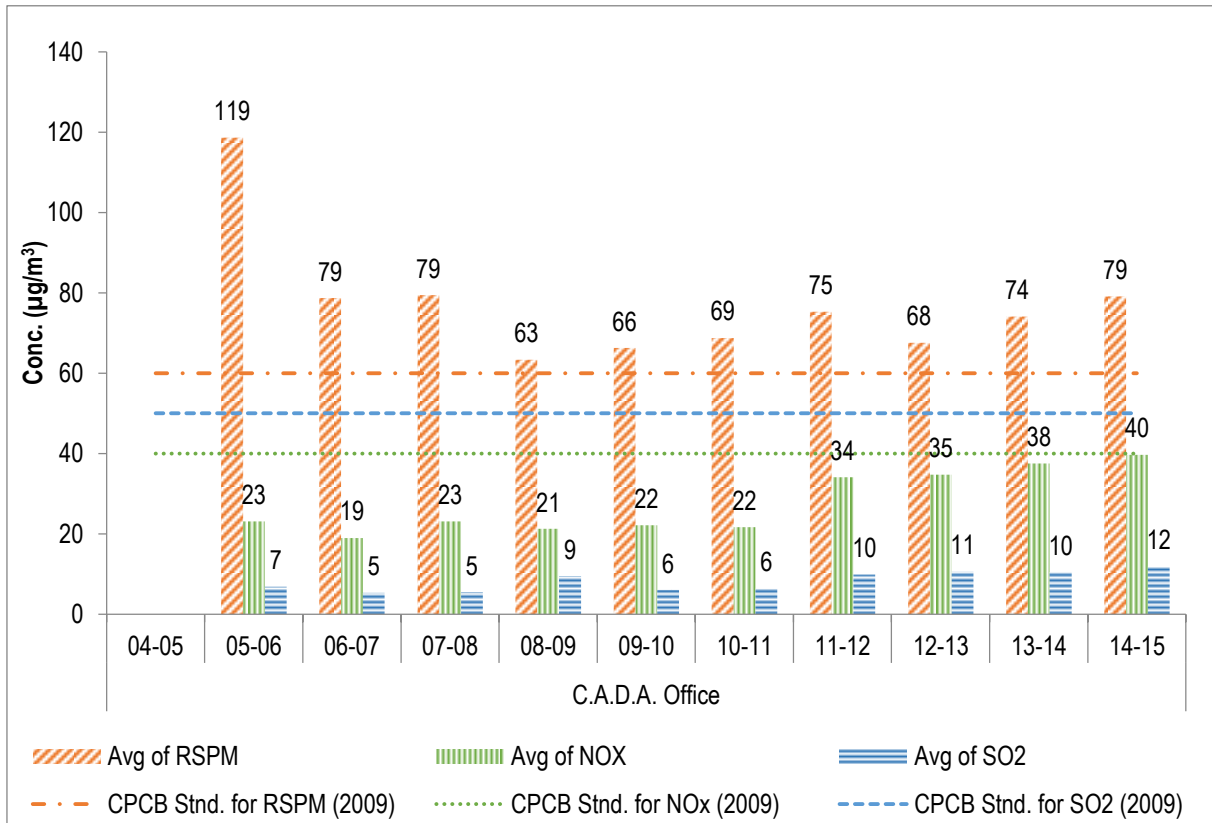
Figure No. 42: Annual average trend of SO₂, NOₓ, and RSPM at C.A.D.A. Office - Aurangabad

Jalna – Bachat Bhavan

Table No. 43: Data for Monthly average reading recorded at Jalna Bachat Bhavan

FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NOX	SO2
Apr				
May	10	119	30	9
Jun	7	91	30	9
Jul	8	68	28	7
Aug	9	48	26	7
Sep	8	56	25	7
Oct	10	87	28	7
Nov	8	98	29	8
Dec	8	106	31	9
Jan	10	121	32	12
Feb	8	140	35	14
Mar	8	157	34	13
94		50.0	0.0	0.0
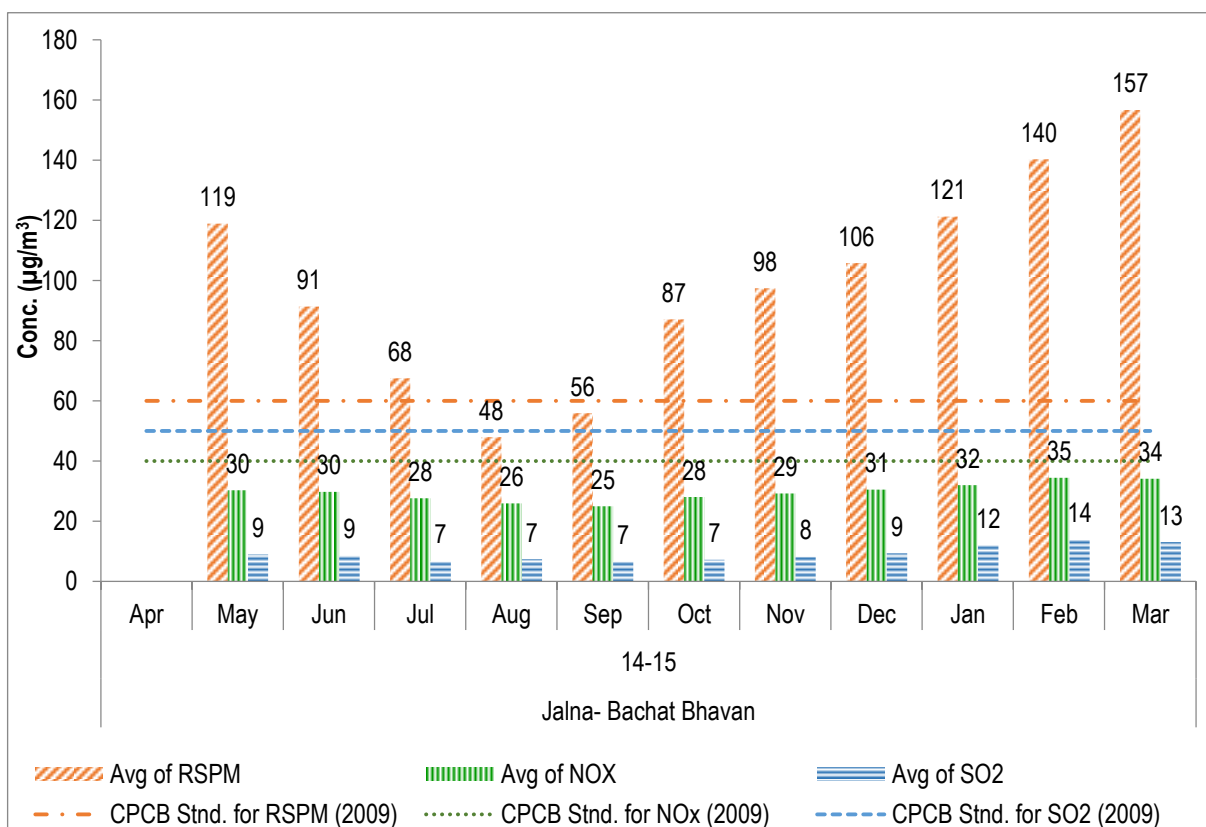
Figure No. 43: Monthly average reading recorded at Jalna Bachat Bhavan

Table No. 44: Data for Annual average trend of SO₂, NOₓ, and RSPM at Jalna Bachat Bhavan

Year	N	Annual average (µg/m³)		
		RSPM	NOX	SO₂
04-05				
05-06				
06-07	100	53	22	13
07-08	95	87	28	17
08-09	18	66	32	17
09-10	32	84	28	5
10-11	102	73	26	5
11-12	104	89	25	6
12-13	93	97	30	10
13-14	83	100	30	10
14-15	94	99	30	9
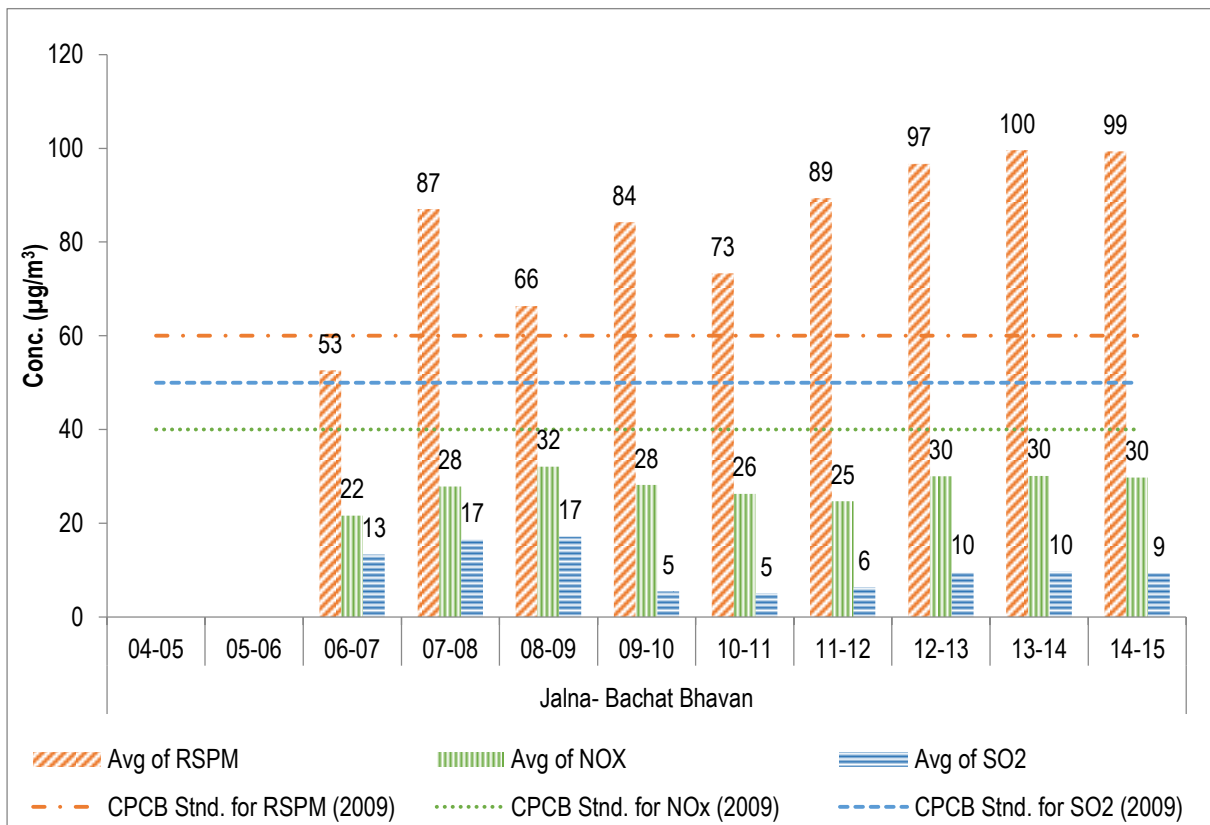
Figure No. 44: Annual average trend of SO₂, NOₓ, and RSPM at Jalna Bachat Bhavan

Jalna – Krishnadhan Seeds Ltd

Table No. 45: Data for Monthly average reading recorded at Jalna Krishnadhan Seeds Ltd

FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NOₓ	SO₂
Apr	10	231	31	11
May	8	163	31	11
Jun	8	168	31	12
Jul	7	212	34	12
Aug	8	178	28	10
Sep	9	124	26	9
Oct	9	147	29	10
Nov	8	154	30	11
Dec	9	178	31	13
Jan	8	206	34	14
Feb	8	222	33	13
Mar	9	132	32	12
101		88.1	0.0	0.0
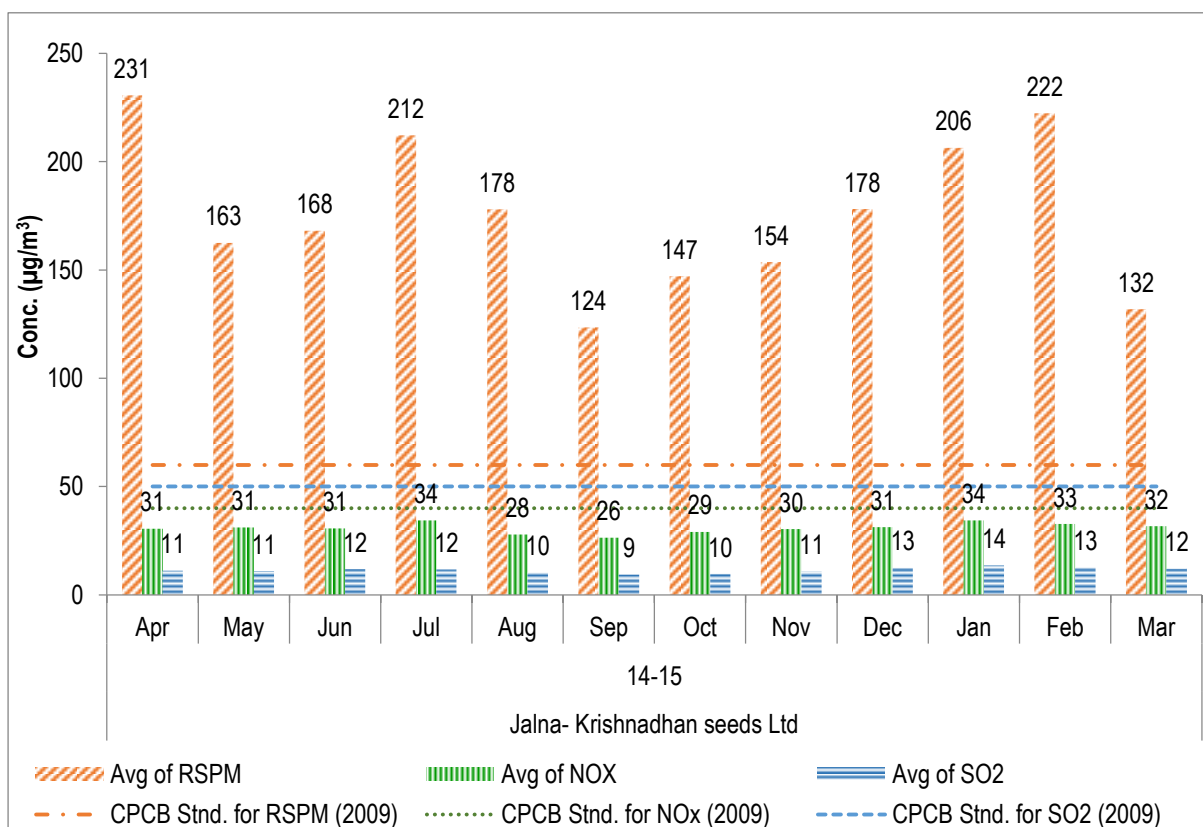
Figure No. 45: Monthly average reading recorded at Jalna Krishnadhan Seeds Ltd

Table No. 46: Data for Annual average trend of SO₂, NOₓ, and RSPM at Jalna Krishnadhan Seeds Ltd

Year	N	Annual average (µg/m³)		
		RSPM	NOX	SO2
04-05				
05-06				
06-07	90	125	29	17
07-08	103	140	44	28
08-09	16	182	45	30
09-10	52	111	37	13
10-11	83	139	33	7
11-12	104	140	26	8
12-13	87	143	32	11
13-14	92	150	31	11
14-15	101	176	31	11
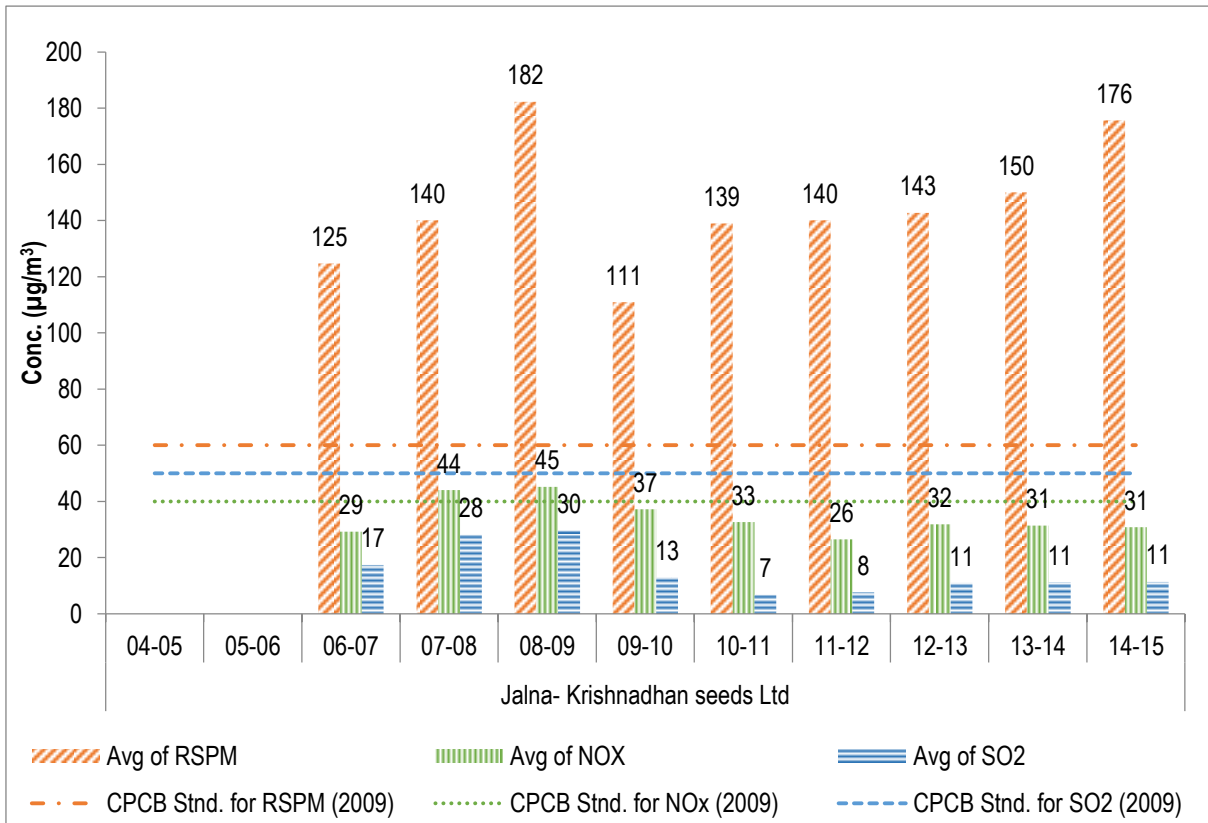
Figure No. 46: Annual average trend of SO₂, NOₓ, and RSPM at Jalna Krishnadhan Seeds Ltd

Latur – MIDC Water Works

Table No. 47: Data for Monthly average reading recorded at Latur MIDC Water Works

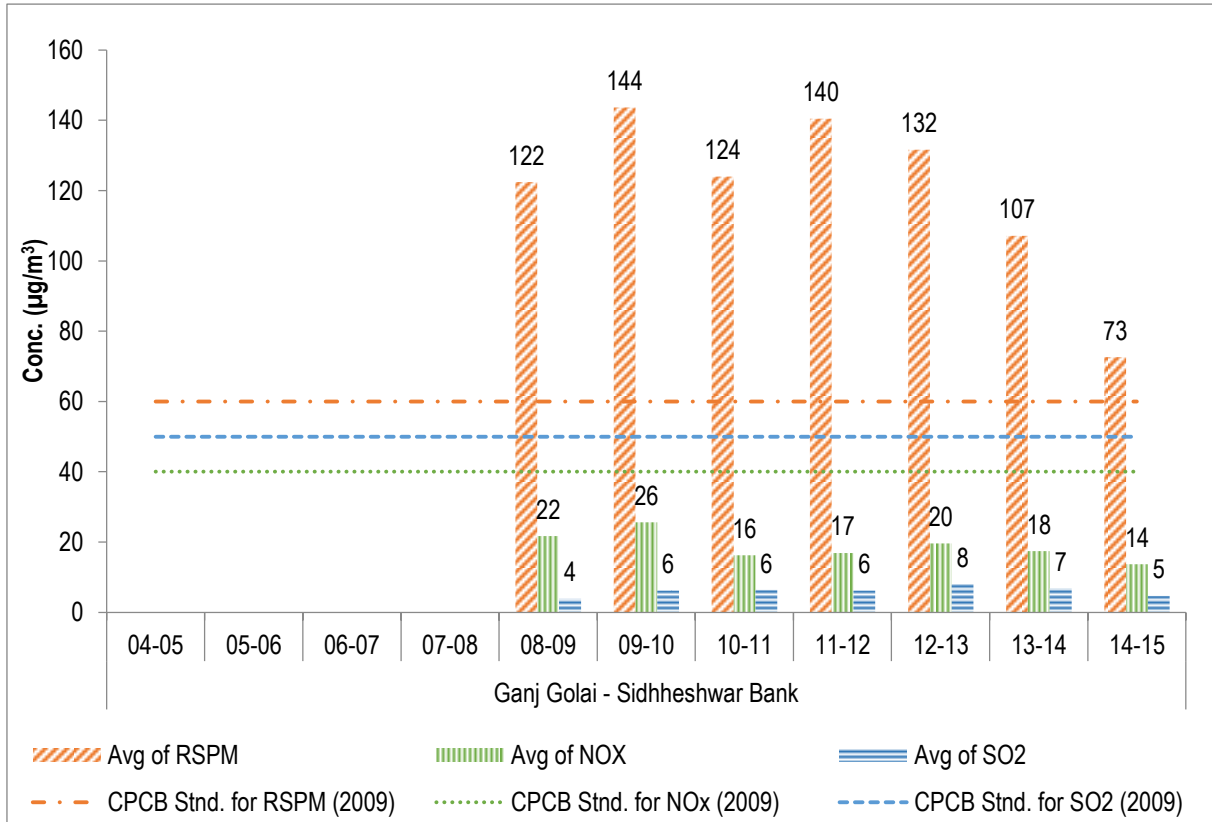| FY 2014-15	N	Monthly average (µg/m³)		
		RSPM	NOₓ	SO₂
Apr	9	81	22	7
May	8	79	16	5
Jun	9	62	14	4
Jul	9	60	11	4
Aug	8	47	15	5
Sep	10	62	12	4
Oct	8	91	14	5
Nov	8	95	11	5
Dec	10	123	12	5
Jan				
Feb	8	112	12	4
Mar	9	69	12	4
	96	24.0	0.0	0.0
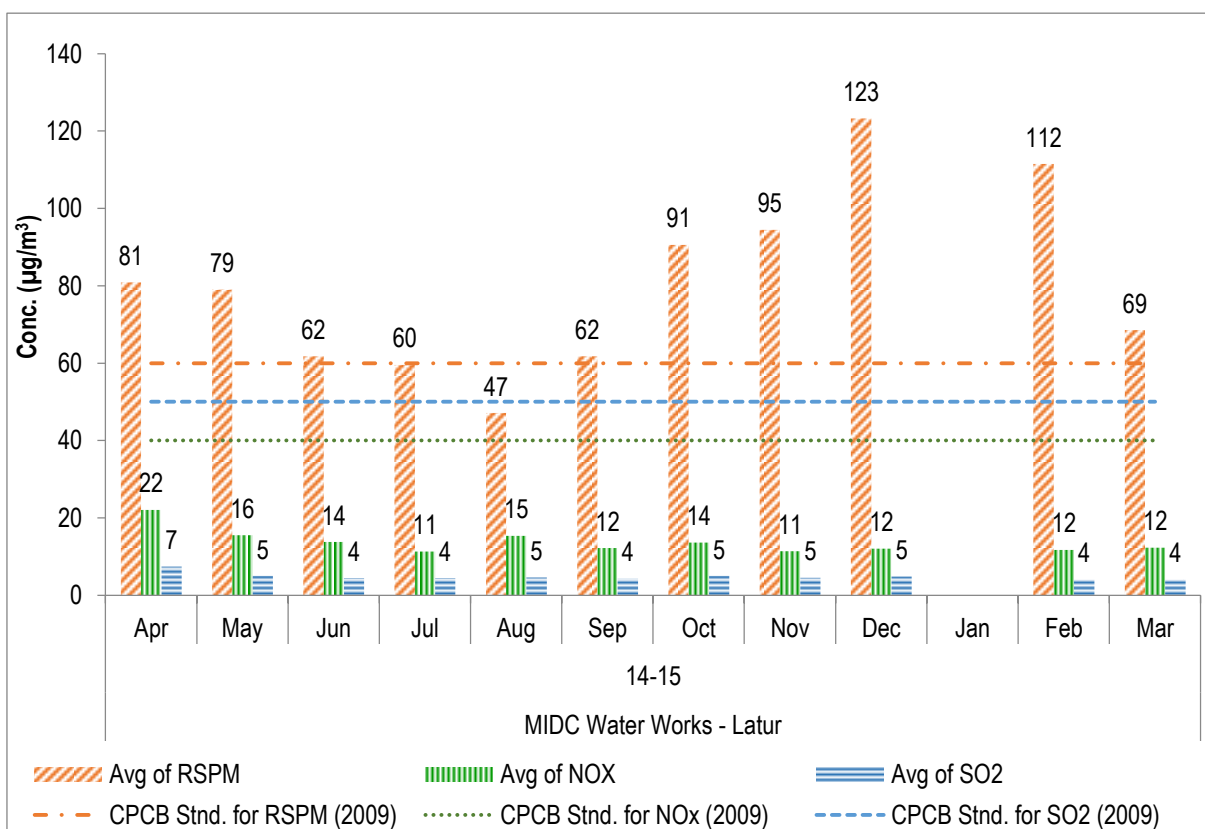
Figure No. 47: Monthly average reading recorded at Latur MIDC Water Works

Table No. 48: Data for Annual average trend of SO₂, NOₓ, and RSPM at Latur MIDC Water Works

Year	N	Annual average ($\mu g/m^3$)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07				
07-08				
08-09	91	77	22	4
09-10	99	76	22	7
10-11	100	95	15	6
11-12	119	99	16	6
12-13	99	82	19	8
13-14	104	88	16	6
14-15	96	80	14	5
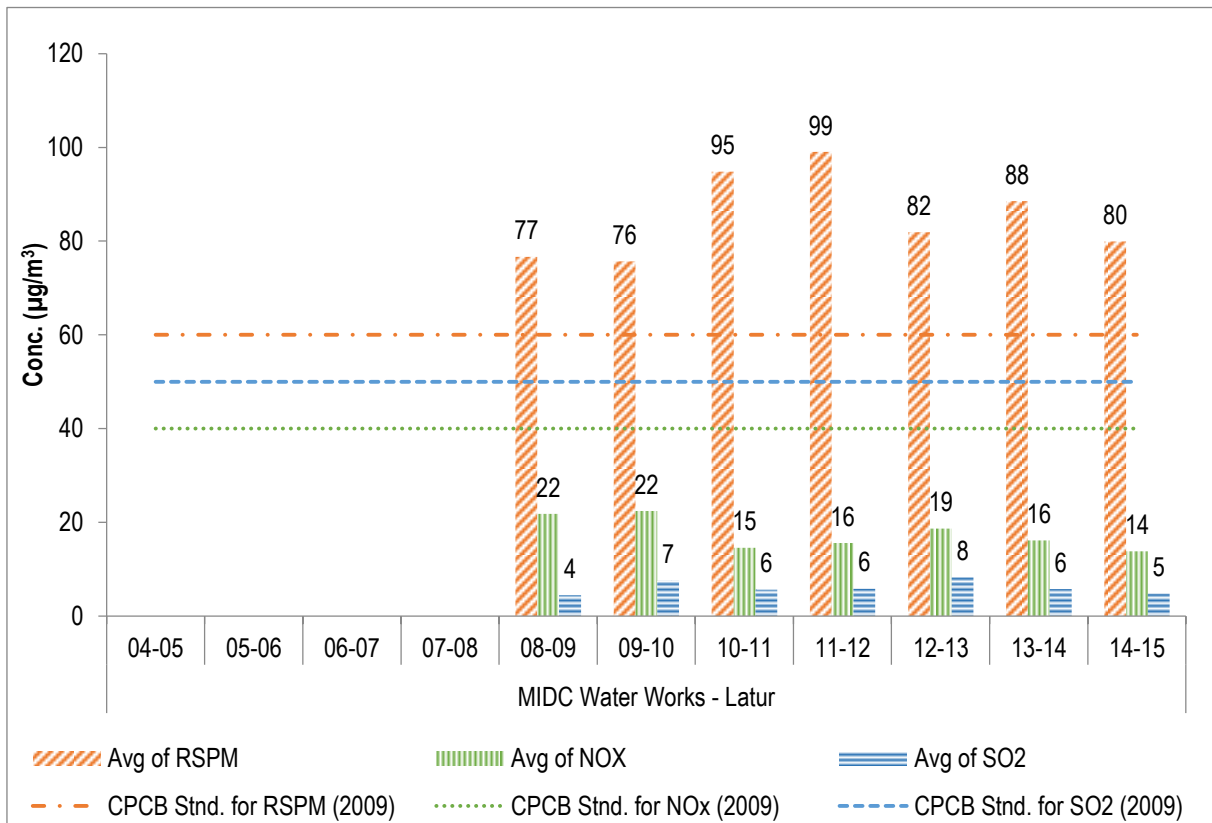
Figure No. 48: Annual average trend of SO₂, NOₓ, and RSPM at Latur MIDC Water Works

Latur – Shyam Nagar – Kshewraj Vidyalaya

Table No. 49: Dat a for Monthly average reading recorded at Shyam Nagar Keshwraj Vidyalaya

FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NOx	SO2
Apr				
May				
Jun	8	77	14	5
Jul	8	78	15	4
Aug	10	88	16	5
Sep	8	84	13	6
Oct	9	71	14	5
Nov	9	91	13	4
Dec	8	99	14	5
Jan				
Feb	8	127	11	4
Mar	8	93	14	4
76		32.9	0.0	0.0
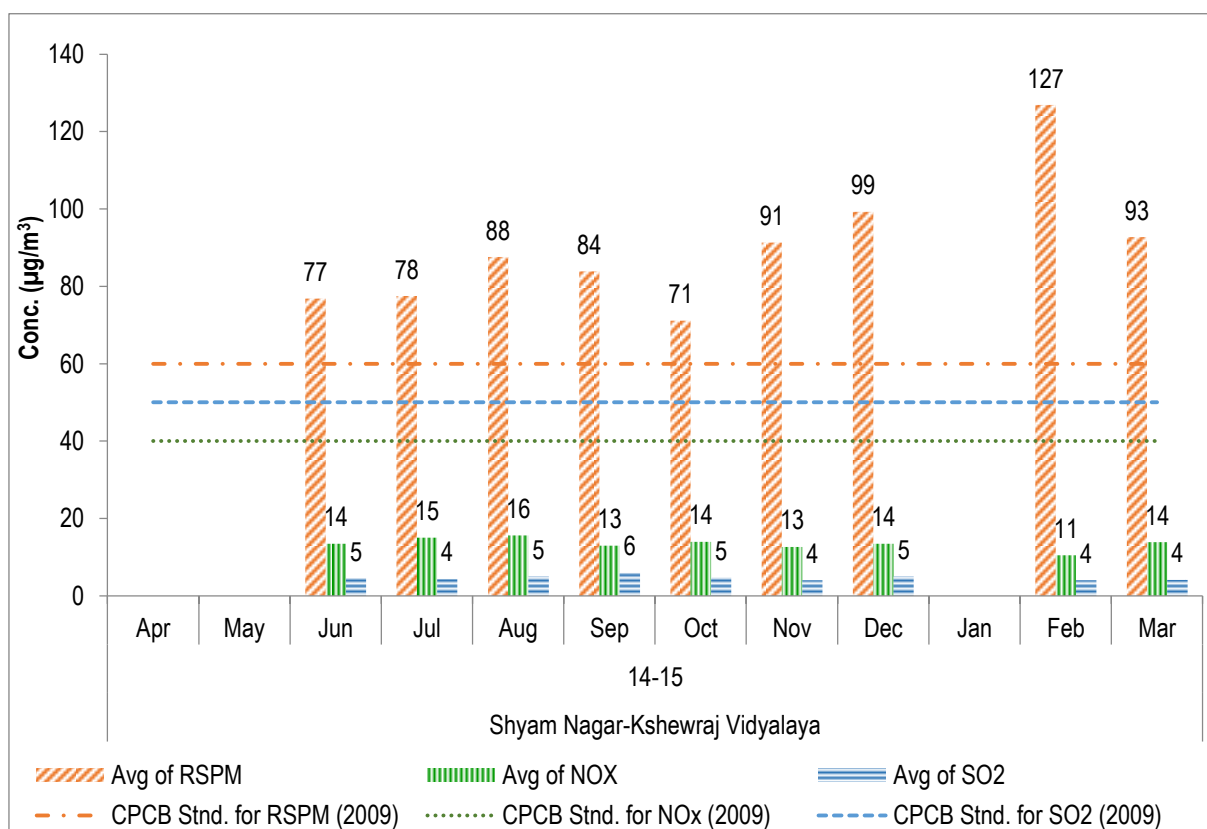
Figure No. 49: Monthly average reading recorded at Shyam Nagar Keshwraj Vidyalaya

Table No. 50: Data for Annual average trend of SO₂, NOₓ, and RSPM at Shyam Nagar Keshwraj Vidyalaya

E	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07				
07-08				
08-09	79	99	16	3
09-10	90	123	19	6
10-11	85	139	13	6
11-12	100	124	14	6
12-13	104	105	19	7
13-14	95	95	17	7
14-15	76	89	14	5
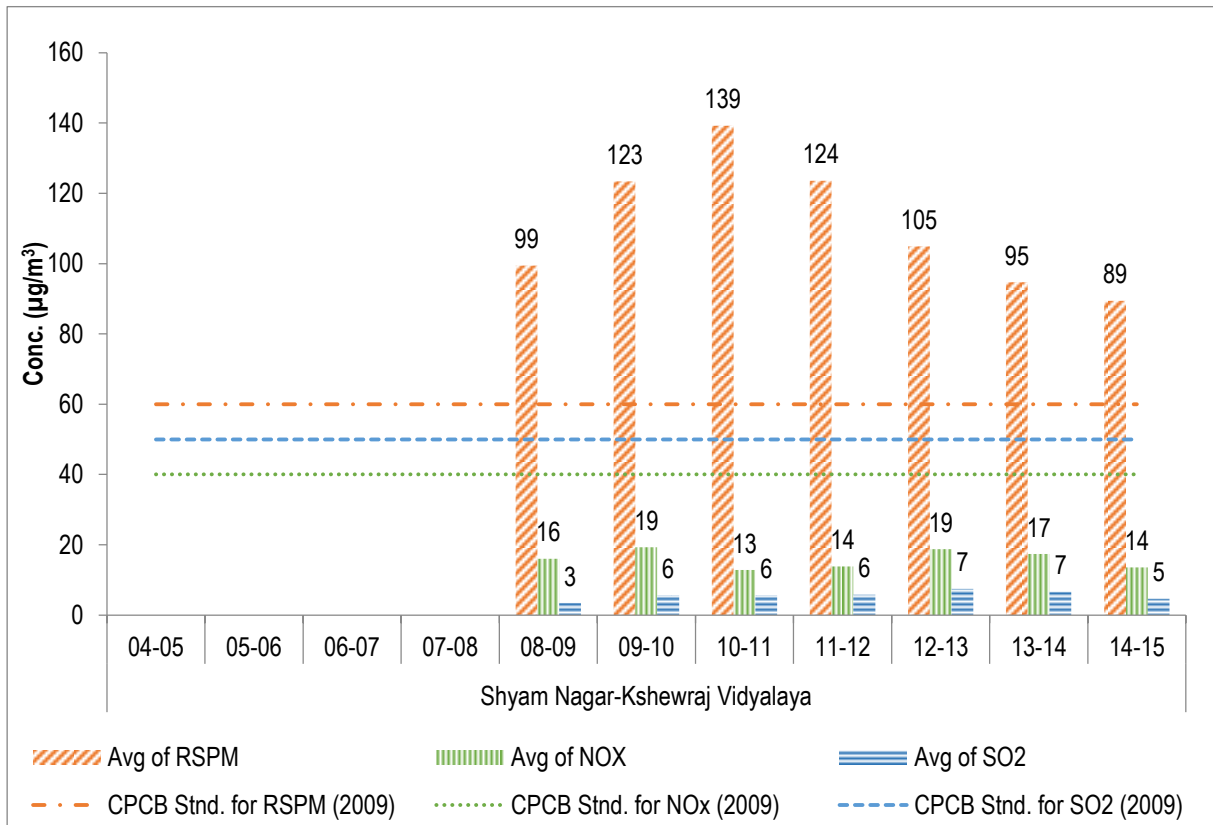
Figure No. 50: Annual average trend of SO₂, NOₓ, and RSPM at Shyam Nagar Keshwraj Vidyalaya

Latur – Ganj Golai – Sidhheshwar Bank

Table No. 51: Data for Monthly average reading recorded at Ganj Golai Sidhheshwar bank

FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NO$_X$	SO$_2$
Apr				
May				
Jun	8	78	13	5
Jul	10	78	13	4
Aug	8	86	16	5
Sep	8	86	13	5
Oct	10	72	16	6
Nov	8	48	12	4
Dec	9	65	13	5
Jan				
Feb	8	72	14	4
Mar	8	69	13	4
77		14.3	0.0	0.0
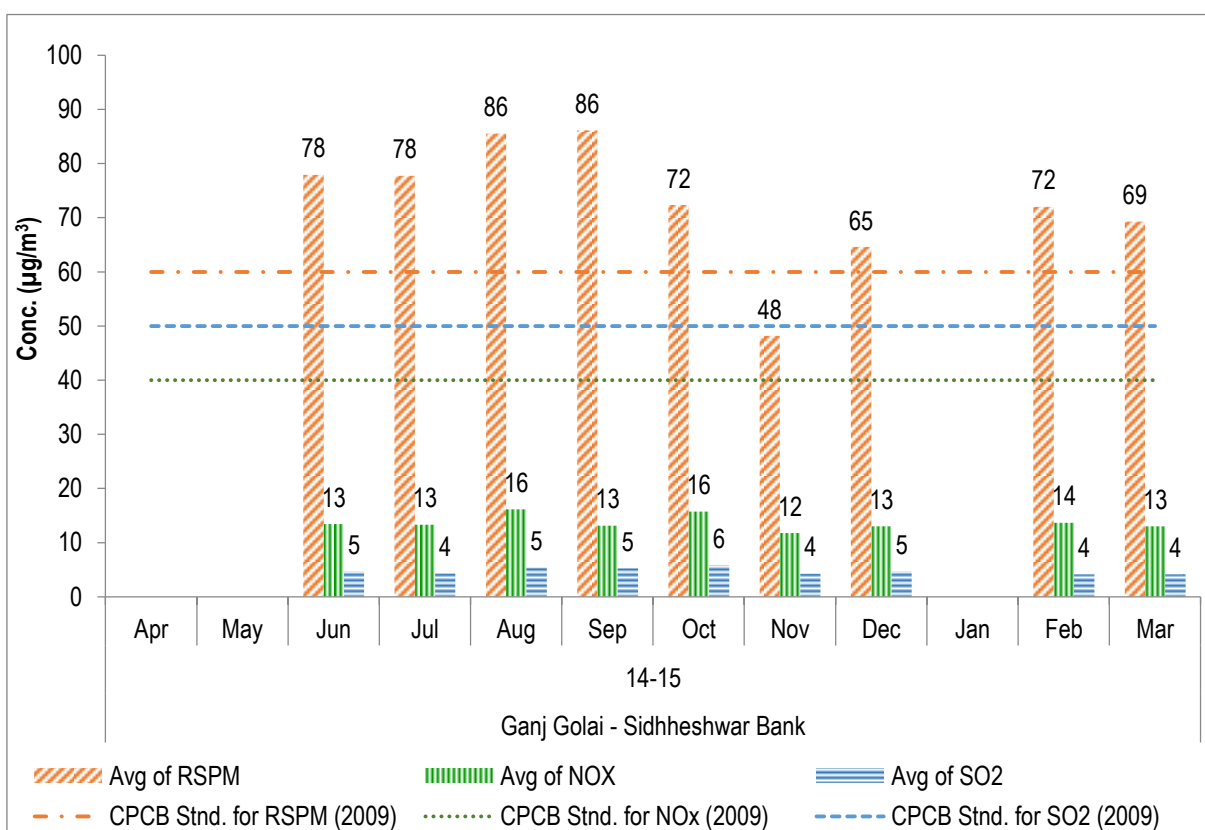
Figure No. 51: Monthly average reading recorded at Ganj Golai Sidhheshwar bank

Table No. 52: Data for Annual average trend of SO₂, NOₓ, and RSPM at Ganj Golai Sidhheshwar bank

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07				
07-08				
08-09	91	122	22	4
09-10	74	144	26	6
10-11	89	124	16	6
11-12	95	140	17	6
12-13	103	132	20	8
13-14	94	107	18	7
14-15	77	73	14	5

Figure No. 52: Annual average trend of SO₂, NOₓ, and RSPM at Ganj Golai Sidhheshwar bank

Nanded - GaneshNagar

Table No. 53: Data for Monthly average reading recorded at Ganeshnagar

E	N	Monthly average (µg/m3)		
2014-15		**RSPM**	**NOX**	**SO2**
Apr	9	36	25	25
May	9	54	39	37
Jun	8	40	27	28
Jul	9	37	28	27
Aug				
Sep	8	122	28	27
Oct	10	122	28	28
Nov	8	118	27	27
Dec	9	121	28	27
Jan	9	119	28	28
Feb	8	118	28	27
Mar	8	116	27	27
	95	63.2	0.0	0.0
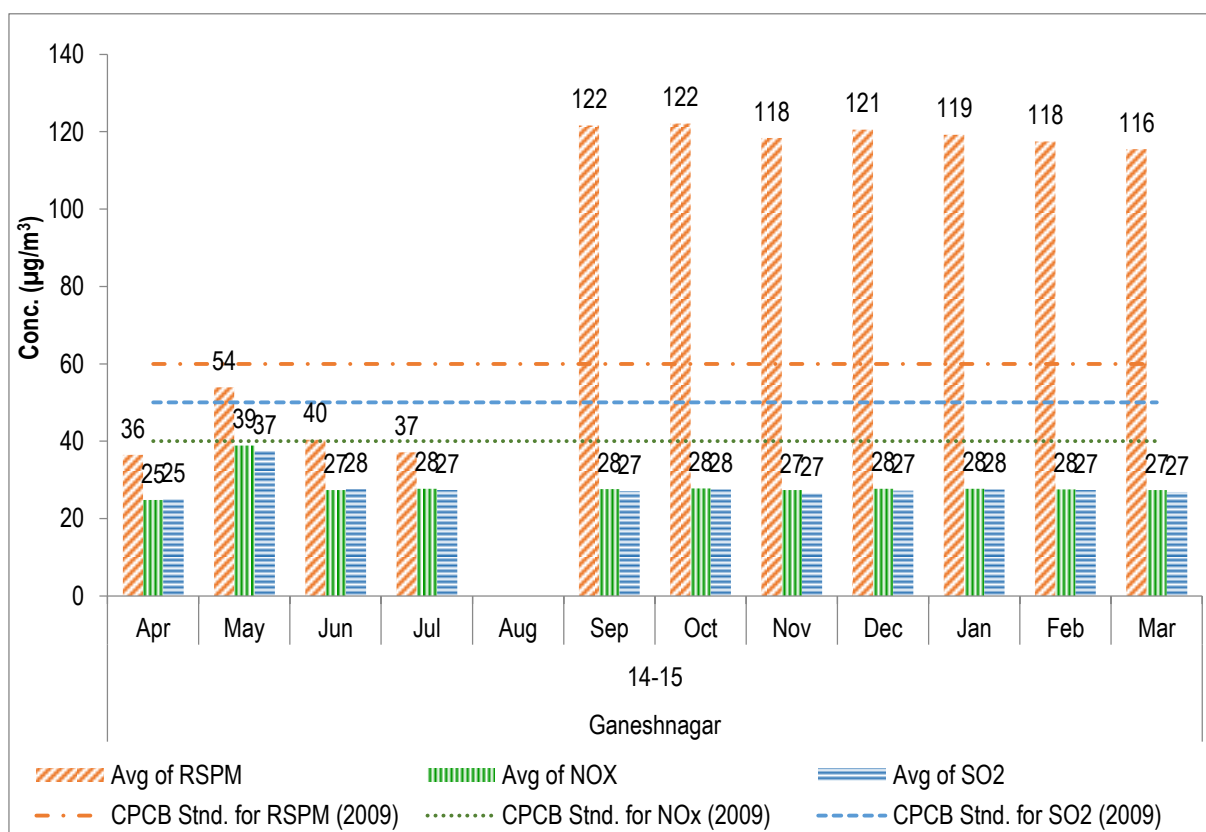
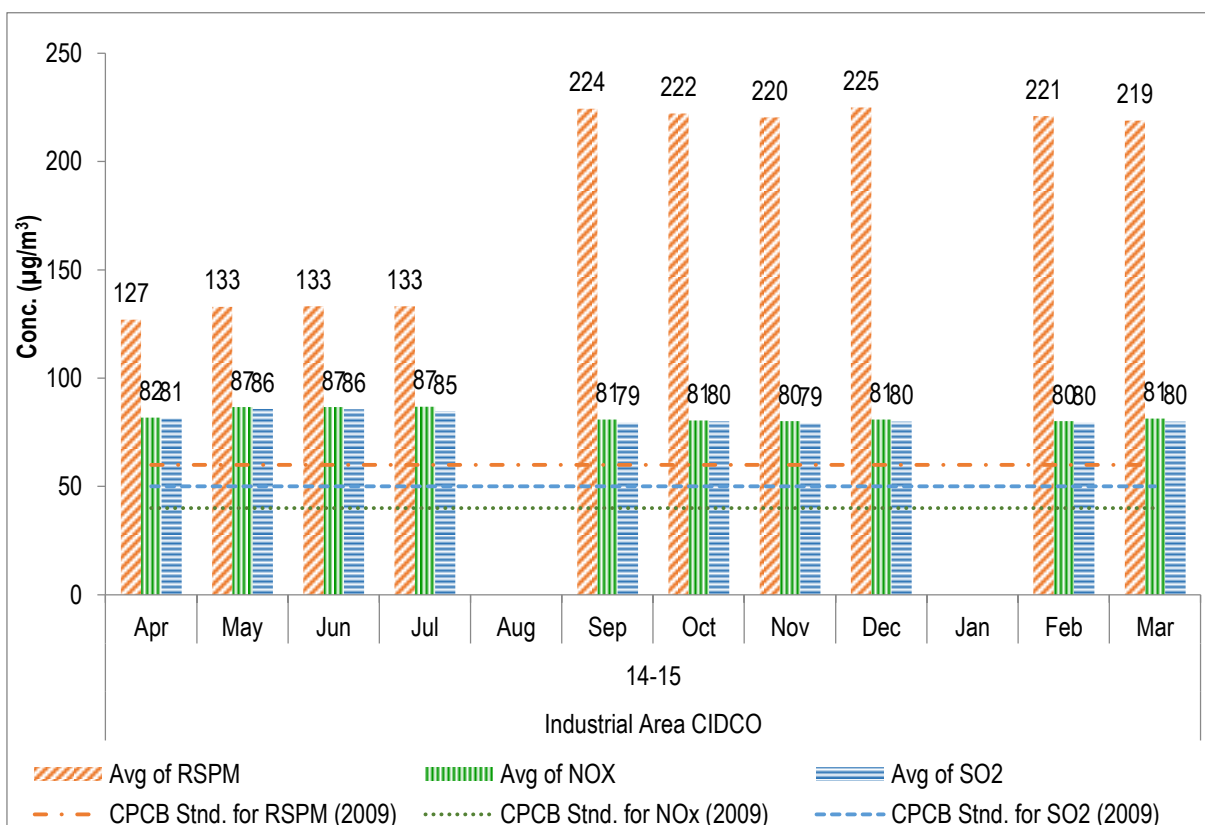**Figure No. 53: Monthly average reading recorded at Ganeshnagar**

Table No. 54: Data for Annual average trend of SO₂, NOₓ, and RSPM at Ganeshnagar

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07				
07-08				
08-09				
09-10				
10-11	10	47	29	28
11-12	87	26	19	18
12-13	112	36	21	22
13-14	95	29	16	17
14-15	95	91	28	28
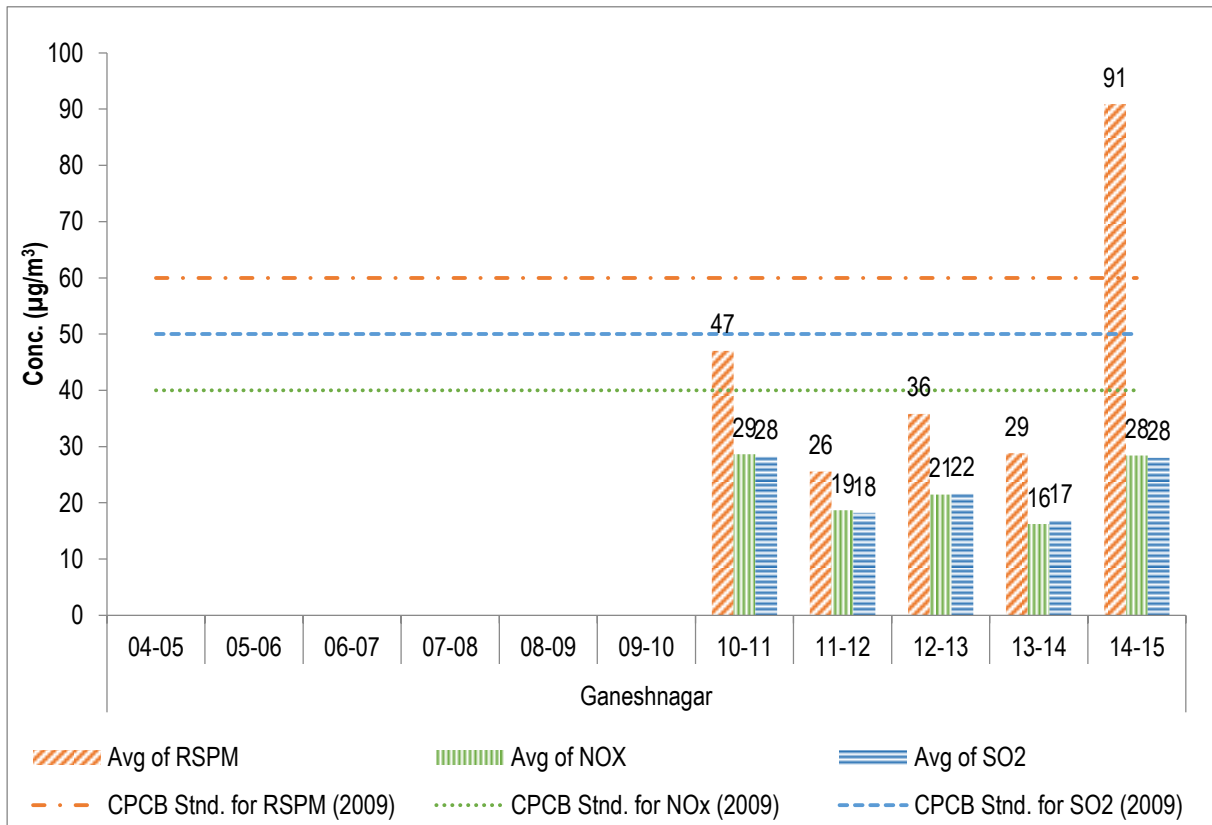
Figure No. 54: Annual average trend of SO₂, NOₓ, and RSPM at Ganeshnagar

Nanded – Mutha Chowk

Table No. 55: Data for Monthly average reading recorded at Mutha Chowk

FY	N	Monthly average ($\mu g/m^3$)		
2014-15		RSPM	NO$_X$	SO$_2$
Apr	8	58	30	34
May	10	82	42	51
Jun	8	63	32	38
Jul	8	56	32	38
Aug				
Sep	8	172	32	38
Oct	9	173	32	38
Nov	9	170	32	37
Dec	8	171	32	38
Jan				
Feb	8	169	32	38
Mar	8	167	32	38
84		59.5	0.0	0.0
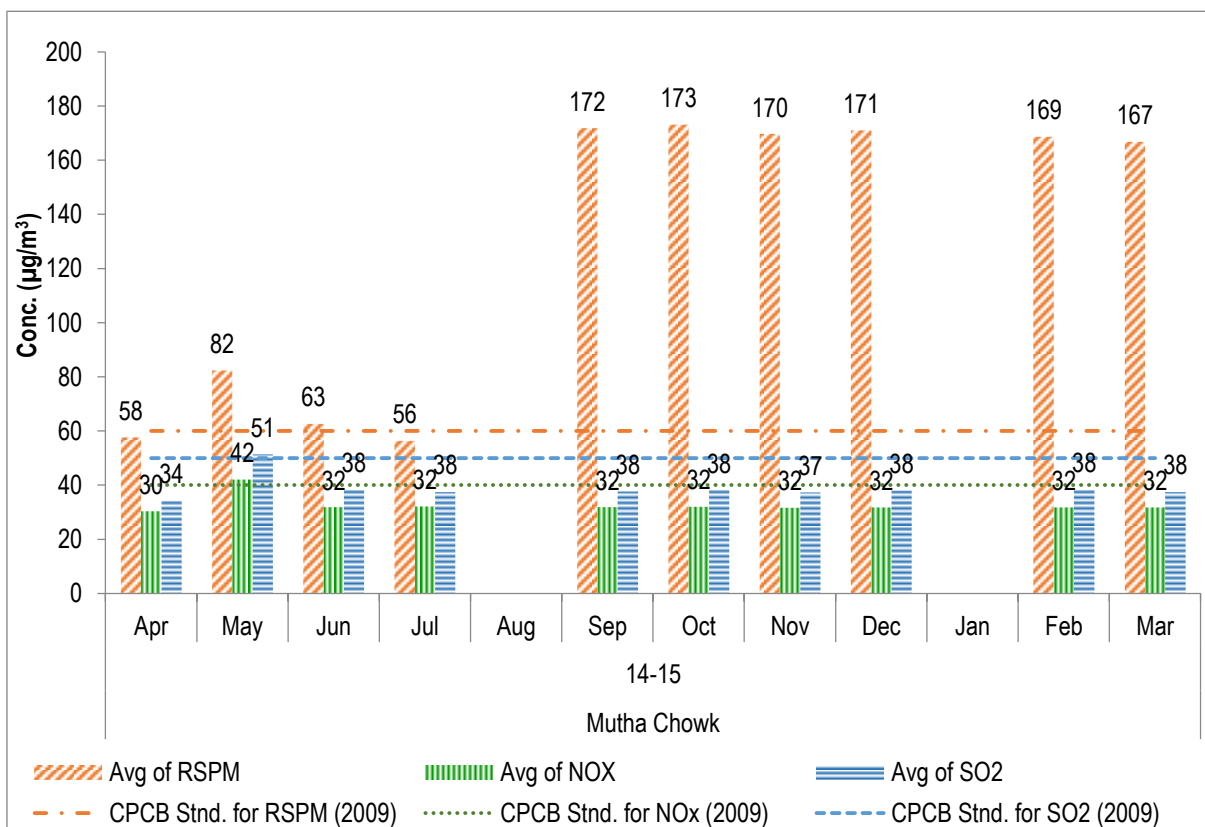
Figure No. 55: Monthly average reading recorded at Mutha Chowk

Table No. 56: Data for Annual average trend of SO₂, NOₓ, and RSPM at Mutha Chowk

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07				
07-08				
08-09				
09-10				
10-11				
11-12	89	44	28	28
12-13	104	53	25	27
13-14	94	62	21	25
14-15	84	128	33	39
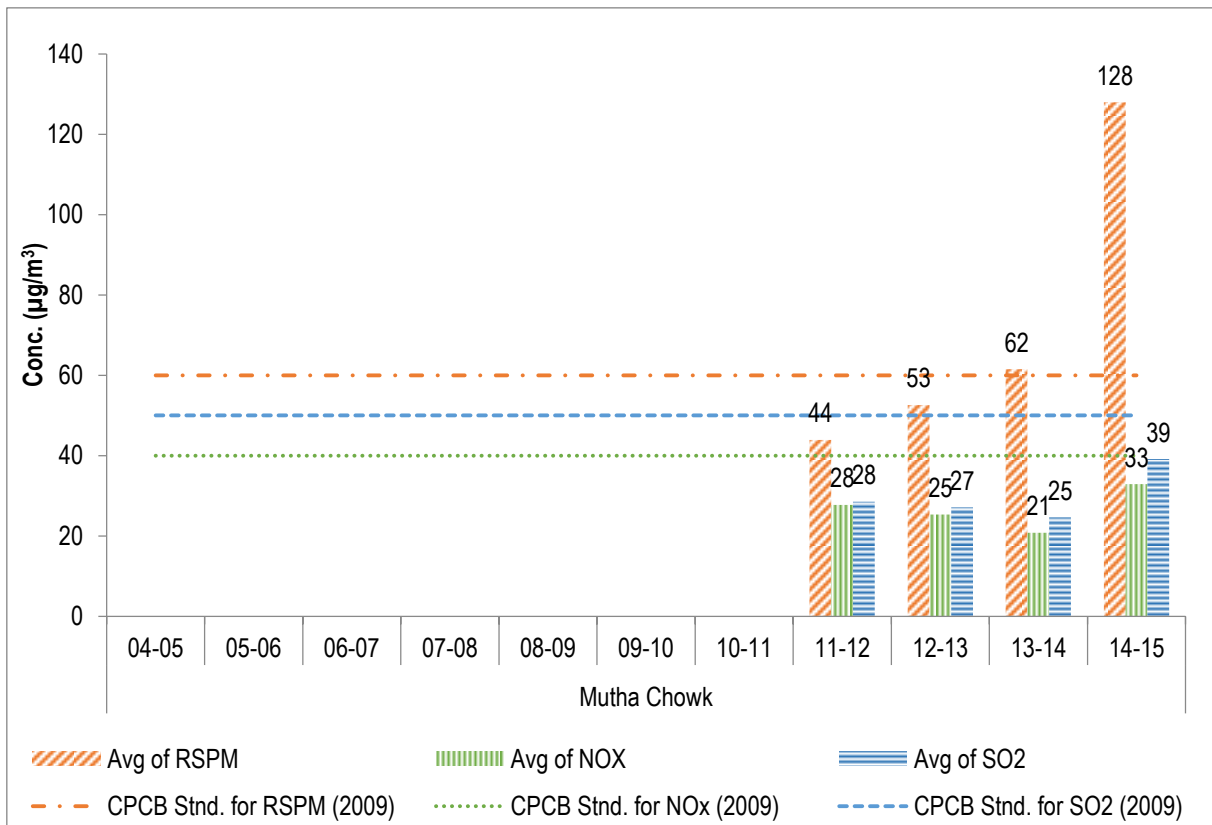
Figure No. 56: Annual average trend of SO₂, NOₓ, and RSPM at Mutha Chowk

Nanded – Industrial Area CIDCO

Table No. 57: Data for Monthly average reading recorded at Industrial Area CIDCO – Nanded

FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NOₓ	SO₂
Apr	9	127	82	81
May	8	133	87	86
Jun	9	133	87	86
Jul	9	133	87	85
Aug				
Sep	9	224	81	79
Oct	8	222	81	80
Nov	8	220	80	79
Dec	9	225	81	80
Jan				
Feb	8	221	80	80
Mar	10	219	81	80
	87	100.0	92.0	92.0

Figure No. 57: Monthly average reading recorded at Industrial Area CIDCO - Nanded

Table No. 58: Data for Annual average trend of SO₂, NOₓ, and RSPM at Industrial Area CIDCO - Nanded

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07				
07-08				
08-09				
09-10				
10-11				
11-12	84	65	45	43
12-13	103	88	54	53
13-14	104	85	43	48
14-15	87	186	83	82
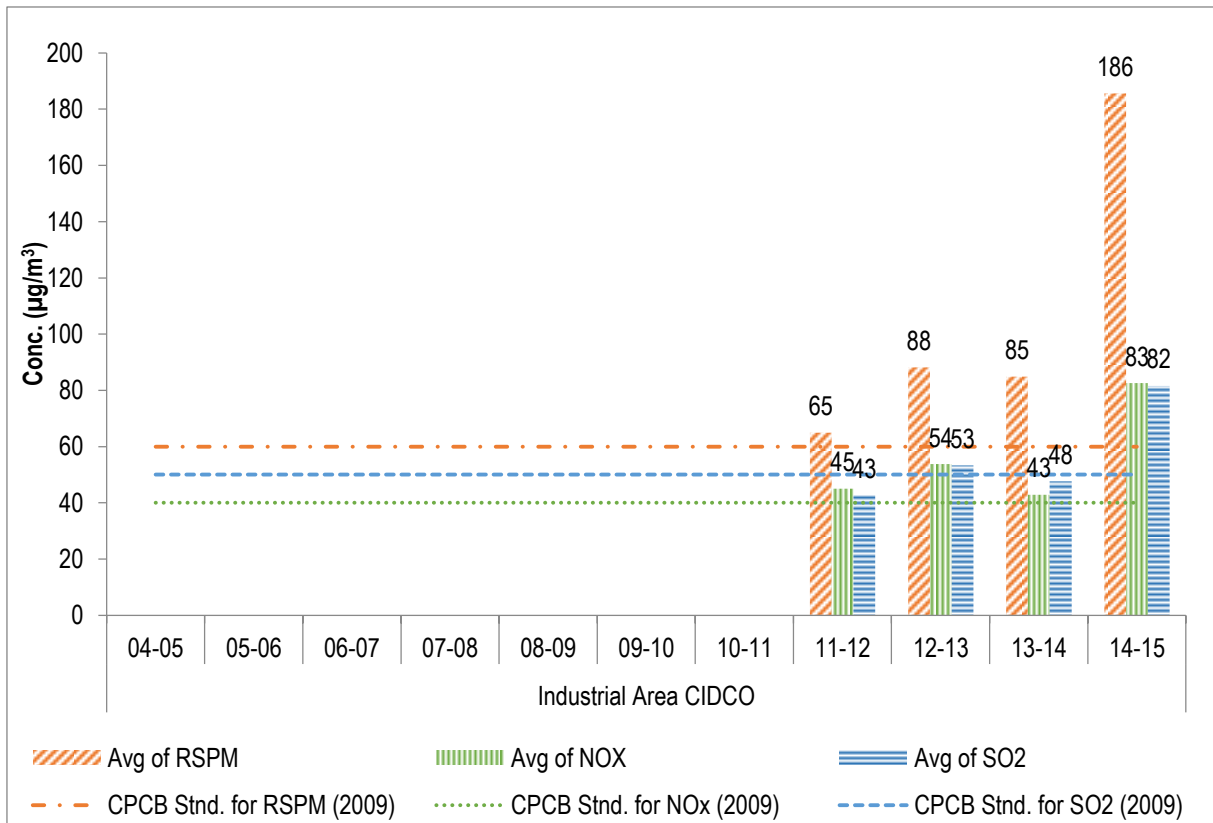
Figure No. 58: Annual average trend of SO₂, NOₓ, and RSPM at Industrial Area CIDCO - Nanded

% occurence for the classes for AQI across Aurangabad RO

Legend:
- Good (0-50)
- Satisfactory (51-100)
- Moderately polluted (101-200)
- Poor (201-300)
- Very Poor (301-400)
- Severe (401+)
- Benchmark (98%)

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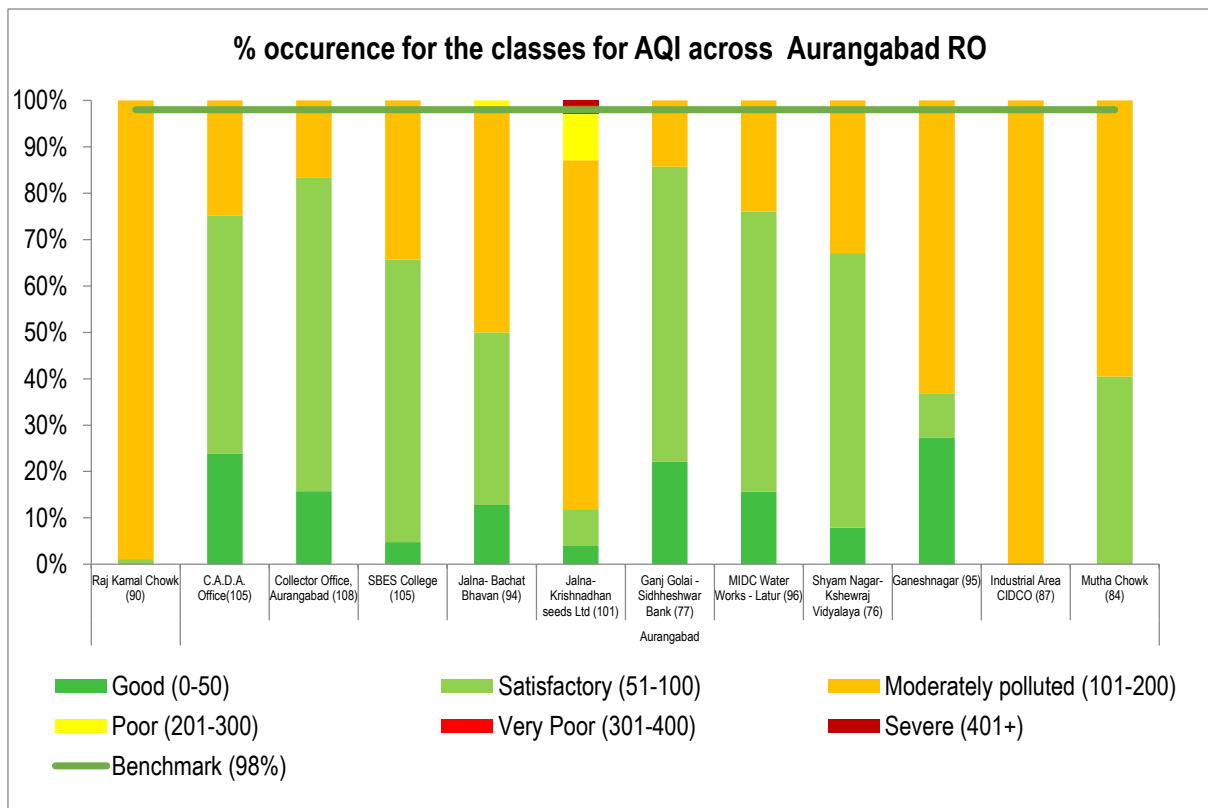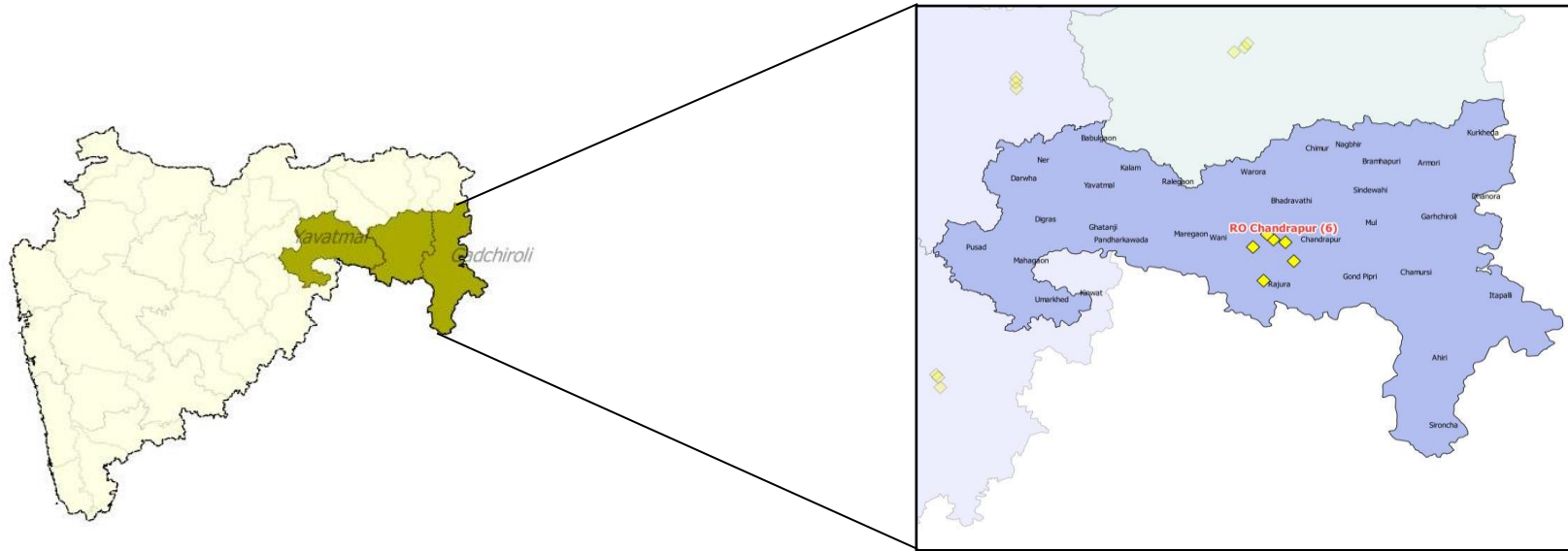
RO – Chandrapur

