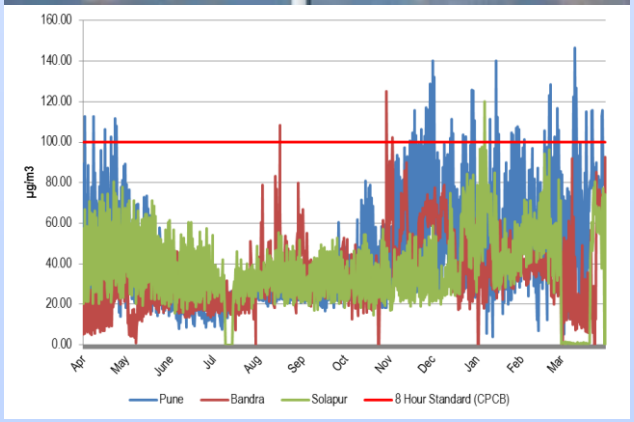
Air Quality Status of Maharashtra



2013-14

Maharashtra Pollution Control Board
महाराष्ट्र प्रदूषण नियंत्रण मंडळ

The Energy & Resources Institute

Air Quality Status of Maharashtra – 2013-14

(Compilation of Air Quality Data Recorded by MPCB)

May 2014

Maharashtra Pollution Control Board

महाराष्ट्र प्रदूषण नियंत्रण मंडळ

Prepared by

The Energy and Resources Institute

...towards global sustainable development

राजीव कुमार मित्तल भाप्रसे
सदस्य सचिव
Rajeev Kumar Mital IAS
MEMBER SECRETARY

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 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 2013-14 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.

(Rajeev Kumar Mital, IAS)
Member Secretary

May' 2014

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Abbreviations

AAQM	Ambient Air Quality Monitoring
AAQMS	Ambient Air Quality Monitoring Stations
ALRI	Acute Lower Respiratory Infections
AMR	Amravati
AQI	Air Quality Index
Ar	Argon
AUR	Aurangabad
CAAQMS	Continuous Ambient Air Quality Monitoring Stations
CDP	Chandrapur
CH_4	Methane
CIDCO	City and Industrial Development Corporation of Maharashtra Ltd
CO	Carbon Monoxide
CO_2	Carbon-di-oxide
CPCB	Central Pollution Control Board
GoM	Government of Maharashtra
H_2	Hydrogen
He	Helium
KOP	Kolhapur
Kr	Krypton
Max	Maximum
MIDC	Maharashtra Industrial Development Corporation
Min	Minimum
MPCB	Maharashtra Pollution Control Board
MVD	Motor Vehicle Department
N_2	Nitrogen
NAAQM	National Ambient Air Quality Monitoring
NAMP	National Air Monitoring Program
Ne	Neon
NEERI	National Environmental Engineering Research Institute
NGP	Nagpur
NHK	Nashik

NOX	Oxides of Nitrogen
NVM	Navi Mumbai
O_2	Oxygen
O_3	Ozone
Pb	Lead
PM	Particulate Matter
PM_{10}	Particulate Matter less than 10 microns
$PM_{2.5}$	Particulate Matter less than 2.5 microns
PUN	Pune
RO	Regional Office
RGD	Raigad
RSPM	Respirable Suspended Particulate Matter
SAMP	State Air Monitoring Program
RSPM	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

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Executive Summary

Air pollution has been one of the major factors affecting the environment with the advent of industrialization and urbanization. Anthropogenic activities like combustion of fossil fuels, construction, mining, agriculture and so on are attributed to be the major sources for air pollution. Globally, motor vehicle emissions are known to be one of the leading sources of increasing air pollution, while the major point sources for air pollution include chemical plants, coal-fired power plants, oil refineries, petrochemical plants, use of incinerators, metal production factories, plastic factories and other heavy industries. Since air pollution directly impacts humans and other life forms, there is a dire need to keep a watch on the air pollution levels and take pro-active initiatives to curb the same.

As per Census of India 2011, the state of Maharashtra accounts for more than 13% of India's urban population and contributes more than 15% to the country's industrial output (World Bank). Maharashtra state has the highest number of registered vehicles and also consumes the maximum amount of fossil fuels in the country (Indian Petroleum & Natural Gas Statistics 2012-13[1]). Combustion of fossil fuels like coal, petrol, diesel and so on to meet the energy demands for electricity generation and vehicular movement are considered the major reasons for air pollution. In this scenario, Maharashtra state needs to keep a tab on the air pollution levels and MPCB (Maharashtra Pollution Control Board) has been taking action oriented initiatives to monitor, regulate, mitigate and reduce the emissions since the implementation of the Air act in 1981 in the state.

MPCB has installed various Ambient Air Quality Monitoring Stations (AAQMS) across the state under the NAMP (National Air Monitoring Program) and SAMP (State Air Monitoring Program) to regularly monitor the ambient air quality. As on March 2014, there were 72 active AAQMS in Maharashtra under NAMP (62), SAMP (4) and Continuous AAQMS (CAAQMS) (6). Apart from these there are a few more AAQMS under NAMP, which are regulated and monitored by NEERI (National Environmental Engineering Research Institute). SO_2 (Sulphur Dioxide), NO_x (Oxides of Nitrogen) and RSPM (Respirable Suspended Particulate Matter) are monitored across all the AAQMS. Other air pollutants like CO (Carbon Monoxide), Ozone, Benzene, Toluene and Xylene were monitored at 2 CAAQMS locations namely Bandra and Pune while only CO and Ozone were monitored at Solapur CAAQMS.

This report also presents an illustrative compilation of the daily, monthly and annual data recorded by the AAQMS in Maharashtra for the SO_2, NOx and RSPM levels in the year 2013-14. A special section on region (MPCB regional office jurisdiction) wise trends has been presented for the major pollutants to illustrate the trend for the air quality in the state. Further a comprehensive comparison for all the AAQMS at a glance, so as to have a glimpse of the overall performance of the areas in terms of the quality of air, the AQI (Air Quality Index) has been developed and presented in the report for the year 2013-14.

[1] Government of India, Ministry of Petroleum & Natural Gas, Indian Petroleum & Natural Gas Statistics (2012-13), Table V5 - State-wise Consumption of Major Petroleum Products During 2012-13 (Prov), pps 79-80

Sulphur –dioxide

The SO_2 concentrations in Maharashtra have been below the annual standard (NAAQS 2009) across all the regions for the past few years. However, the Kalyan region which comprises of industrial areas like Dombivali, Ambernath, Baldapur and so on have recorded the highest SO_2 concentrations as compared to any other region in Maharashtra. In the year 2013-14 four out of nine AAQMS representing areas of Kalyan RO were amongst the top five regions (Table No. 1) which recorded highest annual concentrations for SO_2.

The industrial area of Nanded, is one of the most severely affected areas by SO_2 pollution and recorded an average SO_2 concentration of 48µg/m³ in 2013-14. The 98th percentile readings in Dombivali MIDC area ranged between 93–110 µg/m³ indicating that at certain days the area violated the daily standards (80µg/m³). In terms of AQI for SO_2 concentrations, the above regions recorded moderate air quality for 5 to 8percent of the observations.

Table No. 1: Top five AAQMS which recorded highest annual average SO_2 concentration (2013-14)

MPCB RO	Region	Station name	SO_2 (µg/m³) (Annual standard 50µg/m³)
Aurangabad	Nanded	Industrial Area CIDCO	48
Kalyan	Dombivali	Dombivali	35
Kalyan	Badlapur	Badlapur - BIWA House	35
Kalyan	Ulhasnagar	Powai Chowk	33
Kalyan	Dombivali	MIDC Office Dombivali	32

Oxides of Nitrogen

As compared to SO_2 concentrations, NOx concentrations exceeded the annual standard (40µg/m³), at more than 25 locations while at 6 locations the annual observations were very close (38-40µg/m³) to the annual standard.

The AAQMS at Sion (Mumbai) recorded the highest annual concentrations of about 106µg/m³, more than 2.5 times the annual NOx standard. This AAQMS has consistently violated the NOx standards for more than past 8-10 years. Similarly the monitoring at Bandra (Mumbai) has also been exceeding the NOx annual standards for the past 5-6 years. Vehicular emissions coupled with traffic congestion and slow moving traffic could be attributed to high NOx concentrations in Mumbai city.

The Kalyan region recorded high NOx concentrations, with 5 out of 9 AAQMS in Kalyan RO exceeding the annual NOx concentrations (Table No. 2). AAQMS representing industrial regions of Dombivali, Ambernath and Badlapur have consistently recorded higher NOx concentrations in the past few years.

Similarly all the AAQMS in Navi-Mumbai recorded the NOx levels in the range of 53–41µg/m³, indicating NOx levels above the acceptable standard in Navi Mumbai. An increasing trend for NOx concentrations has been recorded in Kolhapur city and in the year 2013-14 the annual concentrations were recorded to be 48µg/m³.

The top ten AAQMS which exceeded the annual standards for NOx concentrations have been enlisted below in Table No. 2.

Table No. 2: Top ten AAQMS which recorded highest annual average NO_X concentration (2013-14)

MPCB RO	Region	Station name	NO_X (µg/m³) (Annual standard 40µg/m³)
Mumbai	Mumbai	Sion	108
Pune	Pune	Karve Road - CAAQMS	70
Kalyan	Dombivali	Dombivali	66
Kalyan	Ambernath	Ambernath	64
Kalyan	Dombivali	MIDC Office Dombivali	62
Kalyan	Ulhasnagar	Powai Chowk	58
Navi Mumbai	Navi Mumbai	Airoli	53
Mumbai	Mumbai	Bandra	49
Kalyan	Badlapur	Badlapur - BIWA House	49
Kolhapur	Kolhapur	Ruikar Trust	48

Particulate Matter (PM)

High concentration of Particulate Matter (PM) across all the regions has always been a concern in the state. The emission from various industries involved in activities like cement manufacturing, quarrying activities, power plants and so on, coupled with increasing construction activities, traffic movement and so on increases the dispersion of RSPM (Respirable Suspended Particulate Matter) in the air. In the year 2013-14, all but 2 AAQMS recorded annual RSPM concentrations which violated the annual standard (60µg/m³). Navi Mumbai and Chandrapur are the two severely affected regions of the state with high RSPM concentrations.

In Navi Mumbai the areas of Panvel, Taloja and Mahape, which are very close to each other, were among the top 5 AAQMS which recorded highest RSPM concentrations (Table No. 3). There are various quarry sites in the vicinity and they could be attributed to high RSPM concentrations in this region.

Air quality in the Chandrapur area is the most deteriorated in terms of RSPM concentrations with three AAQMS of the region in the list of top ten AAQMS which recorded the highest annual RSPM concentrations in the state. The RSPM levels at the Tadali MIDC area (195µg/m³), Ghuggus (174µg/m³), and Rajura (145 µg/m³) violated the annual standard by more than 3 times. The region is highly influenced with activities like mining, cement manufacturing and presence of thermal power plants which could be the main reason for high RSPM levels in the area.

The Amravati and Aurangabad regions which were relatively clean for SO_2 and NO_X concentrations were also found to violate the RSPM annual standard in the year 2013-14.

Table No. 3: Top ten AAQMS which recorded highest annual average RSPM concentration (2013-14)

MPCB RO	Region	Station name	RSPM (µg/m³) (Annual standard 60µg/m³)
Raigad	Panvel	Panvel- Water Supply Plant	203
Chandrapur	Chandrapur	Tadali MIDC	195
Navi Mumbai	Taloja	Taloja - MIDC Building	187
Navi Mumbai	Navi Mumbai	Mahape, MPCB-Nirmal Bhavan	182
Chandrapur	Chandrapur	Ghuggus	174
Aurangabad	Jalna	Jalna- Krishnadhan seeds Ltd	150
Amravati	Akola	Akola- College of Engg & Technology	149
Chandrapur	Chandrapur	Rajura	145
Kolhapur	Kolhapur	Ruikar Trust	141
Amravati	Akola	MIDC Water Works - Akola	136

Carbon monoxide

Partial oxidation of carbon-containing compounds leads to production of CO (Carbon monoxide) which is highly toxic to humans and animals at higher concentrations. In the year 2013-14, CO was monitored at the CAAQMS in Bandra, Pune and Solapur areas. At the Bandra CAAQMS the CO concentrations exceeded the 8 hourly standards (2mg/m³) during the monsoon season from July to September as well as in the winter season during December to February. The Pune region consistently exceeded the 8 hour standard during the winter season from November to mid-January, while the CO concentrations were well within the standard for rest of the year. The percentage exceedence for CO concentrations has been highest at Bandra 52% followed by Pune (11%) while the Solapur area is relatively less polluted with CO concentrations and recorded only 7% exceedence for the 8 hourly standard.

Ozone

O_3 (Ozone) is a secondary pollutant, formed when NOx and VOCs undergo a photochemical reaction in the atmosphere. People who are active outdoors, especially in hot sunny days are more vulnerable to its harmful impacts. O_3 levels were recorded to be high in Mumbai (Bandra region) especially in the summer and monsoon months. In the year 2013-14, the Bandra region violated the O_3 standard for more than 30percent of the observations recorded at that AAQMS. The peak O_3 concentrations (377.5µg/m³) were recorded in the month of August. The reason for slightly higher ozone condition in Mumbai could be attributed to the prevailing weather conditions and the complex chemistry of Ozone formation, requiring hydrocarbons and nitrogen oxides in presence of sunlight. The Pune and Solapur areas recorded O_3 pollution under control as the exceedence was recorded for merely 1.4 and 0.1percent of the readings respectively.

Benzene

Benzene (C_6H_6) is a colourless sweet smelling liquid and is generated whenever carbon-rich materials undergo incomplete combustion, such as aromatic compounds like tobacco, furniture wax, glue paints and so on. Benzene pollution was recorded at 2 CAAQMS, Bandra and Pune. The annual average benzene concentrations were recorded to be 1.3 and 151.3µg/m^3 respectively. The annual average standard for benzene has been set as 5µg/m^3 by CPCB, indicating that the benzene pollution at Pune is of major concern. Upon segregating the data for eight hour intervals, it becomes interesting to note that high Benzene in Pune was recorded during the day time (8am to 4pm) sampling. The evening (4pm to 12am) and night (12am to 8am) sampling recorded average of about 36 and 1µg/m^3 respectively.

Air Quality Indexing

AQI (Air Quality Index) has been devised to convey the information on outdoor air quality in the easiest possible way which could be understood by the general public. An AQI of 100 or below indicates attainment of National Ambient Air Quality Standards. Higher value of AQI indicates high level of pollution. A corresponding colour code has been attributed ranging from 'Green' to 'Maroon', corresponding to the air quality level. Upon determining the Composite AQI for the areas in Maharashtra, the areas with 'Poor' to 'Moderate' air quality were found to be Akola, Jalgaon, Panvel, Taloja, Jalna, Kolhapur, Mumbai and Navi Mumbai. However, since an area wise analysis may include a bias for a region depending upon the number of AAQMS and the number of observations recorded in that area, an elaborate section on the AQI for the year 2013-14 is presented and discussed in the report.

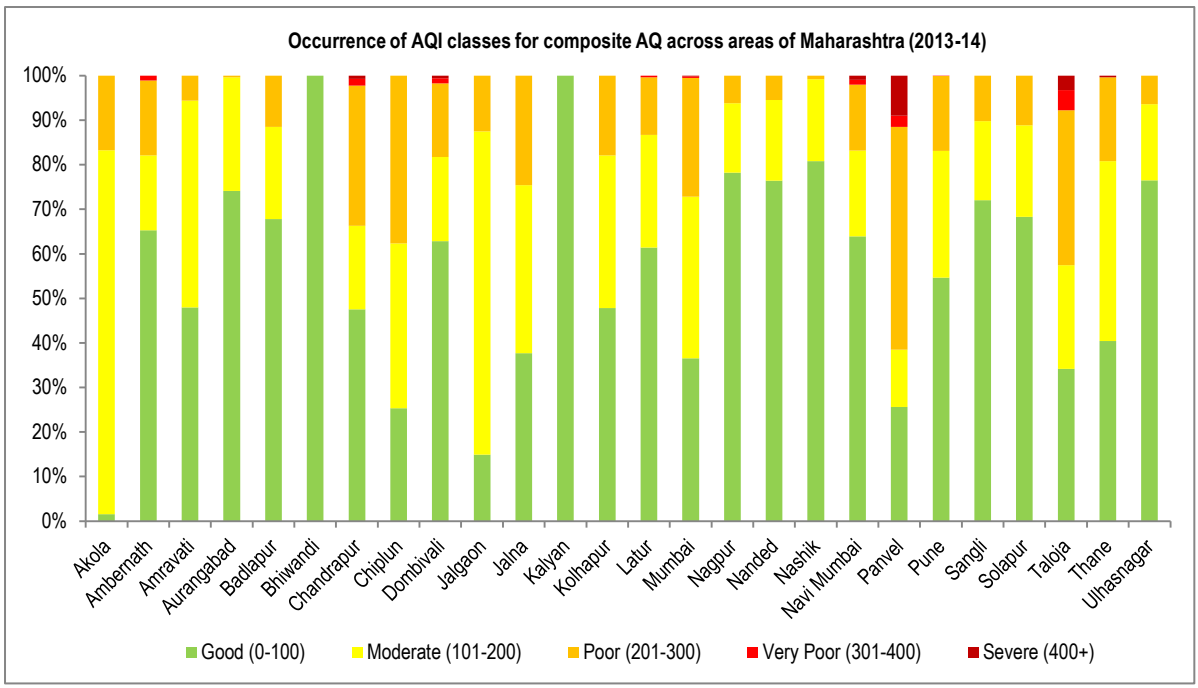


Figure No. 1: Occurrence of AQI classes for composite AQ across areas of Maharashtra (2013-14)

Introduction

Urbanization is a process of relative growth of a country's urban population accompanied by a rapid increase in the economic, political, and cultural importance of cities relative to rural areas. While urbanization is characteristic of nearly all developing countries, levels of urbanization vary quite significantly by region. Transformation of villages to towns and to cities, and then cities into metropolitan regions, is an ongoing process that is highly resource intensive.

The level of urbanization in India has also increased significantly from 27.81% in 2001 to 31.16% in 2011[2] and for the first time since independence, the last decade registered an absolute increase in urban population more than in rural population. On one hand, the escalating demands and limited supply for resources like water and energy are creating a severe resource crunch and on the other hand, anthropogenic activities induces stress on the ecosystem due to release of pollutants which leads to undesirable pollution in the environment. Pollution is defined as the introduction of contaminants into the natural environment that causes adverse change to the otherwise normal constituents of natural resources like water, land and air.

The Earth's atmosphere is a layer of gases surrounding the planet that is retained by its gravitational power. This mixture of gases which envelopes the earth is commonly known as Air. The composition of pure air consists majorly of Nitrogen and Oxygen. Other gases like Argon, Carbon-di-oxide, Methane and so on are present in trace amounts. A representative pie chart depicting the composition of natural air, in earth's atmosphere is presented in Figure No. 2.

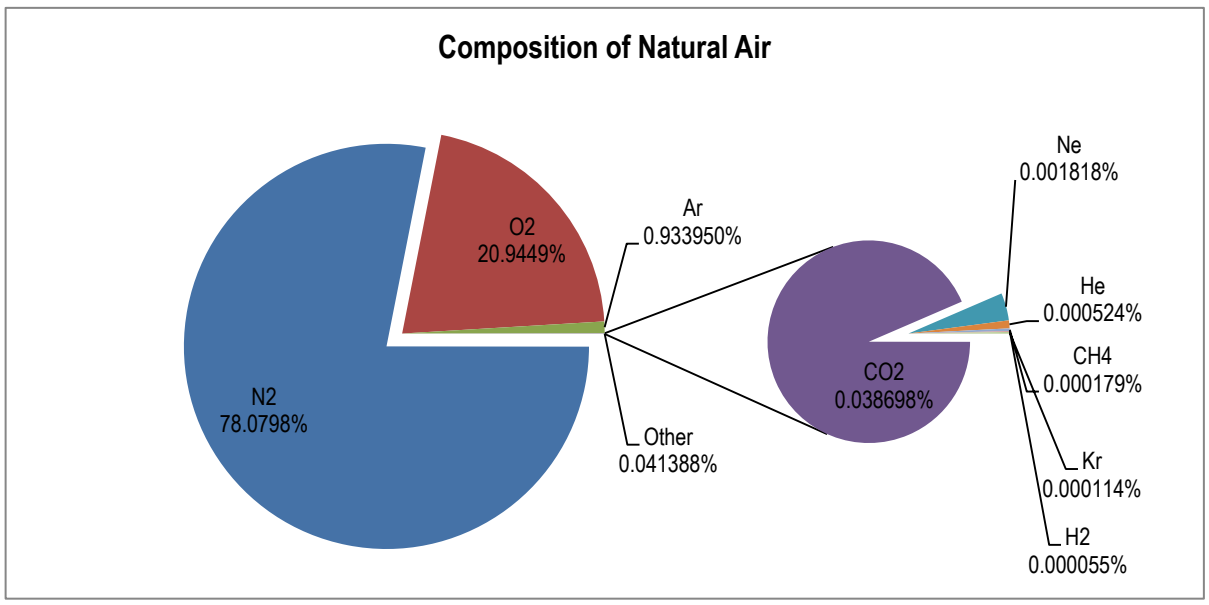


Figure No. 2: Composition of natural air

Data Source: Hand book of Air Pollution, PHS Publication AP-44 (PB 190-247), 1968 [40]

Note: Ar: Argon; CH_4: Methane, CO_2: Carbon-di-oxide; H_2: Hydrogen; He: Helium; Kr: Krypton; N_2: Nitrogen; Ne: Neon; O_2: Oxygen.

[2] http://censusindia.gov.in/2011-prov-results/paper2/data_files/india/Rural_Urban_2011.pdf

Air Pollution

A lot of undesired elements have been added to the natural ambient air's composition especially due to anthropogenic activities involving combustion of fossil fuels. Power plants, industries, automobiles, construction activities and so on emit tonnes of air pollutants every day, thereby deteriorating the air quality and exposing citizens to great health risks. An air pollutant has been defined as any solid, liquid or gaseous substance (including noise) present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment. This change in the composition of pure air is termed as "*Air Pollution*". The source of air pollutants could be both natural as well as anthropogenic. The 6 major air pollutants identified by USEPA (United States Environmental Protection Agency), their anthropogenic source and their effects on human health, is presented below in Table No. 4.

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 (RSPM)	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 of NO_X and (VOCs) in sunlight	• Breathing problems, asthma, reduced lung function.

Challenges and Initiatives in India

As India is developing, the problems associated with pollution are also increasing at a rapid rate. Rapidly growing Indian cities are suffering from some of the worst air quality problems in the world. The major sources responsible for air pollution in India are fuel adulteration, emissions from power plants, transport sector, industrial emissions, combustion of fuel wood & biomass, construction activities, and traffic congestion[3].

Since the 1970s many initiatives have been taken to tackle the issue of air pollution including environmental legislations. 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[4]. 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.

[3] "Urban Air Pollution, Catching gasoline and diesel adulteration. The World Bank. 2002
[4] 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 in 1983 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.

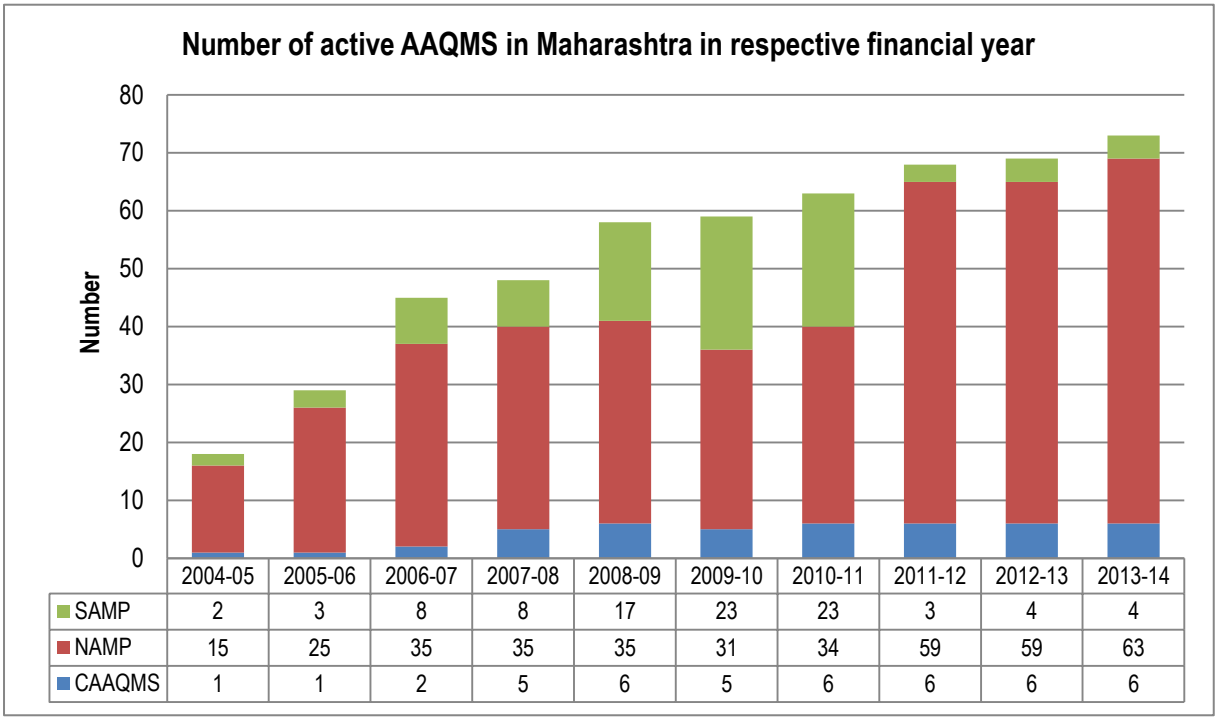
Hence, to keep a constant vigilance on the status of the air quality in the industrial influenced areas like Dombivali, Ambernath, Chandrapur and the exposure to the population in residential areas, MPCB has installed air quality monitoring stations in Maharashtra. The following section presents the highlights of the monitoring and the air quality recorded in the year 2013-14.

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 2013-14.

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 2013-14, there were 72 active AAQMS in Maharashtra under CAAQMS (6), NAMP (62) and SAMP (4). Apart from these there are 3 more AAQMS under NAMP, which are regulated and monitored by NEERI (National Environmental Engineering Research Institute). As per data availability each year the corresponding tally of AAQMS is presented below in Figure No. 3.



	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
SAMP	2	3	8	8	17	23	23	3	4	4
NAMP	15	25	35	35	35	31	34	59	59	63
CAAQMS	1	1	2	5	6	5	6	6	6	6

Figure No. 3: Number of active AAQMS in Maharashtra in respective financial year

Data Source: MPCB, 2013

**Note: Data for Worli, Kalbadevi and Parel AAQMS monitored by NEERI has been considered separately for the analysis as per data provided by them.*

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 2013-14 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 Figure No. 4.

Table No. 5: MPCB RO wise tally of active AAQMS (2013-14)

MPCB RO	Commercial	Industrial	Residential	Rural and other areas	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	3	1	7
Pune		1	6	1	8
Raigad			1		1
Thane		1	1	1	3
Grand Total	**4**	**20**	**35**	**13**	**72**

Data Source: MPCB, 2014

**Note: Data for Worli, Kalbadevi and Parel AAQMS monitored by NEERI have not been included in this tally*

 # includes AAQMS representing sensitive area monitoring at IGM Hospital Bhiwandi

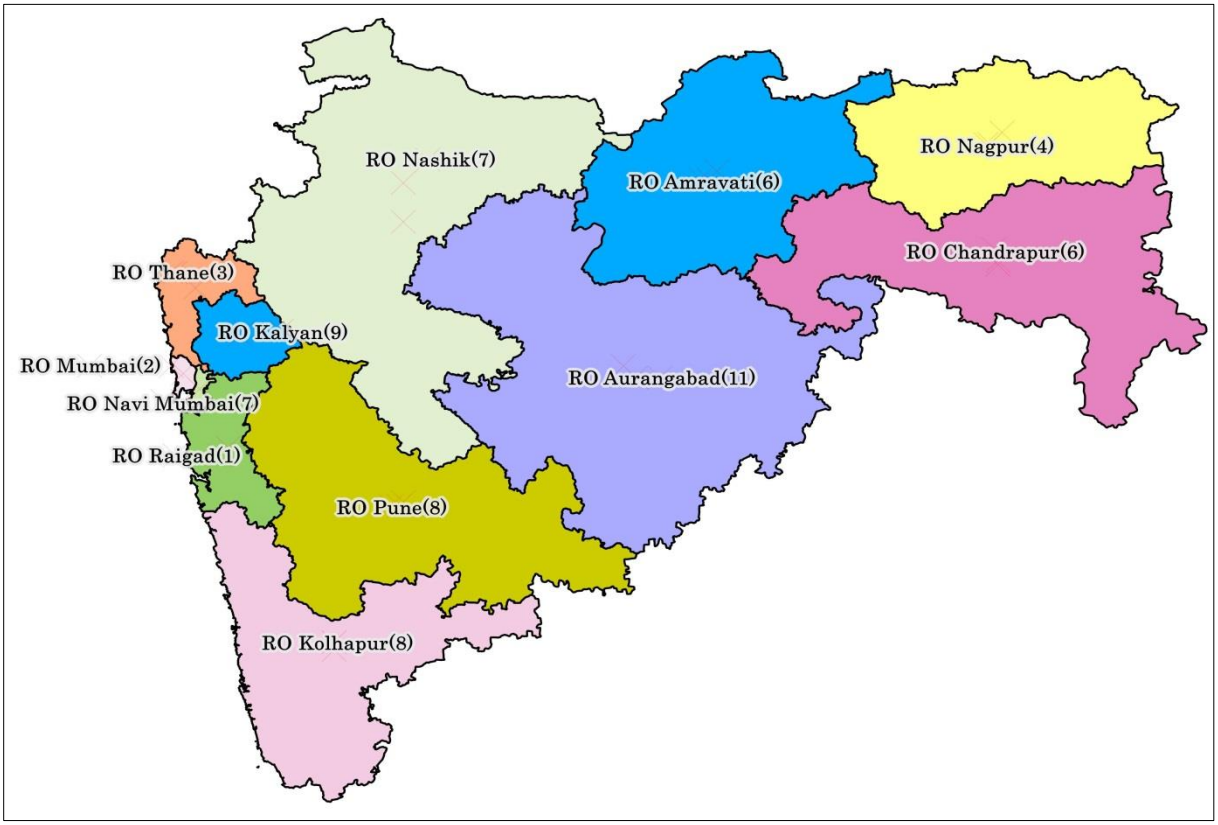


Figure No. 4: Boundaries and tally of AAQMS in each RO of MPCB (2013-14)

Pollutants Monitored

RSPM (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[5]. 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 2013-14 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 years and monthly trend for the year 2013-14 have been presented in Annex – II.

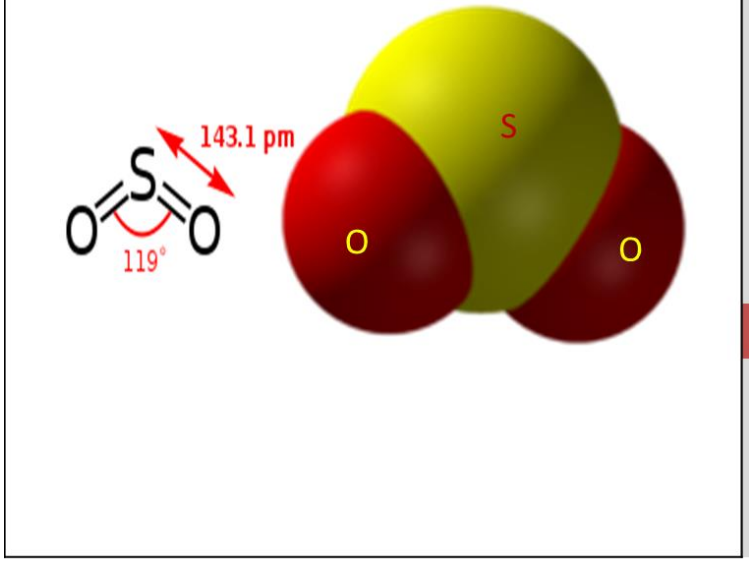
[5] CPCB 2012, *National Ambient Air Quality Status & Trends In India-2010*, Chapter 6, Pg 83

Status of Air Quality

Sulphur dioxide

Sulphur dioxide (SO_2) belongs to a group of highly reactive gases known as "oxides of sulphur". It is a colourless gas and smells like burnt matches. Sulphur compounds are responsible for the major damage to materials and are generally known to accelerate metal corrosion by forming sulphuric acid. The largest sources of SO_2 emissions are from fossil fuel combustion at power plants and other industrial facilities. Smaller sources of SO_2 emissions include industrial processes such as extracting metal from ore, and combustion of sulphur containing fuels (diesel) by vehicles. The skeletal structure sources and impacts on humans is presented in Figure No. 5.

SO_2 is linked with a number of adverse effects on the respiratory system. SO_2 is known to increase the airway resistance, and lung diseases. Sulphur oxide in combination with particulate matter and moisture is a potentially serious health hazard and results in increased mortality. Aerosols of sulphuric acid and other sulphates have a share of 5-20% in total suspended particulate matter in urban air and are responsible for the reduction in visibility.



Chemical/ Molecular Formula

SO_2

Sources

- Vehicles, Power plants, Combustion of fossil fuels (fossil fuels such as oil and coal contain sulfur),
- Extraction of metals from sulfide ores.
- Paper industry
- Extraction and distribution of fossil fuel
- Petroleum refining
- Combustion of diesel, Petrol and Natural gas

Harmful Effects

- Affects respiratory system and lung function.
- Coughing, mucus secretion,
- Asthma and chronic bronchitis,
- Causes acid rain.

Figure No. 5: Molecular formula, sources and harmful impacts of Sulphur dioxide

Data Source: IB Chemistry

Trend of SO_2 Concentrations in the state

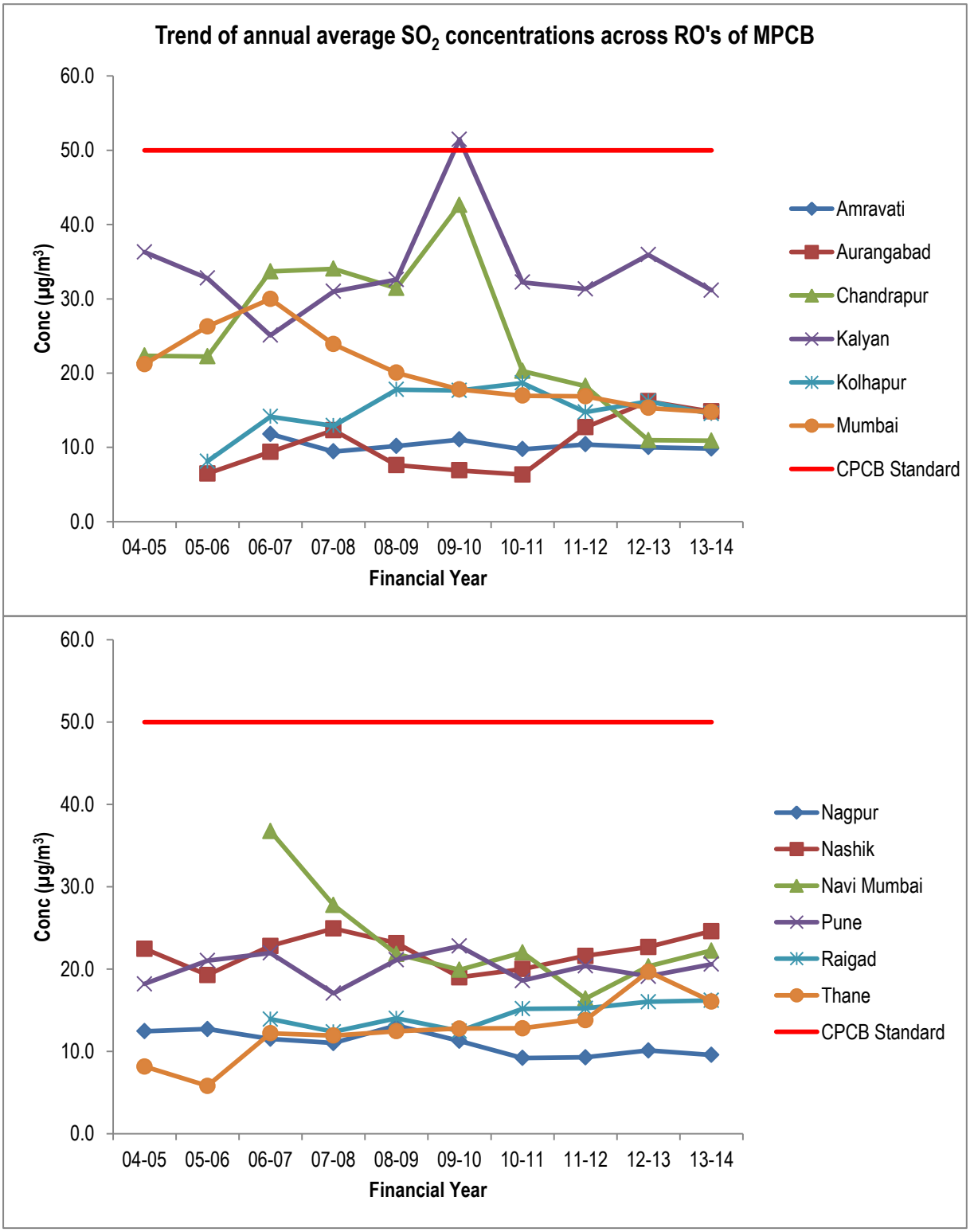


Figure No. 6: Trend of annual average SO_2 concentrations across RO's of MPCB

Comparison for last few years

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. 6, the Kalyan region has consistently recorded relatively high SO_2 concentrations as compared to other regions in the state. This region comprises of MIDC areas of Dombivali, Ambernath, Baldapur and so on. The region has recorded annual average SO_2 levels just above 30µg/m^3 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.

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/m^3. A declining trend in the sulphur dioxide pollution can be observed in Mumbai, Navi Mumbai and Chandrapur regions.

Two regions where the SO_2 concentration shows an increasing trend are Thane and Raigad. Both 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 2013-14.

SO_2 concentrations in industrial areas

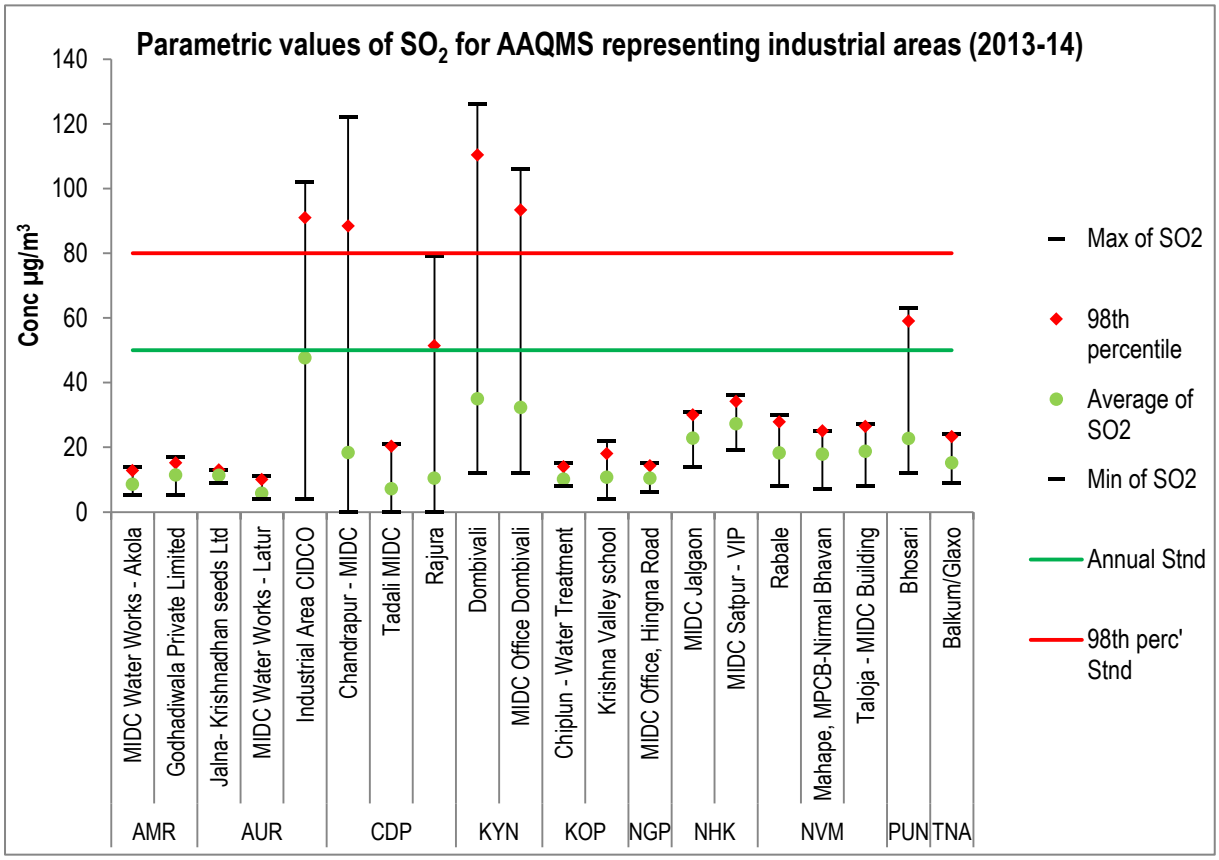


Figure No. 7: Parametric values of SO_2 for AAQMS representing industrial regions (2013-14)

Data Source: MPCB, May 2014

SO_2 concentrations were recorded under annual permissible standards across all the industrial areas which had an active AAQMS in 2013-14 (Figure No. 7). The MIDC areas of Dombivali and Nanded (Aurangabad RO) recorded the highest SO_2 concentrations. These regions have consistently recorded higher SO_2 concentrations. On certain days these areas recorded SO_2 concentrations higher than the daily standards (80µg/m³). The 98th percentile readings in Dombivai MIDC area ranged between 93 – 110 µg/m³. The Chandrapur MIDC area recorded the maximum daily peak of 122µg/m³ this could be attributed as an outlier since the annual average concentrations (18µg/m³) were well within the annual standards of 50µg/m³.

All the other AAQMS in MIDC areas of Maharashtra recorded SO2 concentrations less than 35µg/m³. Industrial areas in Amravati region were the cleanest in terms of SO_2 concentrations with the maximum recorded SO_2 levels were also under 15µg/m³. Similarly the AAQMS in the MIDC areas of the Kolhapur, Nagpur, Nashik and Navi Mumbai recorded low concentrations of SO_2 concentrations.

Table No. 6: Data for SO_2 recorded at AAQMS representing industrial areas (2013-14)

RO	Station name	Station code	Max of SO_2	98th percentile	Average of SO_2	Min of SO_2
	CPCB Standard		*80*	*80*	*50*	*80*
AMR	MIDC Water Works - Akola	701	14.0	12.7	8.6	5.0
	Godhadiwala Private Limited	549	17.0	15.1	11.4	5.0
AUR	Jalna- Krishnadhan seeds Ltd	707	13.0	13.0	11.3	9.0
	MIDC Water Works - Latur	641	11.0	10.0	5.7	4.0
	Industrial Area CIDCO	705	102.0	90.9	47.7	4.0
CDP	Chandrapur - MIDC	281	122.0	88.4	18.3	0.0
	Tadali MIDC	638	21.0	20.3	7.1	0.0
	Rajura	640	79.0	51.4	10.4	0.0
KYN	Dombivali	265	126.0	110.4	35.0	12.0
	MIDC Office Dombivali	-	106.0	93.3	32.3	12.0
KOP	Chiplun - Water Treatment	490	15.0	14.0	10.1	8.0
	Krishna Valley school	576	22.0	18.0	10.7	4.0
NGP	MIDC Office, Hingna Road	288	15.0	14.3	10.4	6.0
NHK	MIDC Jalgaon	646	31.0	30.0	22.7	14.0
	MIDC Satpur - VIP	269	36.0	34.1	27.2	19.0
NVM	Rabale	491	30.0	27.8	18.2	8.0
	Mahape, MPCB-Nirmal Bhavan	493	25.0	25.0	17.8	7.0
	Taloja - MIDC Building	496	27.0	26.4	18.7	8.0
PUN	Bhosari	312	63.0	59.0	22.7	12.0
TNA	Balkum/Glaxo	-	24.0	23.2	15.1	9.0

Data Source: MPCB, 2014 **Units: µg/m³**

SO_2 concentrations in residential areas

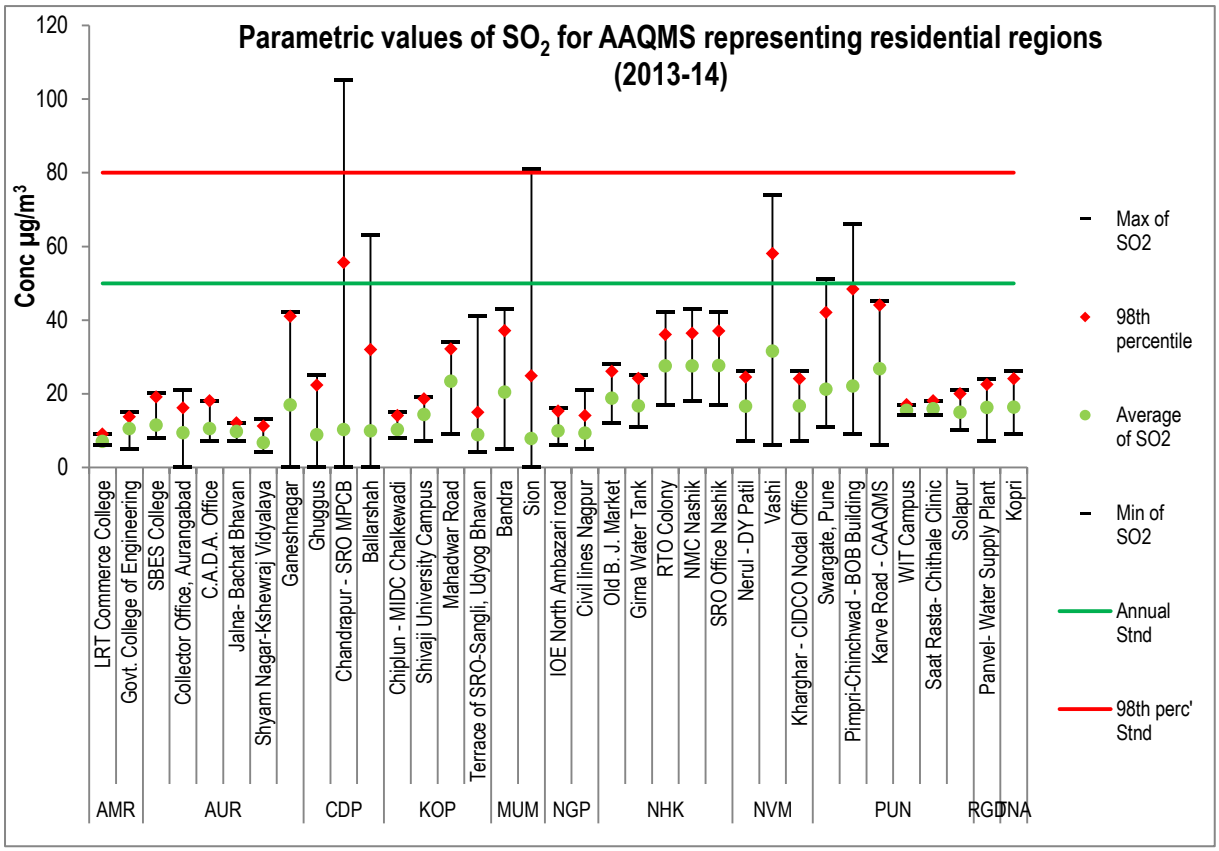


Figure No. 8: Parametric values of SO_2 for AAQMS representing residential regions (2013-14)

Data Source: MPCB, May 2014

As seen in Figure No. 8, all the AAQMS representing residential areas of Maharashtra were recorded clean for SO_2 pollution. Except for a few outliers at a few AAQMS, even the maximum SO_2 levels were under the annual standards (50µg/m^3).