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 - Ghuggus

Table No. 59: Data for Monthly average reading recorded at Ghuggus - Chandrapur

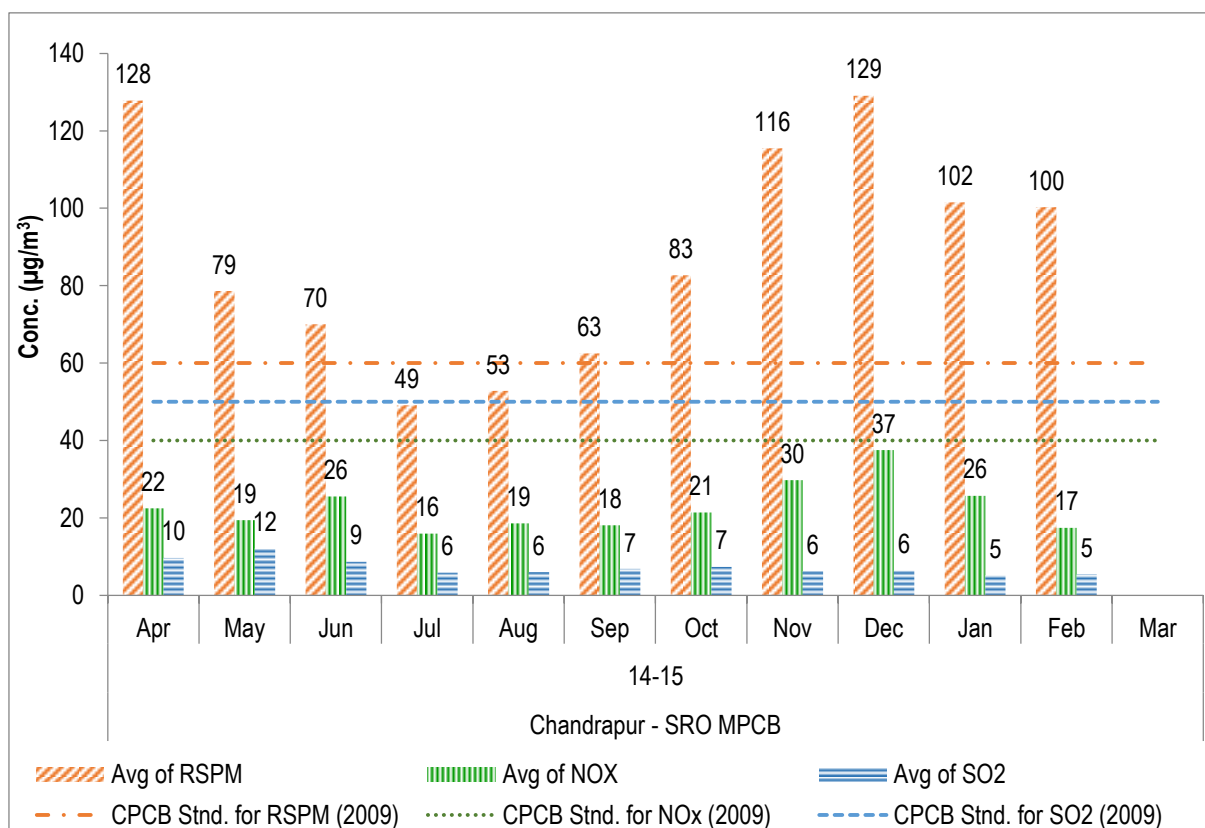| FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NO$_X$	SO$_2$
Apr				
May	*8*	160	28	15
Jun	*8*	123	21	8
Jul	*10*	110	11	6
Aug	*8*	111	12	7
Sep	*8*	134	11	9
Oct	*10*	133	13	6
Nov	*8*	136	15	10
Dec	*8*	162	14	5
Jan	*8*	143	12	5
Feb	*8*	198	14	24
Mar	*8*	236	18	6
92		**79.3**	**0.0**	**1.1**
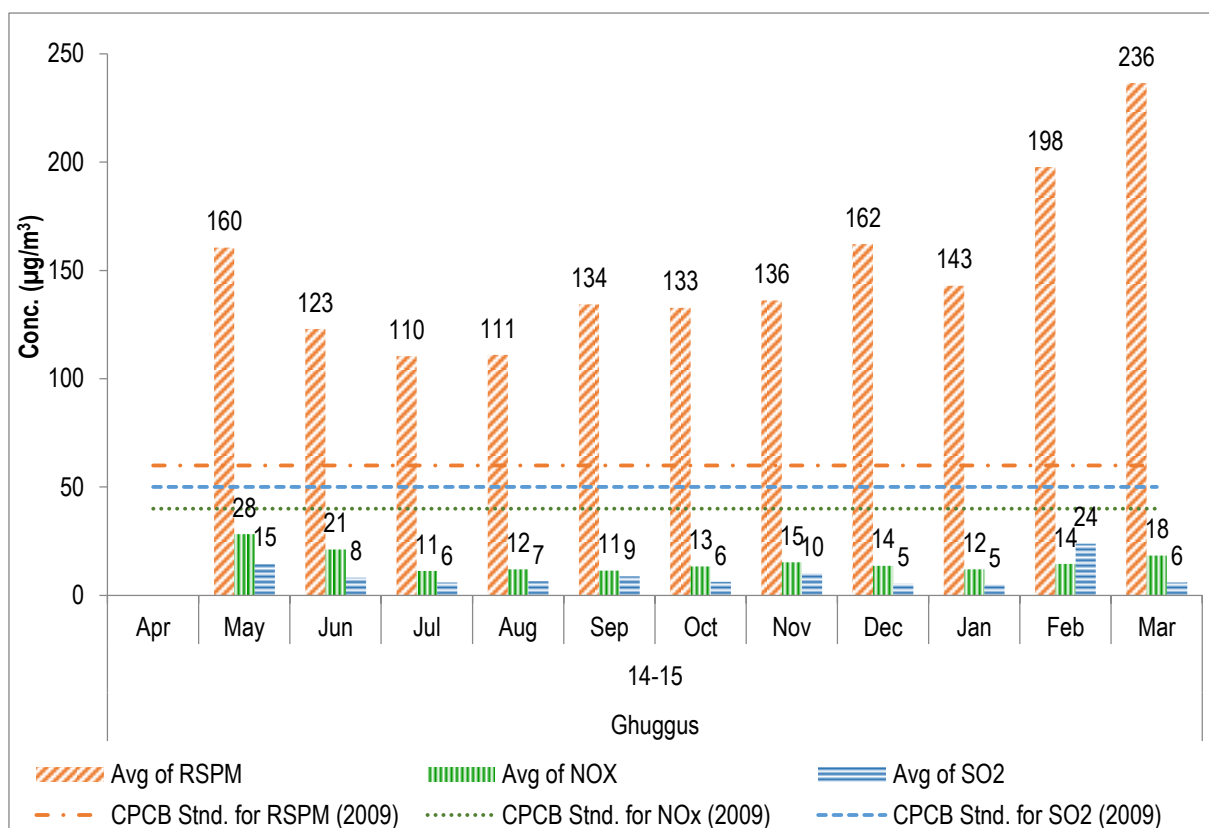
Figure No. 59: Monthly average reading recorded at Ghuggus - Chandrapur

Table No. 60: Data for Annual average trend of SO₂, NOₓ, and RSPM at Ghuggus - Chandrapur

Year	N	Annual average (μg/m³)		
		RSPM	NOₓ	SO₂
04-05		80	28	18
05-06	96	131	31	21
06-07	75	139	39	31
07-08	95	186	53	36
08-09	86	172	54	34
09-10	77	180	32	46
10-11	103	211	24	23
11-12	95	206	21	18
12-13	102	207	13	11
13-14	88	174	19	9
14-15	92	148	15	9
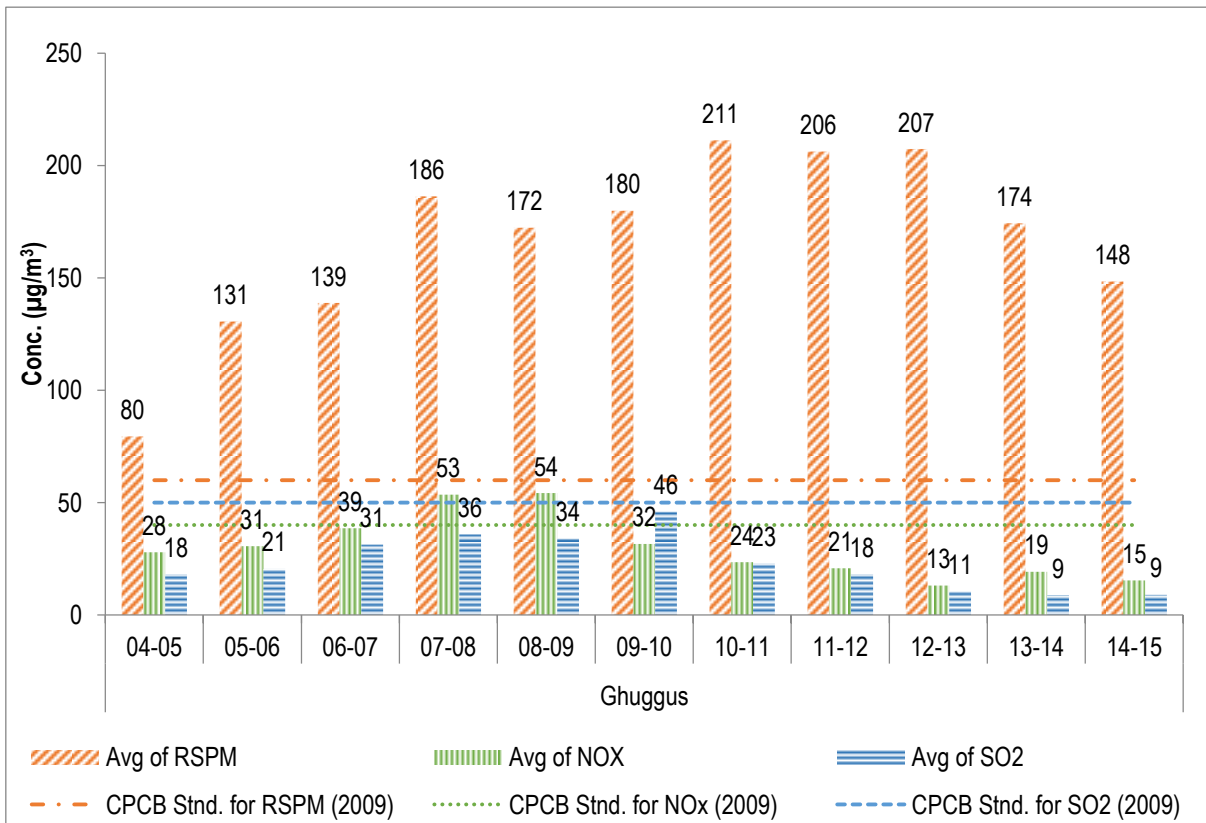
Figure No. 60: Annual average trend of SO₂, NOₓ, and RSPM at Ghuggus - Chandrapur

Chandrapur – Chandrapur - MIDC

Table No. 61: Data for Monthly average reading recorded at Chandrapur - MIDC

FY	N	Monthly average (µg/m3)		
2014-15		RSPM	NOX	SO2
Apr				
May	10	71	17	17
Jun	8	48	25	16
Jul	8	45	37	14
Aug	6	66	23	12
Sep				
Oct				
Nov				
Dec	8	98	54	14
Jan	8	79	32	16
Feb	8	79	28	7
Mar	8	80	31	5
	64	12.5	6.3	0.0
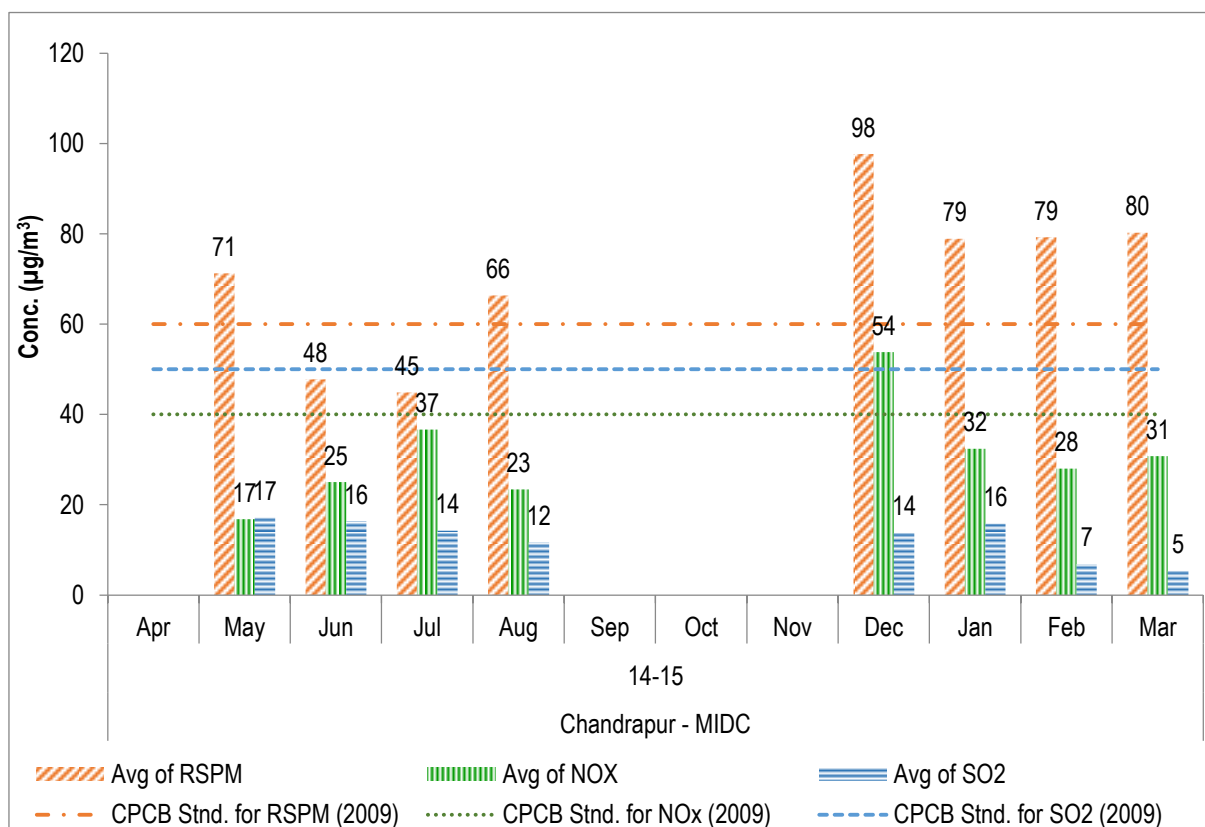
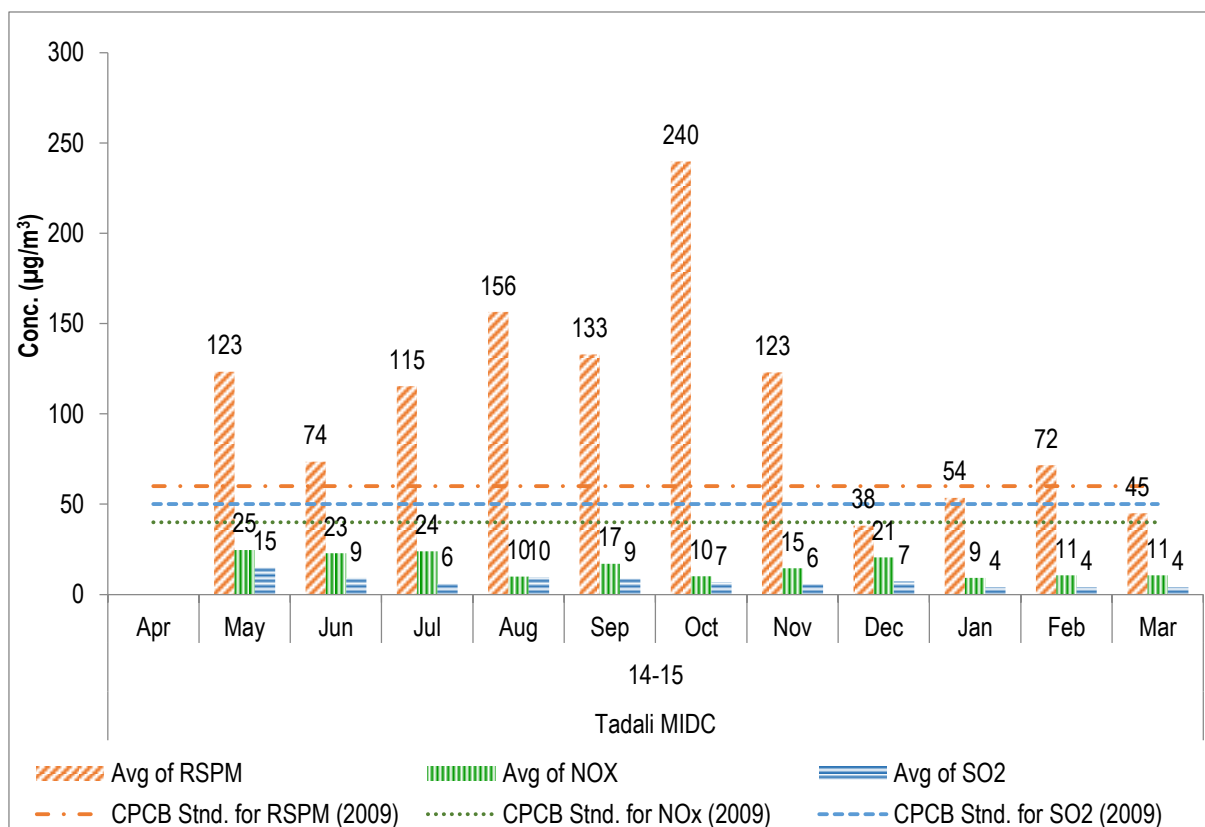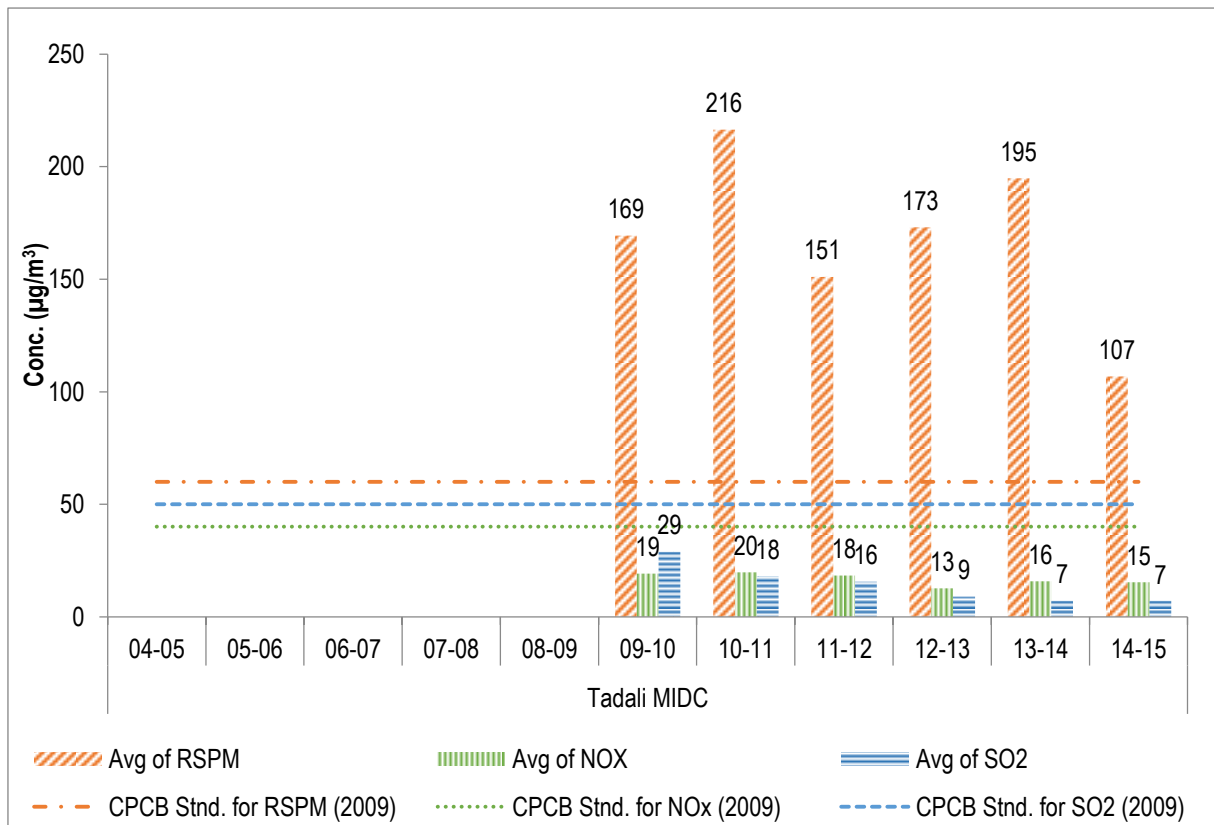**Figure No. 61: Monthly average reading recorded at Chandrapur - MIDC**

Table No. 62: Data for Annual average trend of SO₂, NOₓ, and RSPM at Chandrapur - MIDC

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05		110	37	25
05-06	*92*	130	37	26
06-07	*97*	123	41	38
07-08	*98*	125	50	37
08-09	*81*	148	53	34
09-10	*79*	141	31	63
10-11	*102*	150	25	25
11-12	*108*	131	35	21
12-13	*100*	105	17	14
13-14	*95*	60	27	18
14-15	*64*	71	31	13
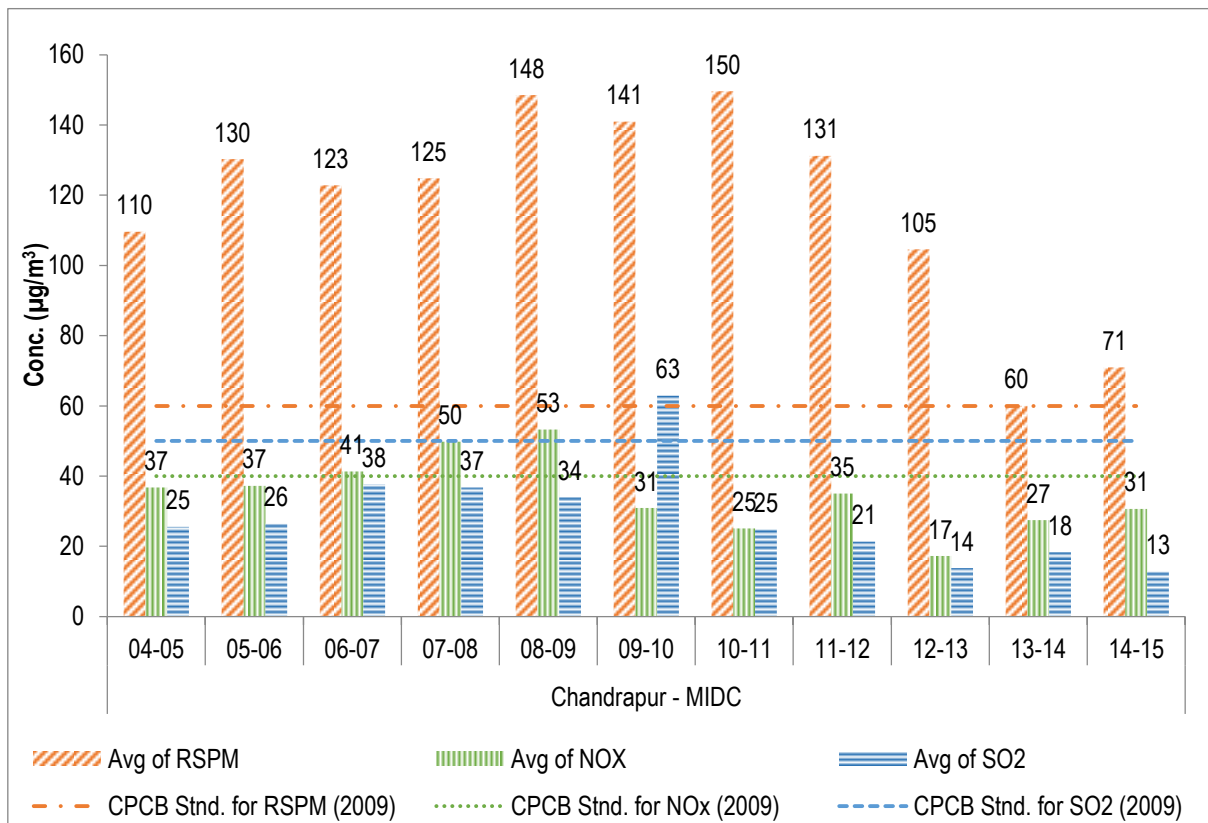
Figure No. 62: Annual average trend of SO₂, NOₓ, and RSPM at Chandrapur - MIDC

Chandrapur – Chandrapur – SRO MPCB

Table No. 63: Data for Monthly average reading recorded at Chandrapur SRO MPCB

FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NO$_X$	SO$_2$
Apr	21	128	22	10
May	24	79	19	12
Jun	26	70	26	9
Jul	31	49	16	6
Aug	29	53	19	6
Sep	30	63	18	7
Oct	28	83	21	7
Nov	30	116	30	6
Dec	31	129	37	6
Jan	26	102	26	5
Feb	28	100	17	5
Mar				
	304	32.9	0.3	0.0

Figure No. 63: Monthly average reading recorded at Chandrapur SRO MPCB

Table No. 64: Data for Annual average trend of SO₂, NOₓ, and RSPM at Chandrapur SRO MPCB

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05		107	34	23
05-06	90	116	30	20
06-07	88	130	38	31
07-08	98	161	46	30
08-09	82	159	45	26
09-10	76	74	35	41
10-11	102	92	27	21
11-12	100	66	31	18
12-13	118	75	17	14
13-14	116	66	26	10
14-15	304	87	23	7
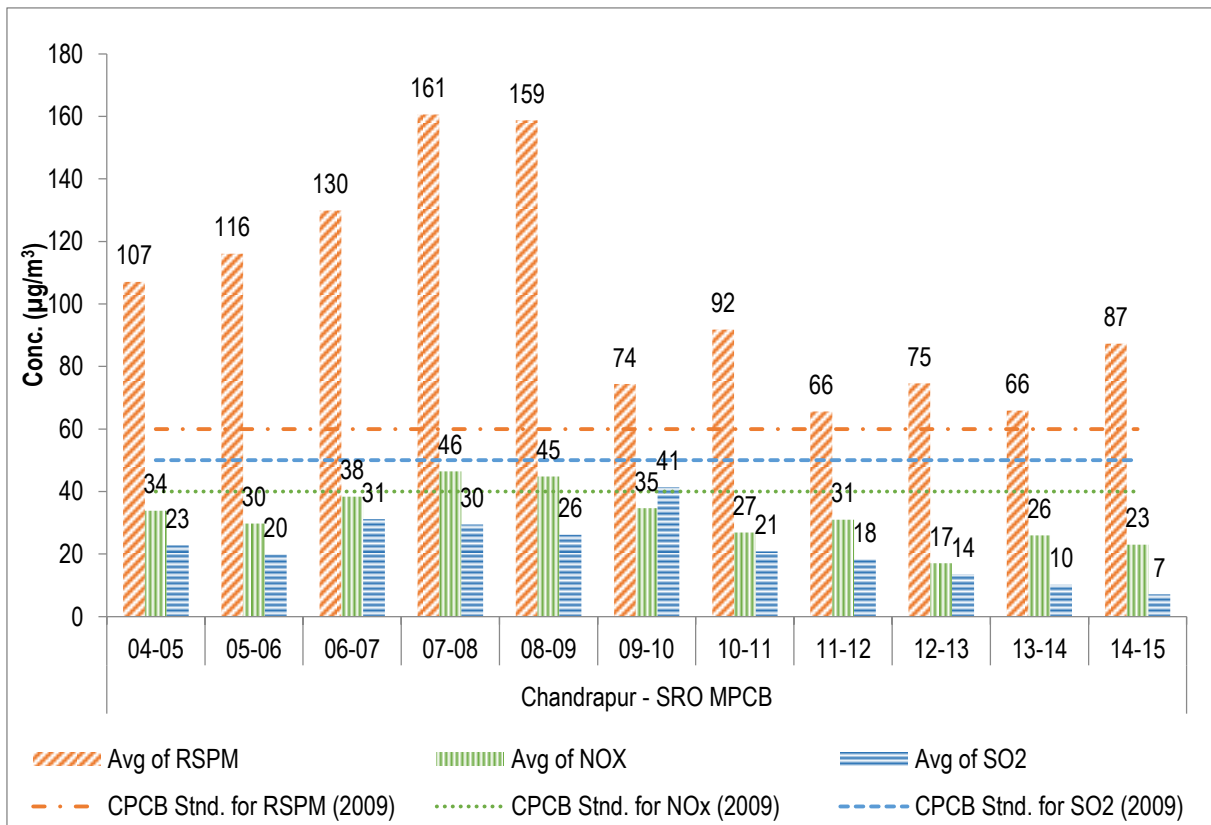
Figure No. 64: Annual average trend of SO₂, NOₓ, and RSPM at Chandrapur SRO MPCB

Chandrapur Tadali MIDC

Table No. 65: Data for Monthly average reading recorded at Tadali MIDC

FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NOX	SO2
Apr				
May	8	123	25	15
Jun	8	74	23	9
Jul	8	115	24	6
Aug	8	156	10	10
Sep	8	133	17	9
Oct	10	240	10	7
Nov	8	123	15	6
Dec	8	38	21	7
Jan	8	54	9	4
Feb	15	72	11	4
Mar	8	45	11	4
97		44.3	0.0	0.0

Figure No. 65: Monthly average reading recorded at Tadali MIDC

Table No. 66: Data for Annual average trend of SO₂, NOₓ, and RSPM at Tadali MIDC

Year	N	Annual average (µg/m³)		
		RSPM	NO$_X$	SO$_2$
04-05				
05-06				
06-07				
07-08				
08-09				
09-10	59	169	19	29
10-11	65	216	20	18
11-12	88	151	18	16
12-13	104	173	13	9
13-14	88	195	16	7
14-15	97	107	15	7

Figure No. 66: Annual average trend of SO₂, NOₓ, and RSPM at Tadali MIDC

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Chandrapur Ballarshah

Table No. 67: Data for Monthly average reading recorded at Ballarshah

FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NOₓ	SO₂
Apr				
May	10	190	46	15
Jun	7	93	48	10
Jul	6	80	31	9
Aug	8	83	55	7
Sep	4	50	32	8
Oct				
Nov	3	258	65	13
Dec	2	136	84	13
Jan				
Feb	6	171	52	5
Mar	8	137	35	4
	54	66.7	11.1	0.0
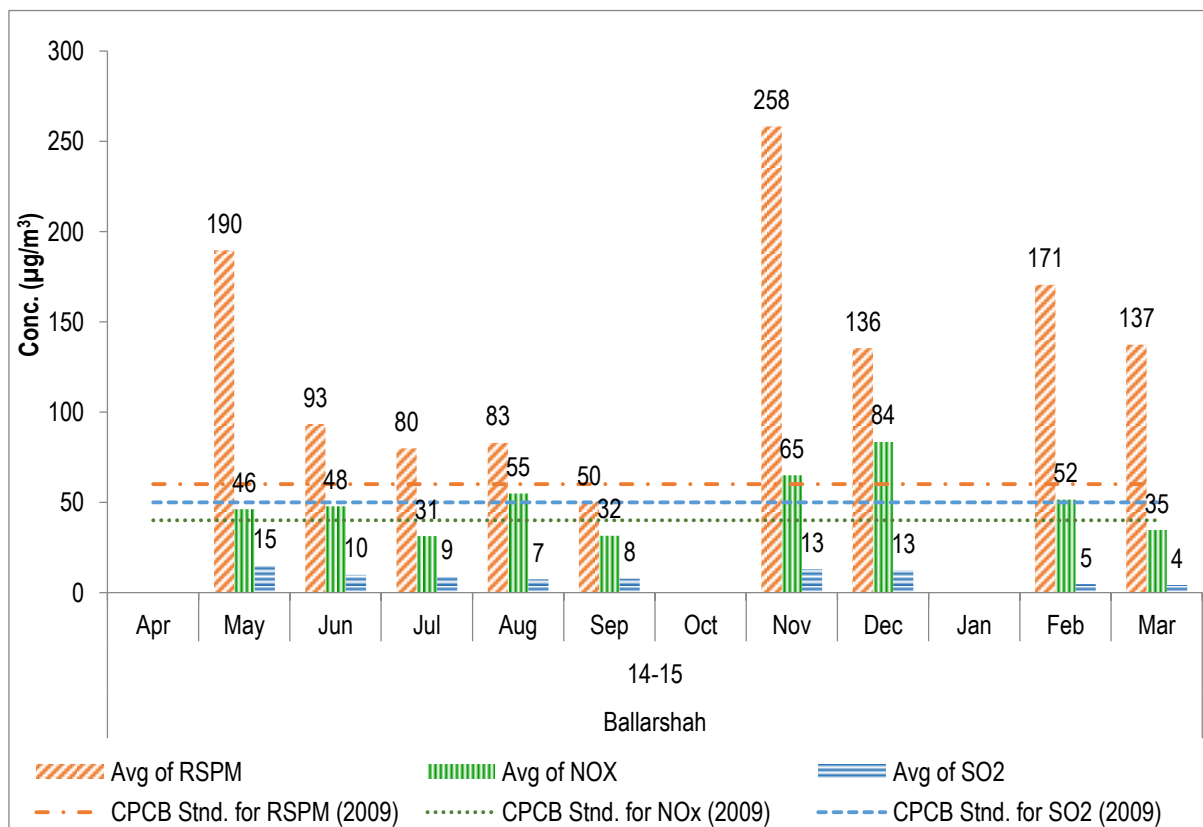
Figure No. 67: Monthly average reading recorded at Ballarshah

Table No. 68: Data for Annual average trend of SO₂, NOₓ, and RSPM at Ballarshah

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07				
07-08				
08-09				
09-10	65	122	35	32
10-11	107	129	32	17
11-12	68	123	24	19
12-13	100	192	19	9
13-14	82	135	37	10
14-15	54	131	46	9
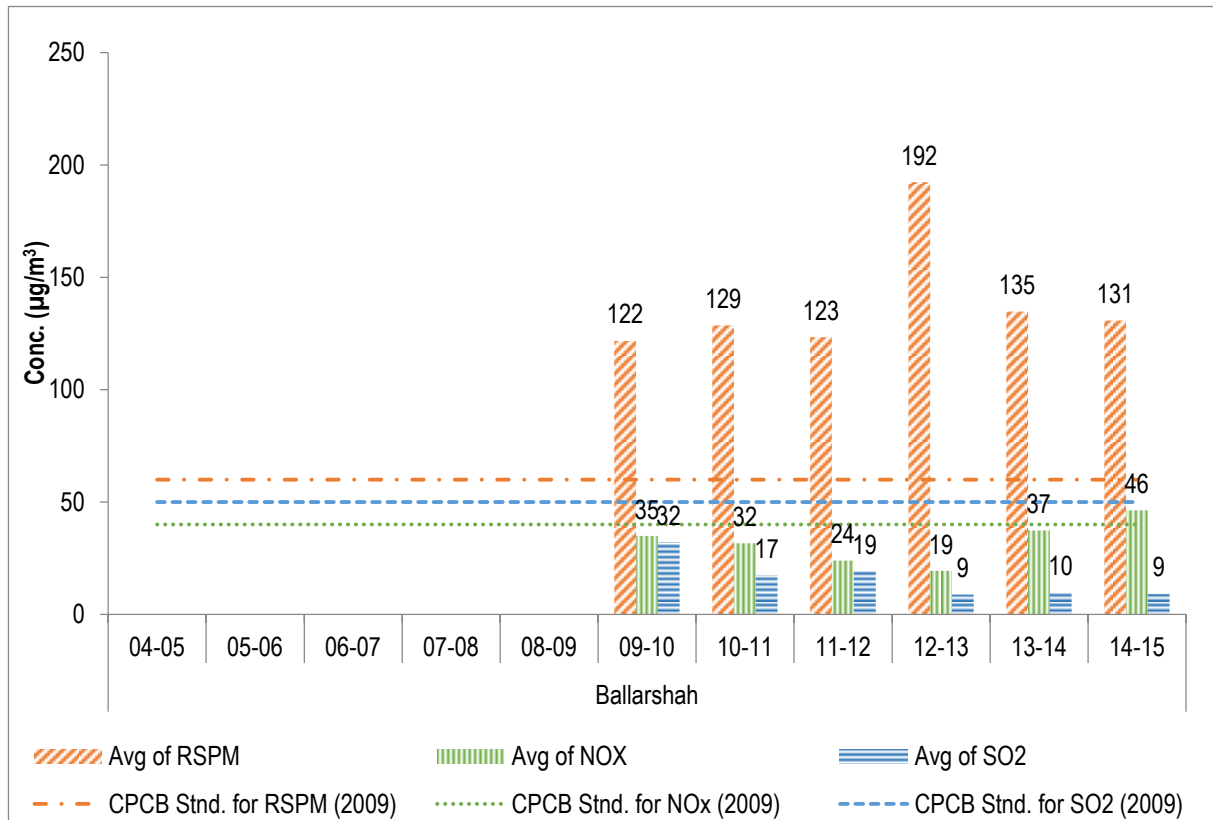
Figure No. 68: Annual average trend of SO₂, NOₓ, and RSPM at Ballarshah

Chandrapur - Rajura

Table No. 69: Data for Monthly average reading recorded at Rajura

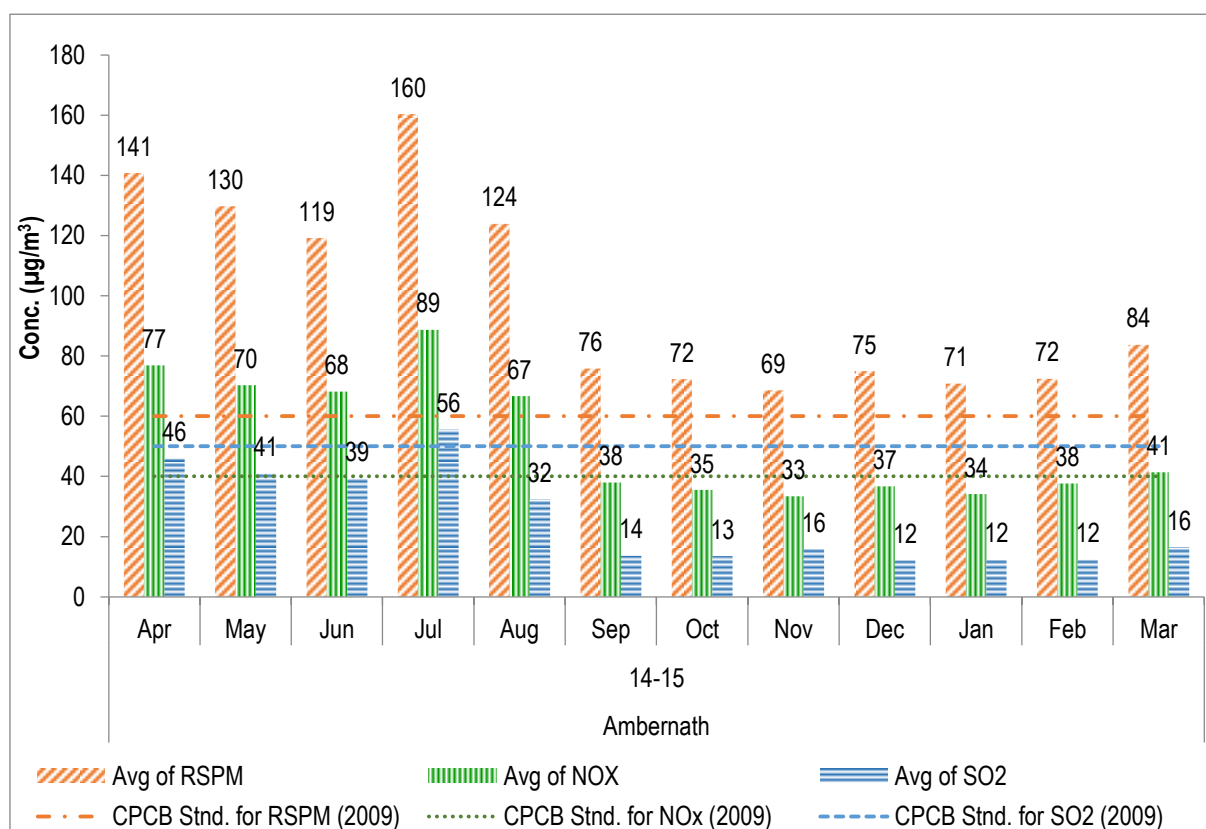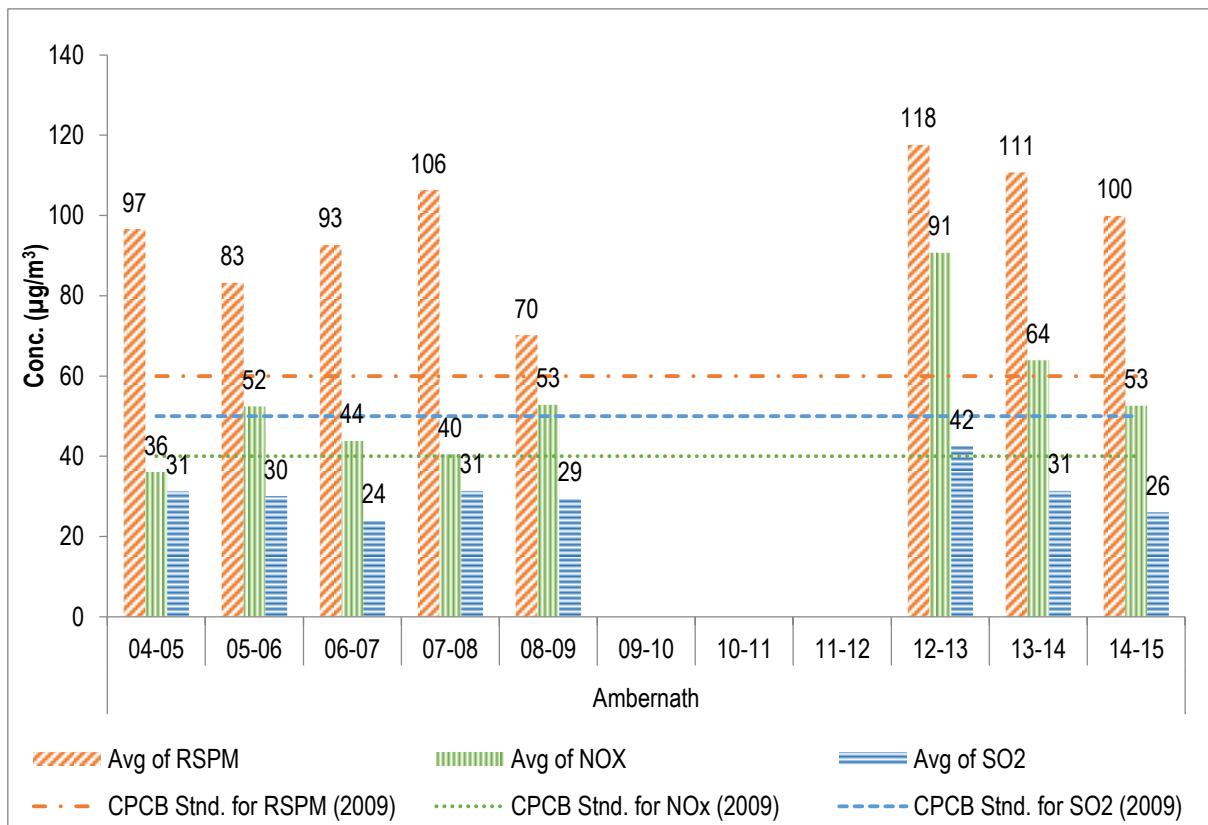| FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NO$_X$	SO$_2$
Apr				
May	8	148	40	15
Jun	8	99	14	9
Jul	8	102	24	6
Aug	8	99	20	6
Sep	8	130	14	11
Oct	10	251	11	6
Nov	8	209	12	7
Dec	8	146	19	7
Jan	8	96	13	4
Feb	8	137	9	4
Mar	8	120	11	4
90		64.4	1.1	0.0
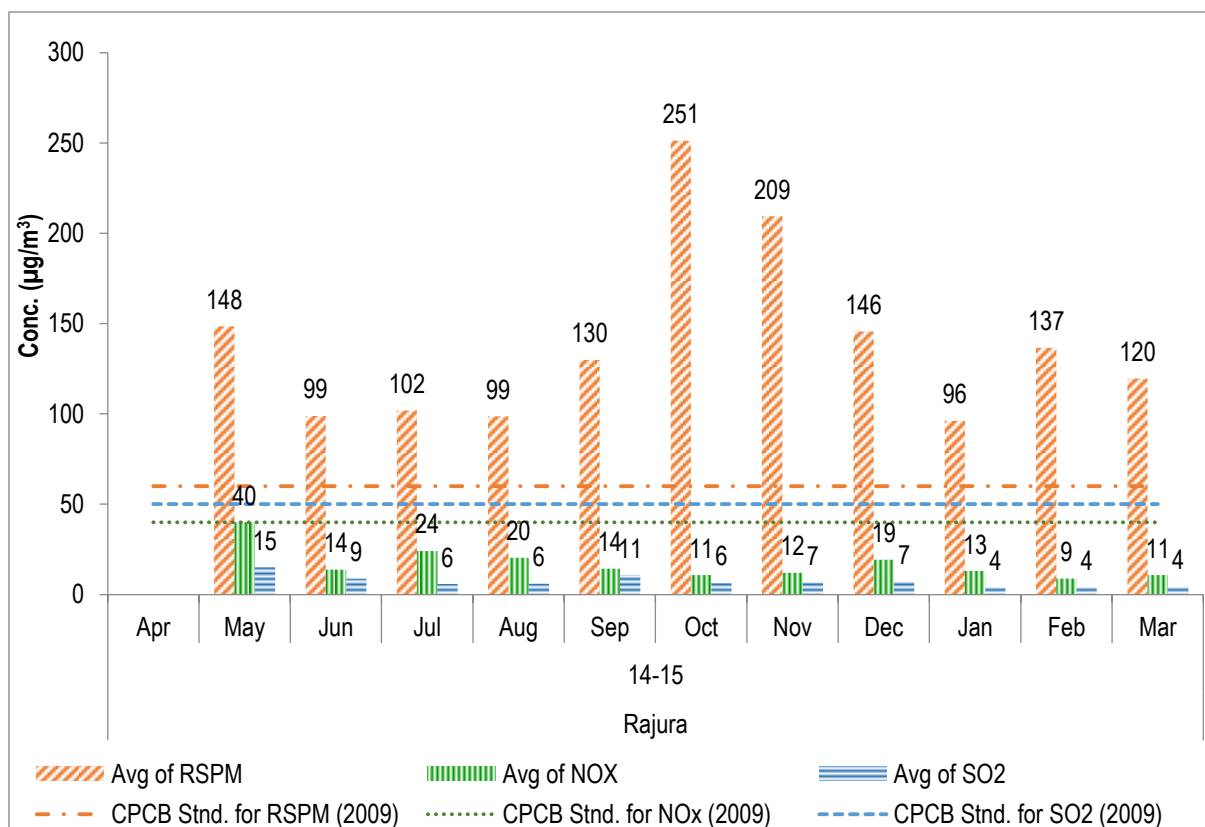
Figure No. 69: Monthly average reading recorded at Rajura

Table No. 70: Data for Annual average trend of SO₂, NOₓ, and RSPM at Rajura

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07				
07-08				
08-09				
09-10	30	119	37	34
10-11	93	115	19	17
11-12	71	159	19	16
12-13	72	196	21	9
13-14	74	145	31	10
14-15	90	142	17	7
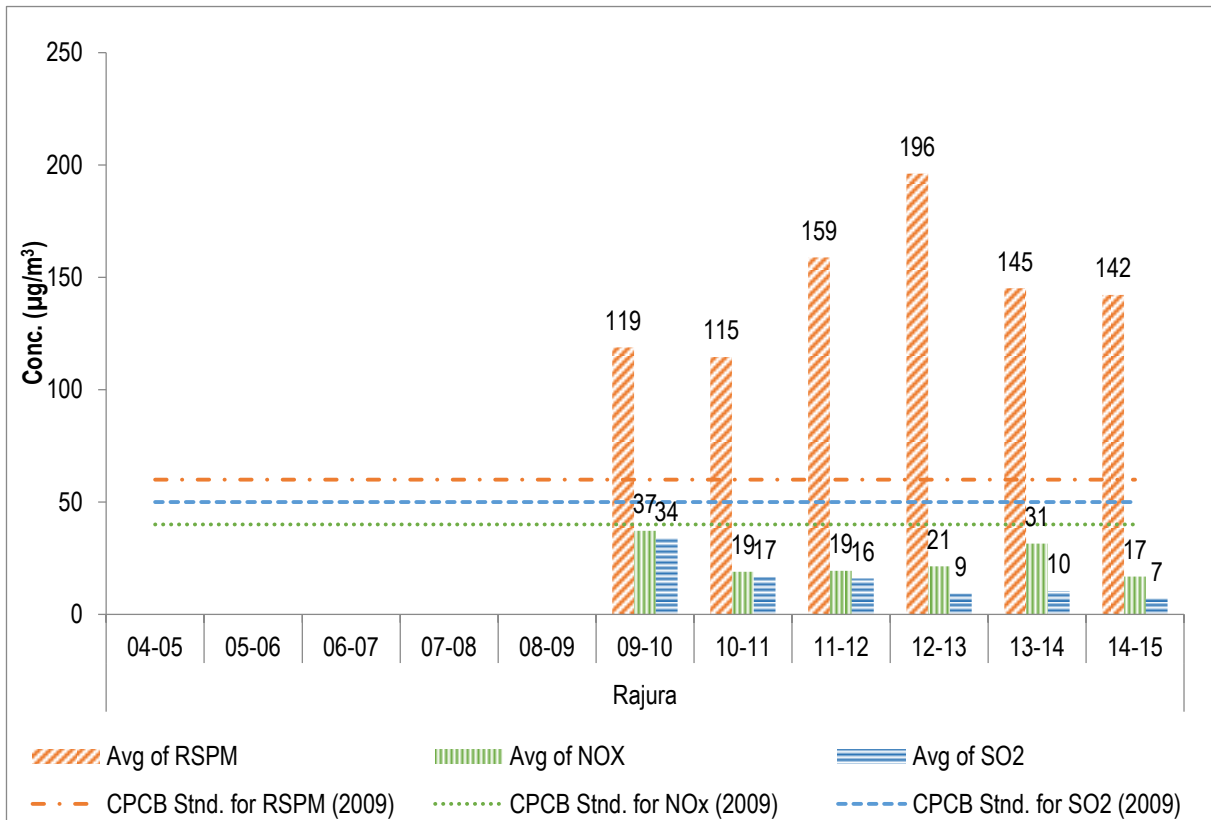
Figure No. 70: Annual average trend of SO₂, NOₓ, and RSPM at Rajura

% occurence for the classes for AQI across Chandrapur RO

Legend:
- Good (0-50)
- Satisfactory (51-100)
- Moderately polluted (101-200)
- Poor (201-300)
- Very Poor (301-400)
- Severe (401+)
- Benchmark (98%)
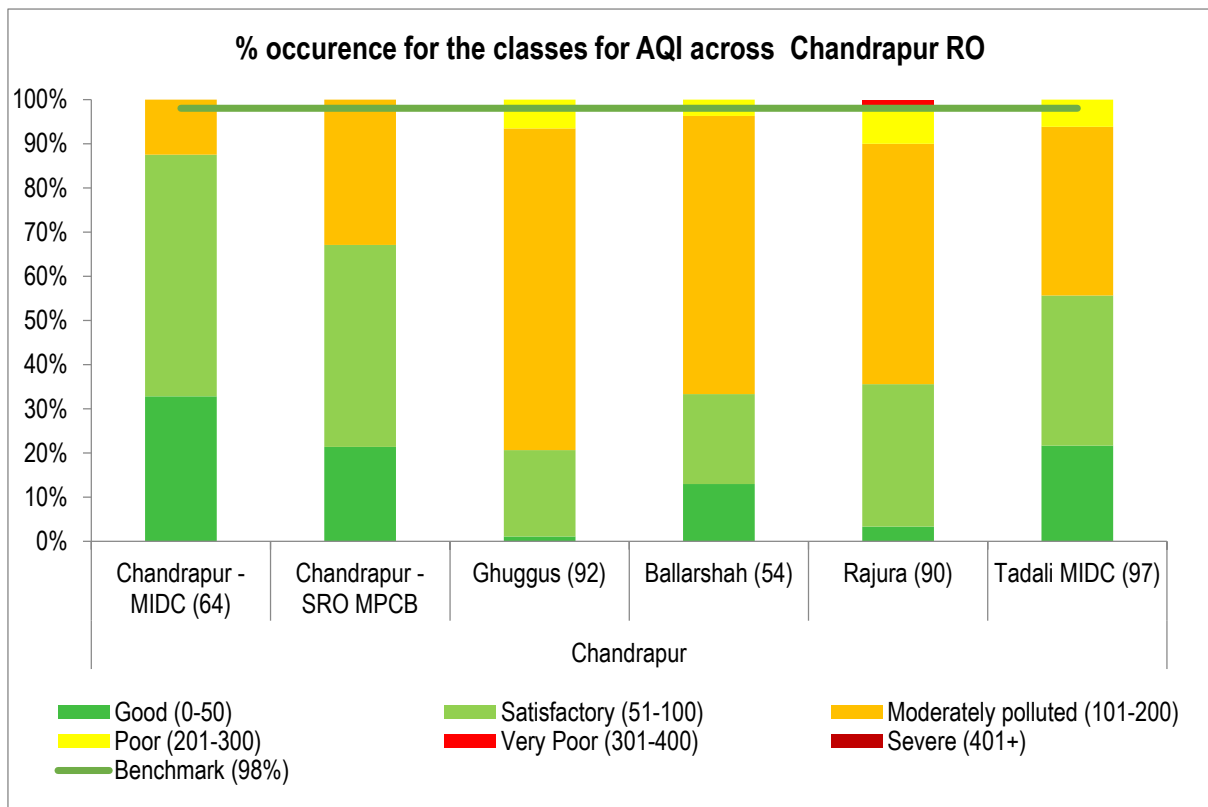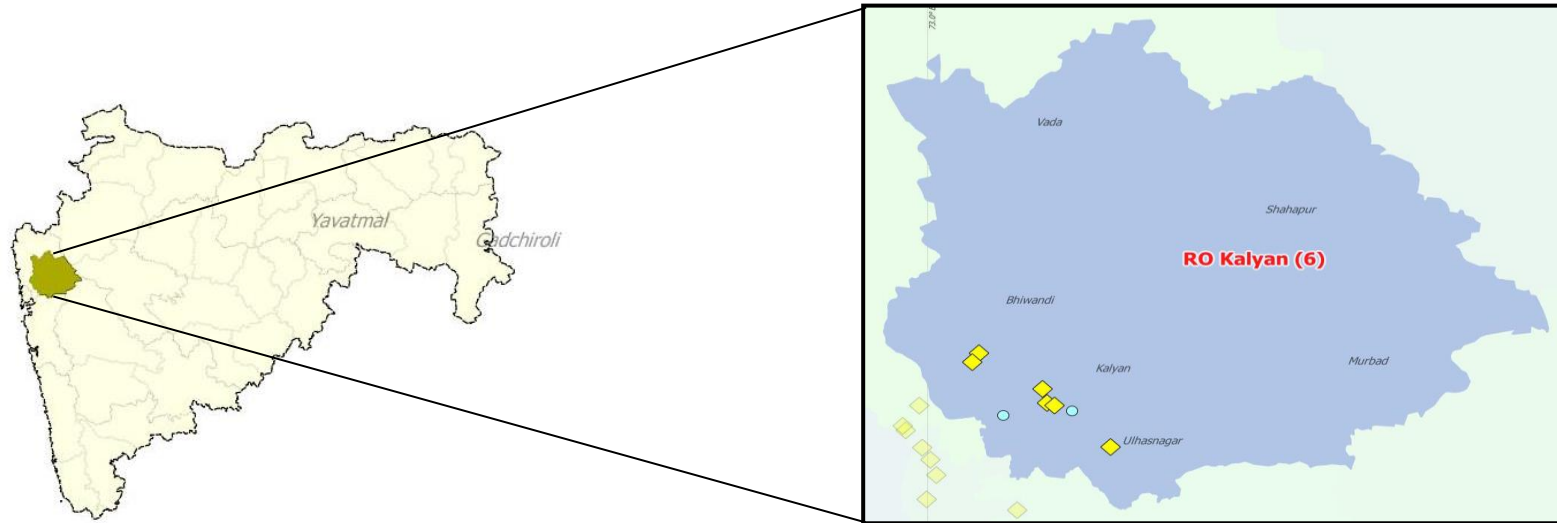
RO – Kalyan

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
	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. 71: Data for monthly average trend of SO₂, NOₓ, and RSPM at Ambernath

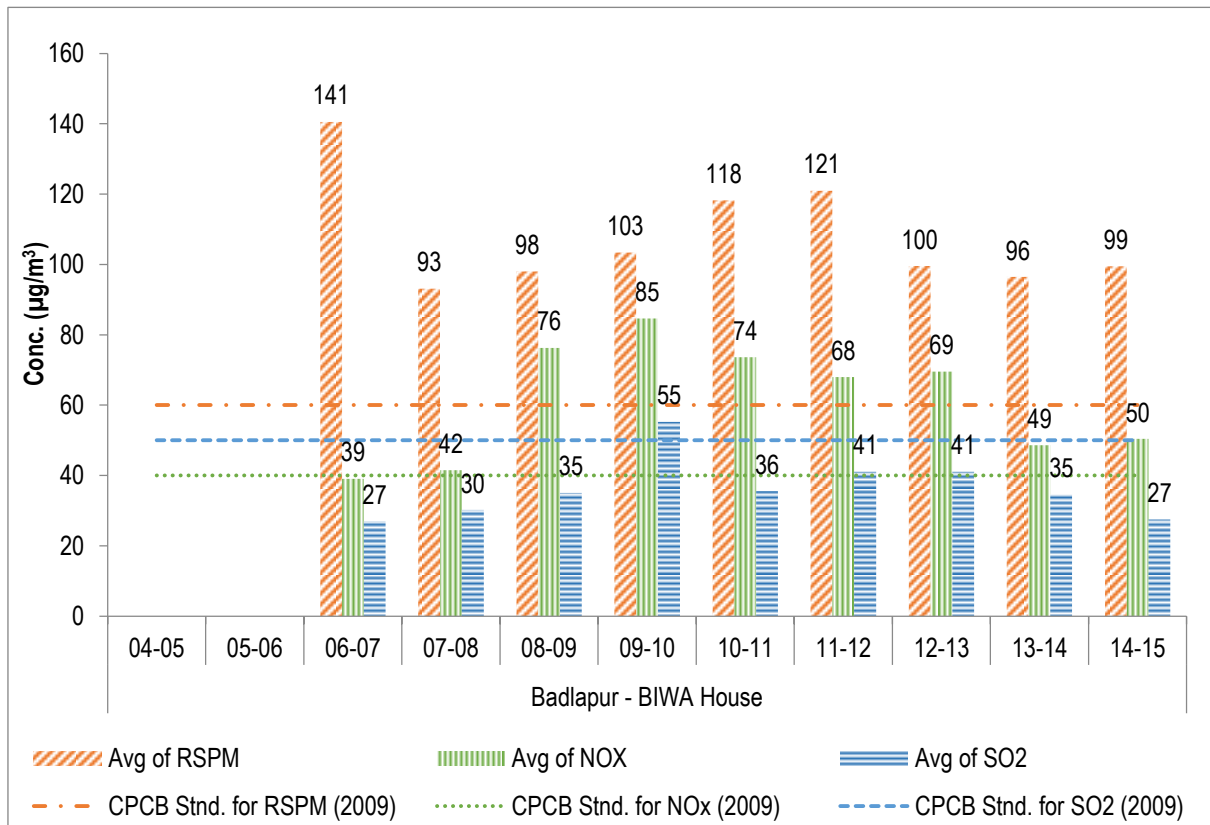| FY	N	Monthly average (µg/m³)		
2014–15		RSPM	NOₓ	SO₂
Apr	*8*	141	77	46
May	*9*	130	70	41
Jun	*9*	119	68	39
Jul	*9*	160	89	56
Aug	*8*	124	67	32
Sep	*9*	76	38	14
Oct	*9*	72	35	13
Nov	*6*	69	33	16
Dec	*9*	75	37	12
Jan	*9*	71	34	12
Feb	*8*	72	38	12
Mar	*9*	84	41	16
102		**36.3**	**13.7**	**0.0**

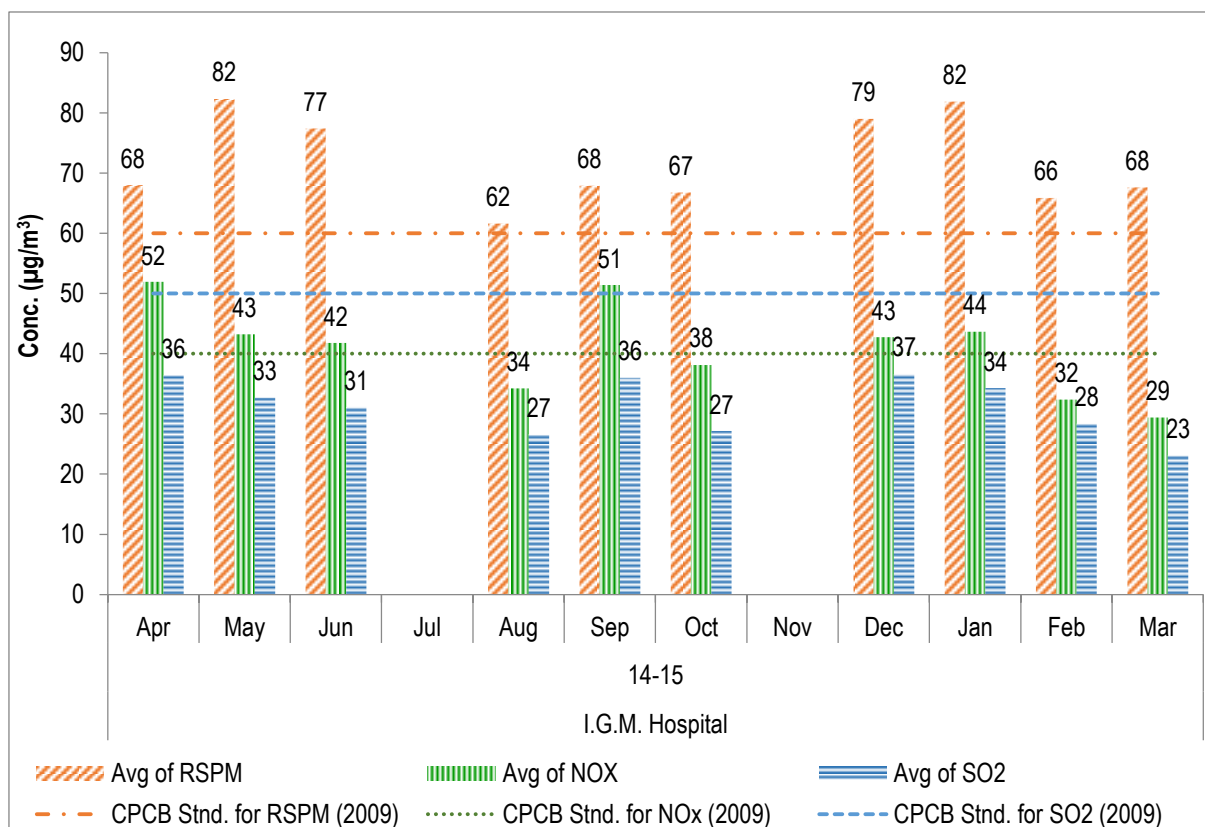**Figure No. 71: Monthly average reading recorded at Ambernath**

Table No. 72: Data for Annual average trend of SO₂, NOₓ, and RSPM at Ambernath

Year	N	Annual average ($\mu g/m^3$)		
		RSPM	NO$_X$	SO$_2$
04-05		97	35	31
05-06	*85*	83	52	30
06-07	*86*	93	44	24
07-08	*101*	106	40	31
08-09	*26*	70	53	29
09-10				
10-11				
11-12				
12-13	*92*	118	91	42
13-14	*95*	111	64	31
14-15	*102*	100	53	26

Figure No. 72: Annual average trend of SO₂, NOₓ, and RSPM at Ambernath

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teri

Badlapur – Badlapur – BIWA House

Table No. 73: Data for Monthly average reading recorded at Badlapur – BIWA House

FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NO$_X$	SO$_2$
Apr	9	141	53	47
May	9	108	56	44
Jun	8	117	68	41
Jul	10	153	91	59
Aug	8	134	71	35
Sep	9	80	38	16
Oct	10	73	35	13
Nov	6	77	39	16
Dec	9	72	35	12
Jan	9	73	36	13
Feb	8	81	41	15
Mar	9	78	39	15
104		32.7	9.6	0.0
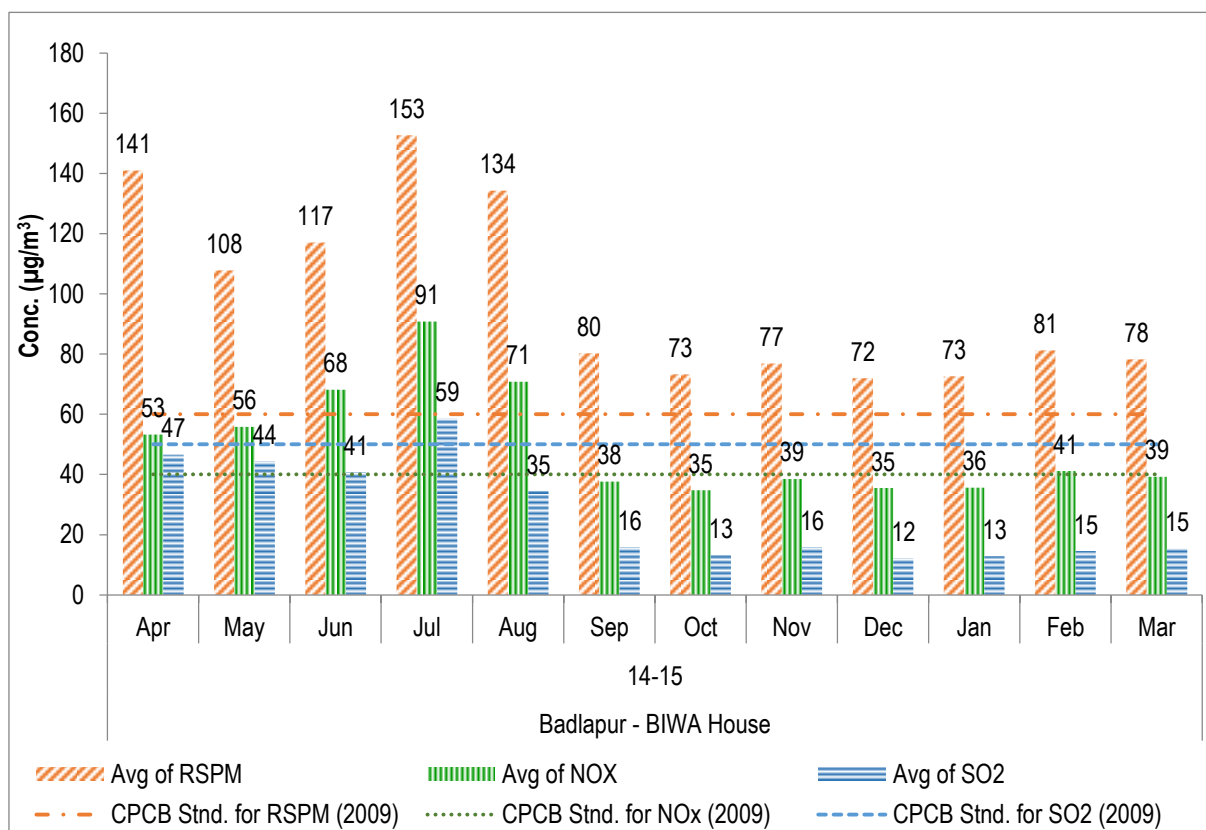
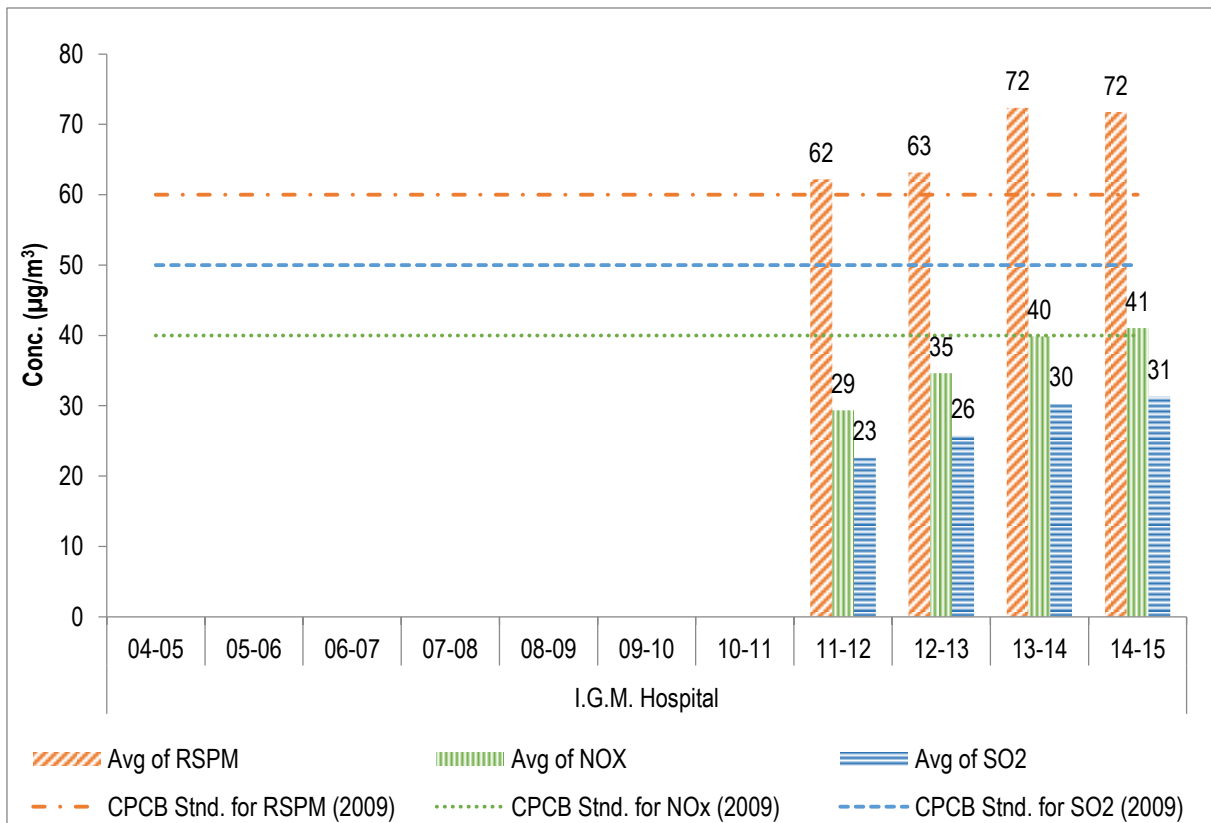**Figure No. 73: Monthly average reading recorded at Badlapur – BIWA House**

Table No. 74: Data for Annual average trend of SO₂, NOₓ, and RSPM at Badlapur – BIWA House

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07	80	141	39	27
07-08	104	93	42	30
08-09	102	98	76	35
09-10	84	103	85	55
10-11	94	118	74	36
11-12	95	121	68	41
12-13	93	100	69	41
13-14	87	96	49	35
14-15	104	99	50	27

Figure No. 74: Annual average trend of SO₂, NOₓ, and RSPM at Badlapur – BIWA House

Bhiwandi – IGM Hospital

Table No. 75: Data for Monthly average reading recorded at IGM Hospital - Bhiwandi

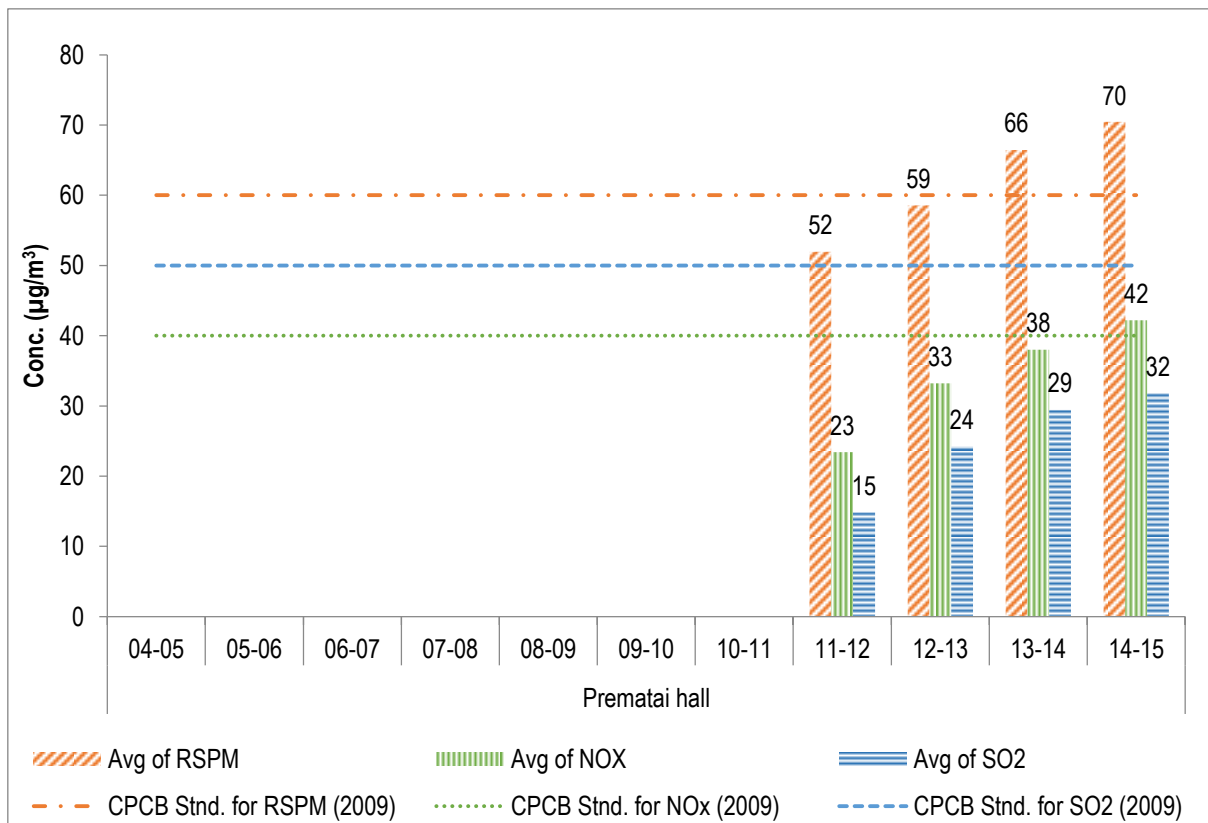| FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NOₓ	SO₂
Apr	10	68	52	36
May	10	82	43	33
Jun	8	77	42	31
Jul				
Aug	10	62	34	27
Sep	8	68	51	36
Oct	8	67	38	27
Nov				
Dec	8	79	43	37
Jan	8	82	44	34
Feb	8	66	32	28
Mar	8	68	29	23
86		0.0	0.0	0.0

Figure No. 75: Monthly average reading recorded at IGM Hospital - Bhiwandi

Table No. 76: Data for Annual average trend of SO₂, NOₓ, and RSPM at IGM Hospital - Bhiwandi

Year	N	Annual average ($\mu g/m^3$)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07				
07-08				
08-09				
09-10				
10-11				
11-12	26	62	29	23
12-13	96	63	35	26
13-14	92	72	40	30
14-15	86	72	41	31

Figure No. 76: Annual average trend of SO₂, NOₓ, and RSPM at IGM Hospital - Bhiwandi

Bhiwandi – Prematai hall

Table No. 77: Data for Monthly average reading recorded at Prematai hall - Bhiwandi

FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NO$_X$	SO$_2$
Apr	8	67	47	35
May	8	70	45	36
Jun	8	78	44	34
Jul				
Aug	8	62	35	24
Sep	8	67	47	35
Oct	10	67	38	27
Nov				
Dec	8	78	44	34
Jan	9	80	43	33
Feb	8	68	41	32
Mar	8	68	41	31
83		0.0	0.0	0.0
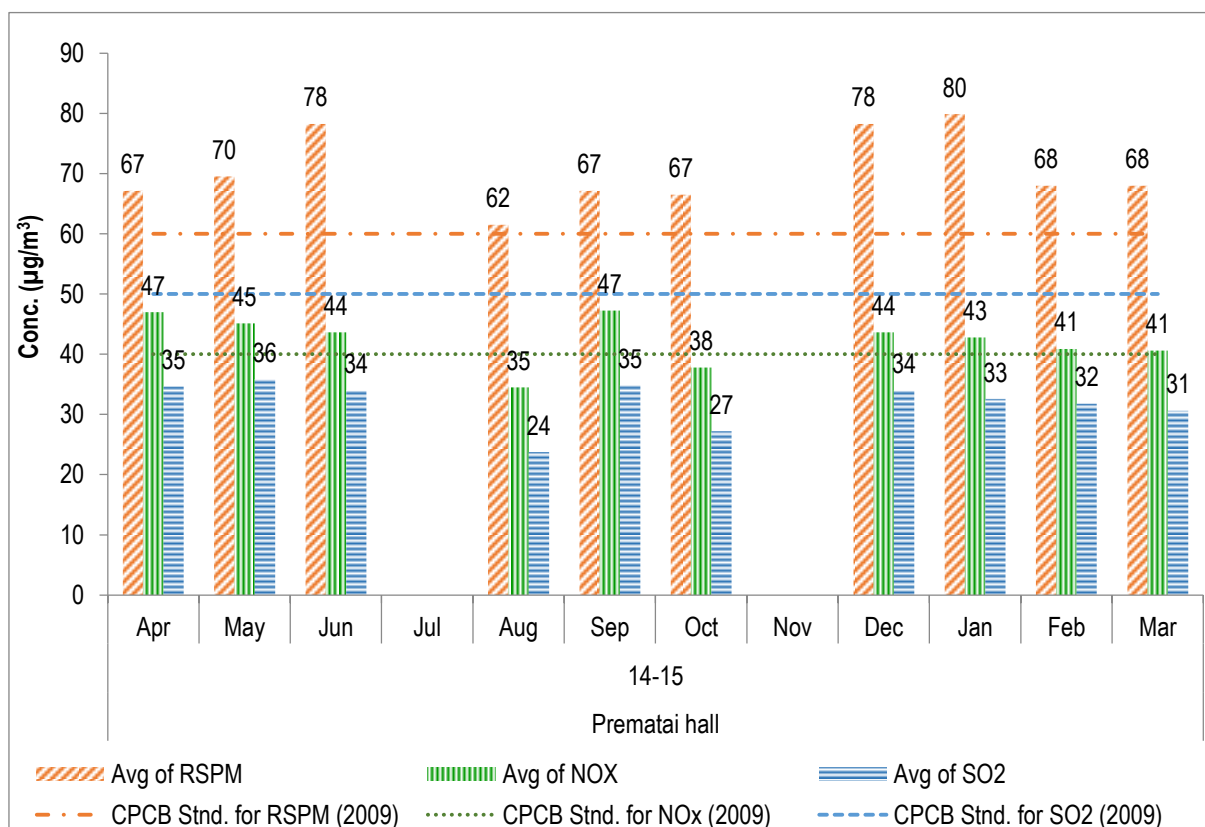
Figure No. 77: Monthly average reading recorded at Prematai hall - Bhiwandi

Table No. 78: Data for Annual average trend of SO₂, NOₓ, and RSPM at Prematai hall - Bhiwandi

Year	N	Annual average (µg/m³)		
		RSPM	NOX	SO₂
04-05				
05-06				
06-07				
07-08				
08-09				
09-10				
10-11				
11-12	103	52	23	15
12-13	102	59	33	24
13-14	97	66	38	29
14-15	83	70	42	32

Figure No. 78: Annual average trend of SO₂, NOₓ, and RSPM at Prematai hall - Bhiwandi

Dombivali

Table No. 79: Data for Monthly average reading recorded at Dombivali

FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NO$_X$	SO$_2$
Apr	9	141	77	47
May	9	134	73	53
Jun	8	158	97	49
Jul	9	235	133	58
Aug	8	109	80	38
Sep	9	74	39	16
Oct	10	78	37	13
Nov	6	85	43	19
Dec	9	74	37	13
Jan	9	83	41	14
Feb	16	76	40	14
Mar	9	98	46	16
111		40.5	20.7	0.0
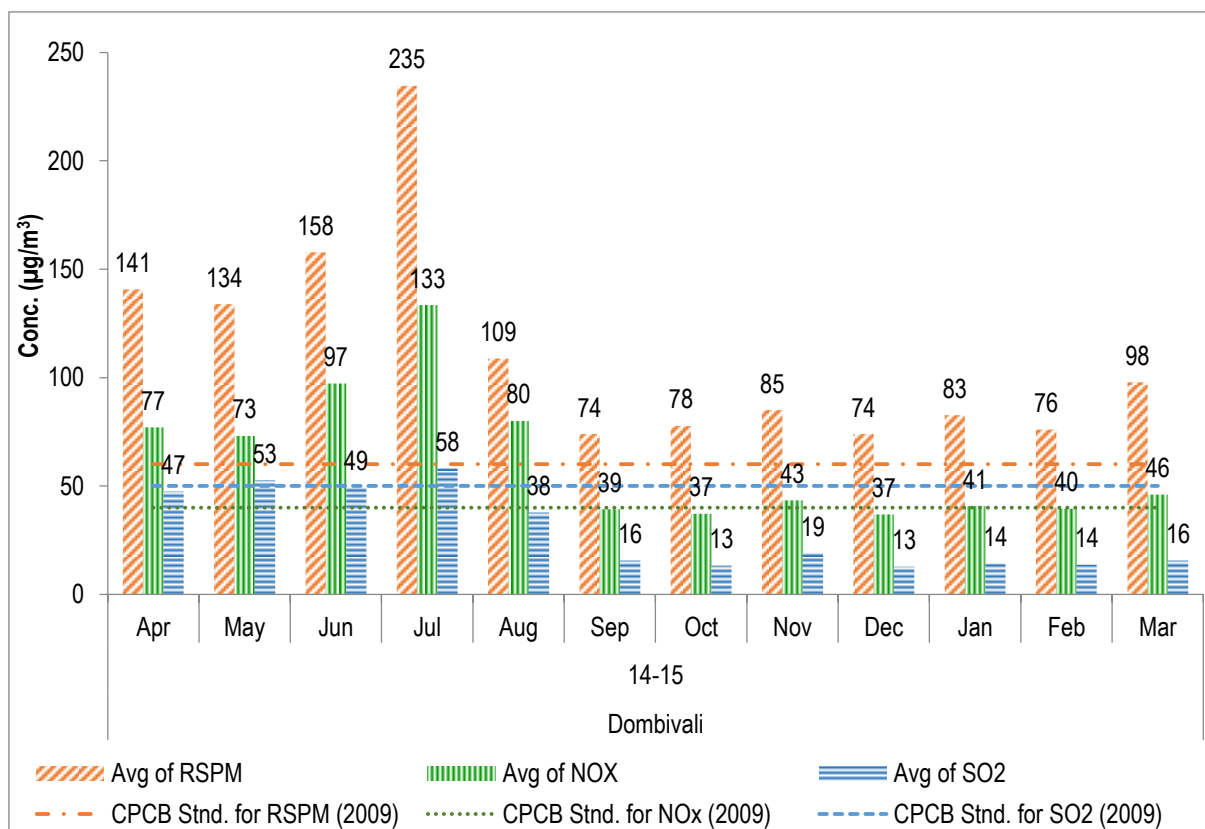
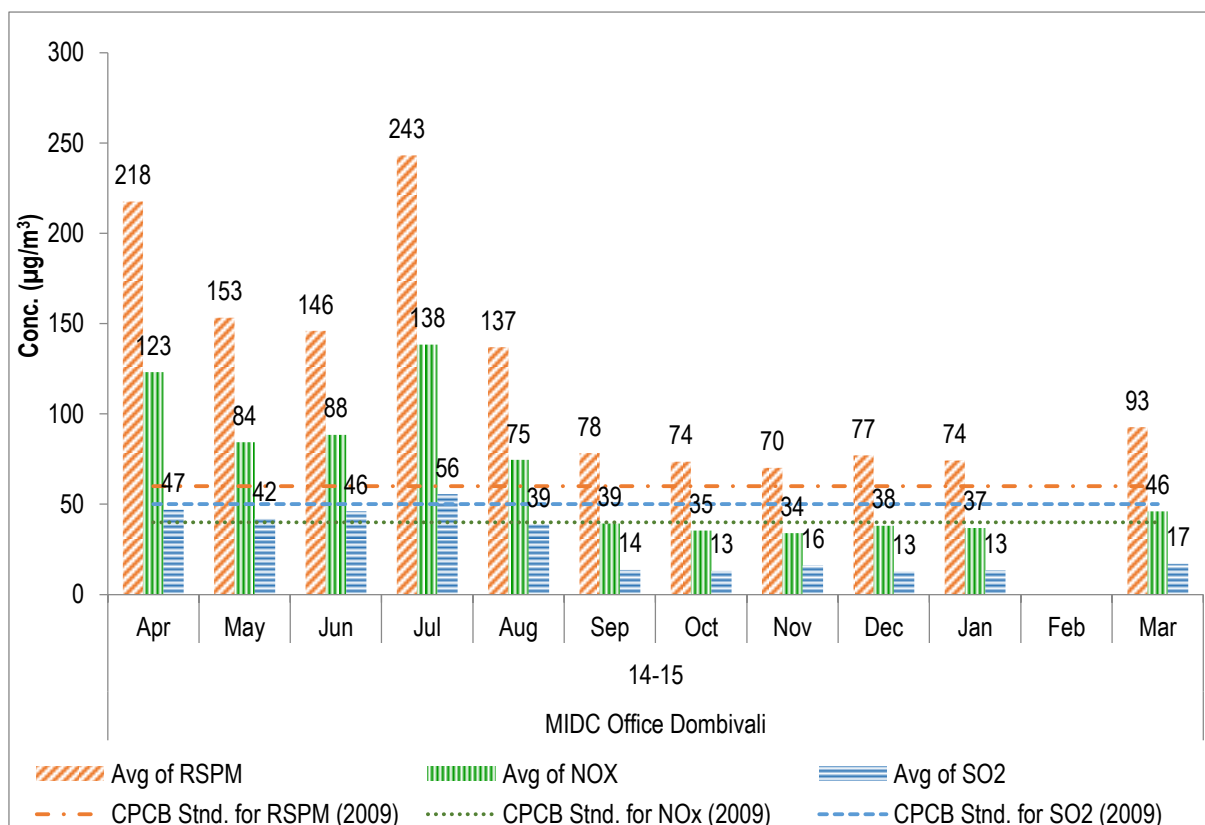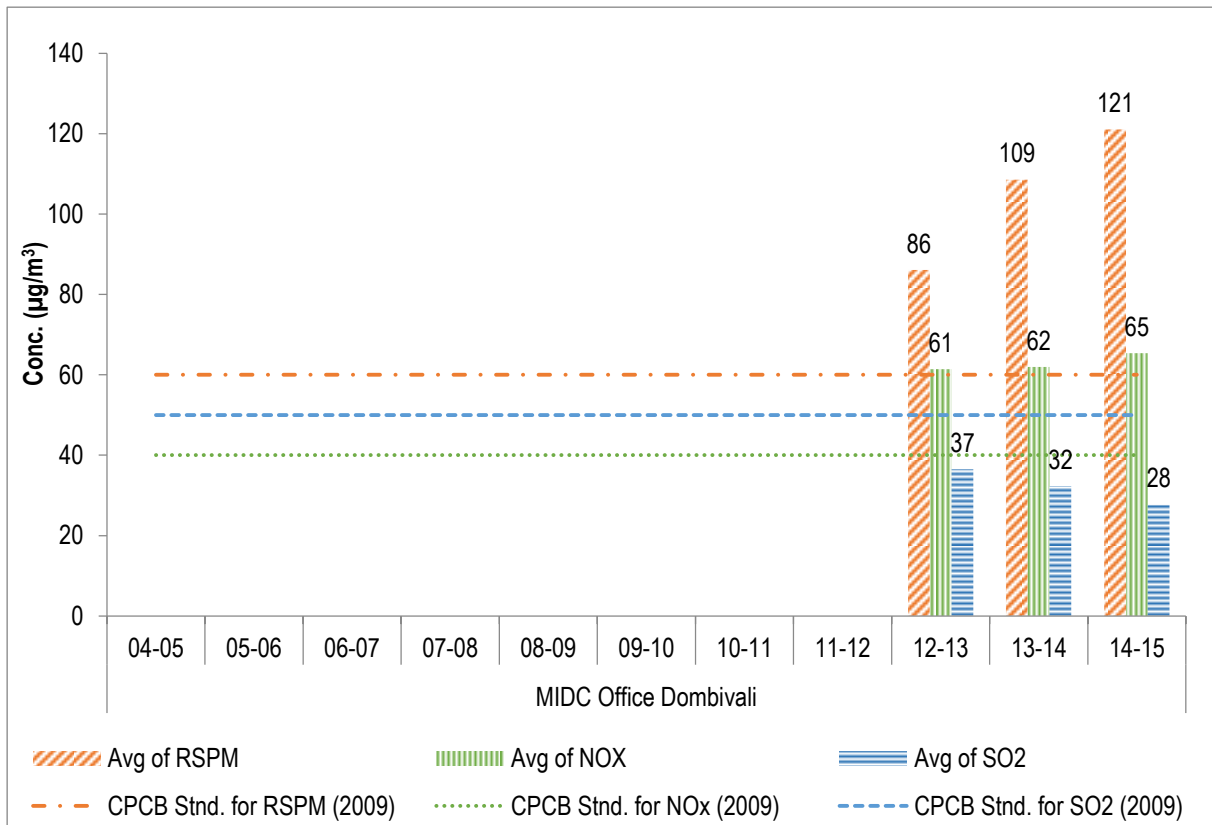**Figure No. 79: Monthly average reading recorded at Dombivali**

Table No. 80: Data for Annual average trend of SO₂, NOₓ, and RSPM at Dombivali

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05		71	38	42
05-06	96	109	52	35
06-07	93	120	38	24
07-08	96	98	41	37
08-09	25	68	55	34
09-10				
10-11				
11-12				
12-13	92	123	94	50
13-14	90	111	66	35
14-15	111	110	60	28
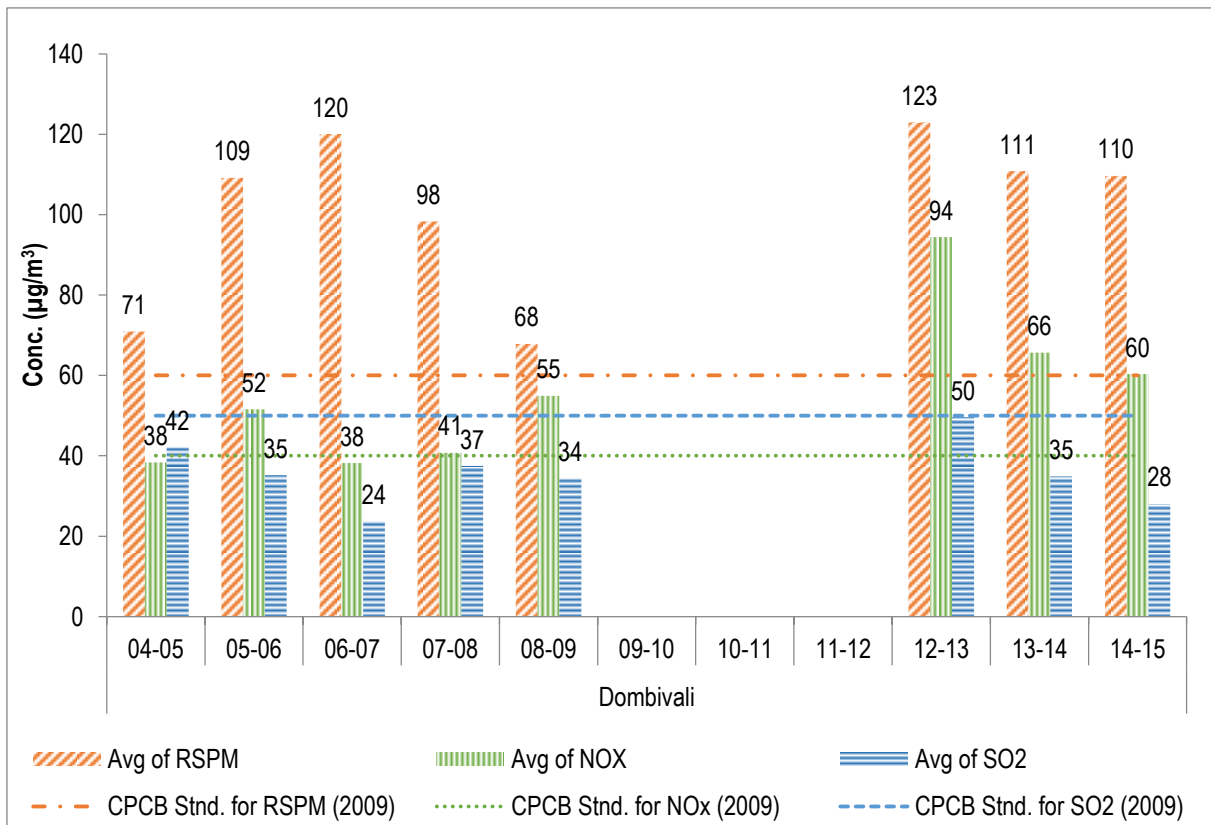
Figure No. 80: Annual average trend of SO₂, NOₓ, and RSPM at Dombivali

Dombivali – MIDC Office Dombivali

Table No. 81: Data for Monthly average reading recorded at MIDC Office - Dombivali

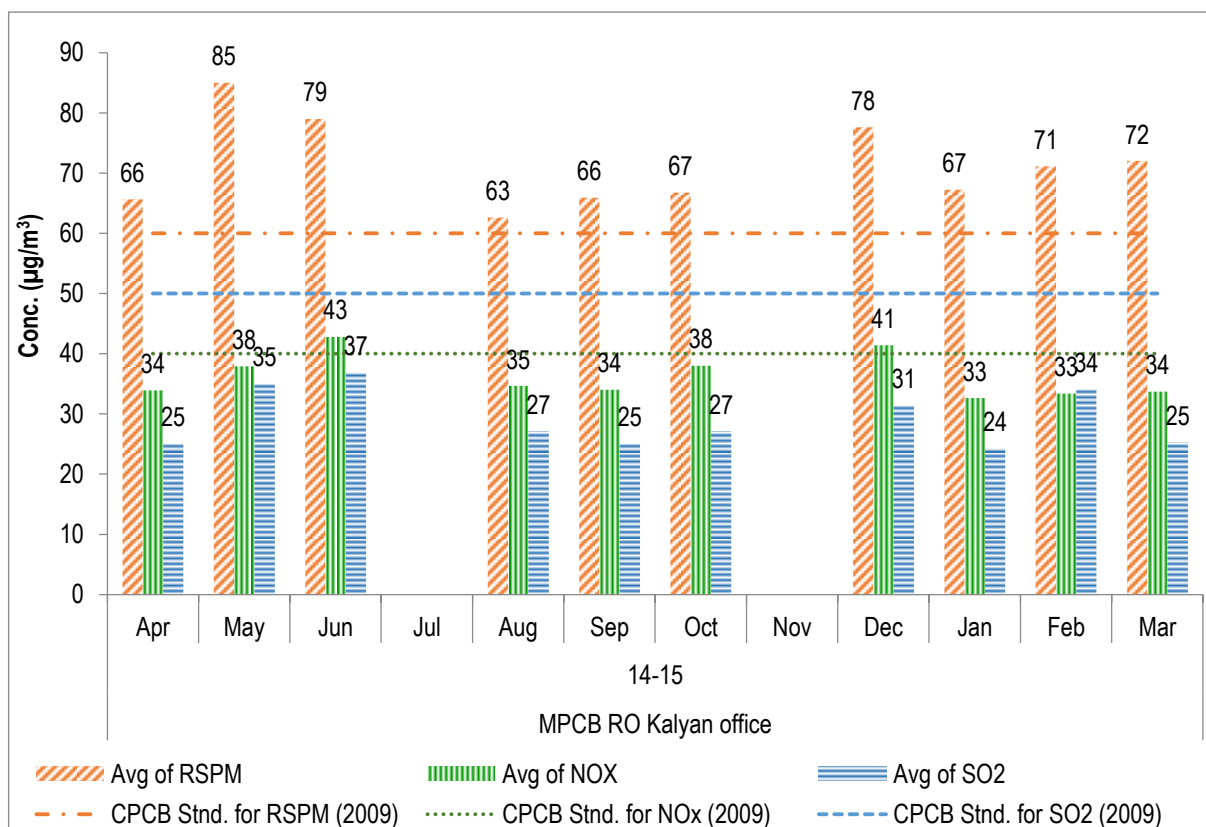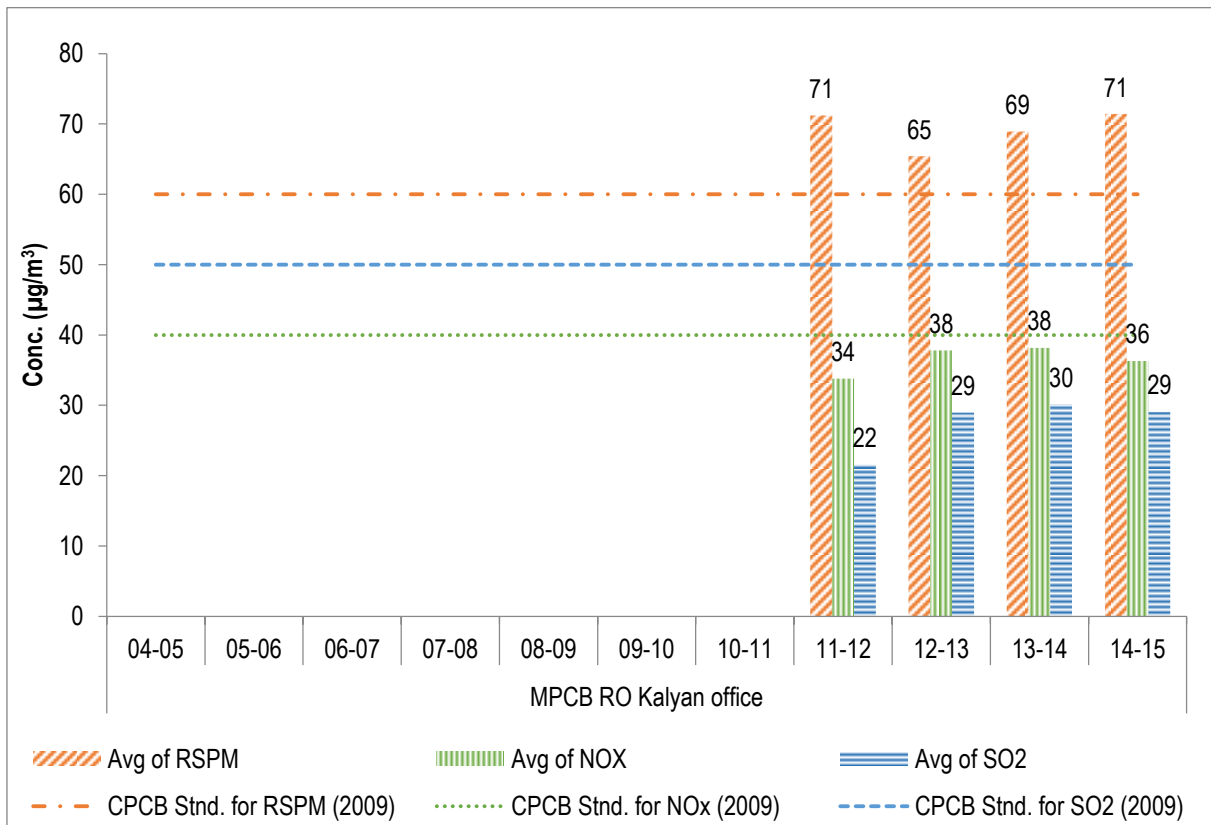| FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NO$_X$	SO$_2$
Apr	9	218	123	47
May	8	153	84	42
Jun	9	146	88	46
Jul	9	243	138	56
Aug	8	137	75	39
Sep	9	78	39	14
Oct	18	74	35	13
Nov	6	70	34	16
Dec	9	77	38	13
Jan	8	74	37	13
Feb				
Mar	9	93	46	17
102		42.2	27.5	1.0

Figure No. 81: Monthly average reading recorded at MIDC Office - Dombivali

Table No. 82: Data for Annual average trend of SO₂, NOₓ, and RSPM at MIDC Office - Dombivali

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07				
07-08				
08-09				
09-10				
10-11				
11-12				
12-13	74	86	61	37
13-14	85	109	62	32
14-15	102	121	65	28

Figure No. 82: Annual average trend of SO₂, NOₓ, and RSPM at MIDC Office - Dombivali

Kalyan – MPCB RO Kalyan office

Table No. 83: Data for Monthly average reading recorded at MPCB RO Kalyan office

FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NOₓ	SO₂
Apr	8	66	34	25
May	8	85	38	35
Jun	9	79	43	37
Jul				
Aug	8	63	35	27
Sep	10	66	34	25
Oct	8	67	38	27
Nov				
Dec	10	78	41	31
Jan	8	67	33	24
Feb	8	71	33	34
Mar	10	72	34	25
87		0.0	0.0	0.0

Figure No. 83: Monthly average reading recorded at MPCB RO Kalyan office

Table No. 84: Data for Annual average trend of SO₂, NOₓ, and RSPM at MPCB RO Kalyan office

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07				
07-08				
08-09				
09-10				
10-11				
11-12	82	71	34	22
12-13	103	65	38	29
13-14	70	69	38	30
14-15	87	71	36	29

Figure No. 84: Annual average trend of SO₂, NOₓ, and RSPM at MPCB RO Kalyan office

Maharashtra Pollution Control Board
महाराष्ट्र प्रदूषण नियंत्रण मंडळ

Ulhasnagar – Smt. CHM College Campus

Table No. 85: Data for Monthly average reading recorded at Smt. CHM College Campus, Ulhasnagar

FY	N	Monthly average (μg/m³)		
2014-15		RSPM	NOx	SO₂
Apr	9	92	47	35
May	8	78	39	35
Jun	9	99	59	31
Jul	9	108	57	35
Aug	8	99	52	23
Sep	9	76	38	15
Oct	10	67	32	12
Nov	6	69	34	14
Dec	9	63	31	12
Jan	8	78	40	12
Feb	8	69	34	12
Mar	9	81	41	15
102		14.7	2.0	0.0
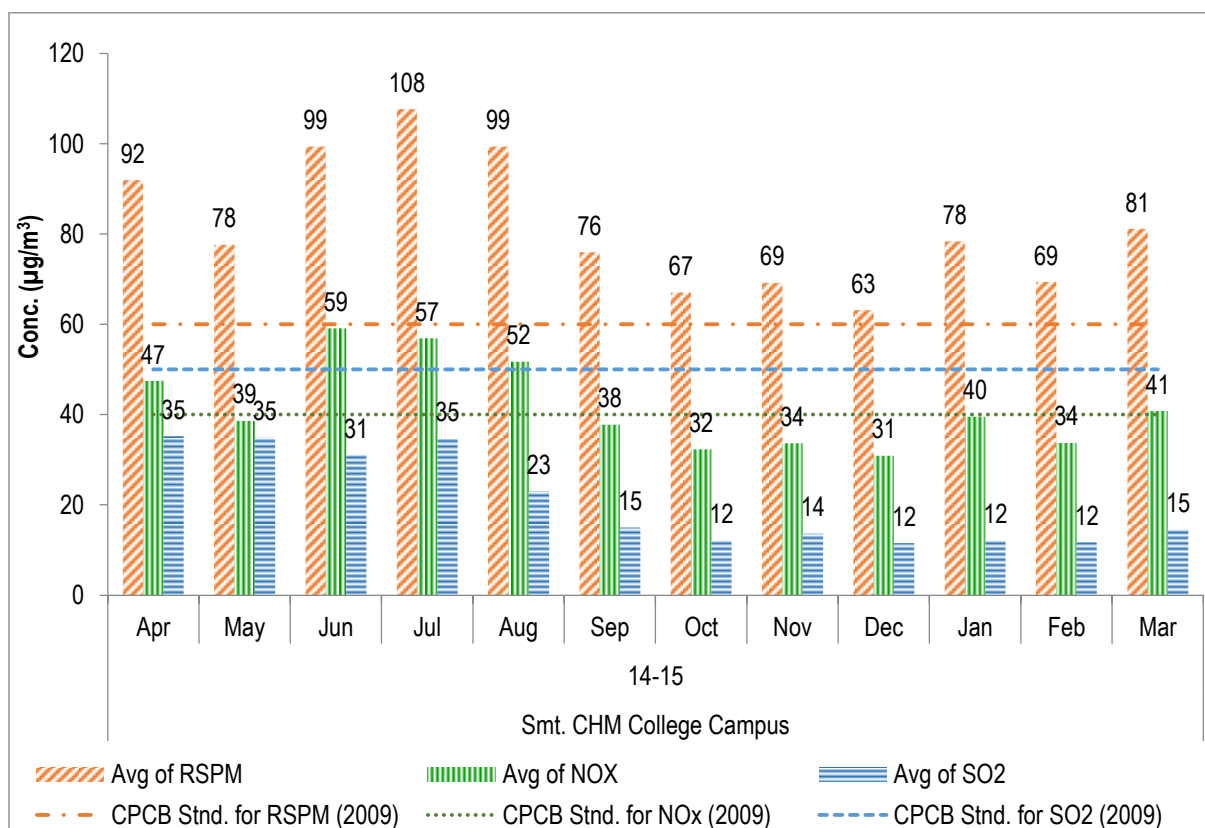
Figure No. 85: Monthly average reading recorded at Smt. CHM College Campus, Ulhasnagar

Table No. 86: Data for Annual average trend of SO₂, NOₓ, and RSPM at Smt. CHM College Campus, Ulhasnagar

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07	75	159	46	28
07-08	53	90	42	31
08-09	92	87	57	30
09-10	88	92	70	46
10-11	99	99	61	30
11-12	102	109	64	37
12-13	100	85	58	34
13-14	97	68	37	25
14-15	102	82	42	21
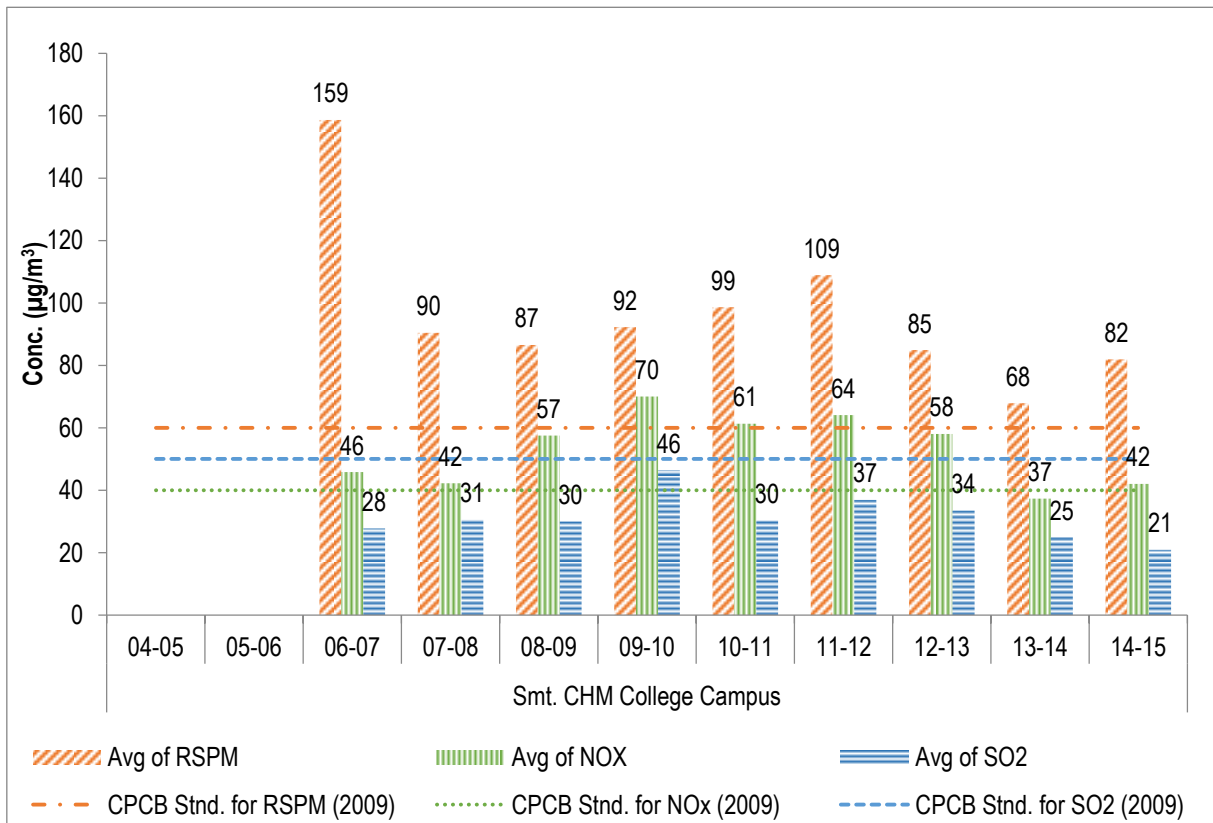
Figure No. 86: Annual average trend of SO₂, NOₓ, and RSPM at Smt. CHM College Campus, Ulhasnagar

Ulhasnagar - Powai Chowk

Table No. 87: Data for Monthly average reading recorded at Powai Chowk - Ulhasnagar

FY	N	Monthly average ($\mu g/m^3$)		
2014-15		RSPM	NO$_X$	SO$_2$
Apr	9	141	77	48
May	8	108	57	48
Jun	9	116	69	41
Jul	9	170	95	59
Aug	8	144	79	37
Sep	8	80	40	15
Oct	10	72	35	13
Nov	6	80	40	26
Dec	9	82	40	13
Jan	8	87	43	16
Feb	8	81	41	14
Mar				
92		38.0	17.4	0.0
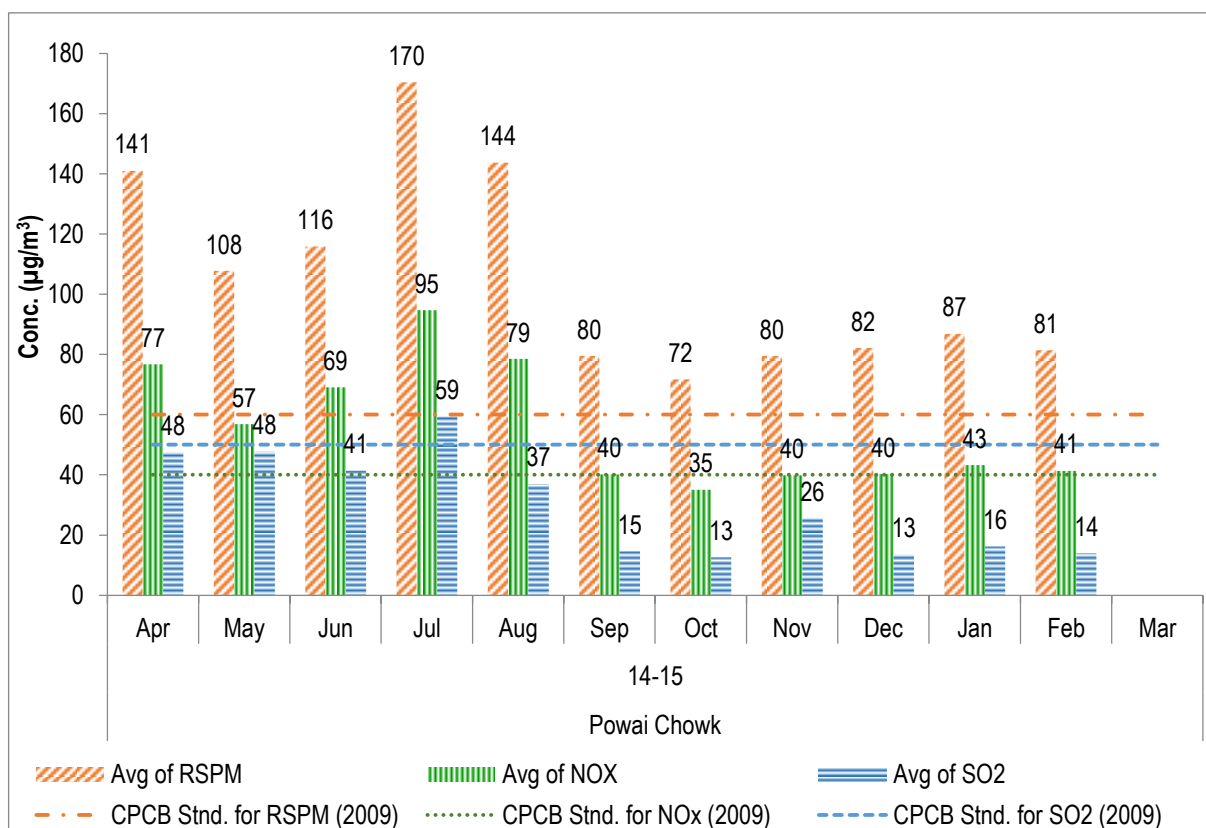
Figure No. 87: Monthly average reading recorded at Powai Chowk - Ulhasnagar

Table No. 88: Data for Annual average trend of SO₂, NOₓ, and RSPM at Powai Chowk - Ulhasnagar

Year	N	Annual average (µg/m³)		
		RSPM	NOX	SO₂
04-05				
05-06				
06-07	89	121	38	24
07-08	98	91	37	25
08-09	98	95	69	33
09-10	89	119	96	53
10-11	96	114	69	31
11-12	102	122	74	43
12-13	101	106	81	43
13-14	90	99	58	33
14-15	92	106	57	30
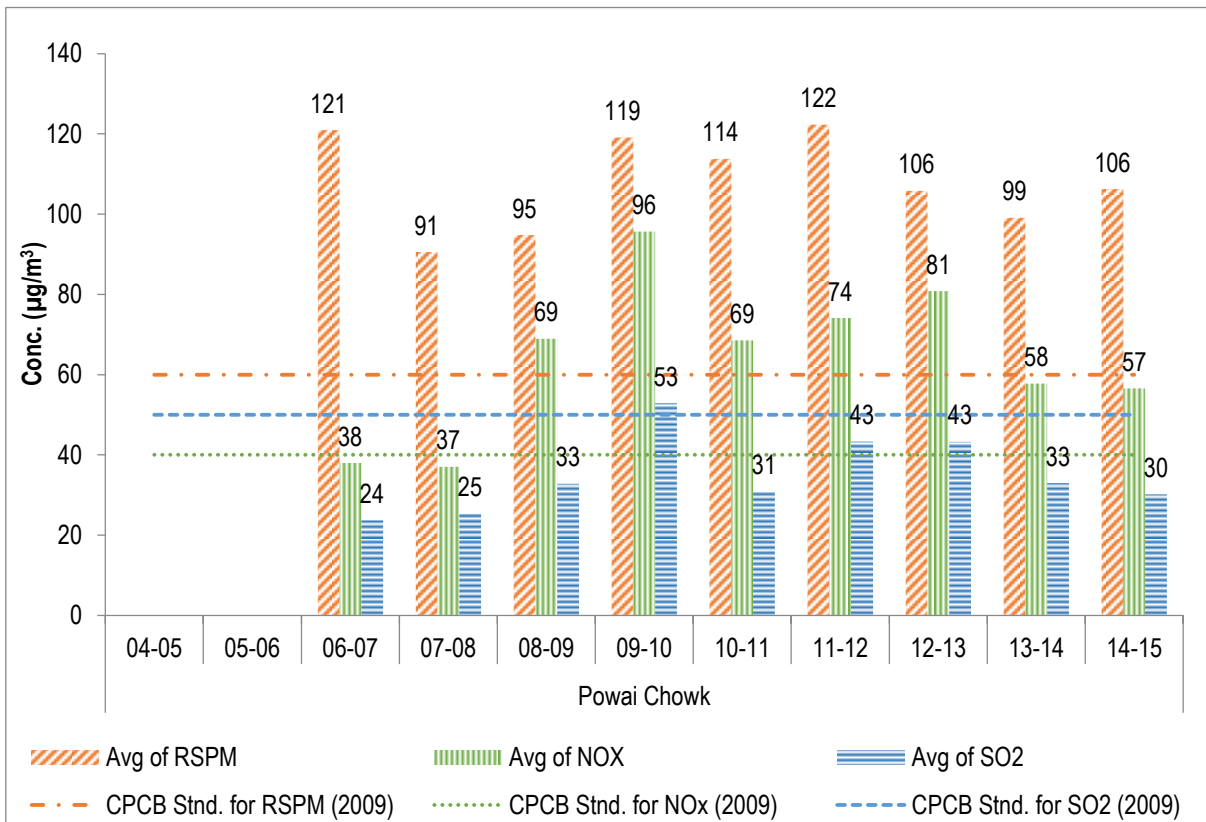
Figure No. 88: Annual average trend of SO₂, NOₓ, and RSPM at Powai Chowk - Ulhasnagar

% occurence for the classes for AQI across Kalyan RO

Kalyan

Legend:
- Good (0-50)
- Satisfactory (51-100)
- Moderately polluted (101-200)
- Poor (201-300)
- Very Poor (301-400)
- Severe (401+)
- Benchmark (98%)
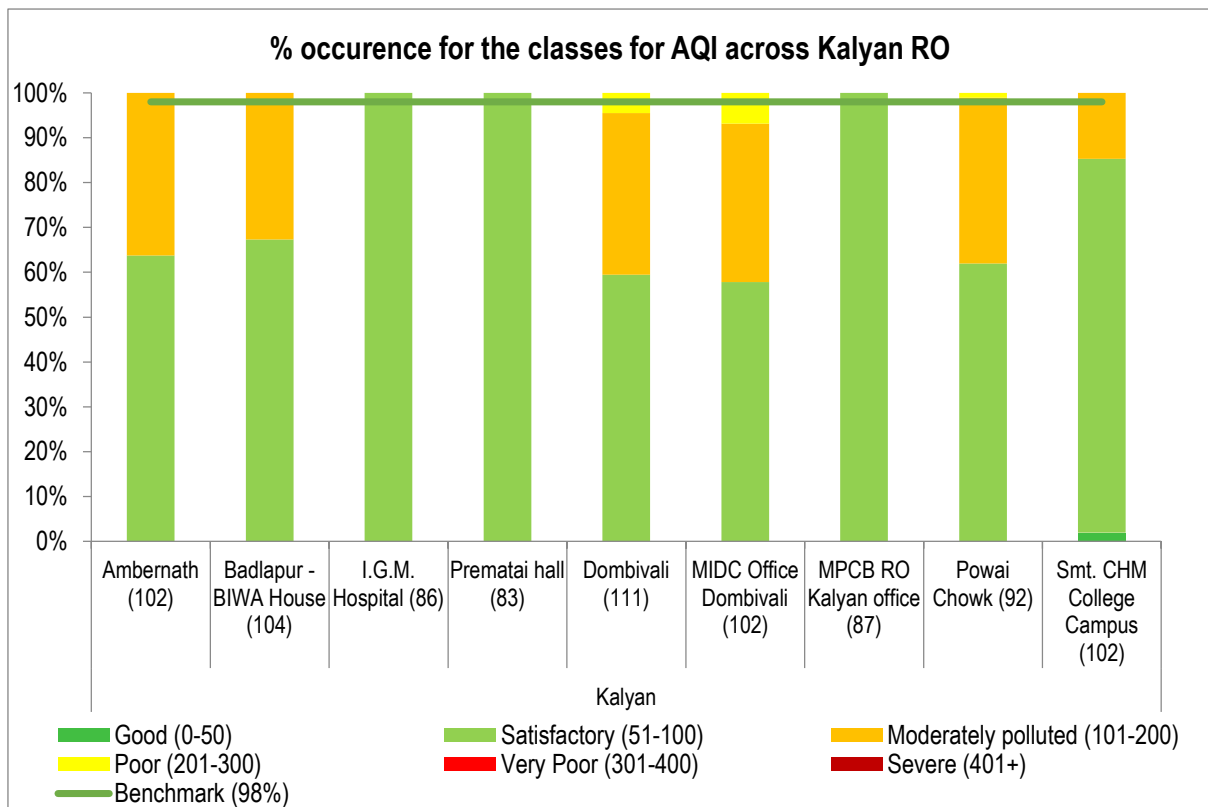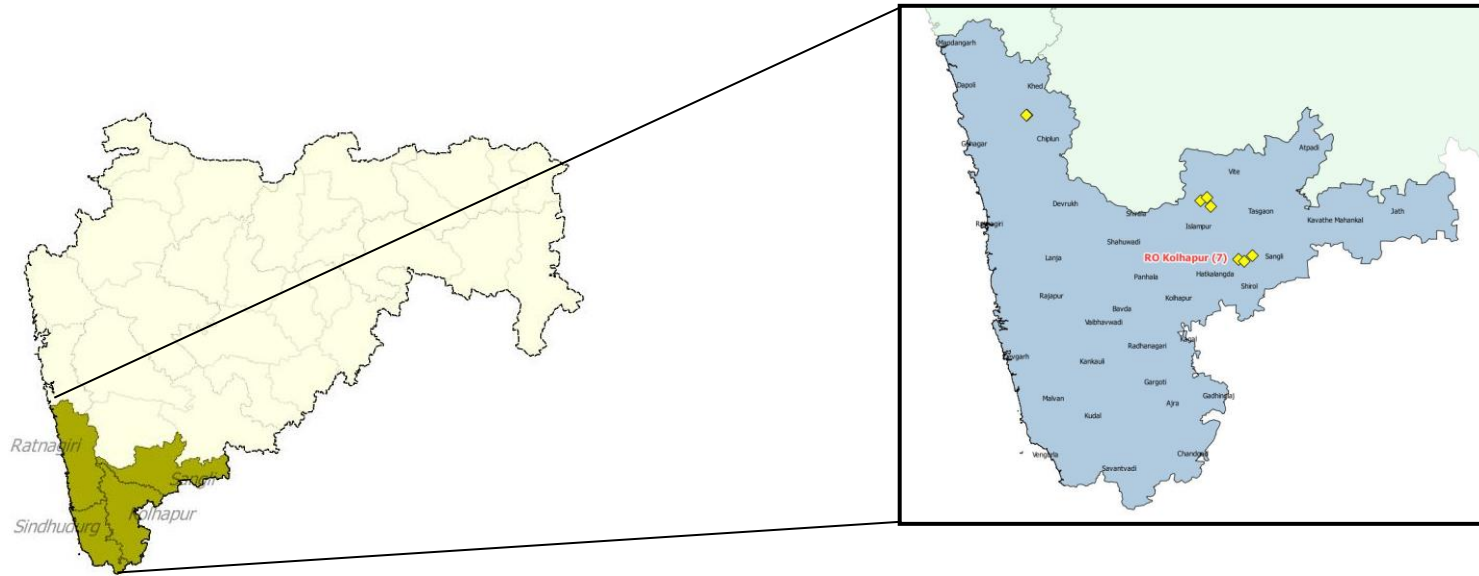
RO – Kolhapur

MPCB RO	Region	Station code	Station name	Type	Latitude (deg)	Longitude (deg)
Kolhapur	**Chiplun**	**489**	**Chiplun - MIDC Chalkewadi**	**Residential**	**17° 35' 16.8" N**	**73° 29' 25.0" E**
	Chiplun	490	Chiplun - Water Treatment	Industrial	17° 35' 15.2" N	73° 29' 13.7" E
	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

Chiplun – Chiplun – MIDC Chalkewadi

Table No. 89: Data for monthly average reading recorded at MIDC Chalkewadi Chiplun

FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NO$_X$	SO$_2$
Apr	8	128	11	11
May	8	125	11	11
Jun	8	102	10	10
Jul	8	100	10	10
Aug	8	77	9	10
Sep	8	82	11	11
Oct	8	94	11	11
Nov	8	133	11	11
Dec	8	131	11	11
Jan	8	152	11	11
Feb				
Mar	8	174	11	11
	88	65.9	0.0	0.0
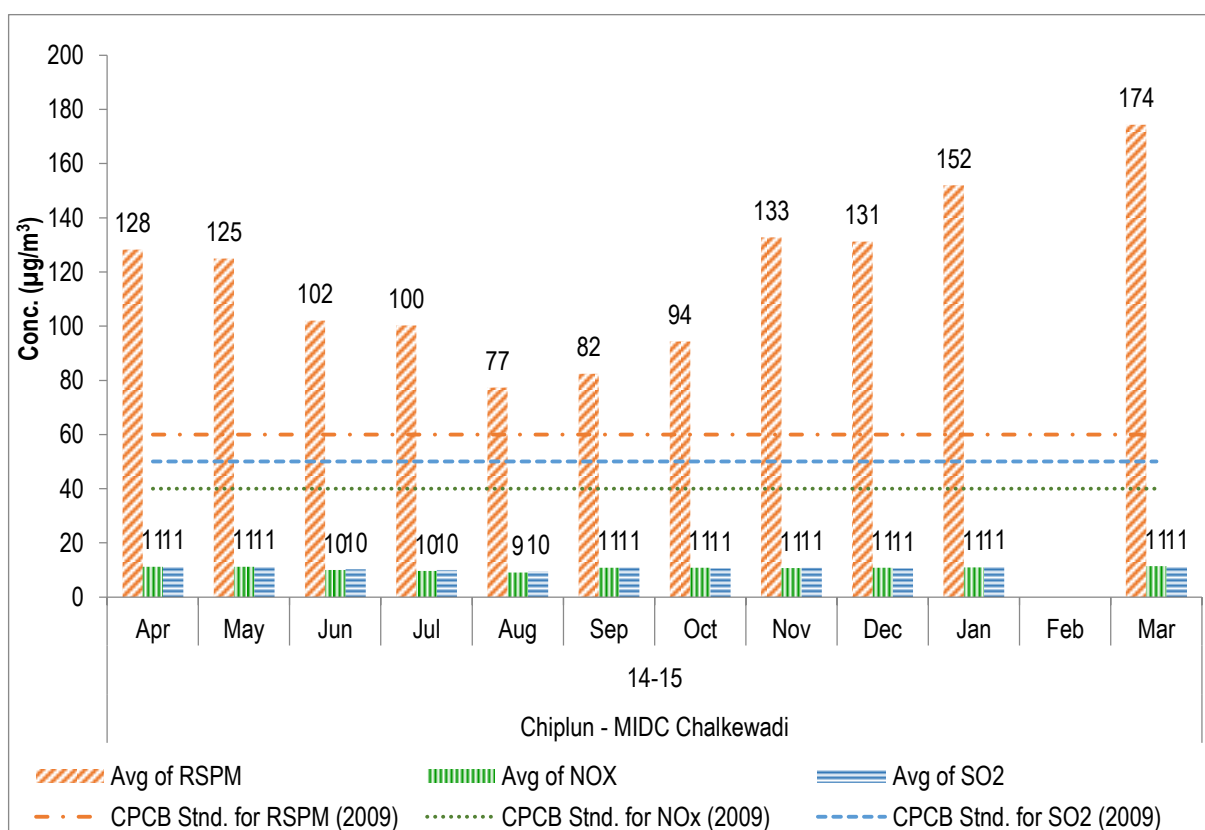
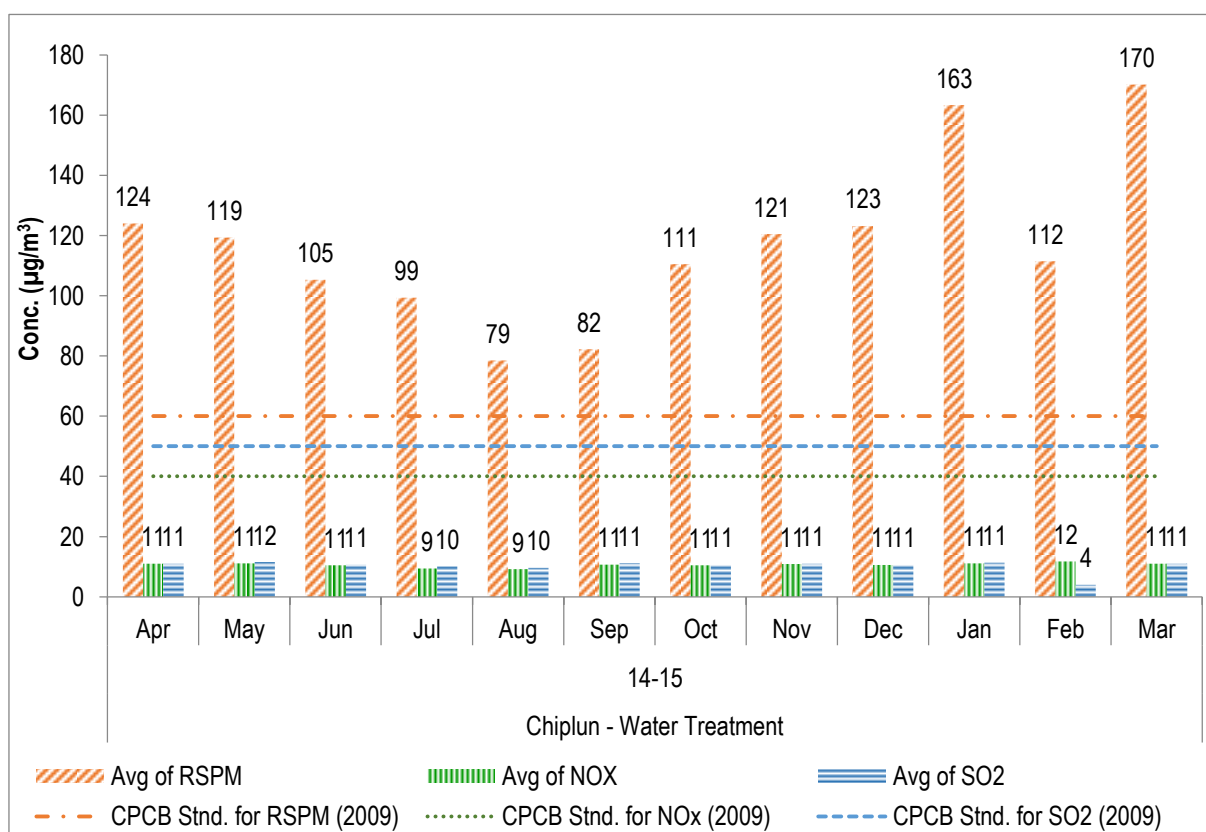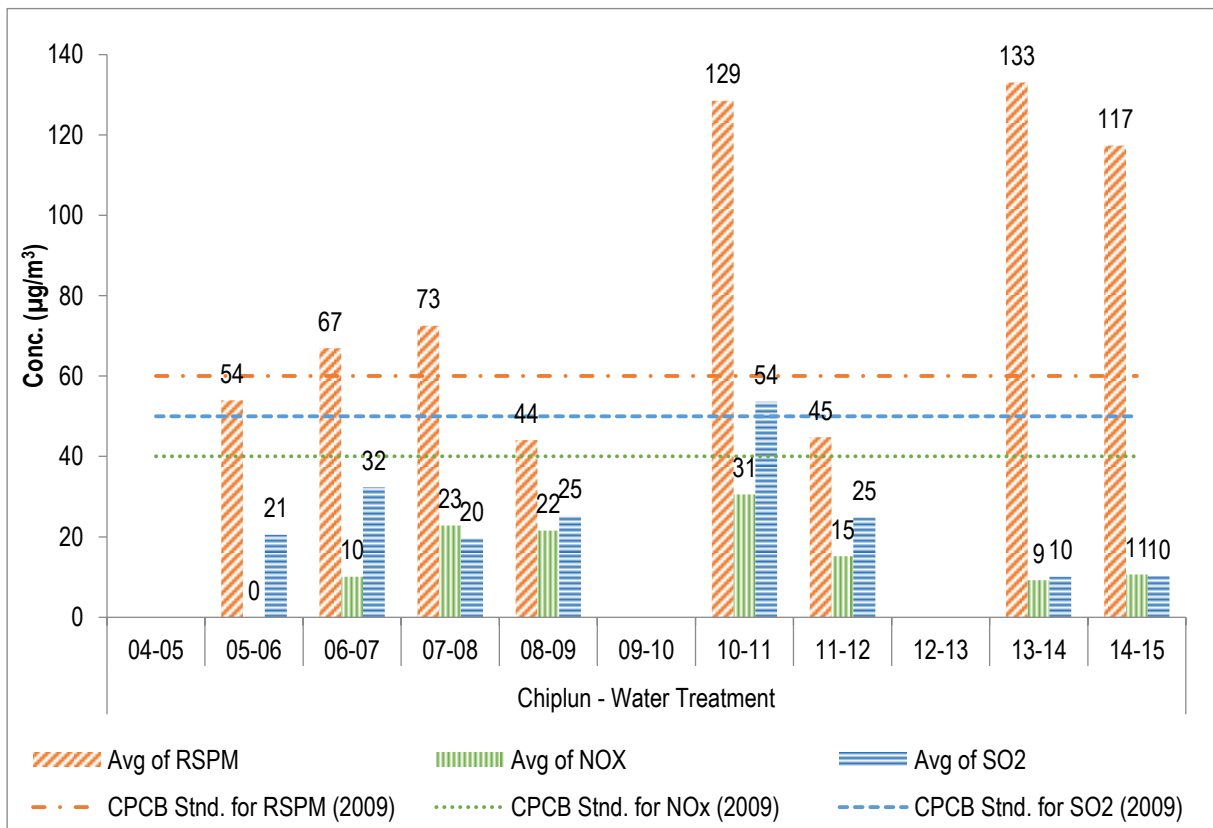**Figure No. 89: Monthly average reading recorded at MIDC Chalkewadi Chiplun**

Table No. 90: Data for annual average trend of SO₂, NOₓ, and RSPM at MIDC Chalkewadi Chiplun

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07	43	85	11	12
07-08	83	87	28	23
08-09	26	62	24	25
09-10				
10-11	36	144	33	59
11-12	24	38	15	24
12-13				
13-14	78	127	9	10
14-15	88	118	11	11
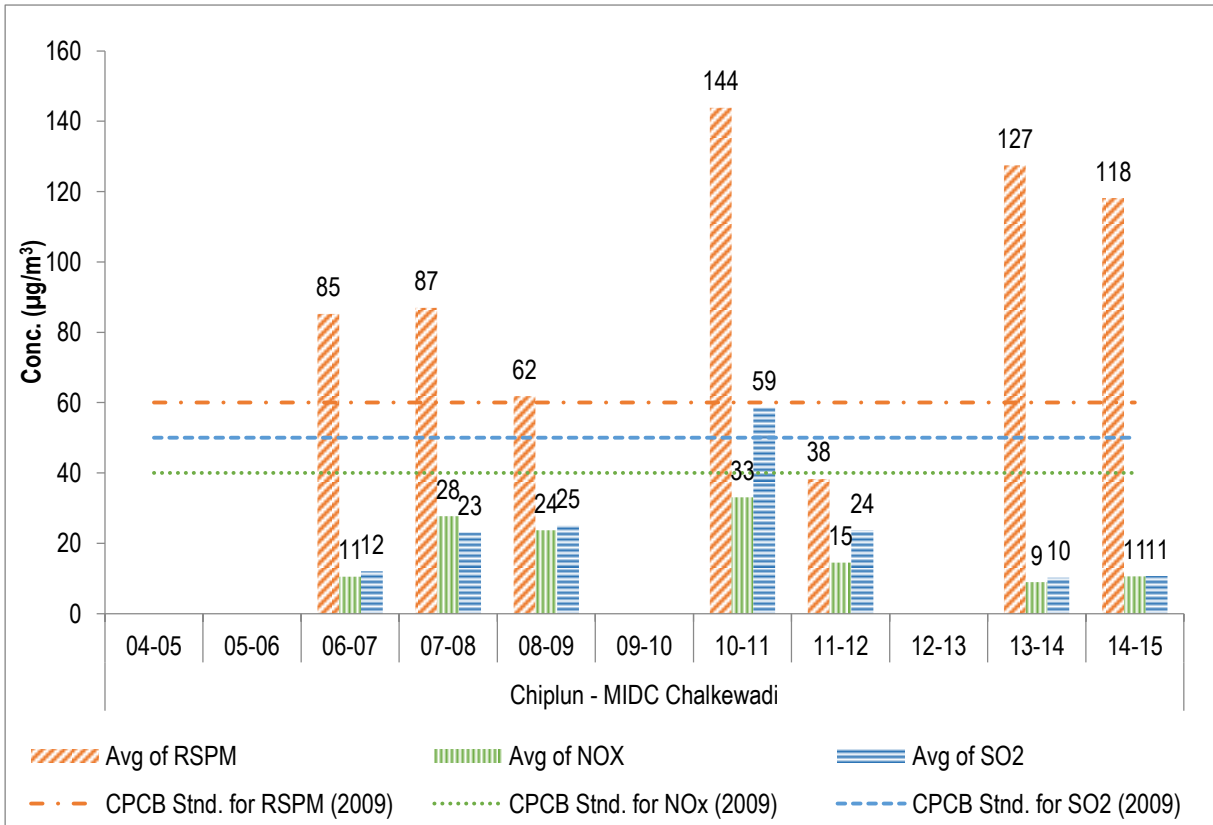
Figure No. 90: Annual average trend of SO₂, NOₓ, and RSPM at MIDC Chalkewadi Chiplun