All the 5 AAQMS in the Nashik region consistently recorded annual SO_2 concentration in the range of 16-28µg/m^3. This is more than the average reading for SO_2 levels recorded in highly urban areas like Mumbai (between 7.7 and 20µg/m^3) and Pune (between 14 and 21µg/m^3). Hence, an investigation is recommended to study the region and identify the source of pollution which may be leading to high SO_2 levels.

The residential areas of Amravati, Raigad, Thane, Nagpur and Aurangabad regions were the cleanest in terms of SO_2 pollution.

Table No. 7: Data for SO2recorded at AAQMS representing residential areas (2013-14)

RO	Station name	Station code	Max of SO2	98th percentile	Average of SO2	Min of SO2
	CPCB Standard		*80*	*80*	*50*	*80*
AMR	LRT Commerce College	700	9.0	9.0	7.0	6.0
	Govt. College of Engineering	548	15.0	13.7	10.5	5.0
AUR	SBES College	511	20.0	19.1	11.4	8.0
	Collector Office, Aurangabad	512	21.0	16.1	9.3	0.0
	C.A.D.A. Office	513	18.0	18.0	10.5	7.0
	Jalna- Bachat Bhavan	706	12.0	12.0	9.7	7.0
	Shyam Nagar-Kshewraj Vidyalaya	642	13.0	11.1	6.6	4.0
	Ganeshnagar	703	42.0	41.0	16.9	0.0
CDP	Ghuggus	267	25.0	22.3	8.9	0.0
	Chandrapur - SRO MPCB	396	105.0	55.6	10.2	0.0
	Ballarshah	639	63.0	31.9	9.8	0.0
KOP	Chiplun - MIDC Chalkewadi	489	15.0	14.0	10.2	8.0
	Shivaji University Campus	508	19.0	18.5	14.3	7.0
	Mahadwar Road	510	34.0	32.1	23.4	9.0
	Terrace of SRO-Sangli, Udyog Bhavan	574	41.0	14.9	8.8	4.0
MUM	Bandra	-	43.0	37.0	20.4	5.0
	Sion	-	81.0	24.8	7.7	0.0
NGP	IOE North Ambazari road	287	16.0	15.3	9.9	6.0
	Civil lines Nagpur	711	21.0	14.0	9.3	5.0
NHK	Old B. J. Market	644	28.0	26.0	18.8	12.0
	Girna Water Tank	645	25.0	24.1	16.7	11.0
	RTO Colony	259	42.0	36.0	27.5	17.0
	NMC Nashik	280	43.0	36.4	27.5	18.0
	SRO Office Nashik	710	42.0	37.0	27.6	17.0
NVM	Nerul - DY Patil	492	26.0	24.4	16.6	7.0
	Vashi	-	74.0	58.0	31.5	6.0
	Kharghar - CIDCO Nodal Office	494	26.0	24.0	16.6	7.0
PUN	Swargate, Pune	381	51.0	42.0	21.2	11.0
	Pimpri-Chinchwad - BOB Building	708	66.0	48.4	22.1	9.0
	Karve Road - CAAQMS	-	45.0	44.0	26.7	6.0
	WIT Campus	299	17.0	17.0	15.4	14.0
	Saat Rasta- Chithale Clinic	300	18.0	18.0	15.9	14.0
	Solapur	-	21.0	19.9	14.9	10.0
RGD	Panvel- Water Supply Plant	495	24.0	22.5	16.2	7.0
TNA	Kopri	303	26.0	24.0	16.3	9.0

Data Source: MPCB, 2014 **Units: µg/m³**

SO_2 concentrations in rural and other areas

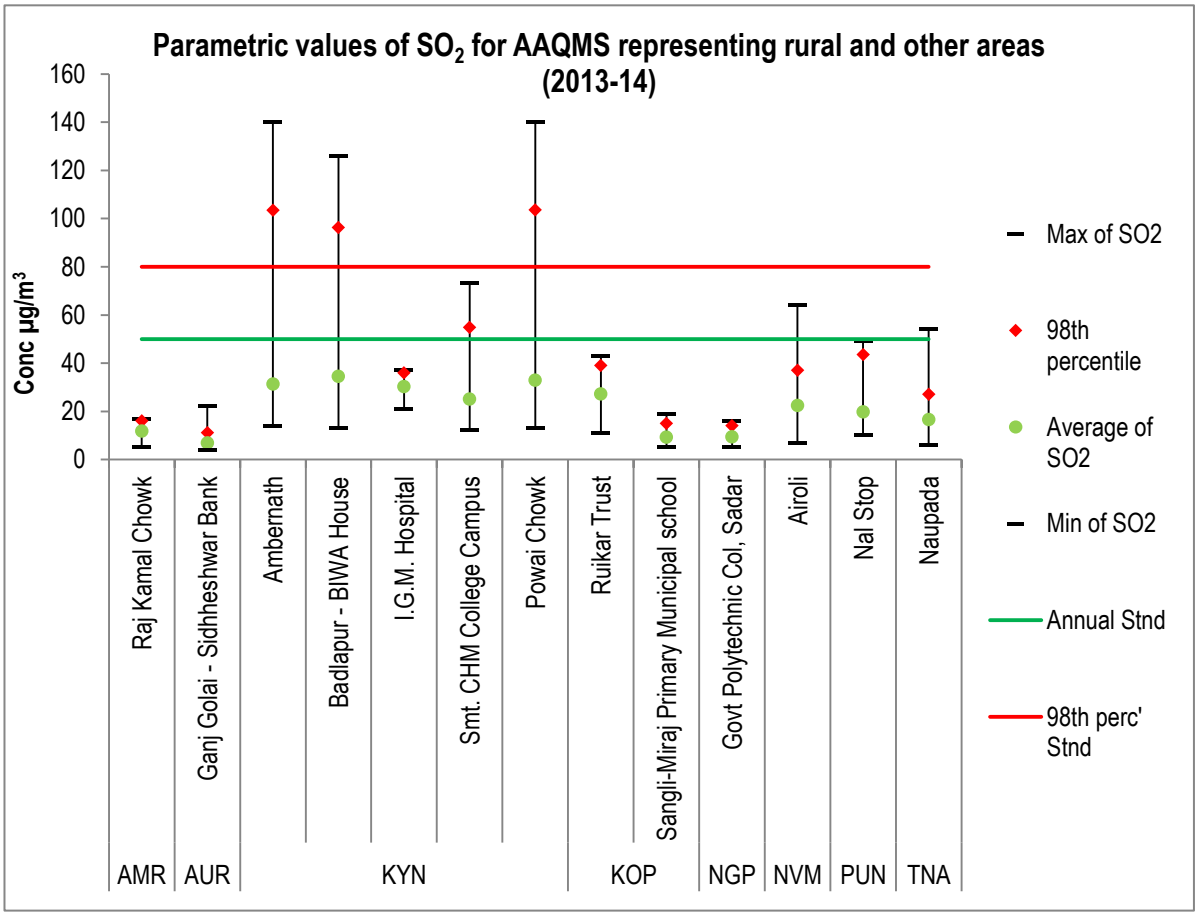


Figure No. 9: Parametric values of SO_2 for AAQMS representing rural and other areas (2013-14)

Data Source: MPCB, May 2014

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

All the AAQMS representing some rural and other type of areas in Maharashtra recorded the annual SO_2 well under the annual standards (50µg/m³). The maximum daily peak was observed at three AAQMS, namely Ambernath, Baldapur and Ulhasnagar (Powai-Chowk) in the Kalyan region. These AAQMS recorded 24 hours readings (maximum and 98th percentile) between 96 to 140µg/m³ indicating that at certain days these areas record SO2 concentrations above the daily standards (80µg/m³).

The observations for SO_2 concentration recorded at the AAQMS at Bhiwandi (I.G.M hospital) ranged between 21 to 37µg/m³ and the annual average exceeded the annual standards (20µg/m³) set for sensitive zones.

Amravati, Kolhapur and Nagpur regions were amongst the cleanest in terms of SO_2 pollution.

Table No. 8: Data for SO2recorded at AAQMS representing rural and other areas (2013-14)

RO	Station name	Station code	Max of SO_2	98th percentile	Average of SO_2	Min of SO_2
	CPCB Standard		*80*	*80*	*50*	*80*
AMR	Raj Kamal Chowk	547	17.0	16.0	11.8	5.0
AUR	Ganj Golai - Sidhheshwar Bank	643	22.0	11.1	6.9	4.0
KYN	Ambernath	445	140.0	103.4	31.3	14.0
	Badlapur - BIWA House	649	126.0	96.3	34.6	13.0
	I.G.M. Hospital	-	37.0	36.0	30.3	21.0
	Smt. CHM College Campus	647	73.0	54.9	25.0	12.0
	Powai Chowk	648	140.0	103.6	32.9	13.0
KOP	Ruikar Trust	509	43.0	39.0	27.2	11.0
	Sangli-Miraj Primary Municipal school	575	19.0	15.0	9.3	5.0
NGP	Govt Polytechnic Col, Sadar	314	16.0	14.0	9.4	5.0
NVM	Airoli	-	64.0	37.0	22.4	7.0
PUN	Nal Stop	379	49.0	43.5	19.8	10.0
TNA	Naupada	304	54.0	27.0	16.6	6.0

Data Source: MPCB, 2014 **Units: µg/m³**

**Note: I.G.M Hospital is categorized as a sensitive type of monitoring zone by MPCB and the standards are 80µg/m³ and 20µg/m³ for 24 and annual averages.*

SO_2 concentrations in commercial areas

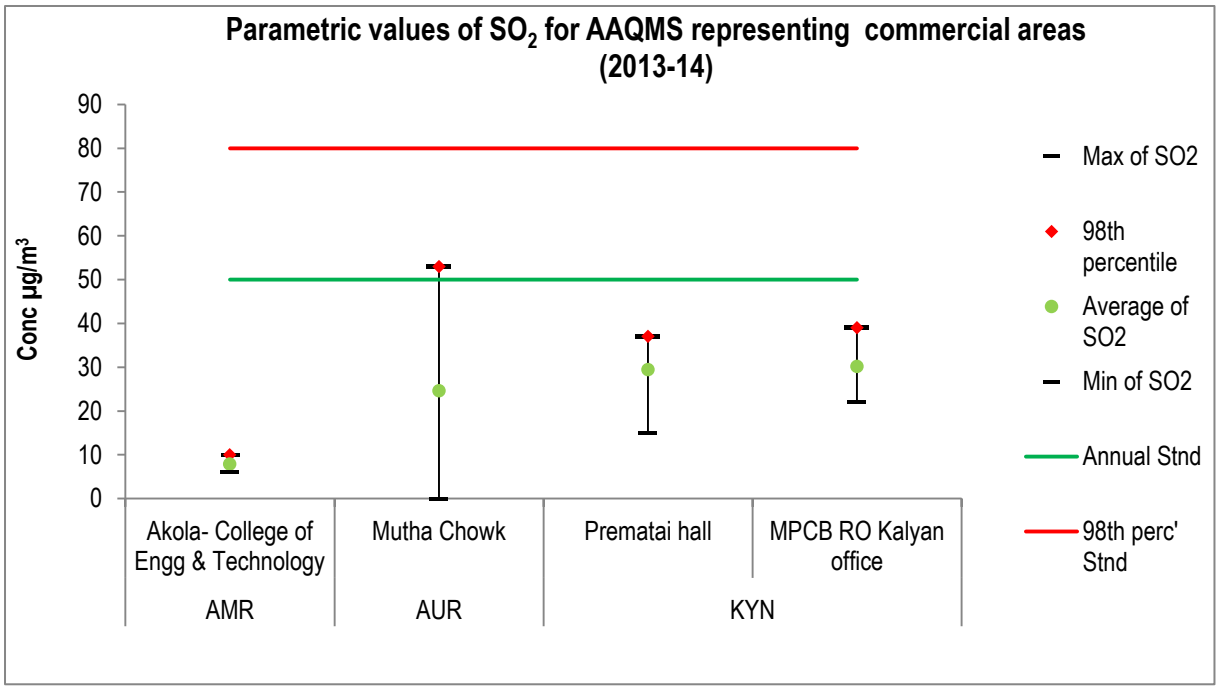


Figure No. 10: Parametric values of SO_2 for AAQMS representing commercial areas (2013-14)

Data Source: MPCB, May 2014

Air quality monitored in areas representing commercial areas was amongst the cleanest in terms of SO_2 pollution since all of AAQMS recorded annual averaged well below the annual standards. The maximum SO_2 concentration of 53µg/m³ was recorded at Mutha Chowk in Aurangabad. The commercial regions in Kalyan (AAQMS at Prematai hall and RO MPCB Kalyan) recorded annual average SO_2 concentration of around 30µg/m³. The Amravati region recorded the best annual statistics for SO_2 concentrations with all the readings ranging between 10 to 6µg/m³.

Table No. 9: Data for SO_2 recorded at AAQMS representing rural and other areas (2013-14)

RO	Station name	Station code	Max of SO_2	98th percentile	Average of SO_2	Min of SO_2
	CPCB Standard		*80*	*80*	*50*	*80*
AMR	Akola- College of Engg & Technology	702	10.0	10.0	7.8	6.0
AUR	Mutha Chowk	704	53.0	53.0	24.6	0.0
KYN	Prematai hall	-	37.0	37.0	29.5	15.0
	MPCB RO Kalyan office	-	39.0	39.0	30.2	22.0

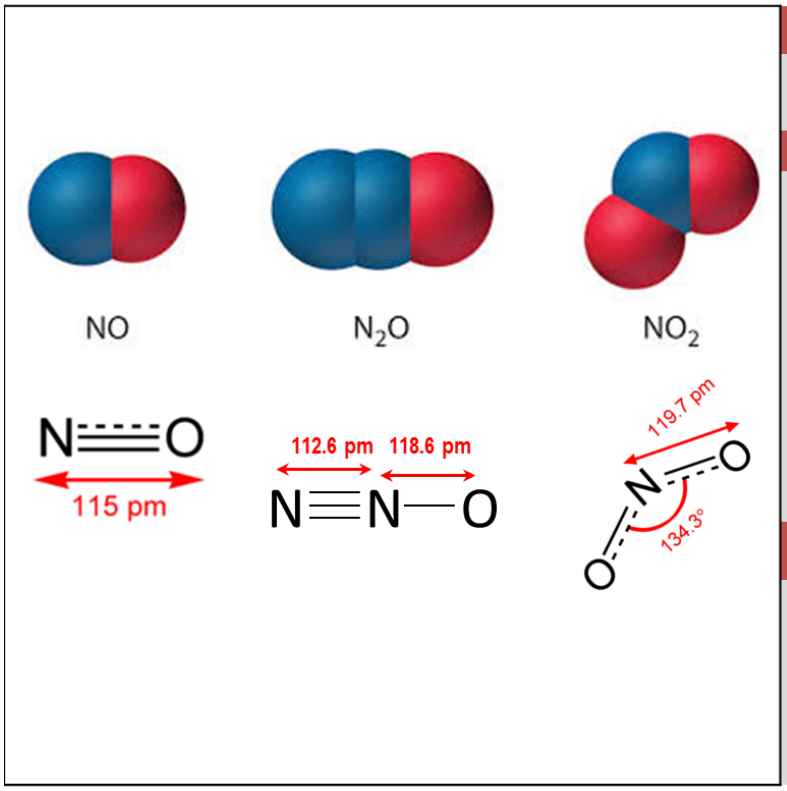
Data Source: MPCB, 2014 **Units: µg/m³**

Oxides of Nitrogen

The oxides of nitrogen, NO (Nitric Oxide) and NO_2 (nitrogen dioxide) are significant air pollutants. Neither NO nor NO_2 causes direct damage to materials; however, NO_2 reacts with atmospheric moisture to form nitric acid, which causes considerable corrosion of metal surfaces. NO_2 acts as an acute irritant and is more injurious than NO. The skeletal structure, their significant sources and impacts are presented below in Figure No. 11.

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. NO_2 is linked with a number of adverse effects on the respiratory system. Further it is also known to contribute to the formation of ground-level ozone and fine particle pollution.

Oxides of nitrogen are produced from the reaction of nitrogen and oxygen gases in the air during combustion, especially at high temperatures. In areas of high motor vehicle traffic, such as in large cities, the amount of nitrogen oxides emitted into the atmosphere as air pollution can be significant.



Chemical/ Molecular Formula

NO_x

Sources

- Combustion processes (heating, power generation, and vehicles)
- Paper industry
- Extraction and distribution of fossil fuel
- Smelting of Metals
- Petroleum refining
- Combustion of diesel, Petrol and Natural gas

Harmful Effects

- Bronchitis in asthmatic children
- Reduced lung function
- Visibility impairment
- Aggravates existing heart and lung disease

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

Data Source: UC Davis

Trend of NO_X Concentrations in the state

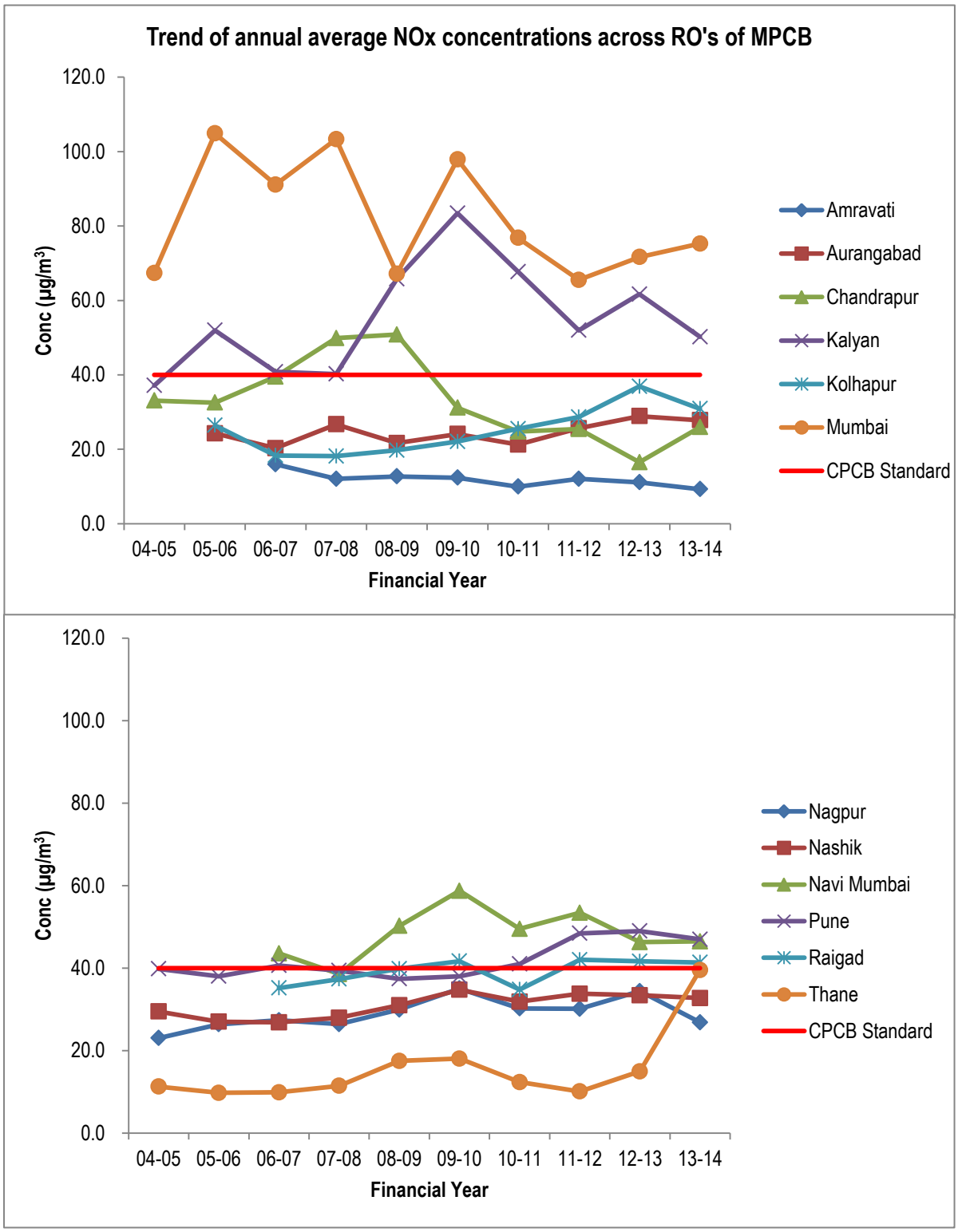


Figure No. 12: Trend of annual average NOx concentrations across RO's of MPCB

Comparison for last few years

As seen in Figure No. 12, the most urbanised regions of the state like Mumbai, Pune, Navi-Mumbai and Kalyan are the ones which are severely affected by high NO_X concentrations. While the moderately crowded and urbanised regions like Nagpur, Amravati, Aurangabad and Nasik recorded annual concentration below the annual standard.

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.

Navi Mumbai region has also been recorded with high NO_X concentrations consistently for the past 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. Since then the annual NO_X concentration has been around 50µg/m^3. Also the Raigad region in the past three years has been a borderline case and violated the annual standard.

Amravati region shows a declining trend for the NO_X and the annual concentrations for the past have always been under 20µg/m^3. The type wise performance for NO_X concentrations recorded by the AAQMS in Maharashtra active in the year 2013-14 have been presented in the following section.

NO_X concentration in industrial areas

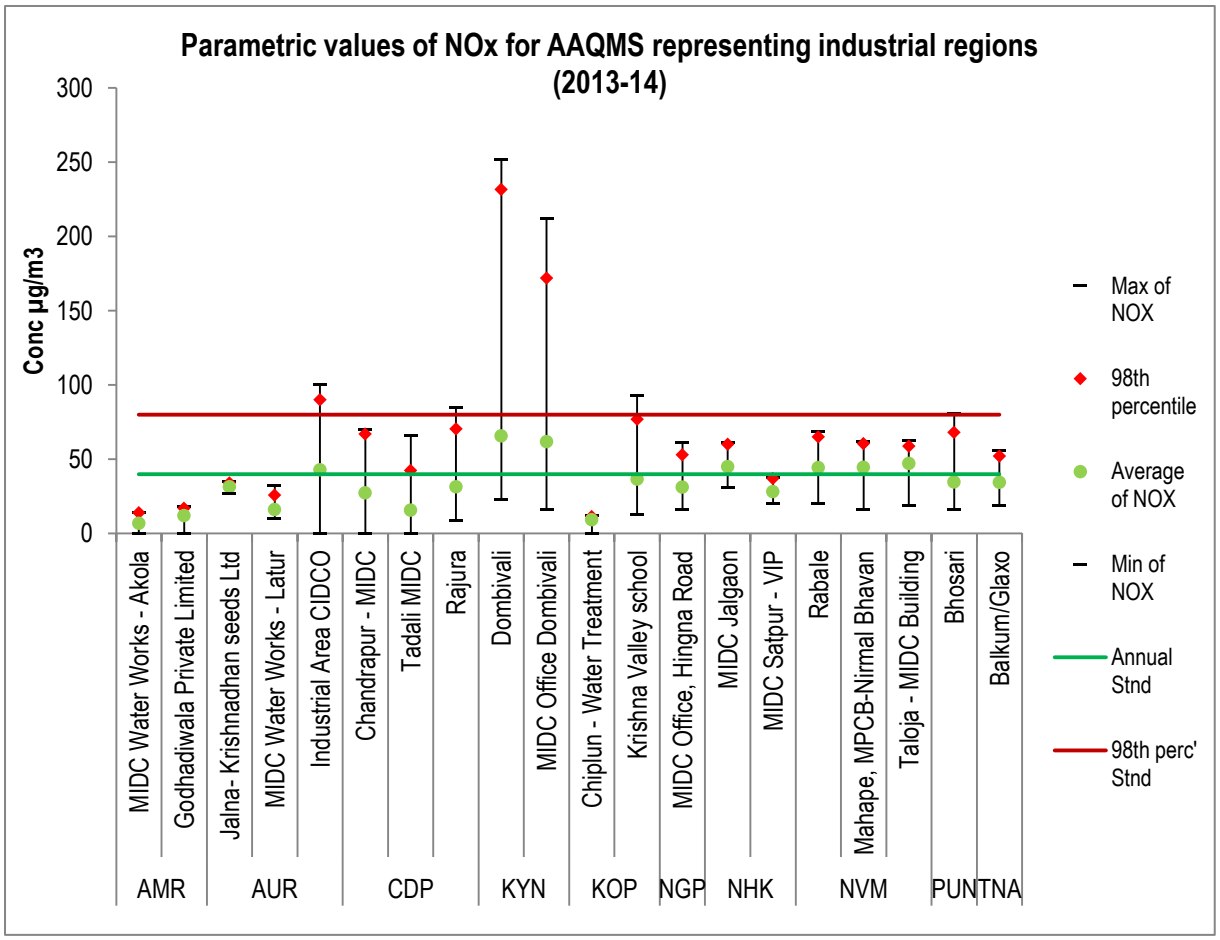


Figure No. 13: Parametric values of NO_X for AAQMS representing industrial regions (2013-14)

Data Source: MPCB, May 2014

One may note from Figure No. 13, that a total 7 out of 20 AAQMS representing industrial areas of Maharashtra exceeded the annual average NO_X standard (40µg/m³).

Dombivali-MIDC area recorded the highest annual NO_X concentration at both the monitoring stations, MIDC Phase-II and MIDC, office in range of 61 to 66µg/m³, which is well above the annual standard. The AAQMS at MIDC Phase II also recorded a 24 hour reading for NO_X concentrations (231µg/m³) almost three times the daily standard (80µg/m³).

Similarly, Navi-Mumbai industrial belt also recorded high levels of NO_X concentration at all its three AAQMS with annual average NO_X levels in the range of 44 to 47µg/m³. While the Nanded industrial area recorded annual NO_X readings (42.9µg/m³) just above the standard (40µg/m³).

Further, NO_X pollution was recorded to be a concern in MIDC Jalgaon as the NO_X concentration recorded were within a very narrow range (31 to 61µg/m³) and the annual average was around 45µg/m³, indicating violation of the annual standard.

Industrial areas of Amravati, Aurangabad and Chandrapur were recorded clean in regard to NO_X pollution.

Table No. 10: Data for NO_x recorded at AAQMS representing Industrial areas (2013-14)

RO	Station name	Station code	Max of NO_X	98th percentile	Average of NO_X	Min of NO_X
	CPCB Standard		*80*	*80*	*40*	*80*
AMR	MIDC Water Works - Akola	701	14.0	14.0	6.9	0.0
	Godhadiwala Private Limited	549	18.0	17.0	12.1	0.0
AUR	Jalna- Krishnadhan seeds Ltd	707	35.0	34.0	31.4	27.0
	MIDC Water Works - Latur	641	32.0	25.9	16.1	10.0
	Industrial Area CIDCO	705	100.0	90.0	42.9	0.0
CDP	Chandrapur - MIDC	281	70.0	67.1	27.4	0.0
	Tadali MIDC	638	66.0	42.5	15.7	0.0
	Rajura	640	85.0	70.5	31.5	9.0
KYN	Dombivali	265	252.0	231.7	65.7	23.0
	MIDC Office Dombivali	-	212.0	172.0	61.9	16.0
KOP	Chiplun - Water Treatment	490	12.0	11.5	9.2	0.0
	Krishna Valley school	576	93.0	76.9	36.6	13.0
NGP	MIDC Office, Hingna Road	288	61.0	53.0	31.1	16.0
NHK	MIDC Jalgaon	646	61.0	60.1	45.0	31.0
	MIDC Satpur - VIP	269	38.0	37.1	28.2	20.0
NVM	Rabale	491	69.0	65.0	44.5	20.0
	Mahape, MPCB-Nirmal Bhavan	493	62.0	60.5	44.5	16.0
	Taloja - MIDC Building	496	63.0	58.9	47.1	19.0
PUN	Bhosari	312	81.0	68.0	34.7	16.0
TNA	Balkum/Glaxo	-	56.0	52.2	34.5	19.0

Data Source: MPCB, May 2014 **Units: µg/m³**

NO_X concentration in residential areas

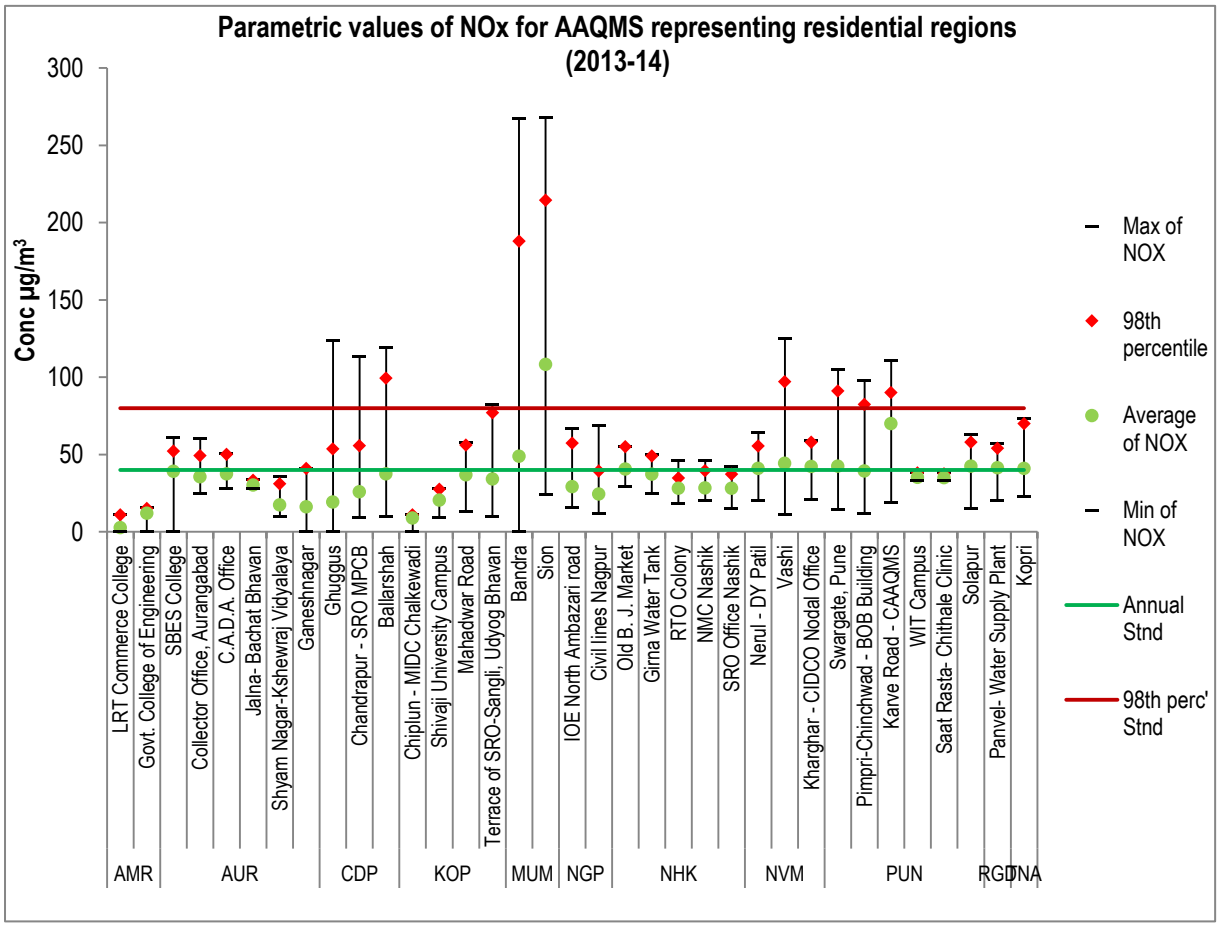


Figure No. 14: Parametric values of NOx for AAQMS representing residential regions (2013-14)

Data Source: MPCB, May 2014

Around 11 out of 35 AAQMS representing residential areas exceeded the annual standards for NOx concentrations (40µg/m³). As seen in Figure No. 14, the AAQMS at Mumbai (Sion), recorded the highest annual NO_X concentration of 108.3µg/m³, violating the standard by more than 2.5 times. Also the monitoring at Bandra (Mumbai), which is located at a traffic junction recorded annual NOx concentrations of 48.7µg/m³.

All the monitoring stations in Navi Mumbai and Pune recorded annual average NO_X concentrations in range of 30 to 45µg/m³ indicating NO_X pollution in those areas. The CAAQMS at Pune (Karve road) recorded annual NO_X concentrations which were almost double the standard. This could be attributed to dense vehicular population in both these regions.

Residential areas in Amravati, Aurangabad, Kolhapur and Nagpur were the best performing regions in terms of NO_X pollution and recorded the least annual average concentrations of NO_X.

Table No. 11: Data for NO_x recorded at AAQMS representing residential areas (2013-14)

RO	Station name	Station code	Max of NO_X	98th percentile	Average of NO_X	Min of NO_X
	CPCB Standard		*80*	*80*	*40*	*80*
AMR	LRT Commerce College	700	11.0	11.0	2.7	0.0
	Govt. College of Engineering	548	16.0	15.0	11.9	0.0
AUR	SBES College	511	61.0	52.2	39.2	0.0
	Collector Office, Aurangabad	512	60.0	49.3	35.6	25.0
	C.A.D.A. Office	513	51.0	50.1	37.5	28.0
	Jalna- Bachat Bhavan	706	34.0	33.4	30.1	28.0
	Shyam Nagar-Kshewraj Vidyalaya	642	36.0	31.1	17.3	10.0
	Ganeshnagar	703	41.0	41.0	16.2	0.0
CDP	Ghuggus	267	124.0	53.6	19.2	0.0
	Chandrapur - SRO MPCB	396	113.0	55.7	25.9	9.0
	Ballarshah	639	119.0	99.3	37.4	10.0
KOP	Chiplun - MIDC Chalkewadi	489	11.0	11.0	9.0	0.0
	Shivaji University Campus	508	28.0	27.5	20.4	9.0
	Mahadwar Road	510	58.0	56.1	36.8	13.0
	Terrace of SRO-Sangli, Udyog Bhavan	574	82.0	76.9	34.2	10.0
MUM	Bandra	-	267.0	188.0	48.7	0.0
	Sion	-	268.0	214.4	108.3	24.0
NGP	IOE North Ambazari road	287	67.0	57.3	29.2	16.0
	Civil lines Nagpur	711	69.0	39.2	24.5	12.0
NHK	Old B. J. Market	644	55.0	55.0	40.6	29.0
	Girna Water Tank	645	50.0	49.0	37.2	25.0
	RTO Colony	259	46.0	34.8	28.1	18.0
	NMC Nashik	280	46.0	39.6	28.4	20.0
	SRO Office Nashik	710	42.0	37.3	28.2	15.0
NVM	Nerul - DY Patil	492	64.0	55.4	41.0	20.0
	Vashi	-	125.0	97.0	44.3	11.0
	Kharghar - CIDCO Nodal Office	494	59.0	58.0	42.2	21.0
PUN	Swargate, Pune	381	105.0	91.0	42.5	14.0
	Pimpri-Chinchwad - BOB Building	708	98.0	82.4	39.4	12.0
	Karve Road - CAAQMS	-	111.0	90.0	70.0	19.0
	WIT Campus	299	38.0	38.0	35.2	33.0
	Saat Rasta- Chithale Clinic	300	38.0	37.5	35.0	33.0
	Solapur	-	63.0	58.0	42.5	15.0
RGD	Panvel- Water Supply Plant	495	57.0	54.0	41.3	20.0
TNA	Kopri	303	73.0	69.9	40.9	23.0

Data Source: MPCB, 2014 **Units: µg/m³**

NO_X concentration in rural and other areas

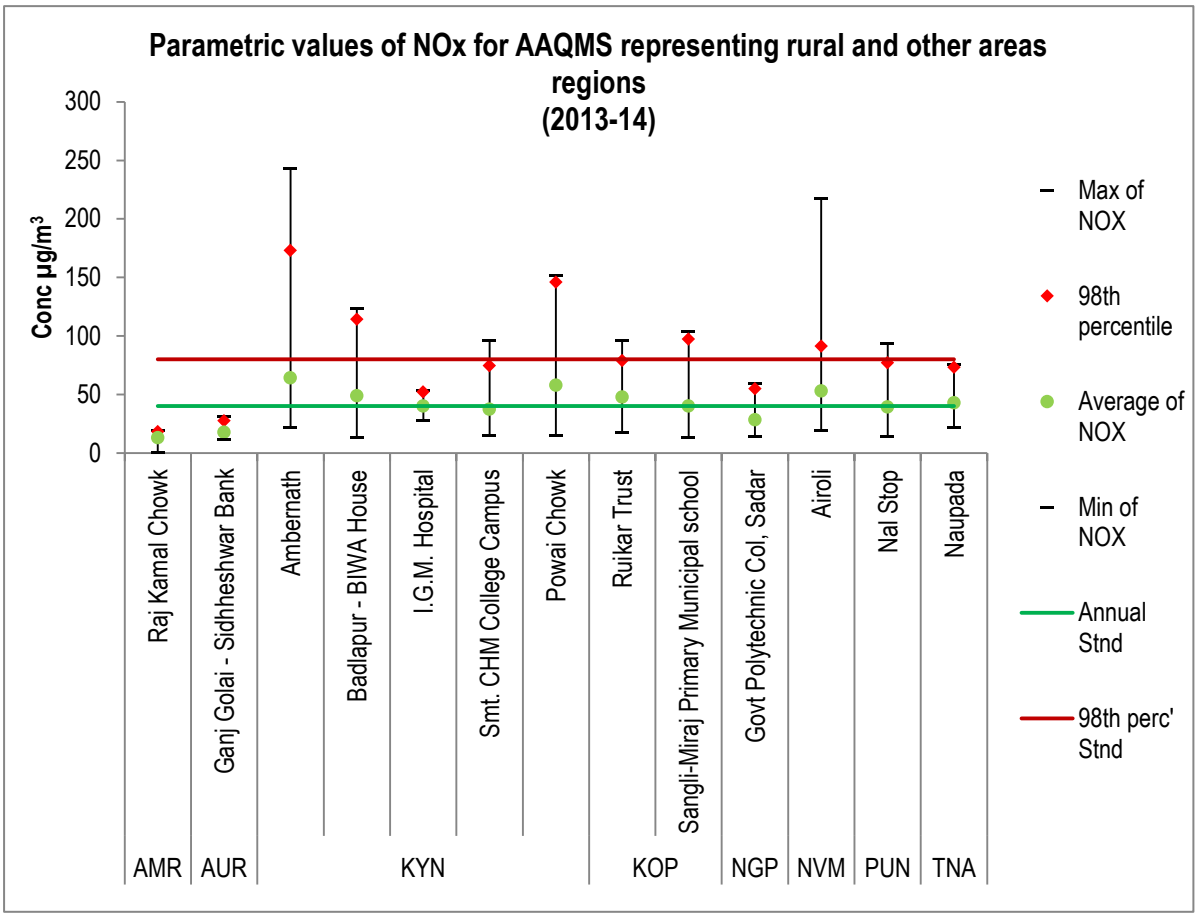


Figure No. 15: Parametric values of NOx for AAQMS representing rural and other type of areas (2013-14)

Data Source: MPCB, May 2014

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

Out of all the 13 active monitoring stations representing rural or other type of areas around 7 AAMQS violated the annual NO_X standard. All the AAQMS in Kalyan, Kolhapur, Navi-Mumbai and Pune regions exceeded the NOx standard. The Ambernth, and Badlapur areas in Kalyan region, recorded annual NOx concentrations of 63.9 and 48.6µg/m³ respectively.. The peak 24 hour reading at Ambernath monitoring station was recorded to be 243µg/m³ followed by monitoring at Navi Mumbai (Airoli)

The AAQMS at Bhiwandi (IGM hospital) represents sensitive type of area and it violated the annual standard (30µg/m³) and recorded concentrations of 39.8µg/m³.

The AAQMS at Pune (Nal-Stop) recorded annual average NO_X concentration (39.0 µg/m³) just under the annual standard (40µg/m³). While the Thane, Aurangabad, Nagpur and Kolhapur regions recorded NO_X concentration well within the standard. Raj Kamal Chowk AAQMS at Amravati recorded the least annual average NO_X concentration of 12.8µg/m³ among the stations representing rural and other type of areas.

Table No. 12: Data for NO_x recorded at AAQMS representing rural and other type of areas (2013-14)

RO	Station name	Station code	Max of NO_X	98th percentile	Average of NO_X	Min of NO_X
	CPCB Standard		*80*	*80*	*40*	*80*
AMR	Raj Kamal Chowk	547	19.0	18.0	12.8	0.0
AUR	Ganj Golai - Sidhheshwar Bank	643	31.0	27.4	17.5	11.0
KYN	Ambernath	445	243.0	172.8	63.9	21.0
	Badlapur - BIWA House	649	123.0	114.1	48.6	13.0
	I.G.M. Hospital	-	53.0	52.0	39.8	27.0
	Smt. CHM College Campus	647	96.0	74.3	37.3	15.0
	Powai Chowk	648	151.0	145.9	57.8	15.0
KOP	Ruikar Trust	509	96.0	78.8	47.7	17.0
	Sangli-Miraj Primary Municipal school	575	103.0	97.1	40.1	13.0
NGP	Govt Polytechnic Col, Sadar	314	59.0	54.8	28.1	14.0
NVM	Airoli	-	217.0	91.0	52.7	19.0
PUN	Nal Stop	379	93.0	76.9	39.0	14.0
TNA	Naupada	304	75.0	73.0	42.6	21.0

Data Source: MPCB, 2014 **Units: µg/m³**

**Note: I.G.M Hospital is categorized as a sensitive type of monitoring zone by MPCB and the standards are 80µg/m³ and 30µg/m³ for 24 and annual averages.*

NO_X concentration in commercial areas

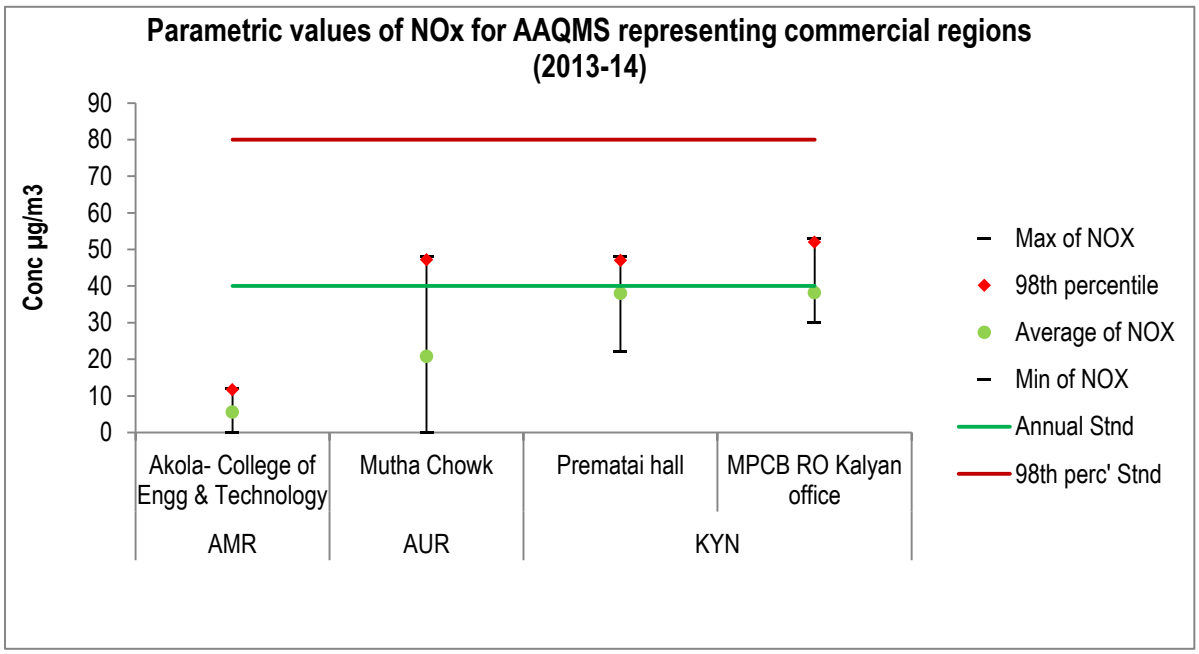


Figure No. 16: Parametric values of NOx for AAQMS representing commercial regions (2013-14)

Data Source: MPCB, May 2014

As seen in Figure No. 16, all the AAQMS representing commercial areas recorded NOx levels well below acceptable limits for annual and daily standard. Although the AAQMS at MPCB office at Kalyan, recorded the highest NO_X value of 53µg/m³ the annual average was around 38µg/m³ which was well within the standard. AAQMS at Amravati recorded the lowest annual NOx concentrations of 5.6µg/m³.

Table No. 13: Data for NO_x recorded at AAQMS representing commercial areas (2013-14)

RO	Station name	Station code	Max of NO_X	98th percentile	Average of NO_X	Min of NO_X
	CPCB Standard		*80*	*80*	*40*	*80*
AMR	Akola- College of Engg & Technology	702	12.0	11.7	5.6	0.0
AUR	Mutha Chowk	704	48.0	47.1	20.8	0.0
KYN	Prematai hall	-	48.0	47.0	38.0	22.0
	MPCB RO Kalyan office	-	53.0	52.0	38.2	30.0

Data Source: MPCB, May 2014 **Units: µg/m³**

Respirable Suspended Particulate Matter (RSPM)

Particulate Matter is a complex mixture of fine particles and aerosols, and is also known as particle pollution. It is made up of a number of components, including acids (such as nitrates and sulfates), organic chemicals, metals, and dust particles. Particles that are 10 micrometers in diameter or smaller can pass through the throat and nose and enter the lungs and are commonly referred to as RSPM (Respirable Suspended Particulate Matter). They are even smaller than human hair follicle and fine sand particles (Figure No. 17). Once inhaled, these particles can affect the heart and lungs and cause serious health effects.

Various studies prove the relationship of high PM and respiratory problems. Statistical analysis of data indicate a relationship between increase in particulate concentration and rise in the number of hospital visits for upper respiratory infections, cardiac diseases, bronchitis, asthma, pneumonia, emphysema and so on. Studies also indicate that much of the PM in the atmosphere is carcinogenic in nature. In some cases it has been observed that exposure to particulate matter in combination with other pollutants such as RSPM produces more severe health deterioration than exposure to each pollutant separately.

Several specific substances which are constituents of PM have been observed to cause some damage to plants and vegetation. Particles containing fluorides appear to cause plant damage, and magnesium oxide falling on agricultural soils has been seen to cause poor plant growth. PM affects the visibility in a region. Due to absorption and scattering of light by airborne particulates, the visibility tends to reduce. PM can affect painted surfaces, clothing, and curtains just by settling on them. Also, PM is known to cause direct chemical damage by corrosion.

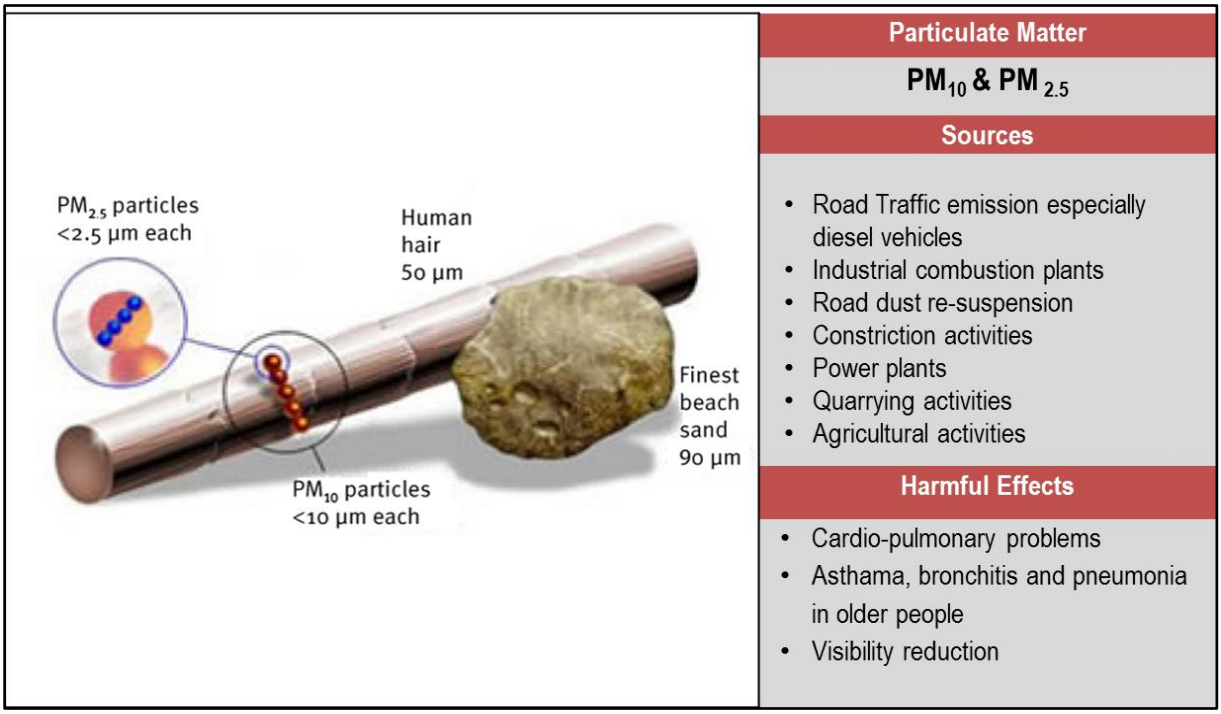


Figure No. 17: Size difference between $PM_{2.5}$ and PM_{10}, their sources and harmful impacts of Particulate Matter

Data Source: Parivesh ENVIS, CPCB

Trend of RSPM Concentrations

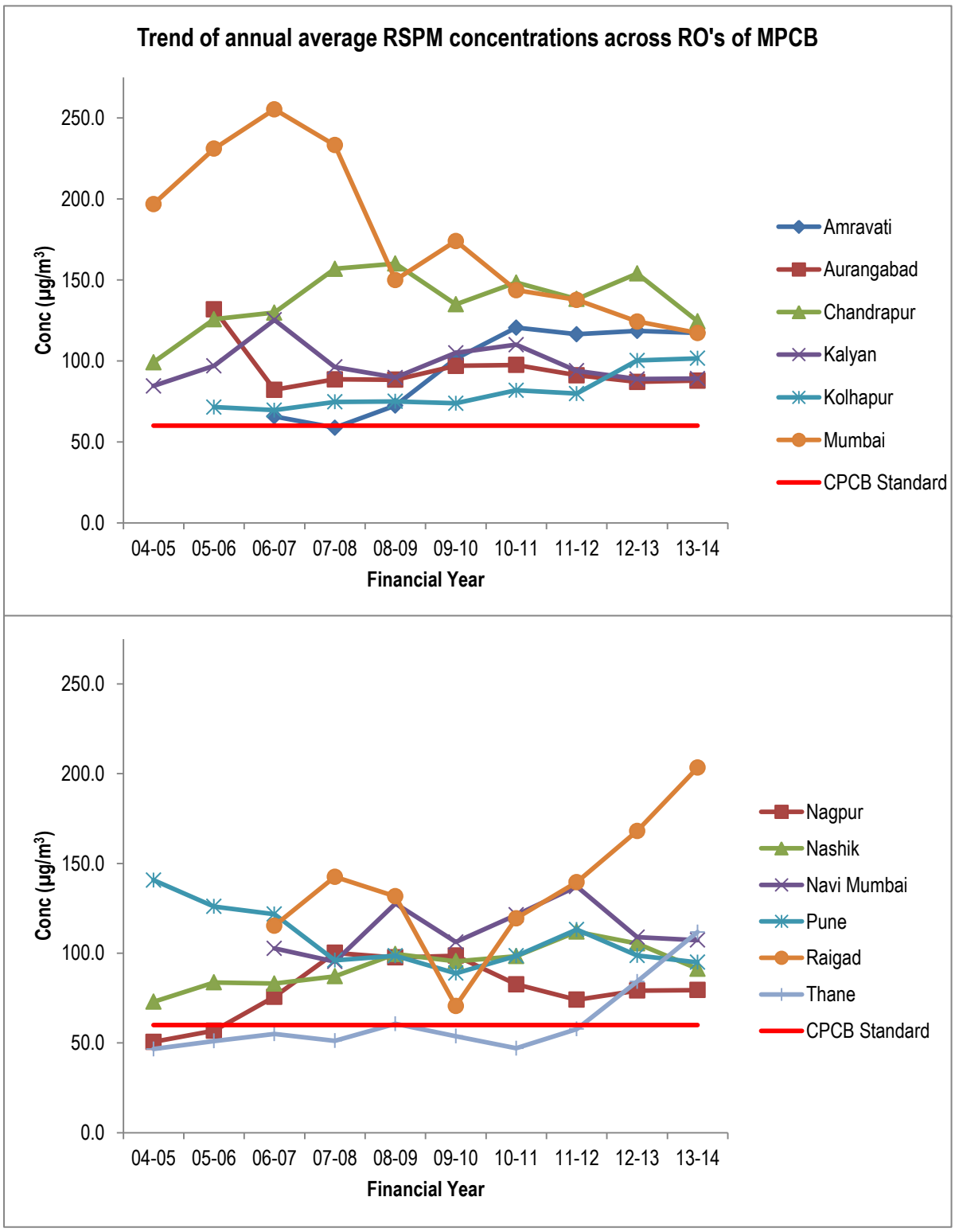


Figure No. 18: Trend of annual average RSPM concentrations across RO's of MPCB

Comparison for last few years

The RSPM concentrations across all the regions in Maharashtra have been very high (Figure No. 18). 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 80-100 µg/m^3. The type wise performance for RSPM concentrations recorded by the AAQMS in Maharashtra active in the year 2013-14 have been presented in the following section.

RSPM concentration in industrial areas

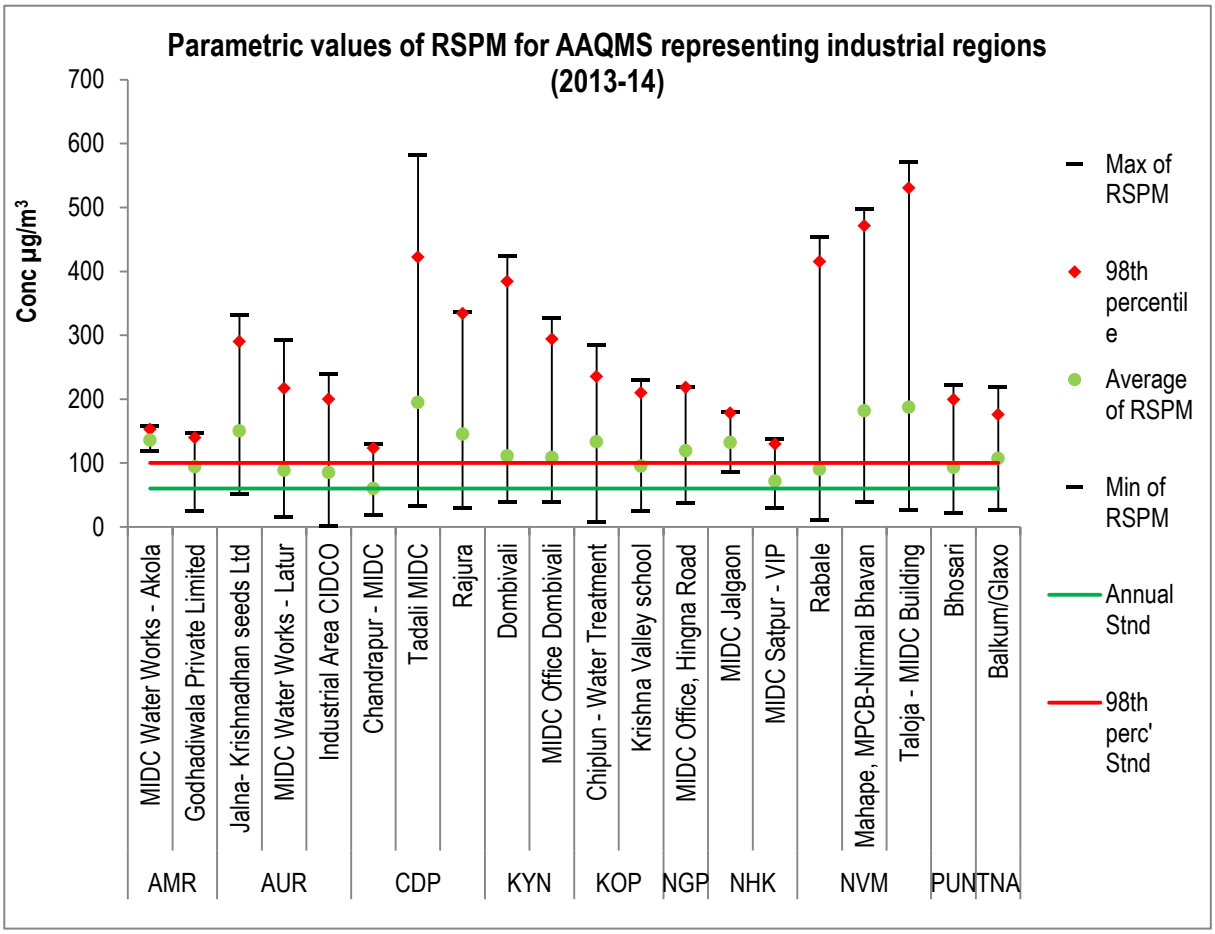


Figure No. 19: Parametric values of RSPM for AAQMS representing industrial areas (2013-14)

Data Source: MPCB, May 2014

As seen in Figure No. 19, out of all the monitoring stations representing industrial areas of Maharashtra, the highest annual average RSPM concentrations was recorded Tadali MIDC area in Chandrapur RO (194.8µg/m³) which is almost 3 times the annual standard and nearly double the daily standard. The Same AAQMS also recorded the highest daily RSPM concentration of 582µg/m³.

The MIDC area in Amravati region consistently recorded high RSPM levels which were in the range of 118 to 157µg/m³. While the region recorded low SO_2 and NO_X levels, the RSPM were unusually high with even the minimum daily reading exceeding the 24 hour standard. Similarly the MIDC at Jalgaon recorded a narrow range of RSPM pollution with annual NO_X levels of 132.2µg/m³. The data sets for the parametric values of RSPM concentrations recorded at AAQMS in industrial areas of Maharashtra have been tabulated in Table No. 14.

Table No. 14: Data for RSPM recorded at AAQMS representing industrial areas (2013-14)

RO	Station name	Station code	Max of RSPM	98th percentile	Average of RSPM	Min of RSPM
	CPCB Standard		*100*	*100*	*60*	*100*
AMR	MIDC Water Works - Akola	701	157.0	152.4	135.6	118.0
	Godhadiwala Private Limited	549	146.0	139.6	94.0	24.0
AUR	Jalna- Krishnadhan seeds Ltd	707	332.0	290.1	150.0	51.0
	MIDC Water Works - Latur	641	292.0	216.6	88.5	16.0
	Industrial Area CIDCO	705	238.0	199.9	84.9	2.0
CDP	Chandrapur - MIDC	281	130.0	122.8	60.0	18.0
	Tadali MIDC	638	582.0	422.3	194.8	33.0
	Rajura	640	336.0	333.7	145.1	29.0
KYN	Dombivali	265	424.0	383.9	110.9	39.0
	MIDC Office Dombivali	-	327.0	293.6	108.5	38.0
KOP	Chiplun - Water Treatment	490	284.0	235.0	133.0	7.0
	Krishna Valley school	576	229.0	209.9	94.9	25.0
NGP	MIDC Office, Hingna Road	288	219.0	218.3	118.8	37.0
NHK	MIDC Jalgaon	646	179.0	178.1	132.3	85.0
	MIDC Satpur - VIP	269	137.0	129.4	71.3	29.0
NVM	Rabale	491	454.0	415.2	89.7	10.0
	Mahape, MPCB-Nirmal Bhavan	493	498.0	471.0	181.6	39.0
	Taloja - MIDC Building	496	571.0	530.2	187.3	26.0
PUN	Bhosari	312	222.0	199.0	92.8	21.0
TNA	Balkum/Glaxo	-	219.0	175.6	107.0	26.0

Data Source: MPCB, 2014 **Units: µg/m³**

RSPM concentration in residential areas

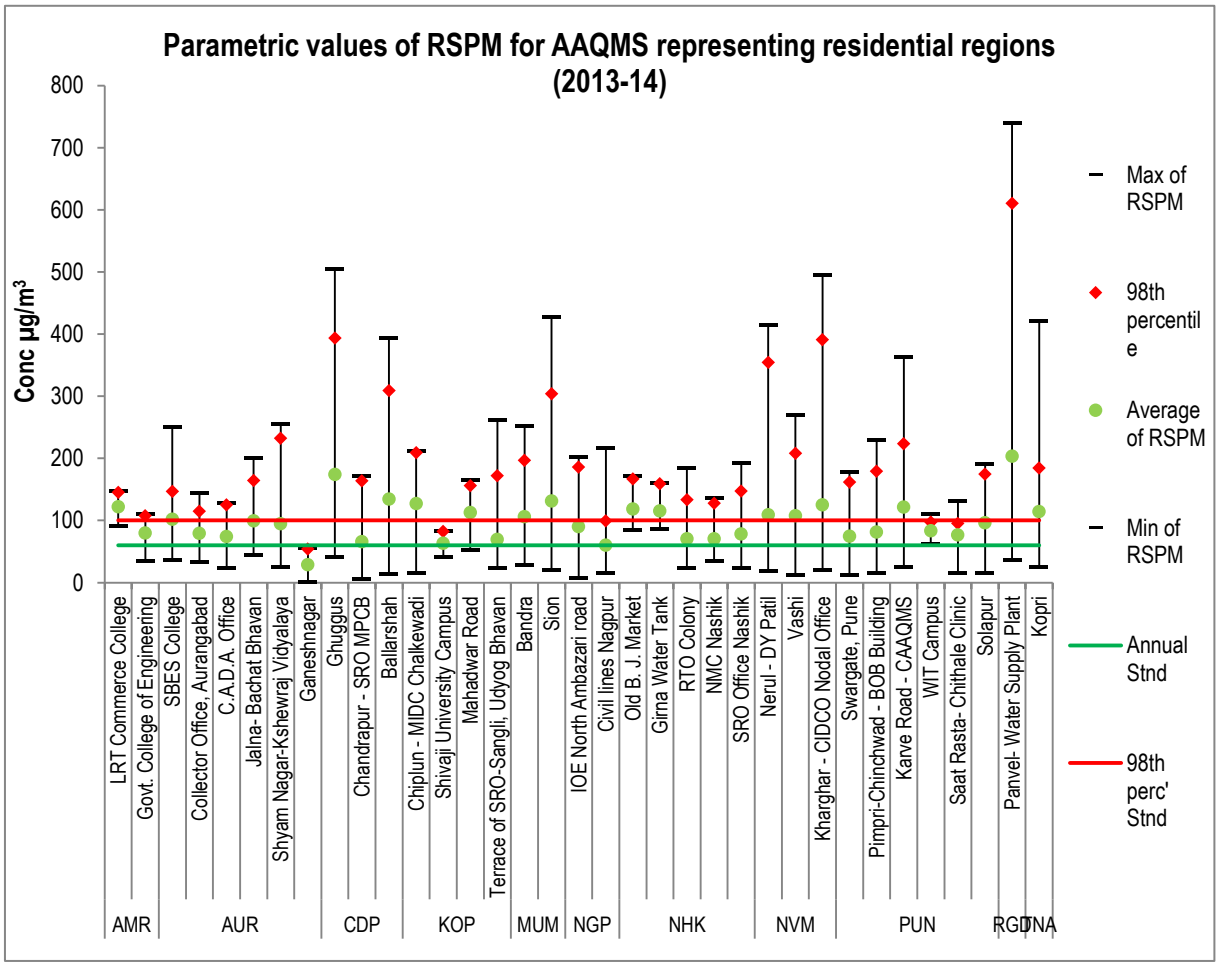


Figure No. 20: Parametric values of RSPM for AAQMS representing residential areas (2013-14)

Data Source: MPCB, May 2014

All the AAQMS representing residential areas in Maharashtra recorded very high levels of levels of RSPM pollution in the year 2013-14. The only exception to the same was the AAQMS representing Ganeshnagar area in Aurangabad region which recorded RSPM concentrations well within the daily and annual standards.

The Panvel AAQMS recorded severely high concentrations of annual RSPM levels (203.3µg/m^3). It also recorded the highest daily RSPM concentrations over 630µg/m^3. Similarly 3 AAQMS at Amravati (LRT College), Pune (WIT campus), Kolpahur (Shivaji university campus) recorded high RSPM concentrations throughout the year. The RSPM concentrations ranged between 60 to 150µg/m^3 across these locations.

Similarly, the Nashik region also recorded severe concentrations of RSPM concentrations throughout the year. The annual average levels at the AAQMS in Nashik ranged between 70 to 120µg/m3.

Table No. 15: Data for RSPM recorded at AAQMS representing residential areas (2013-14)

RO	Station name	Station code	Max of RSPM	98th percentile	Average of RSPM	Min of RSPM
	CPCB Standard		*100*	*100*	*60*	*100*
AMR	LRT Commerce College	700	148.0	145.5	122.1	91.0
	Govt. College of Engineering	548	110.0	107.7	79.8	35.0
AUR	SBES College	511	250.0	147.0	102.0	36.0
	Collector Office, Aurangabad	512	144.0	114.8	79.3	33.0
	C.A.D.A. Office	513	129.0	125.0	74.1	23.0
	Jalna- Bachat Bhavan	706	201.0	164.3	99.6	44.0
	Shyam Nagar-Kshewraj Vidyalaya	642	255.0	232.4	94.6	26.0
	Ganeshnagar	703	55.0	54.0	28.8	1.0
CDP	Ghuggus	267	505.0	393.7	174.3	41.0
	Chandrapur - SRO MPCB	396	172.0	164.0	65.9	5.0
	Ballarshah	639	394.0	309.1	134.7	14.0
KOP	Chiplun - MIDC Chalkewadi	489	211.0	208.9	127.5	16.0
	Shivaji University Campus	508	83.0	82.5	63.6	41.0
	Mahadwar Road	510	165.0	156.3	112.7	53.0
	Terrace of SRO-Sangli, Udyog Bhavan	574	261.0	172.0	69.4	24.0
MUM	Bandra	-	252.0	197.0	106.0	29.0
	Sion	-	428.0	304.1	131.2	20.0
NGP	IOE North Ambazari road	287	202.0	185.8	90.3	8.0
	Civil lines Nagpur	711	216.0	99.2	60.6	15.0
NHK	Old B. J. Market	644	171.0	167.1	118.4	85.0
	Girna Water Tank	645	161.0	159.1	115.6	86.0
	RTO Colony	259	185.0	133.5	70.8	24.0
	NMC Nashik	280	136.0	127.7	70.5	34.0
	SRO Office Nashik	710	193.0	147.3	78.5	23.0
NVM	Nerul - DY Patil	492	414.0	354.4	109.4	19.0
	Vashi	-	270.0	208.3	107.8	12.0
	Kharghar - CIDCO Nodal Office	494	495.0	391.0	125.3	20.0
PUN	Swargate, Pune	381	179.0	162.0	74.8	13.0
	Pimpri-Chinchwad - BOB Building	708	230.0	179.1	81.5	15.0
	Karve Road - CAAQMS	-	363.0	223.6	121.4	26.0
	WIT Campus	299	110.0	97.3	83.6	62.0
	Saat Rasta- Chithale Clinic	300	131.0	95.5	77.0	16.0
	Solapur	-	190.0	174.9	96.2	15.0
RGD	Panvel- Water Supply Plant	495	740.0	610.6	203.3	37.0
TNA	Kopri	303	421.0	184.5	114.4	25.0

Data Source: MPCB, 2014 **Units: µg/m³**

RSPM concentration in rural and other areas

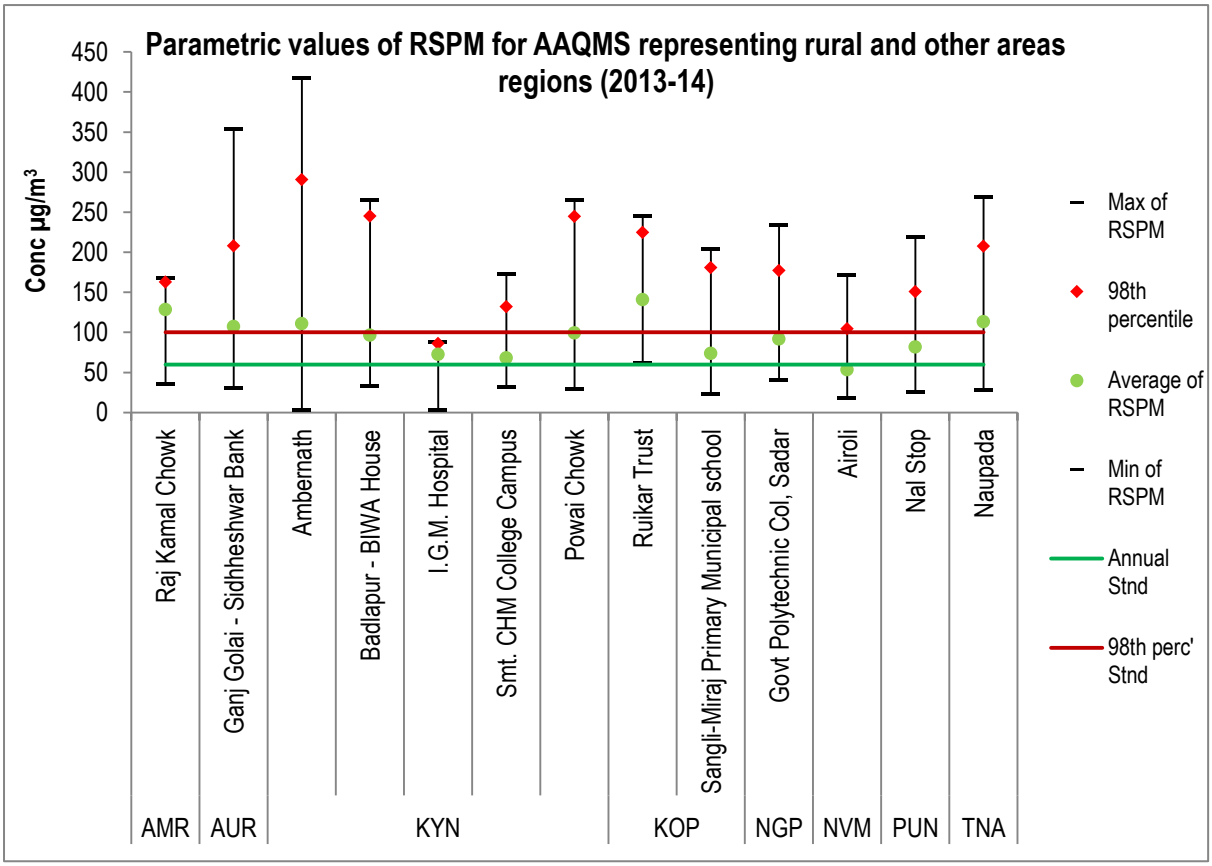


Figure No. 21: Parametric values of RSPM for AAQMS representing rural and other areas (2013-14)

Data Source: MPCB, May 2014

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

The AAQMS which represented mixed and other areas in Maharashtra recorded RSPM concentrations above the prescribed standards (daily and annual). Especially Kolhapur and Kalyan region consistently recorded high RSPM concentrations. In the Kolhapur region the AAQMS at Ruikar trust, recorded the highest annual RSPM concentrations (140.6µg/m^3) among the AAQMS representing rural and other type of areas.

All the AAQMS in the Kalyan region (Ambernath, Badlapur, Ulhasnagar and Bhiwandi) recorded annual RSPM concentrations in the range of 70-110µg/m^3, which was more than the annual RSPM standard (80µg/m^3). The 98th percentile readings at 3 AAQMS in Kalyan region were more than 245µg/m^3 of which Ambernath area (290µg/m^3) was the most severe followed by Badlapur (245µg/m^3) and Ulhasnagar (244.5µg/m^3) areas. The AAQMS representing sensitive region in Bhiwandi (IGM hospital) also violated the annual standards.

The Airoli monitoring station in Navi Mumbai recorded annual concentrations (53.3µg/m^3) less than the annual standard for RSPM.

Table No. 16: Data for RSPM recorded at AAQMS representing rural and other types of areas (2013-14)

RO	Station name	Station code	Max of RSPM	98th percentile	Average of RSPM	Min of RSPM
	CPCB Standard		*100*	*100*	*60*	*100*
AMR	Raj Kamal Chowk	547	168.0	162.8	128.3	35.0
AUR	Ganj Golai - Sidhheshwar Bank	643	353.0	207.8	107.2	31.0
KYN	Ambernath	445	417.0	290.4	110.7	3.0
	Badlapur - BIWA House	649	265.0	245.0	96.4	33.0
	I.G.M. Hospital	-	87.0	86.2	72.3	3.0
	Smt. CHM College Campus	647	173.0	132.0	67.9	32.0
	Powai Chowk	648	265.0	244.5	99.1	29.0
KOP	Ruikar Trust	509	245.0	224.7	140.6	62.0
	Sangli-Miraj Primary Municipal school	575	204.0	180.6	73.8	23.0
NGP	Govt Polytechnic Col, Sadar	314	234.0	176.9	91.7	41.0
NVM	Airoli	-	171.0	104.5	53.3	18.0
PUN	Nal Stop	379	219.0	150.9	81.6	25.0
TNA	Naupada	304	268.0	207.4	113.1	28.0

Data Source: MPCB, 2014 **Units: µg/m³**

RSPM concentration in commercial areas

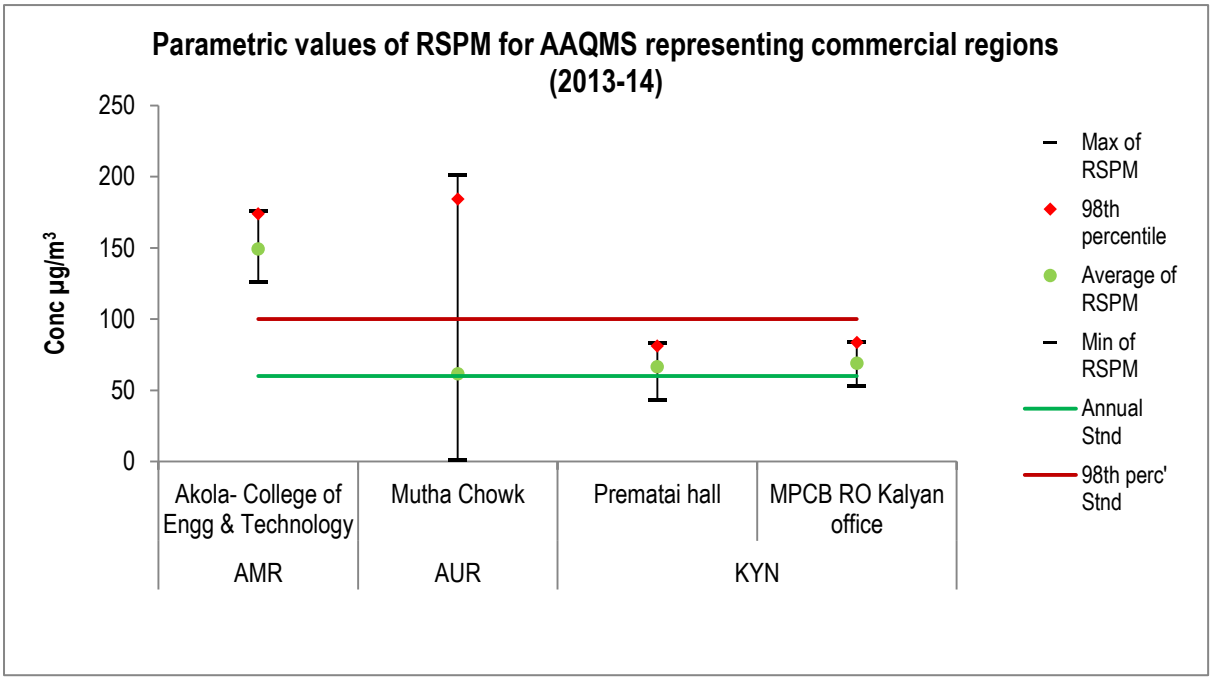


Figure No. 22: Parametric values of RSPM for AAQMS representing commercial areas (2013-14)

Data Source: MPCB, May 2014

Although all the AAQMS representing commercial areas in Maharashtra violated the annual standard for RSPM, the AAQMS at Akola engineering college in Amravati region was the most severely affected area. Even the minimum 24 hour reading recorded (126µg/m³) exceeded daily standard (100µg/m³). In the Kalyan region the RSPM concentrations in the commercial areas ranged between 40-83 µg/m³.

Table No. 17: Data for RSPM recorded at AAQMS representing commercial areas (2013-14)

RO	Station name	Station code	Max of RSPM	98th percentile	Average of RSPM	Min of RSPM
	CPCB Standard		*100*	*100*	*60*	*100*
AMR	Akola- College of Engg & Technology	702	176.0	173.8	149.1	126.0
AUR	Mutha Chowk	704	201.0	184.1	61.5	1.0
KYN	Prematai hall	-	83.0	81.2	66.5	43.0
	MPCB RO Kalyan office	-	84.0	83.6	68.9	53.0

Data Source: MPCB, 2014 **Units: µg/m³**

Carbon Monoxide

Partial oxidation of carbon-containing compounds leads to production of CO (Carbon monoxide); which forms when there is not enough oxygen to produce CO_2 (carbon dioxide), such as when operating a stove or an internal combustion engine in an enclosed space. CO has no colour, odour or taste and is highly toxic to humans and animals at higher concentrations. Although CO has a half-life of 5 hours in fresh air, it combines with haemoglobin to produce carboxy-haemoglobin, which occupies the space in haemoglobin that normally carries oxygen, and hence is a toxic gas. It is known to reduce the oxygen carrying capacity of blood, causes headaches, nausea, and dizziness and at high concentrations can lead to death. Partial combustion of petroleum products in vehicles and, emissions from gas stoves are some of the major sources of CO emissions.

CO is monitored at the CAAQMS in Maharashtra at Bandra, Pune and Solapur. The 8 hour concentrations have been presented for the data recorded at the CAAQMS for the year 2013-14 in Figure No. 23.

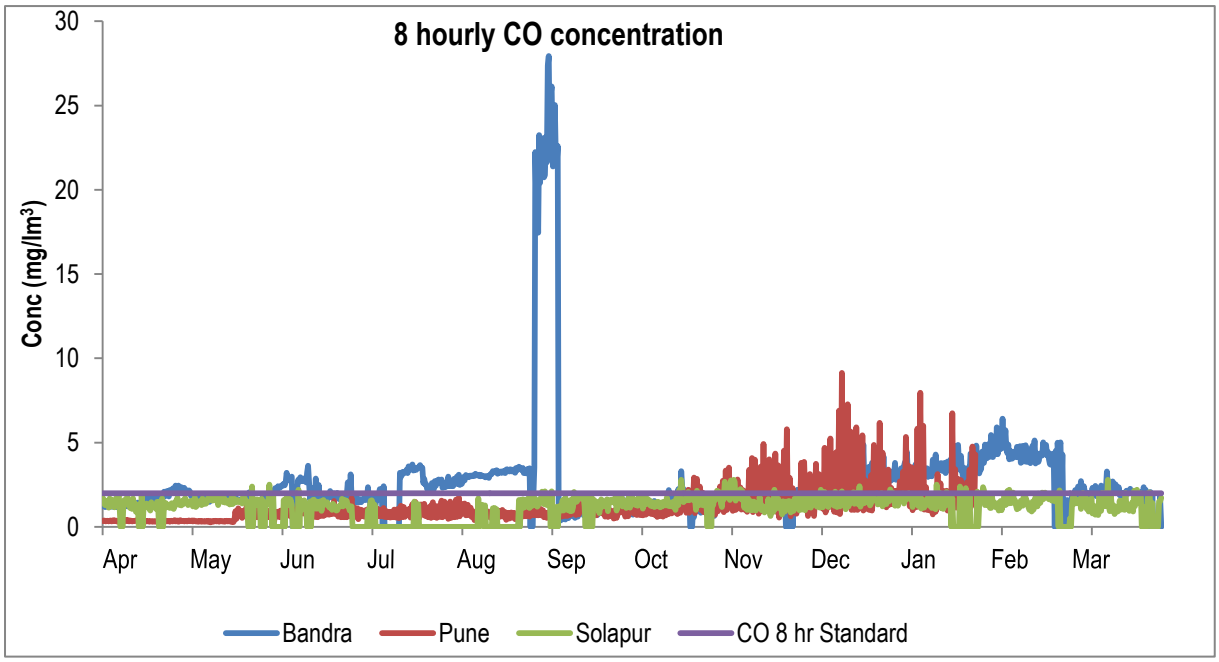


Figure No. 23: Carbon monoxide concentrations at Bandra, Pune and Solapur (2013-14)

At the Bandra CAAQMS the CO concentrations exceeded the 8 hourly standards (2mg/m^3) during the monsoon season from July to September as well as in the winter season during December to February. The Pune region consistently exceeded the 8 hour standard during the winter season from November to mid-January, while the CO concentrations were well within the standard for rest of the year. The percentage exceedence for CO concentrations has been highest at Bandra 52% followed by Pune (11%) while the Solapur area is relatively less polluted with CO concentrations and recorded only 7% exceedence for the 8 hourly standard.

Ozone

O_3 (Ozone) is a secondary pollutant, formed when NOx and VOCs undergo a photochemical reaction in the atmosphere. People who are active outdoors, especially in hot sunny days are more vulnerable to the harmful impacts of O_3. Children are also more likely than adults to have asthma as an impact of O_3 pollution. Breathing ozone can trigger a variety of health problems including chest pain, coughing, throat irritation, and congestion. It can worsen bronchitis, emphysema, and asthma. Ground level ozone also can reduce lung function and inflame the linings of the lungs. Repeated exposure may permanently scar lung tissue.

Ozone is monitored at select locations in Maharashtra. The data for ozone monitored by the CAAQMS at Pune, Bandra for the year 2013-14 has been presented in Figure No. 24.

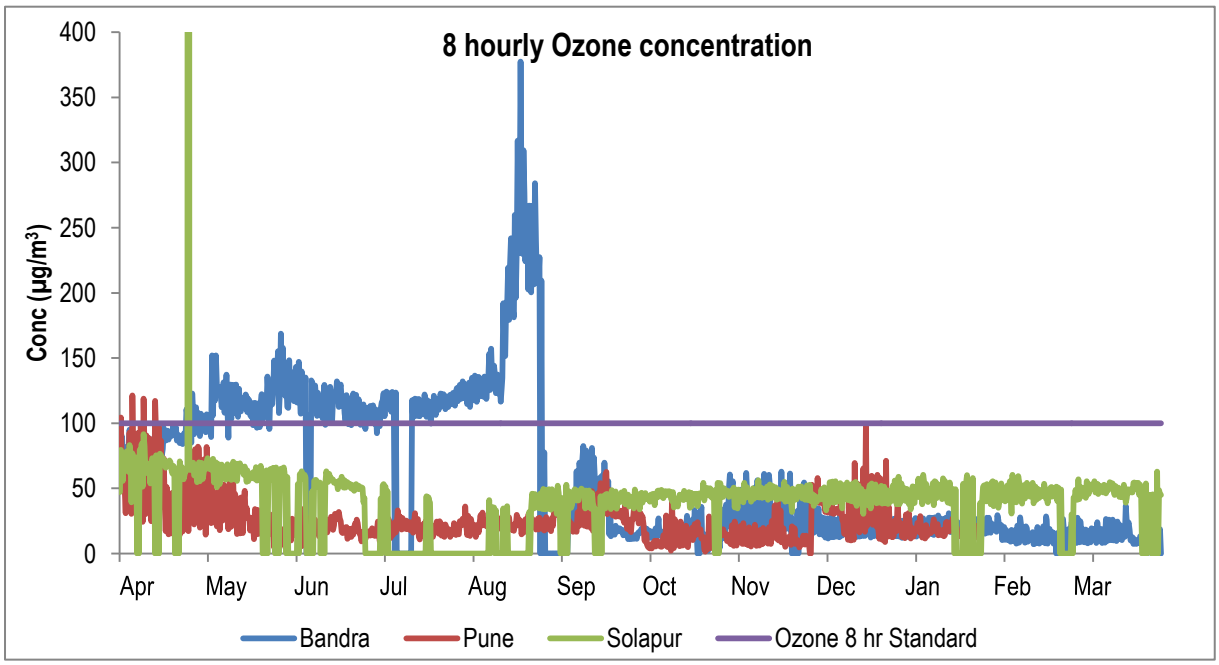


Figure No. 24: Ozone concentrations at Bandra, Pune and Solapur (2013-14)

O_3 levels were recorded to be high in Mumbai (Bandra region) especially in the summer and monsoon months. In the year 2013-14, the Bandra region violated the O_3 standard for more than 30percent of the observations recorded at that AAQMS. The peak O_3 concentrations (377.5µg/m³) were recorded in the month of August. The reason for slightly higher ozone condition in Mumbai could be attributed to the prevailing weather conditions and complex chemistry in formation of ozone involving hydrocarbons and nitrogen oxides in presence of sunlight. The Pune and Solapur areas recorded O_3 pollution under control as the exceedence was recorded for merely 0.4 and 0.1percent of the readings respectively.

Benzene

Benzene (C_6H_6) is a colourless sweet smelling liquid and is generated whenever carbon-rich materials undergo incomplete combustion. Combustion of aromatic compounds, evaporation during fuelling, tobacco smoke, furniture wax and glue paints are some of the major sources of benzene pollution. The natural sources include volcanoes and forest fires. Benzene increases the risk of cancer and other illnesses. Benzene is a notorious cause of bone marrow failure. Substantial quantities of epidemiologic, clinical, and laboratory data link benzene to aplastic anaemia, acute leukaemia, and bone marrow abnormalities. Benzene targets liver, kidney, lung, heart and the brain and can cause strand breaks of the DNA (Deoxyribonucleic acid), ultimately leading to chromosomal damage.

Benzene pollution was recorded at 2 CAAQMS, Bandra and Pune. The annual average benzene concentrations were recorded to be 1.3 and 151.3µg/m^3 respectively. The annual average standard for benzene has been set as 5µg/m^3 by CPCB, indicating that the benzene pollution at Pune is of major concern. Upon segregating the data for eight hour intervals, it is interesting to note that high Benzene at Pune was recorded during the day time (8am to 4pm) sampling. The evening (4pm to 12am) and night (12am to 8am) sampling recorded average of about 36 and 1µg/m^3 respectively.

Air Quality Index

Quality of air around us has direct implications on our health. The air quality, like weather of a location, can change dynamically within a span of an hour. Hence to convey the information on outdoor air quality in the easiest possible way which could be easily understood by general public, tools such as AQI (Air Quality Index) have been devised.

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. Pollutant specific, parametric indexing has become very instrumental and indicative in drawing conclusion on the status and trend of air quality by measuring pollution.

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. An AQI of 100 or below indicates attainment of National Ambient Air Quality Standards. Higher value of AQI indicates high level of pollution. When AQI values are above 100, air quality is considered to be unhealthy—at first for certain sensitive groups of people, then for everyone (including healthy people) as AQI values get higher. Depending upon 'doses of exposure' they are further divided into five classes of AQI, which present different health concerns. To make it easy to understand, the categories of AQI are assigned color codes (Figure No. 25) i.e. color Green to 'Good', Yellow to 'Moderate', Orange to 'Poor', Red to 'Very Poor' and Dark Red to 'Severe'.

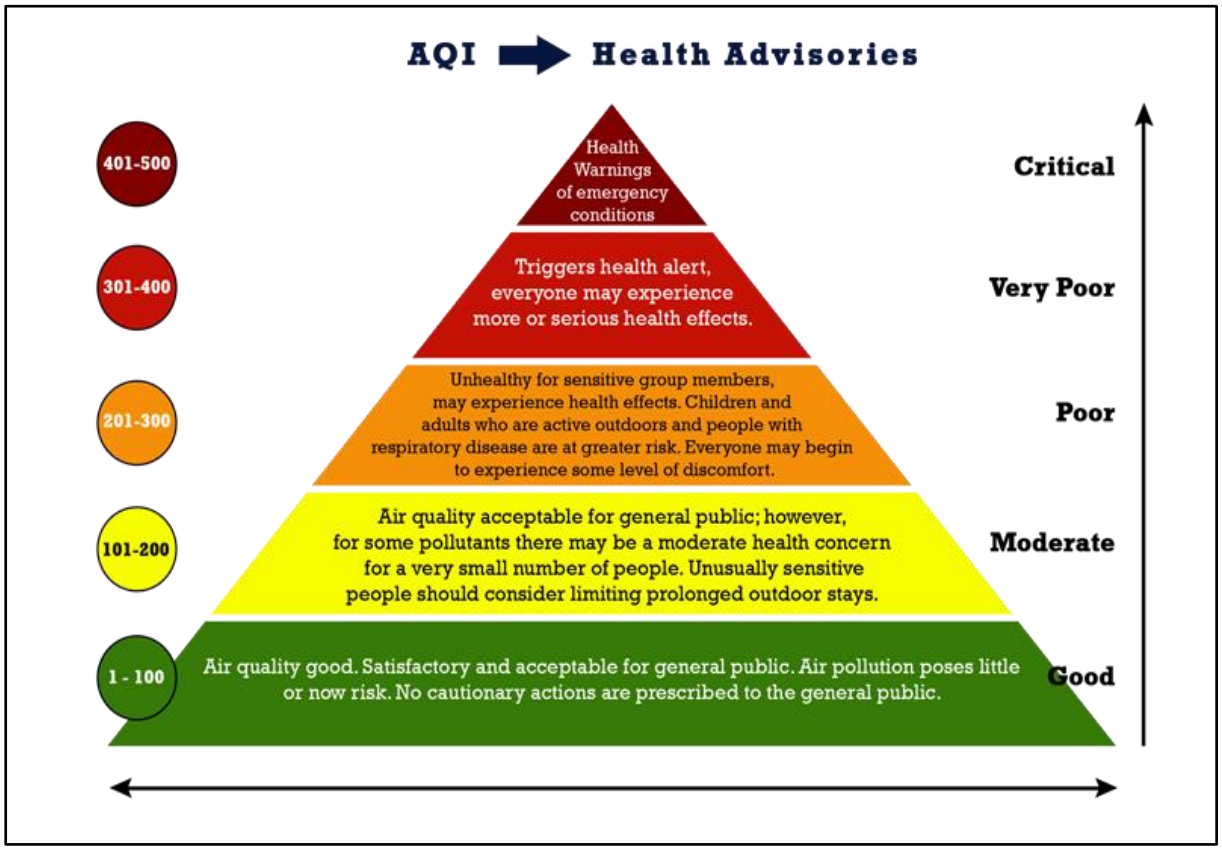


Figure No. 25: Health advisories for various range of Air Quality Indices and respective colour codes

Data Source: EPA and System of Air Quality Weather Forecasting and Research, MoES, GoI

AQI for Indian Standards

With reference to the formula used for calculating AQI, the breakpoint used for SO_X and NO_2 by EPA are of 1 hour averaging time and not 24-hourly whereas, the AAQMS in Maharashtra report levels of major air pollutants for a period of 24-hour. In addition, an AQI value of 100 or below would correspond to the attainment of the pollutant concentration adhering to National Ambient Standards. Since it was not possible to derive any value from it, US-EPA's algorithms were not used.