Chiplun – Chiplun – Water Treatment

Table No. 91: Data for monthly average reading recorded at Chiplun – Water Treatment

FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NOX	SO2
Apr	8	124	11	11
May	8	119	11	12
Jun	8	105	11	11
Jul	8	99	9	10
Aug	8	79	9	10
Sep	8	82	11	11
Oct	8	111	11	11
Nov	8	121	11	11
Dec	8	123	11	11
Jan	8	163	11	11
Feb	8	112	12	4
Mar	8	170	11	11
	96	65.6	0.0	0.0

Figure No. 91: Monthly average reading recorded at Chiplun – Water Treatment

Table No. 92: Annual average trend of SO₂, NOₓ, and RSPM at Chiplun – Water Treatment

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06	2	54	0	21
06-07	105	67	10	32
07-08	105	73	23	20
08-09	25	44	22	25
09-10				
10-11	44	129	31	54
11-12	33	45	15	25
12-13				
13-14	76	133	9	10
14-15	96	117	11	10

Figure No. 92: Annual average trend of SO₂, NOₓ, and RSPM at Chiplun – Water Treatment

Kolhapur – Shivaji University Campus

Table No. 93: Data for monthly average reading recorded at Shivaji University Campus

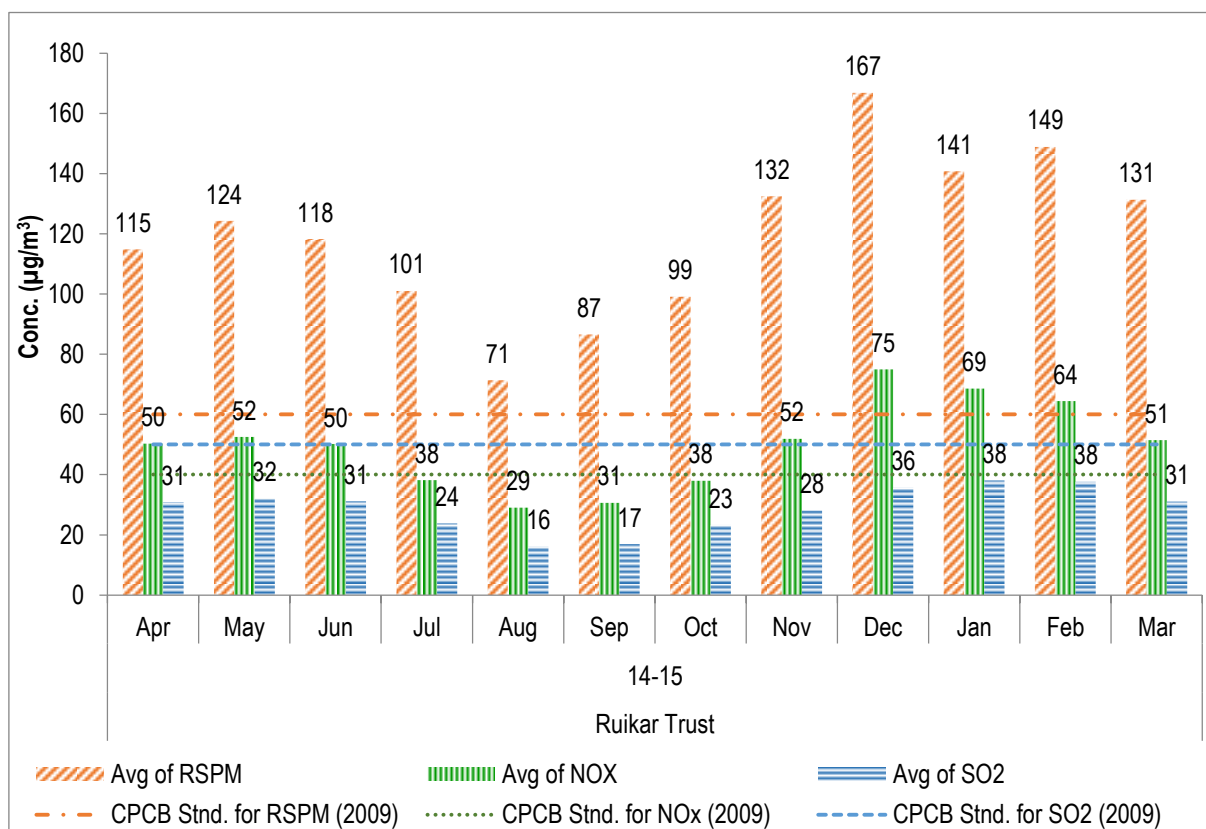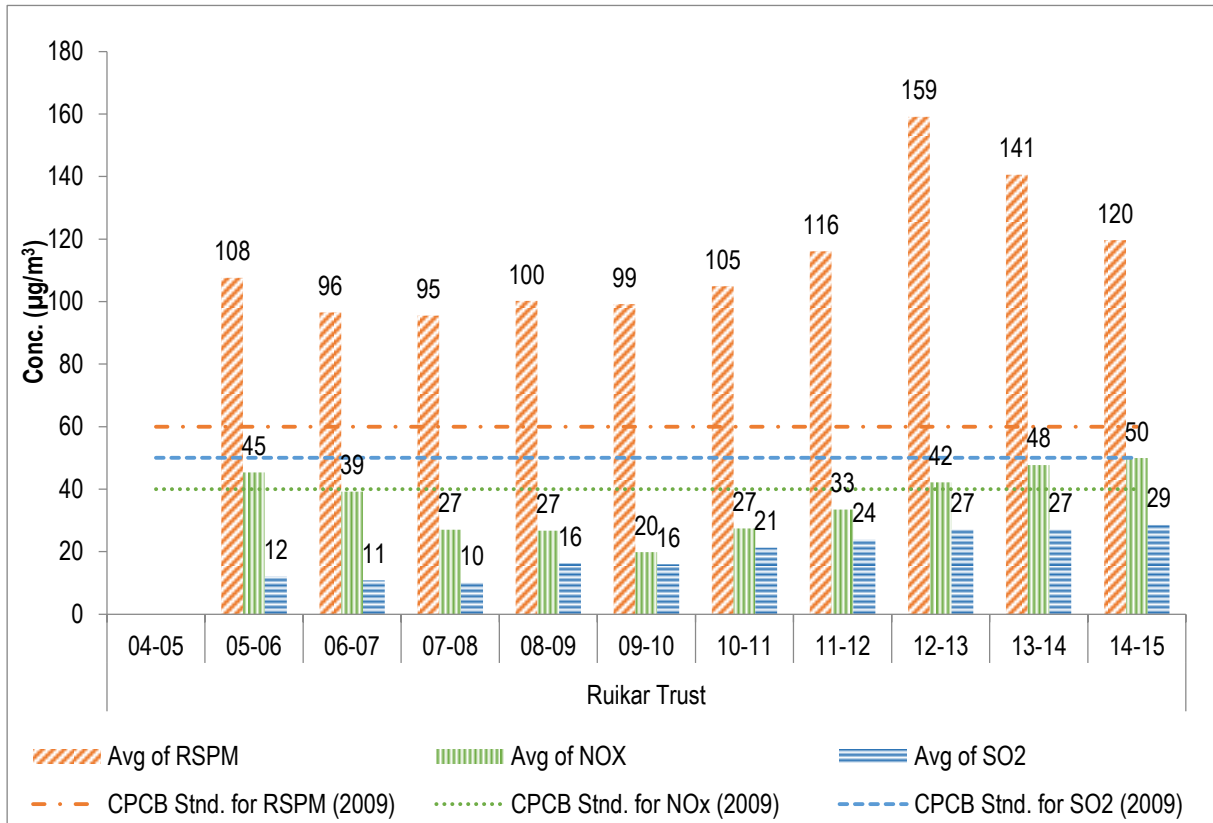| FY 2014-15	N	Monthly average (µg/m³)		
		RSPM	NOX	SO2
Apr	8	54	23	13
May	9	52	24	12
Jun	9	53	22	12
Jul	9	51	18	10
Aug	8	45	13	8
Sep	9	59	16	8
Oct	9	66	19	9
Nov	8	85	27	13
Dec	9	68	30	16
Jan	9	62	24	16
Feb	8	69	27	17
Mar	9	61	22	15
	104	0.0	0.0	0.0
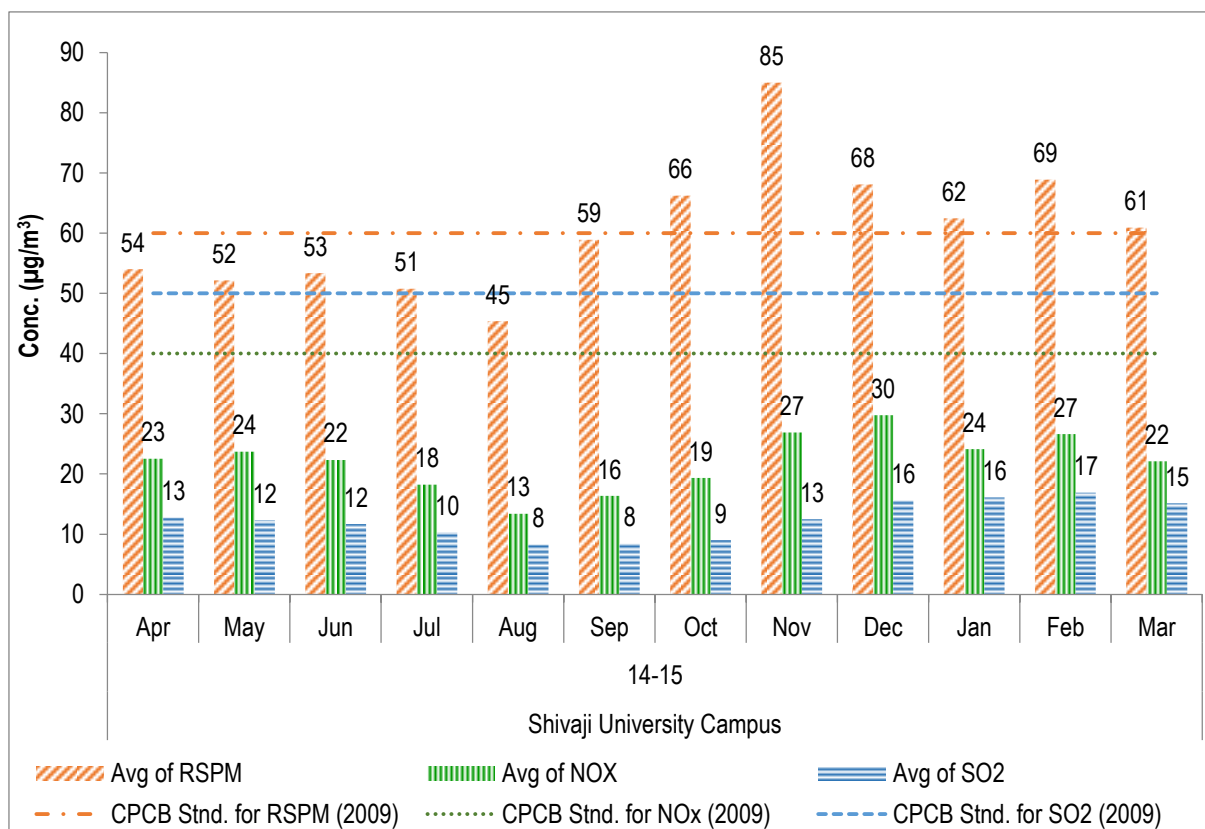
Figure No. 93: Monthly average reading recorded at Shivaji University Campus

Table No. 94: Data for annual average trend of SO₂, NOₓ, and RSPM at Shivaji University Campus

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06	*88*	40	7	4
06-07	*101*	44	7	5
07-08	*104*	46	3	5
08-09	*80*	62	10	8
09-10	*96*	55	4	8
10-11	*104*	56	9	9
11-12	*113*	60	13	10
12-13	*104*	61	18	12
13-14	*74*	64	20	14
14-15	*104*	60	22	12
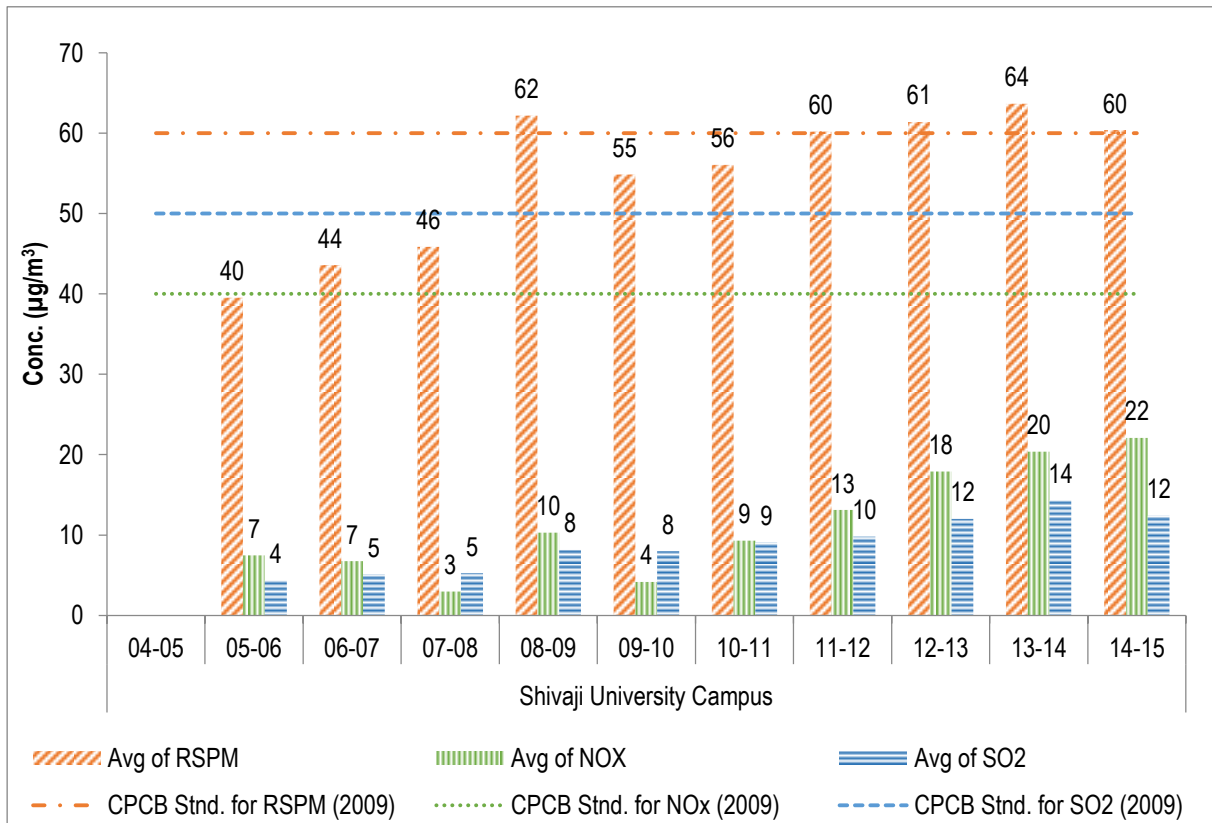
Figure No. 94: Annual average trend of SO₂, NOₓ, and RSPM at Shivaji University Campus

Kolhapur – Ruikar Trust

Table No. 95: Data for monthly average reading recorded at Ruikar Trust - Kolhapur

FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NO$_X$	SO$_2$
Apr	4	115	50	31
May	9	124	52	32
Jun	8	118	50	31
Jul	9	101	38	24
Aug	9	71	29	16
Sep	8	87	31	17
Oct	9	99	38	23
Nov	7	132	52	28
Dec	9	167	75	36
Jan	9	141	69	38
Feb	8	149	64	38
Mar	9	131	51	31
	98	71.4	2.0	0.0

Figure No. 95: Monthly average reading recorded at Ruikar Trust - Kolhapur

Table No. 96: Data for annual average trend of SO₂, NOₓ, and RSPM at Ruikar Trust - Kolhapur

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06	*84*	108	45	12
06-07	*101*	96	39	11
07-08	*103*	95	27	10
08-09	*102*	100	27	16
09-10	*92*	99	20	16
10-11	*102*	105	27	21
11-12	*105*	116	33	24
12-13	*103*	159	42	27
13-14	*103*	141	48	27
14-15	*98*	120	50	29

Figure No. 96: Annual average trend of SO₂, NOₓ, and RSPM at Ruikar Trust - Kolhapur

Kolhapur – Mahadwar Road

Table No. 97: Data for monthly average reading recorded at Mahadwar Road

FY	N	Monthly average (μg/m³)		
2014-15		RSPM	NOX	SO2
Apr	9	112	38	28
May	9	113	37	29
Jun	2	101	36	27
Jul	9	85	28	19
Aug	9	64	22	13
Sep	8	78	26	15
Oct	9	86	30	21
Nov	9	109	35	22
Dec	9	153	56	29
Jan	9	117	56	32
Feb	8	127	48	31
Mar	8	114	37	25
	98	63.3	0.0	0.0
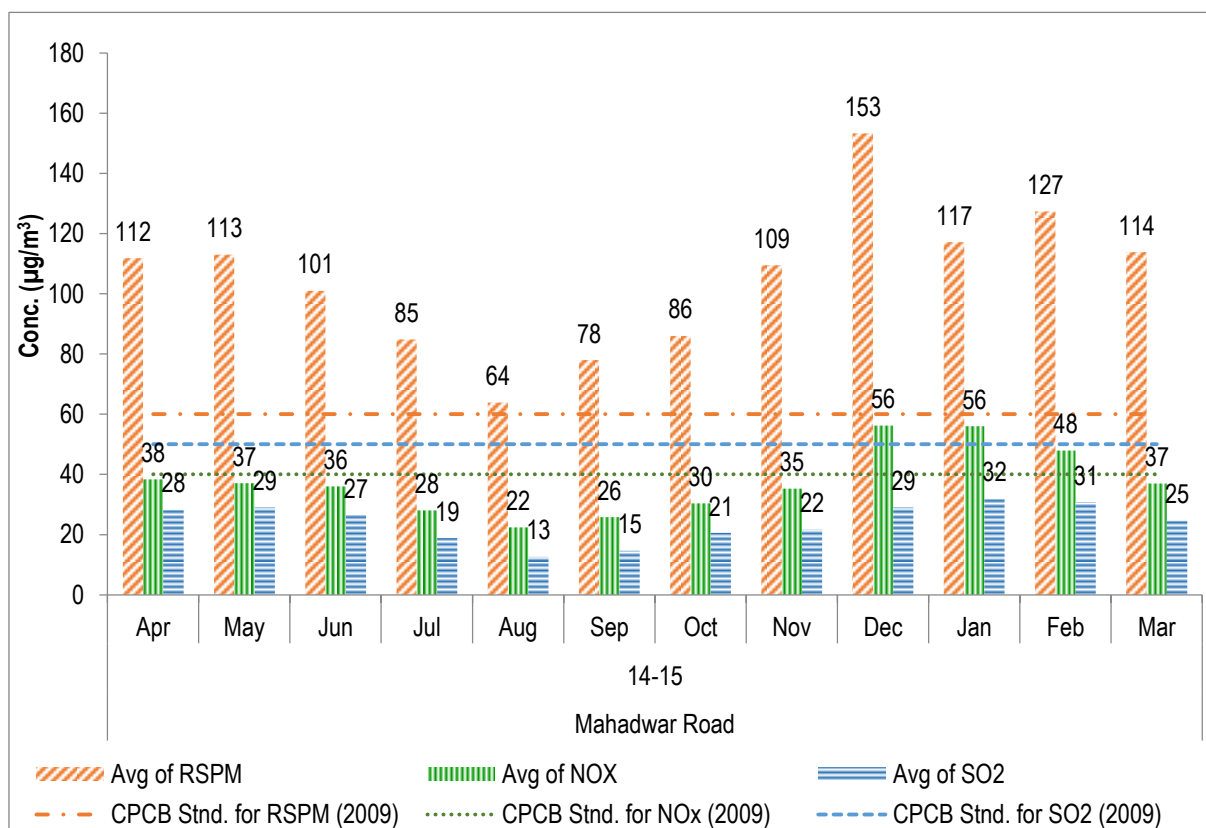
Figure No. 97: Monthly average reading recorded at Mahadwar Road

Table No. 98: Data for annual average trend of SO₂, NOₓ, and RSPM at Mahadwar Road

Year	N	Annual average ($\mu g/m^3$)		
		RSPM	NOₓ	SO₂
04-05				
05-06	79	69	28	8
06-07	99	64	21	8
07-08	91	75	11	8
08-09	100	84	17	12
09-10	103	86	15	13
10-11	104	92	21	17
11-12	97	102	26	20
12-13	102	136	35	25
13-14	97	113	37	23
14-15	98	105	38	24
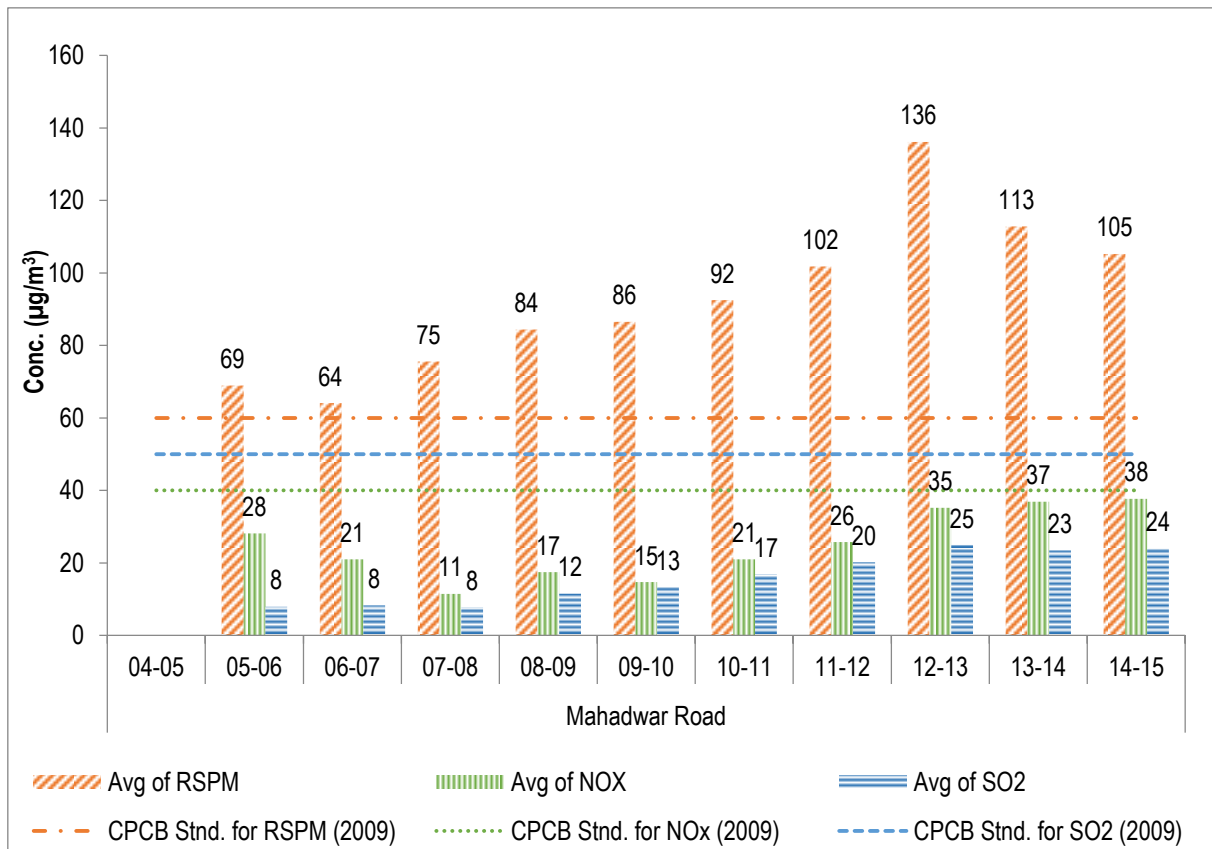
Figure No. 98: Annual average trend of SO₂, NOₓ, and RSPM at Mahadwar Road

Maharashtra Pollution Control Board
महाराष्ट्र प्रदूषण नियंत्रण मंडळ

Sangli – Terrace of SRO – Sangli, Udyog Bhavan

Table No. 99: Data for monthly average reading recorded at Terrace of SRO – Sangli, Udyog Bhavan

FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NOₓ	SO₂
Apr	8	121	36	11
May	9	53	31	10
Jun	9	34	31	12
Jul	9	31	31	11
Aug	9	23	32	12
Sep	8	31	43	17
Oct	9	65	40	14
Nov	9	77	41	14
Dec	8	108	58	10
Jan	9	119	61	10
Feb				
Mar	9	77	57	11
	96	19.8	1.0	0.0
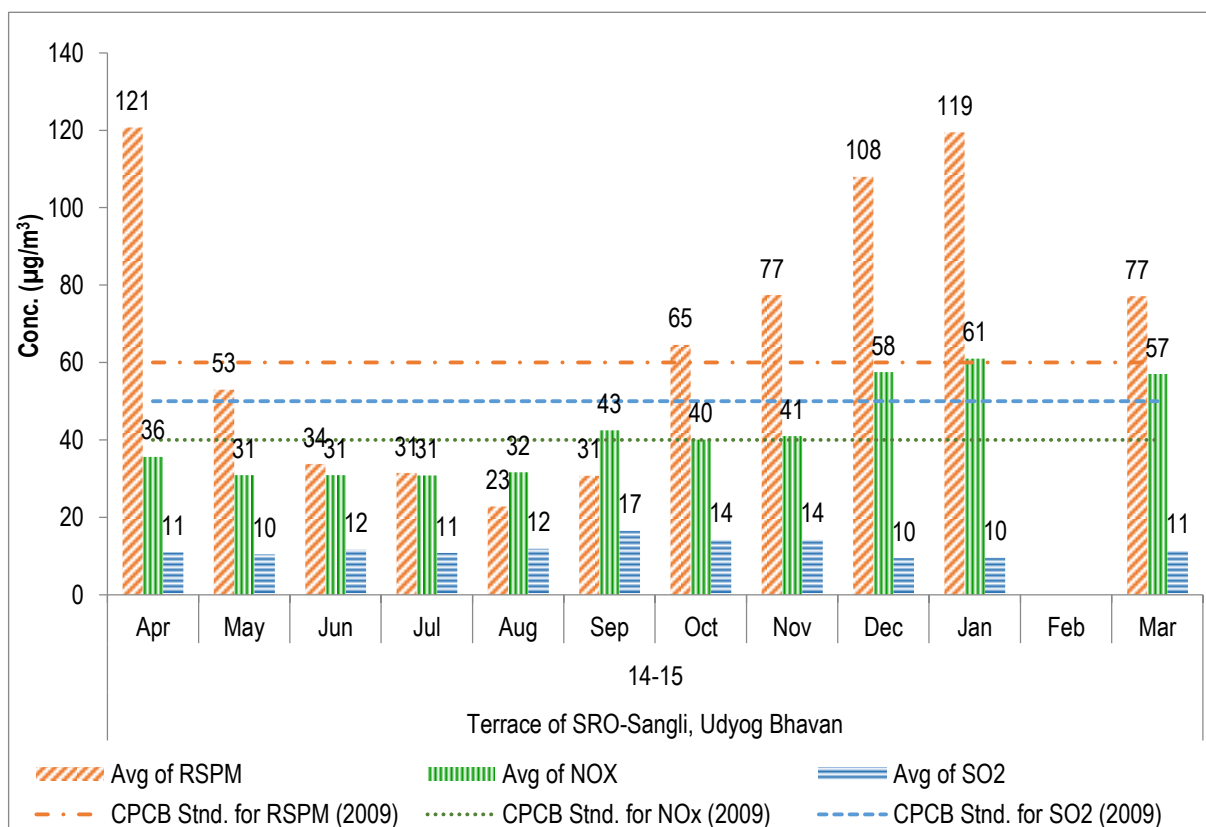
Figure No. 99: Monthly average reading recorded at Terrace of SRO – Sangli, Udyog Bhavan

Table No. 100: Data for annual average trend of SO₂, NOₓ, and RSPM at Terrace of SRO – Sangli, Udyog Bhavan

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07				
07-08				
08-09	69	57	19	25
09-10	102	54	27	22
10-11	104	54	29	12
11-12	105	63	36	10
12-13	104	70	39	10
13-14	104	69	34	9
14-15	96	67	42	12
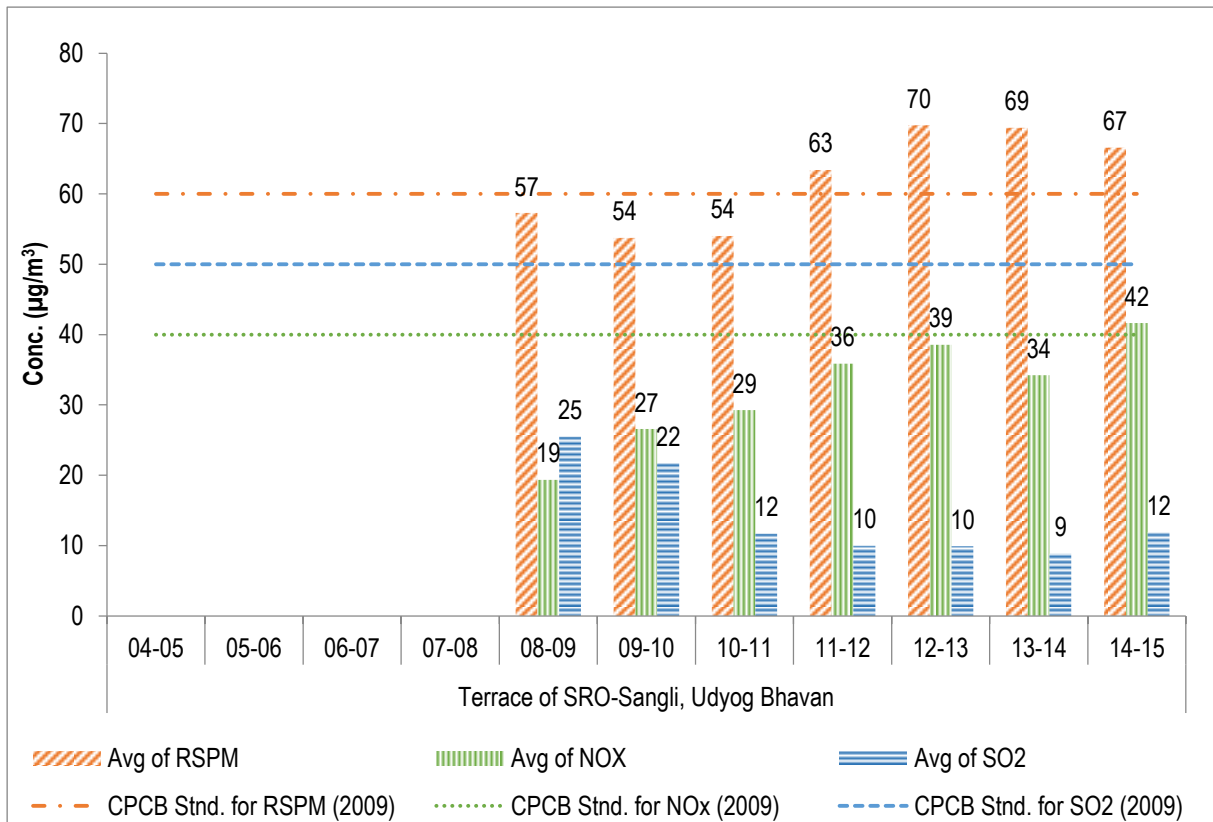
Figure No. 100: Annual average trend of SO₂, NOₓ, and RSPM at Terrace of SRO – Sangli, Udyog Bhavan

Sangli – Sangli – Miraj Primary Municipal School

Table No. 101: Data for monthly average reading recorded at Sangli – Miraj Primary Municipal School

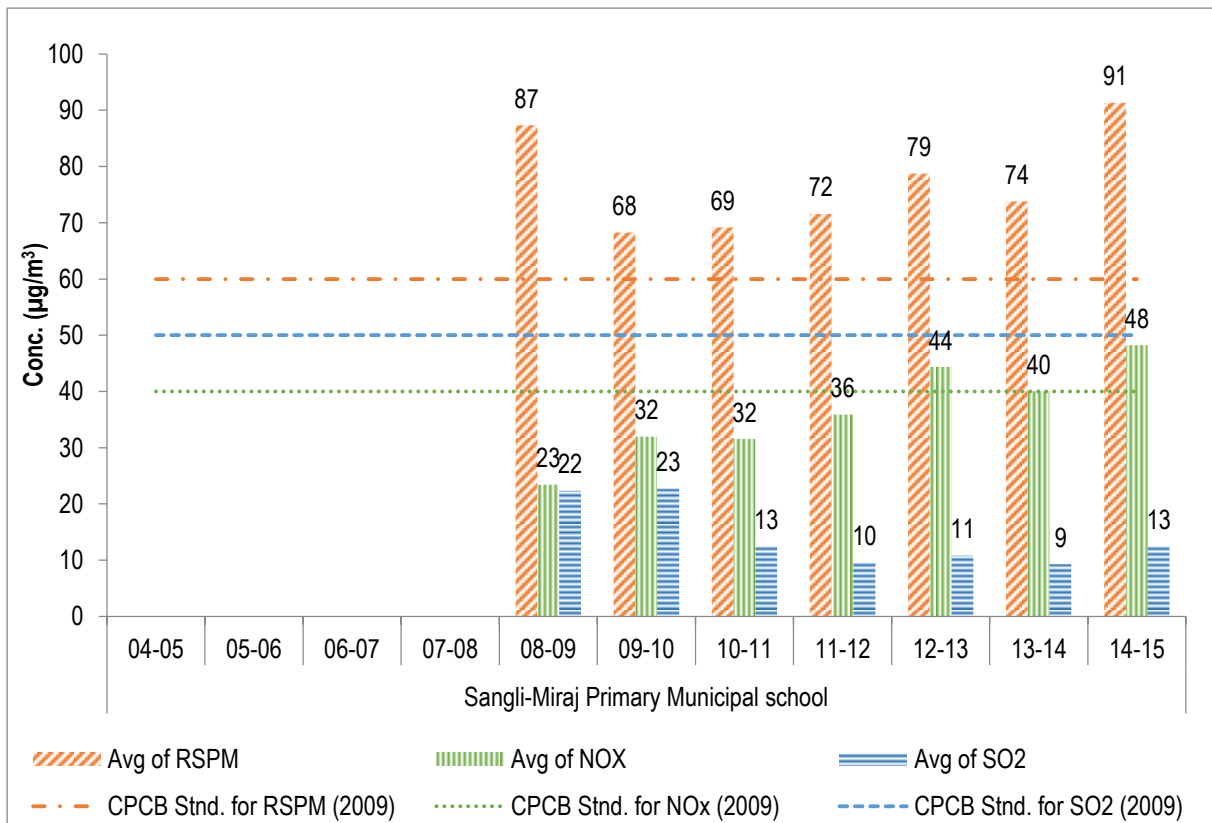| FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NOX	SO₂
Apr	*8*	137	49	14
May	*9*	56	34	11
Jun	*8*	44	32	11
Jul	*9*	35	26	7
Aug	*9*	28	28	12
Sep	*8*	44	38	12
Oct	*9*	90	47	16
Nov	*9*	137	48	15
Dec	*9*	164	62	10
Jan	*9*	139	76	11
Feb	*8*	128	78	18
Mar	*8*	94	61	14
	103	**37.9**	**9.7**	**0.0**
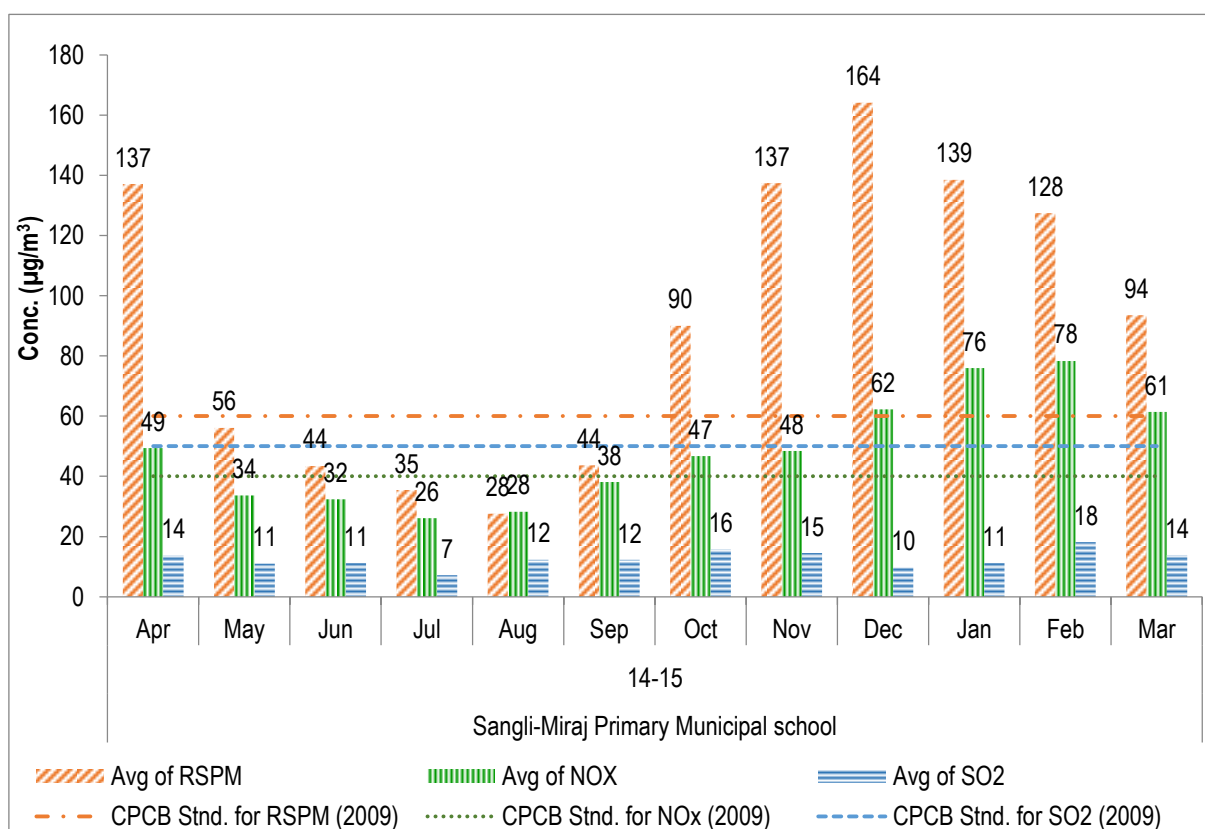
Figure No. 101: Monthly average reading recorded at Sangli – Miraj Primary Municipal School

Table No. 102: Data for annual average trend of SO₂, NOₓ, and RSPM at Sangli – Miraj Primary Municipal School

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07				
07-08				
08-09	14	87	23	22
09-10	101	68	32	23
10-11	105	69	32	13
11-12	104	72	36	10
12-13	102	79	44	11
13-14	96	74	40	9
14-15	103	91	48	13

Figure No. 102: Annual average trend of SO₂, NOₓ, and RSPM at Sangli – Miraj Primary Municipal School

Sangli – Krishna Valley School

Table No. 103: Data for monthly average reading recorded at Krishna Valley School

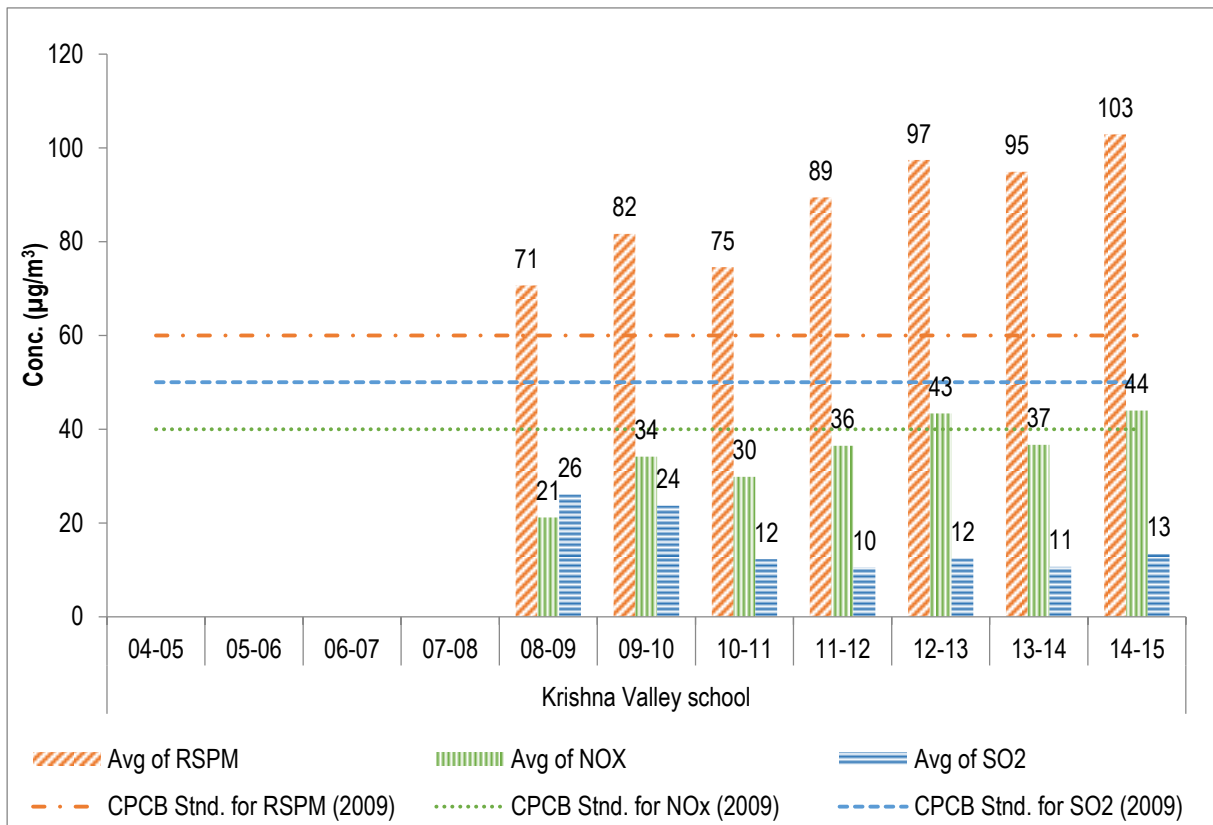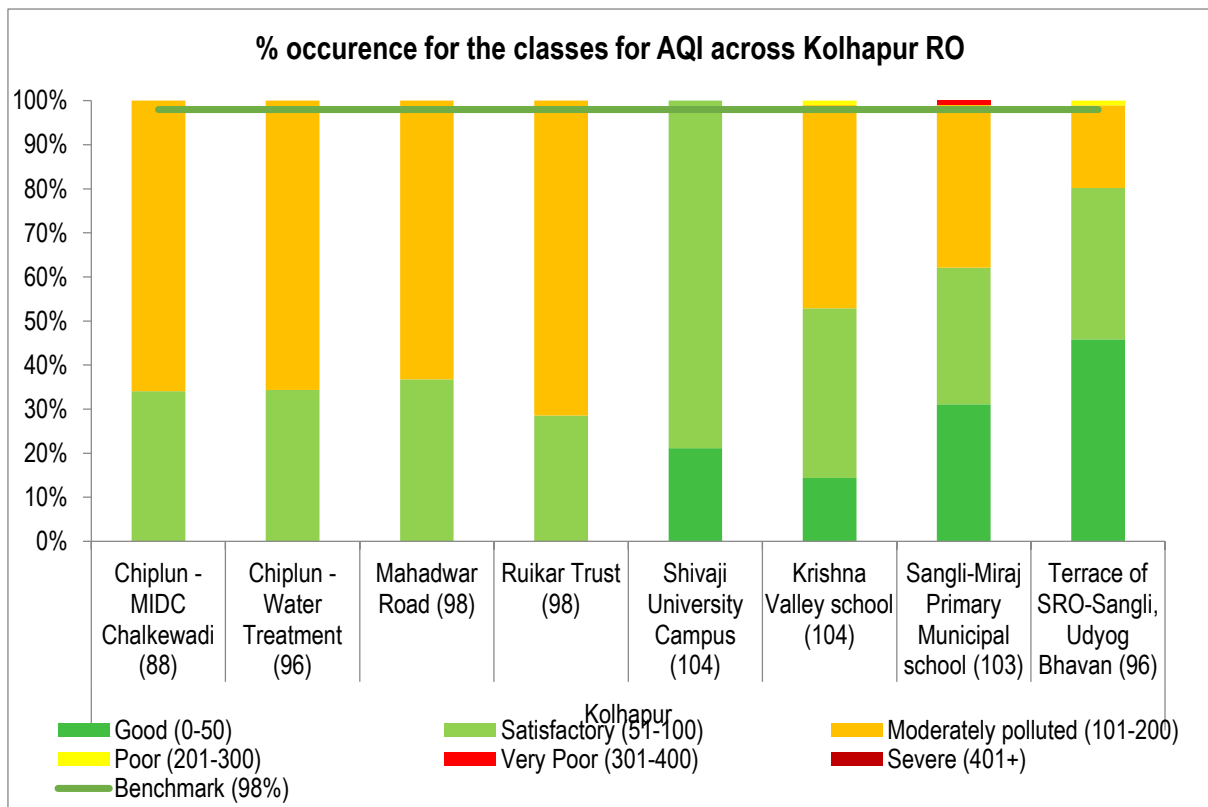| FY | N | Monthly average (µg/m³) | | |
2014-15		RSPM	NOX	SO2
Apr	9	163	48	13
May	9	84	38	11
Jun	9	93	37	15
Jul	8	53	25	7
Aug	9	52	34	14
Sep	8	77	40	13
Oct	9	89	45	16
Nov	8	116	38	13
Dec	9	132	51	14
Jan	9	132	57	15
Feb	8	124	55	15
Mar	9	115	59	14
	104	47.1	0.0	0.0
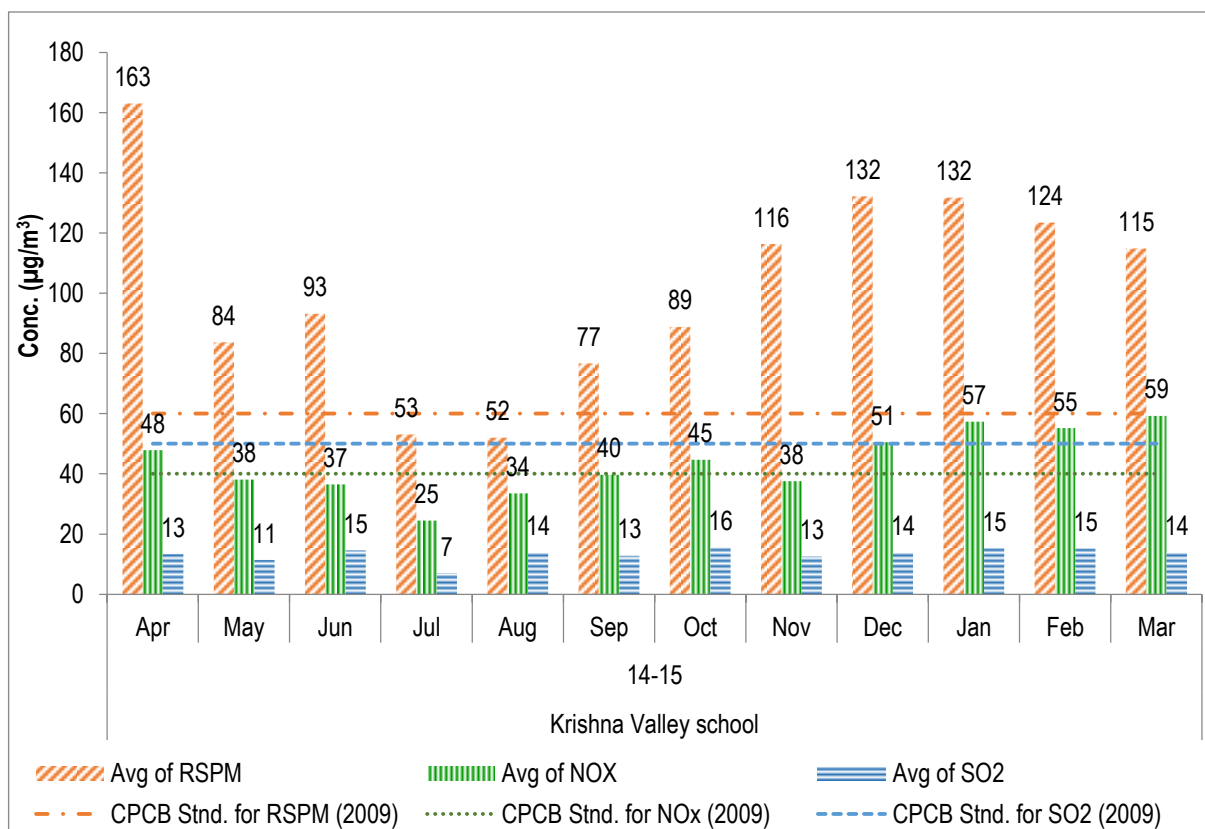
Figure No. 103: Monthly average reading recorded at Krishna Valley School

Table No. 104: Data for annual average trend of SO₂, NOₓ, and RSPM at Krishna Valley School

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07				
07-08				
08-09	70	71	21	26
09-10	102	82	34	24
10-11	104	75	30	12
11-12	105	89	36	10
12-13	103	97	43	12
13-14	104	95	37	11
14-15	104	103	44	13

Figure No. 104: Annual average trend of SO₂, NOₓ, and RSPM at Krishna Valley School

% occurence for the classes for AQI across Kolhapur RO

Kolhapur

Legend:
- Good (0-50)
- Satisfactory (51-100)
- Moderately polluted (101-200)
- Poor (201-300)
- Very Poor (301-400)
- Severe (401+)
- Benchmark (98%)

Maharashtra Pollution Control Board
महाराष्ट्र प्रदूषण नियंत्रण मंडळ

RO – Mumbai

MPCB RO	Region	Station code	Station name	Type	Latitude (deg)	Longitude (deg)
Mumbai	Mumbai		Bandra	Residential	19° 03' 47.1" N	72° 50' 47.2" E
	Mumbai		Sion	Residential	19° 02' 07.9" N	72° 51' 35.3" E

Mumbai - Bandra

Table No. 105: Data for monthly average reading recorded at Bandra

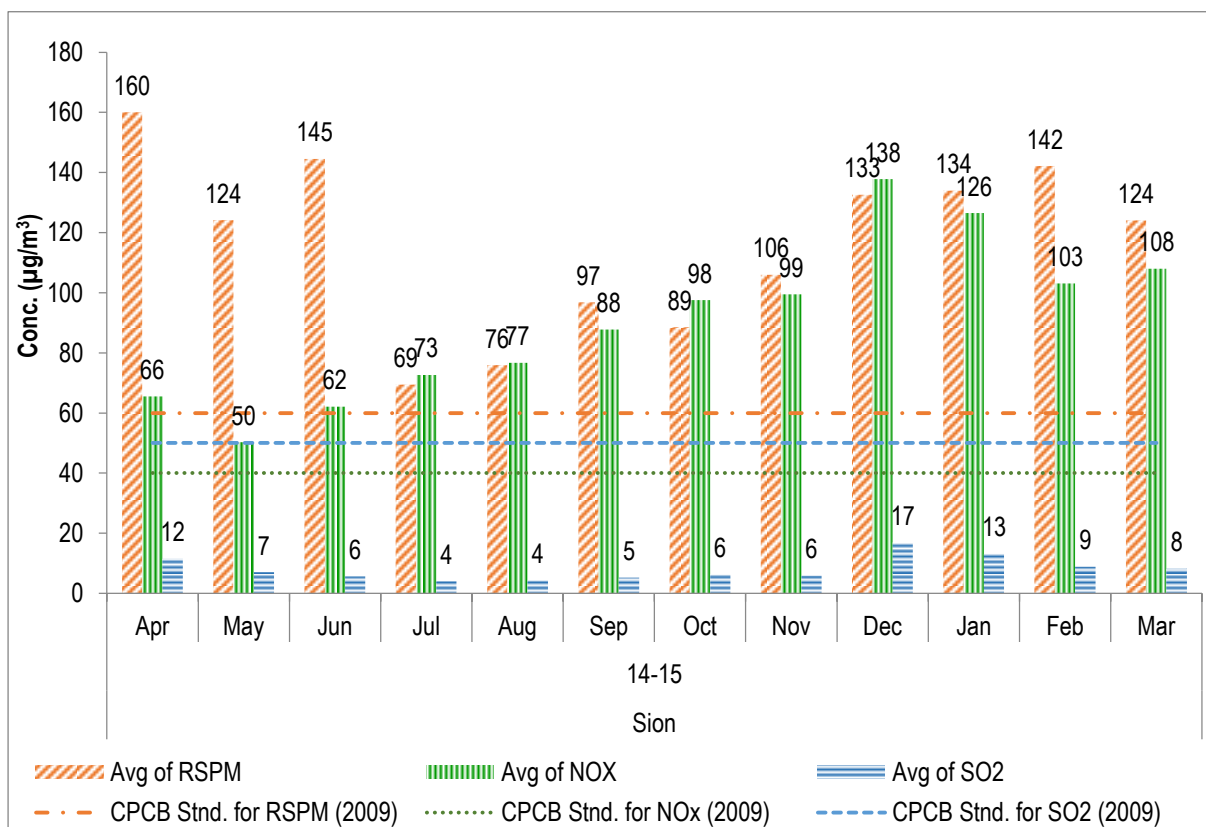| FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NOX	SO2
Apr	28	152	42	11
May	26	93	30	13
Jun	24	104	27	16
Jul	25	53	39	24
Aug	31	77	59	22
Sep	27	103	70	23
Oct	28	147	120	30
Nov	26	163	51	11
Dec	27	141	27	10
Jan	30	118	27	12
Feb	27	115	27	14
Mar	28	103	102	9
	327	63.3	16.2	0.0
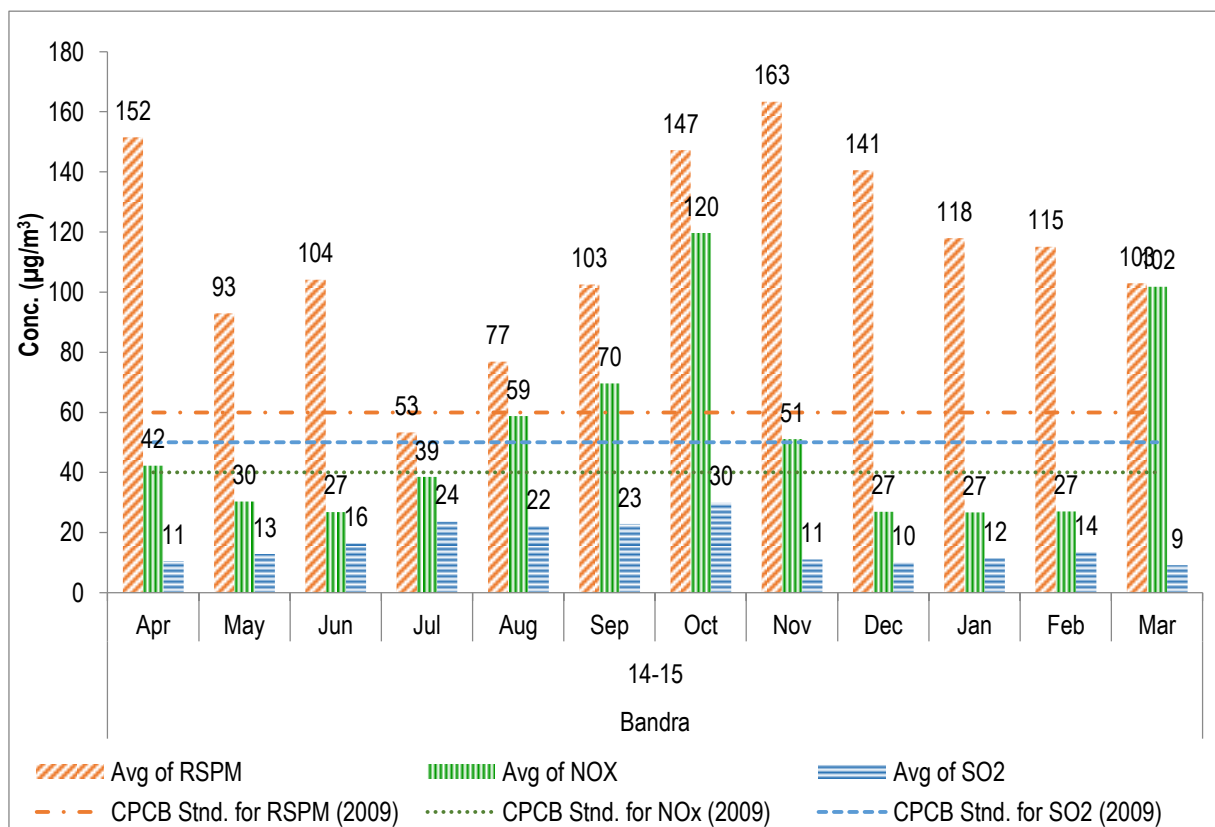
Figure No. 105: Monthly average reading recorded at Bandra

Table No. 106: Annual average trend of SO₂, NOₓ, and RSPM at Bandra

Year	N	Annual average (µg/m³)		
		RSPM	NO$_X$	SO$_2$
04-05				
05-06				
06-07				
07-08	233	158	59	19
08-09	335	137	60	19
09-10	339	140	90	17
10-11	349	116	48	19
11-12	353	131	65	21
12-13	355	116	48	18
13-14	349	106	49	20
14-15	327	114	52	16
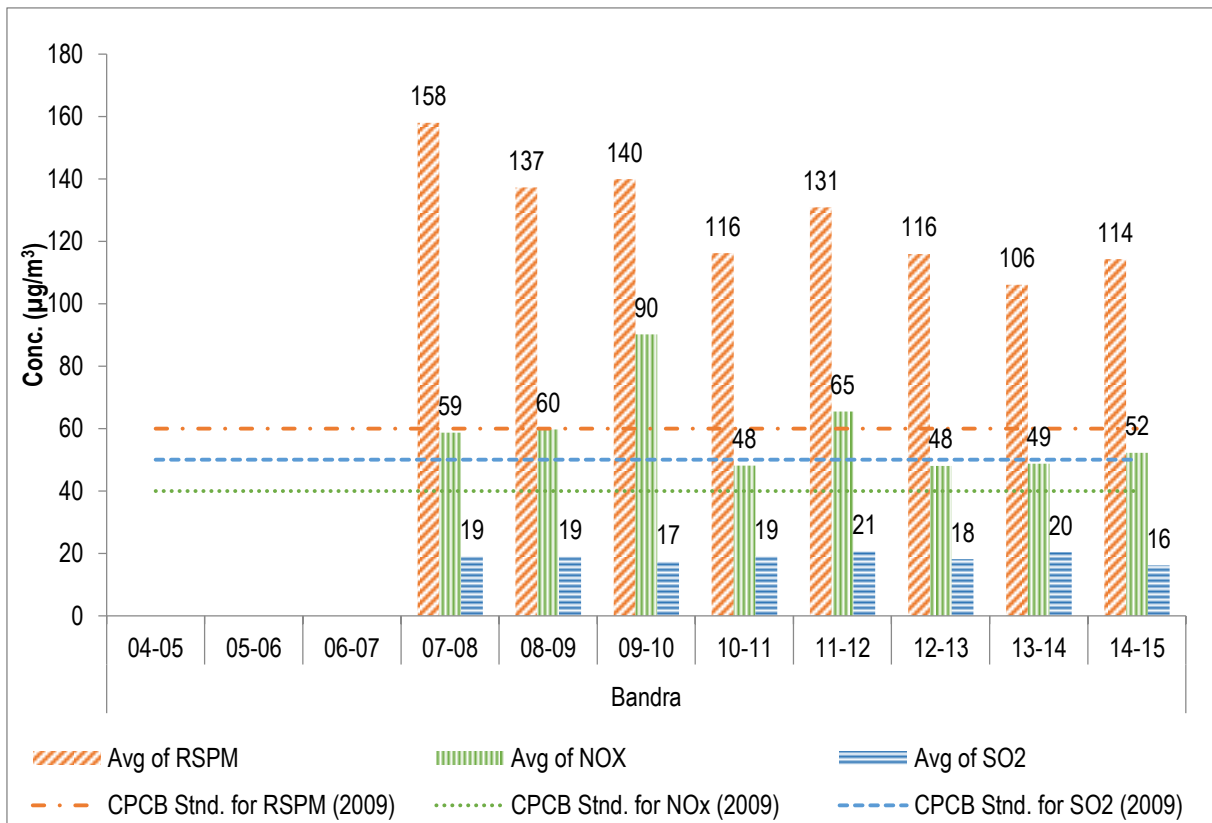
Figure No. 106: Annual average trend of SO₂, NOₓ, and RSPM at Bandra

Mumbai - Sion

Table No. 107: Data for monthly average reading recorded at Sion

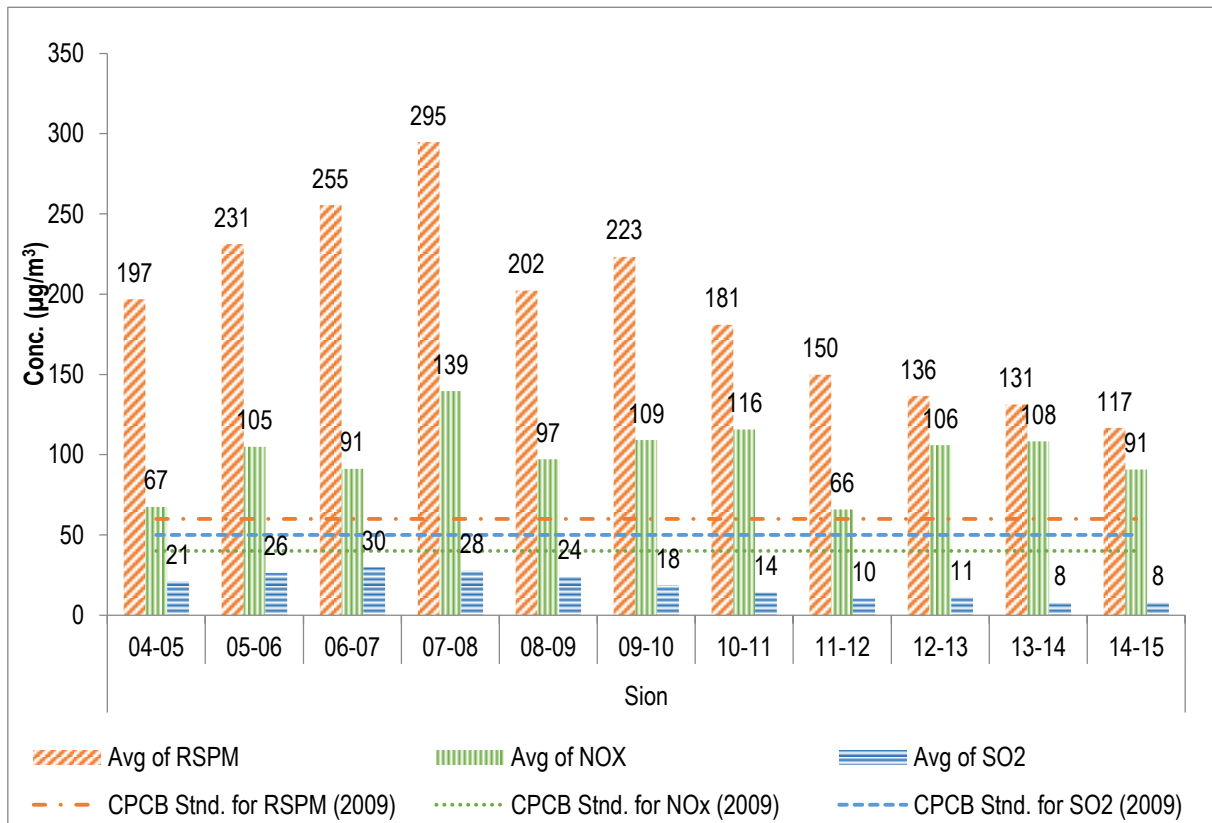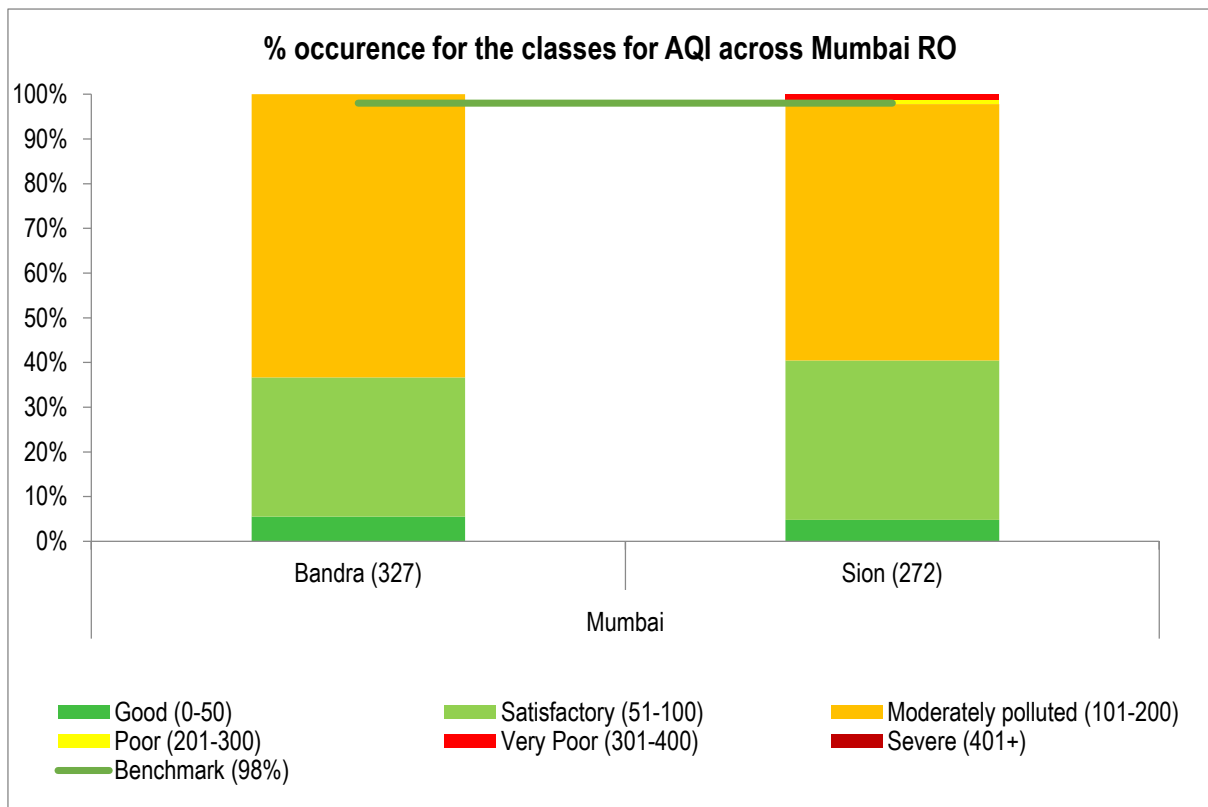| FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NO$_X$	SO$_2$
Apr	22	160	66	12
May	24	124	50	7
Jun	23	145	62	6
Jul	24	69	73	4
Aug	23	76	77	4
Sep	20	97	88	5
Oct	22	89	98	6
Nov	23	106	99	6
Dec	27	133	138	17
Jan	21	134	126	13
Feb	23	142	103	9
Mar	20	124	108	8
	272	59.6	51.1	0.4