Air quality index is a piecewise linear function of the pollutant concentration and there is a discontinuous jump of AQI unit and the corresponding adjustments are made to set the low and high range of AQI corresponding to a certain concentration of the pollutant. IIT-Kanpur has defined daily exposure limits of various pollutants and laid sets of formulae to calculate AQI on similar lines with other indexing worldwide (Table No. 18). These calculations have been endorsed by NEERI (National Environmental Engineering Research Institute), a constituent of CSIR (Council of Scientific & Industrial Research)[6], India.

The algorithm for calculating Air Quality Index is based upon daily averaging time and since dynamic behaviour of concentration of air pollutants causes it to change even within an hour, mentioning of the air quality annually would average out the extremities. The possibility of examining daily air quality gives the scope to study in detail the subject and hence the daily data recorded by AAQMS against the 24 hour standard has been considered while developing the AQI for the AAQMS in Maharashtra.

Table No. 18: Sub-index and breakpoint pollutant concentration for Indian Air Quality Index

Index	Category	RSPM (24 hr avg) ($\mu gm/m^3$)	NO_X (24-hr avg) ($\mu gm/m^3$)	SPM (24-hr avg.) ($\mu gm/m^3$)	RSPM (24-hr avg.) ($\mu gm/m^3$)
0-100	Good	0-80	0-80	0-200	0-100
101-200	Moderate	81-367	81-180	201-260	101-150
201-300	Poor	368-786	181-564	261-400	151-350
301-400	Very poor	787-1572	565-1272	401-800	351-420
401-500	Severe	>1572	>1272	>800	>420

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

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}

[6]Research Article, Prakash Mamta and Bassin J.K, *Analysis of Ambient Air Quality Using Air Quality Index*, IJAET/ Vol.I/ Issue II/July-Sept.,2010/106-114; E-ISSN 0976-3945

AQI for AAQMS in Maharashtra

The data for air quality is regularly recorded by the AAQMS which monitor three parameters majorly, namely RSPM, NO_X and SO_2. These parameters have been analysed for above mentioned calculations. Of the three pollutants, RSPM is the most predominant air pollutant across the state. The concentration levels were converted into AQI using the formulae elaborated in Table No. 18. Finally, the highest or 'dominant' of the AQI value for the respective individual pollutant becomes the AQI for that day. The term composite AQI has been used to analyse the performance of each AAQMS, in terms of the occurrence of a certain air quality recorded in that region.

As per the results obtained upon developing the composite AQI for 2013-14, Figure No. 26, one may note that Navi-Mumbai, Mumbai and Chandrapur are the regions which registered air quality 'Poor to Severe' for a considerable number of observations throughout the year.

Navi Mumbai area and its close neighbourhood Panvel area (Raigad RO) recorded 'Severe' air quality for more than 5 and 10percent of the observation days respectively. While the 'Poor' and 'Moderate' air quality were recorded for more than 35 and 60percent in the areas. This indicates that the ambient air in Navi Mumbai (developing nodes) is highly pollution prone. This is majorly due to high RSPM concentrations since these areas have been recorded 'Good' AQI for more than 98percent of the observations for SO_2 and NO_X.

Similarly, in Mumbai region both the AAQMS at Sion and Bandra, recorded 'Good' air quality for 20 and 30percent of the recorded observations, while the rest of the time the air quality was categorised as 'Moderate' and 'Poor'. Apart from high RSPM concentrations the AAQMS at Sion recorded high NO_x concentrations, while both the AAQMS (Bandra and Sion) recorded almost all the observations as 'Good' for SO_2 concentration, indicating RSPM and NO_x to be the main concerns of pollutions in Mumbai.

It is striking to note that 4 out of 6 AAQMS, namely Rajura, Ballarshah, Ghuggus, and Tadali MIDC have 'Good' air quality for mere 35percent of the observation days. While rest of the observations in that year were categorised as 'Moderate' and 'Poor'. The situation is even more critical at Tadali-MIDC and Ghuggus where at certain days the air quality has been recorded to be in the category of 'Very Poor' and 'Severe'. The bias is majorly due to high RSPM levels recorded in the region, since the AQI for SO_2 and NOx levels in the region are well within the acceptable limits and the air quality was recorded to be 'Good' for both the parameters (Figure No. 29 and Figure No. 30). The mining activities, emissions from power plants, cement factories in the region could be the major source of the same. A stringent regulatory policy and strict adherence to the norms is highly desired in the region.

In the Amravati region the AQI 'Moderate to 'Poor' for more than 50percent across all the AAQMS, except AAQMS at Govt. College of Engineering. Two out of three AAQMS in the Akola area (Akola College of Engineering and MIDC Water Works Akola), failed to have 'Good' air quality even for a single day, while only 5percent of the observations days had were classified as 'Good' air quality at AAQMS at LTR college of Commerce-Akola. The poor air quality in this region could be majorly attributed because of high RSPM levels recorded by the AAQMS the AQI for RSPM and NOx levels in the region are well within the, acceptable limits.

In the Kalyan Region all the areas recorded at least 60percent of the observation days with 'Good' air quality. The MIDC areas of Ambernath and Dombivali on certain days had 'Very Poor' and 'Severe' air quality. These two are the only areas which recorded air quality poor for all the three pollutants, SO_2, NO_X and RSPM. In this region (Kalyan), only one AAQMS representing the sensitive area near IGM hospital recorded 'Good' air quality.

The Thane region which lies very close to Mumbai and Navi Mumbai, also recorded 'Good' air quality for just about 40percent of the observation days at all the three monitoring stations. In Pune all the areas were found to have 'Good' air quality for nearly 50percent of the observation days, while on certain days there has been high NO_X concentration. More than 60percent of the observation days near Karve road area had air quality in the category 'Moderate' to 'Poor'. Thane and Pune areas have increasing vehicular population which may be directly leading to NOx emissions, due to consumption of petroleum products.

The RO wise and type wise percentage occurrence of AQI classes for composite AQI for the AAQMS in Maharashtra have been presented in Figure No. 26 and Figure No. 27. To further analyse the parameter wise, RSPM (Figure No. 28), NOx (Figure No. 29) and SO_2 (Figure No. 30), occurrence of these have been presented separately for further investigation.

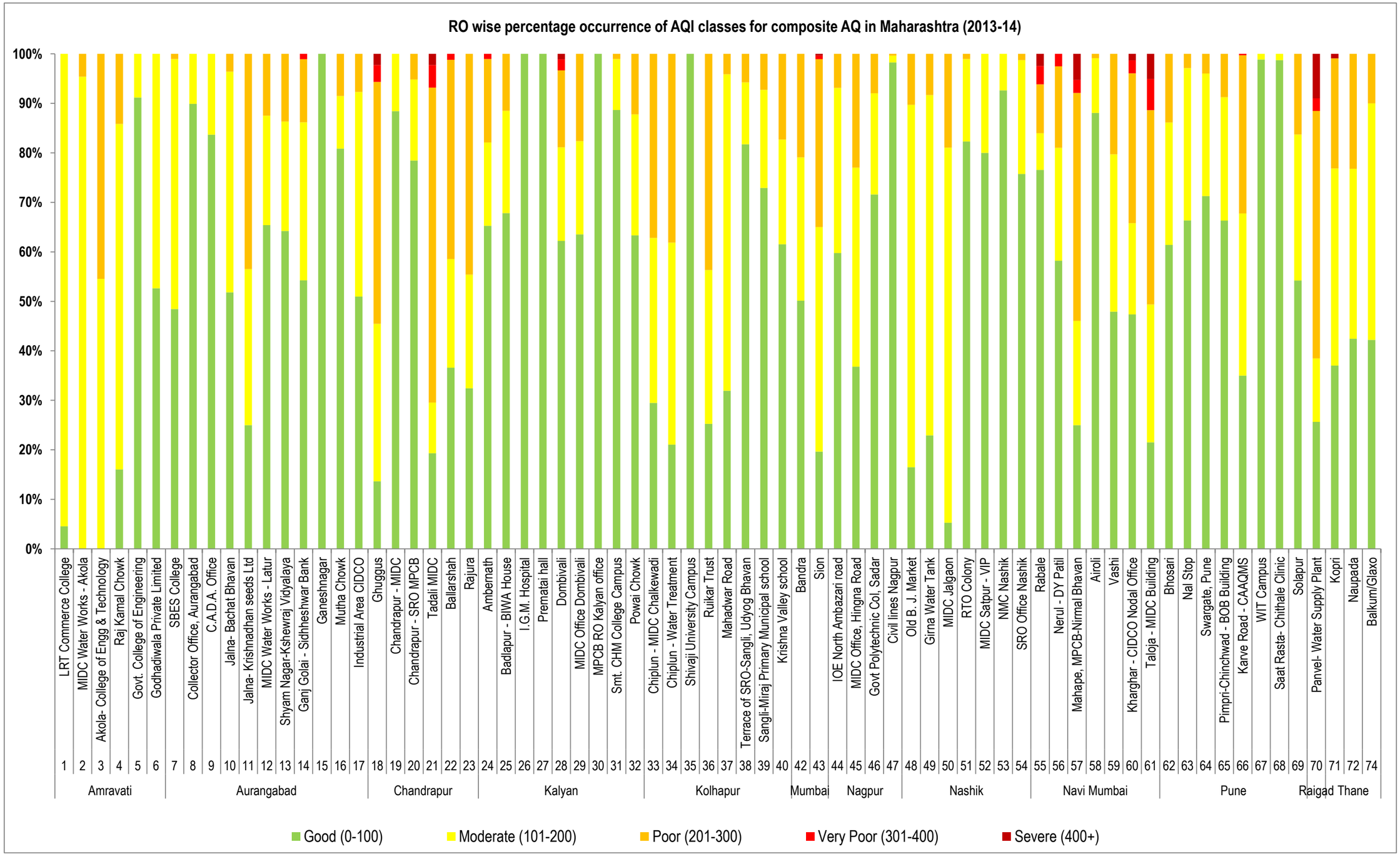


Figure No. 26: RO wise percentage occurrence of AQI classes for composite AQ in Maharashtra (2013-14)

The number given here are for internal convenience. 41 and 73 are missing since those attributed stations were non-functional in 2013-14

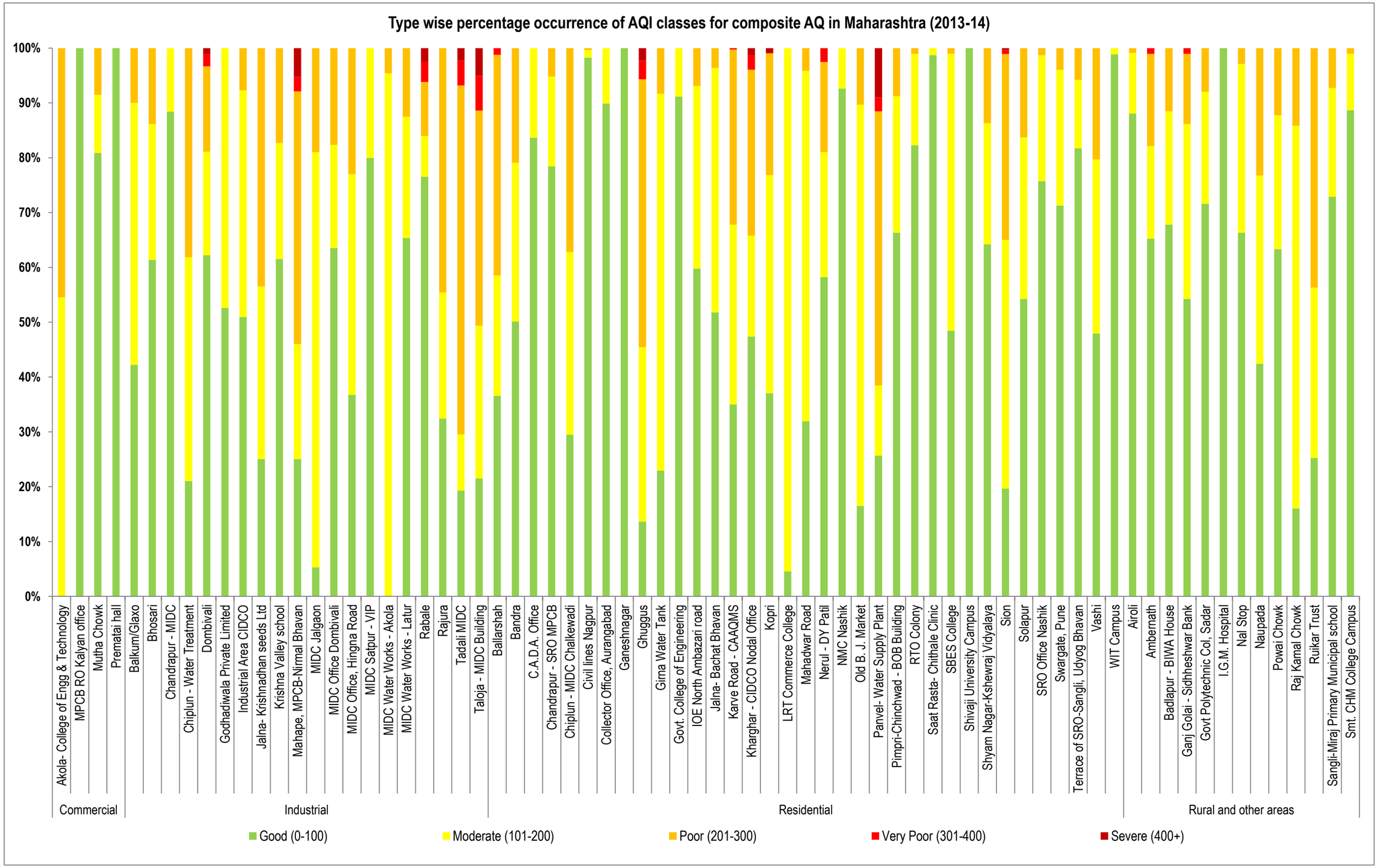


Figure No. 27: Type wise percentage occurrence of AQI classes for composite AQ in Maharashtra (2013-14)

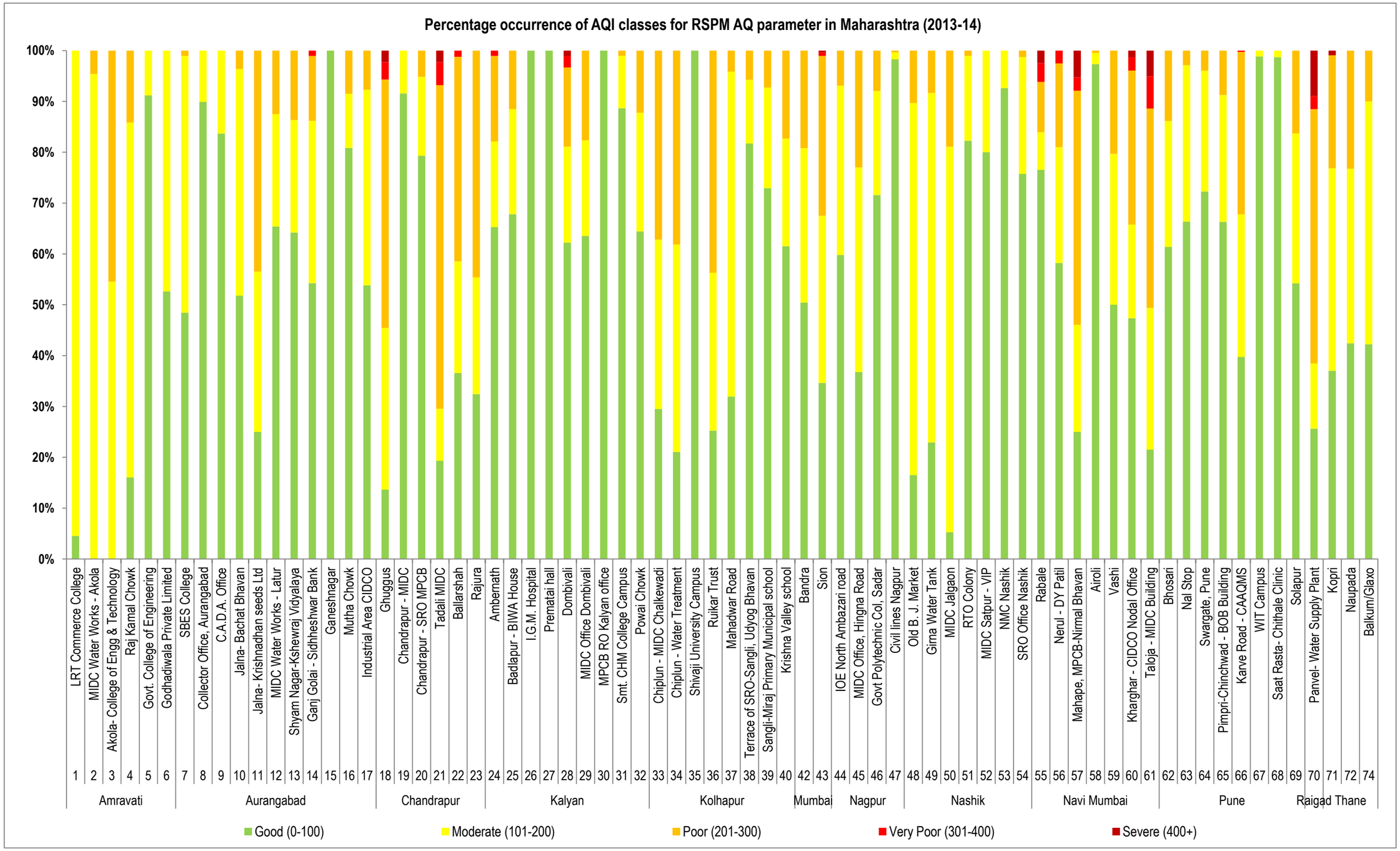


Figure No. 28: Percentage occurrence of AQI classes for RSPM AQ parameter in Maharashtra (2013-14)

The number given here are for internal convenience. 41 and 73 are missing since those attributed stations were non-functional in 2013-14

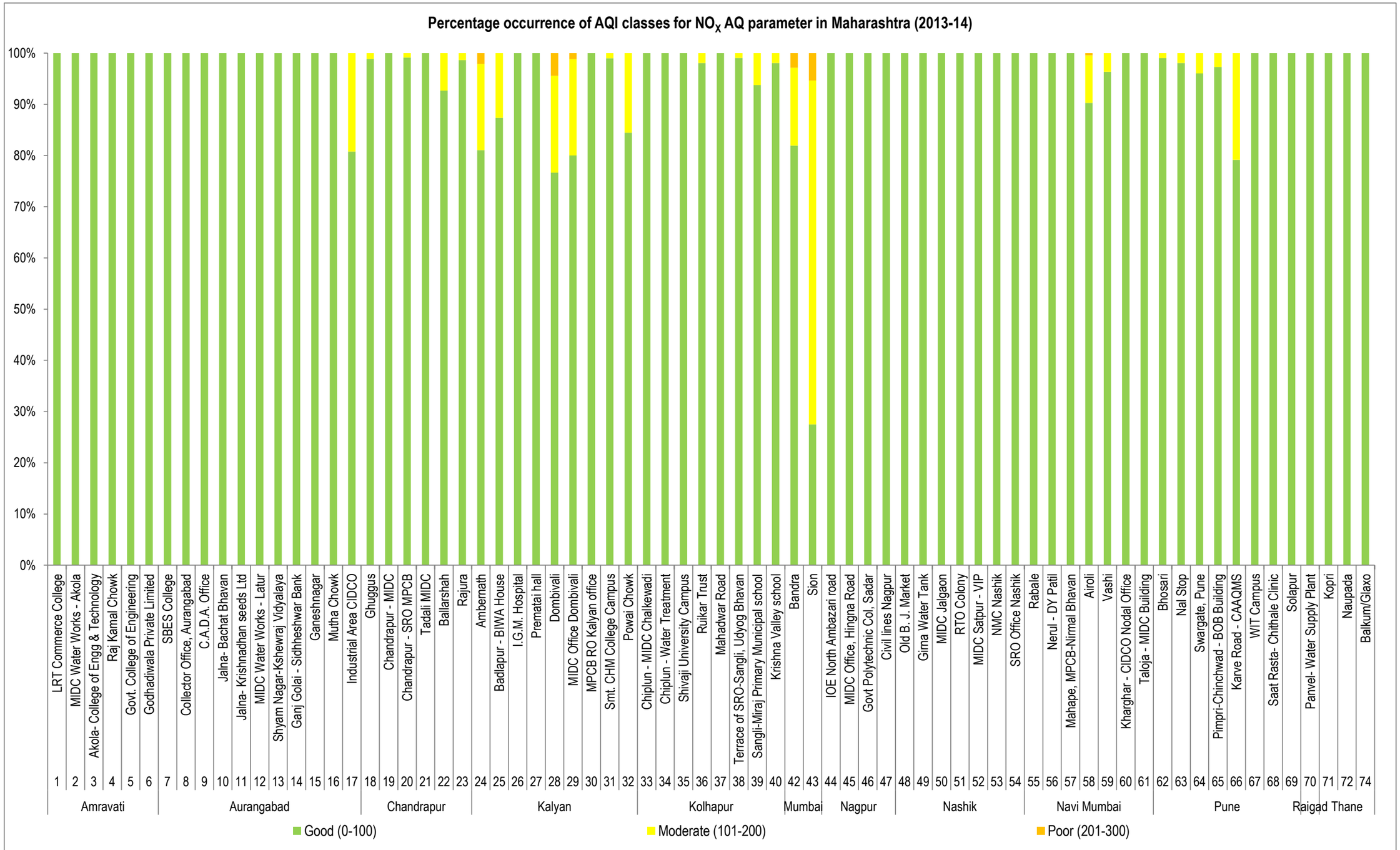


Figure No. 29: Percentage occurrence of AQI classes for NO_X AQ parameter in Maharashtra (2013-14)

The number given here are for internal convenience. 41 and 73 are missing since those attributed stations were non-functional in 2013-14

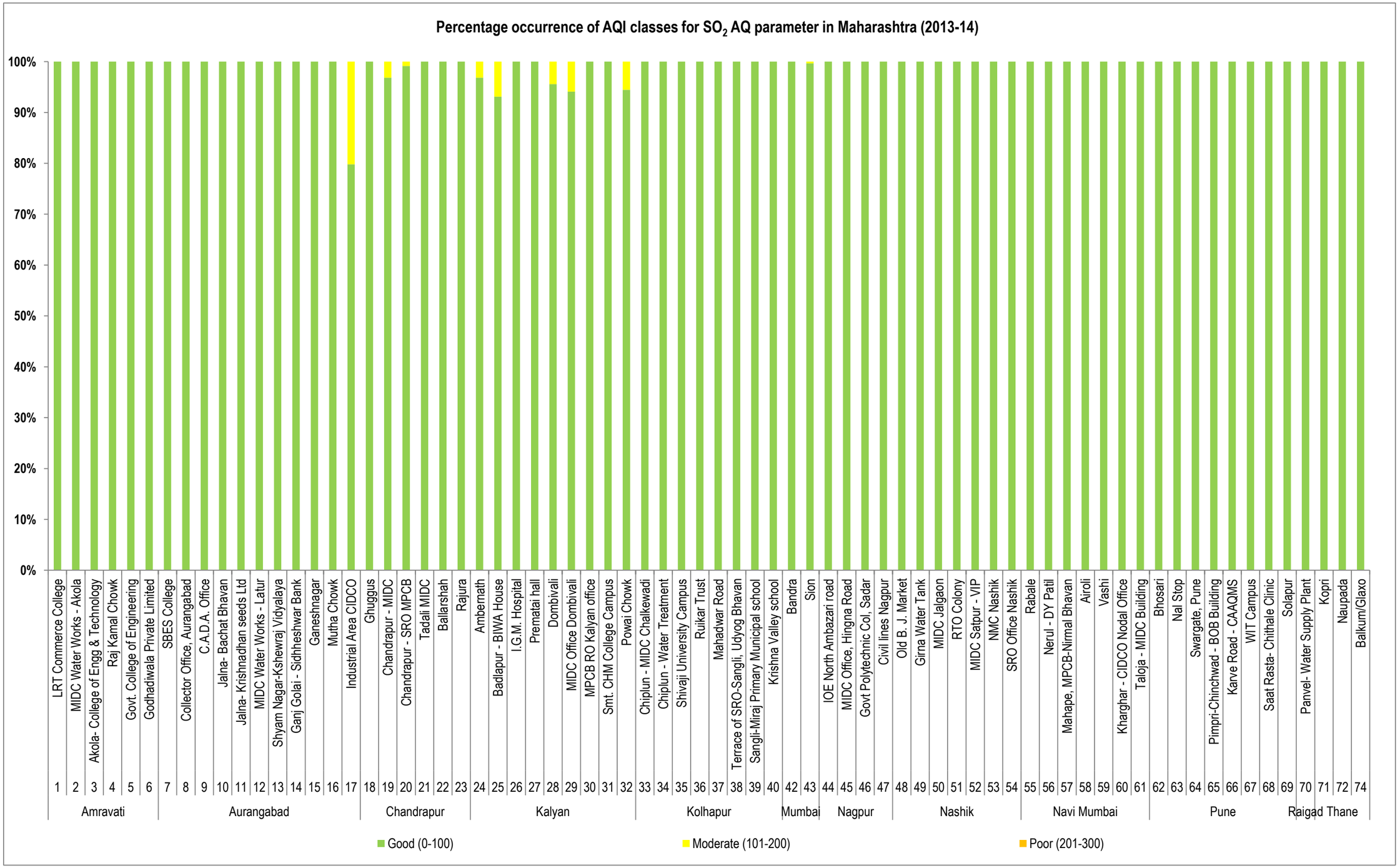


Figure No. 30: Percentage occurrence of AQI classes for SO_2 AQ parameter in Maharashtra (2013-14)

The number given here are for internal convenience. 41 and 73 are missing since those attributed stations were non-functional in 2013-14

Conclusion

Urbanization, industrialization, vehicular emissions, construction sector, quarrying and mining activities and so on are some of the major drivers for air pollution in Maharashtra. MPCB has been taking active initiatives for monitoring air quality and has the highest number of AAQMS under NAMP in India. As a result, MPCB records massive amount of datasets which have been used in this report to present an overview on the status of concentration for various air pollutants recorded by the 72 AAQM stations which were active in the year 2013-14.

Out of all the measured parameters including RSPM, NO_X, SO_2, CO, benzene and Ozone; the main and primary pollutant was RSPM (PM_{10}) followed by NO_X while the air quality for almost 42percent of the observations was found to be 'Moderate' and below.

RSPM was found to exceed the annual standard at 70 out of 72 AAQMS in the year 2013-14. Areas like Chandrapur and Navi Mumbai which are influenced with industries and mining activities (quarry sites) recorded high levels of RSPM concentrations. 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.

The annual NO_X concentrations exceeded the standard at 25 AAQMS, in the year 2013-14. The NOx concentrations were found to be peculiarly high in urbanized areas like Mumbai, Navi Mumbai and Pune. The Navi Mumbai area has consistently recorded high levels of NO_X pollution and requires immediate attention. Traffic congestion and vehicular emissions could be attributed to increase in NO_X concentration in these areas.

SO_2 concentrations in Maharashtra are not that high and none of the AAQMS violated the annual standards. However, the MIDC areas of Ambernath, Dombivali and Badlapur, in the Kalyan Region recorded relatively higher SO_2 concentrations as compared to other regions of the state. Ambernath and Dombivali areas were found to violate the daily standards on certain days of the year 2013-14 for SO_2 concentrations. A source apportionment study for the same needs to be conducted for the region, and CAAQMS need to be installed in both the areas to have continuous data on the SO_2 and NO_X levels in these areas.

CO and Ozone are among the 6 major pollutants commonly found in the urban environment which have the potential to harm human health and property, but the monitoring of CO and Ozone was limited to Bandra and Pune monitoring stations. It was found that the relation is seasonal as well as region-based for these two pollutants. It was observed that the CO levels in Pune were unusually high and 100 percent of the observations exceeded the CO standard, while in the Bandra area, the exceedence was about 52percent. Ozone was recorded to be of a non-polluting level in Pune but in Bandra, the level was found to be in violation of the standard for almost 31.4percent of the observations.

Given the fact that Maharashtra is the most urbanized and highly industrialized states of the nation, augmenting new AAQMS to the existing network is highly desired. Rapidly developing regions and regions which are yet to have a regular AAQM stations should be prioritized. A road map must be developed to strengthen the monitoring network. Areas like Badlapur, Ulhasnagar, Chandrapur and so on which recorded high pollutant concentrations in 2013-14 should be considered for installing CAAQMS.

Annex – I: List of AAQMS in Maharashtra – 2013-14

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	Latur	Residential	NAMP

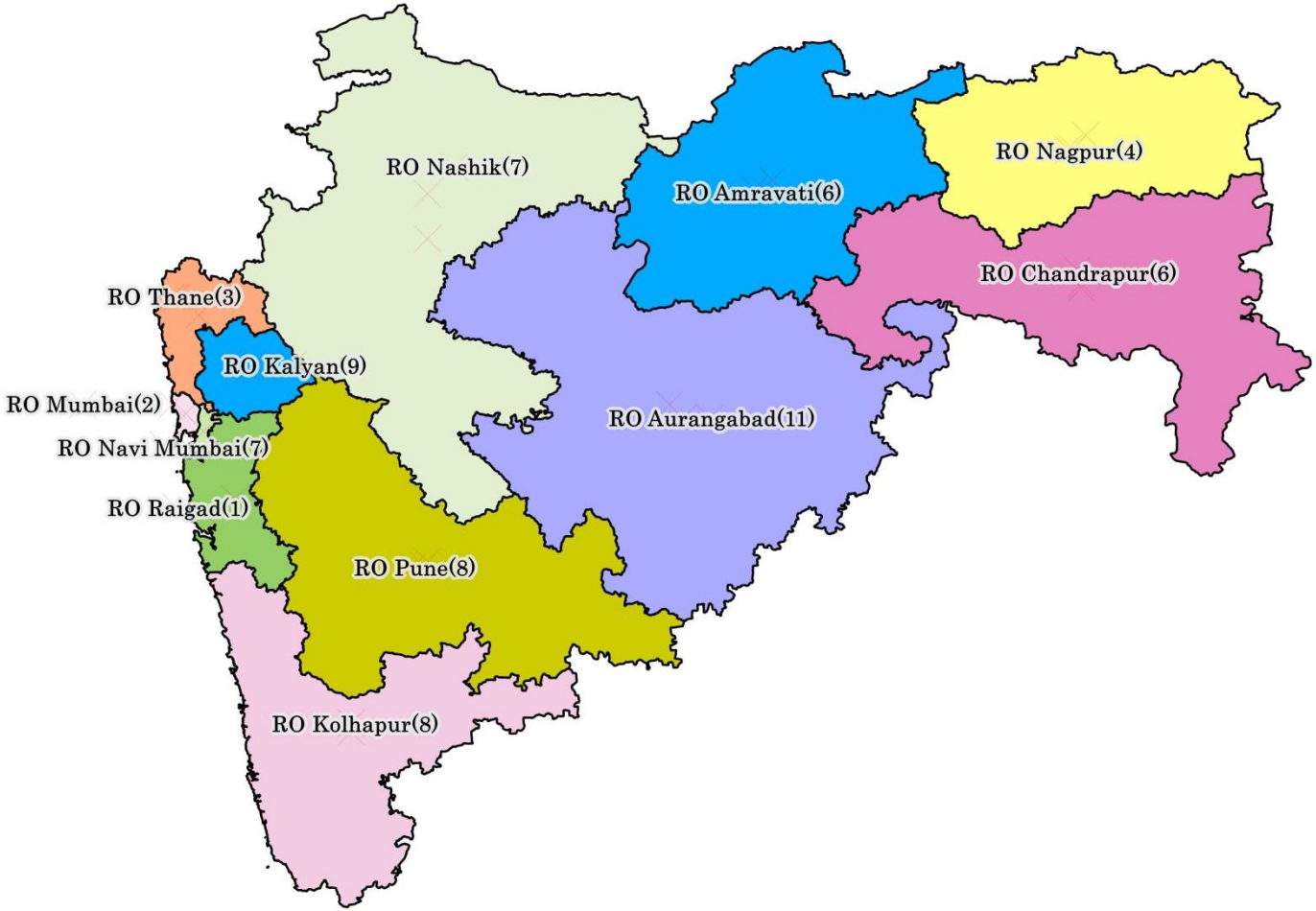
MPCB RO	Region	Station code	Station name	Location	Type	Program
			Vidyalaya			
		643	Ganj Golai - Sidhheshwar Bank	Ganjgolai, Latur	Rural and other areas	NAMP
	Nanded	703	Ganeshnagar	Nanded	Residential	NAMP
		704	Mutha Chowk	Nanded	Commercial	NAMP
		705	Industrial Area CIDCO	Nanded	Industrial	NAMP
Chandrapur	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

MPCB RO	Region	Station code	Station name	Location	Type	Program
			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
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

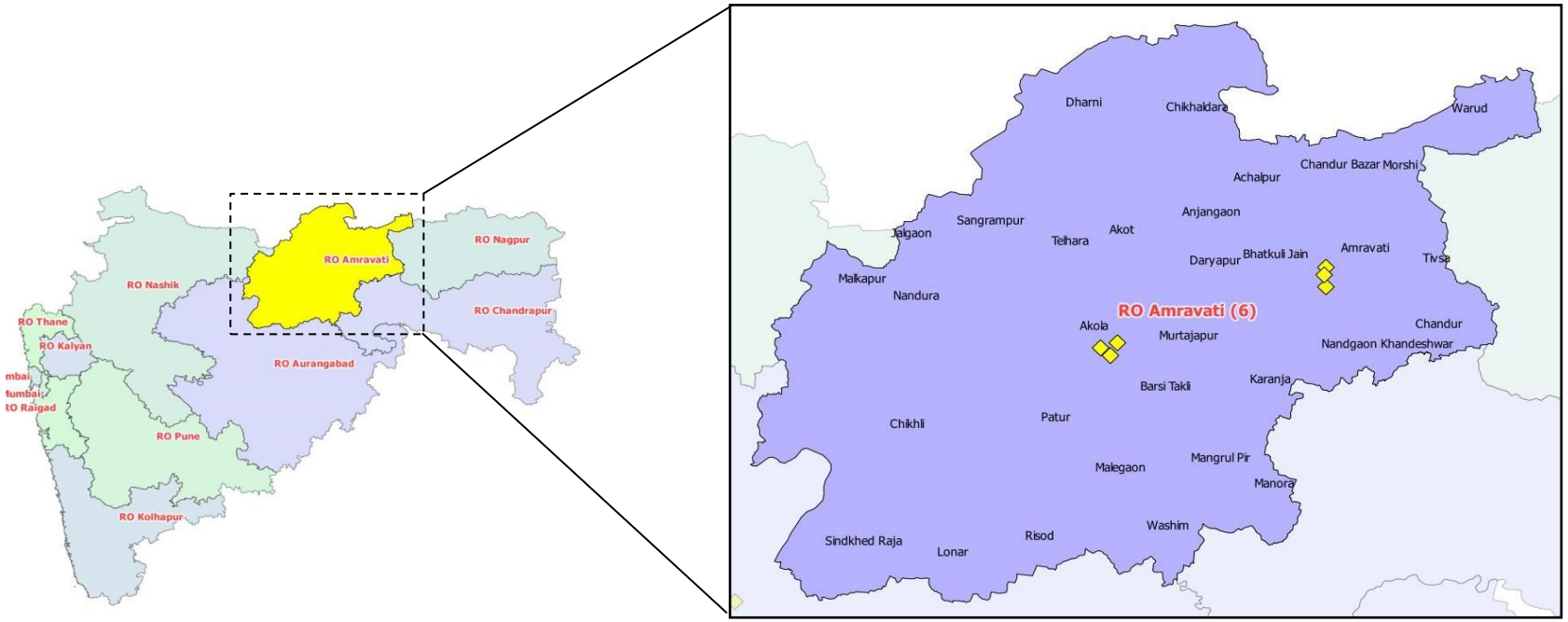
MPCB RO	Region	Station code	Station name	Location	Type	Program
		288	MIDC Office, Hingna Road	MIDC office Hingna Road Nagpur	Industrial	NAMP
		314	Govt Polytechnic Col, Sadar	Govt. poly technique College , Sadar, Nagpur	Rural and other areas	NAMP
		711	Civil lines Nagpur	RO Office Nagpur Premises	Residential	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
	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

MPCB RO	Region	Station code	Station name	Location	Type	Program
		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
		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

Annex – II: Data recorded by AAQMS in Maharashtra 2013-14



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. 19: Data for monthly average reading recorded at LRT Commerce College.- Akola

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	2	148	10	9
May				
Jun				
Jul				
Aug	6	99	2	7
Sep	9	113	0	7
Oct	9	110	0	6
Nov	8	123	0	6
Dec	10	125	1	7
Jan	8	130	0	7
Feb	8	134	10	8
Mar	6	137	10	8
Total N		% of exceedence of daily readings for 2013-14		
66		95.5	0.0	0.0

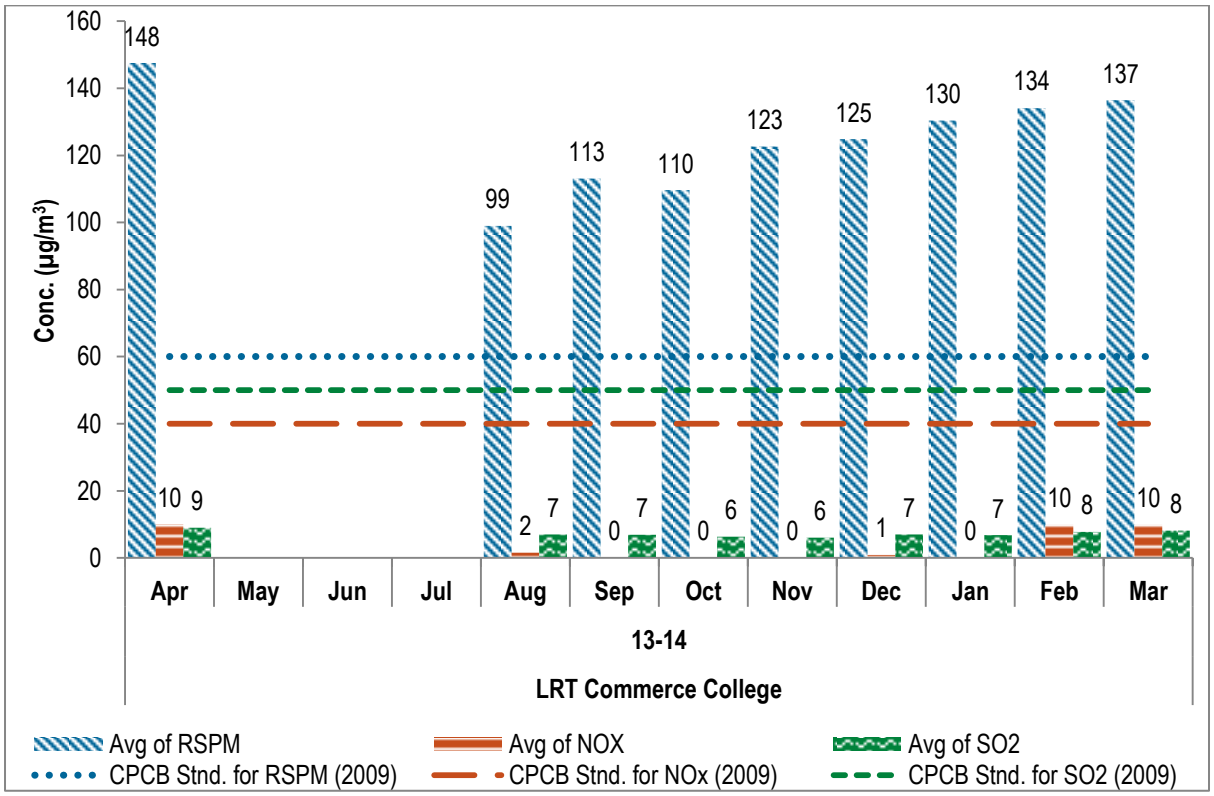


Figure No. 31: Monthly average reading recorded at LRT Commerce Collage. – Akola

Table No. 20: Data for annual average trend of RSPM, NO_X and SO_2 at LRT Commerce College.- Akola

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

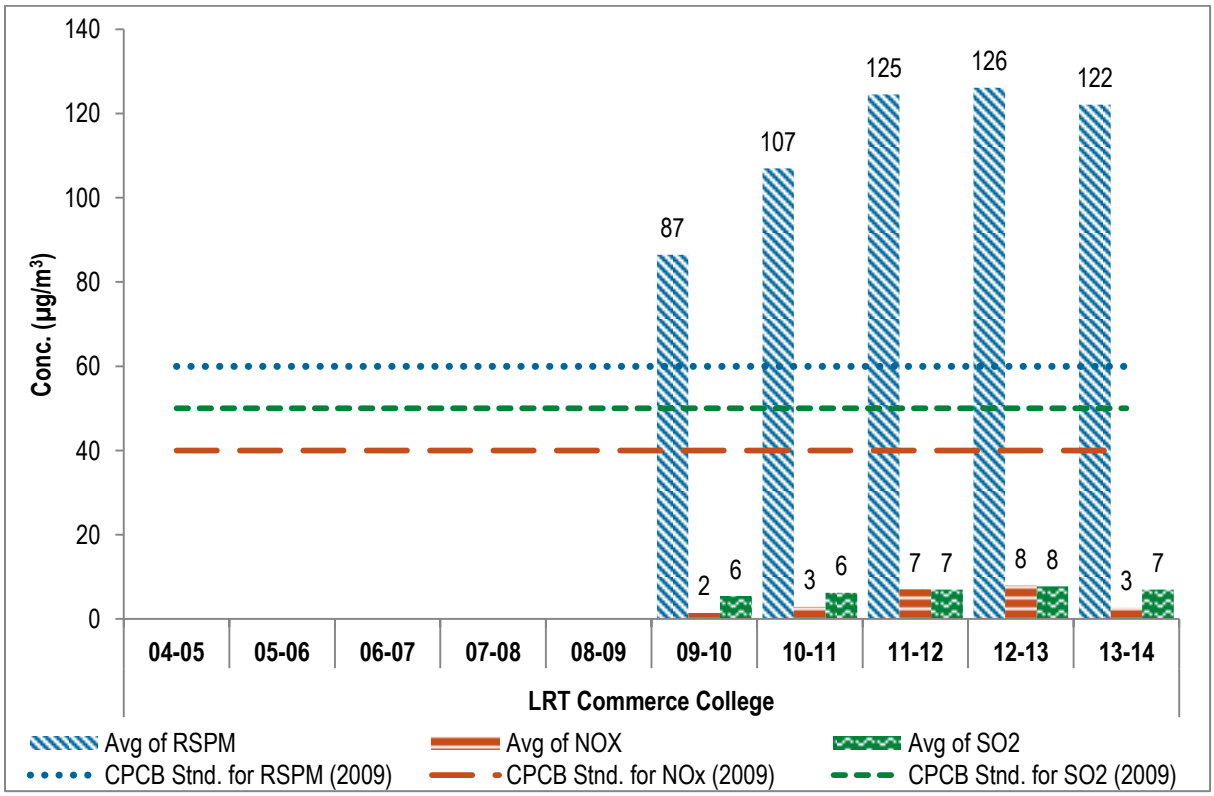


Figure No. 32: Annual average trend of SO_2, NO_X and RSPM at LRT Commerce Collage. - Akola

Akola - MIDC Water Works

Table No. 21: Data for monthly average reading recorded at MIDC Water Works.- Akola

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	1	157	14	12
May				
Jun				
Jul				
Aug	7	122	4	8
Sep	8	123	1	7
Oct	10	125	5	8
Nov	8	130	1	7
Dec	8	140	10	8
Jan	10	148	10	9
Feb	8	149	13	12
Mar	5	148	13	11
	Total N	% of exceedence of daily readings for 2013-14		
	65	100.0	0.0	0.0

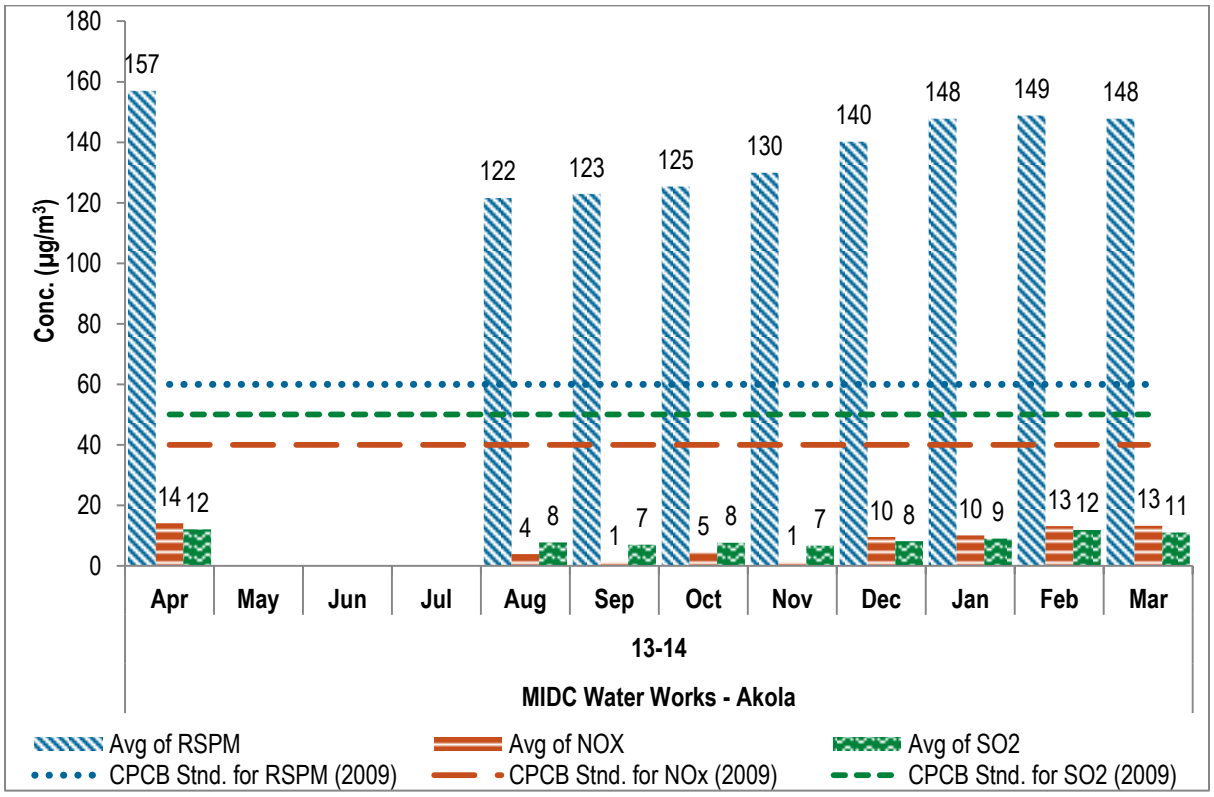


Figure No. 33: Monthly average reading recorded at MIDC Water Works.- Akola

Table No. 22: Data for annual average trend of RSPM, NO_X and SO_2 at MIDC Water Works.- Akola

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

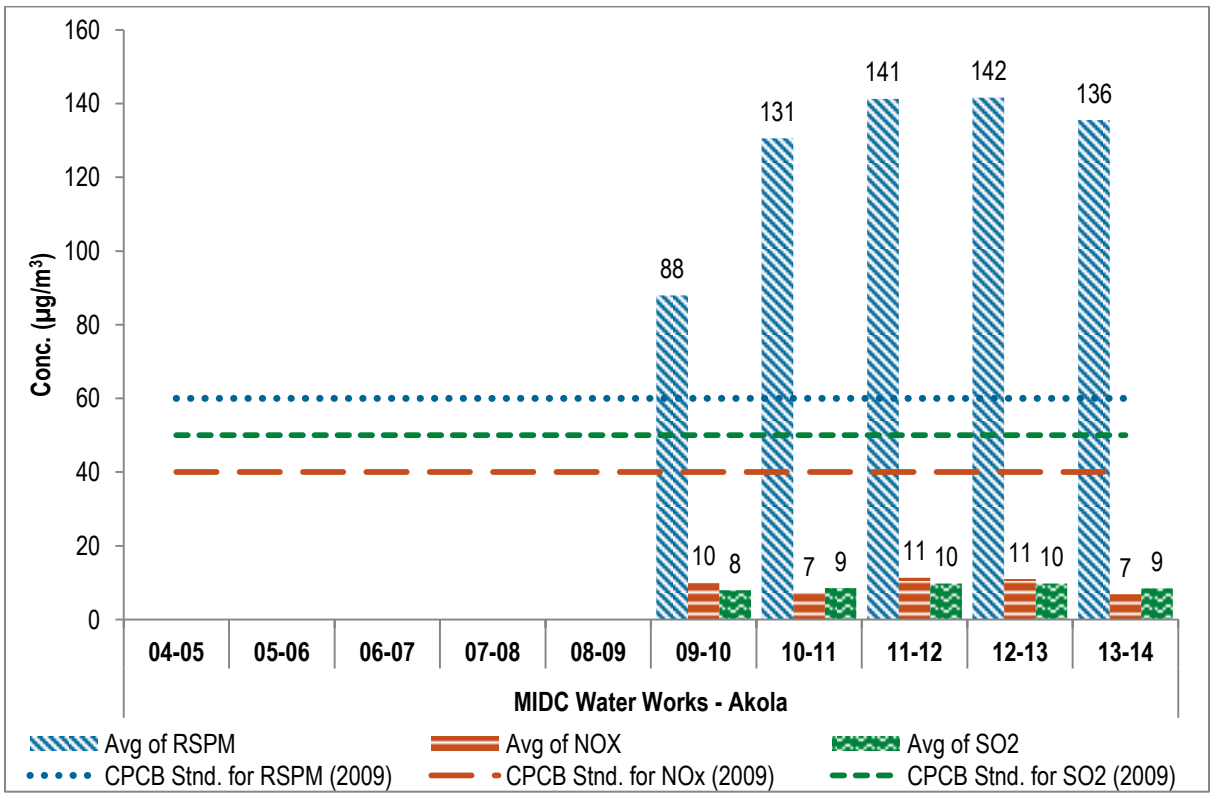


Figure No. 34: Annual average trend of SO_2, $NO_X$and RSPM at MIDC Water Works.-Akola

Akola - Akola College of Engg & Technology

Table No. 23: Data for monthly average reading recorded at College of Engg & Technology Akola (Architecture Branch) –Akola

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	2	168	12	10
May				
Jun				
Jul				
Aug	8	130	7	8
Sep	8	137	2	7
Oct	8	139	1	7
Nov	10	143	0	6
Dec	8	152	5	7
Jan	9	160	10	8
Feb	8	166	10	9
Mar	5	170	11	10
Total N		% of exceedence of daily readings for 2013-14		
66		100.0	0.0	0.0

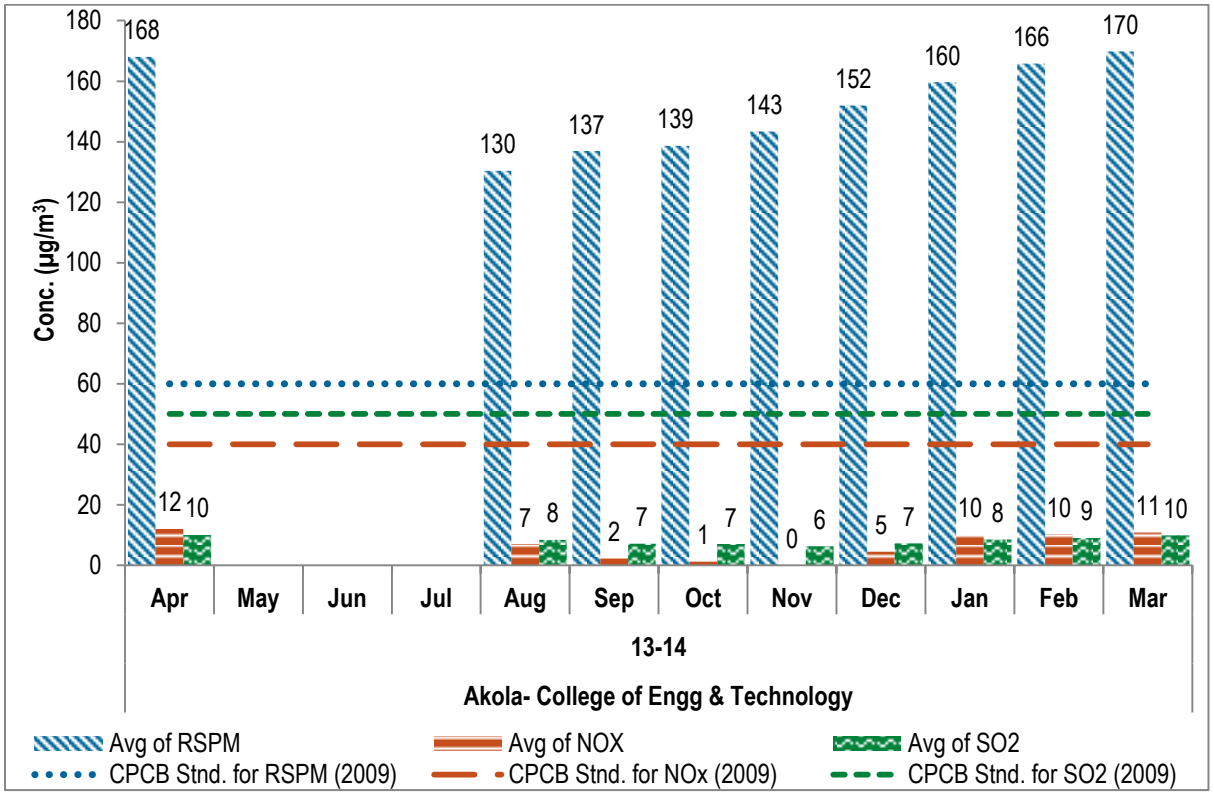


Figure No. 35: Monthly average reading recorded at Collage of Eng. And Technology Akola (Architecture Branch)-Akola

Table No. 24: Data for annual average trend of SO_2 NO_X and RSPM at College of Engg & Technology Akola (Architecture Branch) –Akola

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

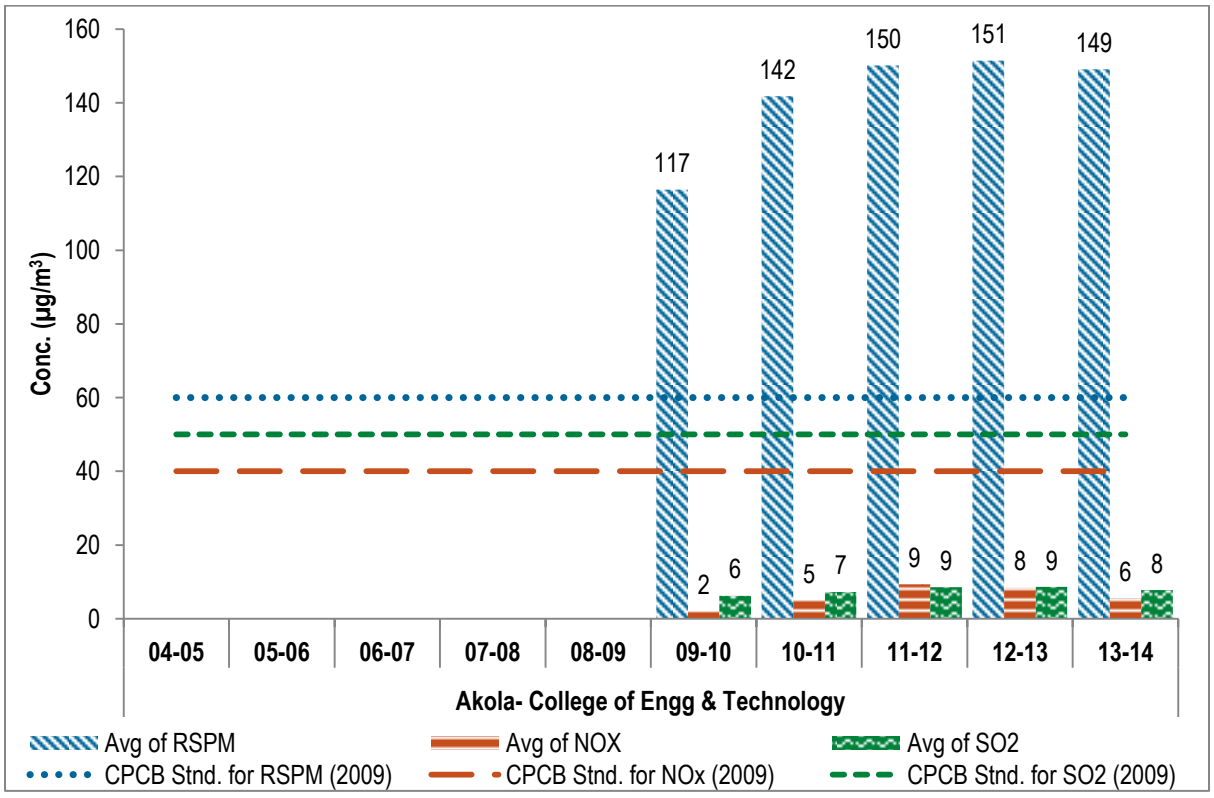


Figure No. 36: Annual average trend of SO_2 NO_X and RSPM at Collage of Eng And Technology Akola (Architecture Branch)-Akola

Amravati - Raj Kamal Chowk

Table No. 25: Data for monthly average reading recorded at Raj Kamal Chowk, Amravati

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	8	143	15	13
May	9	152	17	15
Jun	9	117	11	10
Jul	7	102	11	10
Aug	9	114	11	11
Sep	7	108	11	11
Oct	17	107	12	11
Nov	9	141	14	12
Dec	8	144	14	12
Jan	9	146	14	12
Feb	6	134	13	12
Mar	8	146	11	14
Total N		% of exceedence of daily readings for 2013-14		
106		85.8	0.0	0.0

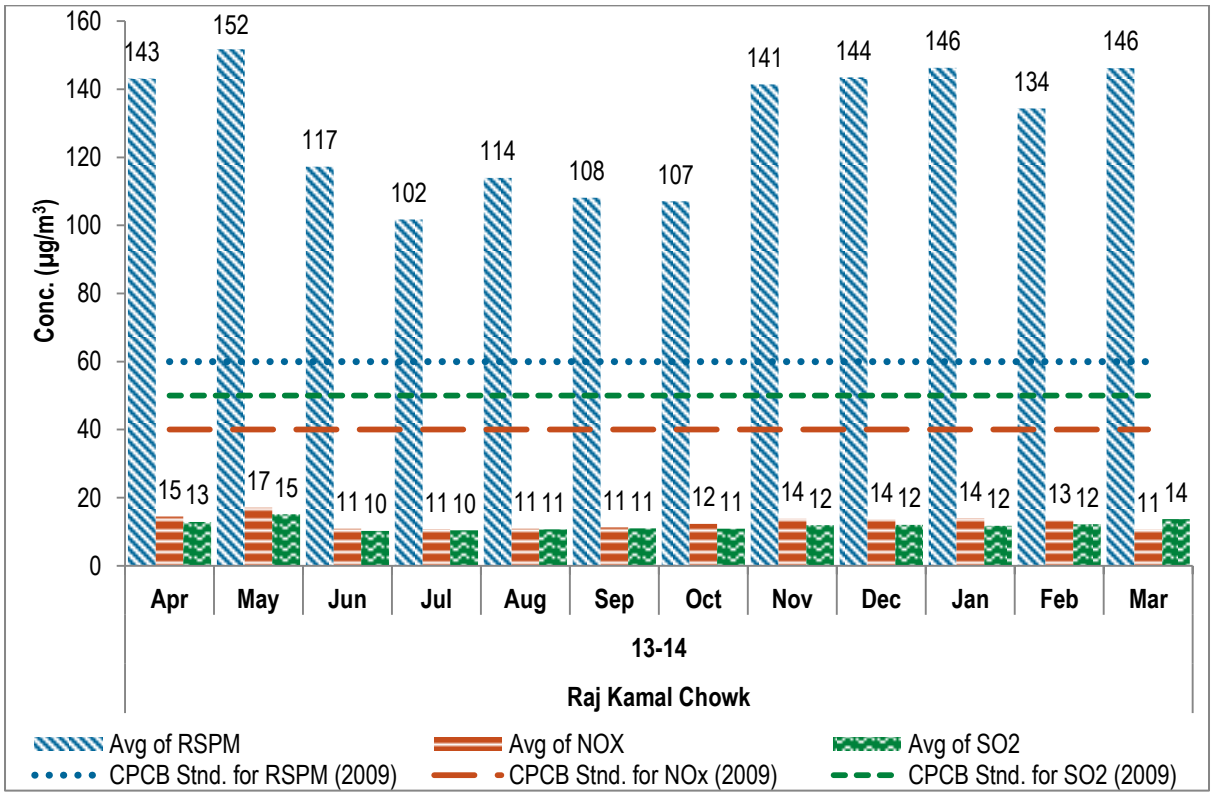


Figure No. 37: Monthly average reading recorded at Raj Kamal Chowk, Amravati

Table No. 26: Data for annual average trend of RSPM, NO_X and SO_2 at Raj Kamal Chowk, Amravati

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

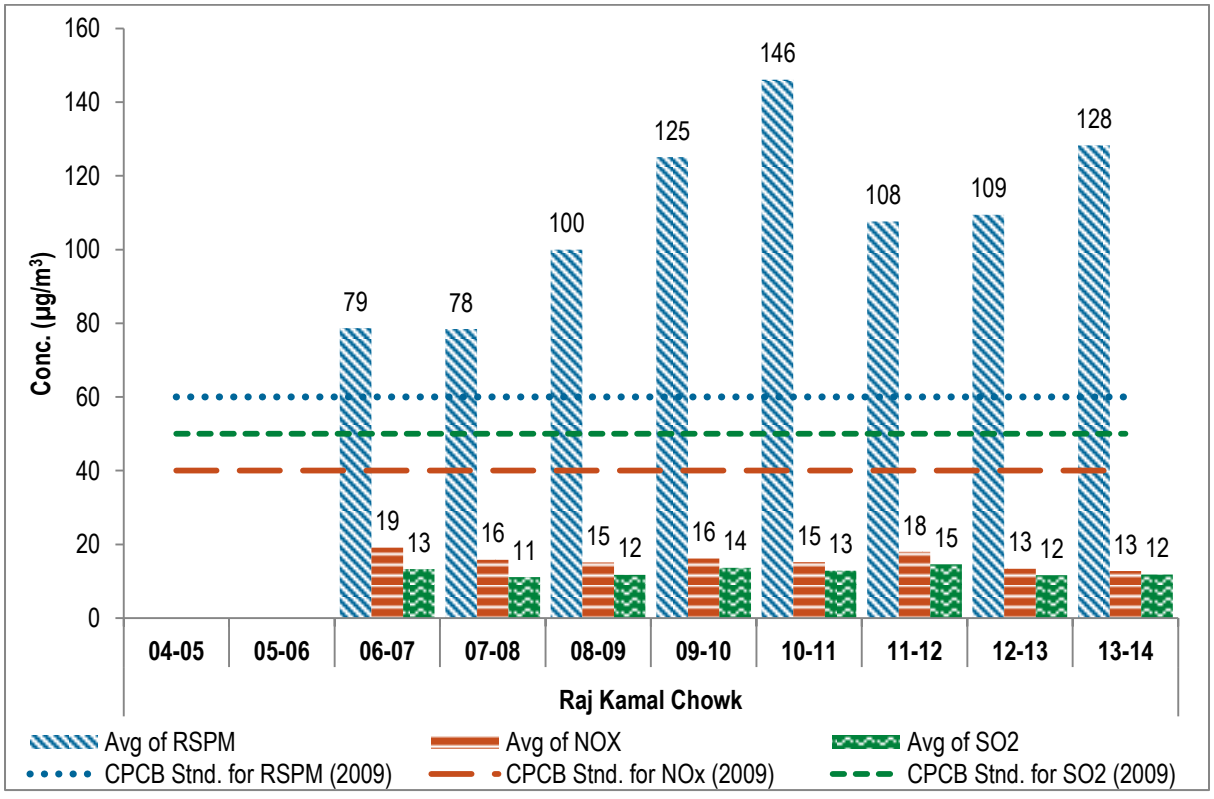


Figure No. 38: Annual average trend of SO_2, NO_X and RSPM at Raja Kamal Chowk, Amravati

Amravati - Govt. College of Engineering

Table No. 27: Data for monthly average reading recorded at Govt. College of Engineering Amravati

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	9	92	13	12
May	7	96	14	12
Jun	6	80	12	10
Jul	5	65	10	9
Aug	3	55	8	8
Sep	4	73	9	9
Oct				
Nov	5	73	12	10
Dec	4	81	13	11
Jan	9	79	12	11
Feb	7	73	11	10
Mar	9	84	12	11
	Total N	% of exceedence of daily readings for 2013-14		
	68	8.8	0.0	0.0

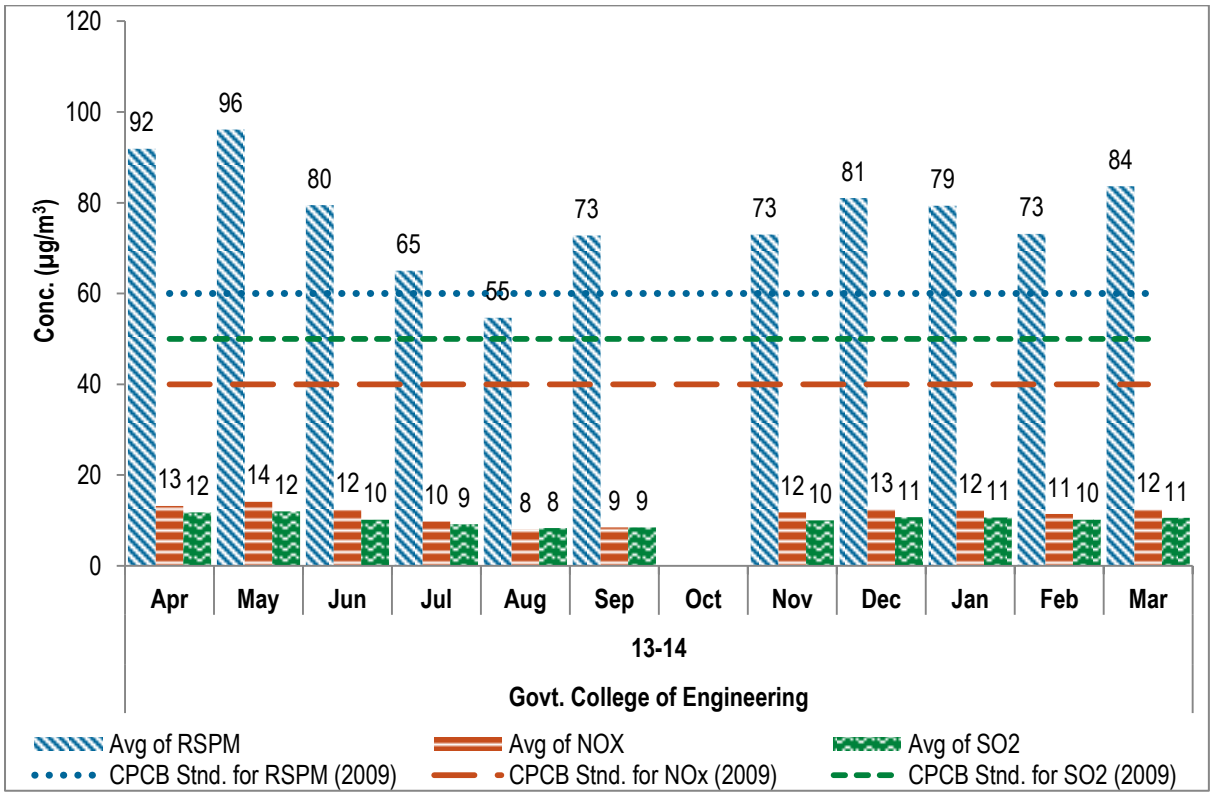


Figure No. 39 Monthly average reading recorded at Govt. Collage of Engineering –Amravati

Table No. 28: Data for annual average trend of SO_2, NO_X and RSPM at Govt. College of Engineering Amravati

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

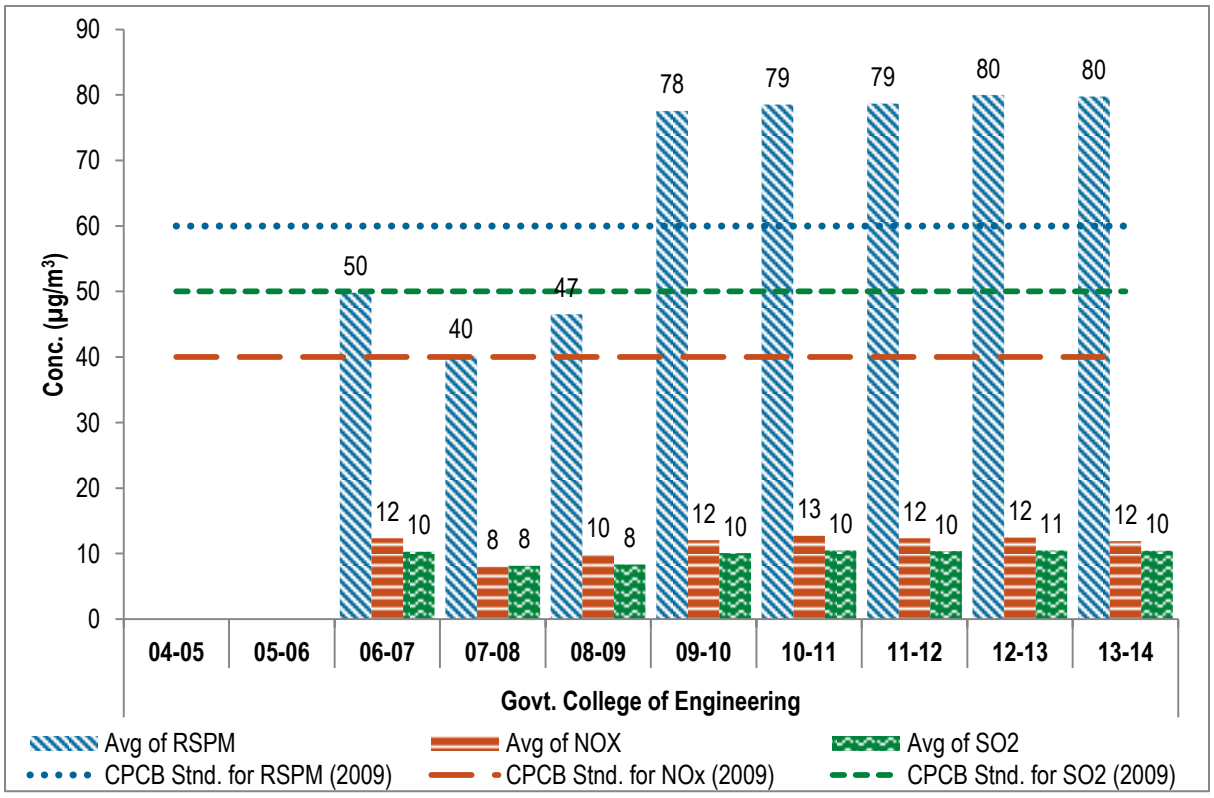


Figure No. 40 Annual average trend of SO_2, NO_X and RSPM at Govt Collage of Engineering.- Amravati

Amravati - Godhadiwala Private Limited

Table No. 29: Data for monthly average reading recorded at Godhadiwala Private Limited

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	9	131	14	12
May	9	132	16	15
Jun	6	87	11	11
Jul	8	63	8	9
Aug	8	65	9	11
Sep	8	85	12	11
Oct	8	79	11	11
Nov	7	87	12	11
Dec	7	83	12	11
Jan	9	106	15	13
Feb	8	104	13	11
Mar	8	92	12	11
Total N		% of exceedence of daily readings for 2013-14		
95		47.4	0.0	0.0

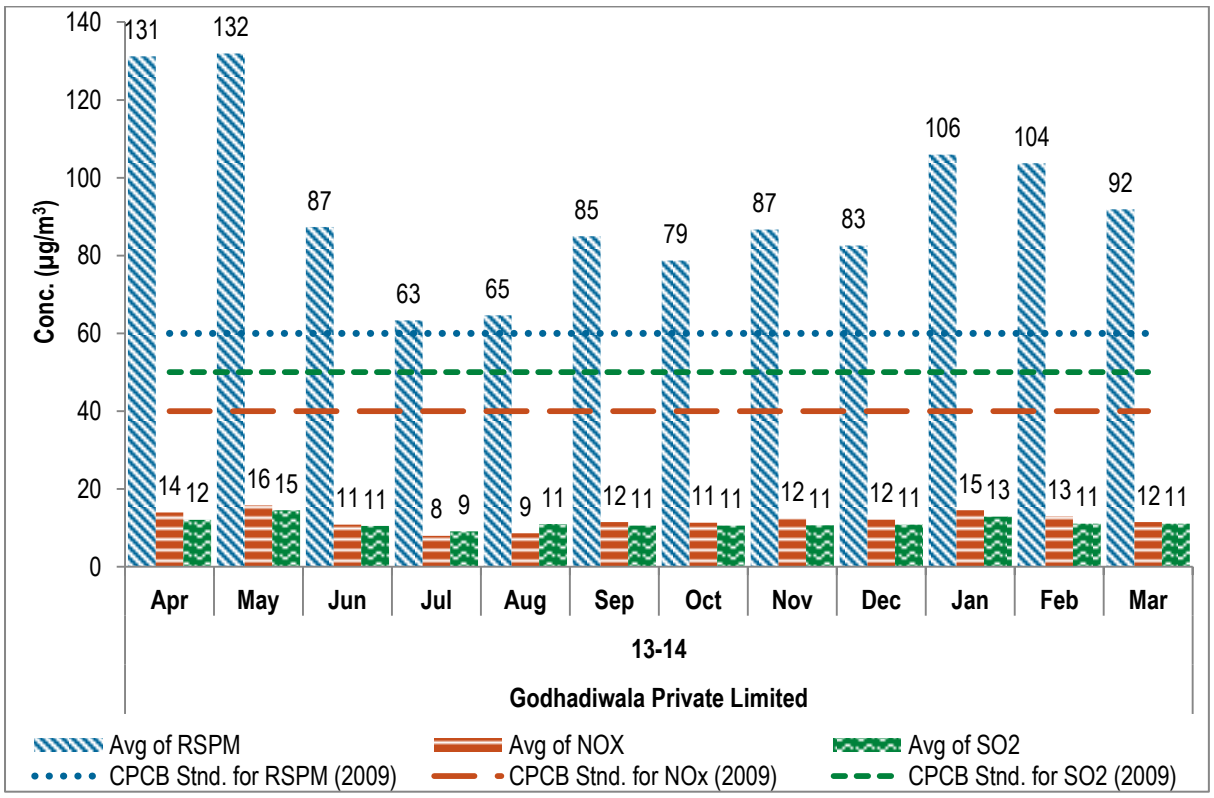


Figure No. 41: Monthly average reading recorded at Godhadiwala Pravate Limited Amravati

Table No. 30: Data for annual average trend of RSPM, NO_X and SO_2 at Godhadiwala Private Limited

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

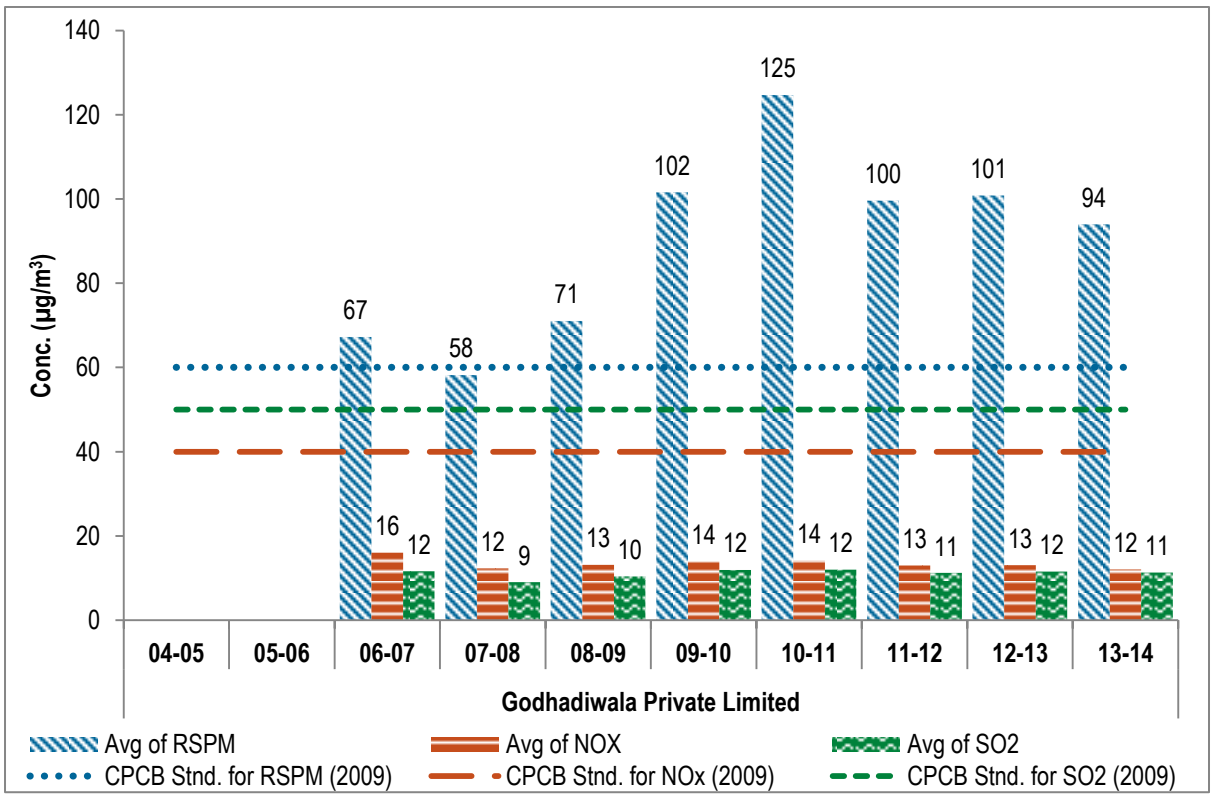


Figure No. 42: Annual average trend of SO_2, NO_X and RSPM at Godhadiwala Pravate Limited Amravati

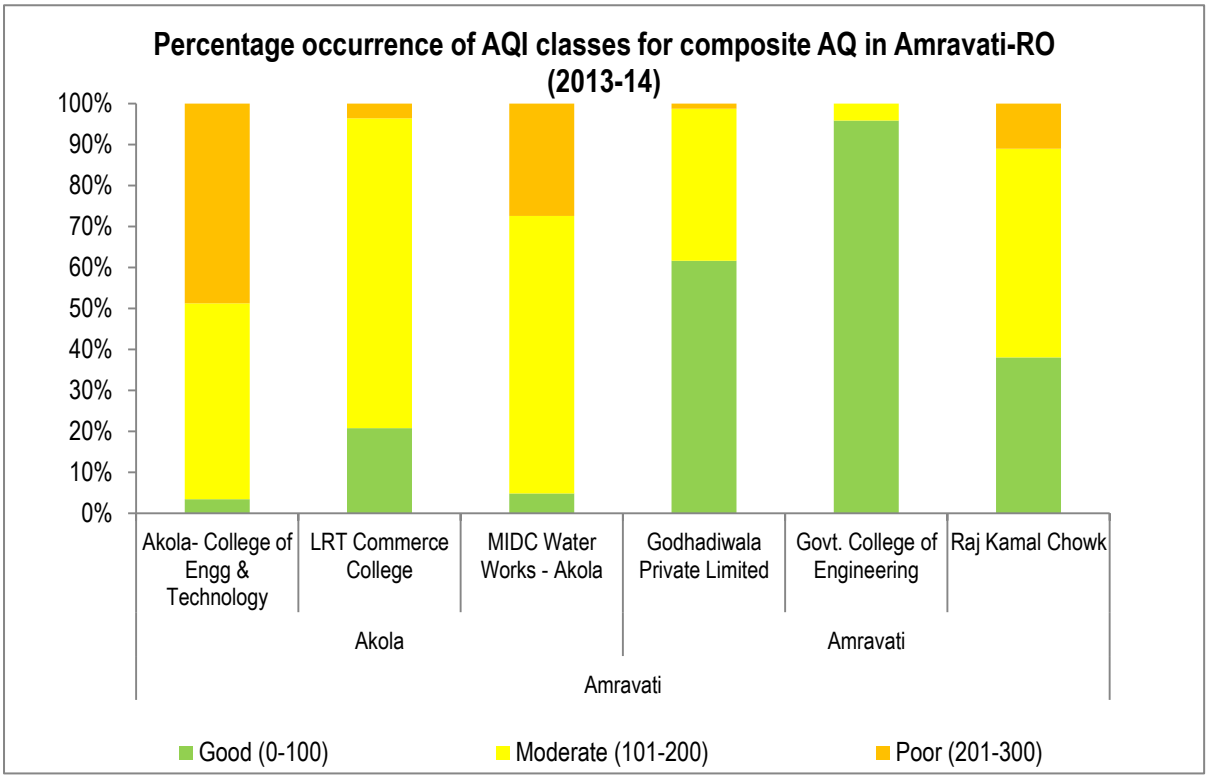
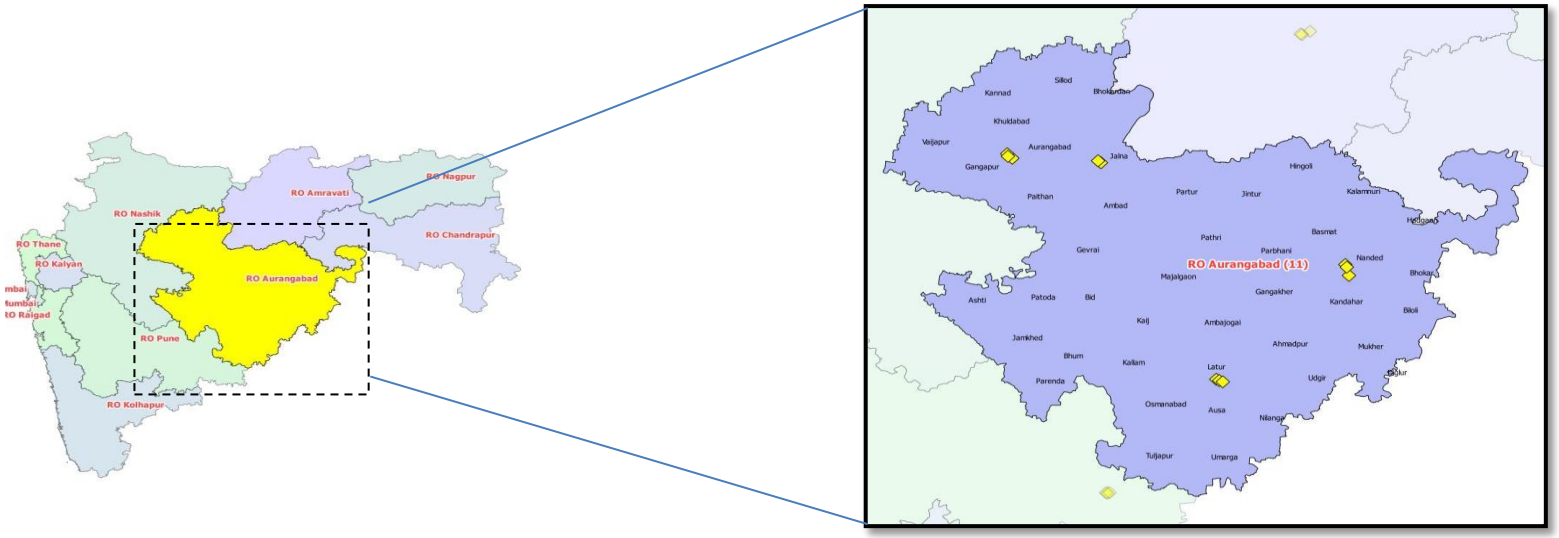


Figure No. 43: Percentage occurrence of AQI classes for composite AQ in Amravati-RO (2013-14)

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. 31: Data for monthly average reading recorded at SBES College -Aurngabad

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	*8*	130	37	11
May	*9*	126	30	8
Jun	*9*	79	36	8
Jul	*8*	78	33	8
Aug	*7*	75	32	8
Sep	*8*	84	31	8
Oct	*8*	83	35	9
Nov	*10*	95	44	11
Dec	*8*	115	51	16
Jan	*9*	114	51	19
Feb	*8*	132	48	17
Mar	*5*	114	43	14
	Total N	% of exceedence of daily readings for 2013-14		
	97	51.5	0.0	0.0

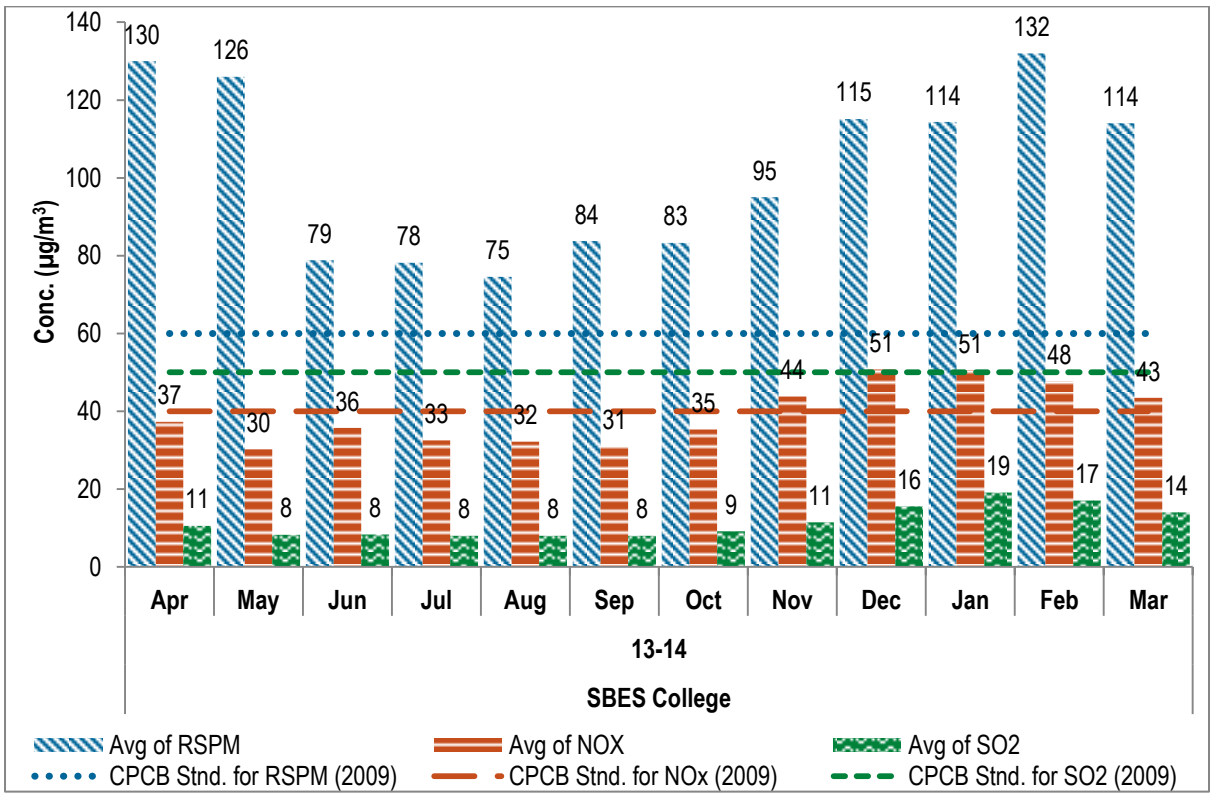


Figure No. 44: Monthly average reading recorded at SBES College -Aurangabad

Table No. 32: Data for annual average trend of SO_2, NO_X and RSPM, at SBES College -Aurngabad

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

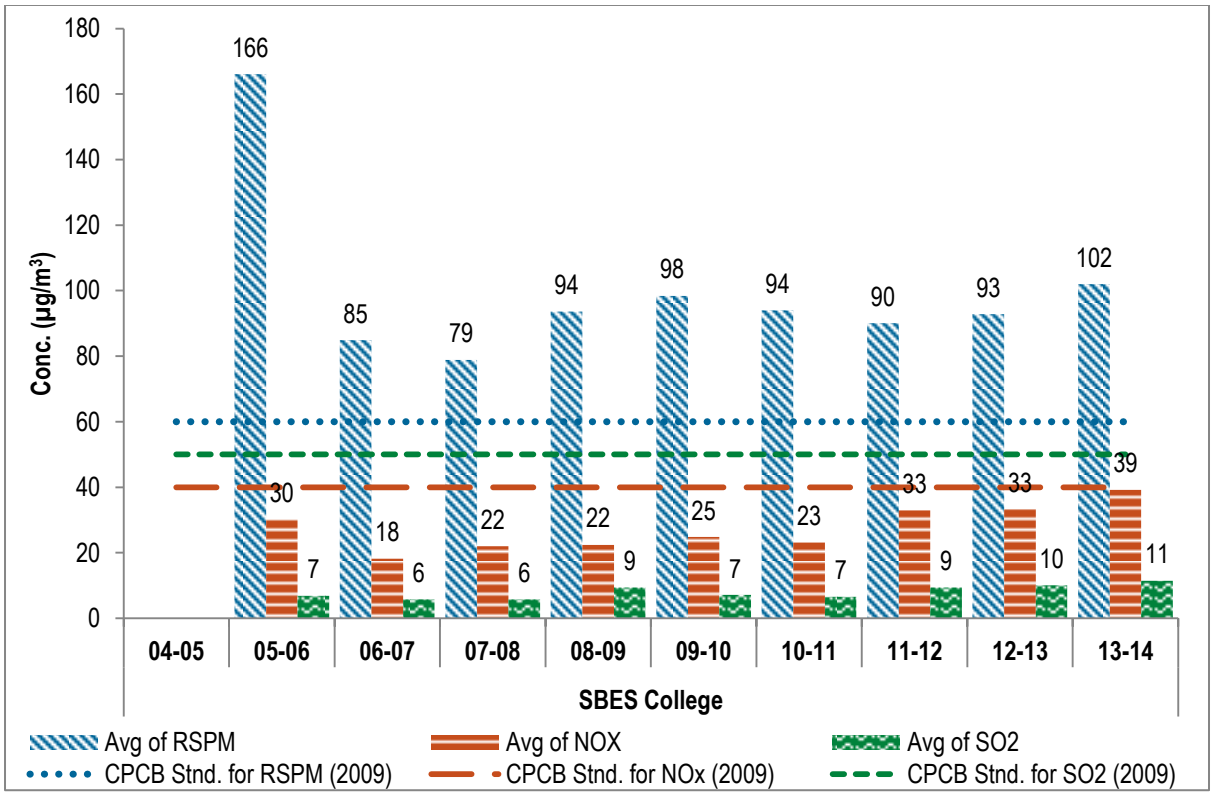


Figure No. 45: Annual average trend of SO_2, NOx and RSPM at SBES College –Aurangabad

Aurangabad - Collector Office, Aurangabad

Table No. 33: Data for monthly average reading recorded at Collector Office, Aurangabad

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	*10*	91	34	8
May	*8*	78	31	7
Jun	*8*	50	30	7
Jul	*9*	57	30	7
Aug	*8*	68	29	6
Sep	*9*	72	28	7
Oct	*9*	81	32	8
Nov	*8*	86	44	12
Dec	*10*	100	45	13
Jan	*8*	87	43	14
Feb	*8*	100	43	13
Mar	*4*	74	40	10
	Total N	**% of exceedence of daily readings for 2013-14**		
	99	**10.1**	0.0	0.0