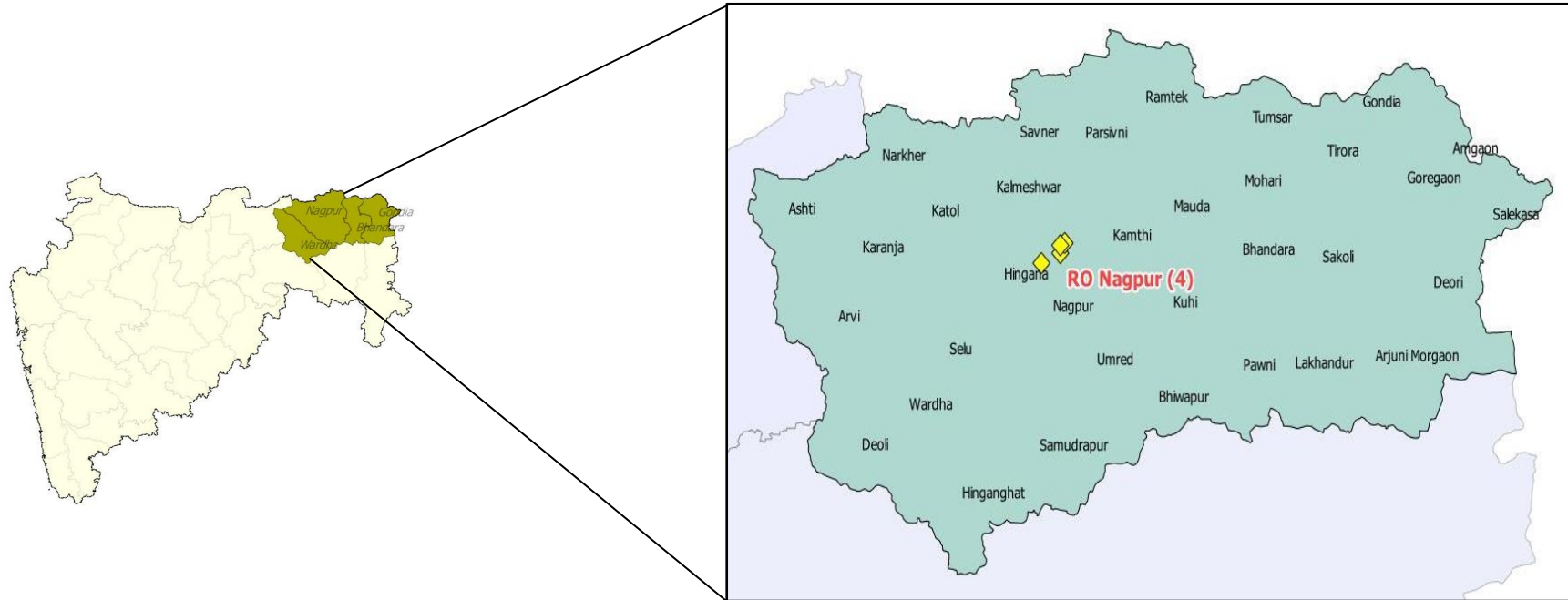**Figure No. 107: Monthly average reading recorded at Sion**

Table No. 108: Data for annual average trend of SO$_2$, NO$_x$, and RSPM at Sion

Year	N	Annual average (µg/m³)		
		RSPM	NO$_X$	SO$_2$
04-05		197	67	21
05-06	317	231	105	26
06-07	276	255	91	30
07-08	288	295	139	28
08-09	84	202	97	24
09-10	236	223	109	18
10-11	259	181	116	14
11-12	200	150	66	10
12-13	245	136	106	11
13-14	280	131	108	8
14-15	272	117	91	8

Figure No. 108: Annual average trend of SO$_2$, NO$_x$, and RSPM at Sion

Maharashtra Pollution Control Board
महाराष्ट्र प्रदूषण नियंत्रण मंडळ

% occurence for the classes for AQI across Mumbai RO

Legend:
- Good (0-50)
- Satisfactory (51-100)
- Moderately polluted (101-200)
- Poor (201-300)
- Very Poor (301-400)
- Severe (401+)
- Benchmark (98%)

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 – IOE North Ambazari road

Table No. 109: Data for monthly average reading recorded at IOE North Ambazari road

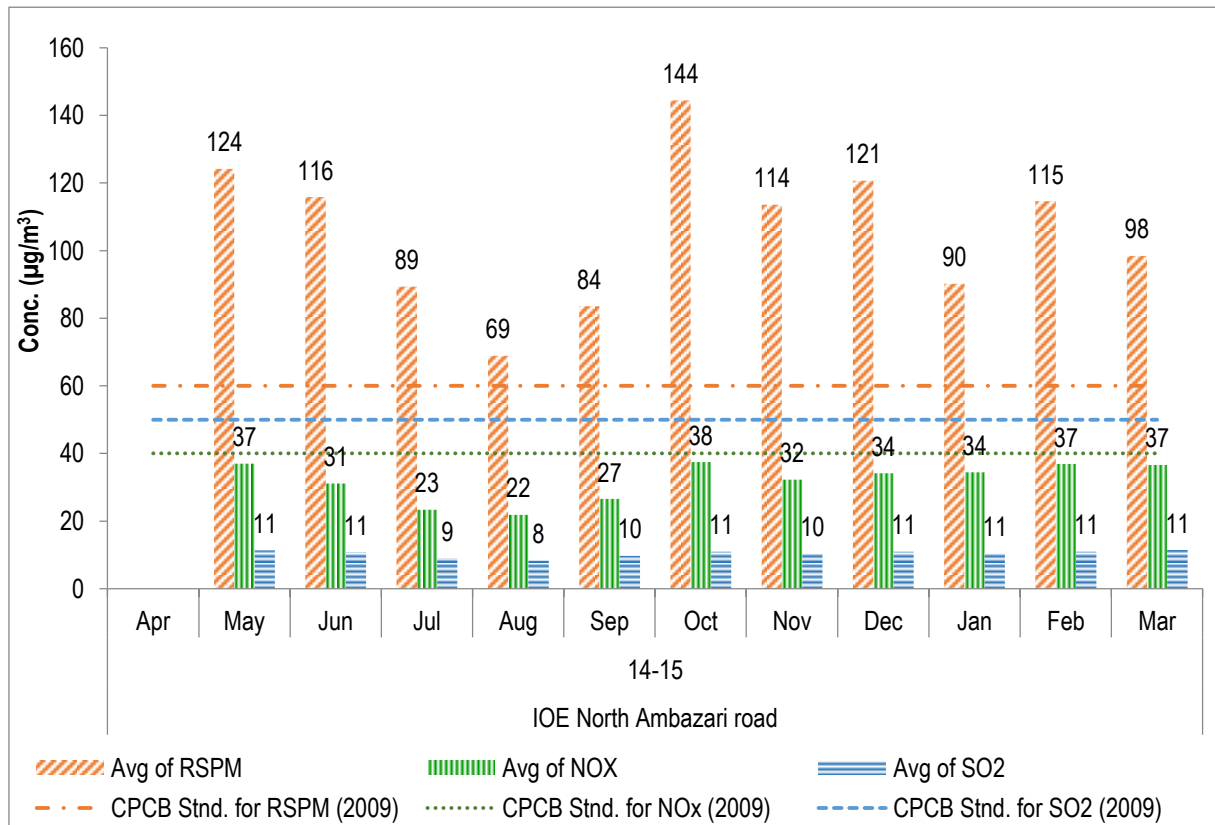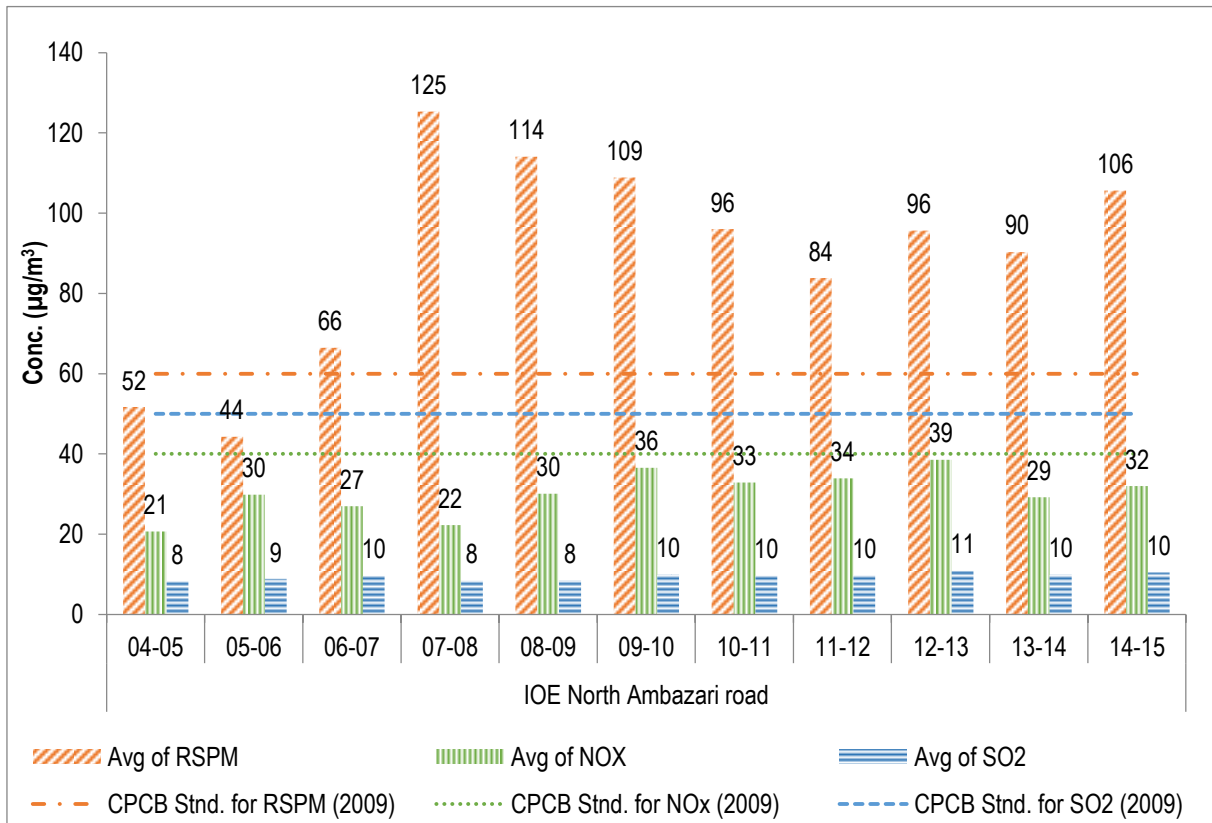| FY 2014-15	N	Monthly average (µg/m³)		
		RSPM	NO$_X$	SO$_2$
Apr				
May	9	124	37	11
Jun	8	116	31	11
Jul	8	89	23	9
Aug	10	69	22	8
Sep	9	84	27	10
Oct	10	144	38	11
Nov	10	114	32	10
Dec	7	121	34	11
Jan	9	90	34	11
Feb	8	115	37	11
Mar	9	98	37	11
	97	51.5	0.0	0.0

Figure No. 109: Monthly average reading recorded at IOE North Ambazari road

Table No. 110: Data for annual average trend of SO$_2$, NO$_x$, and RSPM at IOE North Ambazari road

Year	N	Annual average ($\mu g/m^3$)		
		RSPM	NO$_X$	SO$_2$
04-05				
05-06	66	44	30	9
06-07	85	66	27	10
07-08	95	125	22	8
08-09	99	114	30	8
09-10	107	109	36	10
10-11	101	96	33	10
11-12	99	84	34	10
12-13	105	96	39	11
13-14	87	90	29	10
14-15	97	106	32	10

Figure No. 110: Annual average trend of SO$_2$, NO$_x$, and RSPM at IOE North Ambazari road

Maharashtra Pollution Control Board
महाराष्ट्र प्रदूषण नियंत्रण मंडळ

Nagpur – MIDC Office, Hingna Road

Table No. 111: Data for monthly average reading recorded at MIDC Office, Hingna Road

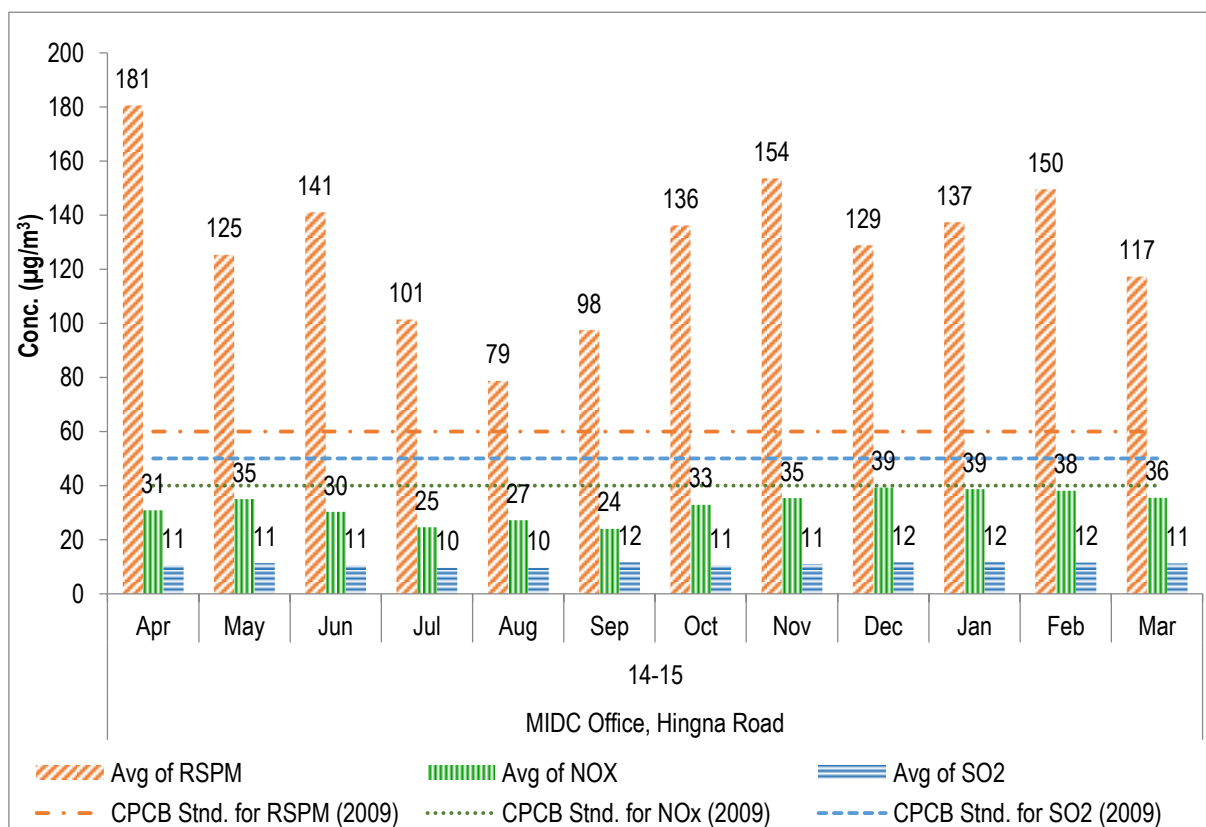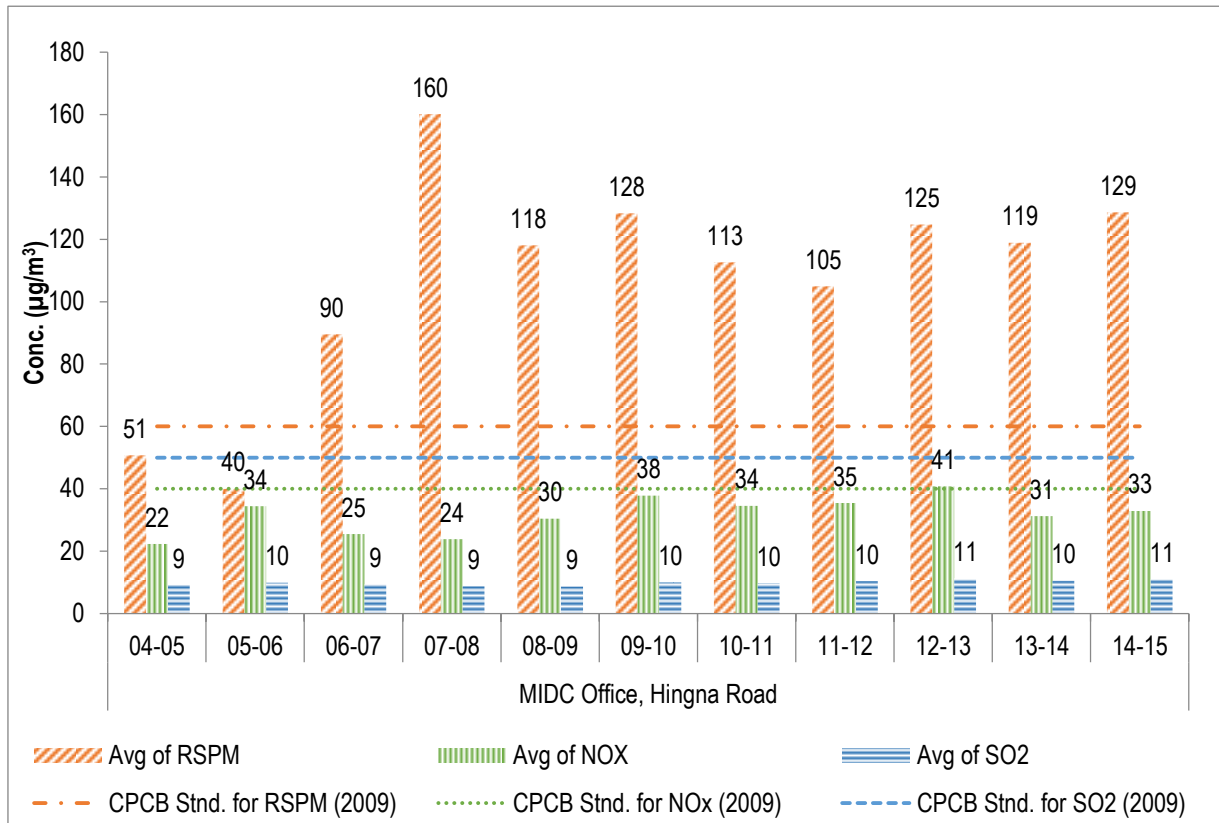| FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NOₓ	SO₂
Apr	9	181	31	11
May	9	125	35	11
Jun	8	141	30	11
Jul	8	101	25	10
Aug	10	79	27	10
Sep	8	98	24	12
Oct	9	136	33	11
Nov	8	154	35	11
Dec	12	129	39	12
Jan	9	137	39	12
Feb	8	150	38	12
Mar	8	117	36	11
	106	64.2	0.0	0.0

Figure No. 111: Monthly average reading recorded at MIDC Office, Hingna Road

Table No. 112: Data for annual average trend of SO₂, NOₓ, and RSPM at MIDC Office, Hingna Road

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05		51	22	9
05-06	81	40	34	10
06-07	78	90	25	9
07-08	92	160	24	9
08-09	96	118	30	9
09-10	104	128	38	10
10-11	95	113	34	10
11-12	99	105	35	10
12-13	100	125	41	11
13-14	87	119	31	10
14-15	106	129	33	11

Figure No. 112: Annual average trend of SO₂, NOₓ, and RSPM at MIDC Office, Hingna Road

Nagpur – Govt Polytechnic Col, Sadar

Table No. 113: Data for monthly average reading recorded at Govt Polytechnic Col, Sadar

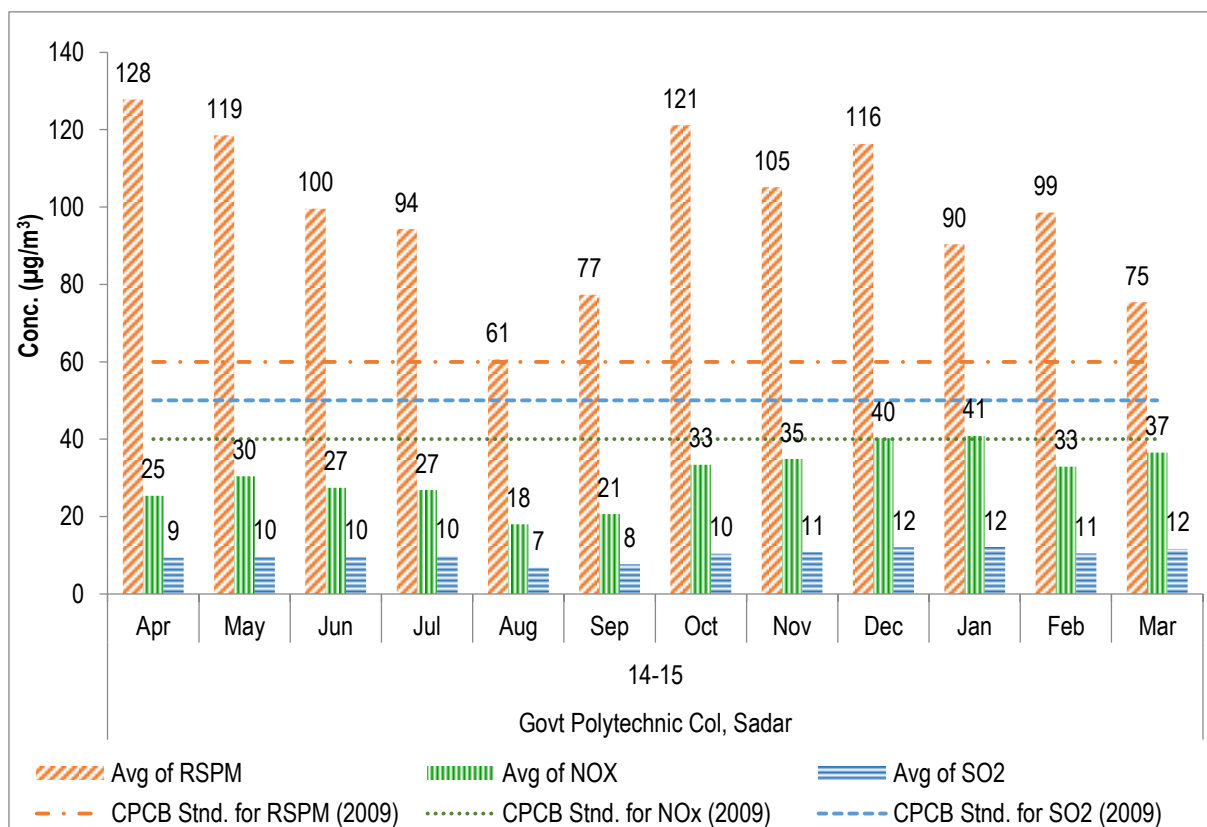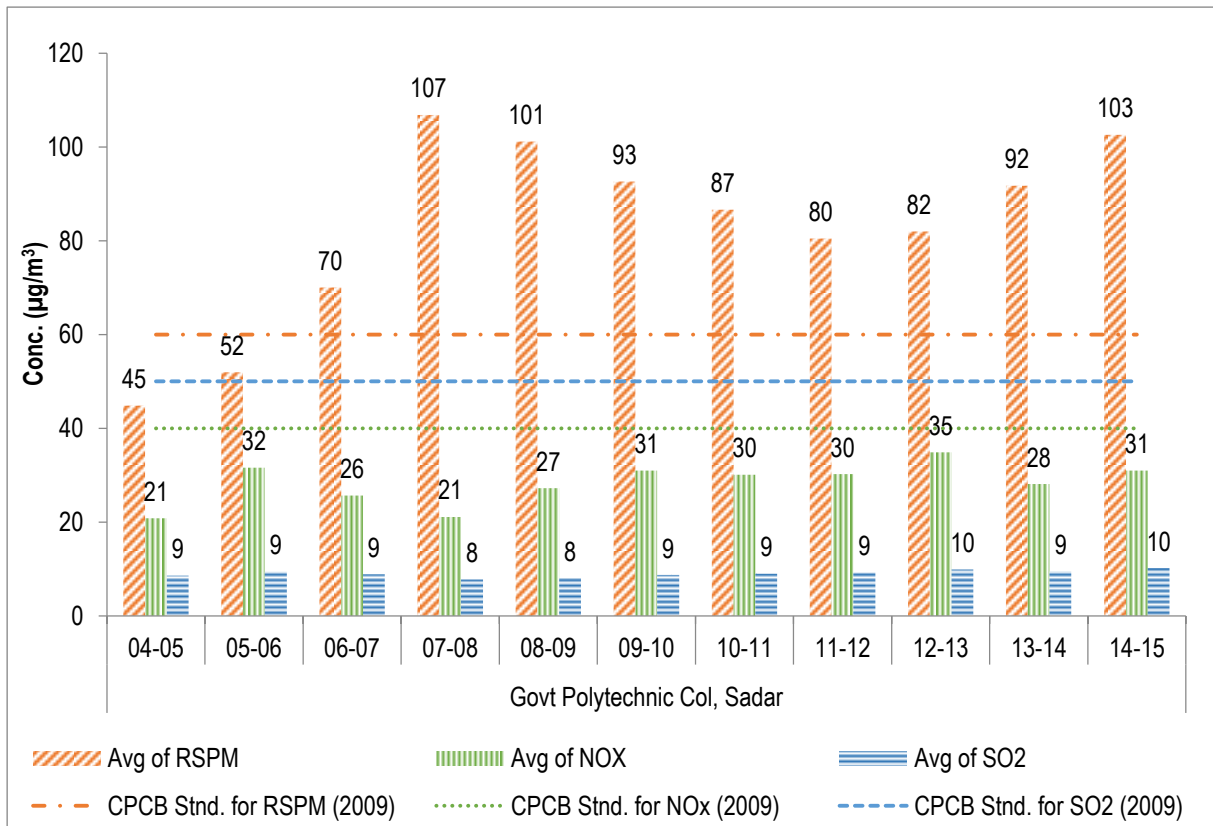| FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NOx	SO₂
Apr	17	128	25	9
May	9	119	30	10
Jun	8	100	27	10
Jul	7	94	27	10
Aug	6	61	18	7
Sep	9	77	21	8
Oct	10	121	33	10
Nov	9	105	35	11
Dec	12	116	40	12
Jan	9	90	41	12
Feb	8	99	33	11
Mar	9	75	37	12
	113	48.7	0.0	0.0

Figure No. 113: Monthly average reading recorded at Govt Polytechnic Col, Sadar

Table No. 114: Data for annual average trend of SO₂, NOₓ, and RSPM at Govt Polytechnic Col, Sadar

Year	N	Annual average (µg/m³)		
		RSPM	NOX	SO₂
04-05		45	21	9
05-06	76	52	32	9
06-07	84	70	26	9
07-08	93	107	21	8
08-09	81	101	27	8
09-10	102	93	31	9
10-11	102	87	30	9
11-12	113	80	30	9
12-13	103	82	35	10
13-14	88	92	28	9
14-15	113	103	31	10

Figure No. 114: Annual average trend of SO₂, NOₓ, and RSPM at Govt Polytechnic Col, Sadar

Maharashtra Pollution Control Board
महाराष्ट्र प्रदूषण नियंत्रण मंडळ

Nagpur – Nagpur Civil Lines

Table No. 115: Data for monthly average reading recorded at Civil Lines Nagpur

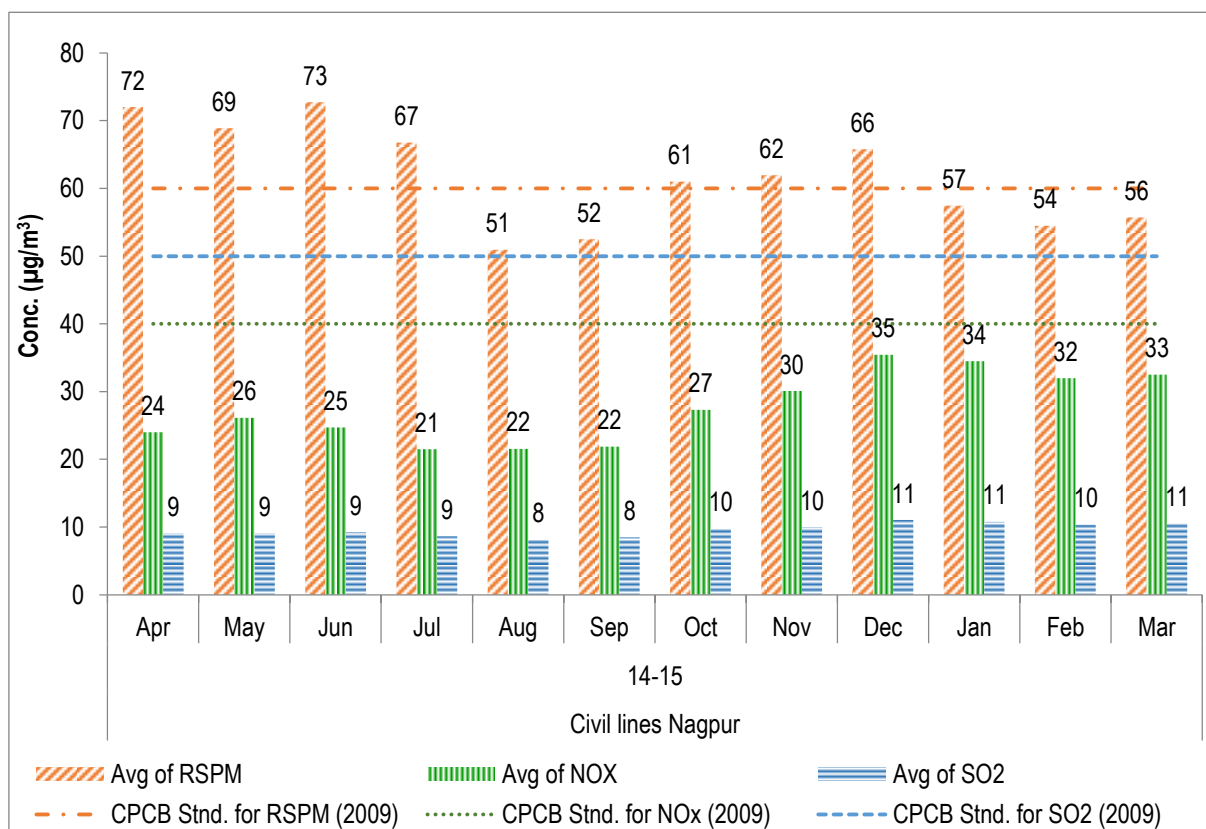| FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NOX	SO2
Apr	23	72	24	9
May	26	69	26	9
Jun	23	73	25	9
Jul	23	67	21	9
Aug	27	51	22	8
Sep	25	52	22	8
Oct	25	61	27	10
Nov	26	62	30	10
Dec	25	66	35	11
Jan	26	57	34	11
Feb	24	54	32	10
Mar	22	56	33	11
	295	0.7	0.0	0.0

Figure No. 115: Monthly average reading recorded at Civil Lines Nagpur

Table No. 116: Data for annual average trend of SO₂, NOₓ, and RSPM at Civil Lines Nagpur

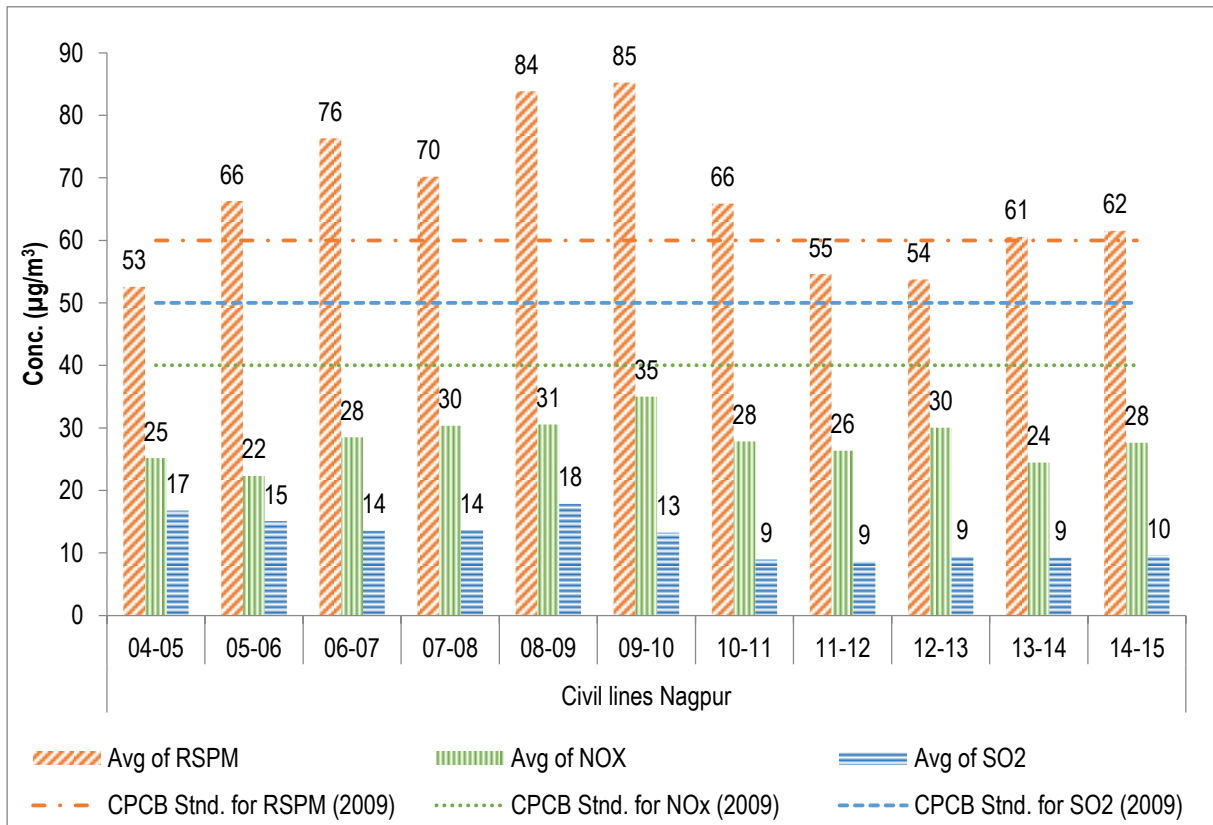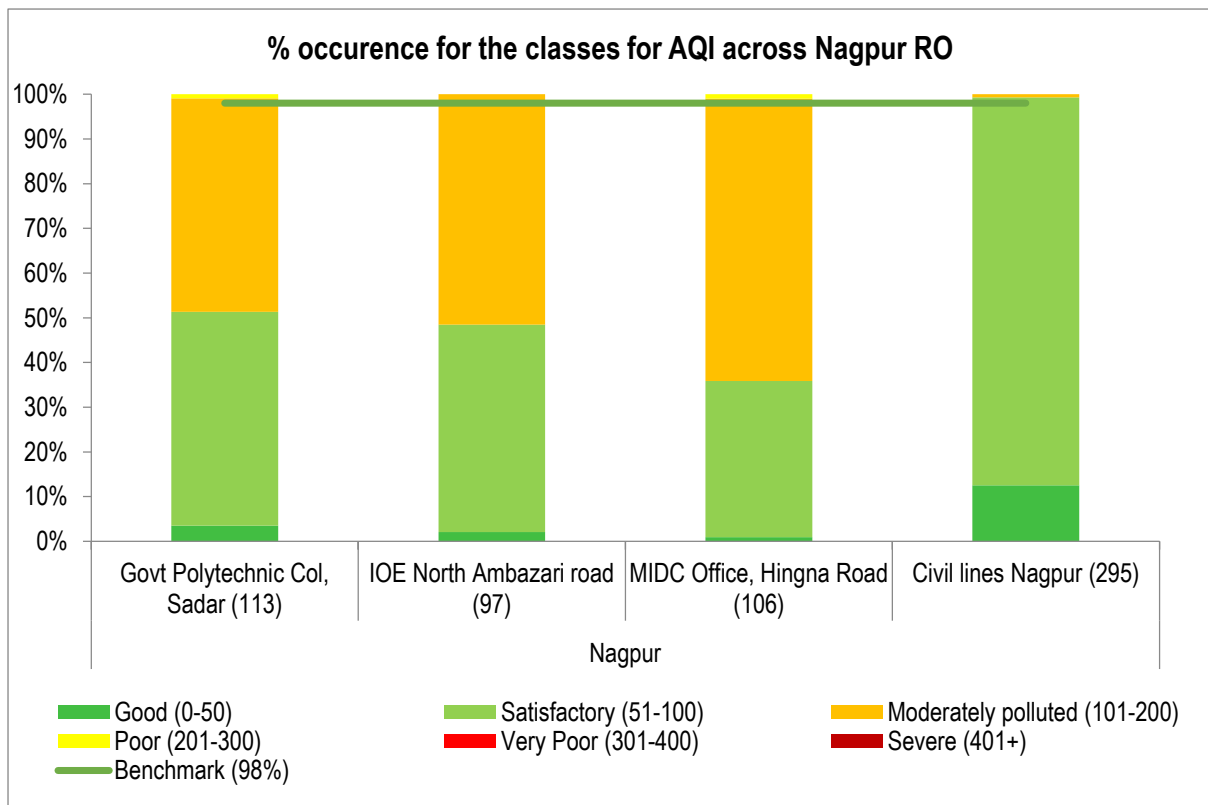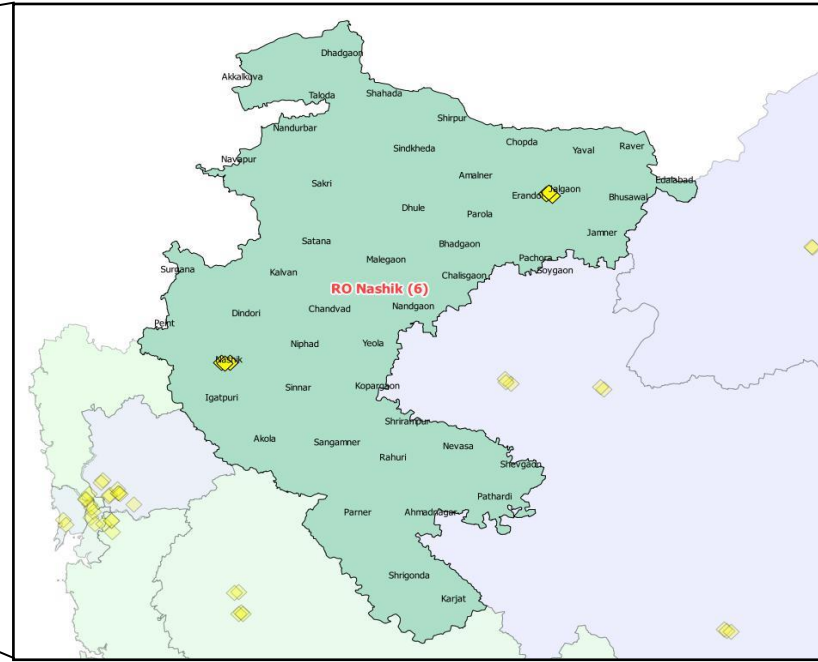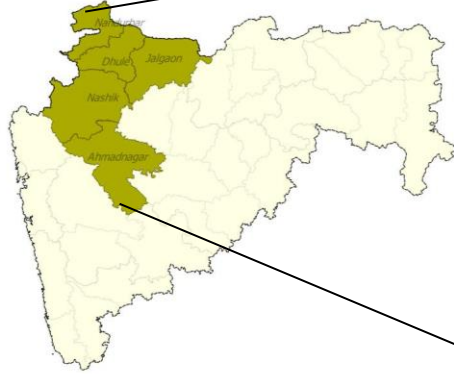| Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05		53	25	17
05-06	313	66	22	15
06-07	277	76	28	14
07-08	286	70	30	14
08-09	280	84	31	18
09-10	269	85	35	13
10-11	273	66	28	9
11-12	243	55	26	9
12-13	258	54	30	9
13-14	289	61	24	9
14-15	295	62	28	10

Figure No. 116: Annual average trend of SO₂, NOₓ, and RSPM at Civil Lines Nagpur

% occurence for the classes for AQI across Nagpur RO

Legend:
- Good (0-50)
- Satisfactory (51-100)
- Moderately polluted (101-200)
- Poor (201-300)
- Very Poor (301-400)
- Severe (401+)
- Benchmark (98%)

Nagpur: Govt Polytechnic Col, Sadar (113); IOE North Ambazari road (97); MIDC Office, Hingna Road (106); Civil lines Nagpur (295)

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

Jalgaon – Old B. J. Market

Table No. 117: Data for monthly average reading recorded at Old B. J. Market

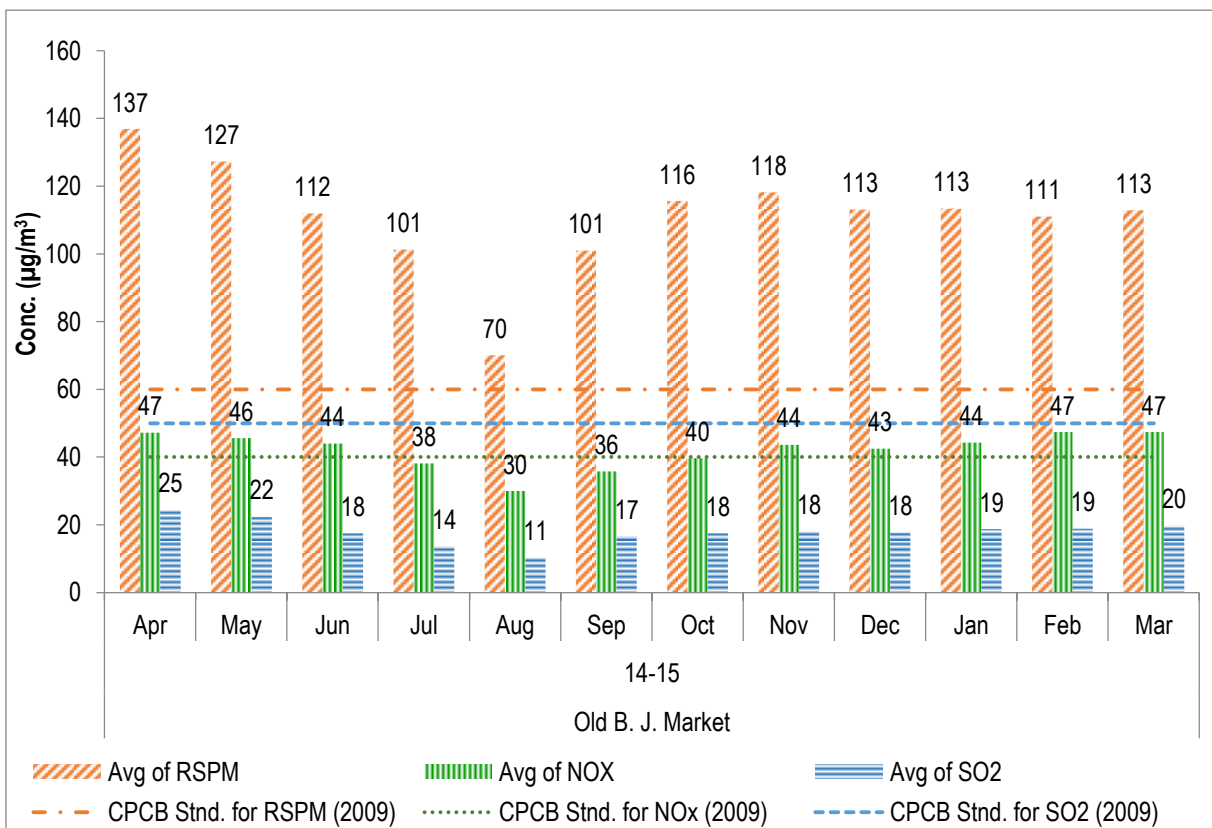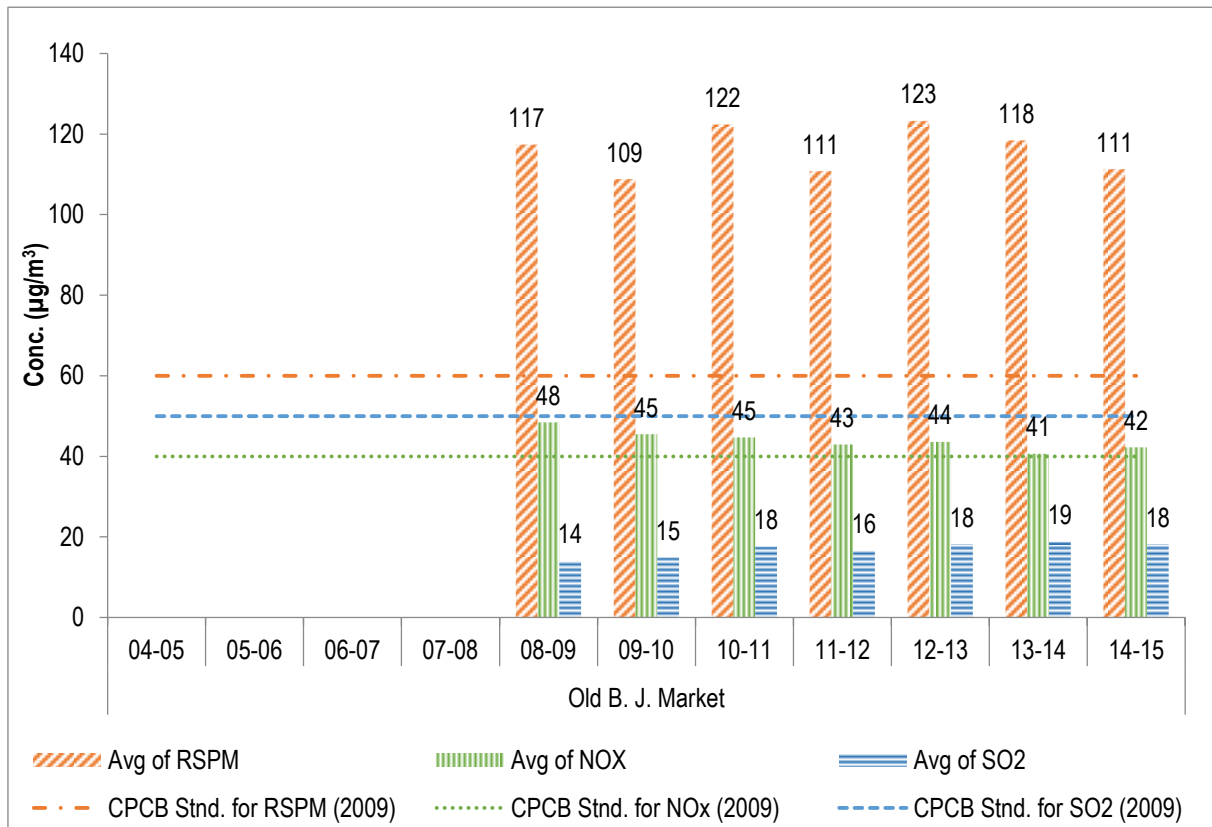| FY 2014-15	N	Monthly average (μg/m³)		
		RSPM	NO$_X$	SO$_2$
Apr	9	137	47	25
May	8	127	46	22
Jun	9	112	44	18
Jul	9	101	38	14
Aug	8	70	30	11
Sep	9	101	36	17
Oct	8	116	40	18
Nov	8	118	44	18
Dec	10	113	43	18
Jan	8	113	44	19
Feb	8	111	47	19
Mar	10	113	47	20
	104	84.6	0.0	0.0

Figure No. 117: Monthly average reading recorded at - Old B. J. Market

Table No. 118: Data for annual average trend of SO₂, NOₓ, and RSPM at Old B. J. Market

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07				
07-08				
08-09	31	117	48	14
09-10	104	109	45	15
10-11	95	122	45	18
11-12	96	111	43	16
12-13	100	123	44	18
13-14	97	118	41	19
14-15	104	111	42	18

Figure No. 118: Annual average trend of SO₂, NOₓ, and RSPM at - Old B. J. Market

Jalgaon – Girna Water Tank

Table No. 119: Data for monthly average reading recorded at Girna Water Tank

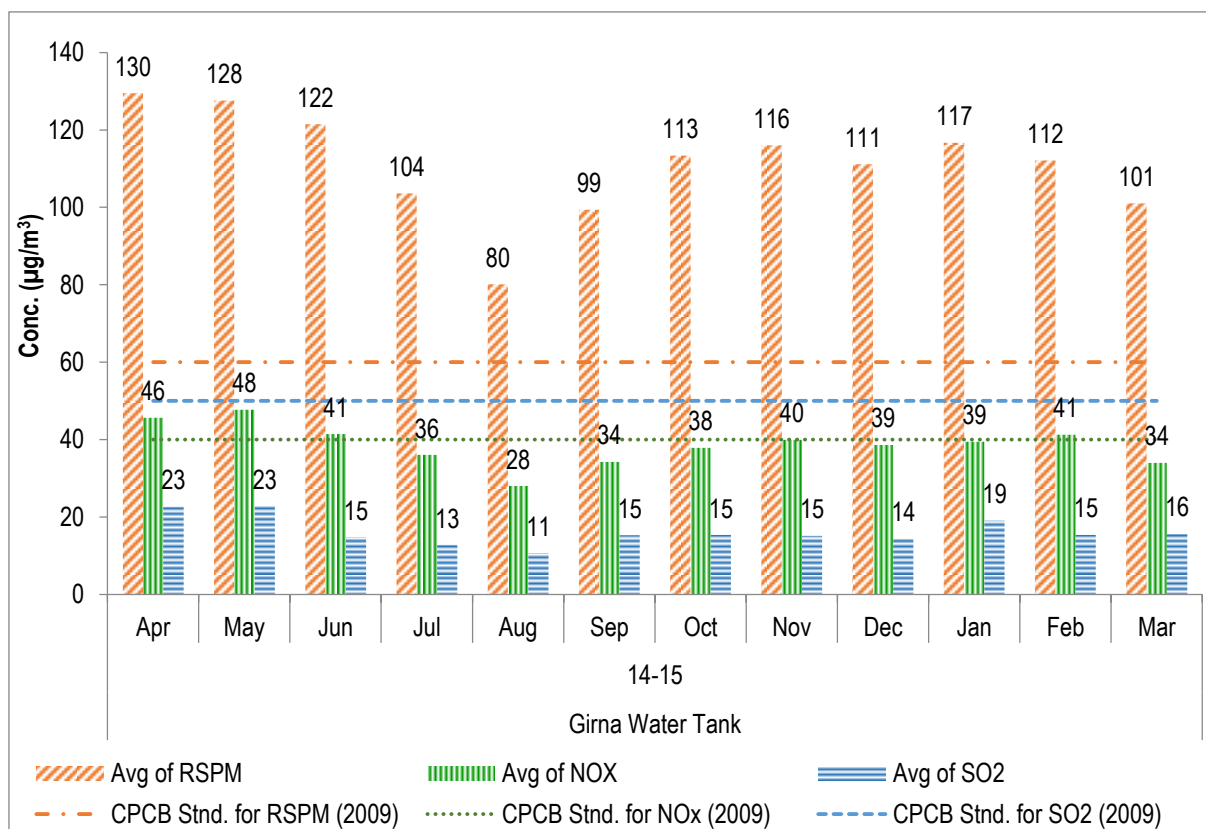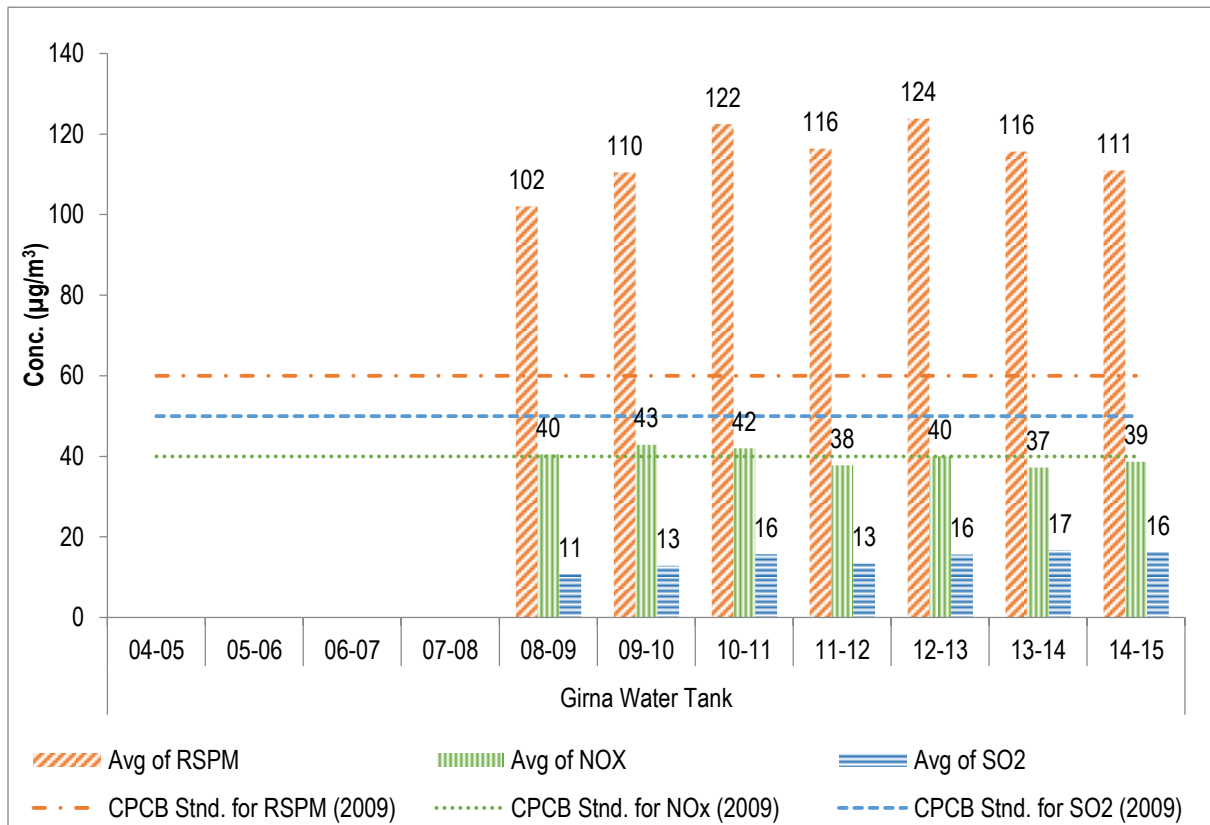| FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NOₓ	SO₂
Apr	8	130	46	23
May	10	128	48	23
Jun	8	122	41	15
Jul	8	104	36	13
Aug	10	80	28	11
Sep	8	99	34	15
Oct	9	113	38	15
Nov	9	116	40	15
Dec	8	111	39	14
Jan	10	117	39	19
Feb	8	112	41	15
Mar	8	101	34	16
	104	81.7	0.0	0.0

Figure No. 119: Monthly average reading recorded at Girna Water Tank

Table No. 120: Data for annual average trend of SO₂, NOₓ, and RSPM at - Girna Water Tank

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07				
07-08				
08-09	36	102	40	11
09-10	104	110	43	13
10-11	103	122	42	16
11-12	94	116	38	13
12-13	100	124	40	16
13-14	96	116	37	17
14-15	104	111	39	16

Figure No. 120: Annual average trend of SO₂, NOₓ, and RSPM at Girna Water Tank

Maharashtra Pollution Control Board
महाराष्ट्र प्रदूषण नियंत्रण मंडळ

Jalgaon – MIDC Jalgaon

Table No. 121: Data for monthly average reading recorded at MIDC Jalgaon

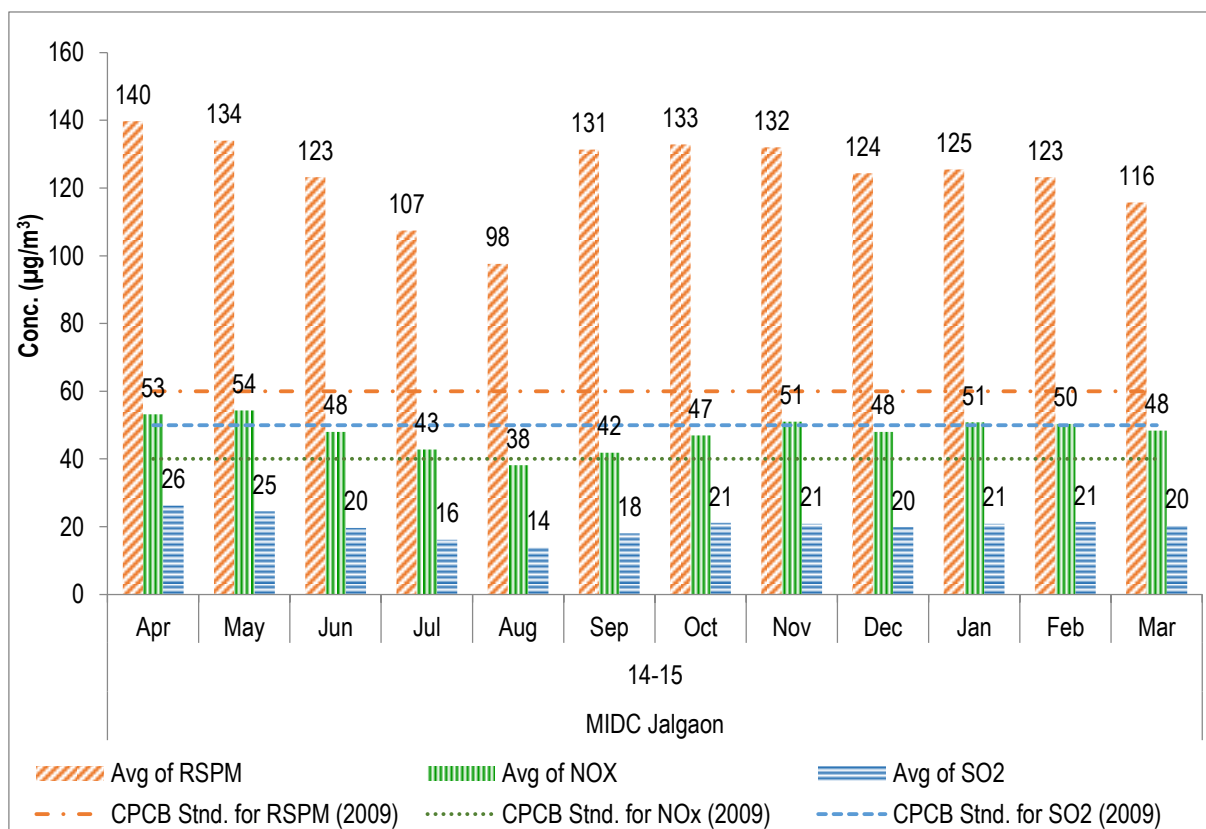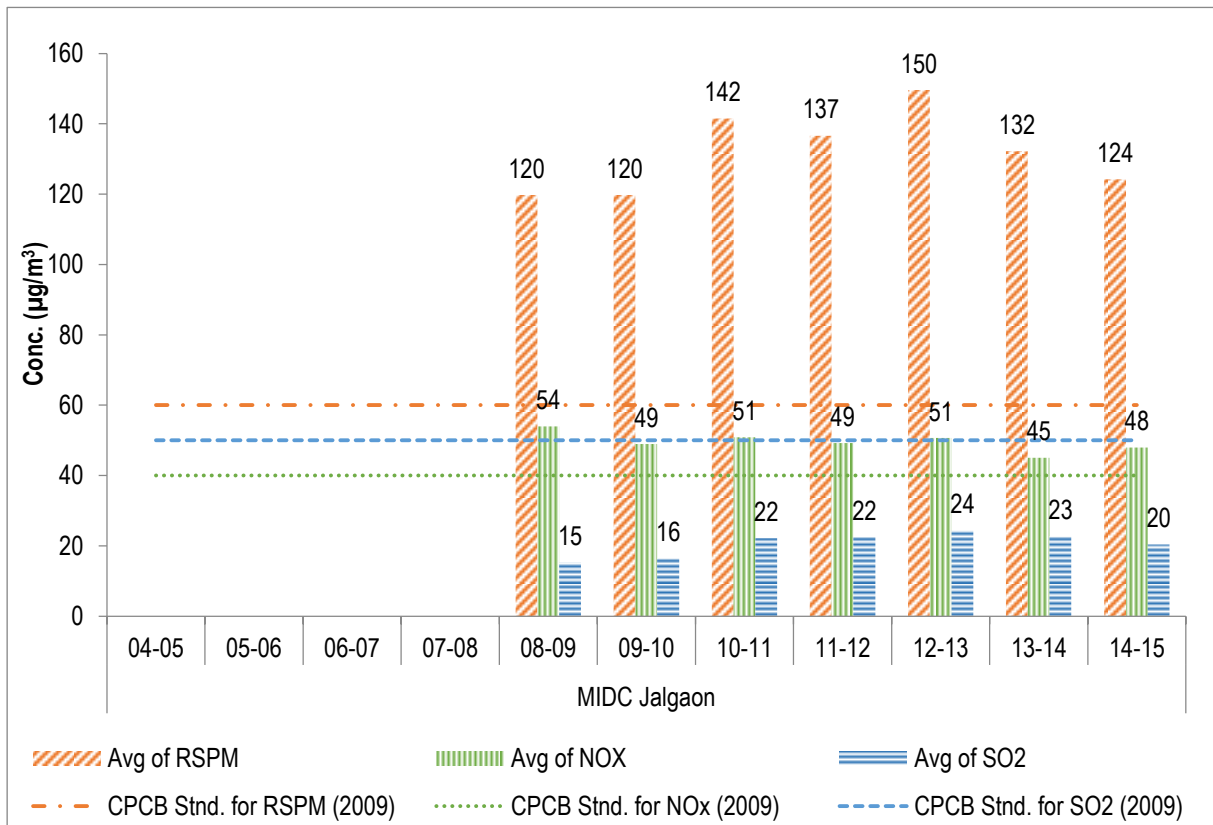| FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NOX	SO2
Apr	9	140	53	26
May	9	134	54	25
Jun	8	123	48	20
Jul	9	107	43	16
Aug	8	98	38	14
Sep	8	131	42	18
Oct	10	133	47	21
Nov	8	132	51	21
Dec	9	124	48	20
Jan	9	125	51	21
Feb	8	123	50	21
Mar	8	116	48	20
	103	93.2	0.0	0.0

Figure No. 121: Monthly average reading recorded at MIDC Jalgaon

Table No. 122: Annual average trend of SO₂, NOₓ, and RSPM at MIDC Jalgaon

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07				
07-08				
08-09	24	120	54	15
09-10	97	120	49	16
10-11	105	142	51	22
11-12	92	137	49	22
12-13	101	150	51	24
13-14	95	132	45	23
14-15	103	124	48	20

Figure No. 122: Annual average trend of SO₂, NOₓ, and RSPM at MIDC Jalgaon

Nashik - RTO Colony

Table No. 123: Data for monthly average reading recorded at RTO Colony

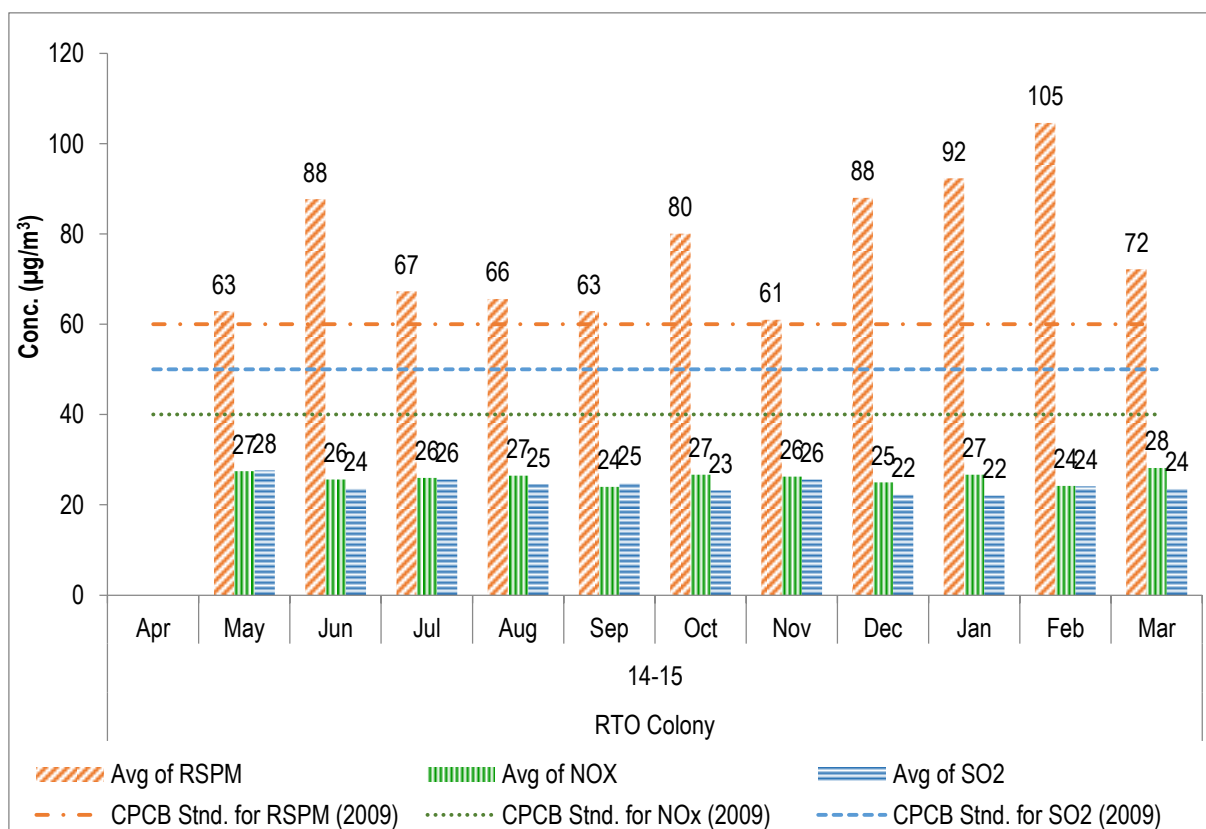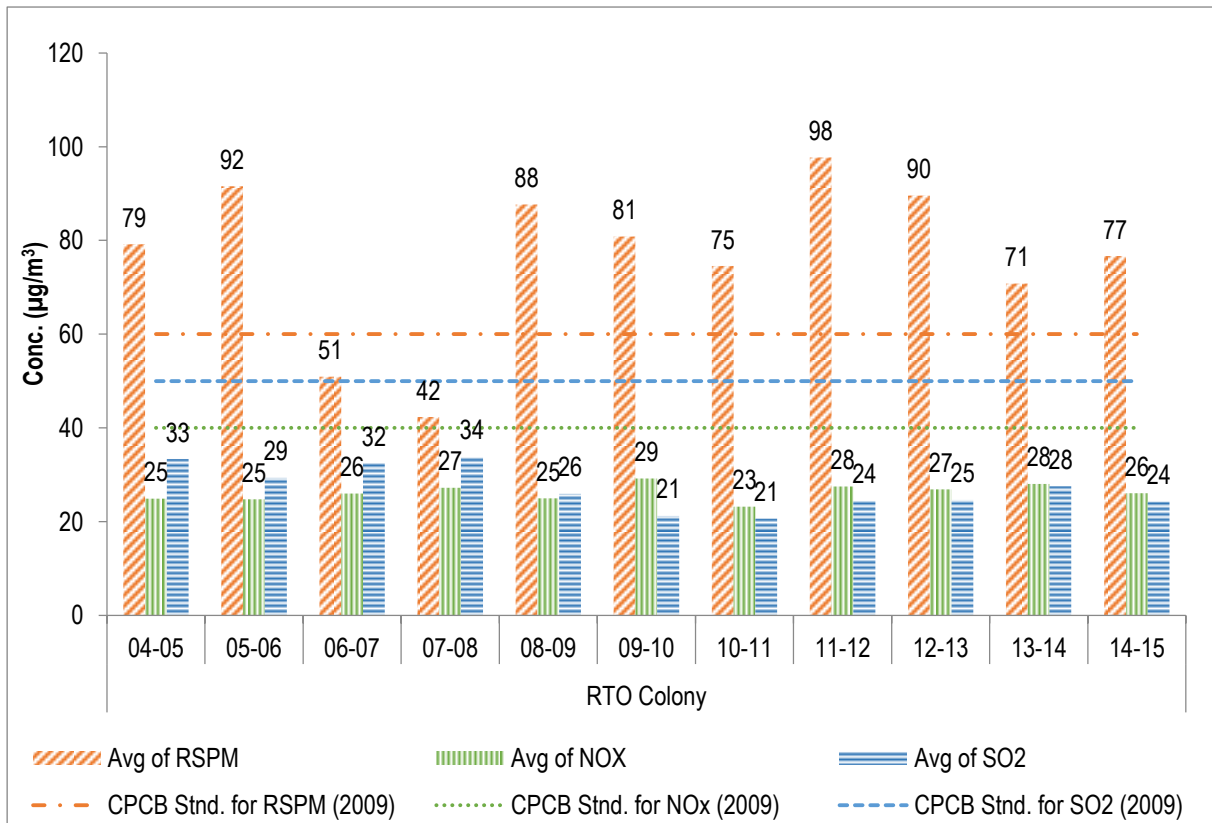| FY 2014-15	N	Monthly average (µg/m³)		
		RSPM	NOₓ	SO₂
Apr				
May	9	63	27	28
Jun	8	88	26	24
Jul	9	67	26	26
Aug	8	66	27	25
Sep	9	63	24	25
Oct	9	80	27	23
Nov	8	61	26	26
Dec	9	88	25	22
Jan	9	92	27	22
Feb	8	105	24	24
Mar	9	72	28	24
	95	15.8	0.0	0.0