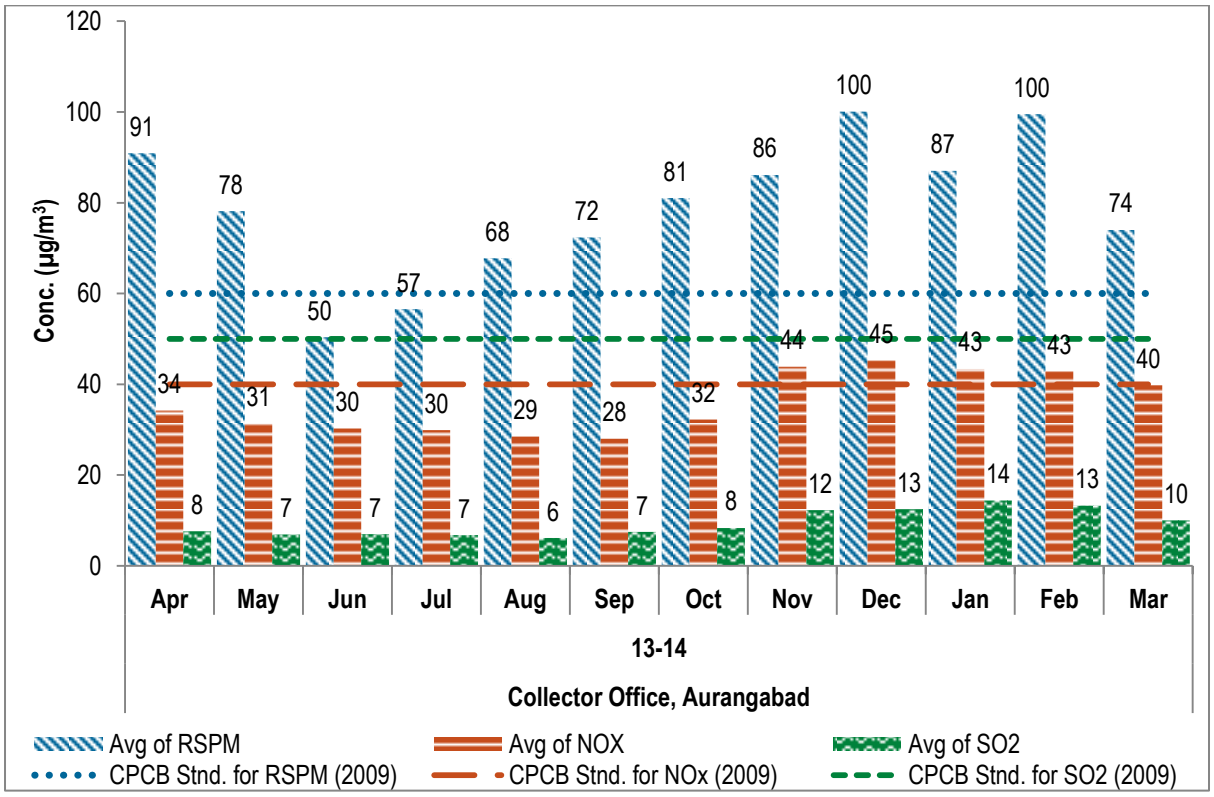


Figure No. 46: Monthly average reading recorded at Collector Office, Aurangabad

Table No. 34: Data for annual average trend of RSPM, NO_X and SO_2 at Collector Office, Aurangabad

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

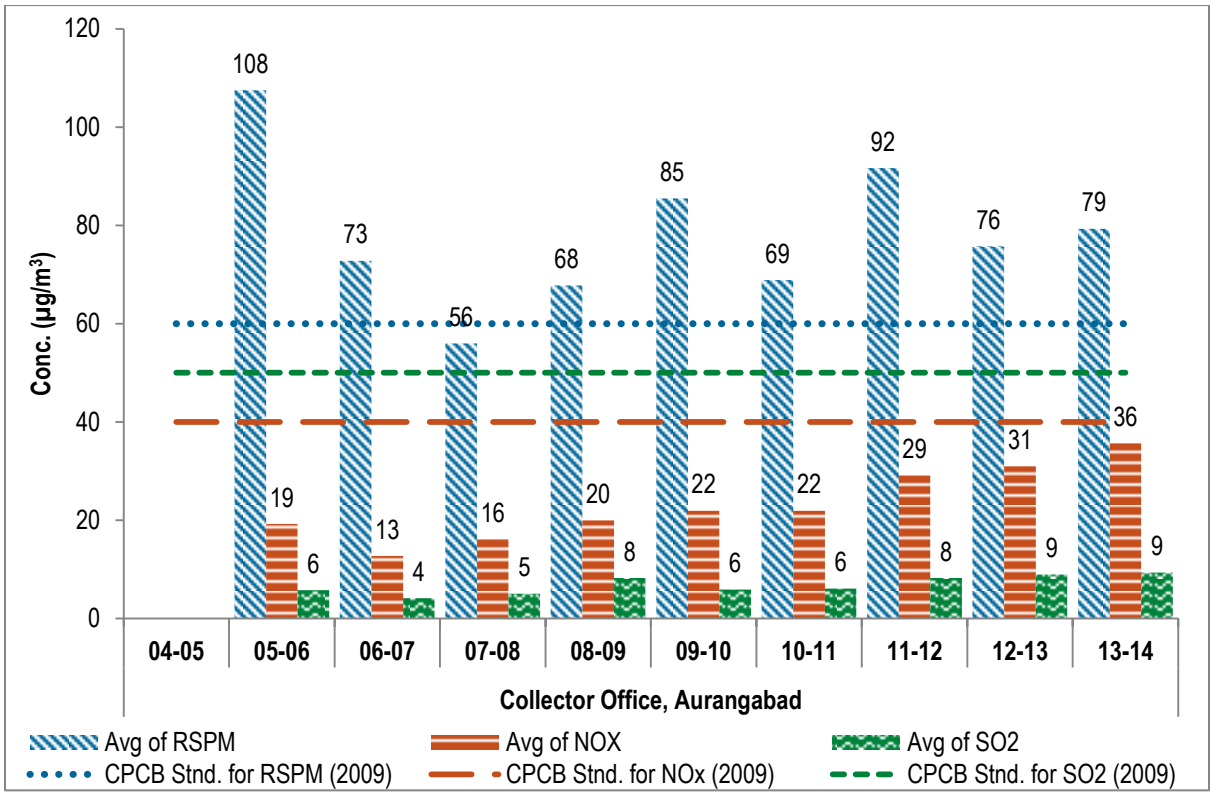


Figure No. 47: Annual average trend of SO_2, NOx and RSPM at Collector Office, Aurangabad

Aurangabad - C.A.D.A. Office

Table No. 35: Data for monthly average reading recorded at C.A.D.A. Office

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	*8*	83	36	9
May	*10*	78	33	8
Jun	*8*	46	32	8
Jul	*8*	36	32	7
Aug	*8*	62	31	7
Sep	*8*	49	29	8
Oct	*10*	57	34	9
Nov	*8*	90	42	11
Dec	*8*	93	48	14
Jan	*10*	102	49	17
Feb	*8*	107	44	15
Mar	*4*	90	42	12
	Total N	**% of exceedence of daily readings for 2013-14**		
	98	17.3	0.0	0.0

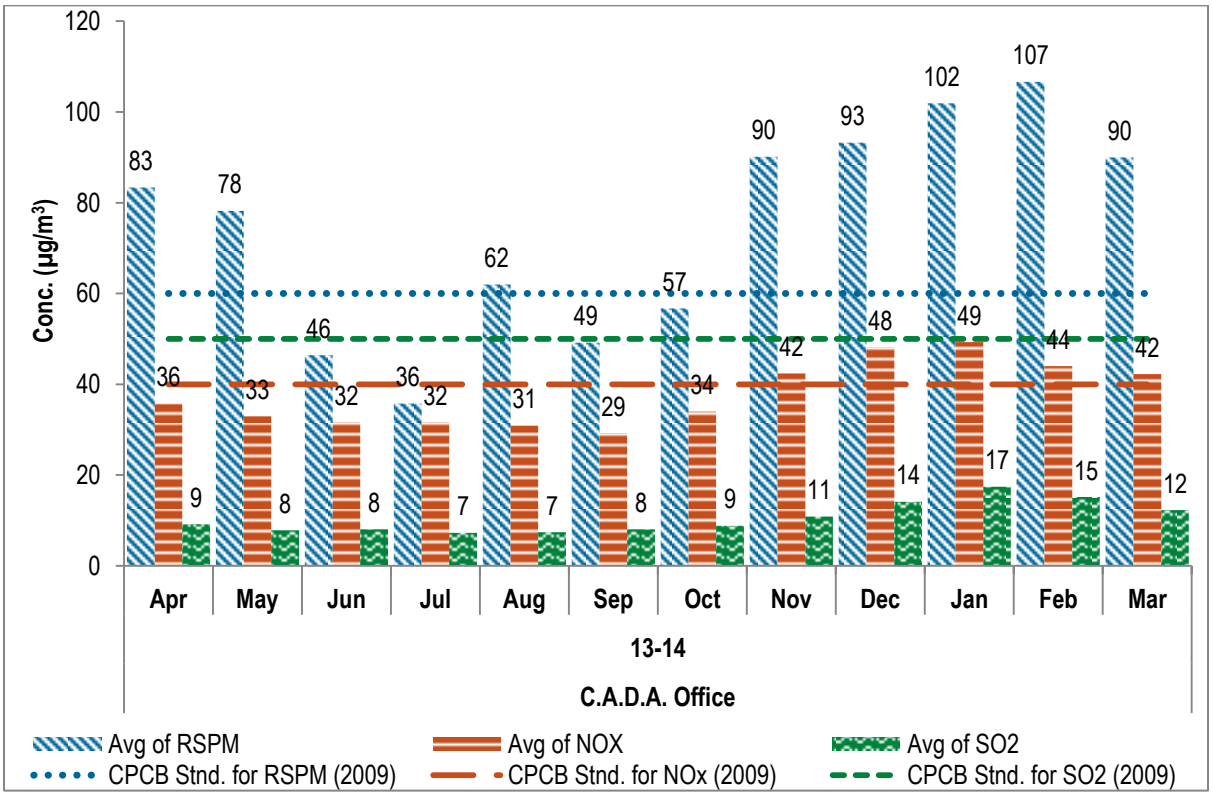


Figure No. 48: Monthly average reading recorded at C.A.D.A. Office Aurangabad

Table No. 36: Data for annual average trend of RSPM, NO_X and SO_2 at C.A.D.A. Office

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

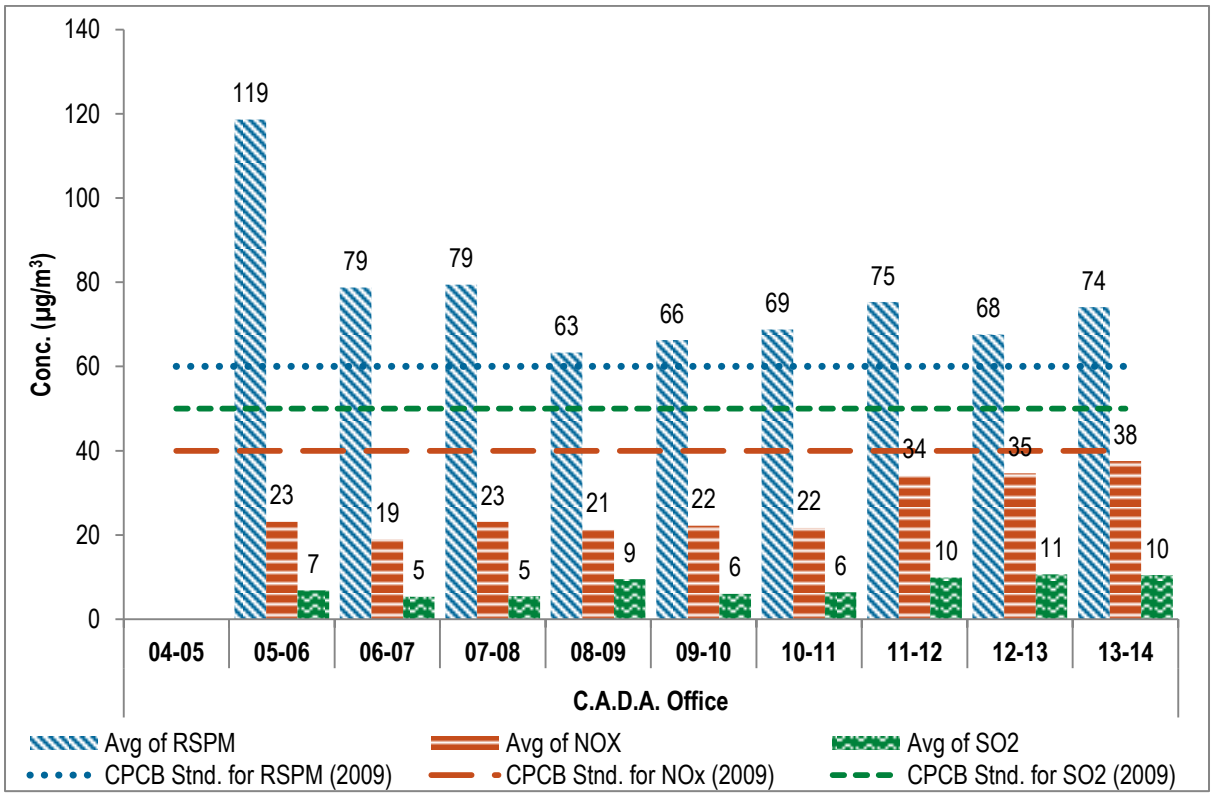


Figure No. 49: Annual average trend of SO_2, NOx and RSPM at C.A.D.A.Office Aurangabad

Jalna - Bachat Bhavan

Table No. 37: Data for monthly average reading recorded at Jalna- Bachat Bhavan

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	8	113	30	10
May	10	106	29	9
Jun	6	78	29	9
Jul				
Aug	7	93	30	10
Sep	8	86	31	11
Oct	9	72	29	8
Nov	9	107	30	9
Dec	8	109	31	11
Jan	10	115	31	11
Feb	8	108	32	9
Mar				
Total N		% of exceedence of daily readings for 2013-14		
83		49.4	0.0	0.0

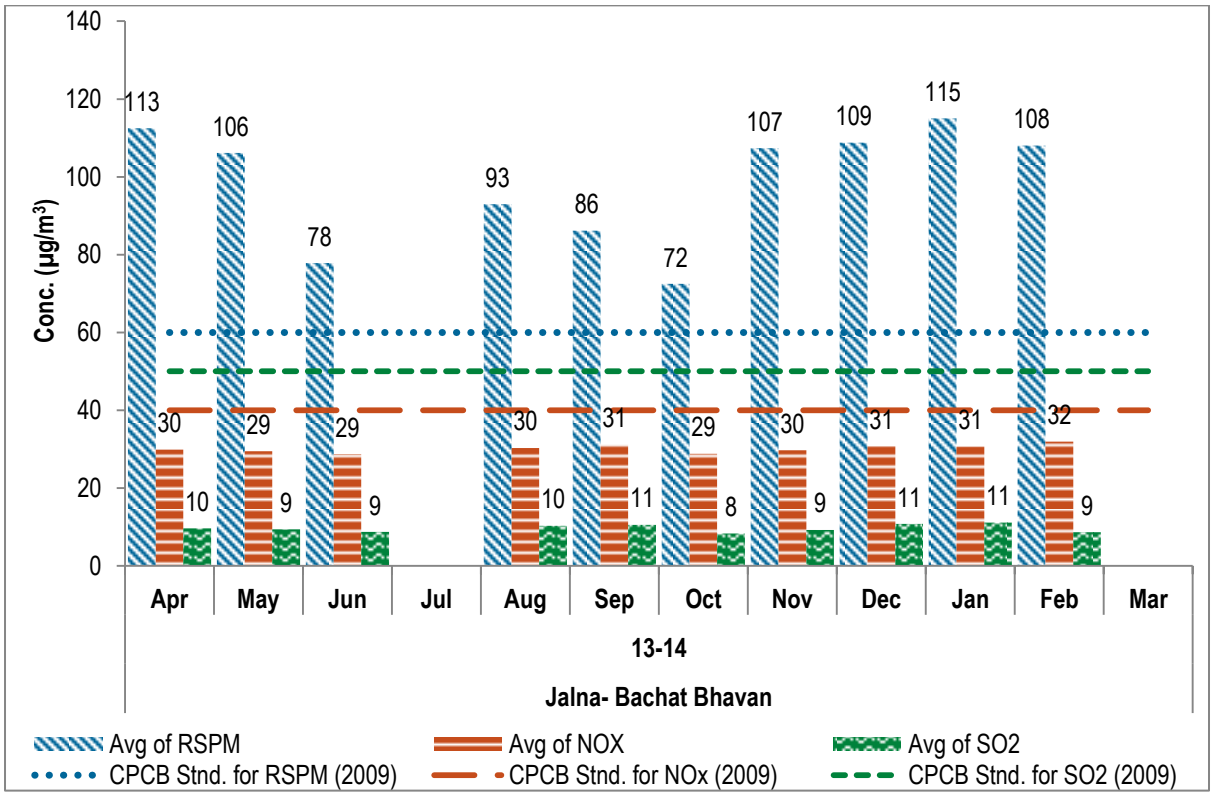


Figure No. 50: Monthly average reading recorded at Jalna Bachat Bhavan

Table No. 38: Data for annual average trend of RSPM, NO_X and SO_2 at Jalna- Bachat Bhavan

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

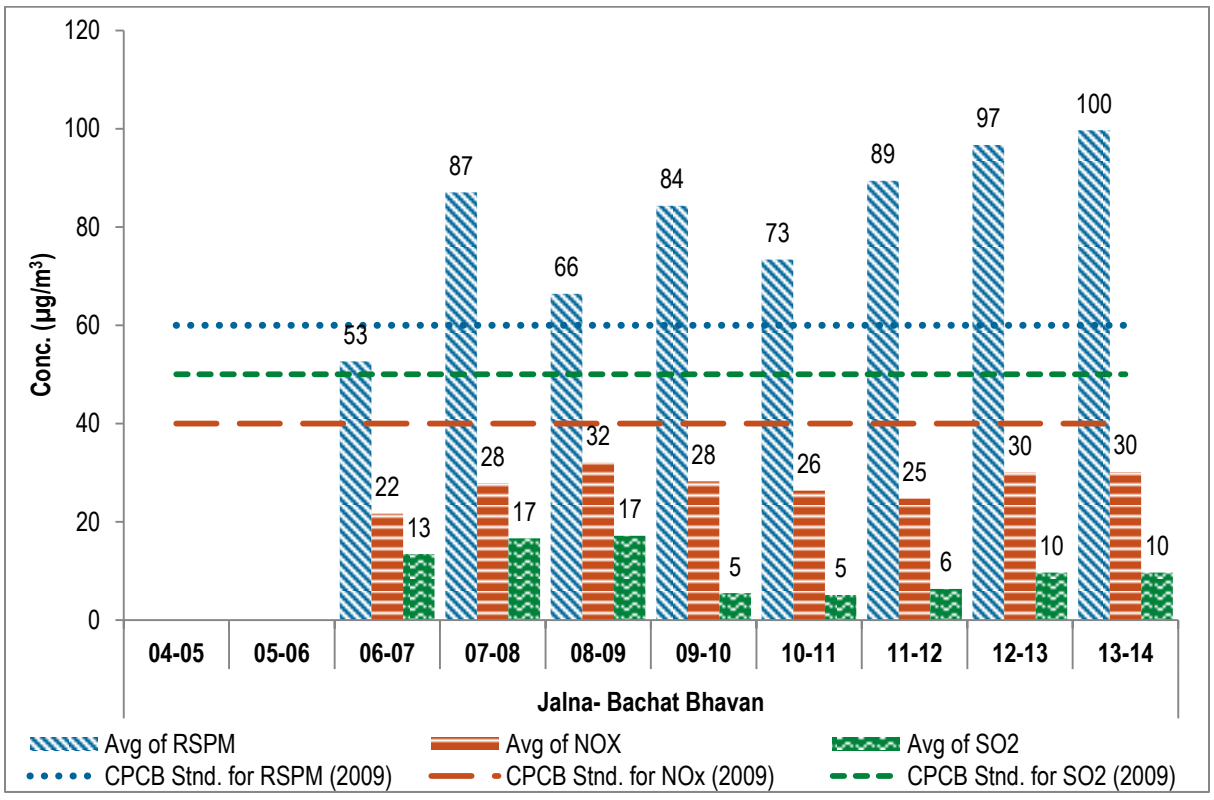


Figure No. 51: Annual average trend of SO_2, NOx and RSPM at Jalna Bachat Bhavan

Jalna - Krishnadhan seeds Ltd

Table No. 39: Data for monthly average reading recorded at Jalna- Krishnadhan seeds Ltd

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	9	147	32	12
May	9	113	31	11
Jun	7	124	30	11
Jul	8	103	30	10
Aug	8	115	32	11
Sep	8	108	32	11
Oct	9	119	30	10
Nov	8	168	32	11
Dec	9	173	32	12
Jan	9	244	32	12
Feb	8	228	32	13
Mar				
	Total N	% of exceedence of daily readings for 2013-14		
	92	77.2	0.0	0.0

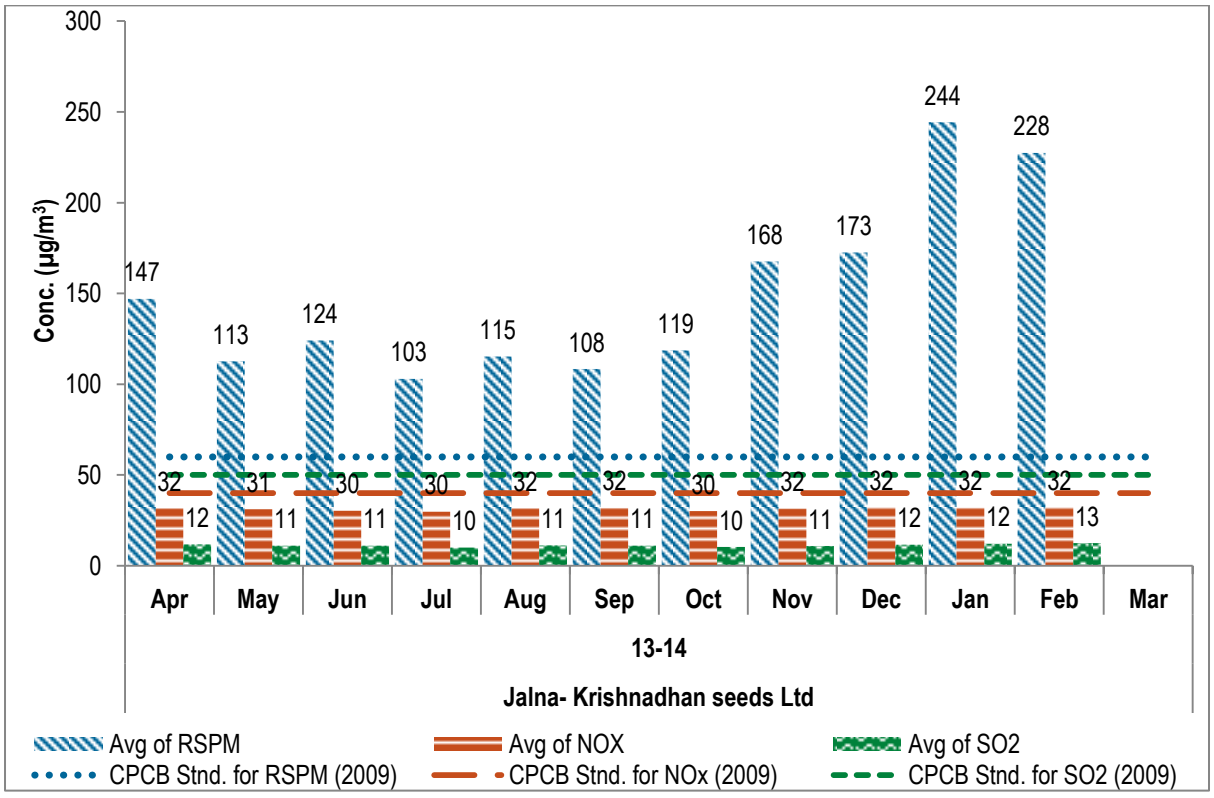


Figure No. 52: Monthly average reading recorded at Jalna Krishnadhan Seeds Ltd

Table No. 40: Data for annual average trend of RSPM, NO_X and SO_2 at Jalna- Krishnadhan seeds Ltd

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

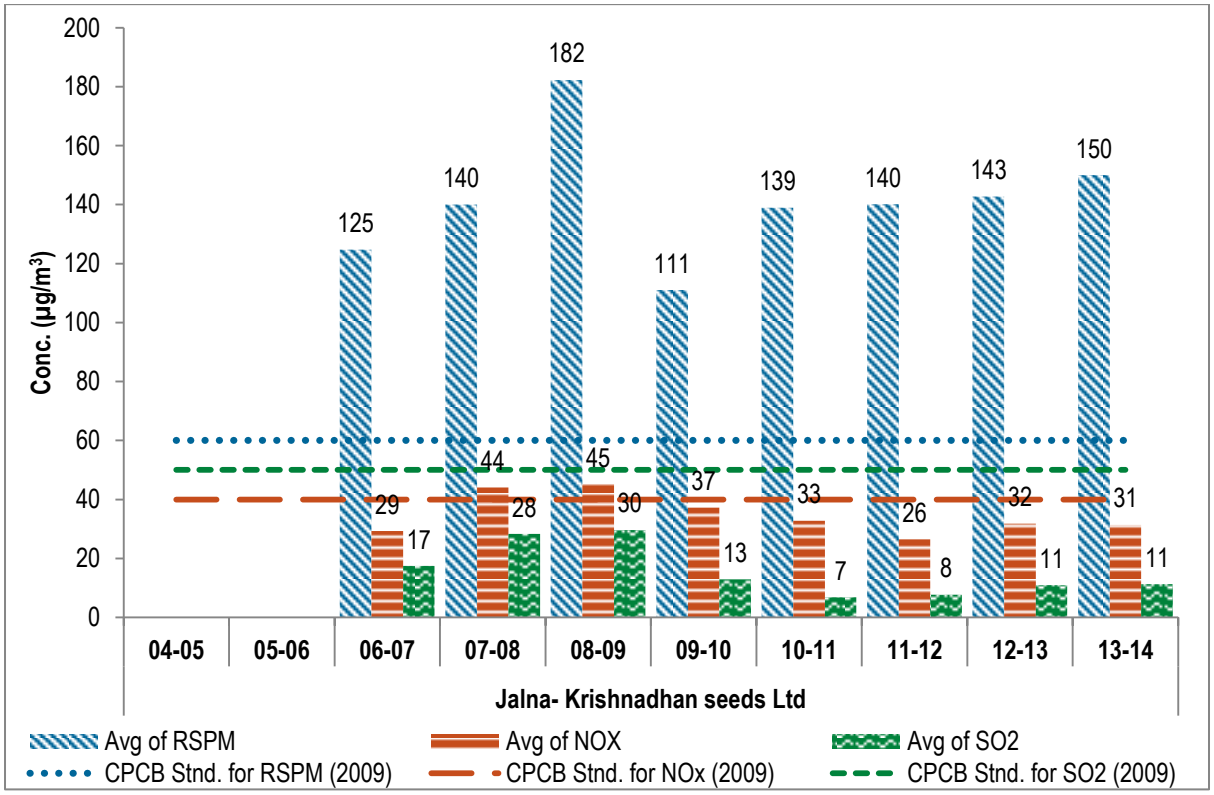


Figure No. 53: Annual average trend of SO_2, NOx and RSPM at Jalna Krishnadhan Seeds Ltd

Latur - MIDC Water Works

Table No. 41: Data for monthly average reading recorded at Latur MIDC Water Works

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	*8*	75	19	4
May	*10*	113	17	5
Jun	*9*	53	15	6
Jul	*8*	28	13	6
Aug	*10*	50	13	5
Sep	*8*	60	15	7
Oct	*8*	57	16	7
Nov	*10*	95	14	5
Dec	*8*	114	20	5
Jan	*8*	141	17	5
Feb	*8*	129	14	5
Mar	*9*	148	21	9
Total N		% of exceedence of daily readings for 2013-14		
104		35.6	0.0	0.0

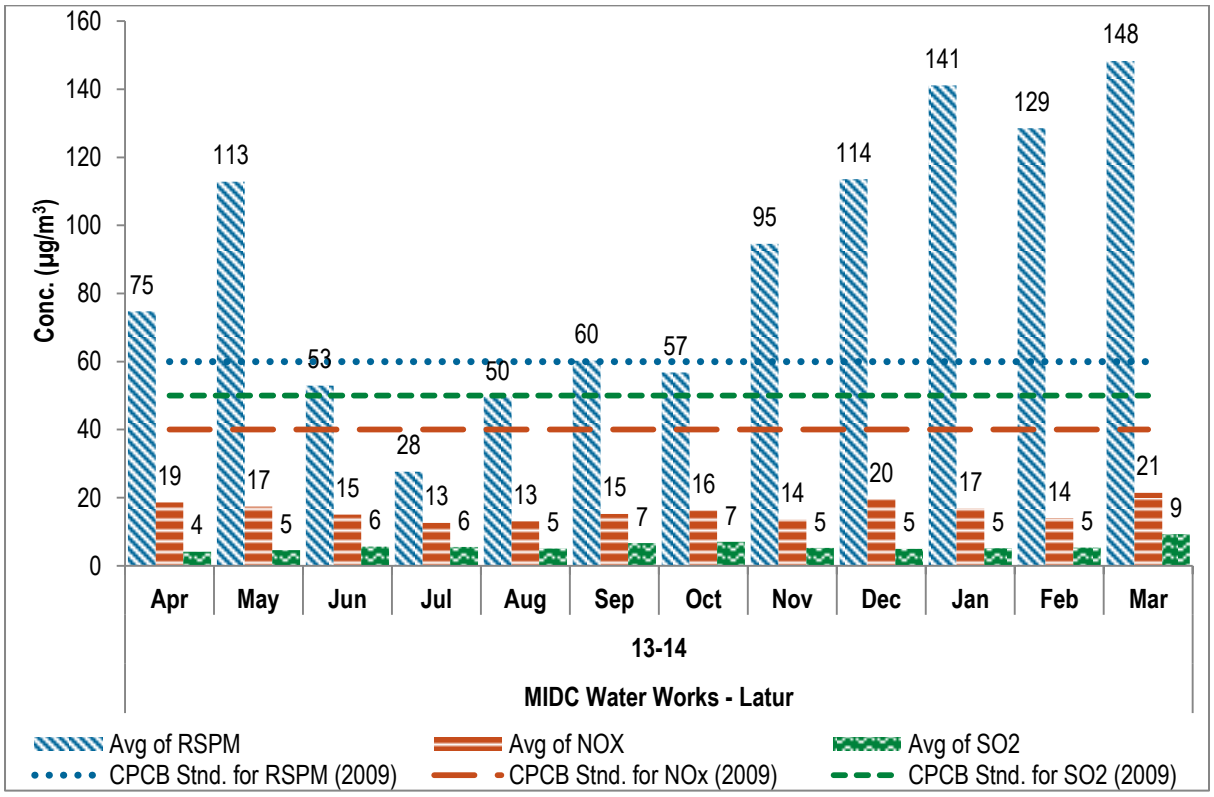


Figure No. 54: Monthly average reading recorded at Latur MIDC Water Works

Table No. 42: Data for annual average trend of RSPM, NO_X and SO_2 at Latur MIDC Water Works

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

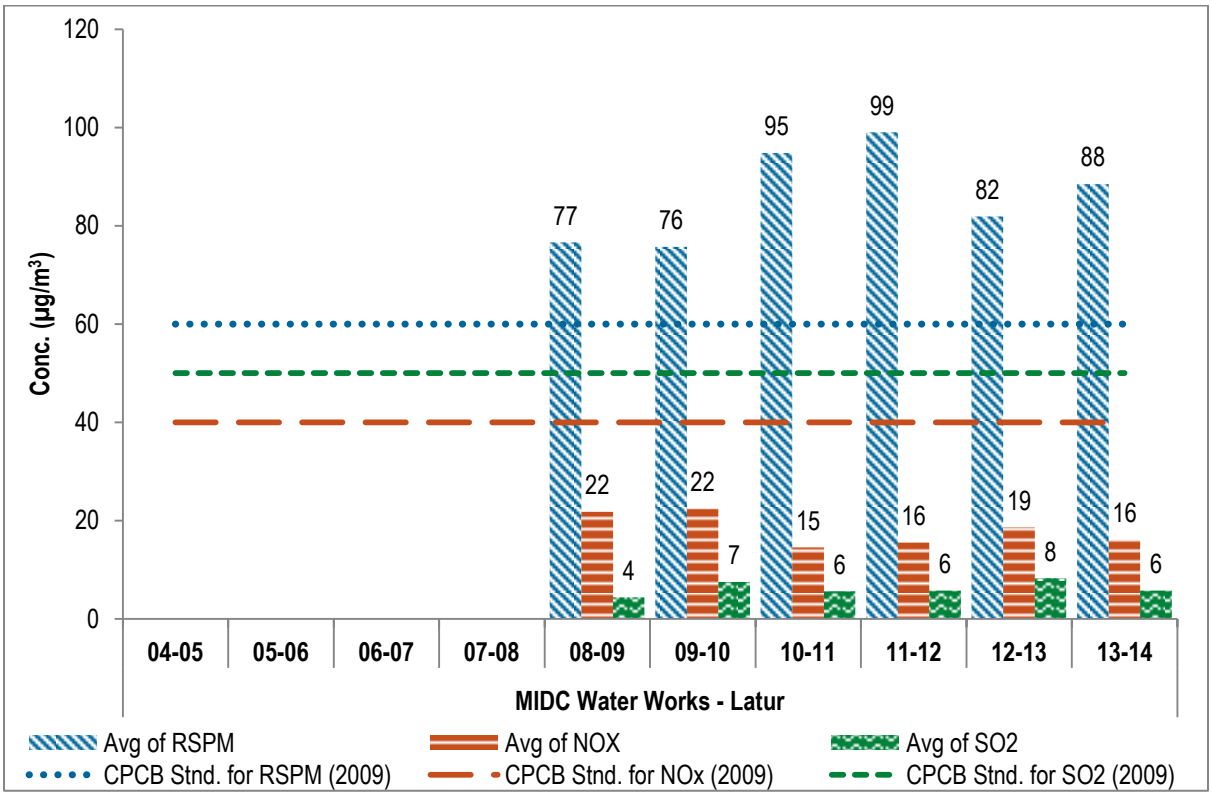


Figure No. 55: Annual average trend of SO_2, NOx and RSPM at Latur MIDC Water Works

Latur - Shyam Nagar-Kshewraj Vidyalaya

Table No. 43: Data for monthly average reading recorded at Shyam Nagar-Kshewraj Vidyalaya

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	10	118	20	5
May	8	140	22	8
Jun	8	74	18	7
Jul	10	44	14	7
Aug	8	78	16	5
Sep	9	97	14	6
Oct	9	77	17	9
Nov	8	80	15	6
Dec	9	131	18	5
Jan	8	134	18	6
Feb				
Mar	8	74	21	10
Total N		% of exceedence of daily readings for 2013-14		
95		35.8	0.0	0.0

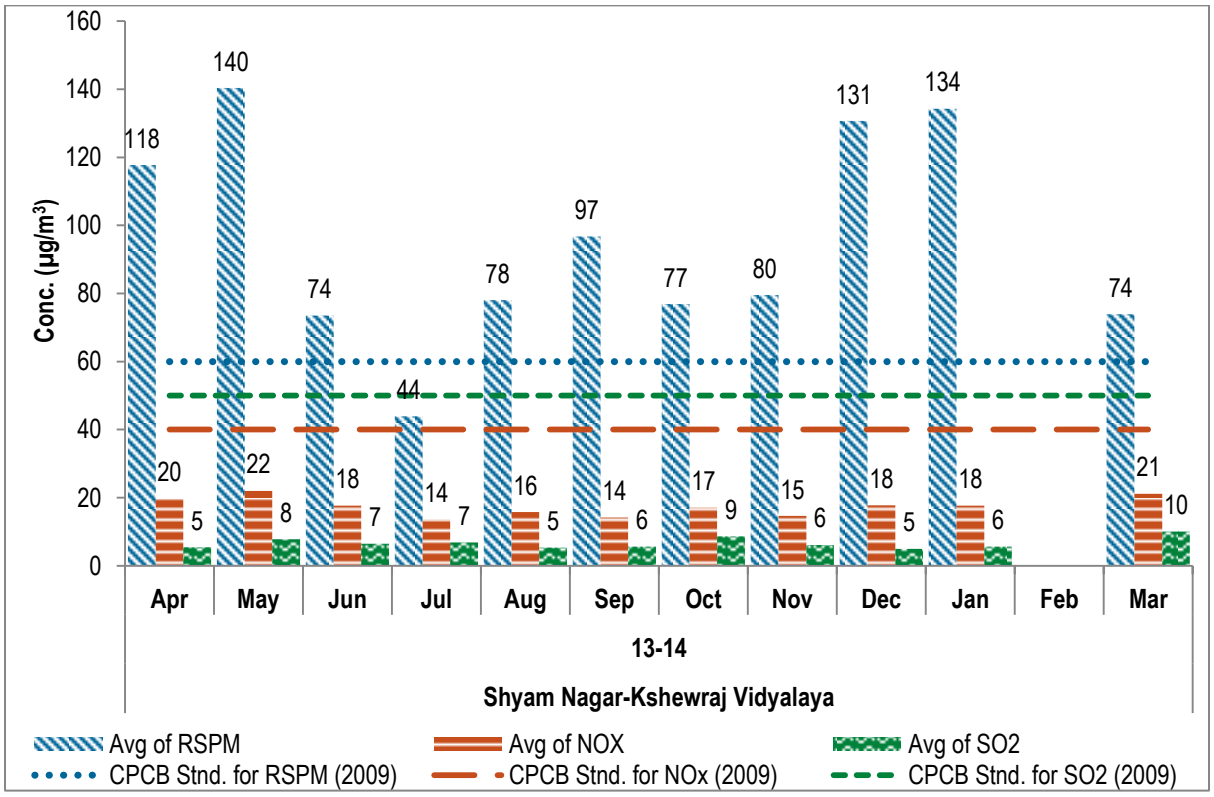


Figure No. 56: Monthly average reading recorded at Shyam Nagar Keshwraj Vidyalaya

Table No. 44: Data for annual average trend of RSPM, NO_X and SO_2 at Shyam Nagar-Kshewraj Vidyalaya

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

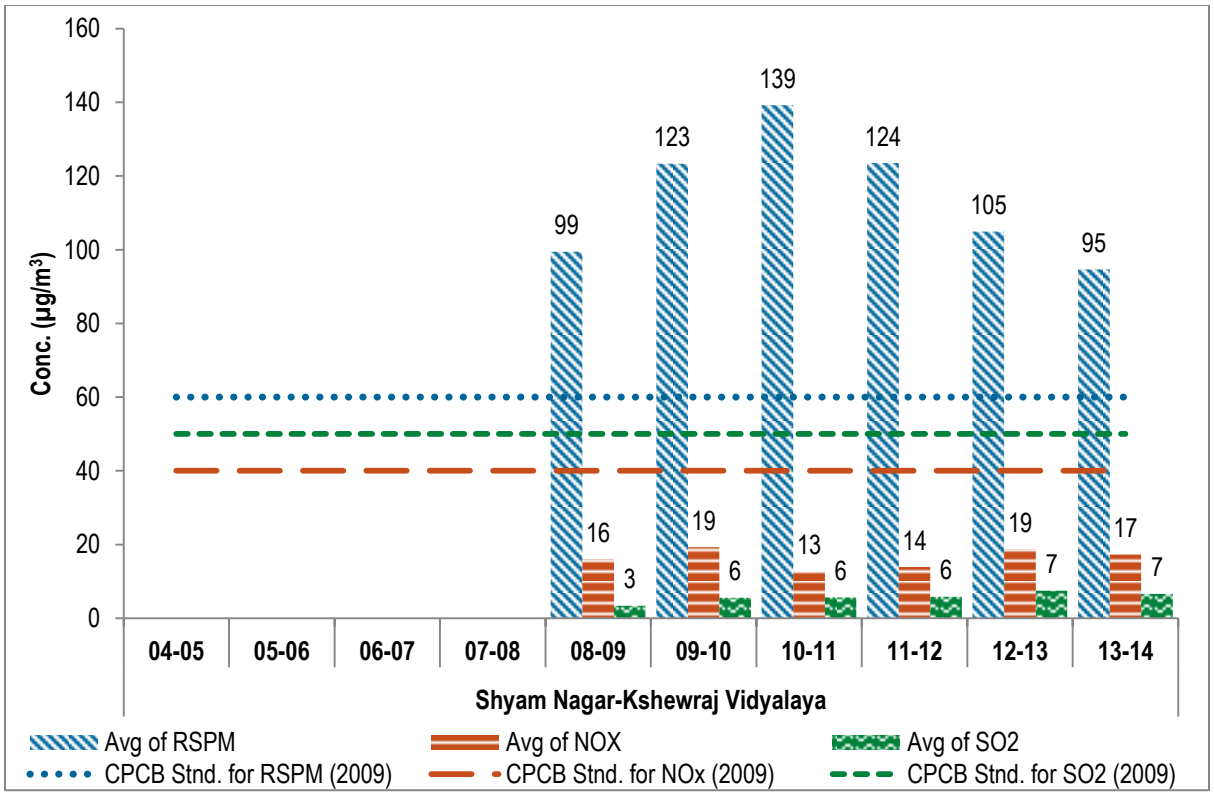


Figure No. 57: Annual average trend of SO_2, NOx and RSPM at Shyam Nagar Keshwraj Vidyalaya

Latur - Ganj Golai - Sidhheshwar Bank

Table No. 45: Data for monthly average reading recorded at Ganj Golai - Sidhheshwar Bank

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	*8*	117	20	6
May	*9*	96	18	6
Jun	*8*	82	18	8
Jul	*8*	107	15	8
Aug	*9*	75	14	7
Sep	*8*	80	16	8
Oct	*10*	86	18	9
Nov	*8*	114	14	5
Dec	*8*	135	18	5
Jan	*10*	167	19	6
Feb				
Mar	*8*	115	23	10
Total N		**% of exceedence of daily readings for 2013-14**		
94		46.8	0.0	0.0

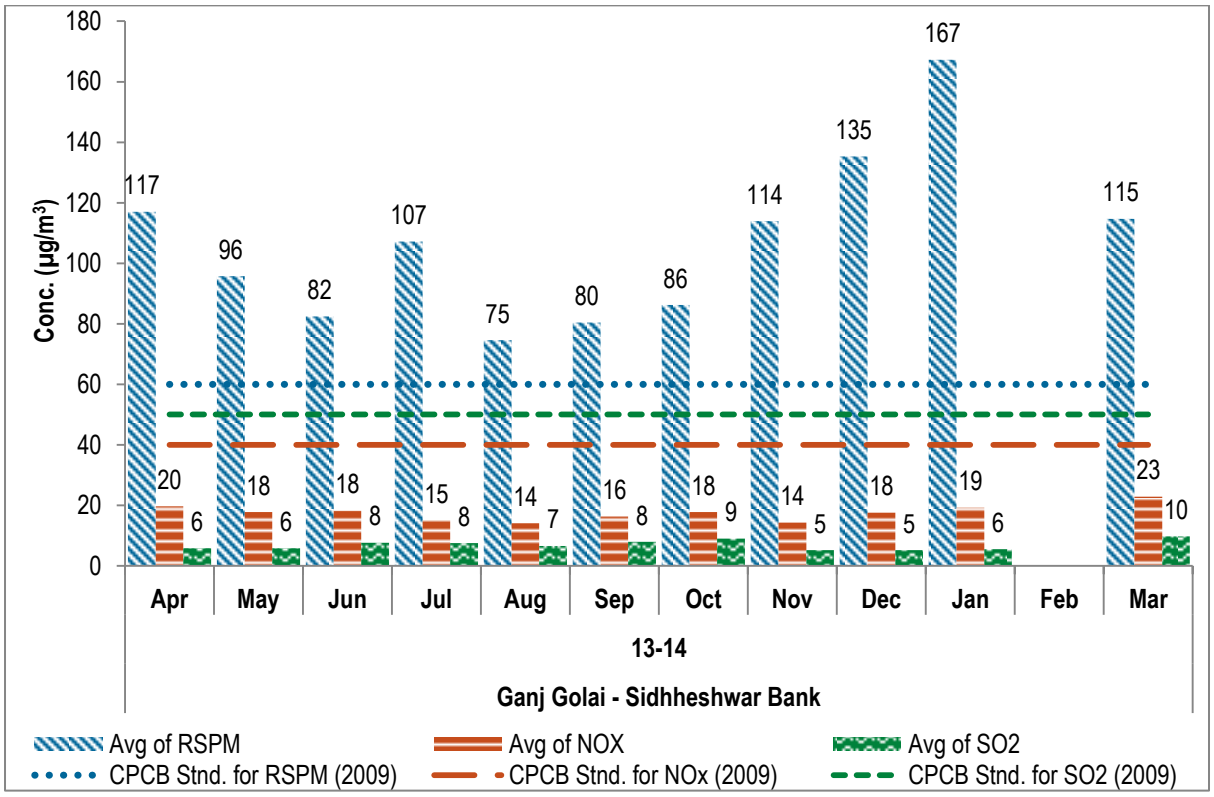


Figure No. 58: Monthly average reading recorded at Ganj Golai Sidheshwar Bank

Table No. 46: Data for annual average trend of RSPM, NO_X and SO_2 at Ganj Golai - Sidhheshwar Bank

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

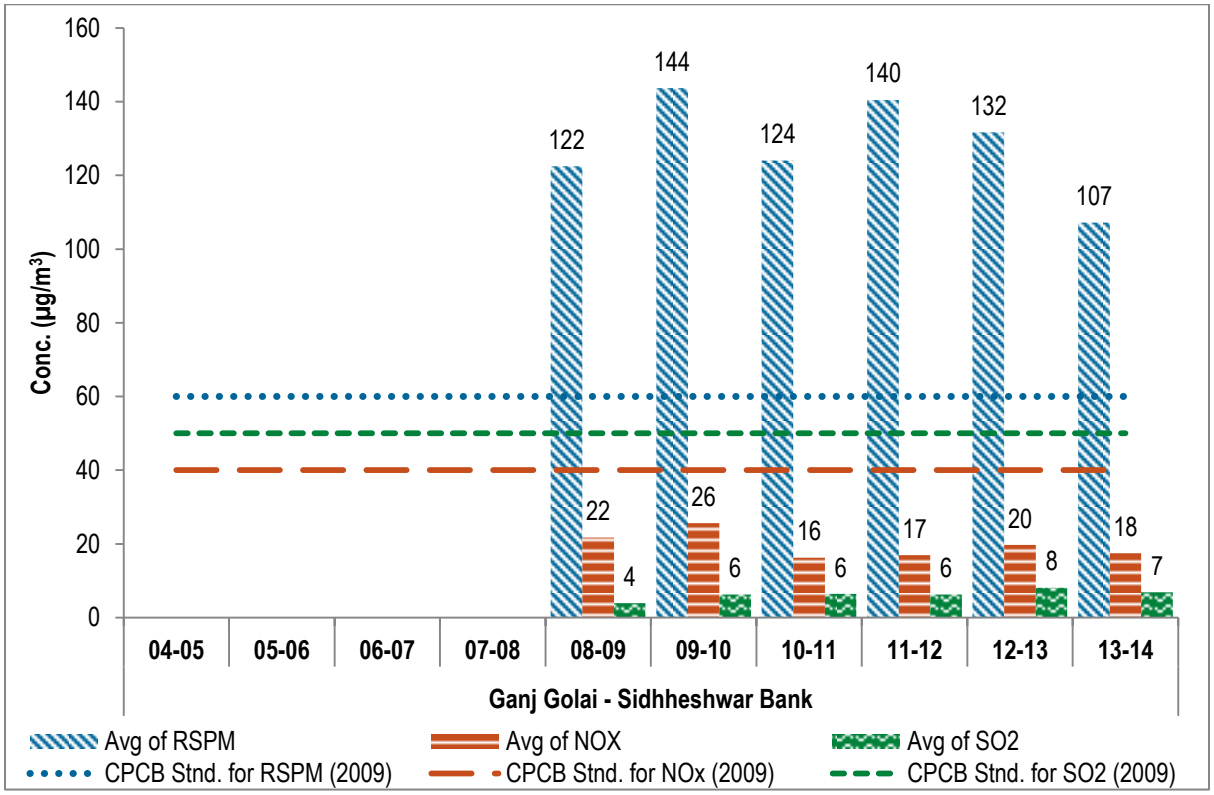


Figure No. 59: Annual average trend of SO_2, NOx and RSPM at Ganj Golai Sidheshwar Bank

Nanded - Ganeshnagar

Table No. 47: Data for monthly average reading recorded at Ganeshnagar

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	*8*	49	33	34
May	*10*	54	40	41
Jun	*8*	9	10	6
Jul	*9*	11	4	4
Aug	*9*	3	0	1
Sep	*8*	15	10	11
Oct	*9*	32	17	17
Nov	*8*	38	9	9
Dec	*8*	39	9	9
Jan	*10*	27	17	22
Feb	*8*	39	26	27
Mar				
	Total N	**% of exceedence of daily readings for 2013-14**		
	95	0.0	0.0	0.0

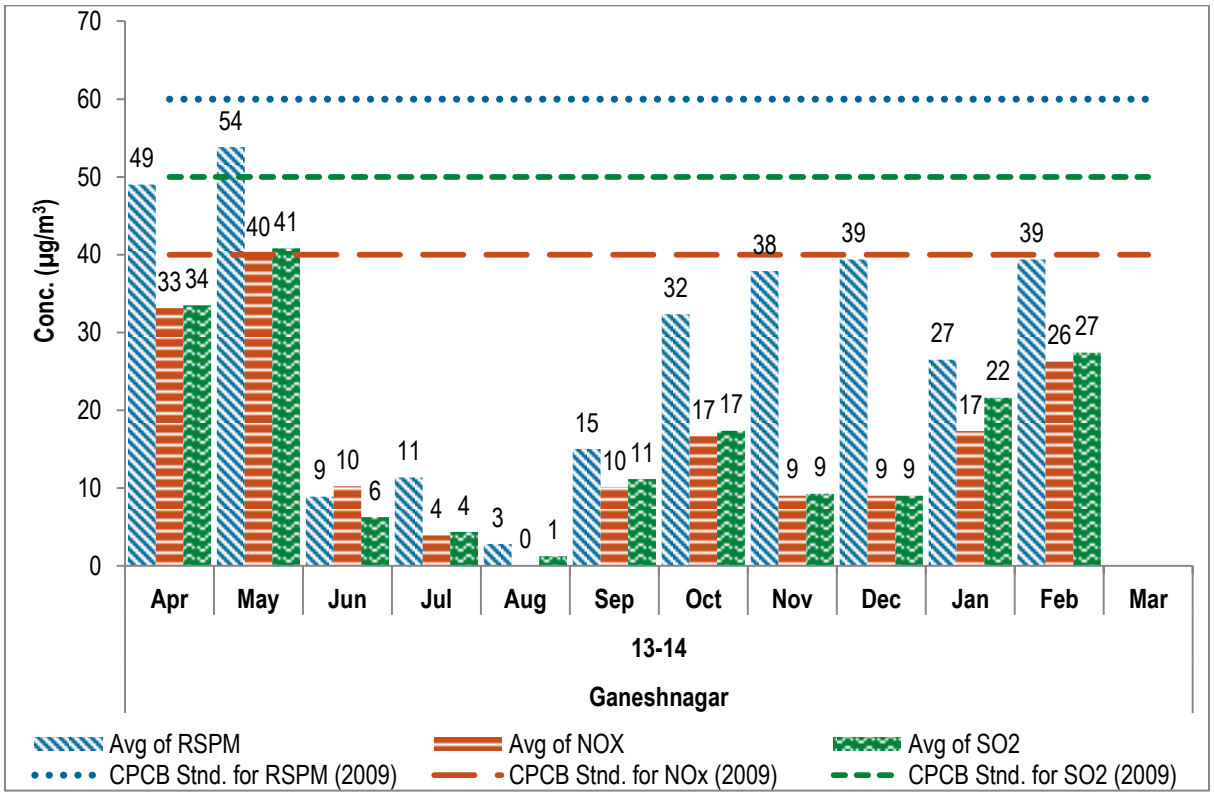


Figure No. 60: Monthly average reading recorded at Ganeshnagar

Table No. 48: Data for annual average trend of RSPM, NO_X and SO_2 at Ganeshnagar

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

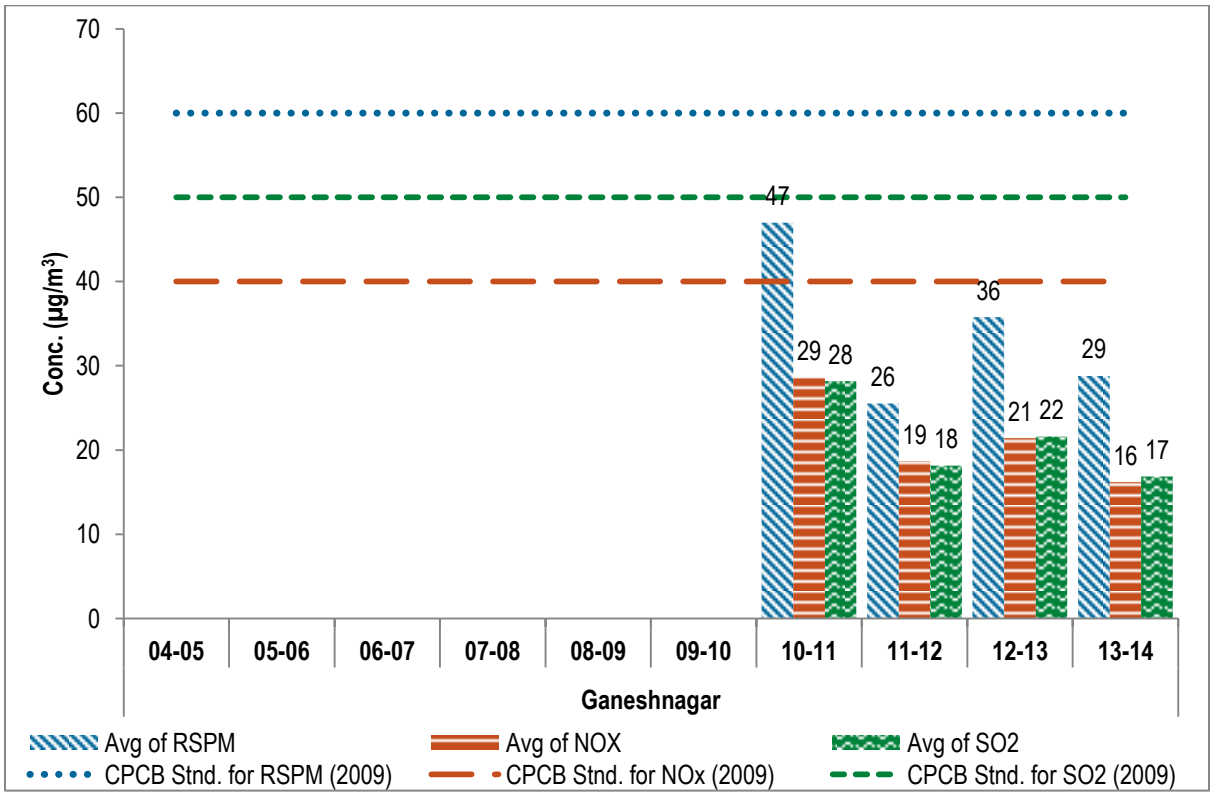


Figure No. 61: Annual average trend of SO_2, NOx and RSPM at Ganeshnagar

Nanded - Mutha Chowk

Table No. 49: Data for monthly average reading recorded at Mutha Chowk

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	8	77	40	46
May	9	81	46	51
Jun	9	15	11	16
Jul	8	9	11	12
Aug	9	4	1	2
Sep	8	22	10	11
Oct	8	55	24	30
Nov	10	156	15	22
Dec	8	139	16	23
Jan	9	42	21	21
Feb	8	67	35	37
Mar				
	Total N	% of exceedence of daily readings for 2013-14		
	94	19.1	0.0	0.0

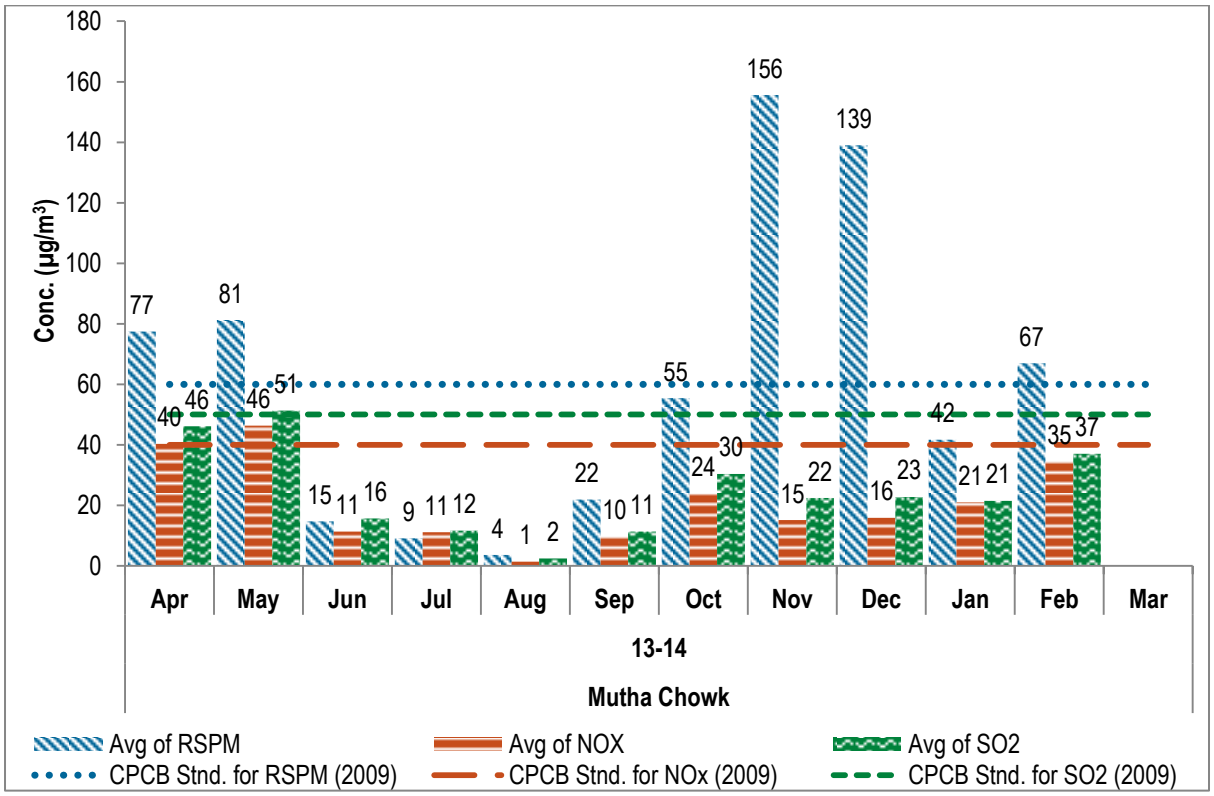


Figure No. 62: Monthly average reading recorded at Mutha Chowk

Table No. 50: Data for annual average trend of RSPM, NO_X and SO_2 at Mutha Chowk

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

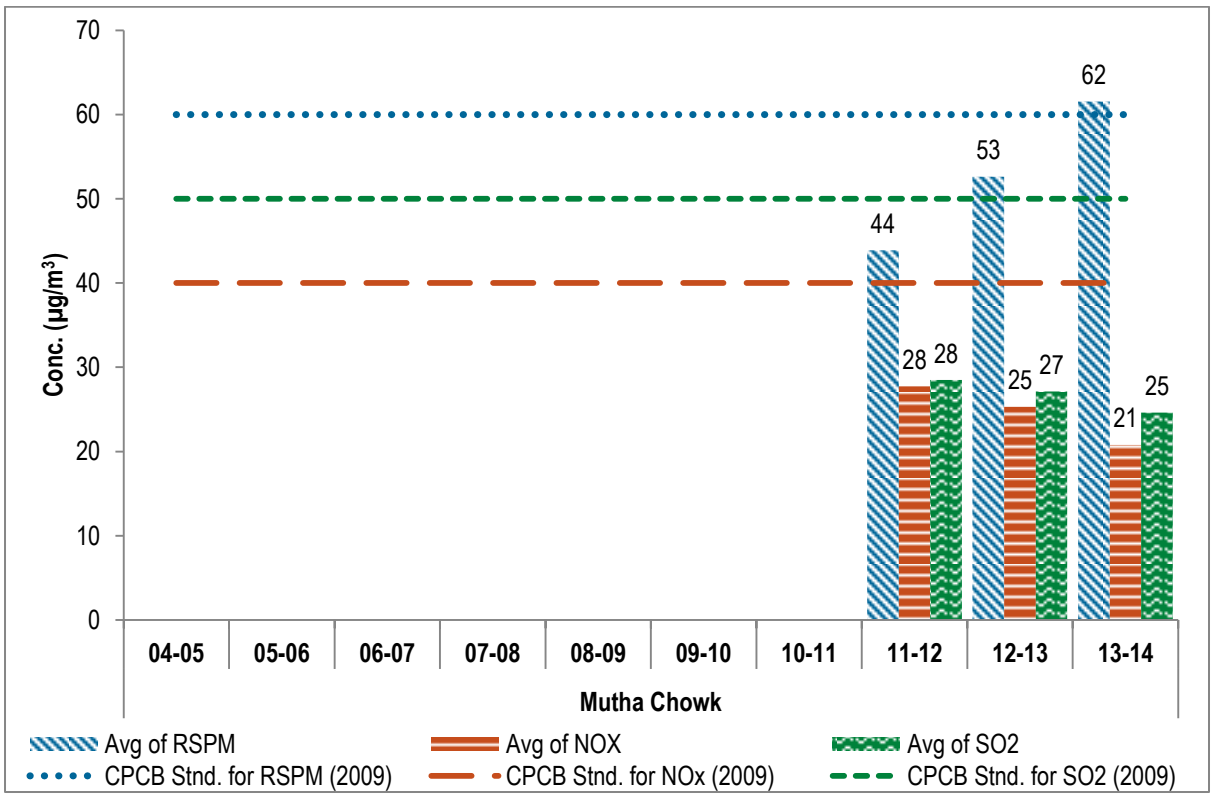


Figure No. 63: Annual average trend of SO_2, NOx and RSPM at Mutha Chowk

Nanded - Industrial Area CIDCO

Table No. 51: Data for monthly average reading recorded at Industrial Area CIDCO -Nanded

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	10	126	82	82
May	8	135	89	90
Jun	16	23	21	19
Jul	10	35	22	27
Aug	8	6	0	8
Sep	9	67	52	53
Oct	9	79	60	66
Nov	8	146	15	35
Dec	10	140	15	35
Jan	8	111	66	66
Feb	8	120	72	71
Mar				
Total N		% of exceedence of daily readings for 2013-14		
104		47.1	21.2	20.2

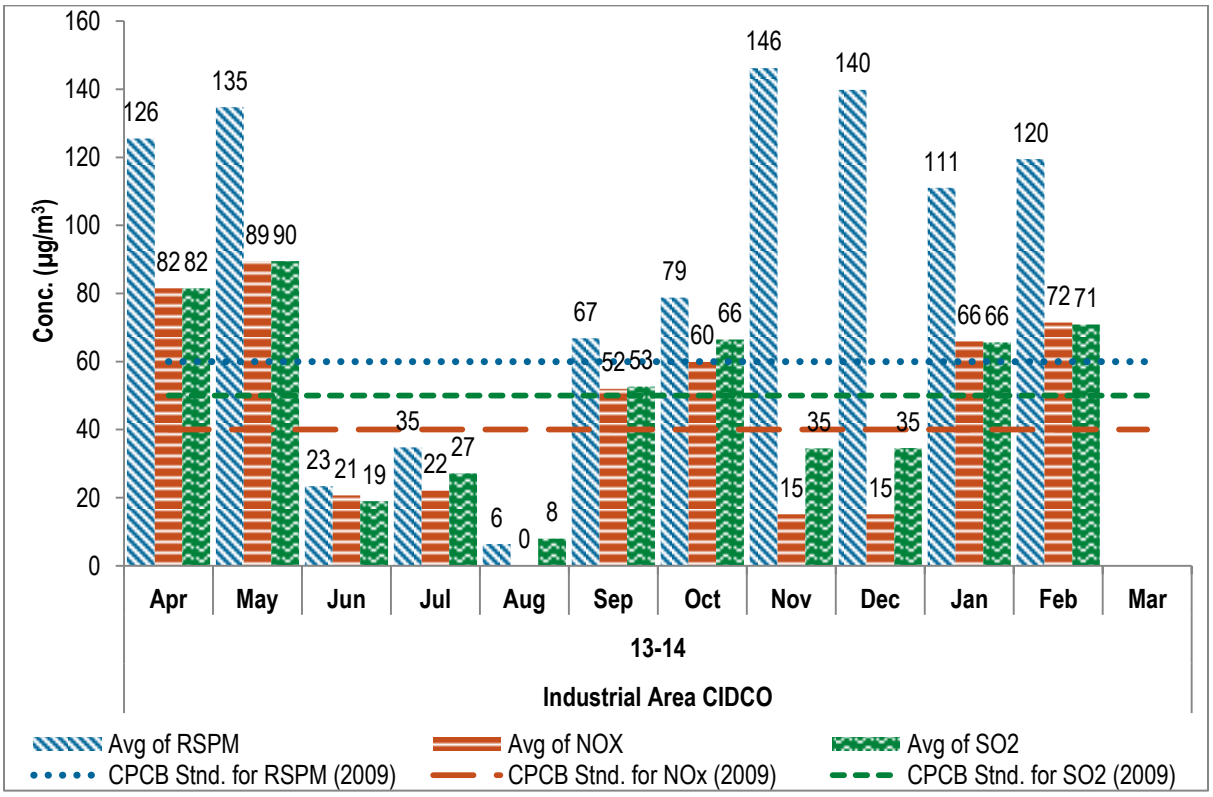


Figure No. 64: Monthly average reading recorded at Industrial Area CIDCO -Nanded

Table No. 52: Data for annual average trend of RSPM, NO_X and SO_2 at Industrial Area CIDCO - Nanded

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

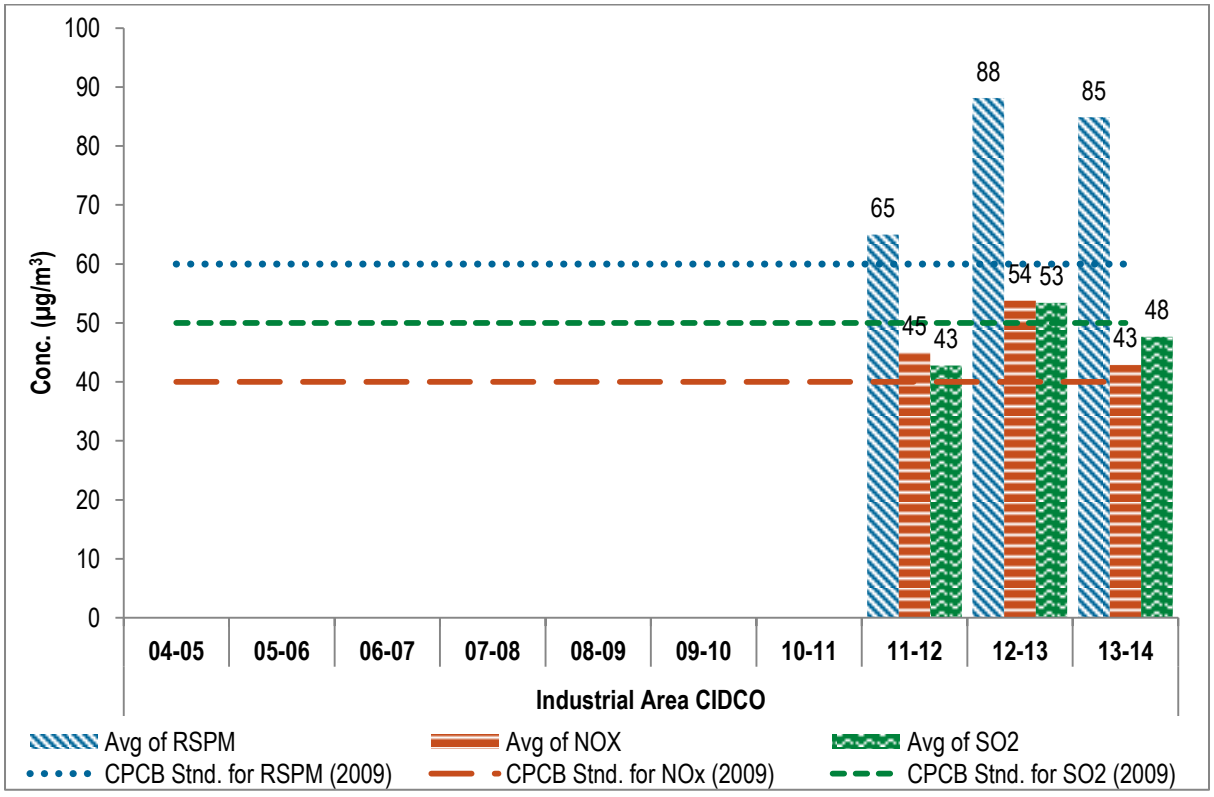


Figure No. 65: Annual average trend of SO_2, NOx and RSPM at Industrial Area Nanded

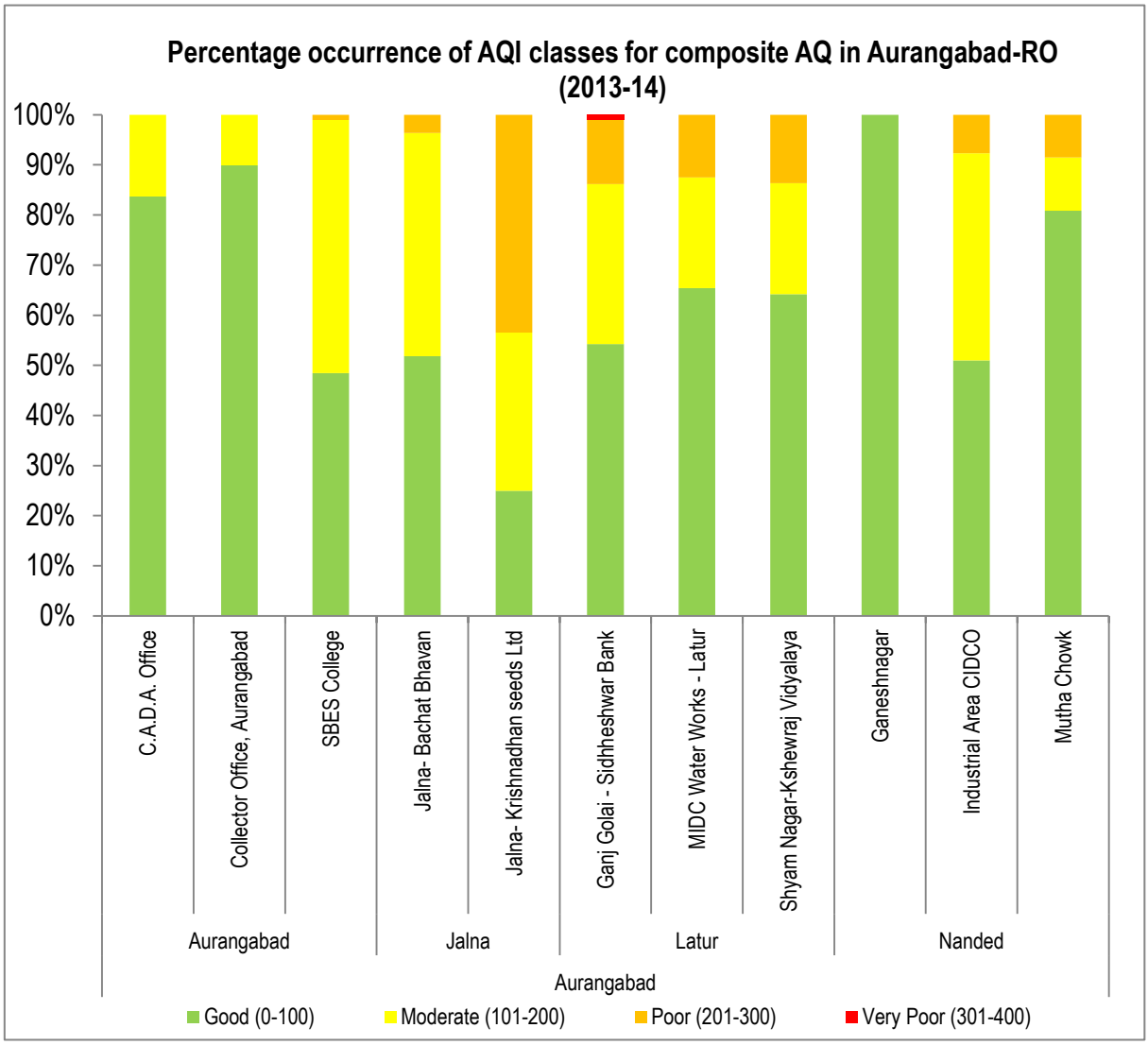
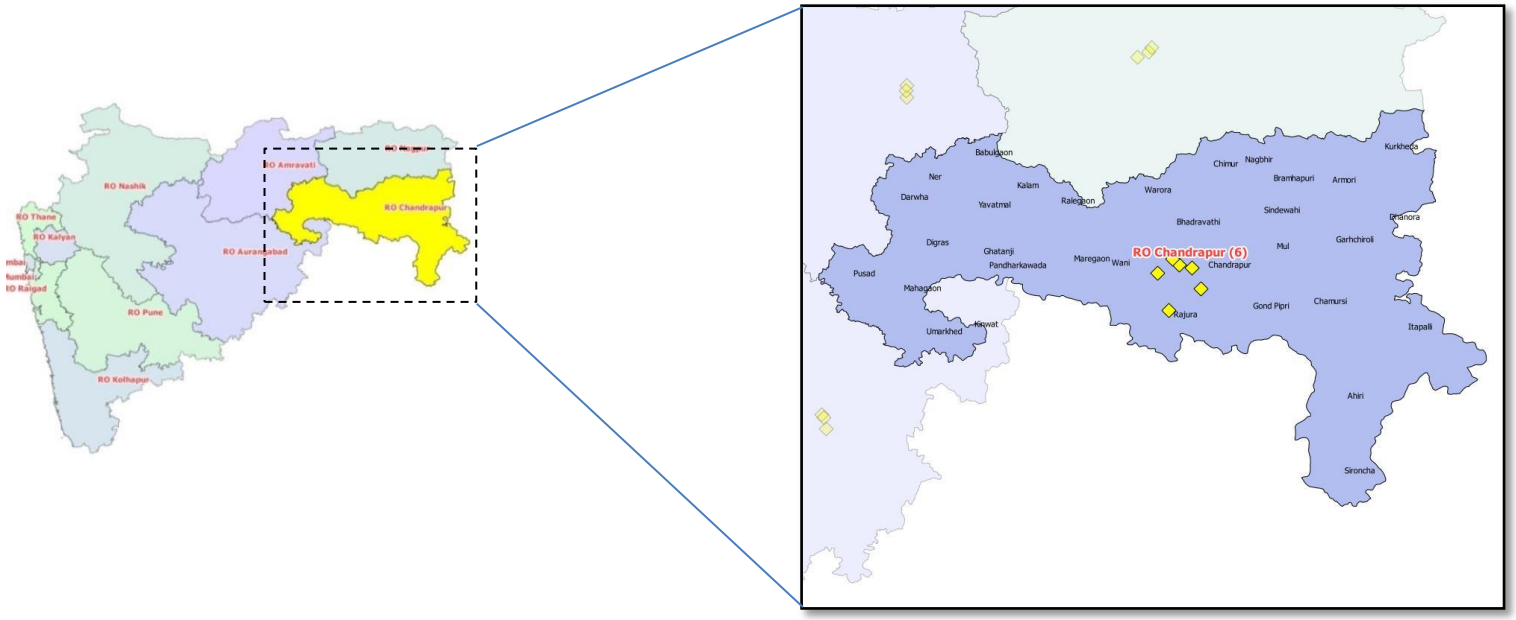


Figure No. 66: Percentage occurrence of AQI classes for composite AQ in Aurangabad-RO (2013-14)

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. 53: Data for monthly average reading recorded at Ghuggus

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	*8*	238	5	13
May	*10*	232	8	16
Jun	*8*	168	11	12
Jul	*8*	150	19	13
Aug	*6*	116	11	12
Sep	*8*	104	19	16
Oct	*8*	120	24	1
Nov	*8*	119	19	0
Dec	*8*	217	43	6
Jan	*8*	245	28	2
Feb	*8*	180	27	6
Mar				
	Total N	% of exceedence of daily readings for 2013-14		
	88	86.4	1.1	0.0

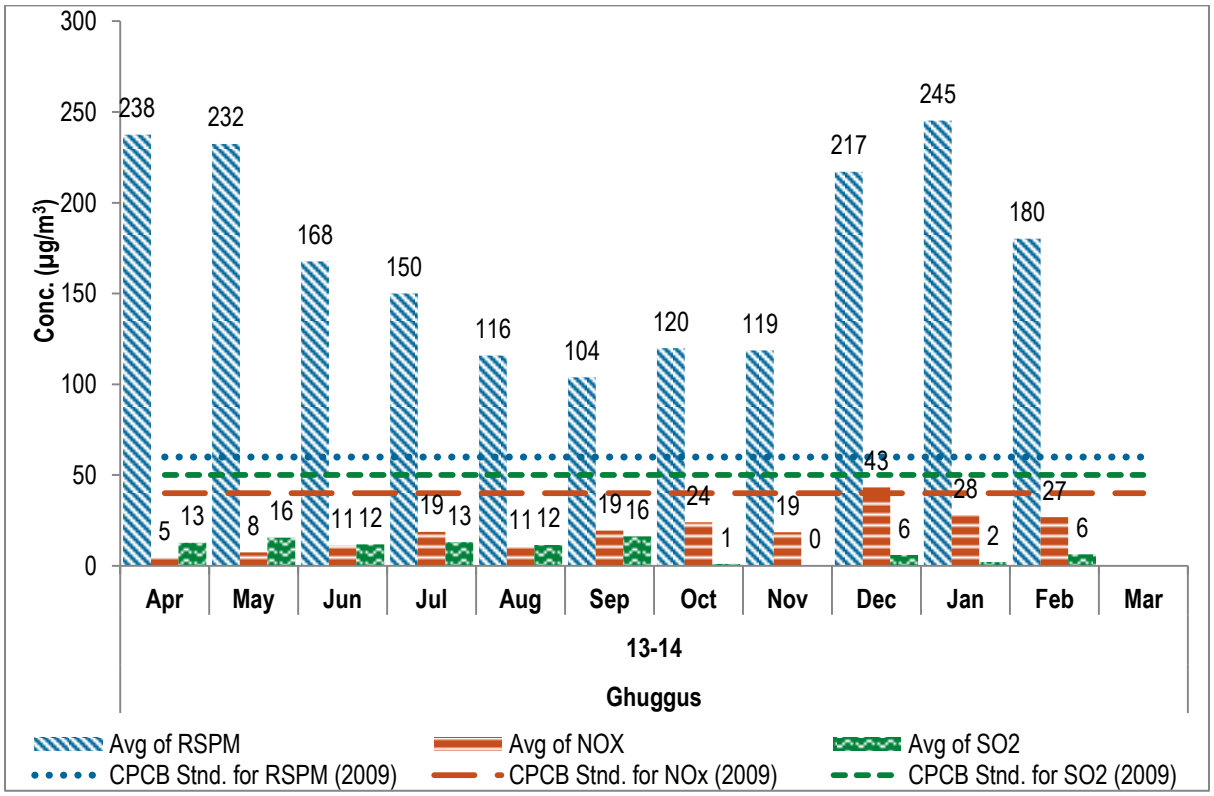


Figure No. 67: Monthly average reading recorded at Ghuggus –Chandrapur

Table No. 54: Data for annual average trend of RSPM, NO_X and SO_2 at Ghuggus

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
04-05	*80*	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

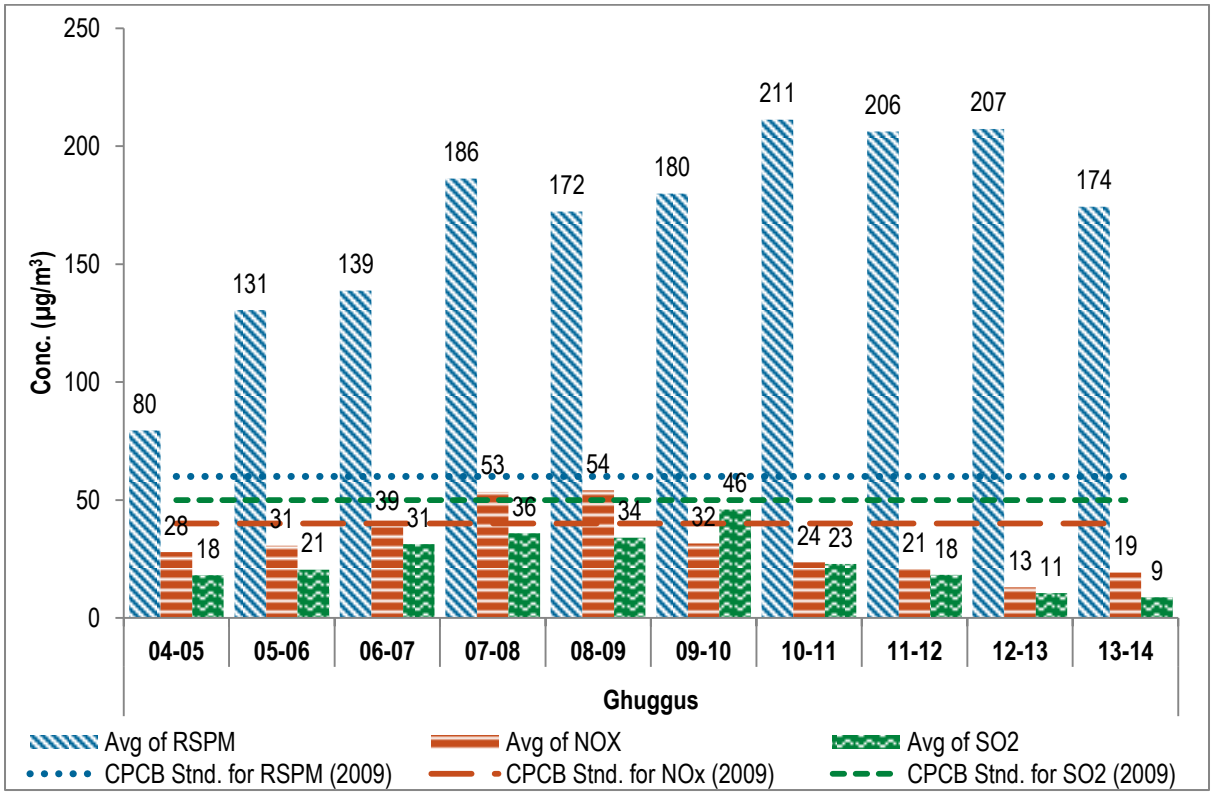


Figure No. 68: Annual average trend of SO_2, NOx and RSPM at Ghuggus –Chandrapur

Chandrapur - Chandrapur - MIDC

Table No. 55: Data for monthly average reading recorded at Chandrapur - MIDC

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	5	34	13	25
May	10	71	24	32
Jun	7	66	30	26
Jul	9	43	20	11
Aug	9	34	16	23
Sep	10	40	18	49
Oct	10	54	33	5
Nov	9	70	38	6
Dec	8	78	43	7
Jan	10	87	36	6
Feb	8	75	26	12
Mar				
Total N		% of exceedence of daily readings for 2013-14		
95		9.5	0.0	3.2

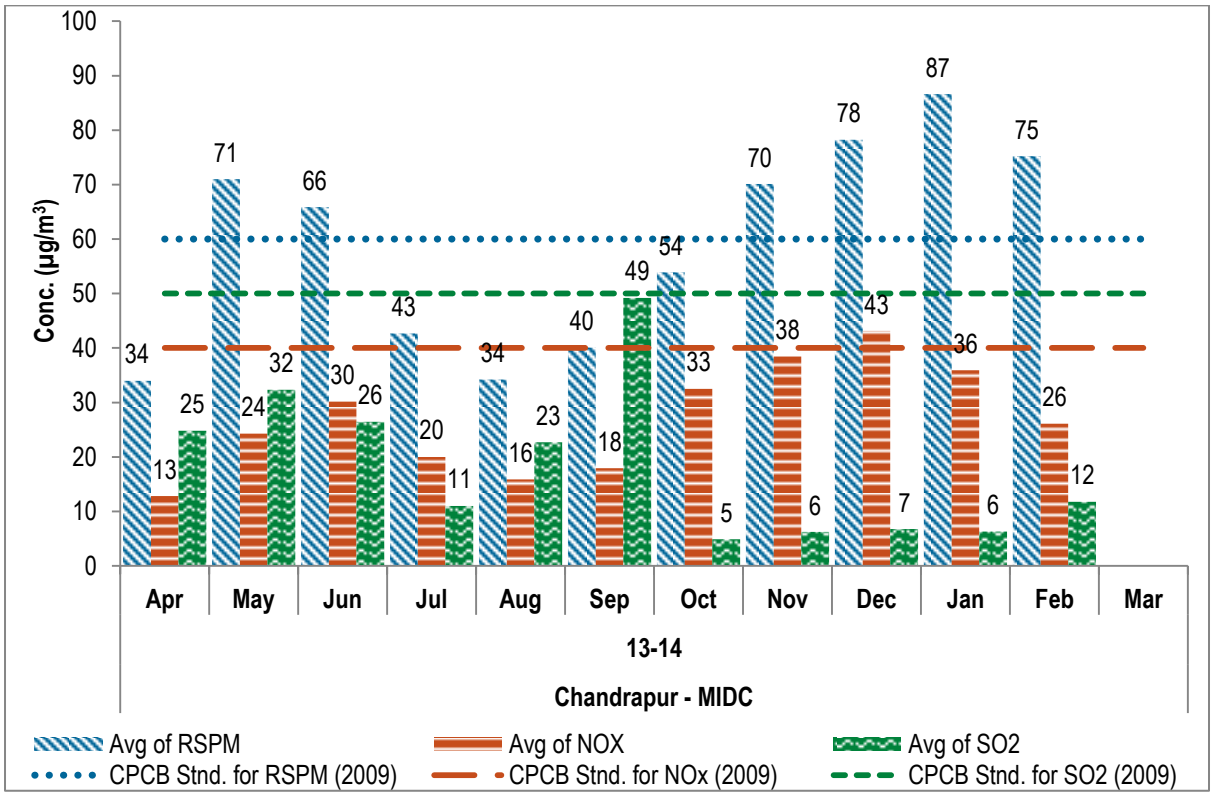


Figure No. 69: Monthly average reading recorded at Chandrapur -MIDC

Table No. 56: Data for annual average trend of RSPM, NO_X and SO_2 at Chandrapur - MIDC

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
04-05	*95*	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

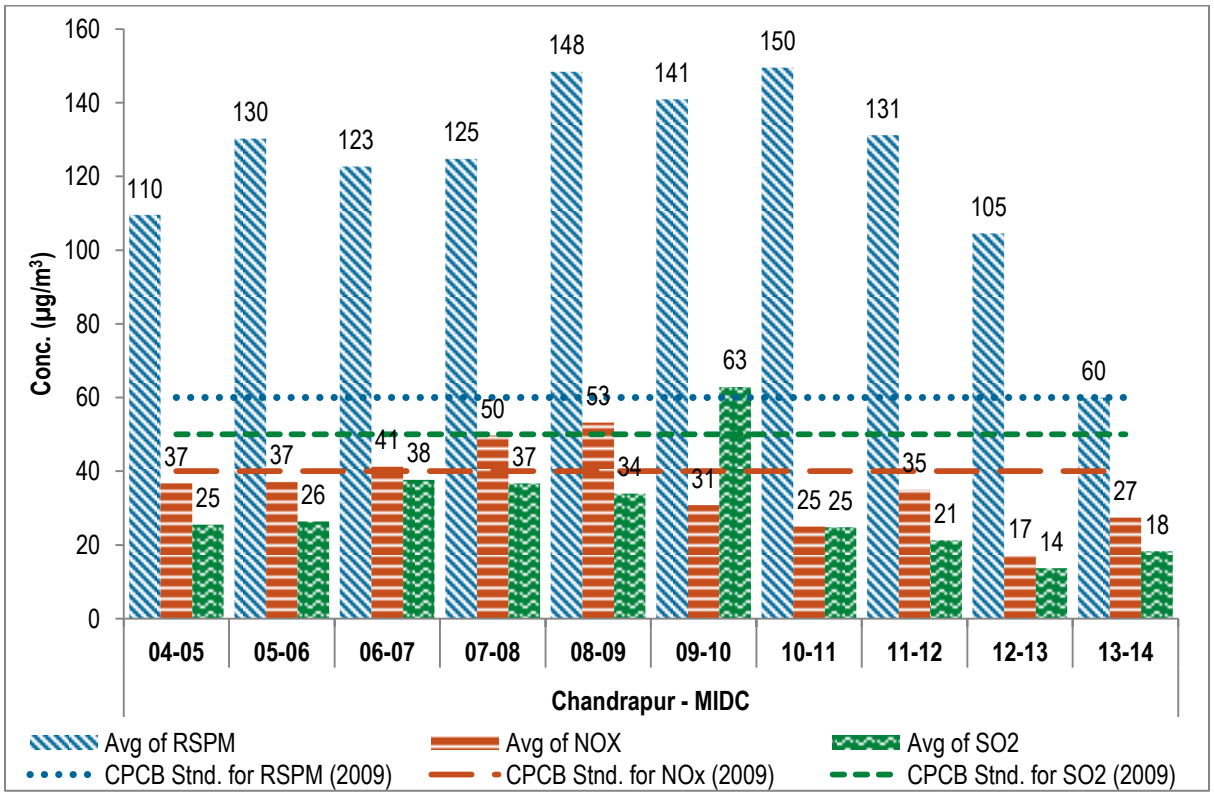


Figure No. 70: Annual average trend of SO_2, NOx and RSPM at Chandrapur -MIDC

Chandrapur - Chandrapur - SRO MPCB

Table No. 57: Data for monthly average reading recorded at Chandrapur - SRO MPCB

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	*10*	67	22	14
May	*10*	44	25	24
Jun	*8*	48	32	19
Jul	*10*	46	20	16
Aug	*9*	44	20	11
Sep	*10*	45	21	34
Oct	*9*	29	35	0
Nov	*8*	49	26	2
Dec				
Jan				
Feb	*26*	115	33	1
Mar	*16*	75	20	0
	Total N	% of exceedence of daily readings for 2013-14		
	116	20.7	0.9	0.9