Figure No. 123: Monthly average reading recorded at RTO Colony

Table No. 124: Data for annual average trend of SO₂, NOₓ, and RSPM at RTO Colony

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05		79	33	25
05-06	69	92	25	29
06-07	86	51	26	32
07-08	94	42	27	34
08-09	104	88	25	26
09-10	94	81	29	21
10-11	104	75	23	21
11-12	105	98	28	24
12-13	113	90	27	25
13-14	96	71	28	28
14-15	95	77	26	24

Figure No. 124: Annual average trend of SO₂, NOₓ, and RSPM at RTO Colony

Nashik – MIDC Satpur - VIP

Table No. 125: Data for monthly average reading recorded at MIDC Satpur - VIP

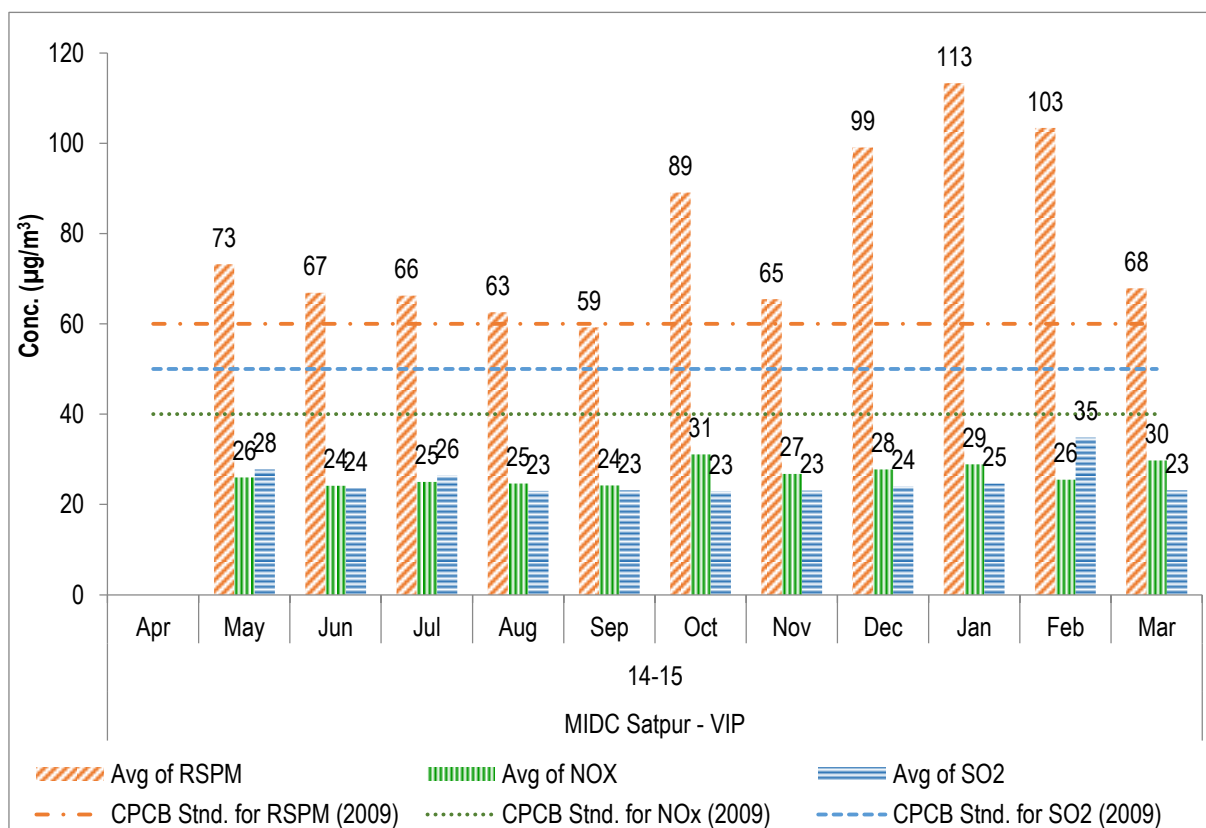| FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NO$_X$	SO$_2$
Apr				
May	9	73	26	28
Jun	8	67	24	24
Jul	9	66	25	26
Aug	9	63	25	23
Sep	8	59	24	23
Oct	9	89	31	23
Nov	9	65	27	23
Dec	9	99	28	24
Jan	9	113	29	25
Feb	8	103	26	35
Mar	8	68	30	23
	95	14.7	0.0	1.1

Figure No. 125: Monthly average reading recorded at MIDC Satpur - VIP

Table No. 126: Data for annual average trend of SO₂, NOₓ, and RSPM at MIDC Satpur – VIP

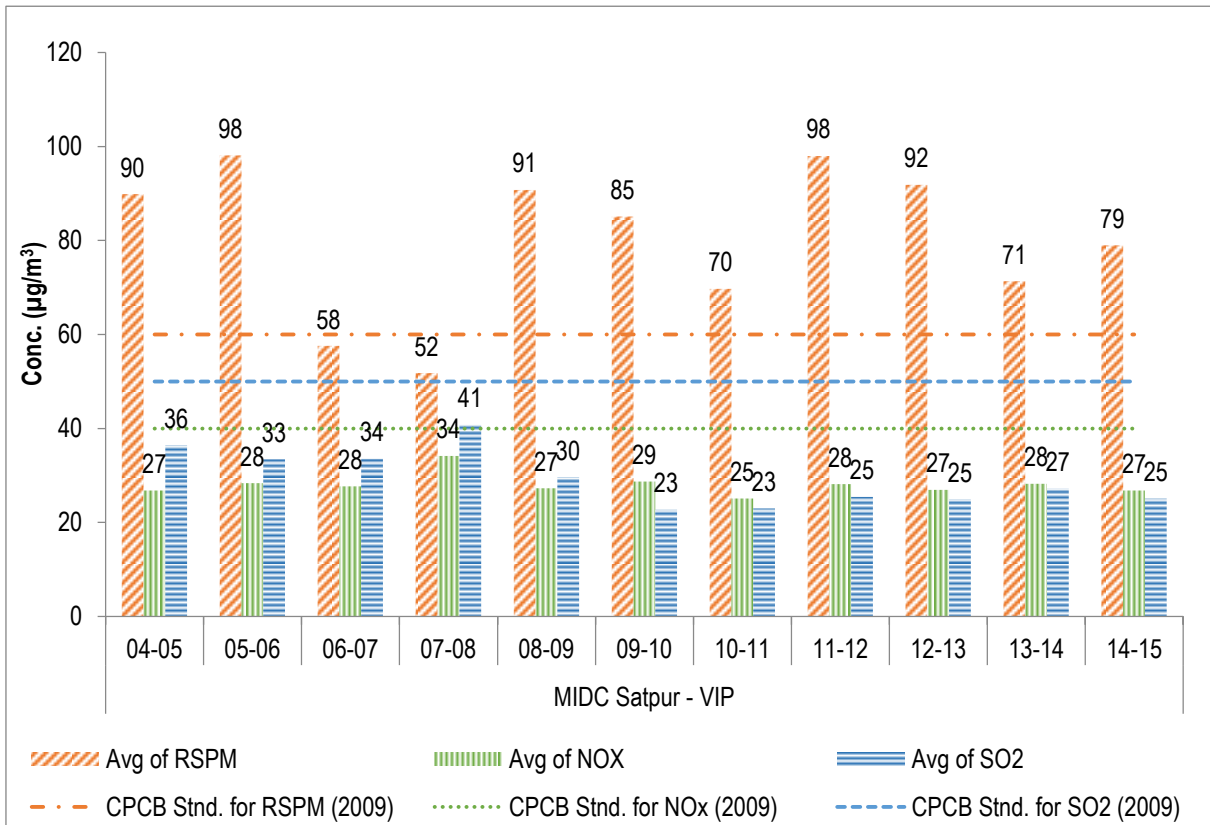| Year	N	Annual average ($\mu g/m^3$)		
		RSPM	NOₓ	SO₂
04-05		90	36	27
05-06	68	98	28	33
06-07	101	58	28	34
07-08	101	52	34	41
08-09	104	91	27	30
09-10	104	85	29	23
10-11	103	70	25	23
11-12	105	98	28	25
12-13	102	92	27	25
13-14	95	71	28	27
14-15	95	79	27	25

Figure No. 126: Annual average trend of SO₂, NOₓ, and RSPM at MIDC Satpur – VIP

Nashik – NMC Nashik

Table No. 127: Data for monthly average reading recorded at NMC Nashik

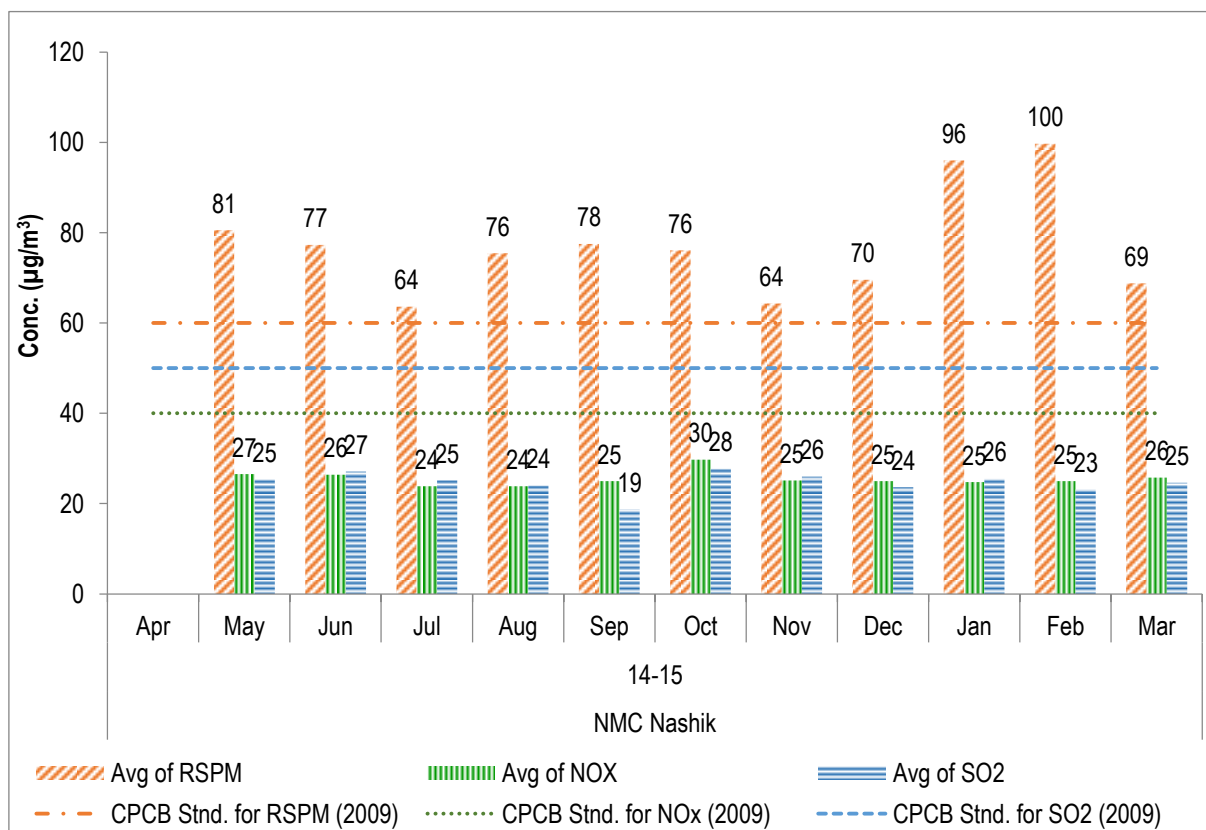| FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NOx	SO2
Apr				
May	9	81	27	25
Jun	9	77	26	27
Jul	9	64	24	25
Aug	8	76	24	24
Sep	9	78	25	19
Oct	9	76	30	28
Nov	8	64	25	26
Dec	9	70	25	24
Jan	8	96	25	26
Feb	8	100	25	23
Mar	9	69	26	25
	95	12.6	0.0	0.0

Figure No. 127: Monthly average reading recorded at NMC Nashik

Maharashtra Pollution Control Board
महाराष्ट्र प्रदूषण नियंत्रण मंडळ

Table No. 128: Data for annual average trend of SO₂, NOₓ, and RSPM at NMC Nashik

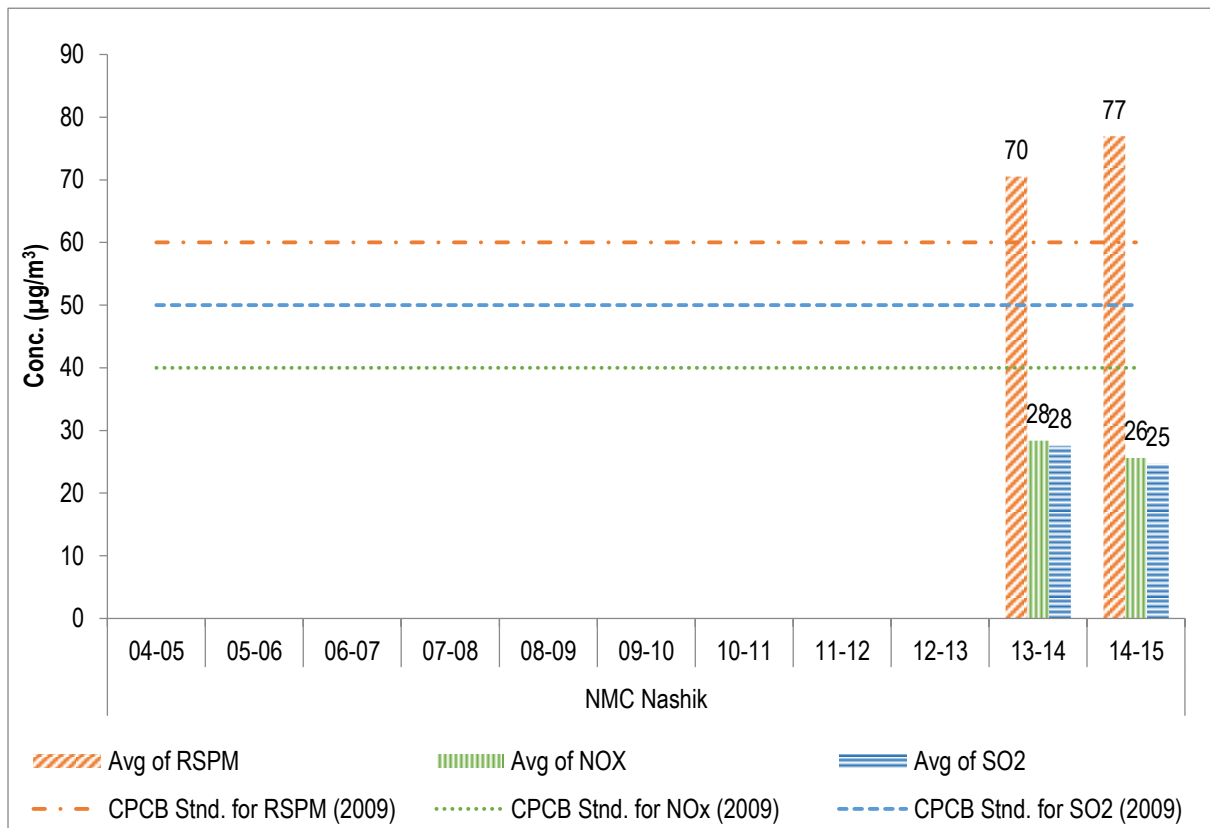| Year	N	Annual average (µg/m³)		
		RSPM	NOX	SO₂
04-05				
05-06				
06-07				
07-08				
08-09				
09-10				
10-11				
11-12				
12-13				
13-14	95	70	28	28
14-15	95	77	26	25

Figure No. 128: Annual average trend of SO₂, NOₓ, and RSPM at NMC Nashik

Nashik - SRO Office Nashik

Table No. 129: Monthly average reading recorded at SRO Office Nashik

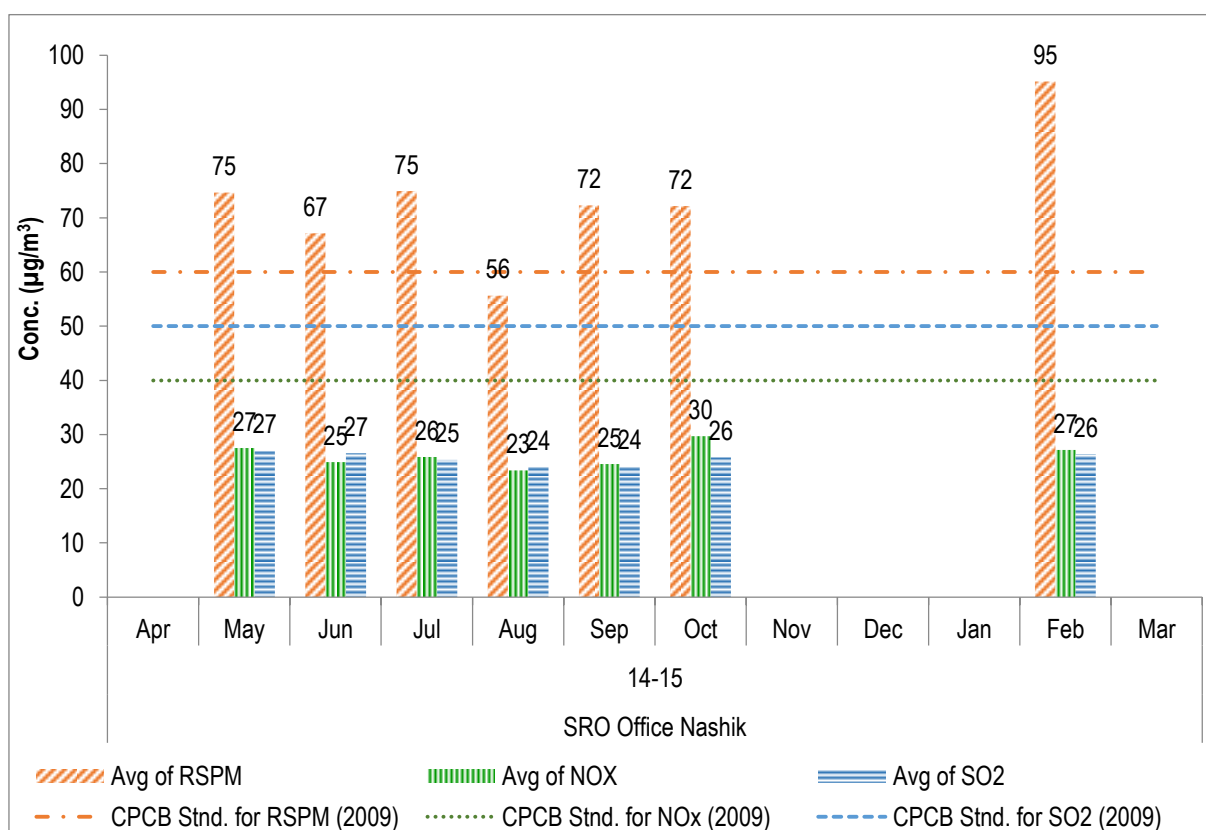| FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NOₓ	SO₂
Apr				
May	27	75	27	27
Jun	25	67	25	27
Jul	18	75	26	25
Aug	25	56	23	24
Sep	26	72	25	24
Oct	27	72	30	26
Nov				
Dec				
Jan				
Feb	24	95	27	26
Mar				
	172	11.0	0.0	0.0

Figure No. 129: Monthly average reading recorded at SRO Office Nashik

Table No. 130: Data for annual average trend of SO₂, NOₓ, and RSPM at SRO Office Nashik

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05		69	31	19
05-06	319	78	27	14
06-07	276	102	27	16
07-08	290	114	26	17
08-09	253	104	29	23
09-10	297	86	27	21
10-11	294	85	23	20
11-12	232	114	28	24
12-13	309	90	27	24
13-14	235	78	28	28
14-15	172	73	26	26
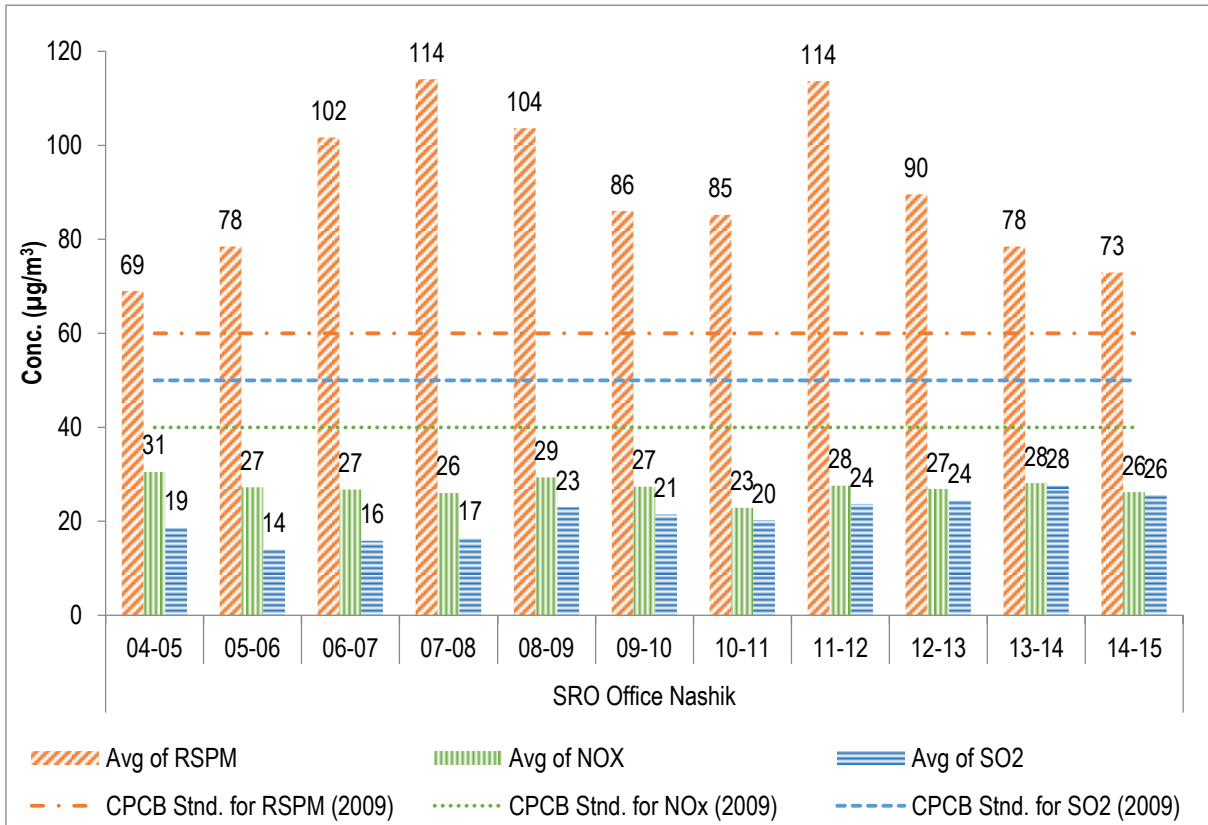
Figure No. 130: Annual average trend of SO₂, NOₓ, and RSPM at SRO Office Nashik

% occurence for the classes for AQI across Nashik RO

Nashik

Legend:
- Good (0-50)
- Satisfactory (51-100)
- Moderately polluted (101-200)
- Poor (201-300)
- Very Poor (301-400)
- Severe (401+)
- Benchmark (98%)
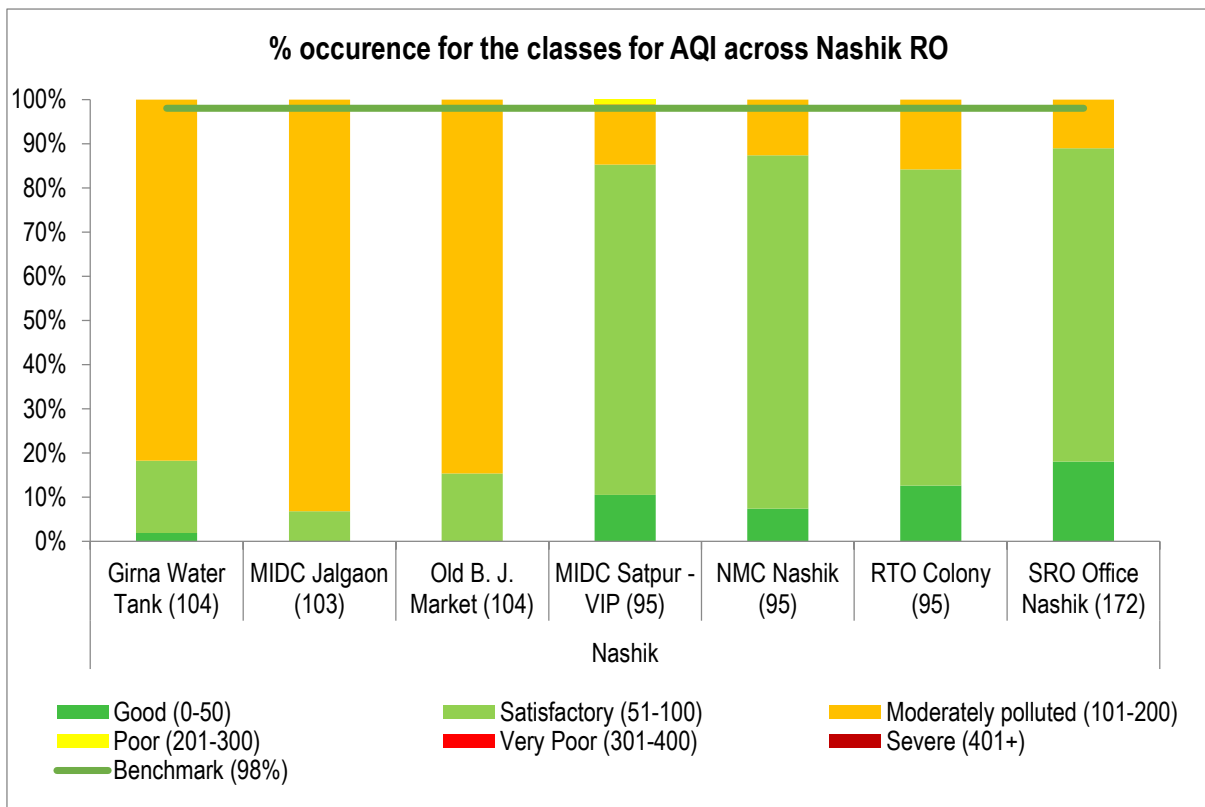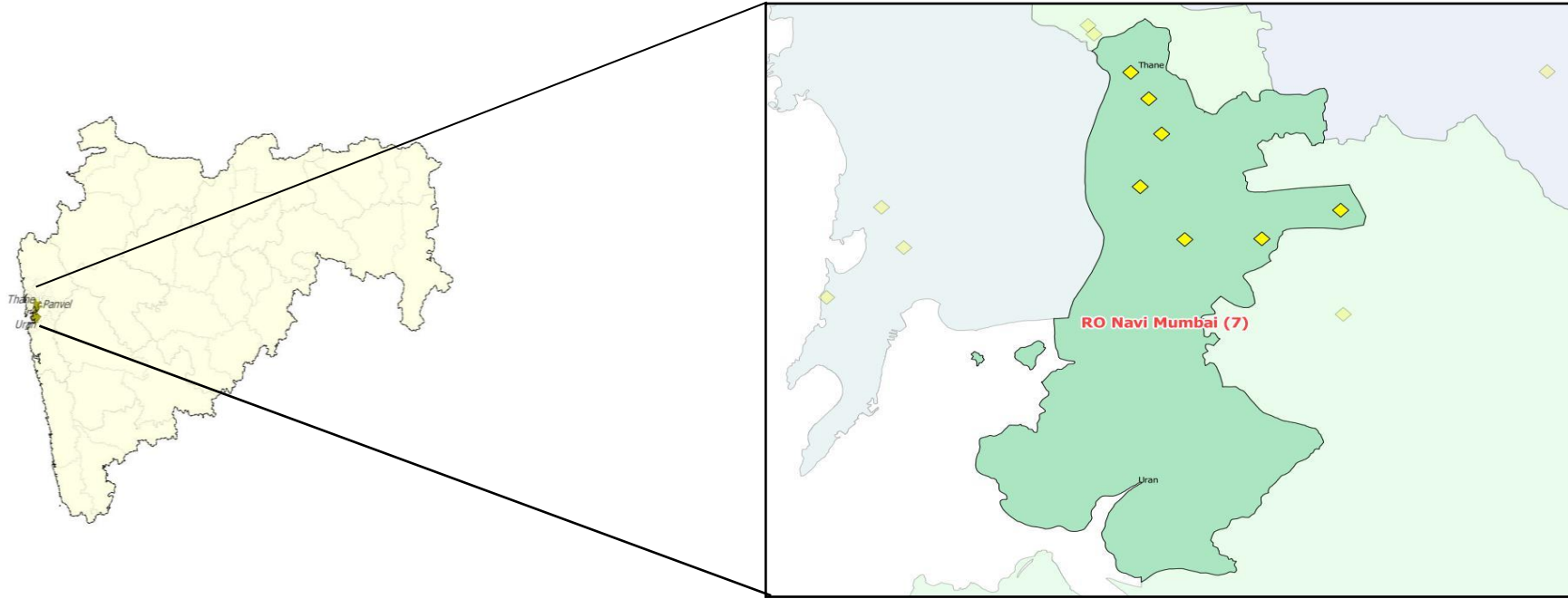
RO – Navi Mumbai

MPCB RO	Region	Station code	Station name	Type	Latitude (deg)	Longitude (deg)
Navi Mumbai	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	493	Mahape, MPCB-Nirmal Bhavan	Industrial	19° 06' 49.0" N	73° 00' 40.1" E
	Navi Mumbai		Airoli	Rural and other areas	19° 09' 21.4" N	72° 59' 35.4" E
	Navi Mumbai		Vashi	Residential	19° 03' 20.4" N	72° 55' 19.5" 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. 131: Data for monthly average reading recorded at Rabale

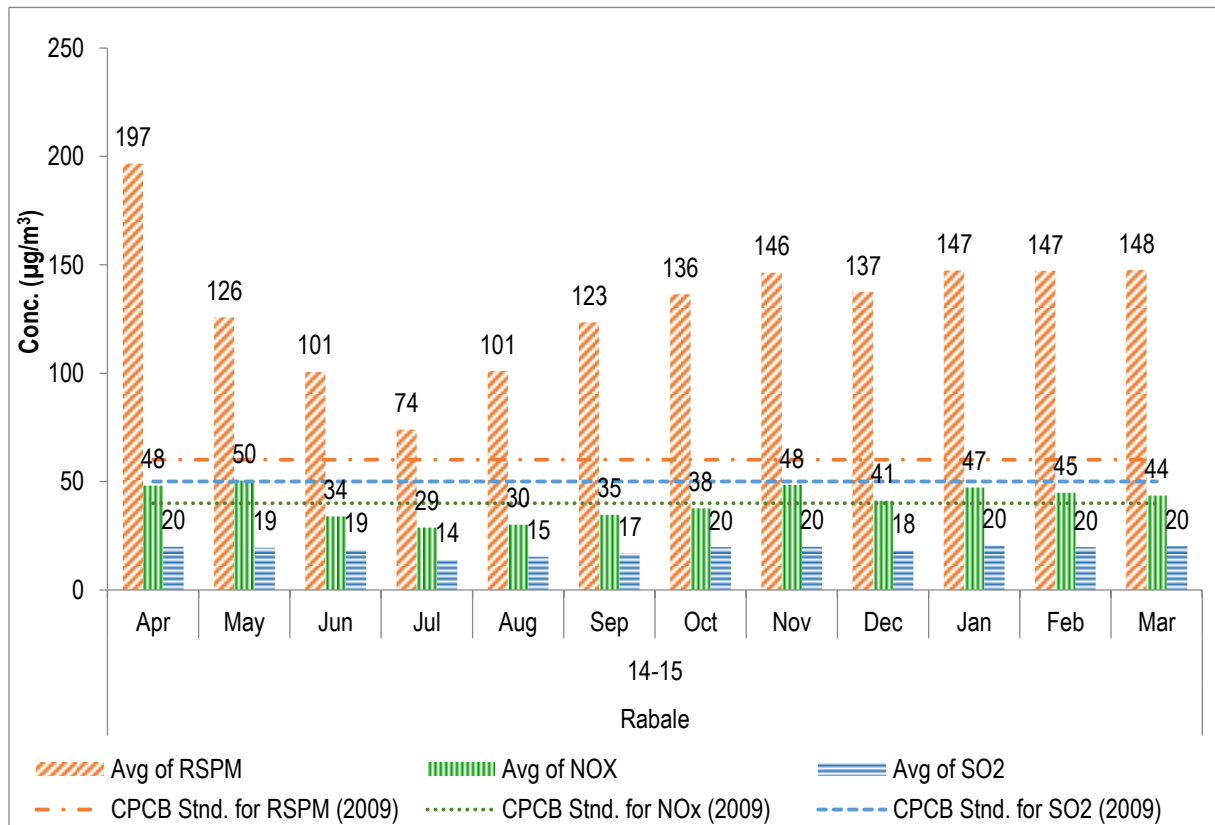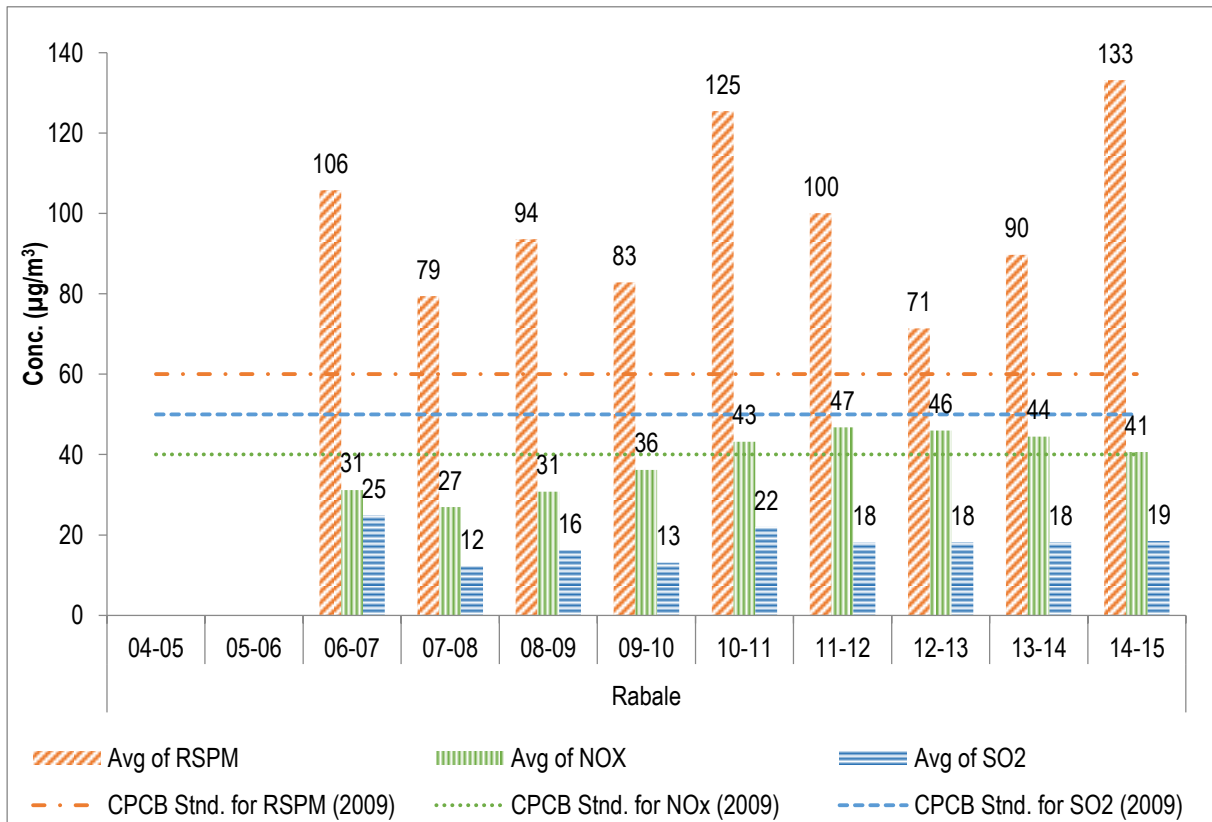| FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NO$_X$	SO$_2$
Apr	*8*	197	48	20
May	*5*	126	50	19
Jun	*7*	101	34	19
Jul	*8*	74	29	14
Aug	*6*	101	30	15
Sep	*9*	123	35	17
Oct	*9*	136	38	20
Nov	*8*	146	48	20
Dec	*9*	137	41	18
Jan	*9*	147	47	20
Feb	*8*	147	45	20
Mar	*7*	148	44	20
	93	79.6	0.0	0.0

Figure No. 131: Monthly average reading recorded at Rabale

Table No. 132: Data for annual average trend of SO₂, NOₓ, and RSPM at Rabale

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO₂
04-05				
05-06				
06-07	*65*	106	31	25
07-08	*101*	79	27	12
08-09	*107*	94	31	16
09-10	*103*	83	36	13
10-11	*100*	125	43	22
11-12	*97*	100	47	18
12-13	*103*	71	46	18
13-14	*81*	90	44	18
14-15	*93*	133	41	19

Figure No. 132: Annual average trend of SO₂, NOₓ, and RSPM at Rabale

Navi Mumbai – Nerul – DY Patil

Table No. 133: Data for monthly average reading recorded at Nerul – DY Patil

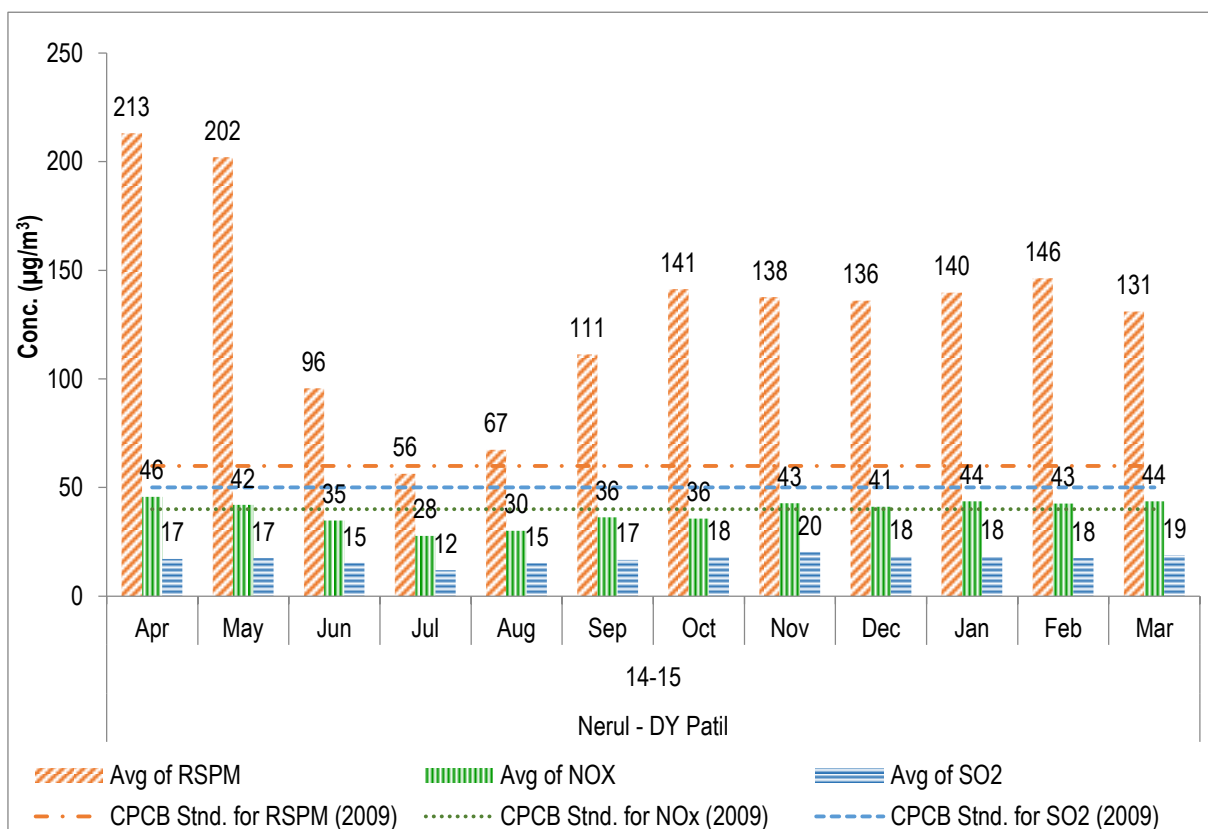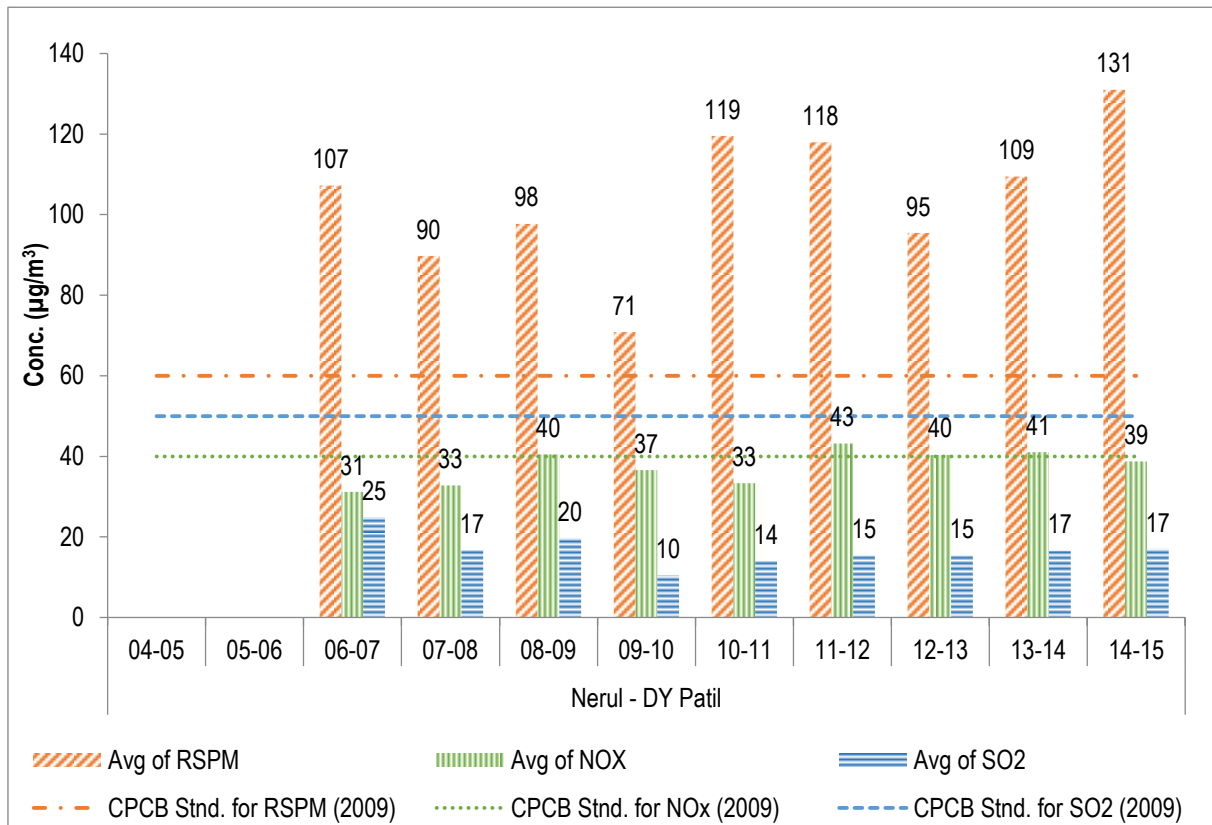| FY	N	Monthly average (µg/m³)		
2014-15		**RSPM**	**NOₓ**	**SO₂**
Apr	*8*	213	46	17
May	*9*	202	42	17
Jun	*9*	96	35	15
Jul	*9*	56	28	12
Aug	*8*	67	30	15
Sep	*9*	111	36	17
Oct	*9*	141	36	18
Nov	*8*	138	43	20
Dec	*9*	136	41	18
Jan	*8*	140	44	18
Feb	*8*	146	43	18
Mar	*9*	131	44	19
	103	**71.8**	**0.0**	**0.0**

Figure No. 133: Monthly average reading recorded at Nerul – DY Patil

Table No. 134: Data for annual average trend of SO₂, NOₓ, and RSPM at Nerul – DY Patil

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07	*78*	107	31	25
07-08	*105*	90	33	17
08-09	*113*	98	40	20
09-10	*104*	71	37	10
10-11	*96*	119	33	14
11-12	*98*	118	43	15
12-13	*95*	95	40	15
13-14	*79*	109	41	17
14-15	*103*	131	39	17

Figure No. 134: Annual average trend of SO₂, NOₓ, and RSPM at Nerul – DY Patil

Navi Mumbai – Mahape, MPCB – Nirmal Bhavan

Table No. 135: Data for Monthly average reading recorded at Mahape, MPCB – Nirmal Bhavan

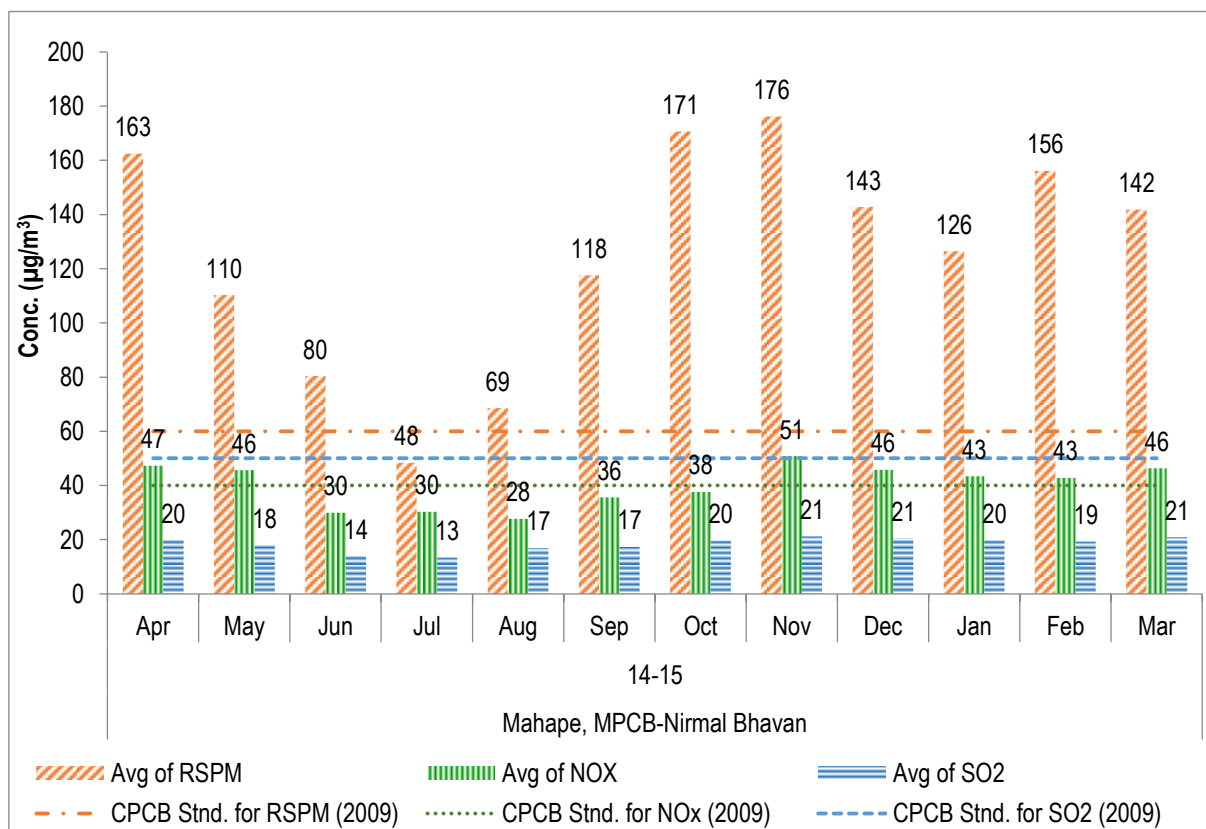| FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NOX	SO₂
Apr	9	163	47	20
May	8	110	46	18
Jun	9	80	30	14
Jul	12	48	30	13
Aug	11	69	28	17
Sep	8	118	36	17
Oct	9	171	38	20
Nov	8	176	51	21
Dec	9	143	46	21
Jan	11	126	43	20
Feb	6	156	43	19
Mar	7	142	46	21
	107	64.5	0.0	0.0

Figure No. 135: Monthly average reading recorded at Mahape, MPCB – Nirmal Bhavan

Table No. 136: Data for annual average trend of SO₂, NOₓ, and RSPM at Mahape, MPCB – Nirmal Bhavan

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07	57	106	27	37
07-08	98	94	32	17
08-09	88	131	43	22
09-10	105	95	42	15
10-11	90	101	41	22
11-12	69	133	44	17
12-13	117	121	45	18
13-14	76	182	45	18
14-15	107	121	40	18

Figure No. 136: Annual average trend of SO₂, NOₓ, and RSPM at Mahape, MPCB – Nirmal Bhavan

Navi Mumbai - Airoli

Table No. 137: Data for monthly average reading recorded at Airoli

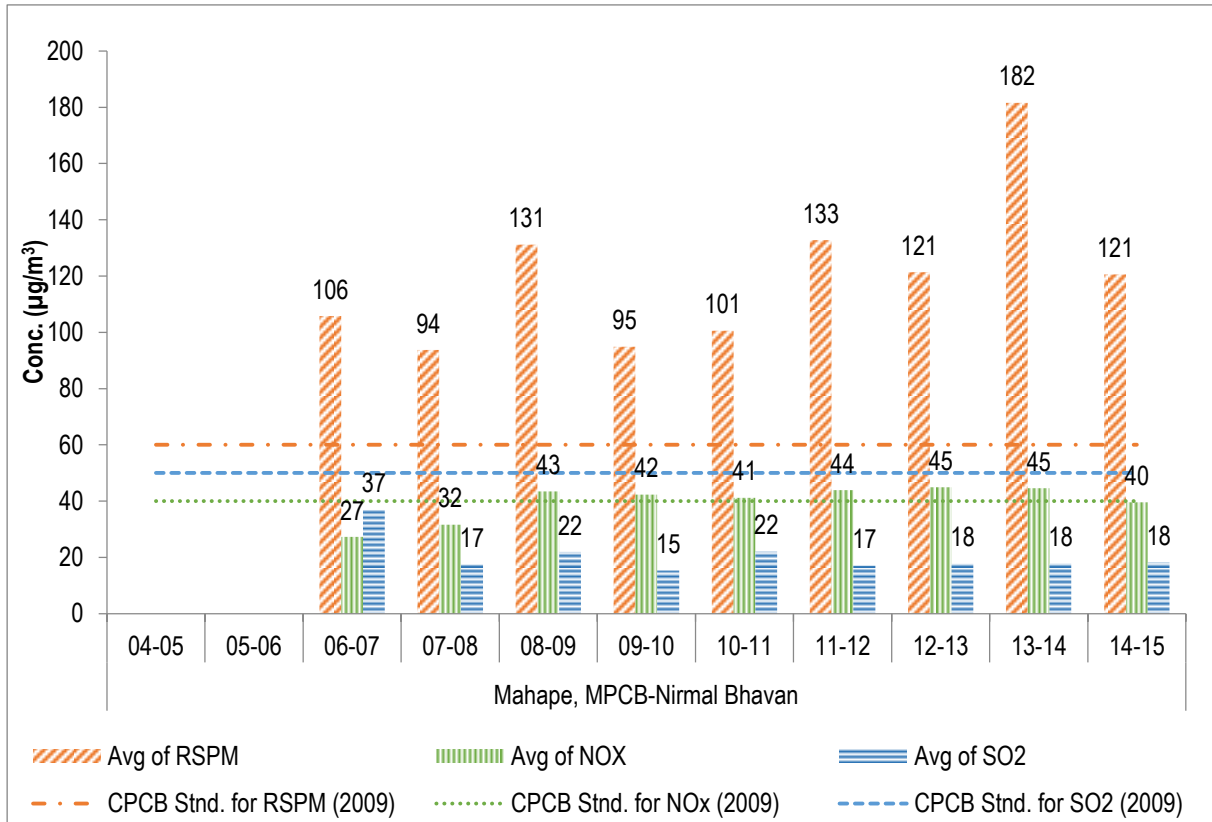| FY	N	Monthly average ($\mu g/m^3$)		
2014-15		RSPM	NO$_X$	SO$_2$
Apr	30	37	45	19
May	27	25	28	12
Jun	30	23	35	16
Jul	22	17	30	13
Aug	24	21	26	15
Sep	29	20	25	12
Oct	27	26	25	13
Nov	30	34	25	15
Dec	30	60	25	18
Jan	30	63	25	20
Feb	27	71	27	26
Mar	29	46	26	21
	335	1.5	0.3	0.0
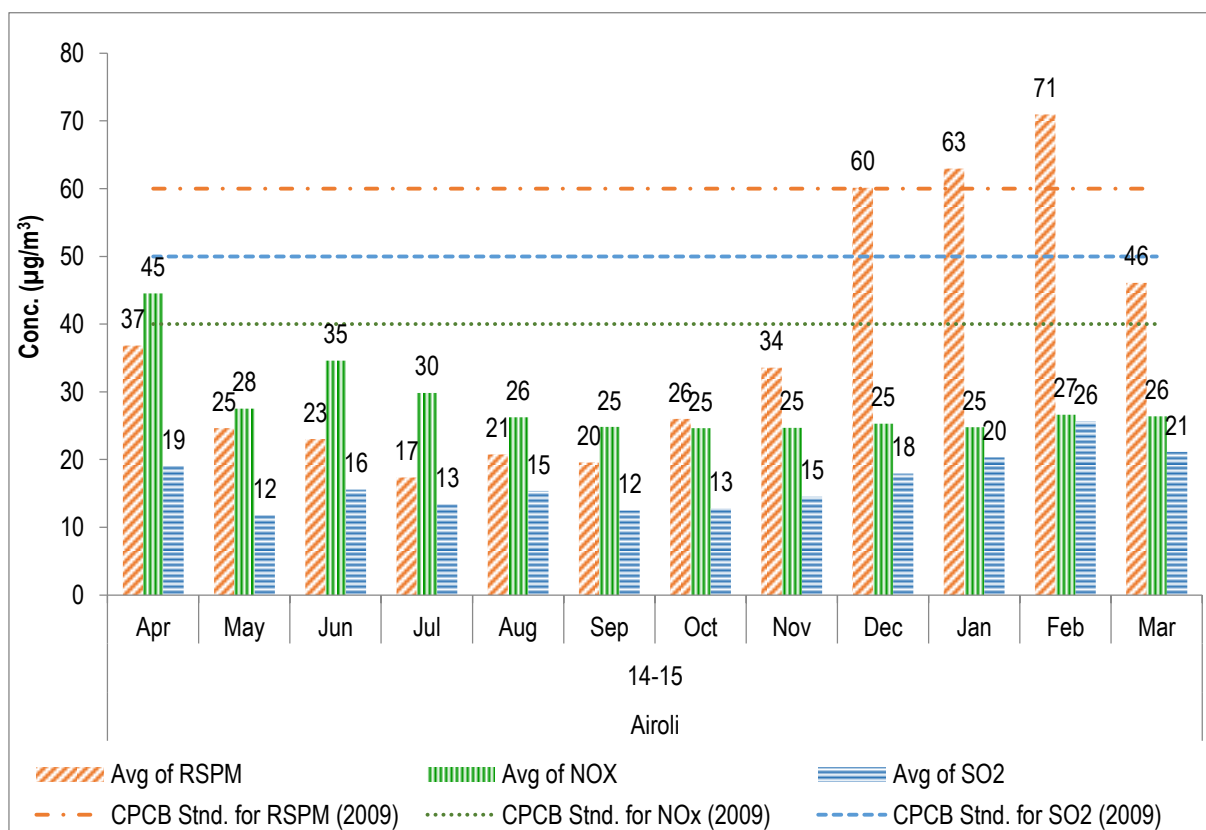
Figure No. 137: Monthly average reading recorded at Airoli

Table No. 138: Data for annual average trend of SO₂, NOₓ, and RSPM at Airoli

Year	N	Annual average (µg/m³)		
		RSPM	NO$_X$	SO$_2$
04-05				
05-06				
06-07				
07-08				
08-09	*80*	87	112	31
09-10	*335*	120	89	23
10-11	*343*	128	67	27
11-12	*250*	181	75	13
12-13	*297*	109	43	21
13-14	*226*	53	53	22
14-15	*335*	38	28	17
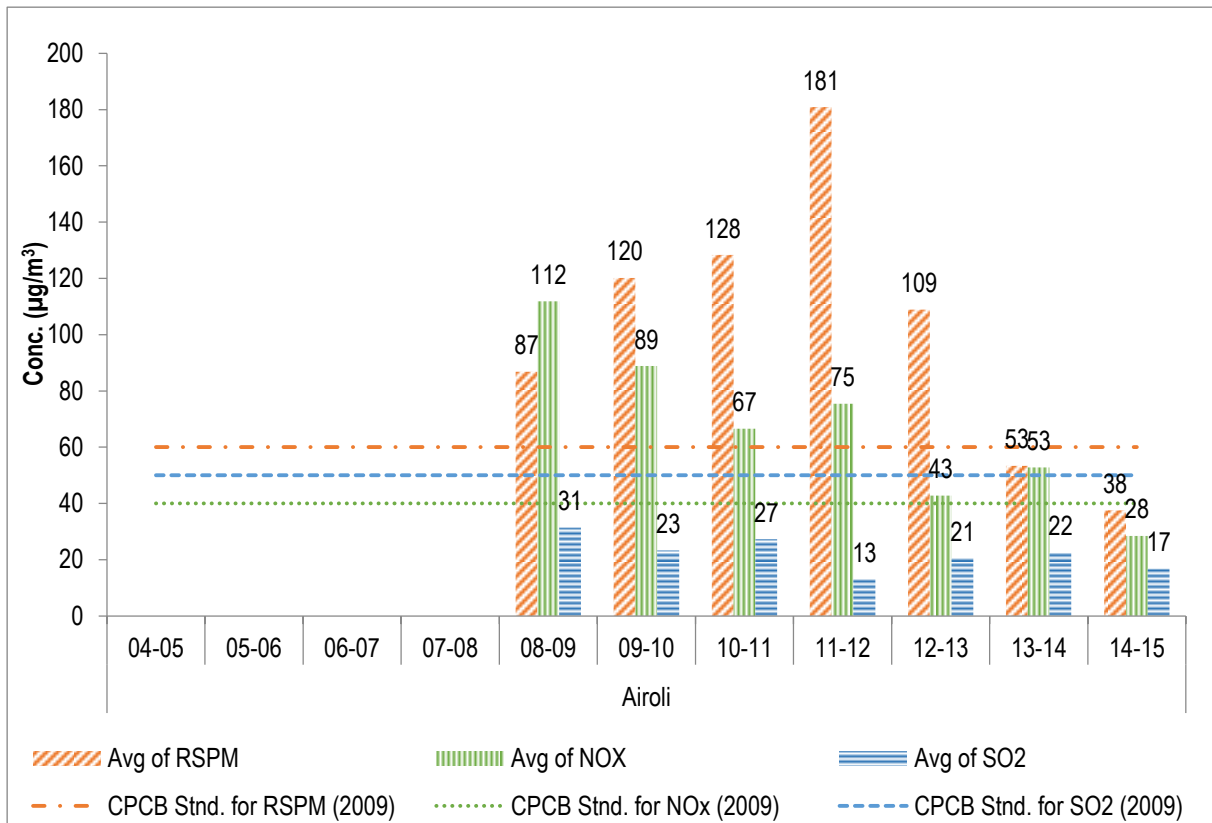
Figure No. 138: Annual average trend of SO₂, NOₓ, and RSPM at Airoli

Navi Mumbai - Vashi

Table No. 139: Data for monthly average reading recorded at Vashi

The station was not functional in 2014-15

Figure No. 139: Monthly average reading recorded at - Vashi

Navi Mumbai - Vashi

Table No. 139: Data for monthly average reading recorded at Vashi

Maharashtra Pollution Control Board
महाराष्ट्र प्रदूषण नियंत्रण मंडळ

Table No. 140: Data for annual average trend of SO₂, NOₓ, and RSPM at Vashi

Year	N	Annual average (µg/m³)		
		RSPM	NOX	SO₂
05-06				
06-07	*137*	101	71	62
07-08	*269*	93	50	50
08-09	*287*	124	51	22
09-10	*329*	96	57	26
10-11	*296*	92	45	19
11-12	*186*	111	43	19
12-13	*250*	110	56	27
13-14	*192*	108	44	31
14-15				
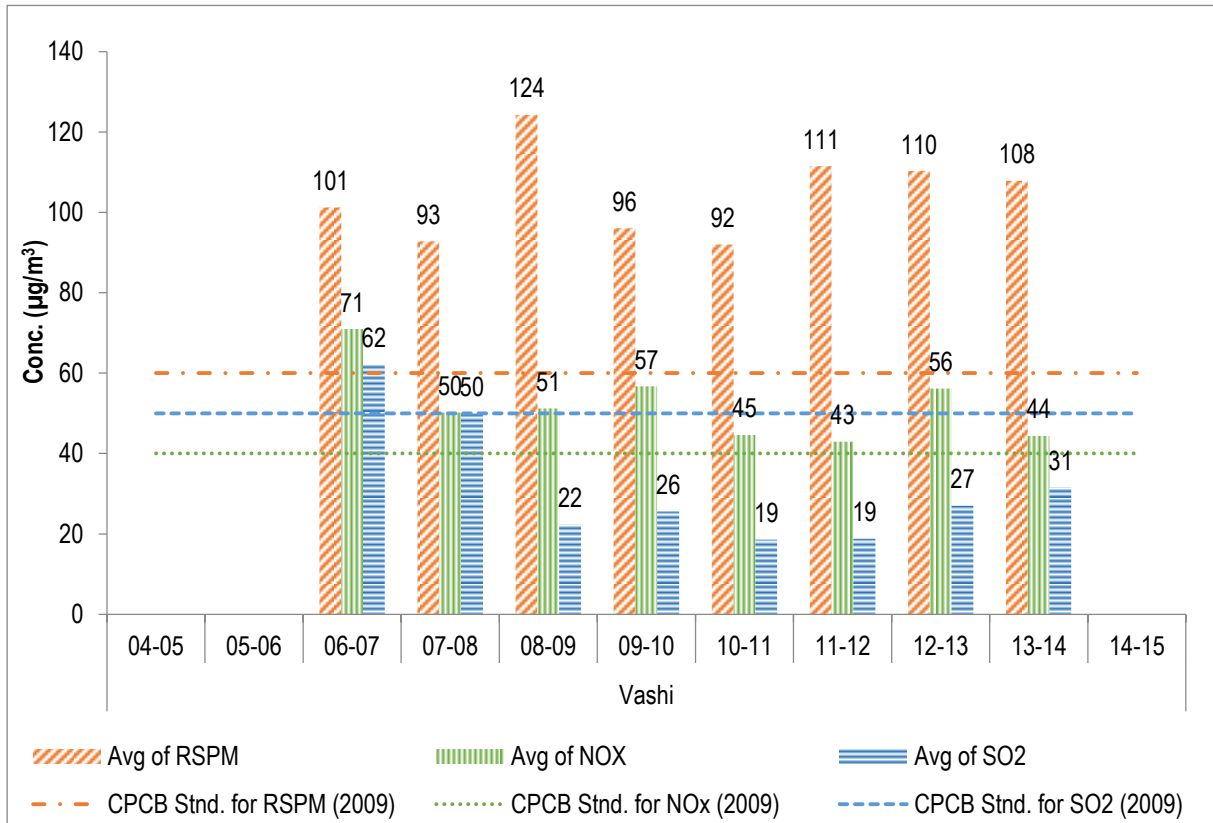
Figure No. 140: Annual average trend of SO₂, NOₓ, and RSPM at Vashi

Taloja – Kharghar – CIDCO Nodal Office

Table No. 141: Data for monthly average reading recorded at Kharghar – CIDCO Nodal Office

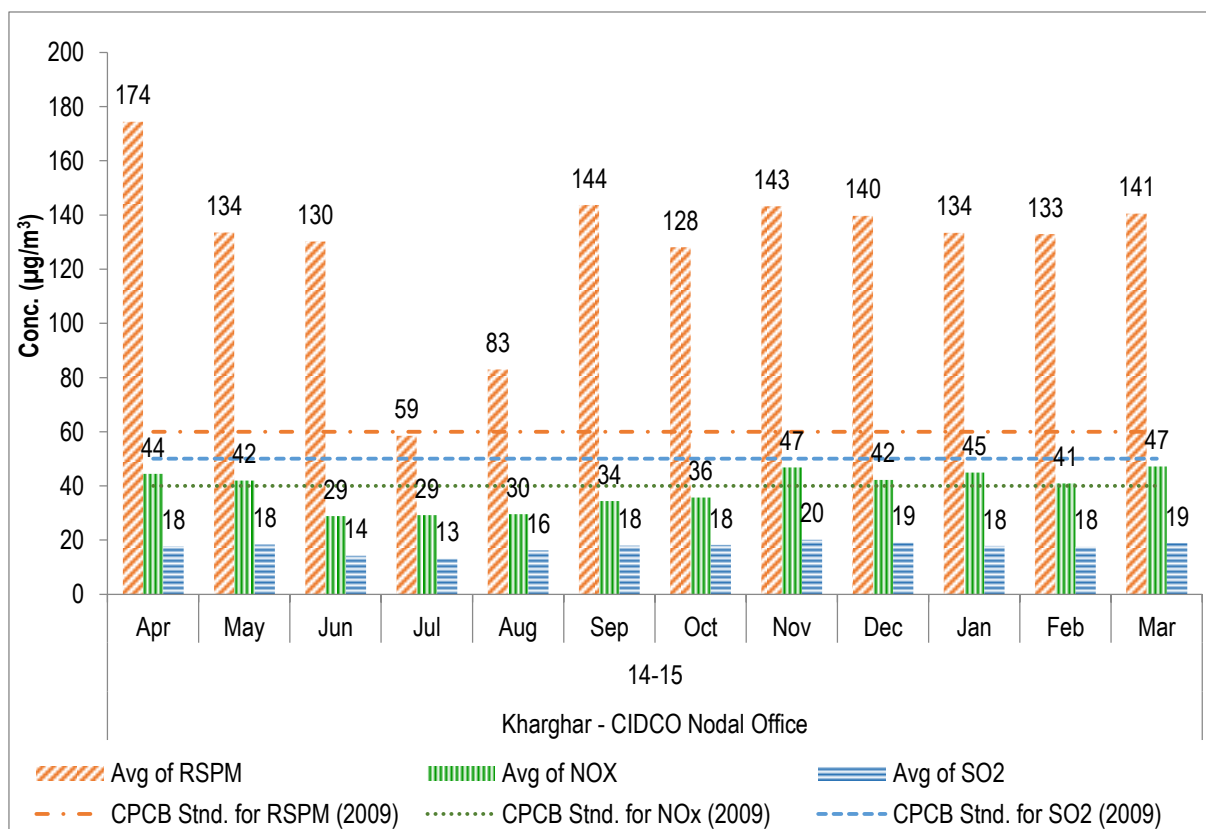| FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NOₓ	SO₂
Apr	9	174	44	18
May	9	134	42	18
Jun	8	130	29	14
Jul	9	59	29	13
Aug	8	83	30	16
Sep	7	144	34	18
Oct	9	128	36	18
Nov	8	143	47	20
Dec	7	140	42	19
Jan	8	134	45	18
Feb	7	133	41	18
Mar	8	141	47	19
	97	80.4	0.0	0.0

Figure No. 141: Monthly average reading recorded at Kharghar – CIDCO Nodal Office

Table No. 142: Data for annual average trend of SO₂, NOₓ, and RSPM at Kharghar – CIDCO Nodal Office

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07	76	96	33	18
07-08	94	108	31	10
08-09	94	115	40	13
09-10	111	75	35	10
10-11	105	122	37	17
11-12	95	122	43	16
12-13	102	122	41	16
13-14	76	125	42	17
14-15	97	128	39	17

Figure No. 142: Annual average trend of SO₂, NOₓ, and RSPM at Kharghar – CIDCO Nodal Office

Taloja – MIDC Building

Table No. 143: Data for monthly average reading recorded at Taloja - MIDC Building

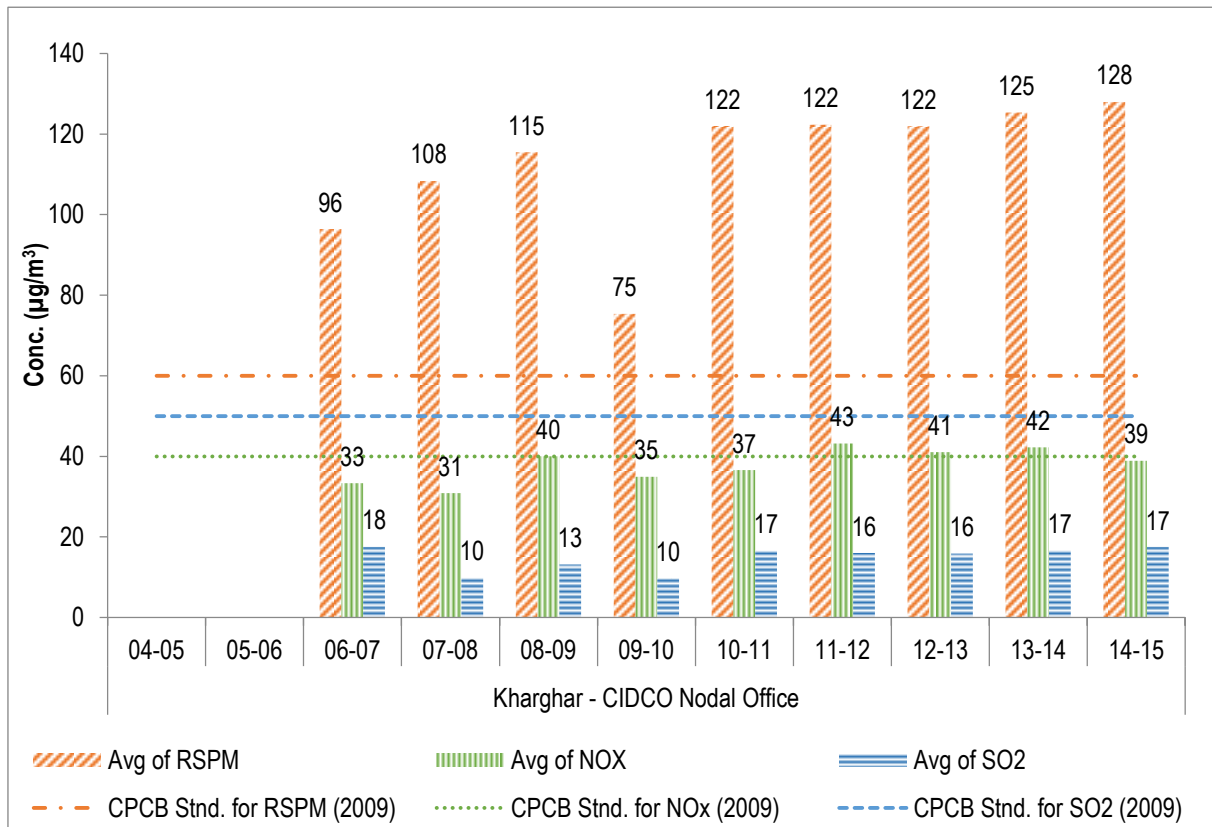| FY 2014-15	N	Monthly average (µg/m³)		
		RSPM	NOX	SO2
Apr	8	157	52	19
May	9	213	47	17
Jun	9	149	41	26
Jul	8	96	34	12
Aug	9	93	29	15
Sep	9	141	37	18
Oct	9	138	38	18
Nov	8	135	51	20
Dec	9	133	45	19
Jan	7	153	45	18
Feb	7	153	39	18
Mar				
	92	80.4	0.0	0.0
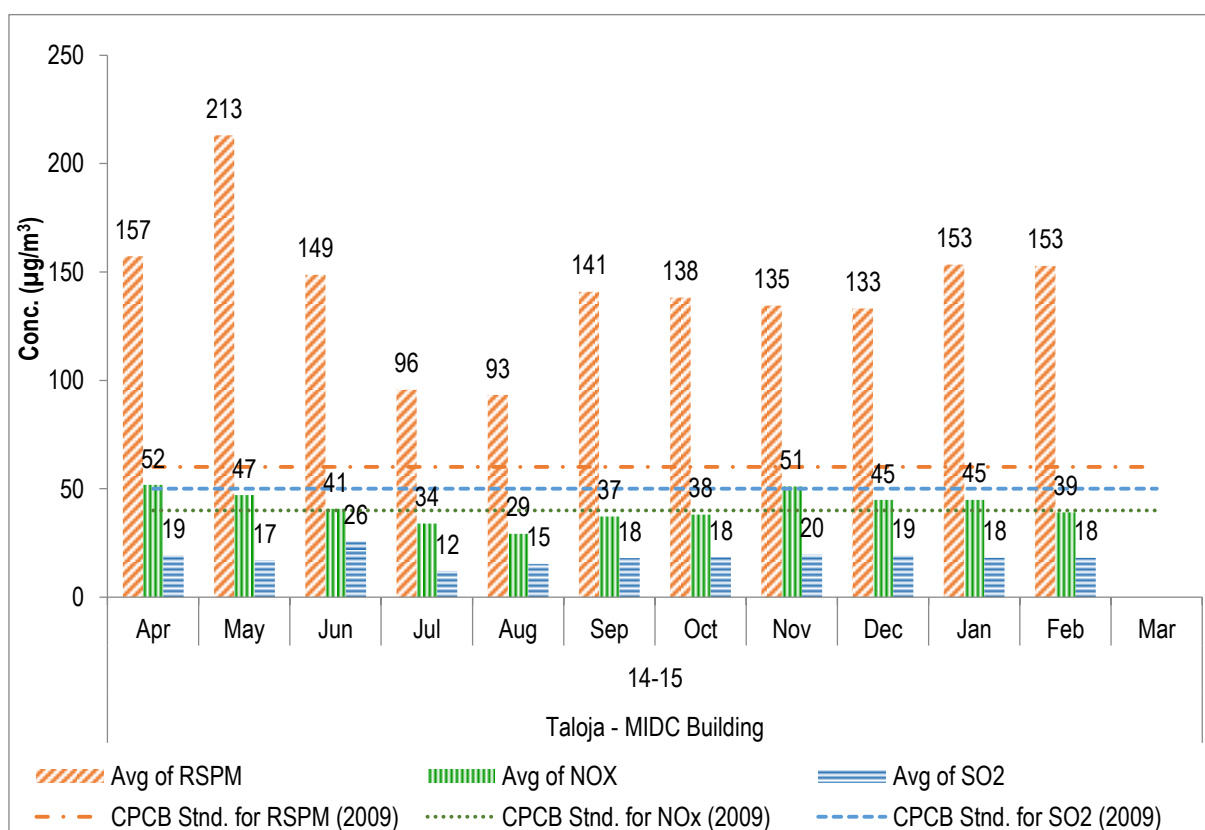
Figure No. 143: Monthly average reading recorded at Taloja - MIDC Building

Table No. 144: Data for annual average trend of SO₂, NOₓ, and RSPM at Taloja - MIDC Building

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07	65	101	40	32
07-08	101	113	39	22
08-09	107	241	46	29
09-10	100	200	55	23
10-11	106	194	48	27
11-12	93	148	51	20
12-13	104	129	45	18
13-14	79	187	47	19
14-15	92	142	41	18
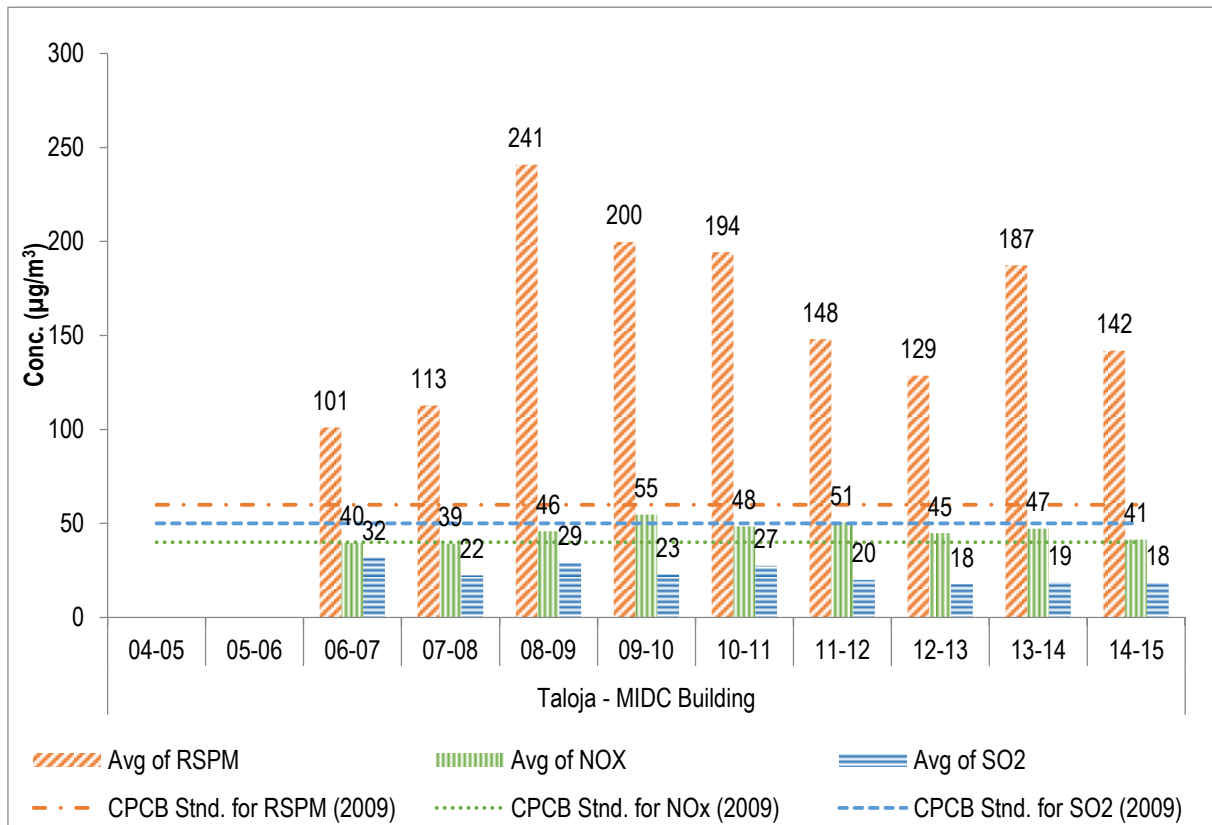
Figure No. 144: Annual average trend of SO₂, NOₓ, and RSPM at Taloja - MIDC Building

% occurence for the classes for AQI across Navi Mumbai RO
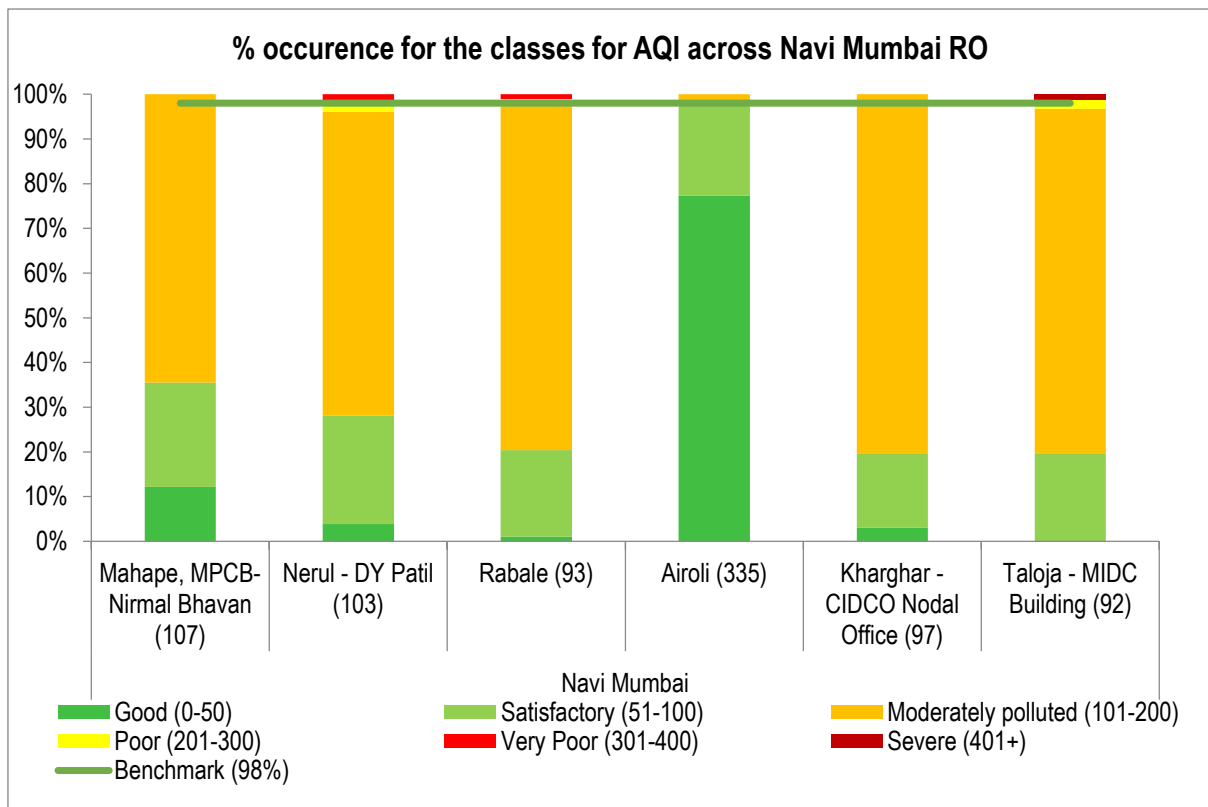
RO – Pune
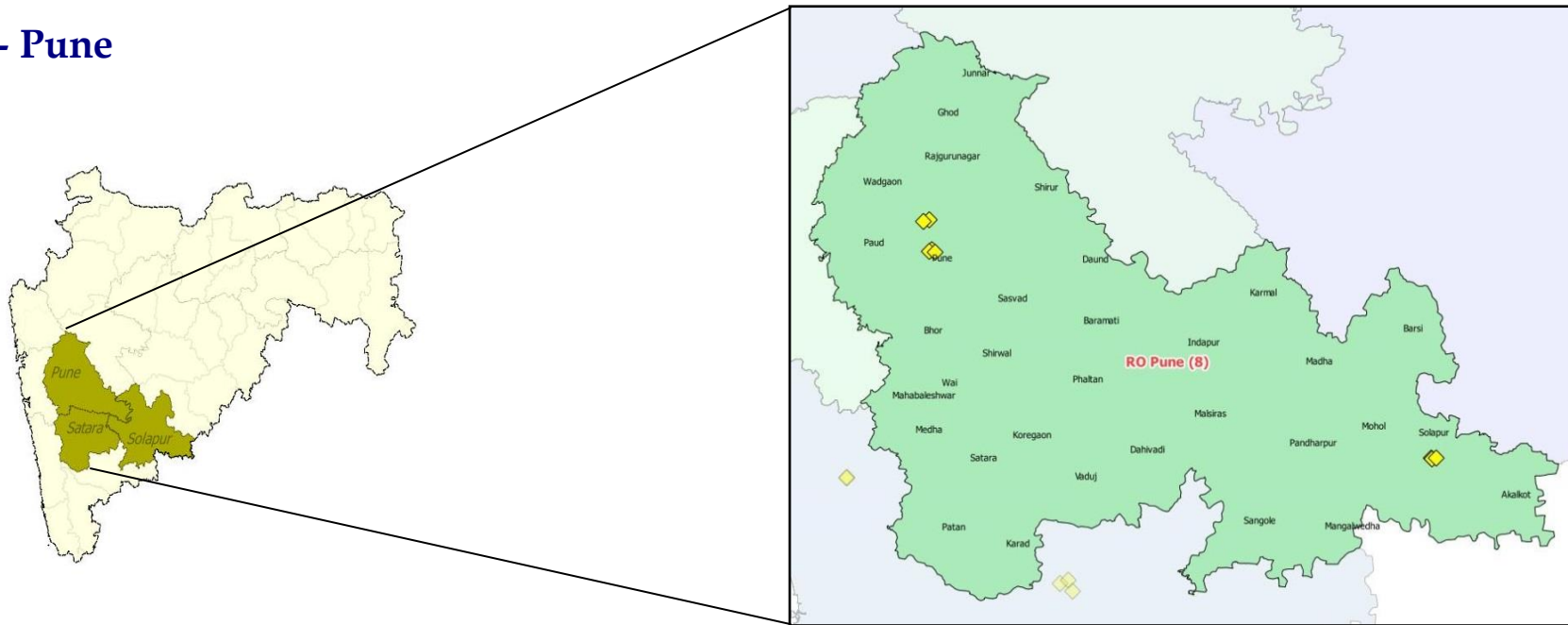
MPCB RO	Region	Station code	Station name	Type	Latitude (deg)	Longitude (deg)
Pune	Pune	312	Bhosari	Industrial	18° 38' 04.1" N	73° 49' 42.0" E
	Pune	379	Nal Stop	Rural and other areas	18° 30' 25.2" N	73° 49' 39.2" E
	Pune	381	Swargate, Pune	Residential	18° 30' 12.6" N	73° 51' 09.4" E
	Pune	708	Pimpri-Chinchwad - 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	Residential	17° 40' 07.1" N	75° 54' 05.2" E

Pune - Bhosari

Table No. 145: Data for monthly average reading recorded at Bhosari

FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NO$_X$	SO$_2$
Apr	8	96	41	28
May	9	69	33	23
Jun	7	43	26	18
Jul	9	61	20	17
Aug	9	46	27	16
Sep	9	53	48	29
Oct	7	103	33	28
Nov	8	136	54	34
Dec	8	186	57	20
Jan	9	182	106	29
Feb	8	142	69	39
Mar	8	130	60	24
	99	47.5	8.1	0.0
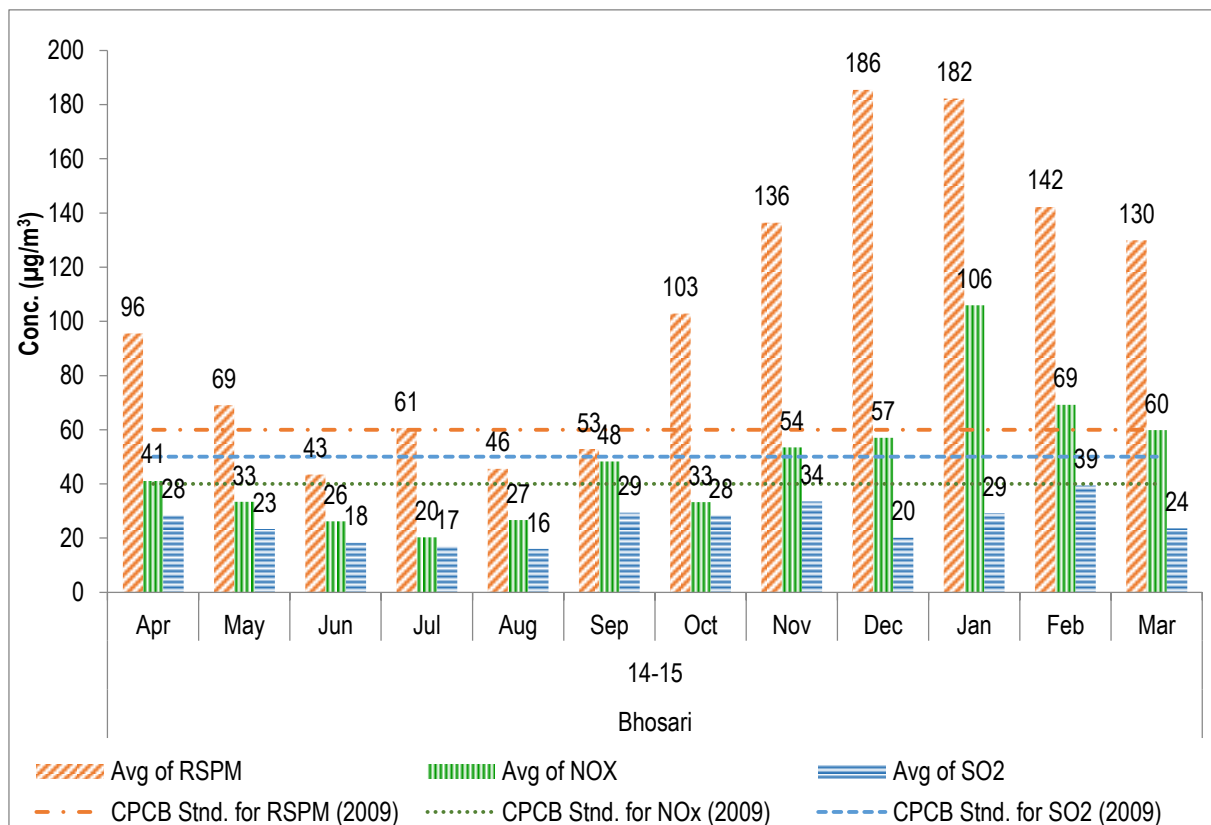
Figure No. 145: Monthly average reading recorded at Bhosari

Table No. 146: Data for annual average trend of SO₂, NOₓ, and RSPM at Bhosari

Year	N	Annual average (µg/m³)		
		RSPM	NOX	SO₂
04-05				
05-06	40	144	42	27
06-07	99	126	42	24
07-08	100	111	42	20
08-09	106	109	37	24
09-10	103	88	36	42
10-11	97	84	38	30
11-12	103	130	49	37
12-13	105	101	39	25
13-14	101	93	35	23
14-15	99	103	48	25
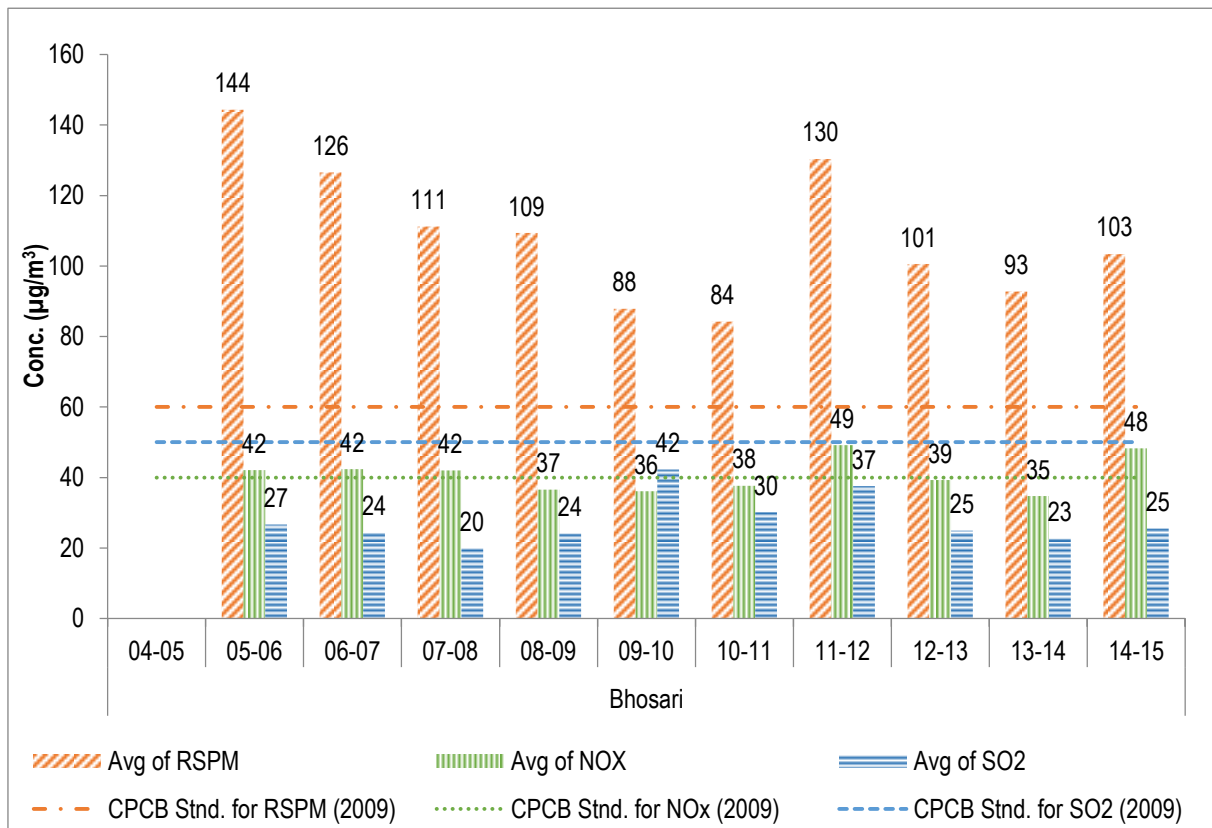
Figure No. 146: Annual average trend of SO₂, NOₓ, and RSPM at Bhosari

Pune - Nal Stop

Table No. 147: Data for monthly average reading recorded at Nal Stop

FY 2014-15	N	Monthly average (µg/m³)		
		RSPM	NOx	SO2
Apr	8	85	54	20
May	8	94	35	19
Jun	9	59	24	17
Jul	9	42	28	18
Aug	6	59	34	15
Sep	8	60	36	29
Oct	6	121	39	22
Nov	8	117	52	31
Dec	8	153	68	20
Jan	8	127	97	22
Feb	8	107	66	30
Mar	9	97	50	20
	95	36.8	10.5	0.0
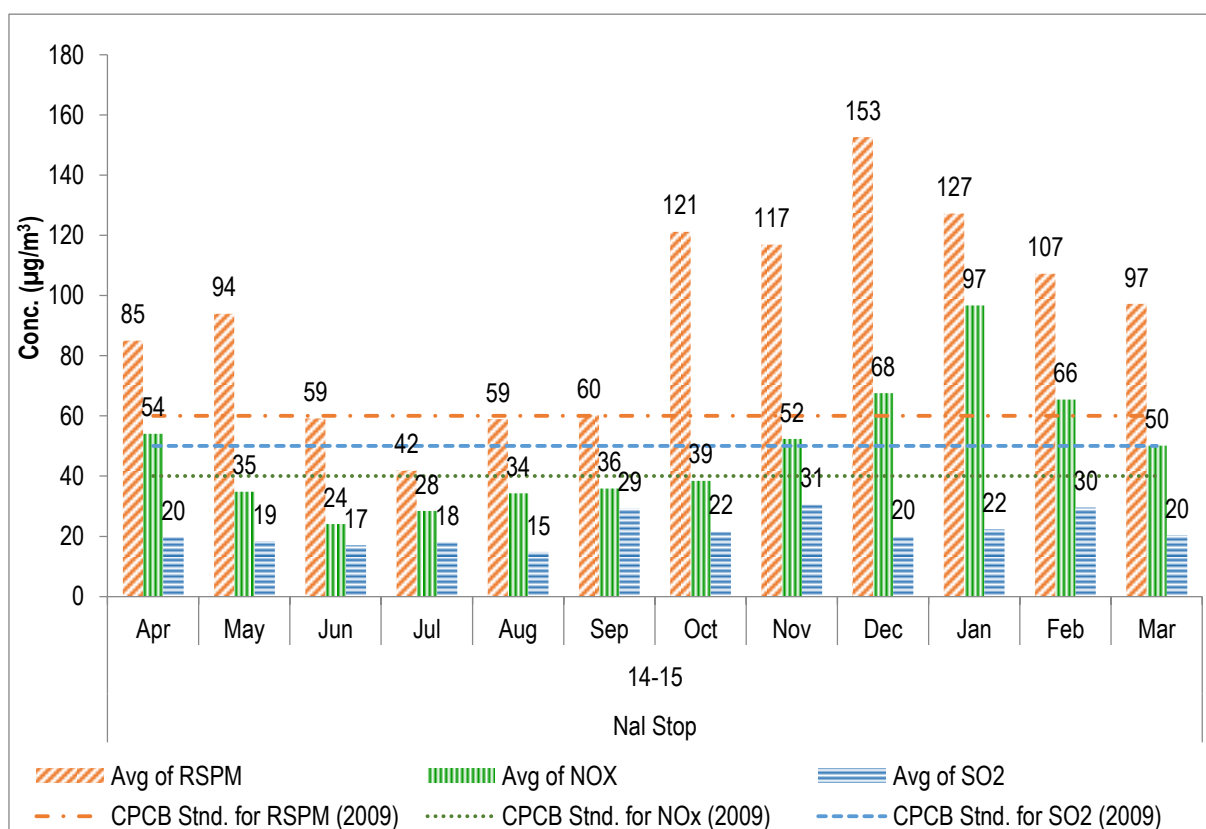
Figure No. 147: Monthly average reading recorded at Nal Stop

Table No. 148: Data for annual average trend of SO₂, NOₓ, and RSPM at Nal Stop

Year	N	Annual average (μg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06	44	152	43	27
06-07	93	129	42	23
07-08	101	108	42	19
08-09	107	91	41	21
09-10	102	82	39	23
10-11	102	88	43	21
11-12	104	100	62	30
12-13	101	82	45	19
13-14	104	82	39	20
14-15	95	93	49	22
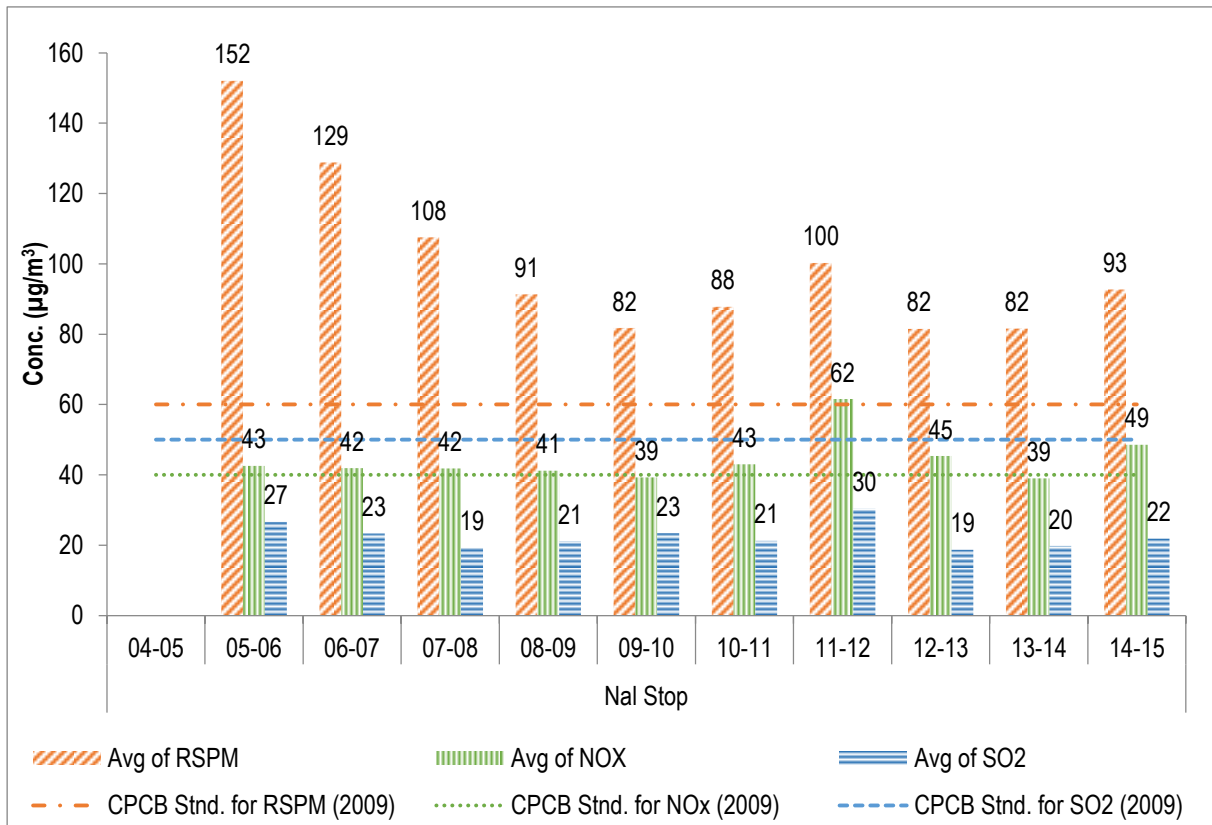
Figure No. 148: Annual average trend of SO₂, NOₓ, and RSPM at Nal Stop

Maharashtra Pollution Control Board
महाराष्ट्र प्रदूषण नियंत्रण मंडळ

Pune – Swargate, pune

Table No. 149: Data for monthly average reading recorded at Swargate, Pune

FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NO$_X$	SO$_2$
Apr	8	89	65	18
May	8	73	39	17
Jun	8	49	25	17
Jul	18	53	20	19
Aug	9	37	26	17
Sep	8	62	49	33
Oct	8	106	43	28
Nov	8	128	55	29
Dec	9	155	78	21
Jan	9	129	114	22
Feb	7	119	67	29
Mar	6	105	58	23
	106	37.7	16.0	0.0
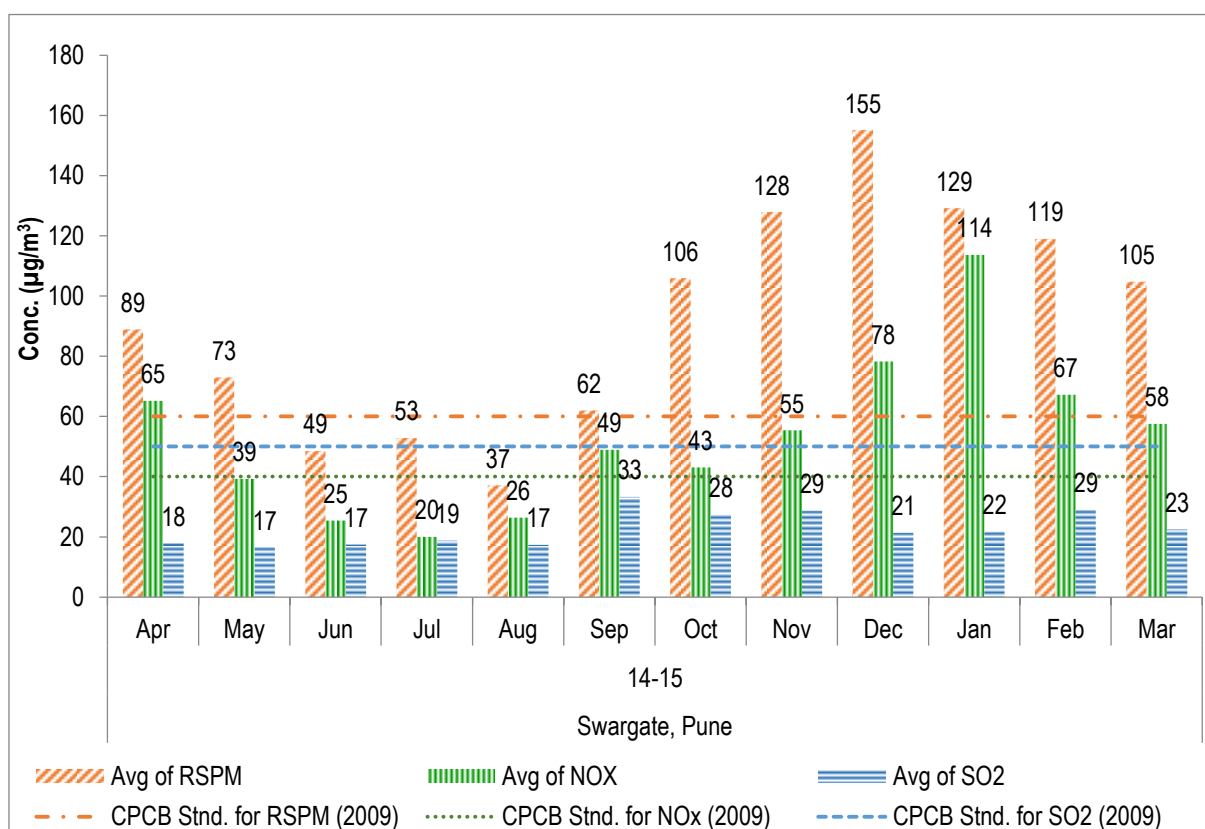
Figure No. 149: Monthly average reading recorded at Swargate, Pune

Table No. 150: Data for annual average trend of SO₂, NOₓ, and RSPM at Swargate, Pune

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06	44	152	43	27
06-07	95	138	43	25
07-08	97	101	46	20
08-09	112	100	44	23
09-10	107	81	39	24
10-11	105	80	50	23
11-12	91	95	63	28
12-13	102	75	53	19
13-14	101	75	42	21
14-15	106	88	51	22
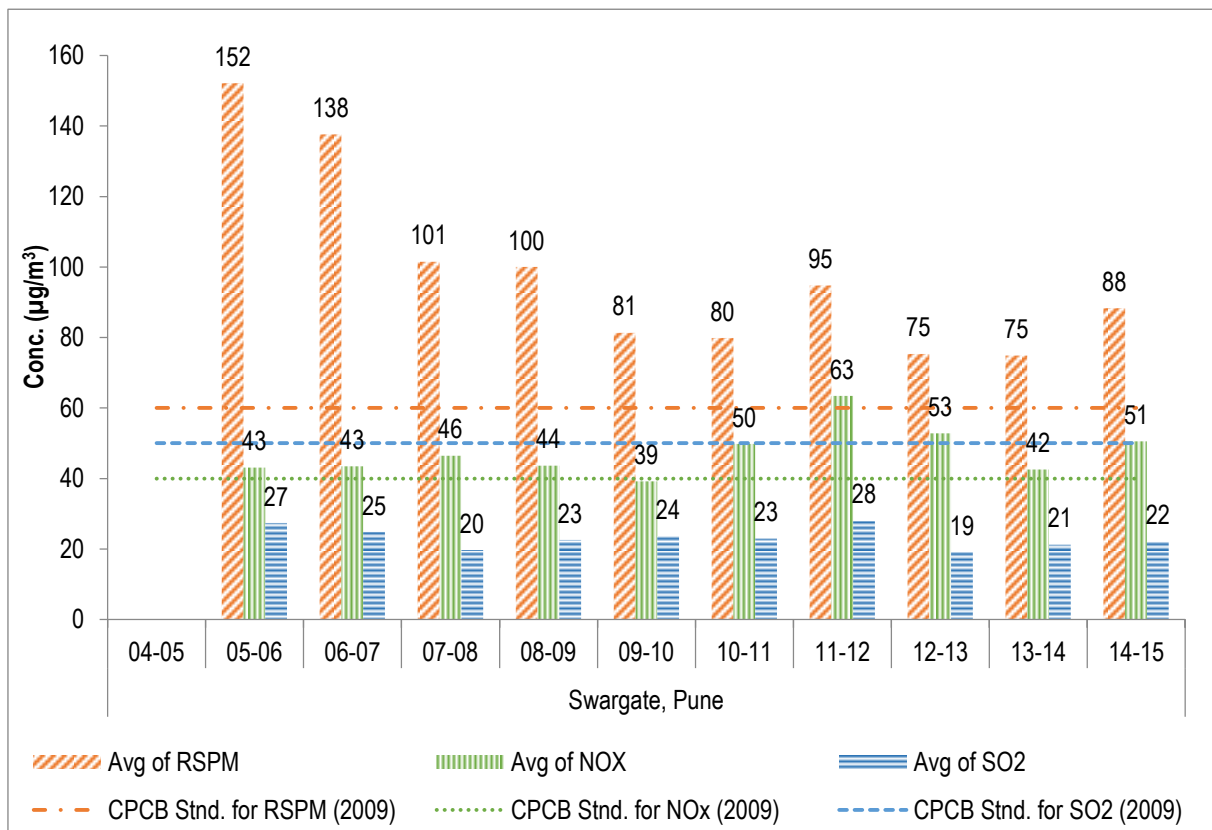
Figure No. 150: Annual average trend of SO₂, NOₓ, and RSPM at Swargate, pune

Pune – Pimpri – Chinchwad – BOB Building

Table No. 151: Data for monthly average reading recorded at Pimpri – Chinchwad – BOB Building

FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NO$_X$	SO$_2$
Apr	23	98	49	20
May	25	60	31	17
Jun	24	45	25	17
Jul	25	50	23	17
Aug	24	43	31	16
Sep	25	50	42	28
Oct	24	112	39	25
Nov	23	126	42	28
Dec	24	164	50	20
Jan	26	149	88	28
Feb	24	144	64	29
Mar	24	115	52	20
	291	42.3	6.2	0.0
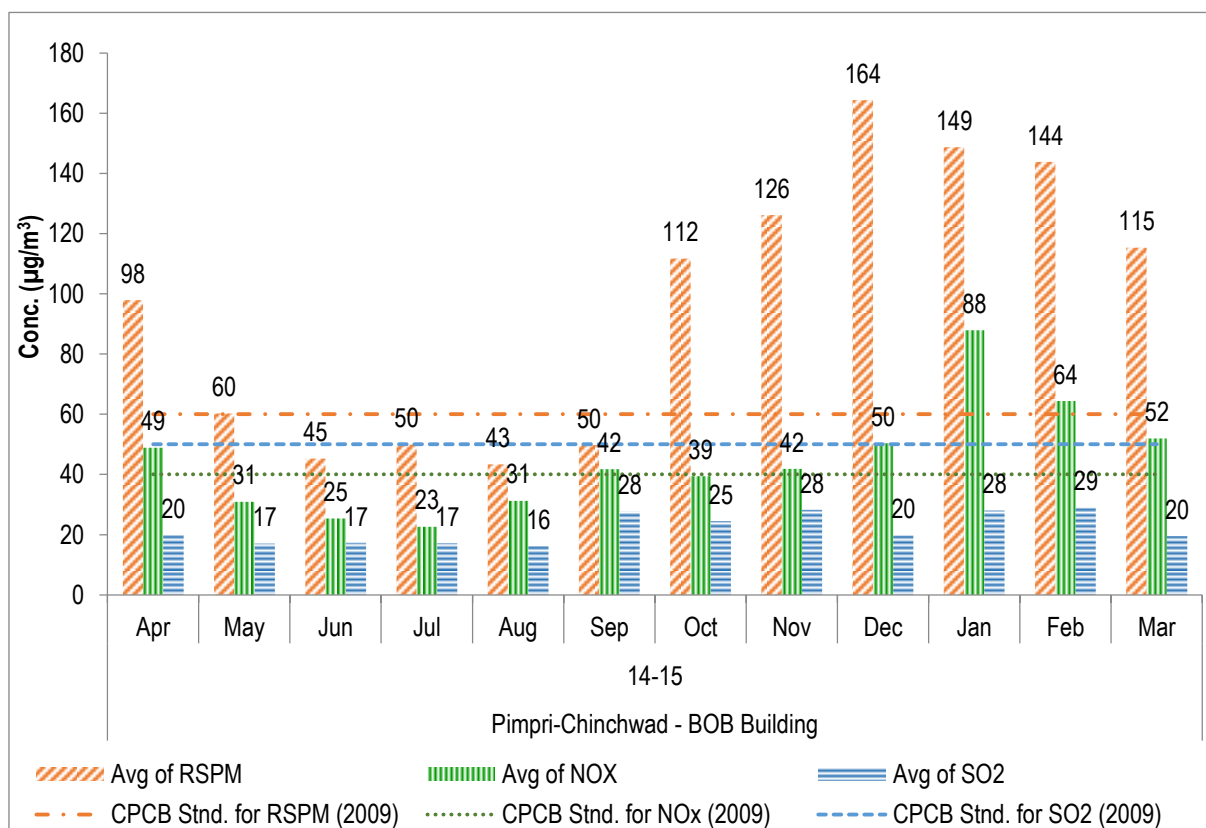
Figure No. 151: Monthly average reading recorded at Pimpri – Chinchwad – BOB Building

Table No. 152: Data for annual average trend of SO₂, NOₓ, and RSPM at Pimpri – Chinchwad – BOB Building

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06	173	114	35	21
06-07	277	127	42	24
07-08	287	105	41	19
08-09	283	96	39	23
09-10	265	89	43	31
10-11	300	86	49	26
11-12	270	117	57	33
12-13	266	84	49	20
13-14	297	82	39	22
14-15	291	96	45	22
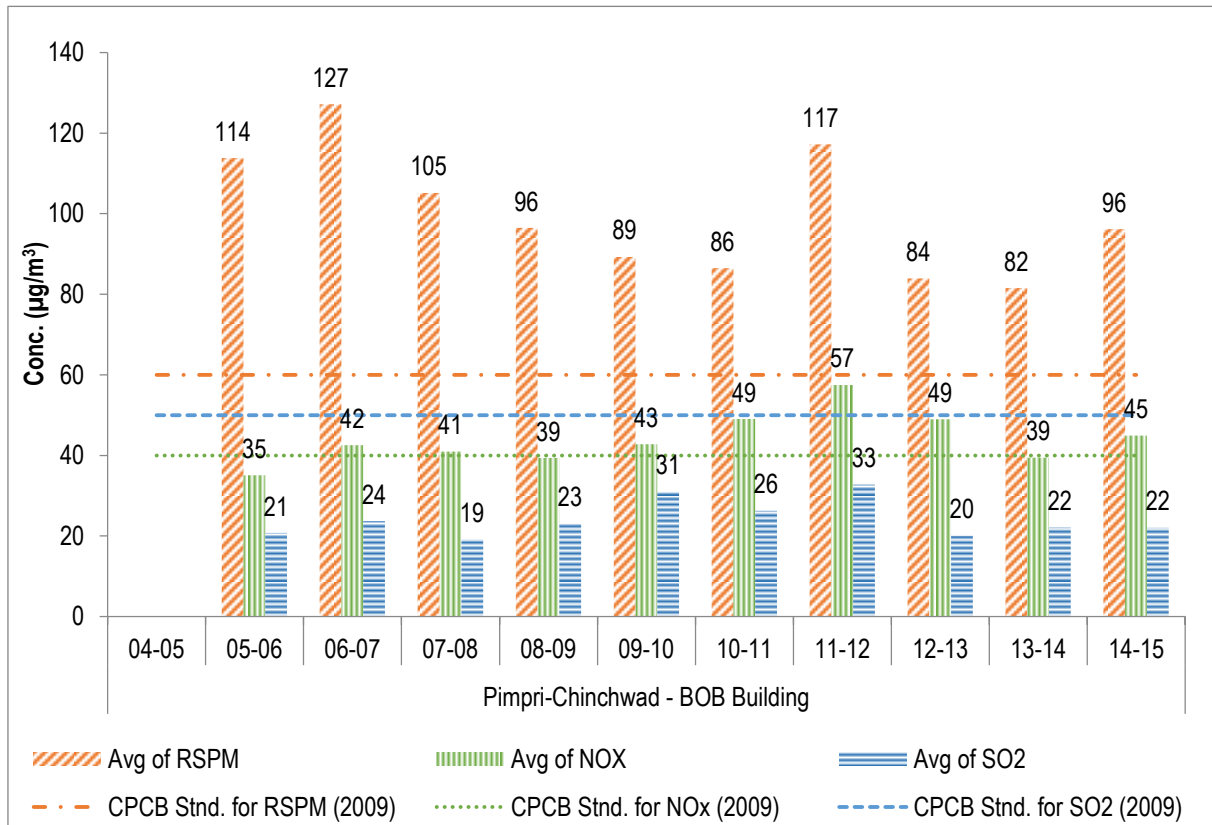
Figure No. 152: Annual average trend of SO₂, NOₓ, and RSPM at Pimpri – Chinchwad – BOB Building

Pune - Karve Road - CAAQMS

Table No. 153: Data for monthly average reading recorded at Karve Road - CAAQMS

FY 2014-15	N	Monthly average (µg/m³)		
		RSPM	NOₓ	SO₂
Apr	28	141	75	13
May	30	108	71	12
Jun	29	90	75	12
Jul	29	56	70	12
Aug	30	56	31	13
Sep	30	70	9	13
Oct	27	111	9	15
Nov	23	132	9	17
Dec	29	196	9	20
Jan	30	197	9	22
Feb	25	179	10	23
Mar	19	167	54	10
	329	58.1	0.3	0.0

Figure No. 153: Monthly average reading recorded at Karve Road - CAAQMS

Table No. 154: Data for annual average trend of SO₂, NOₓ, and RSPM at Karve Road - CAAQMS

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07				
07-08	247	71	43	13
08-09	266	121	39	25
09-10	280	109	35	11
10-11	354	128	39	12
11-12	351	131	49	11
12-13	361	124	66	22
13-14	360	121	70	27
14-15	329	123	36	15

Figure No. 154: Annual average trend of SO₂, NOₓ, and RSPM at Karve Road - CAAQMS

Solapur – WIT Campus

Table No. 155: Data for monthly average reading recorded at WIT Campus

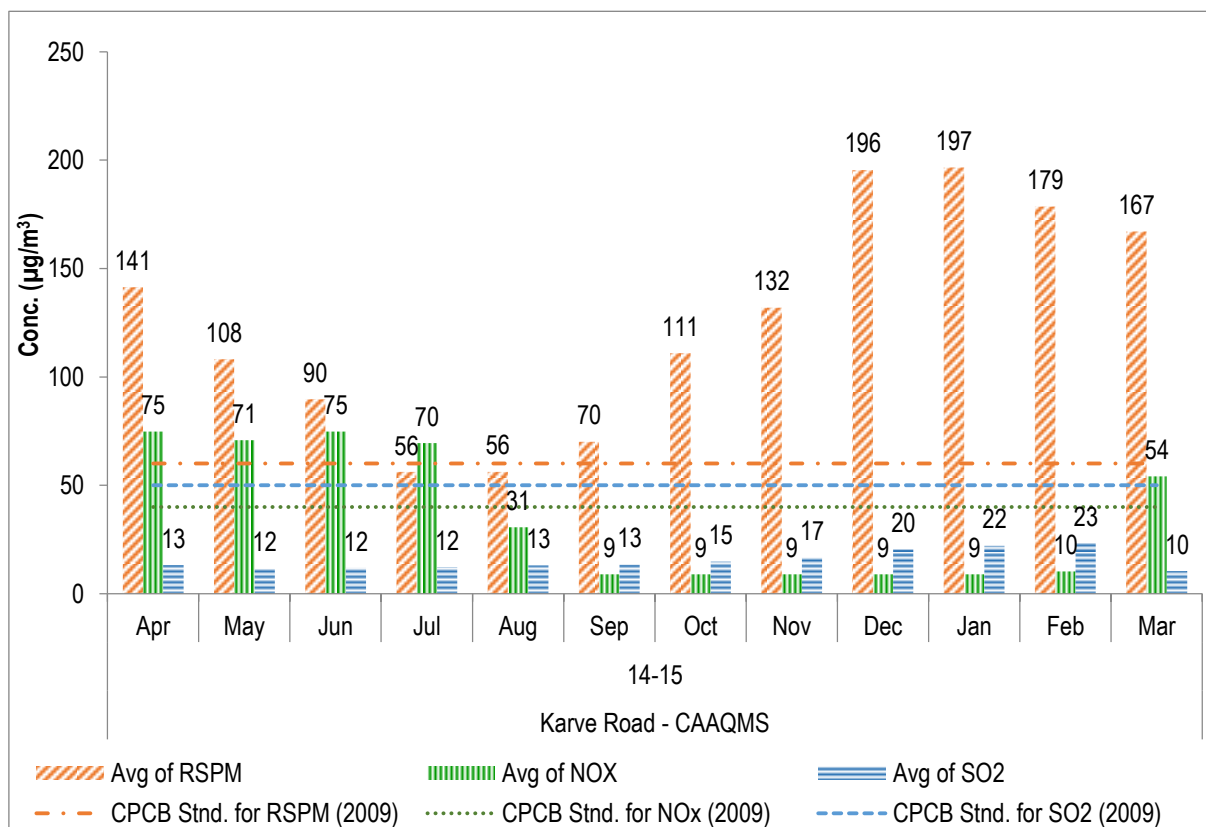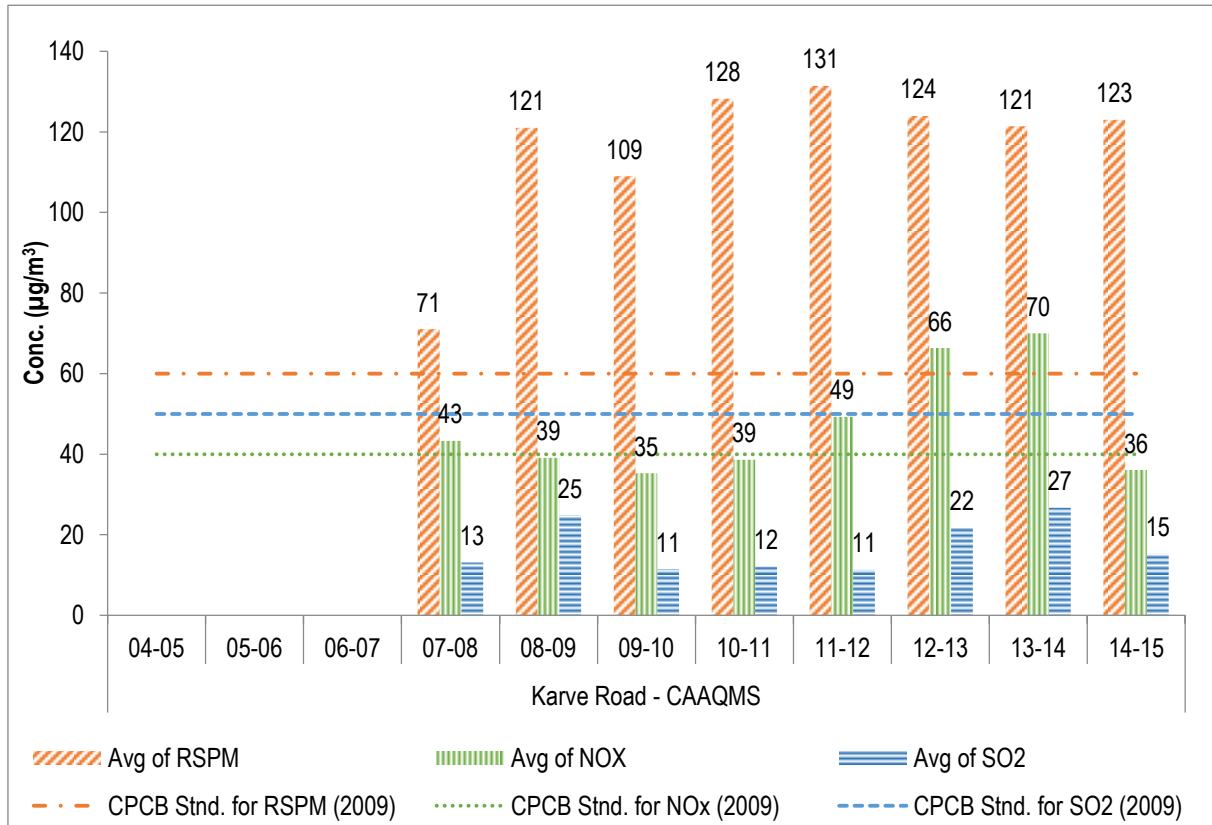| FY 2014-15	N	Monthly average (µg/m³)		
		RSPM	NOx	SO2
Apr	9	81	35	16
May	9	81	35	15
Jun	8	81	24	15
Jul				
Aug	9	74	34	14
Sep	9	76	35	14
Oct	9	76	35	14
Nov	8	77	35	14
Dec	9	75	34	14
Jan	9	76	35	14
Feb	8	75	36	14
Mar	9	76	34	15
	96	0.0	0.0	0.0

Figure No. 155: Monthly average reading recorded at WIT Campus

Table No. 156: Data for annual average trend of SO$_2$, NO$_x$, and RSPM at WIT Campus

Year	N	Annual average (µg/m³)		
		RSPM	NO$_X$	SO$_2$
04-05		137	40	18
05-06	95	115	37	17
06-07	104	97	35	16
07-08	106	86	34	17
08-09	103	76	35	17
09-10	103	71	35	17
10-11	107	74	35	17
11-12	103	77	35	17
12-13	104	78	35	17
13-14	87	84	35	15
14-15	96	77	34	14

Figure No. 156: Annual average trend of SO$_2$, NO$_x$, and RSPM at WIT Campus

Maharashtra Pollution Control Board
महाराष्ट्र प्रदूषण नियंत्रण मंडळ

Solapur – Saat Rasta – Chithale Clinic

Table No. 157: Data for monthly average reading recorded at Saat Rasta – Chithale Clinic

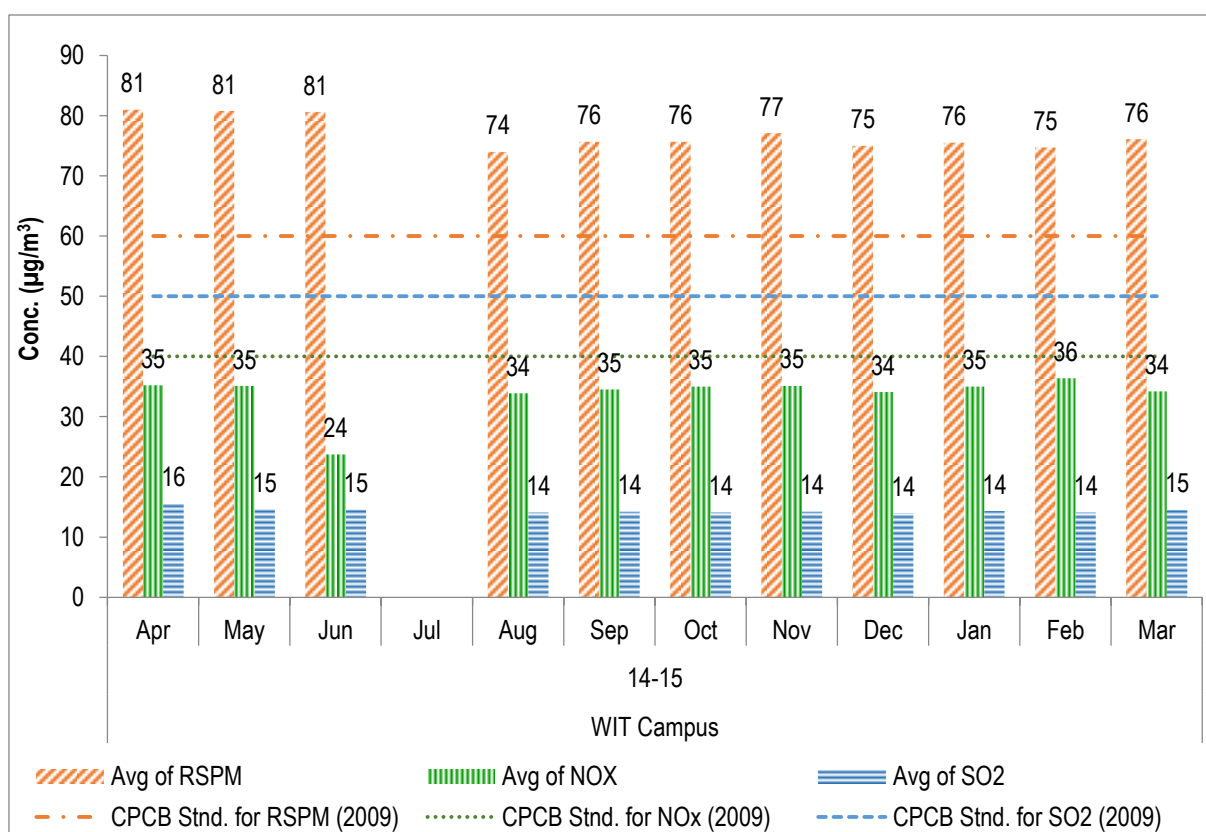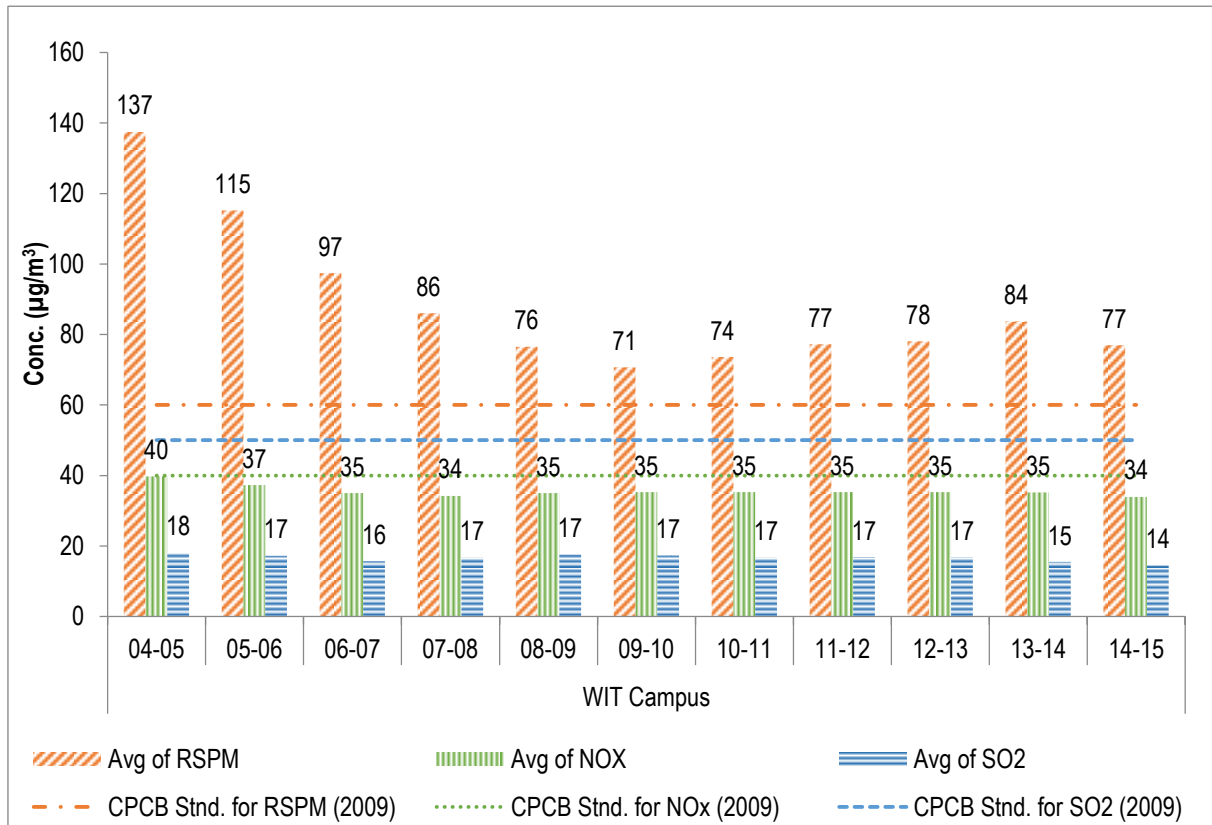| FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NOX	SO2
Apr	8	84	35	15
May	9	76	35	14
Jun	12	89	34	15
Jul				
Aug	8	75	34	14
Sep	9	73	34	14
Oct	9	75	34	15
Nov	8	78	34	14
Dec	9	77	34	14
Jan	9	79	35	14
Feb	8	77	36	14
Mar	9	75	35	15
	98	0.0	0.0	0.0
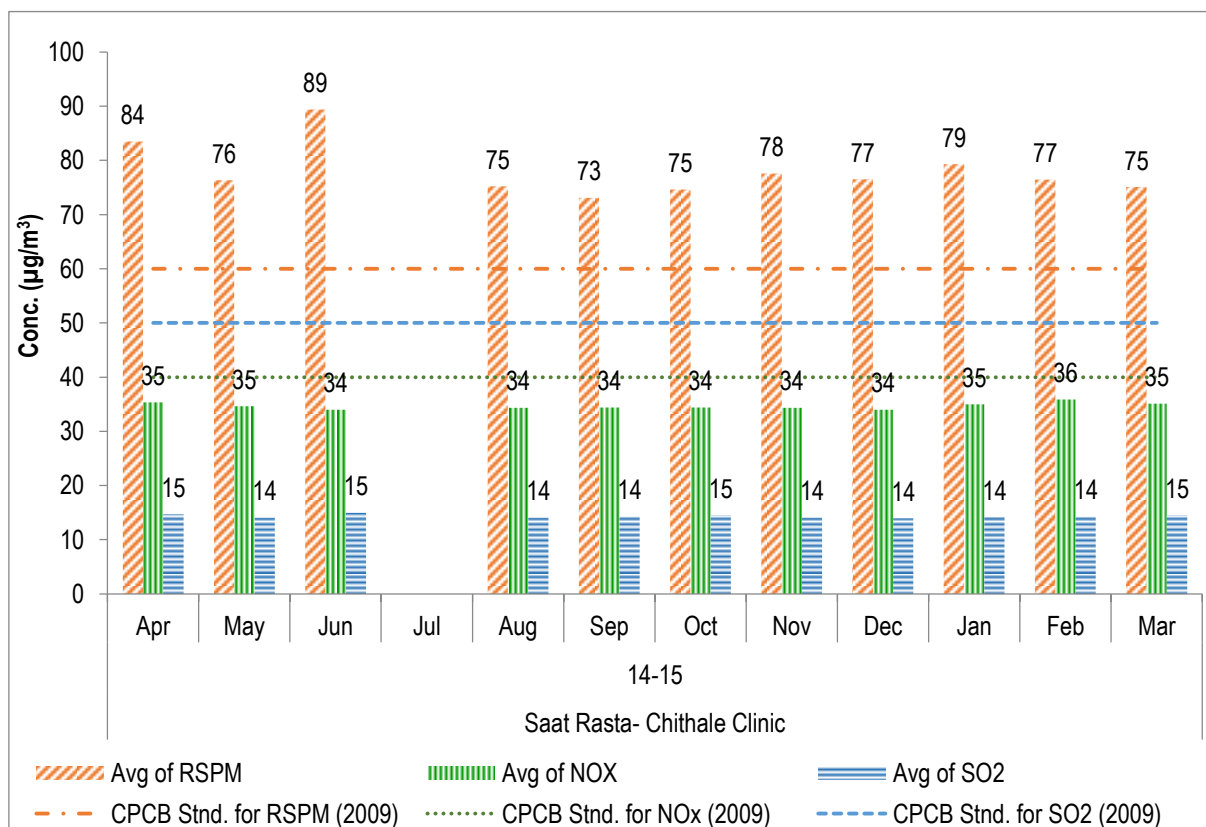
Figure No. 157: Monthly average reading recorded at Saat Rasta – Chithale Clinic

Maharashtra Pollution Control Board
महाराष्ट्र प्रदूषण नियंत्रण मंडळ

Table No. 158: Data for annual average trend of SO₂, NOₓ, and RSPM at Saat Rasta – Chithale Clinic

Year	N	Annual average (µg/m³)		
		RSPM	NOX	SO2
04-05		144	40	18
05-06	95	125	38	18
06-07	104	107	36	17
07-08	100	96	34	18
08-09	105	74	36	18
09-10	103	66	36	17
10-11	108	69	34	17
11-12	96	77	35	17
12-13	95	81	35	17
13-14	78	77	35	16
14-15	98	78	35	14
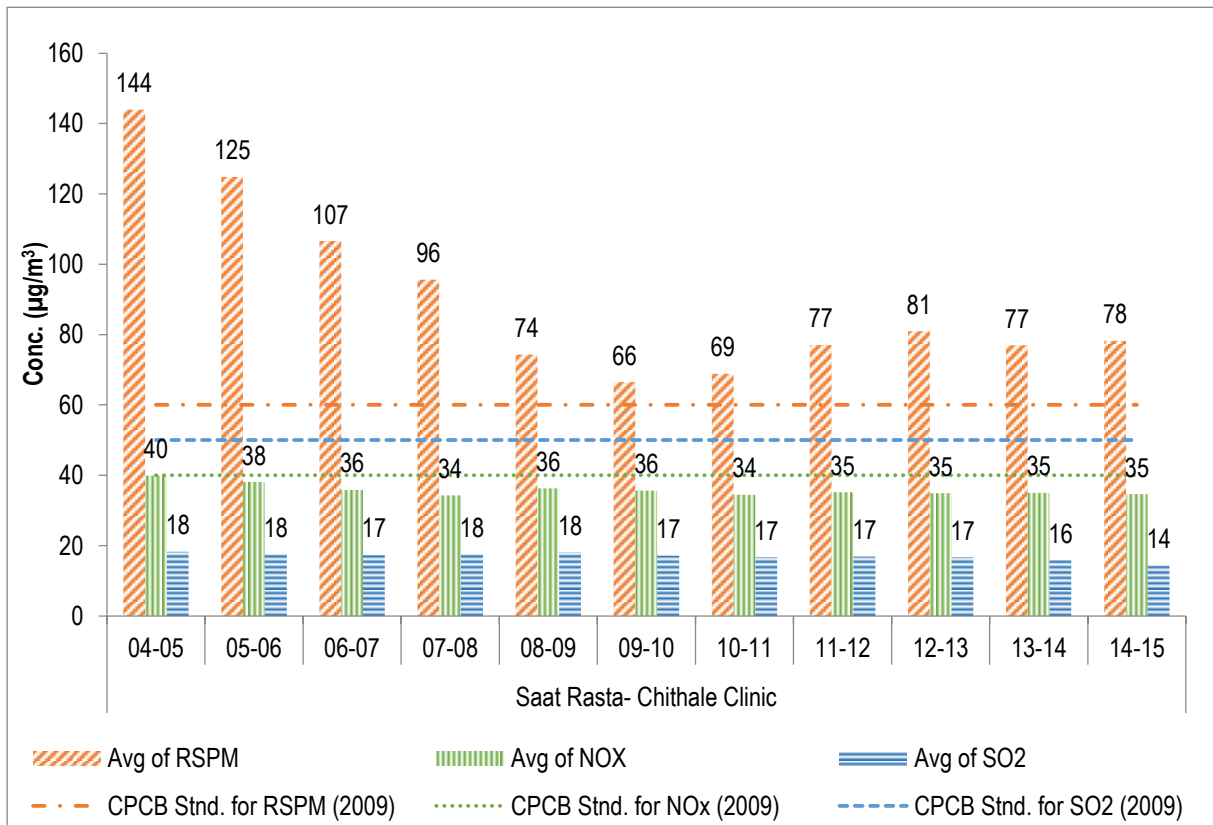
Figure No. 158: Annual average trend of SO₂, NOₓ, and RSPM at Saat Rasta – Chithale Clinic

Solapur - Solapur

Table No. 159: Data for monthly average reading recorded at Solapur

FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NO$_X$	SO$_2$
Apr	27	117	51	15
May	29	88	44	15
Jun	27	67	26	8
Jul	28	42	23	7
Aug	31	47	19	7
Sep	27	69	24	7
Oct	28	108	34	8
Nov	26	140	43	8
Dec	29	174	48	9
Jan	28	158	59	8
Feb	28	139	49	9
Mar	28	108	37	8
	336	49.7	0.9	0.0

Figure No. 159: Monthly average reading recorded at Solapur

Table No. 160: Data for annual average trend of SO₂, NOₓ, and RSPM at Solapur

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07				
07-08	195	102	31	15
08-09	231	96	30	15
09-10				
10-11	250	112	37	13
11-12	359	116	40	12
12-13	351	106	42	16
13-14	356	96	42	15
14-15	336	104	38	9
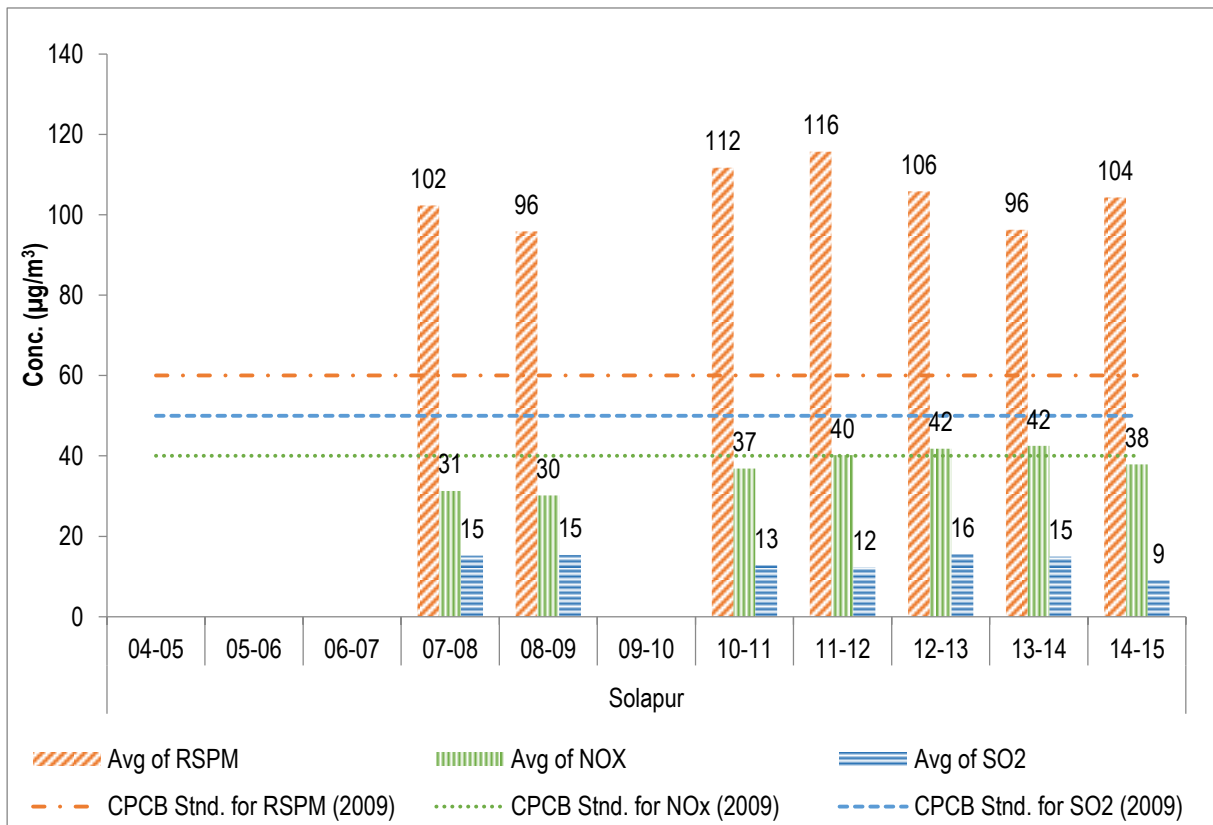
Figure No. 160: Annual average trend of SO₂, NOₓ, and RSPM at Solapur

% occurence for the classes for AQI across Pune RO

Legend:
- Good (0-50)
- Satisfactory (51-100)
- Moderately polluted (101-200)
- Poor (201-300)
- Very Poor (301-400)
- Severe (401+)
- Benchmark (98%)

Categories (Pune):
Bhosari (99), Nal Stop (95), Swargate, Pune (106), Pimpri-Chinchwad - BOB Building (291), Karve Road - CAAQMS (329), Saat Rasta-Chithale Clinic (98), WIT Campus (96), Solapur (336)
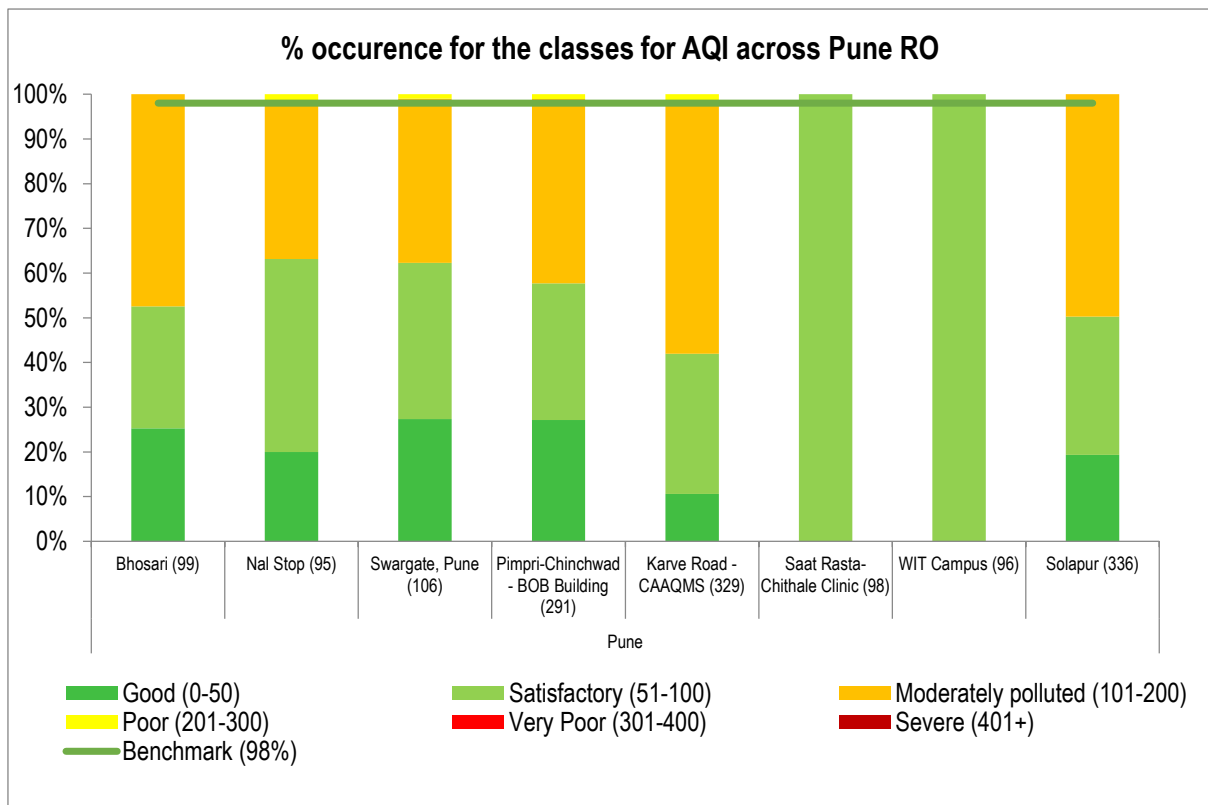
RO – Raigad

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. 161: Data for monthly average reading recorded at Panvel – Water Supply Plant

FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NOX	SO2
Apr	9	191	47	17
May	9	189	43	18
Jun	8	121	29	12
Jul	9	78	27	14
Aug	9	90	25	15
Sep	8	144	35	16
Oct	9	147	35	17
Nov	9	130	44	17
Dec	9	117	45	20
Jan	9	139	46	20
Feb	8	147	41	19
Mar	8	140	42	19
	104	76.9	0.0	0.0

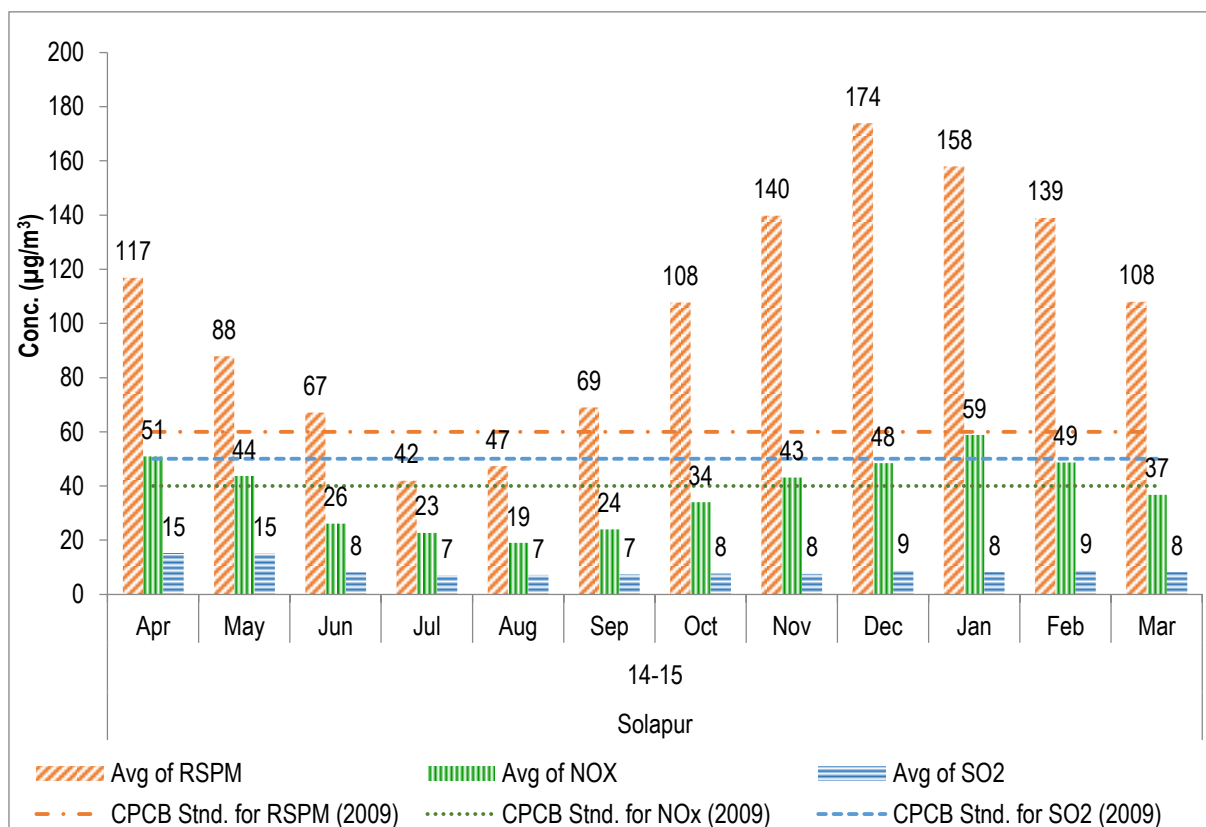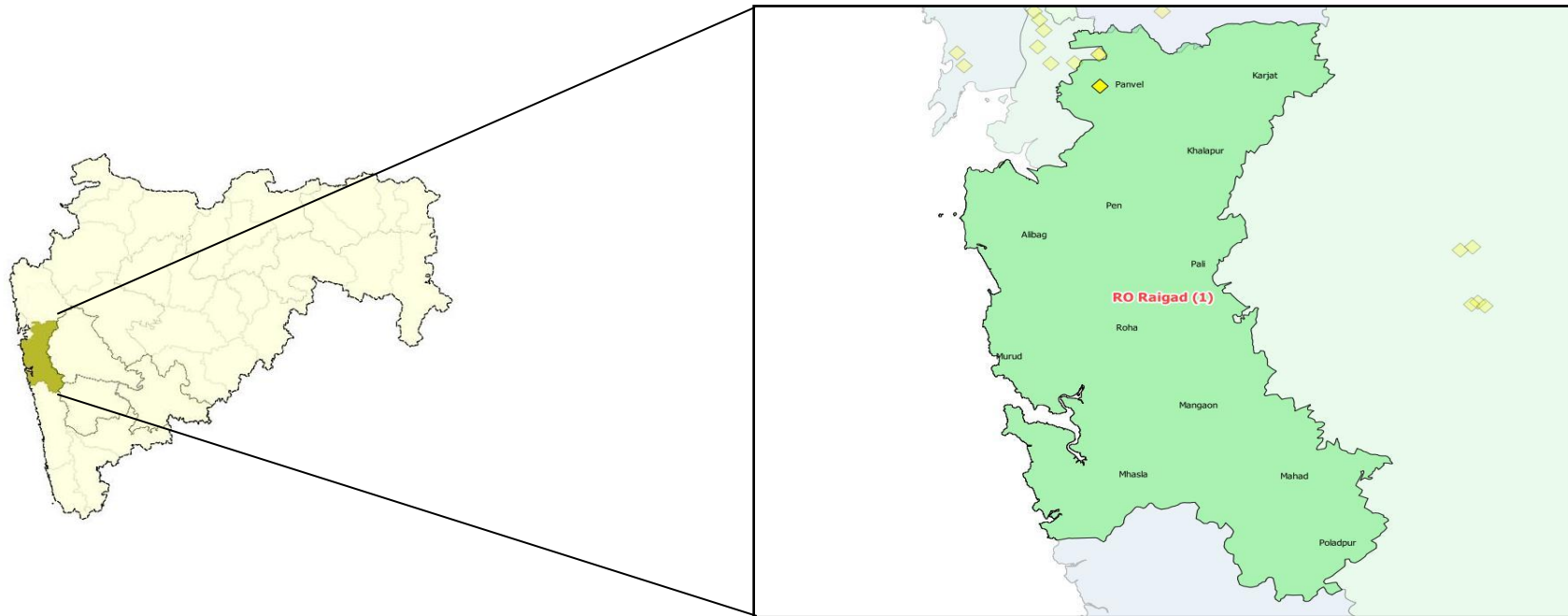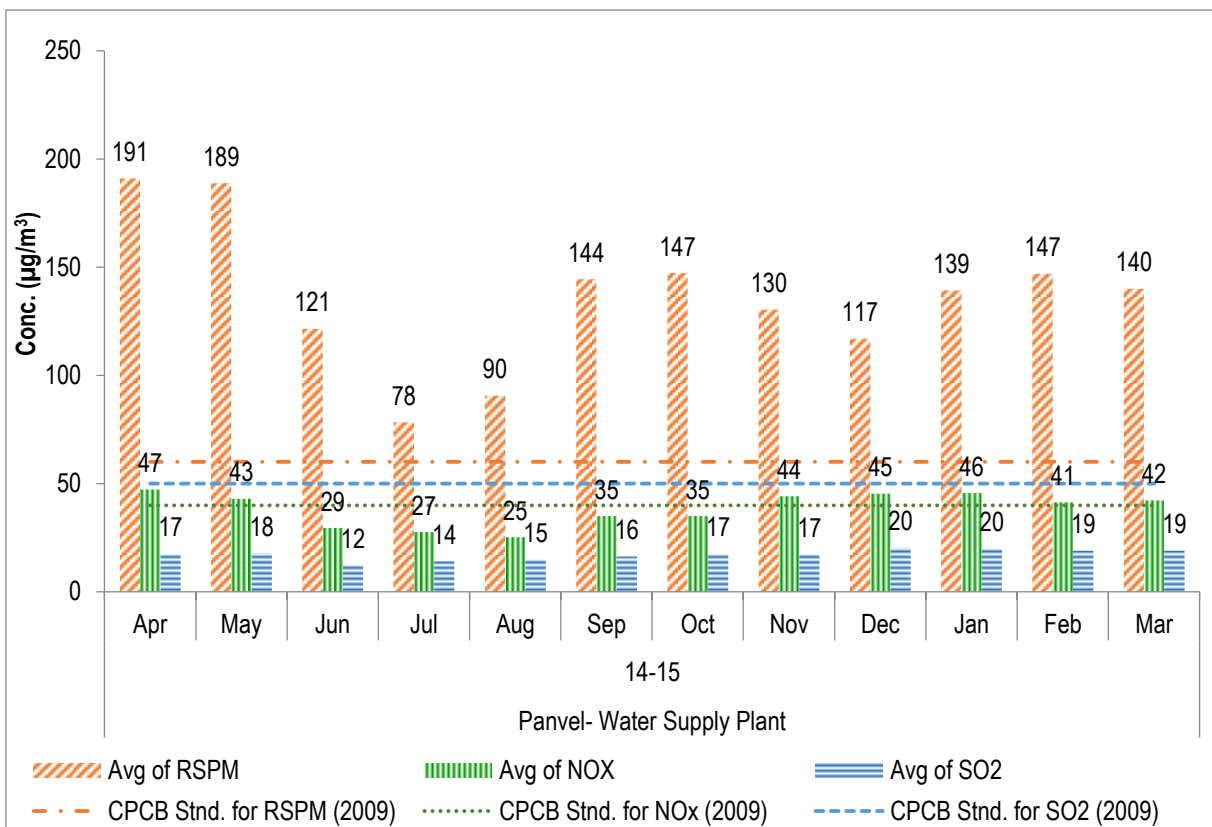**Figure No. 161: Monthly average reading recorded at Panvel – Water Supply Plant**

Table No. 162: Data for annual average trend of SO₂, NOₓ, and RSPM at Panvel – Water Supply Plant

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07	71	115	35	14
07-08	119	143	37	12
08-09	106	132	40	14
09-10	102	71	42	12
10-11	100	119	35	15
11-12	97	140	42	15
12-13	103	168	42	16
13-14	78	203	41	16
14-15	104	136	38	17
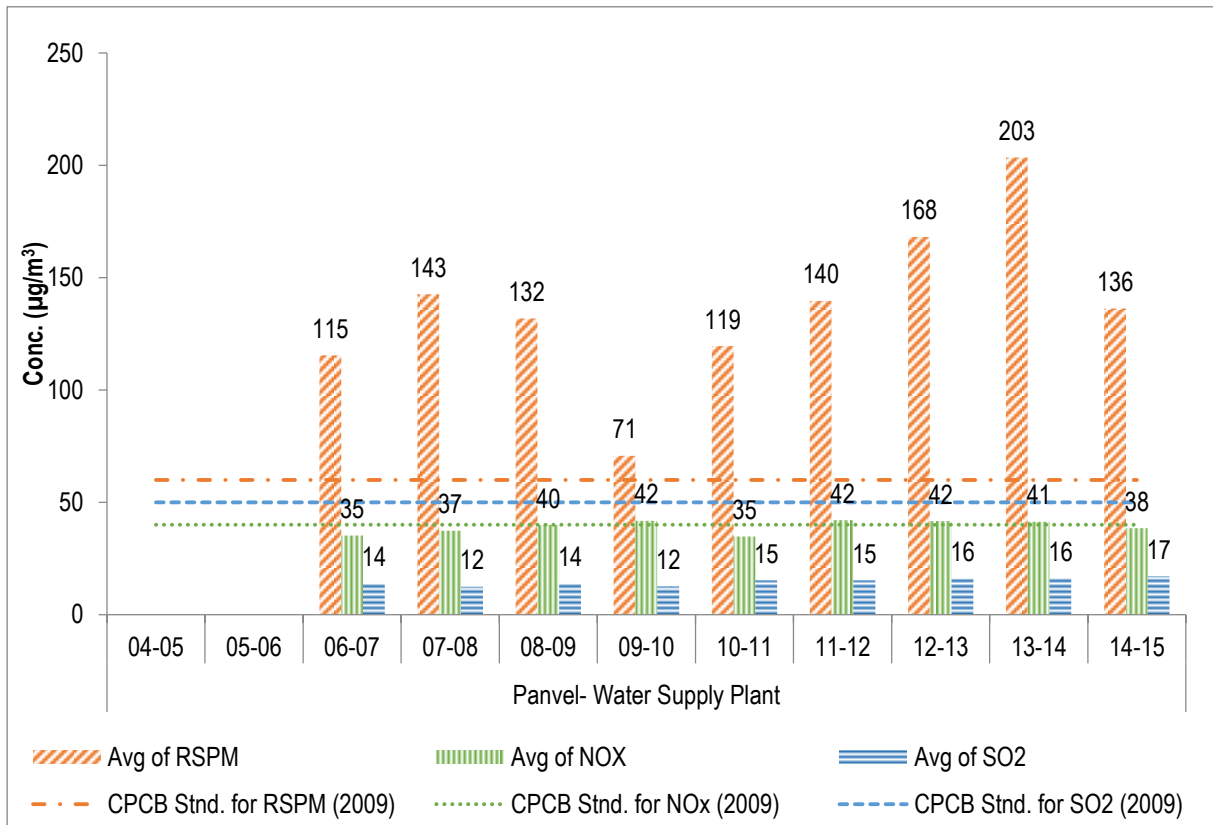
Figure No. 162: Annual average trend of SO₂, NOₓ, and RSPM at Panvel – Water Supply Plant

% occurence for the classes for AQI across Raigad RO

Panvel- Water Supply Plant (104)

Raigad

- Good (0-50)
- Satisfactory (51-100)
- Moderately polluted (101-200)
- Poor (201-300)
- Very Poor (301-400)
- Severe (401+)
- Benchmark (98%)

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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	305	Kolshet	Industrial	19° 13' 12.4" N	72° 59' 19.4" E
	Thane		Balkum/Glaxo	Industrial	19° 13' 05.8" N	72° 57' 59.7" E

Thane – Kopri

Table No. 163: Data for monthly average reading recorded at Kopri

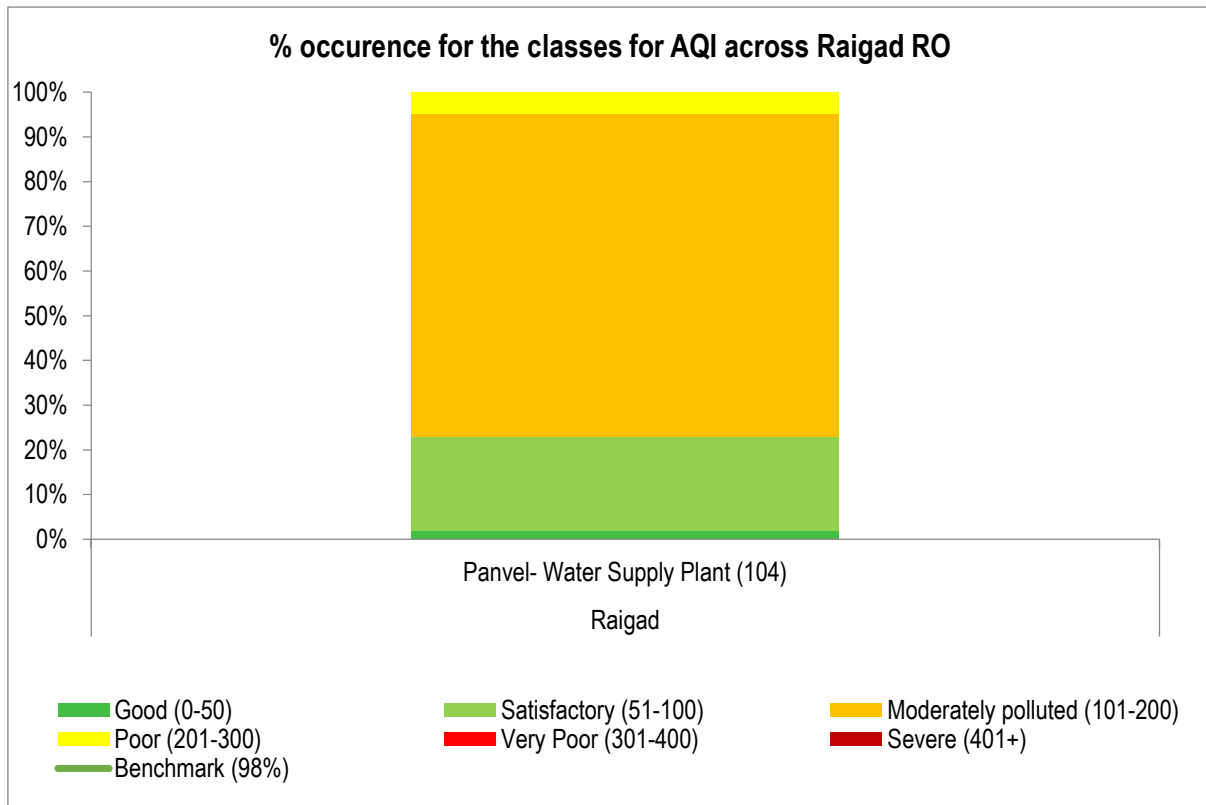| FY 2014-15	N	Monthly average (μg/m³)		
		RSPM	NOₓ	SO₂
Apr	*7*	111	61	19
May	*10*	109	70	20
Jun	*8*	110	66	18
Jul	*9*	58	59	14
Aug	*9*	61	63	12
Sep	*8*	58	58	12
Oct	*10*	122	57	15
Nov	*2*	115	51	16
Dec	*8*	127	62	30
Jan	*9*	130	61	34
Feb	*8*	140	62	26
Mar	*10*	140	60	29
	98	58.2	0.0	0.0

Figure No. 163: Monthly average reading recorded at Kopri

222

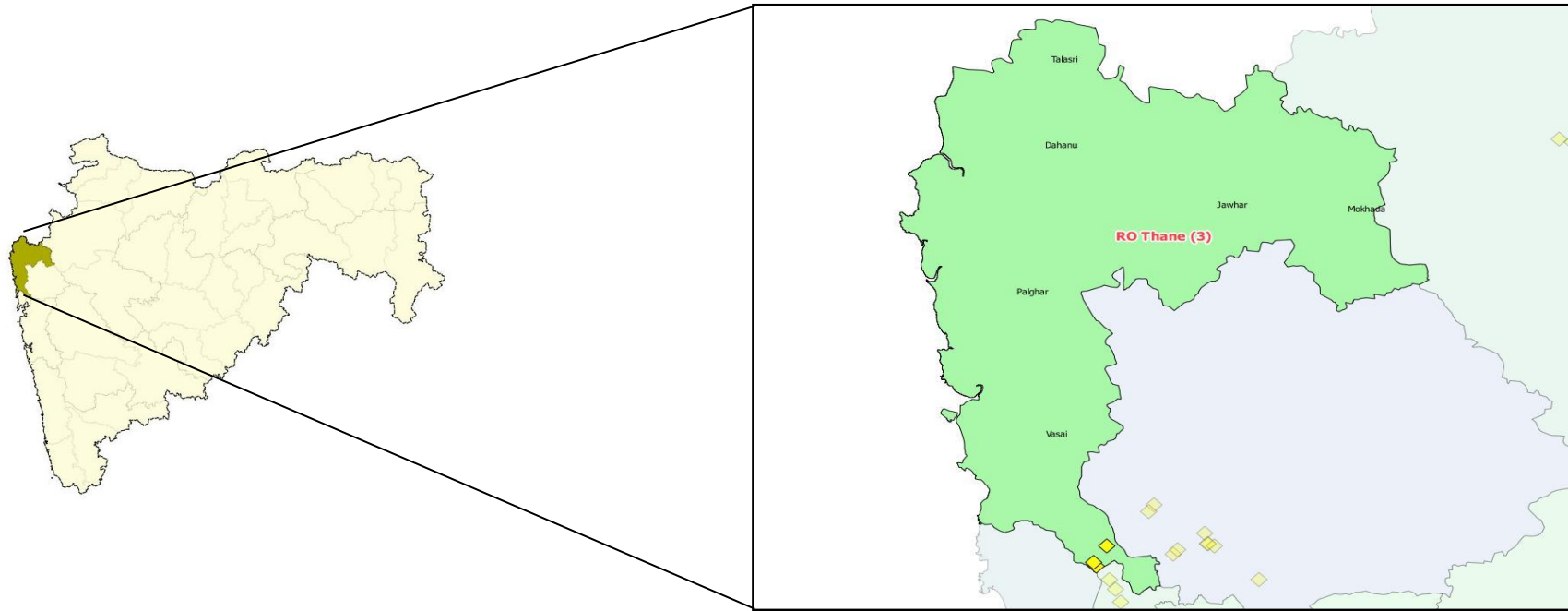**Table No. 164: Data for annual average trend of SO₂, NOₓ, and RSPM at Kopri station**

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05		45	11	8
05-06	97	51	9	6
06-07	111	51	10	12
07-08	111	50	10	11
08-09	103	60	16	11
09-10	97	50	13	11
10-11	117	46	11	12
11-12	123	60	9	12
12-13	110	86	15	20
13-14	108	114	41	16
14-15	98	106	61	21

Figure No. 164: Annual average trend of SO₂, NOₓ, and RSPM at Kopri station

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महाराष्ट्र प्रदूषण नियंत्रण मंडळ

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Thane - Naupada

Table No. 165: Data for monthly average reading recorded at Naupada

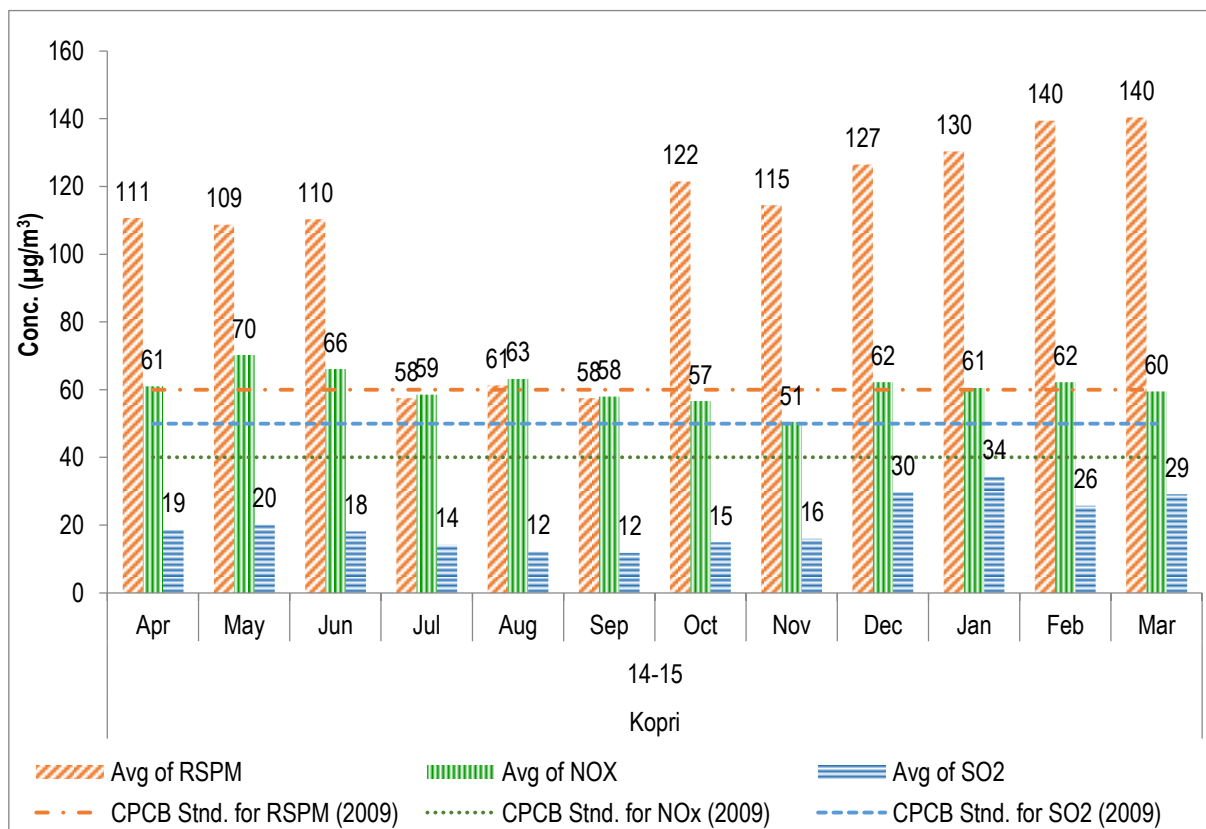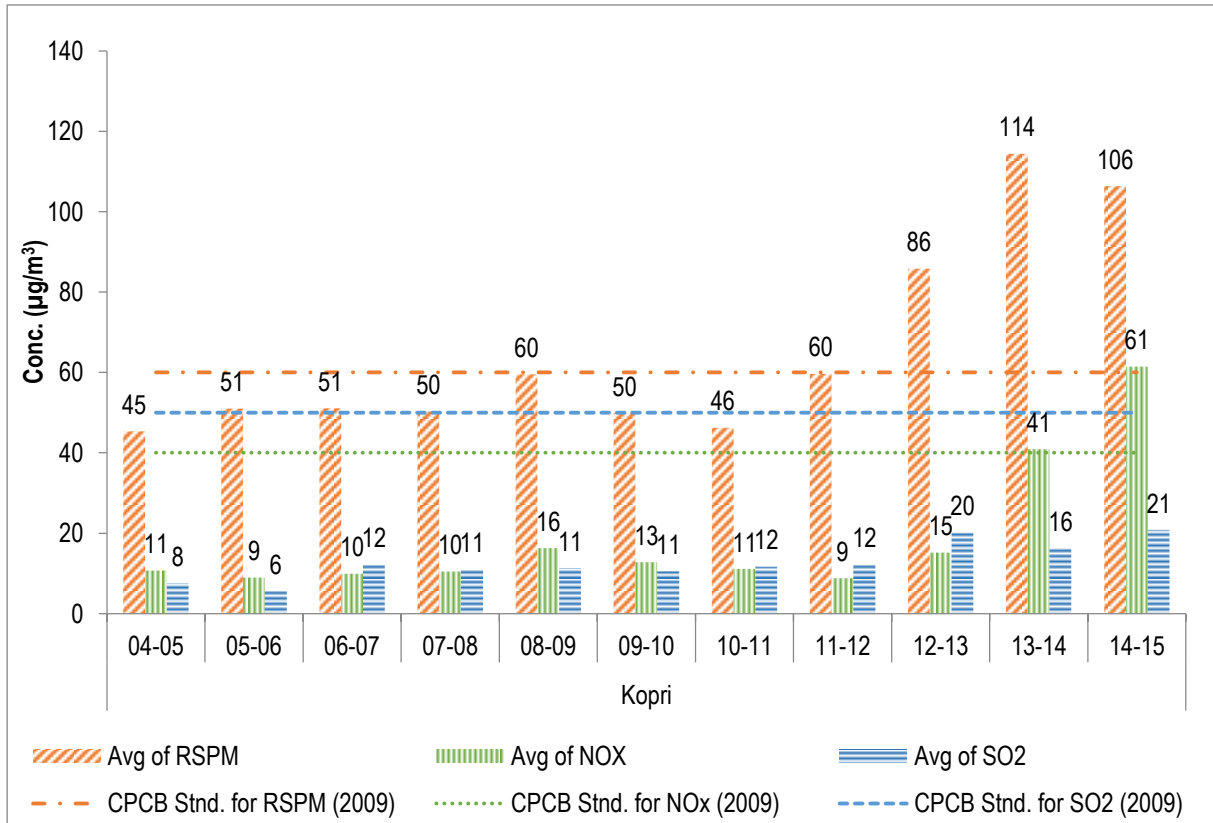| FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NO$_X$	SO$_2$
Apr	10	137	66	20
May	8	100	73	21
Jun	9	94	66	20
Jul	8	62	56	15
Aug	9	57	62	12
Sep	9	67	57	12
Oct	9	121	59	18
Nov	4	115	53	18
Dec	9	128	60	28
Jan	8	122	60	30
Feb	8	125	64	32
Mar	8	125	63	31
	99	54.5	0.0	0.0
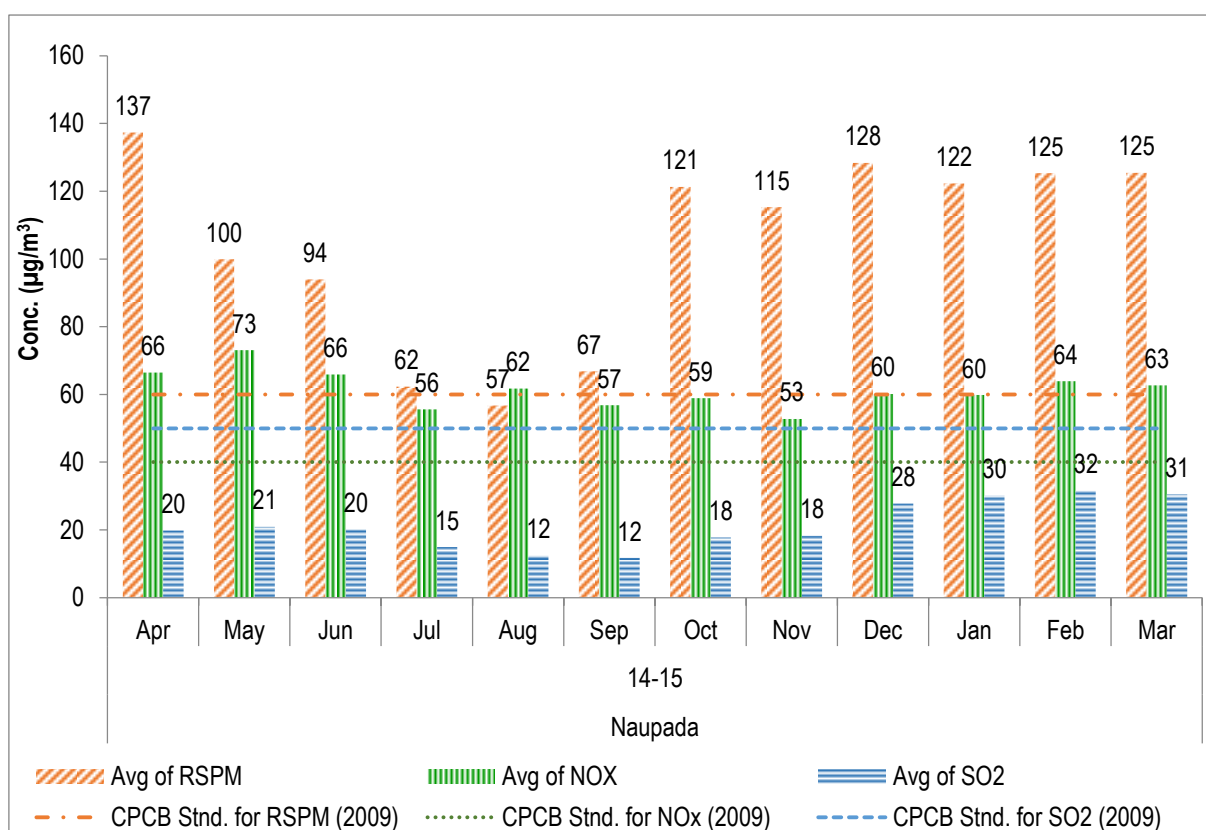
Figure No. 165: Monthly average reading recorded at Naupada

Table No. 166: Data for annual average trend of SO₂, NOₓ, and RSPM at Naupada

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05		46	11	8
05-06	*98*	51	10	6
06-07	*105*	52	9	12
07-08	*104*	50	10	11
08-09	*100*	60	15	11
09-10	*112*	55	21	14
10-11	*122*	48	13	14
11-12	*123*	56	10	13
12-13	*103*	93	16	21
13-14	*99*	113	43	17
14-15	*99*	104	62	21
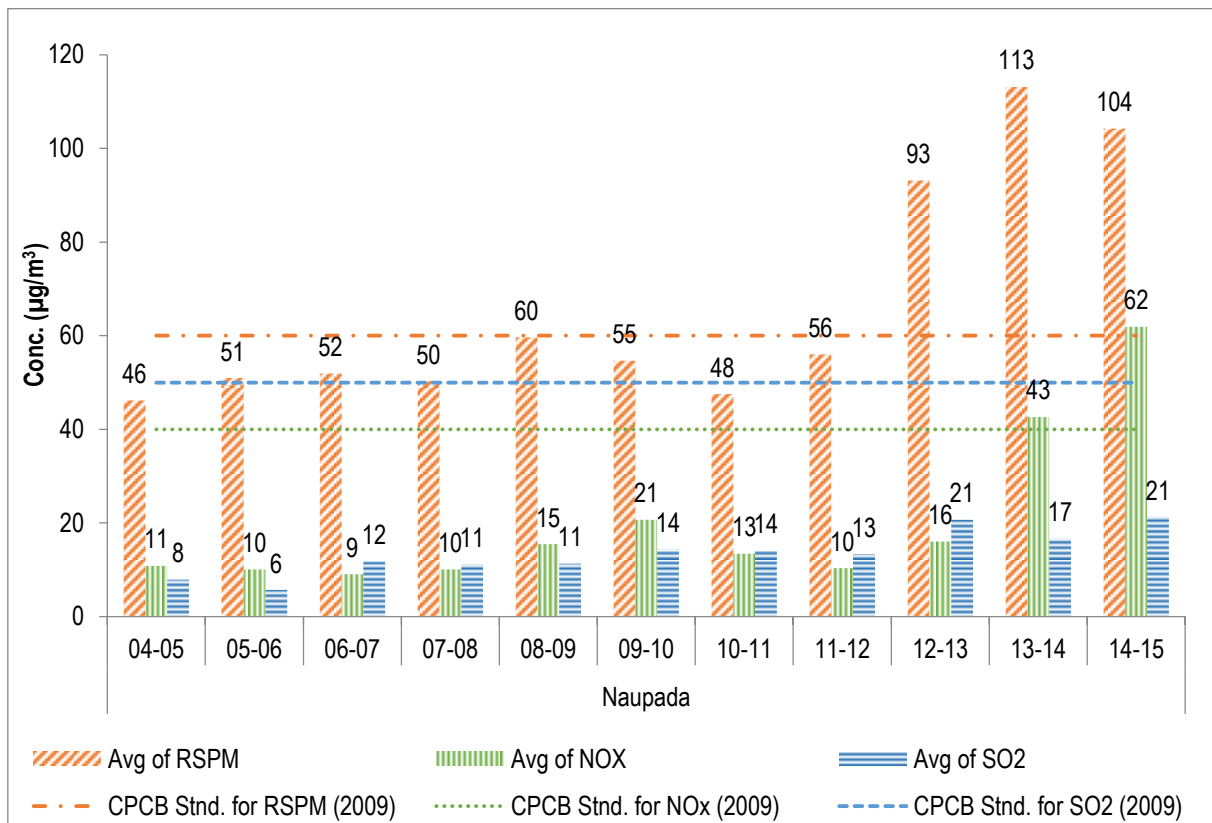
Figure No. 166: Annual average trend of SO₂, NOₓ, and RSPM at Naupada

Thane - Kolshet

Table No. 167: Data at monthly average reading recorded at Kolshet

This station was non-functional in 2014-15
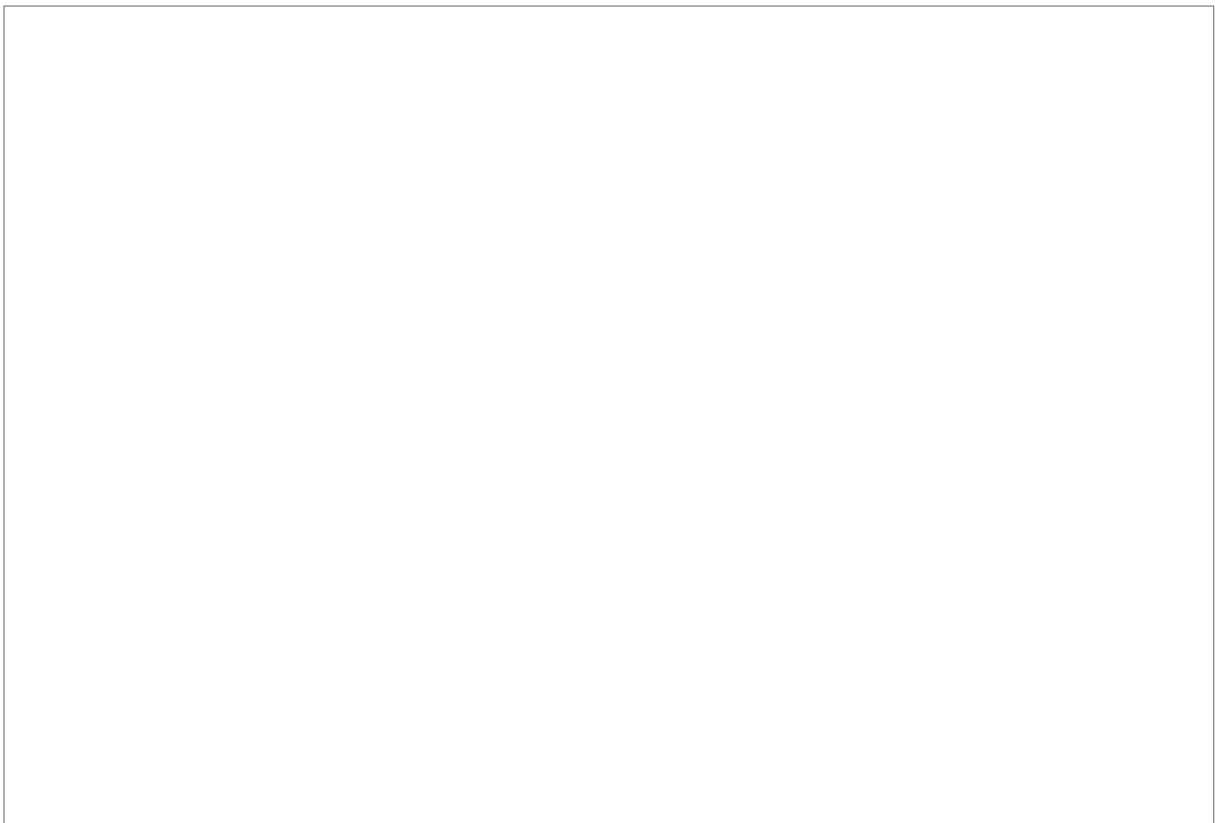
Figure No. 167: Monthly average reading recorded at Kolshet

Table No. 168: Data for annual average trend of SO₂, NOₓ, and RSPM at Kolshet

Year	N	Annual average ($\mu g/m^3$)		
		RSPM	NO$_X$	SO$_2$
04-05		48	12	9
05-06	85	51	10	6
06-07	91	63	11	13
07-08	96	53	14	14
08-09	94	63	21	15
09-10	80	57	21	13
10-11	21	48	13	12
11-12	45	57	13	19
12-13	97	73	14	18
13-14				
14-15				
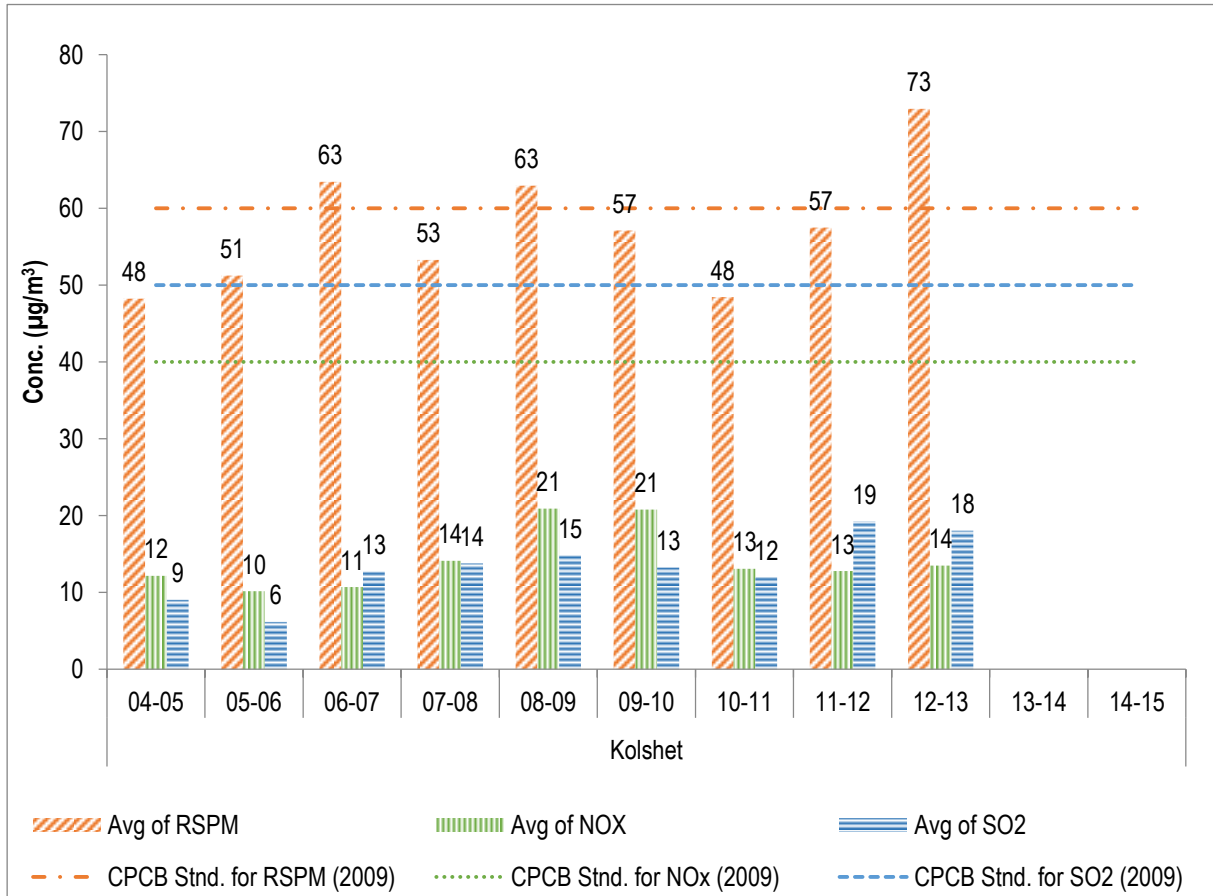
Figure No. 168: Annual average trend of SO₂, NOₓ, and RSPM at Kolshet

Thane – Balkum Glaxo

Table No. 169: Data for monthly average reading recorded at Balkum Glaxo

FY	N	Monthly average (µg/m³)		
2014-15		RSPM	NOₓ	SO₂
Apr	9	185	63	21
May	9	141	69	21
Jun	8	177	63	17
Jul	9	58	57	15
Aug	8	70	56	12
Sep	9	70	59	11
Oct	10	120	54	18
Nov	2	167	55	15
Dec	10	163	59	24
Jan	8	137	58	28
Feb	8	166	63	29
Mar	8	148	57	30
	98	71.4	0.0	0.0
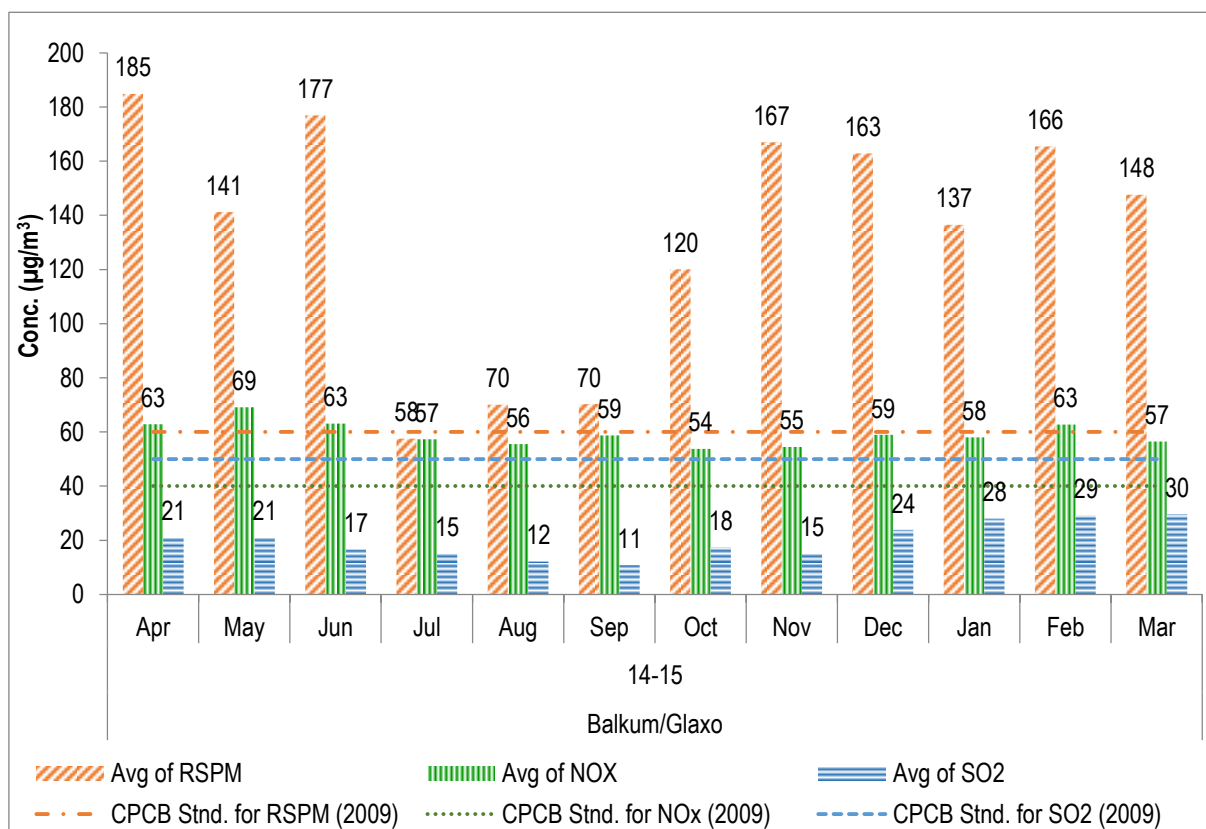
Figure No. 169: Monthly average reading recorded at Balkum Glaxo

Table No. 170: Data for annual average trend of SO₂, NOₓ, and RSPM at Balkum Glaxo

Year	N	Annual average (µg/m³)		
		RSPM	NOₓ	SO₂
04-05				
05-06				
06-07				
07-08				
08-09				
09-10				
10-11				
11-12				
12-13				
13-14	90	107	34	15
14-15	98	131	60	20
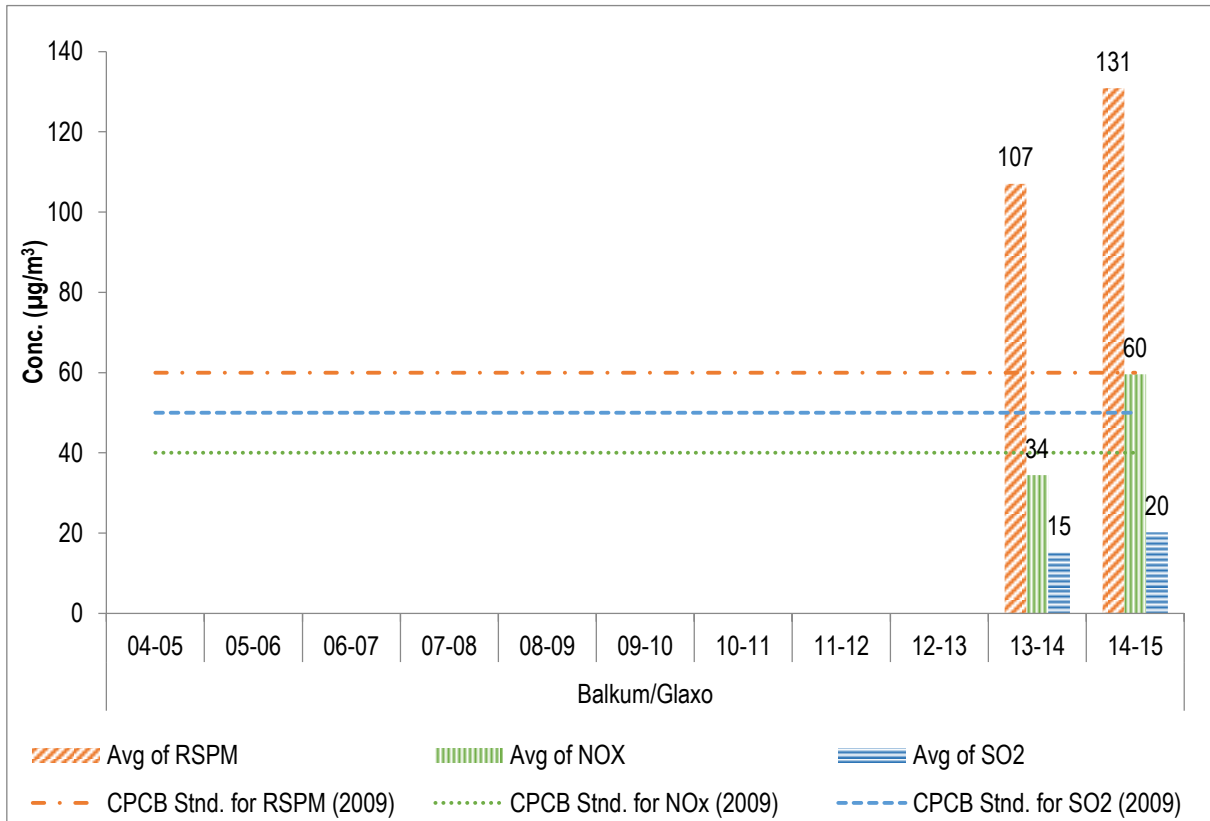
Figure No. 170: Annual average trend of SO₂, NOₓ, and RSPM at Balkum Glaxo

Maharashtra Pollution Control Board
महाराष्ट्र प्रदूषण नियंत्रण मंडळ

% occurence for the classes for AQI across Thane RO

Legend:
- Good (0-50)
- Satisfactory (51-100)
- Moderately polluted (101-200)
- Poor (201-300)
- Very Poor (301-400)
- Severe (401+)
- Benchmark (98%)

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teri
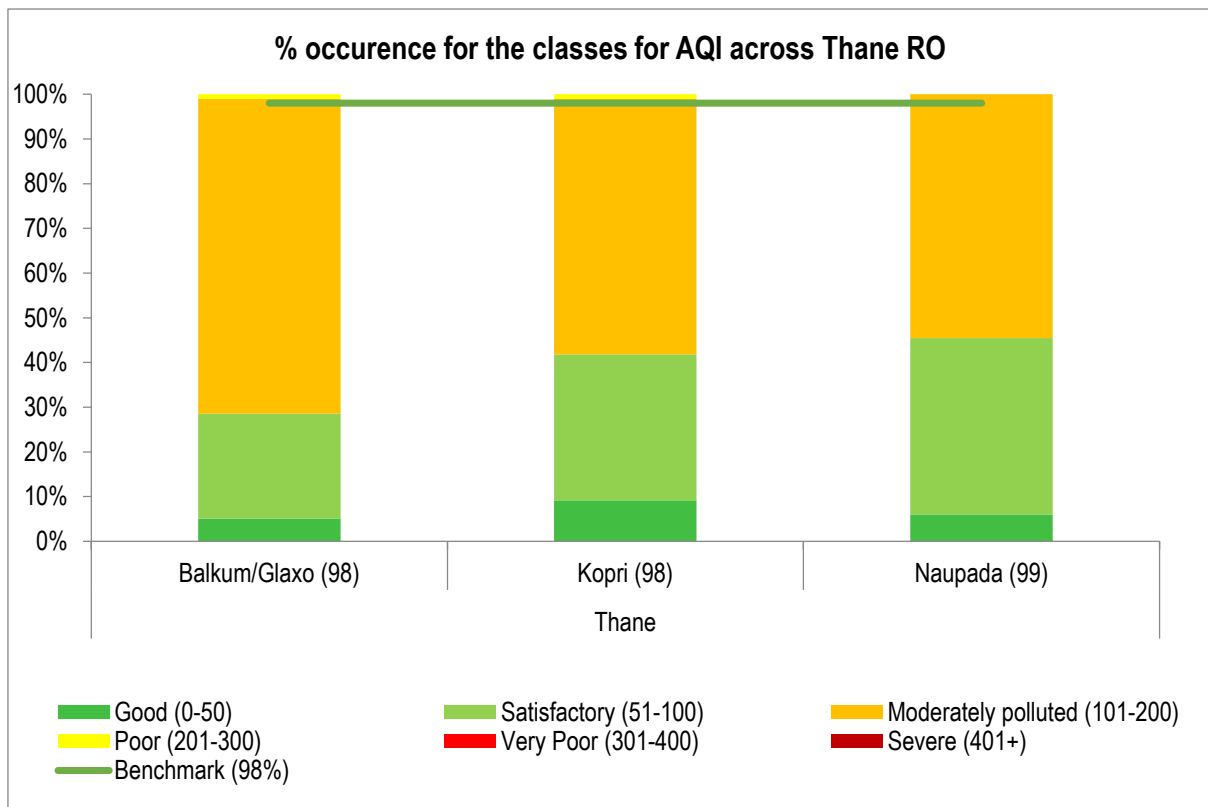
रजिस्ट्री सं॰ डी॰ एल॰-33004/99

REGD. NO. D. L.-33004/99

भारत का राजपत्र
The Gazette of India

असाधारण

EXTRAORDINARY

भाग III—खण्ड 4

PART III—Section 4

प्राधिकार से प्रकाशित

PUBLISHED BY AUTHORITY

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, रिहायशी, ग्रामीण और अन्य क्षेत्र	पारिस्थितिकीय संवेदनशील क्षेत्र (केन्द्र सरकार द्वारा अधिसूचित)	प्रबोधन की पद्धति
(1)	(2)	(3)	(4)	(5)	(6)
1	सल्फर डाई आक्साइड (SO₂), µg/m³	वार्षिक*	50	20	-उन्नत वेस्ट और गाईक
		24 घंटे**	80	80	-पराबैंगनी परिदीप्ती
2	नाइट्रोजन डाई आक्साइड (NO₂), µg/m³	वार्षिक*	40	30	-उपांतरित जैकब और हॉचाइजर (सोडियम-आर्सेनाईट)
		24 घंटे**	80	80	-रासायनिक संदीप्ति
3	विविक्त पदार्थ (10माइक्रान से कम आकार)या PM₁₀, µg/m³	वार्षिक*	60	60	-हरात्मैक विश्लेषण
		24 घंटे**	100	100	-टेयम
					-बीटा तनुकरण पद्धति

2   THE GAZETTE OF INDIA : EXTRAORDINARY   [PART III—SEC. 4]

4	विविक्त पदार्थ (2.5 माइक्रान से कम आकार या $PM_{2.5}$, $\mu g/m^3$	वार्षिक* 24 घंटे**	40 60	40 60	-हरात्मक विश्लेषण -टोयम -बीटा तनुकरण पद्धति
5	ओज़ोन (O_3) $\mu g/m^3$	8 घंटे** 1 घंटा**	100 180	100 180	-पराबैंगनी द्वीप्तिकाल -रासायनिक संदीप्ति -रासायनिक पद्धति
6	सीसा (Pb) $\mu g/m^3$	वार्षिक* 24 घंटे**	0.50 1.0	0.50 1.0	ई.पी.एम 2000 या समरूप फिल्टर पेपर का प्रयोग करके AAS/ICP पद्धति -टेफ्लॉन फिल्टर पेपर का प्रयोग करते हुए ED-XRF
7	कार्बन मोनोक्साइड (CO) mg/m^3	8 घंटे** 1 घंटा**	02 04	02 04	-अविपेशी अवरक्त (NDIR) स्पैक्ट्रम मापन
8	अमोनिया (NH_3) $\mu g/m^3$	वार्षिक* 24 घंटे**	100 400	100 400	-रासायनिक संदीप्ति -इण्डोफिनॉल ब्ल्यू पद्धति
9	बैन्ज़ीन (C_6H_6) $\mu g/m^3$	वार्षिक*	05	05	- गैस क्रोमेटोग्राफी आधारित सतत् विश्लेषक -अधिशोषण तथा निशोषण के बाद गैस क्रोमेटोग्राफी
10	बैन्जो (ए) पाईरीन (BaP) केवल विविक्त कण, ng/m^3	वार्षिक*	01	01	-विलायक निष्कर्षण के बाद HPLC/GC द्वारा विश्लेषण
11	आर्सेनिक (As) ng/m^3	वार्षिक*	06	06	-असंवितरक अवरक्त स्पैक्ट्रमिती ई.पी.एम. 2000 या समरूप फिल्टर पेपर का प्रयोग करके ICP/AAS पद्धति
12	निकिल (Ni) 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 अंकगणितीय 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, ऊपर विनिर्दिष्ट सीमा से अधिक हो तो इसे नियमित या निरन्तर प्रबोधन तथा अतिरिक्त अन्वेषण करवाने के लिये पर्याप्त कारण समझा जायेगा ।

संत प्रसाद गौतम, अध्यक्ष
[विज्ञापन-III/4/184/09/अस.]

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 ।

[भाग III—खण्ड 4] भारत का राजपत्र : असाधारण 3

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		Methods of Measurement
			Industrial, Residential, Rural and Other Area	Ecologically Sensitive Area (notified by Central Government)	
(1)	(2)	(3)	(4)	(5)	(6)
1	Sulphur Dioxide (SO₂), µg/m³	Annual*	50	20	- Improved West and Gaeke
		24 hours**	80	80	-Ultraviolet fluorescence
2	Nitrogen Dioxide (NO₂), µg/m³	Annual*	40	30	- Modified Jacob & Hochheiser (Na-Arsenite)
		24 hours**	80	80	- Chemiluminescence
3	Particulate Matter (size less than 10µm) or PM₁₀ µg/m³	Annual*	60	60	- Gravimetric
		24 hours**	100	100	- TOEM - Beta attenuation
4	Particulate Matter (size less than 2.5µm) or PM₂.₅ µg/m³	Annual*	40	40	- Gravimetric - TOEM
		24 hours**	60	60	- Beta attenuation
5	Ozone (O₃) µg/m³	8 hours**	100	100	- UV photometric - 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
		24 hours**	1.0	1.0	- ED-XRF using Teflon filter
7	Carbon Monoxide (CO) mg/m³	8 hours**	02	02	- Non Dispersive Infra Red (NDIR)
		1 hour**	04	04	spectroscopy
8	Ammonia (NH₃) µg/m³	Annual*	100	100	-Chemiluminescence
		24 hours**	400	400	-Indophenol blue method

Maharashtra Pollution Control Board
महाराष्ट्र प्रदूषण नियंत्रण मंडळ

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(1)	(2)	(3)	(4)	(5)	(6)
9	Benzene (C_6H_6) µg/m³	Annual*	05	05	- Gas chromatography based continuous analyzer - Adsorption and Desorption followed by GC analysis
10	Benzo(a)Pyrene (BaP) - particulate phase only, ng/m³	Annual*	01	01	- Solvent extraction followed by HPLC/GC analysis
11	Arsenic (As), ng/m³	Annual*	06	06	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper
12	Nickel (Ni), ng/m³	Annual*	20	20	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper

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

** 24 hourly or 08 hourly 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.

Maharashtra Pollution Control Board
महाराष्ट्र प्रदूषण नियंत्रण मंडळ

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