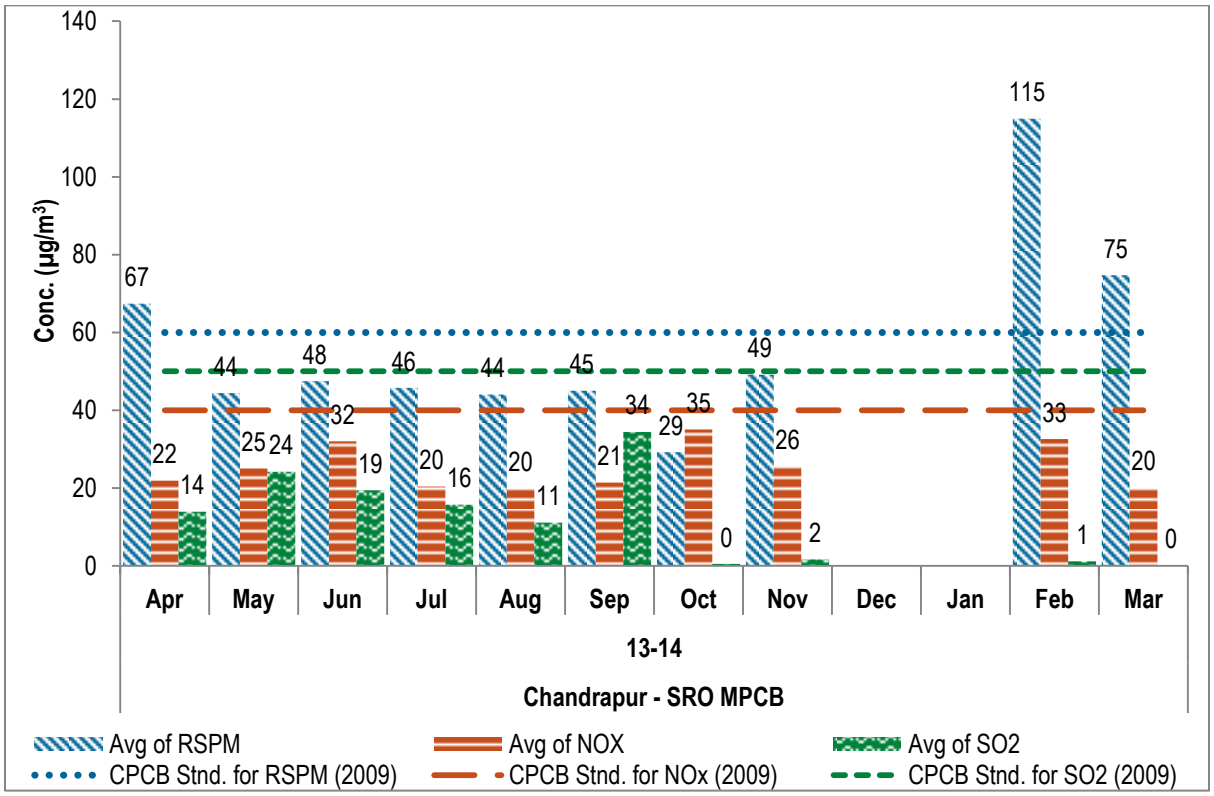


Figure No. 71: Monthly average reading recorded at Chandrapur –SRO MPCB

Table No. 58: Data for annual average trend of RSPM, NO_X and SO_2 at Chandrapur - SRO MPCB

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
04-05	*70*	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

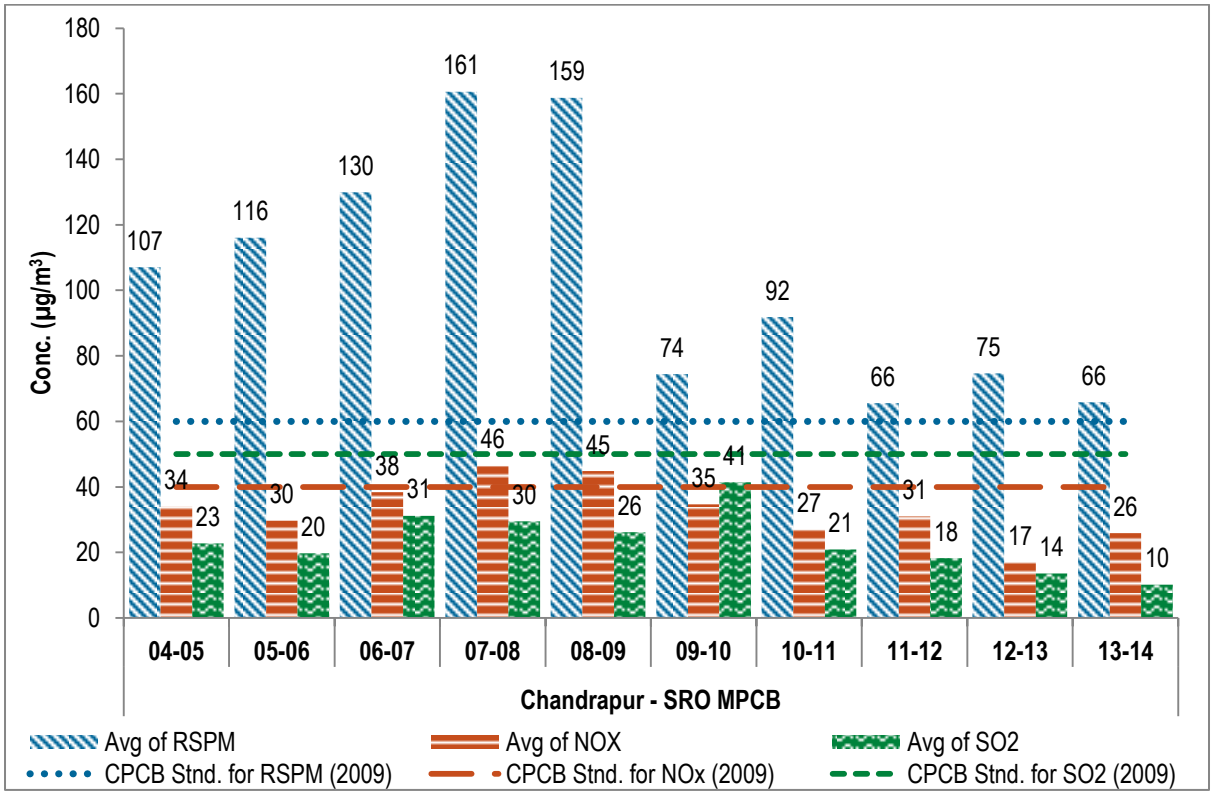


Figure No. 72: Annual average trend of SO_2, NOx and RSPM at Chandrapur –SRO MPCB

Chandrapur - Tadali MIDC

Table No. 59: Data for monthly average reading recorded at Tadali MIDC

FY	N		Monthly average (µg/m³)		
2013-14			RSPM	NO_X	SO_2
Apr	*8*		277	7	10
May	*10*		217	9	14
Jun	*8*		188	11	11
Jul	*8*		162	19	8
Aug	*6*		78	7	10
Sep	*8*		88	10	17
Oct	*8*		160	18	4
Nov	*8*		207	27	0
Dec	*8*		204	25	4
Jan	*8*		296	17	0
Feb	*8*		233	21	1
Mar					
		Total N	% of exceedence of daily readings for 2013-14		
	88	81.8	0.0	0.0	

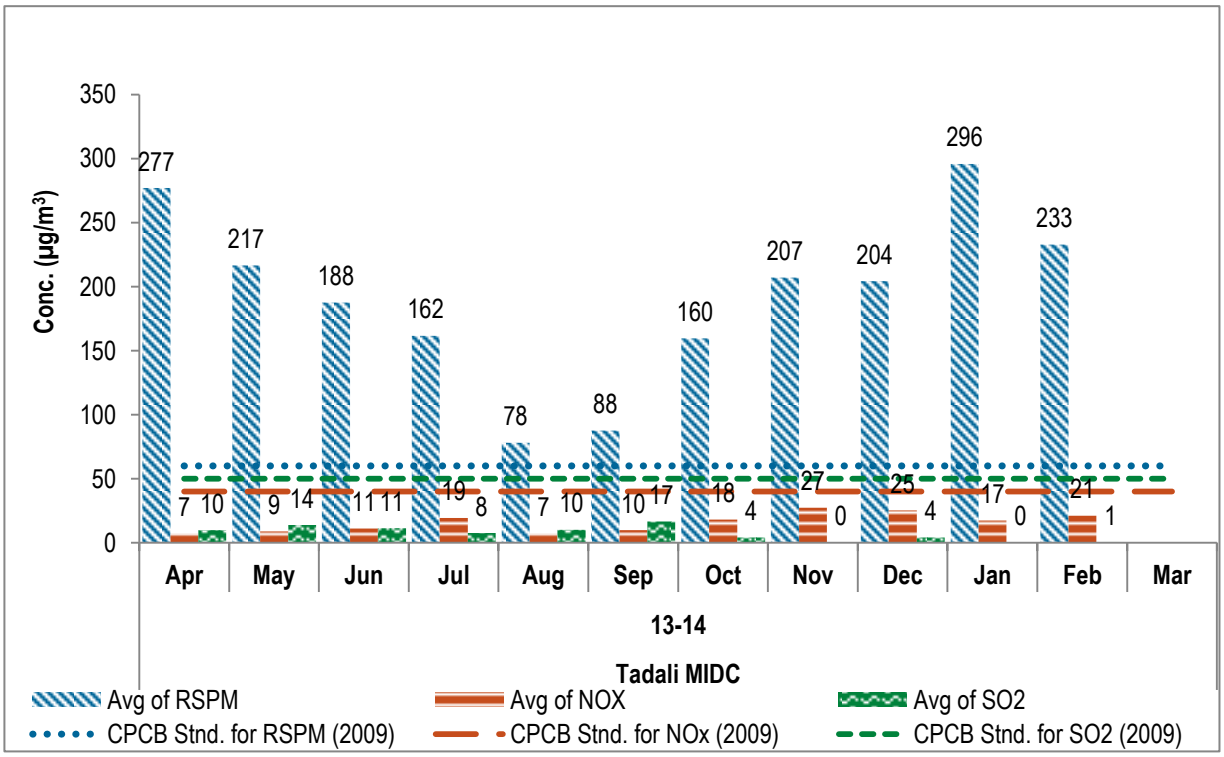


Figure No. 73: Monthly average reading recorded at Taladi MIDC

Table No. 60: Data for annual average trend of RSPM, NO_X and SO_2 at Tadali MIDC

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

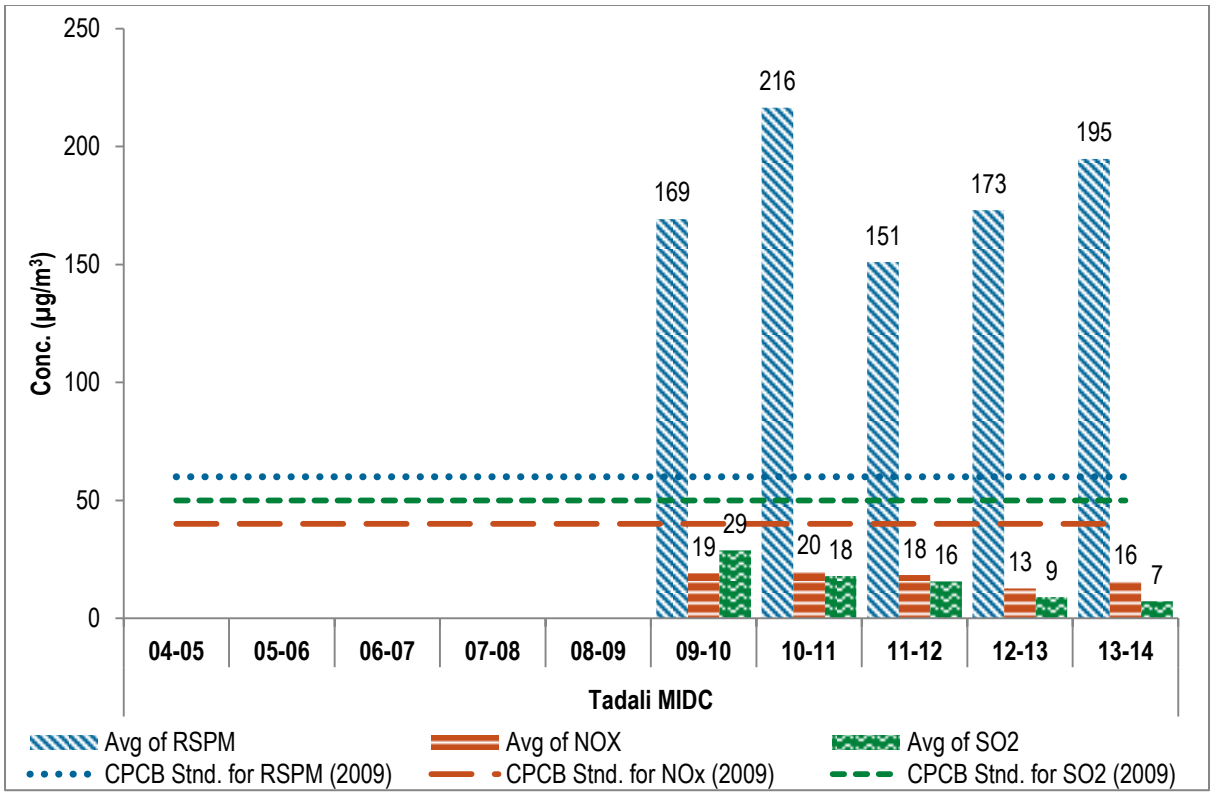


Figure No. 74: Annual average trend of SO_2, NOx and RSPM at Taladi MIDC

Chandrapur - Ballarshah

Table No. 61: Data for monthly average reading recorded at Ballarshah

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	*8*	171	35	13
May	*10*	191	26	16
Jun	*6*	85	34	26
Jul	*8*	92	14	14
Aug	*6*	35	19	15
Sep	*8*	79	24	20
Oct	*8*	93	37	0
Nov	*6*	182	38	1
Dec	*8*	177	53	0
Jan	*6*	194	48	0
Feb	*8*	159	82	2
Mar				
	Total N	% of exceedence of daily readings for 2013-14		
	82	63.4	8.5	0.0

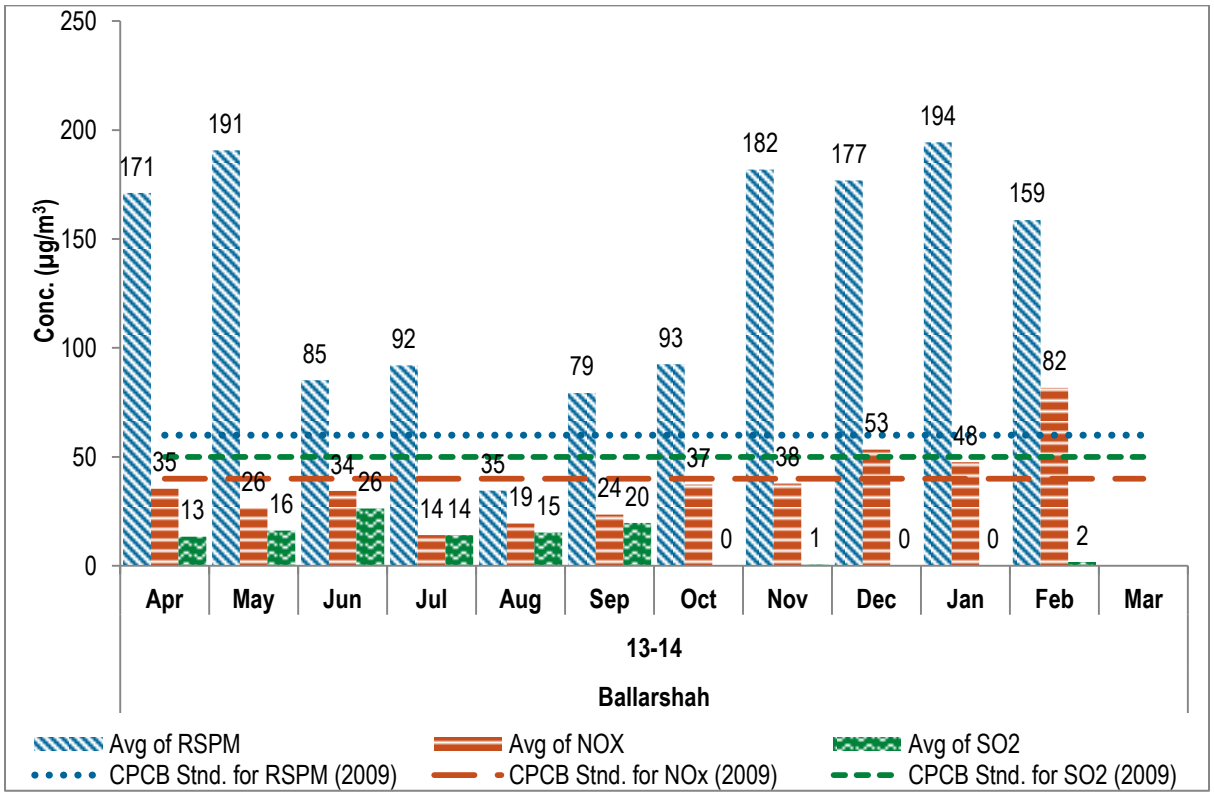


Figure No. 75: Monthly average reading recorded at Ballarshah

Table No. 62: Data for annual average trend of RSPM, NO_X and SO_2 at Ballarshah

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

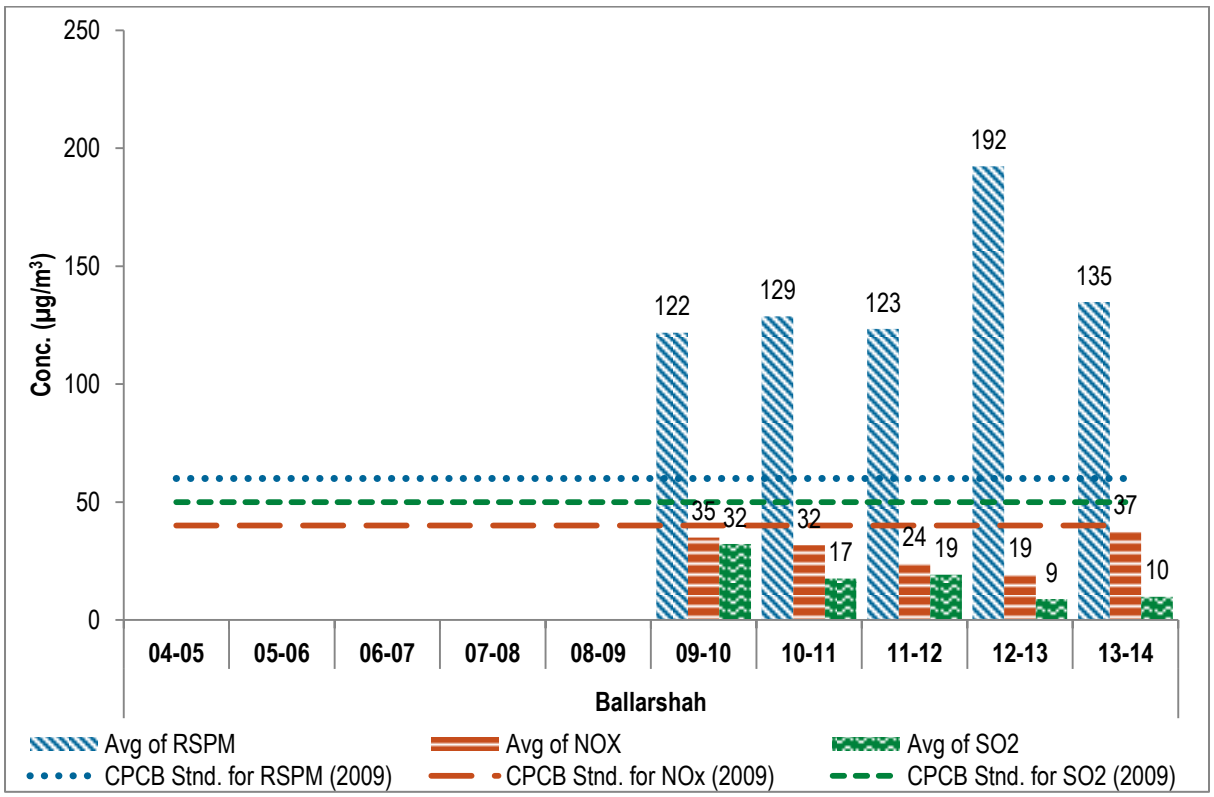


Figure No. 76: Annual average trend of SO_2, NOx and RSPM at Ballarshah

Chandrapur - Rajura

Table No. 63: Data for monthly average reading recorded at Rajura

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	6	187	22	12
May	6	217	25	17
Jun	4	131	26	26
Jul	8	52	13	14
Aug	6	73	15	24
Sep	8	77	32	25
Oct	8	107	32	2
Nov	6	234	32	0
Dec	8	221	36	2
Jan	6	169	53	1
Feb	8	162	56	1
Mar				
	Total N	% of exceedence of daily readings for 2013-14		
	74	67.6	1.4	0.0

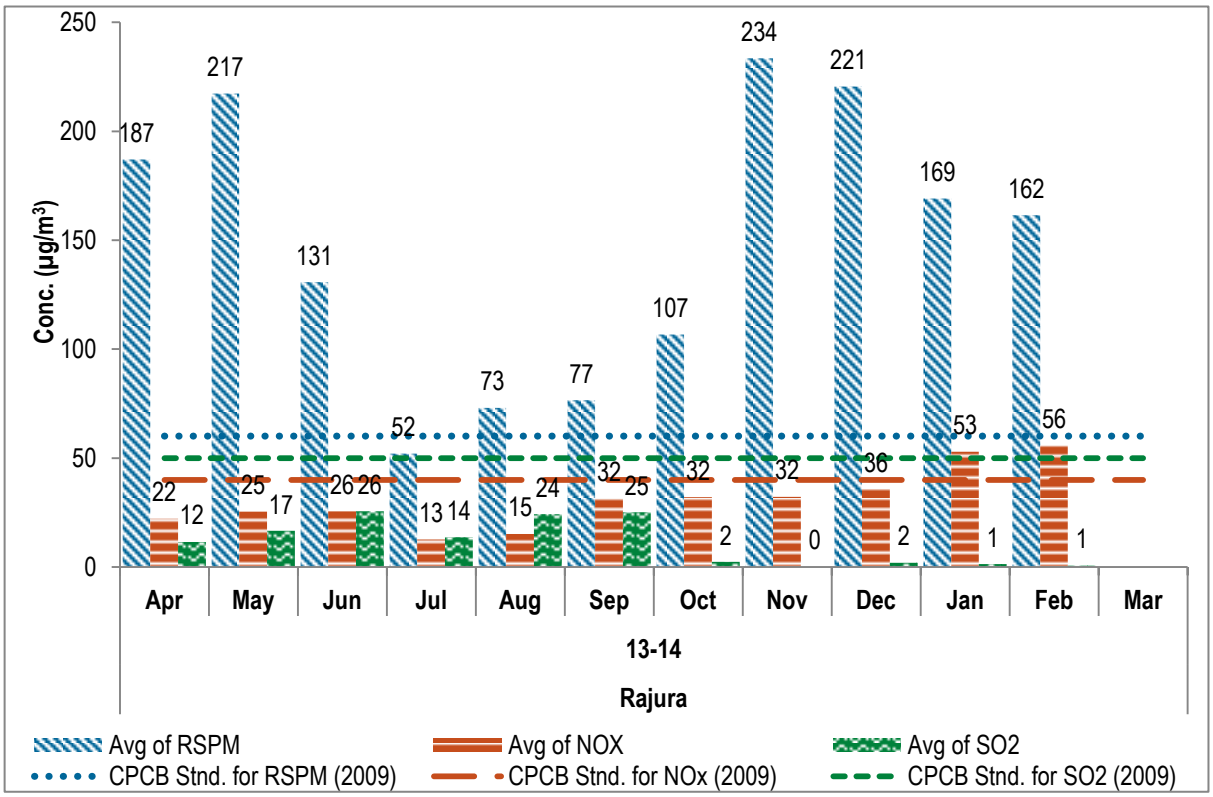


Figure No. 77: Monthly average reading recorded at Rajura

Table No. 64: Data for annual average trend of RSPM, NO_X and SO_2 at Rajura

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

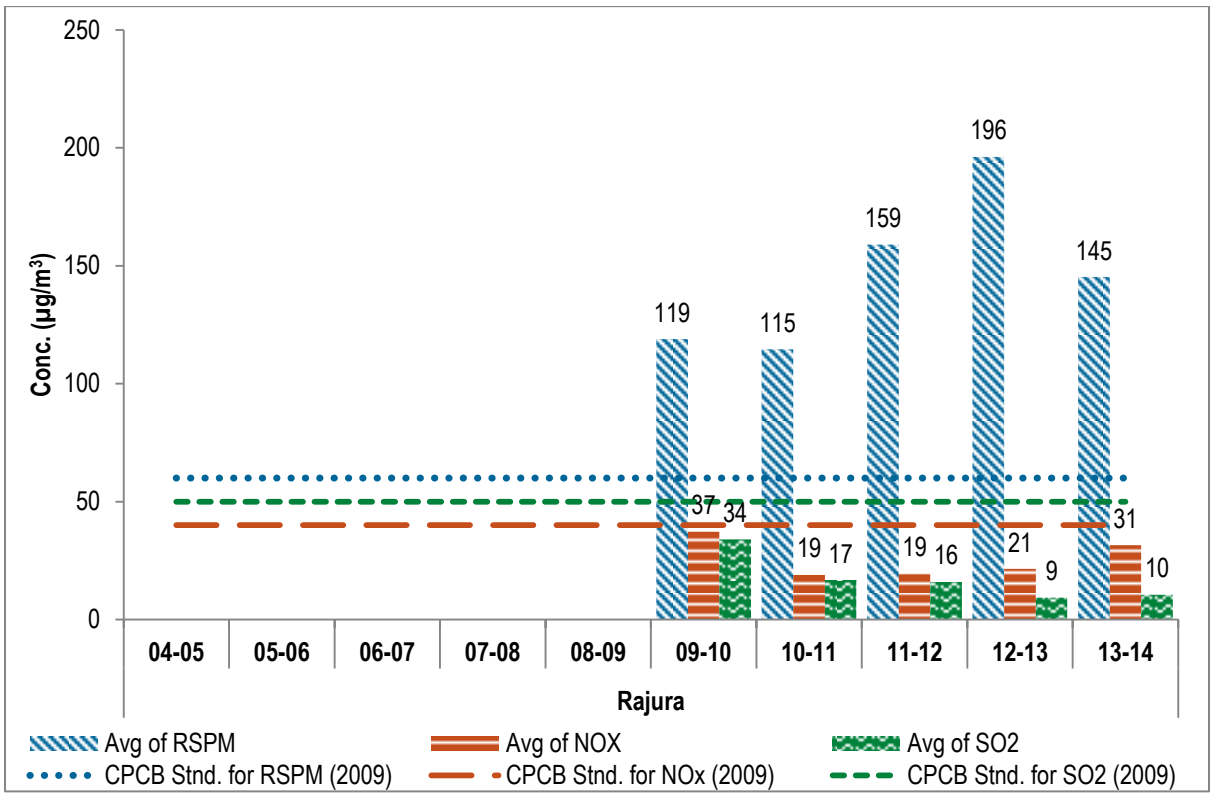


Figure No. 78: : Annual average trend of SO_2, NOx and RSPM at Rajura

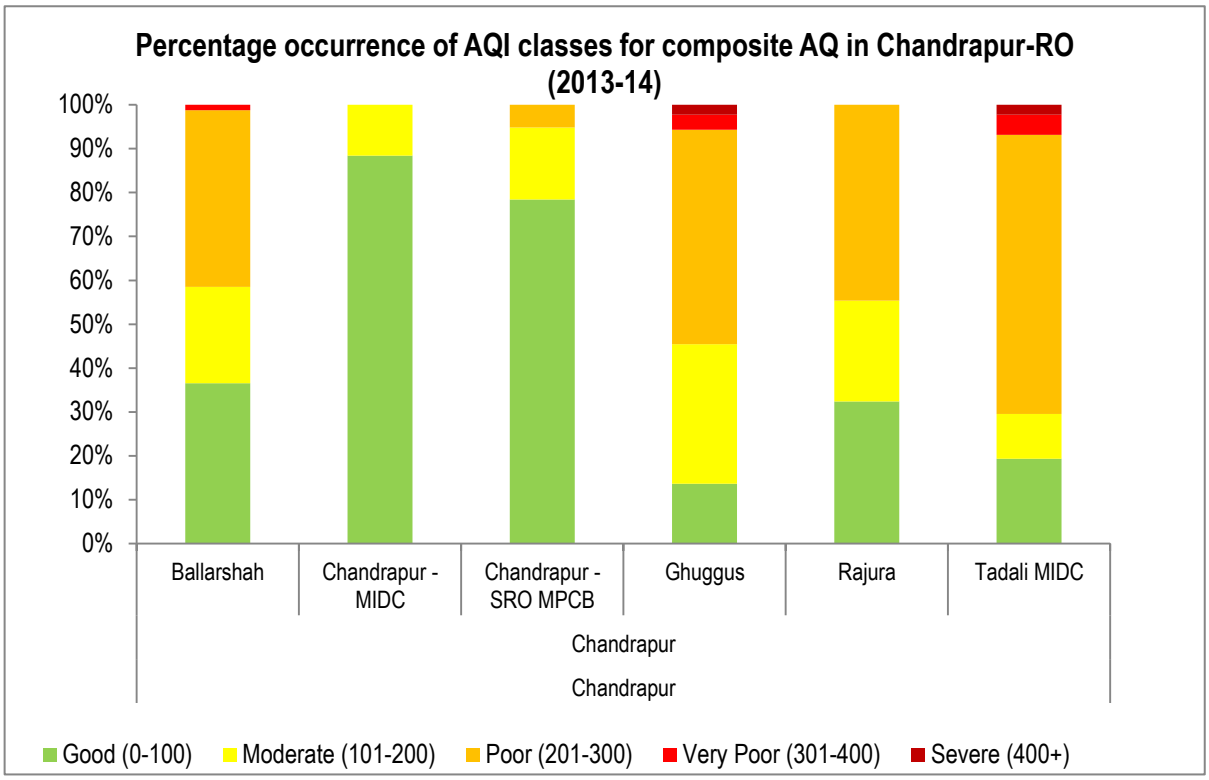
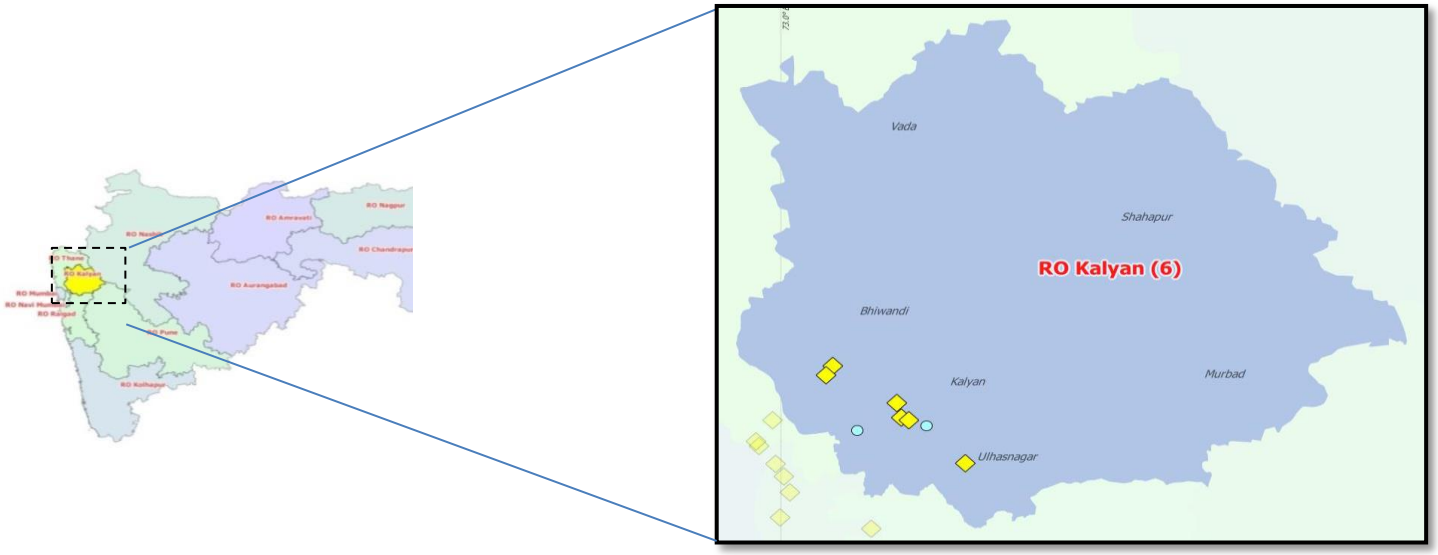


Figure No. 79: Percentage occurrence of AQI classes for composite AQ in Chandrapur-RO (2013-14)

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. 65: Data for monthly average reading recorded at Ambernath

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	9	82	56	34
May	9	71	47	33
Jun	8	75	43	25
Jul	8	75	40	20
Aug	9	85	44	20
Sep	9	52	30	18
Oct	9	67	42	20
Nov	8	107	57	20
Dec	9	156	86	21
Jan	9	208	121	83
Feb	8	248	142	50
Mar				
	Total N	% of exceedence of daily readings for 2013-14		
	95	36.8	18.9	3.2

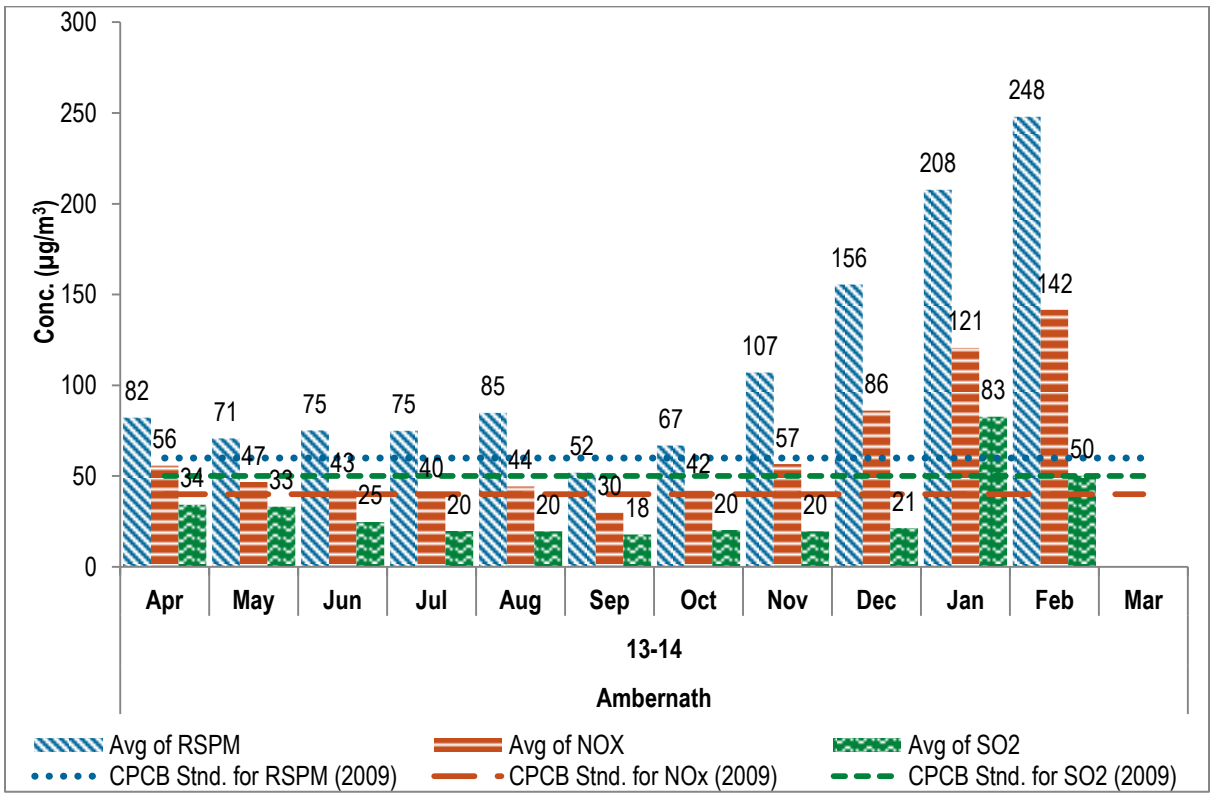


Figure No. 80: Monthly average reading recorded at Ambernath

Table No. 66: Data for annual average trend of RSPM, NO_X and SO_2 at Ambernath

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
04-05	*63*	97	36	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

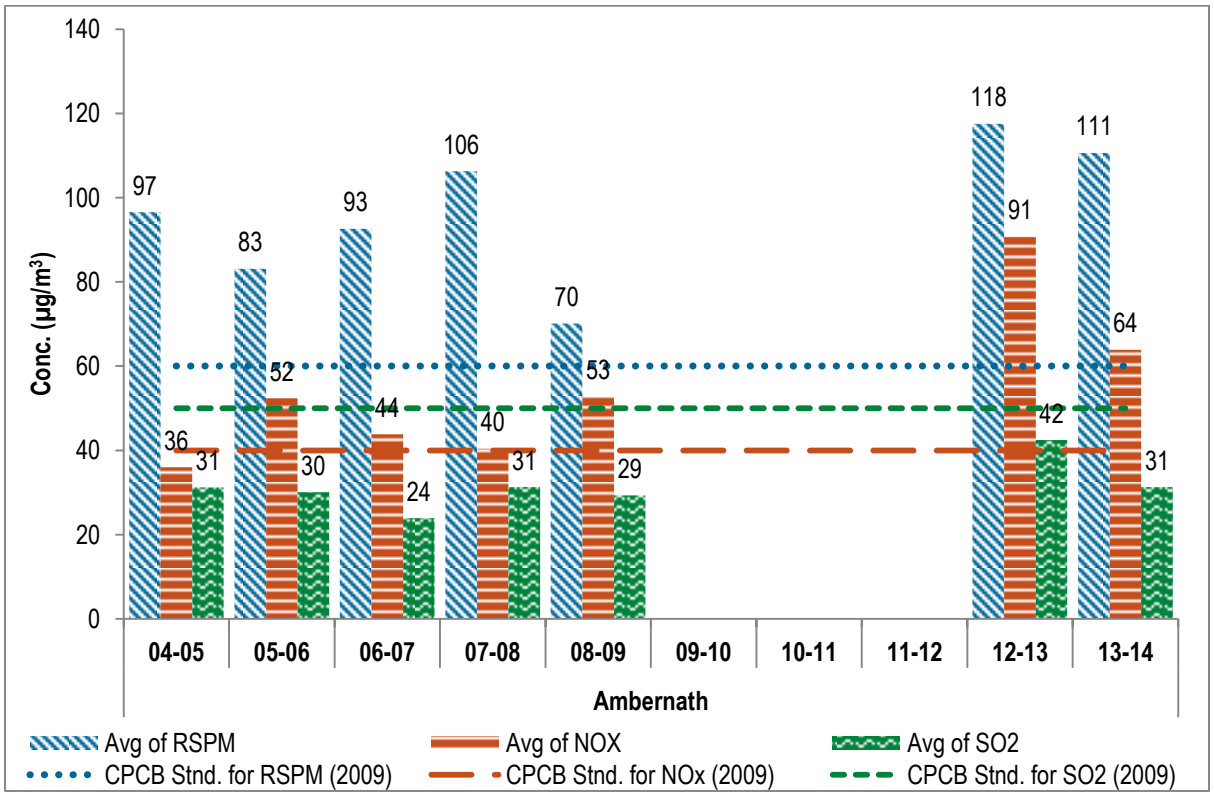


Figure No. 81: Annual average trend of SO_2, NOx and RSPM at Ambernath

Badlapur - Badlapur - BIWA House

Table No. 67: Data for monthly average reading recorded at Badlapur - BIWA House

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	9	90	61	33
May	9	66	43	37
Jun	5	76	41	25
Jul	6	72	38	23
Aug	8	74	41	21
Sep	8	59	28	23
Oct	9	56	35	20
Nov	7	87	44	23
Dec	9	137	36	32
Jan	9	187	95	81
Feb	8	135	64	50
Mar				
Total N		% of exceedence of daily readings for 2013-14		
87		33.3	12.6	8.0

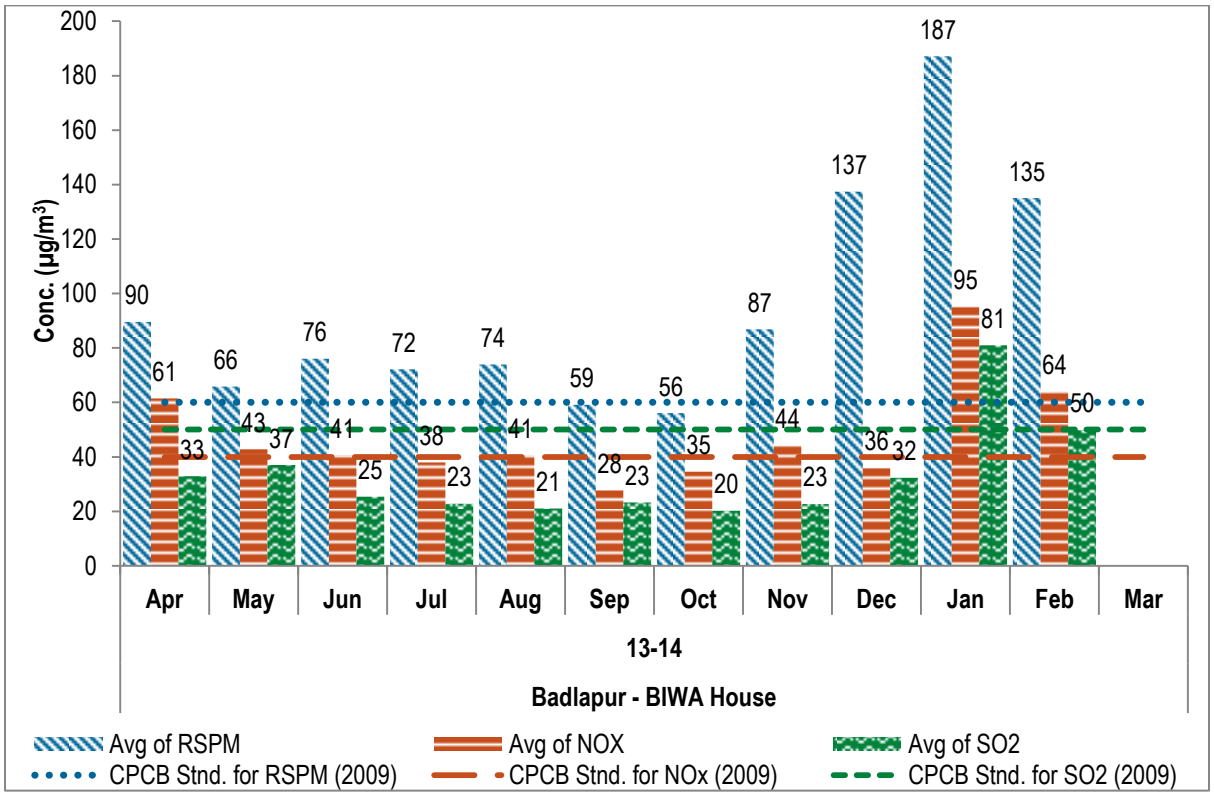


Figure No. 82: Monthly average reading recorded at Badlapur –BIWA House

Table No. 68: Data for annual average trend of RSPM, NO_X and SO_2 at Badlapur - BIWA House

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

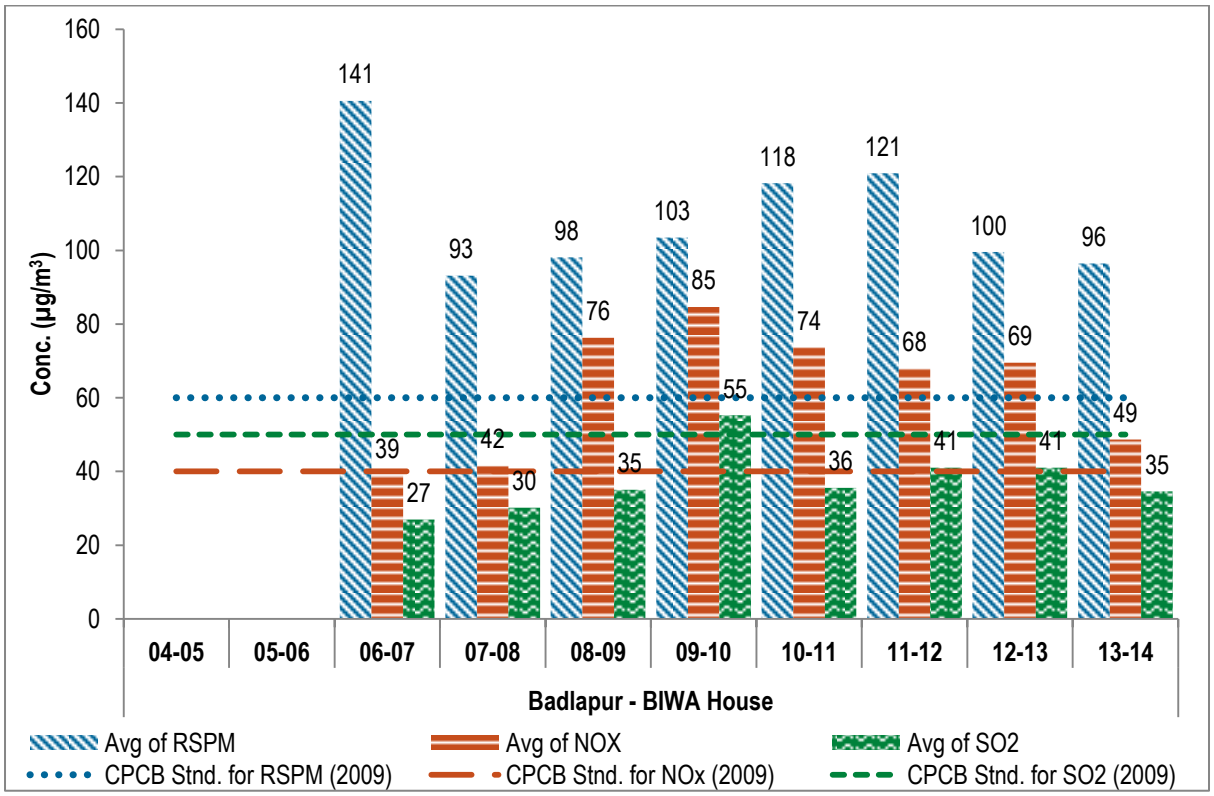


Figure No. 83: Annual average trend of SO_2, NOx and RSPM at Badlapur –BIWA House

Bhiwandi - I.G.M. Hospital

Table No. 69: Data for monthly average reading recorded at I.G.M. Hospital

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	*8*	68	51	36
May	*10*	67	47	35
Jun				
Jul	*8*	57	31	24
Aug	*8*	60	34	24
Sep	*8*	64	35	26
Oct	*9*	85	43	32
Nov	*8*	85	43	33
Dec	*8*	83	43	33
Jan	*8*	70	40	33
Feb	*8*	78	29	23
Mar	*9*	78	39	32
	Total N	% of exceedence of daily readings for 2013-14		
	92	0.0	0.0	0.0

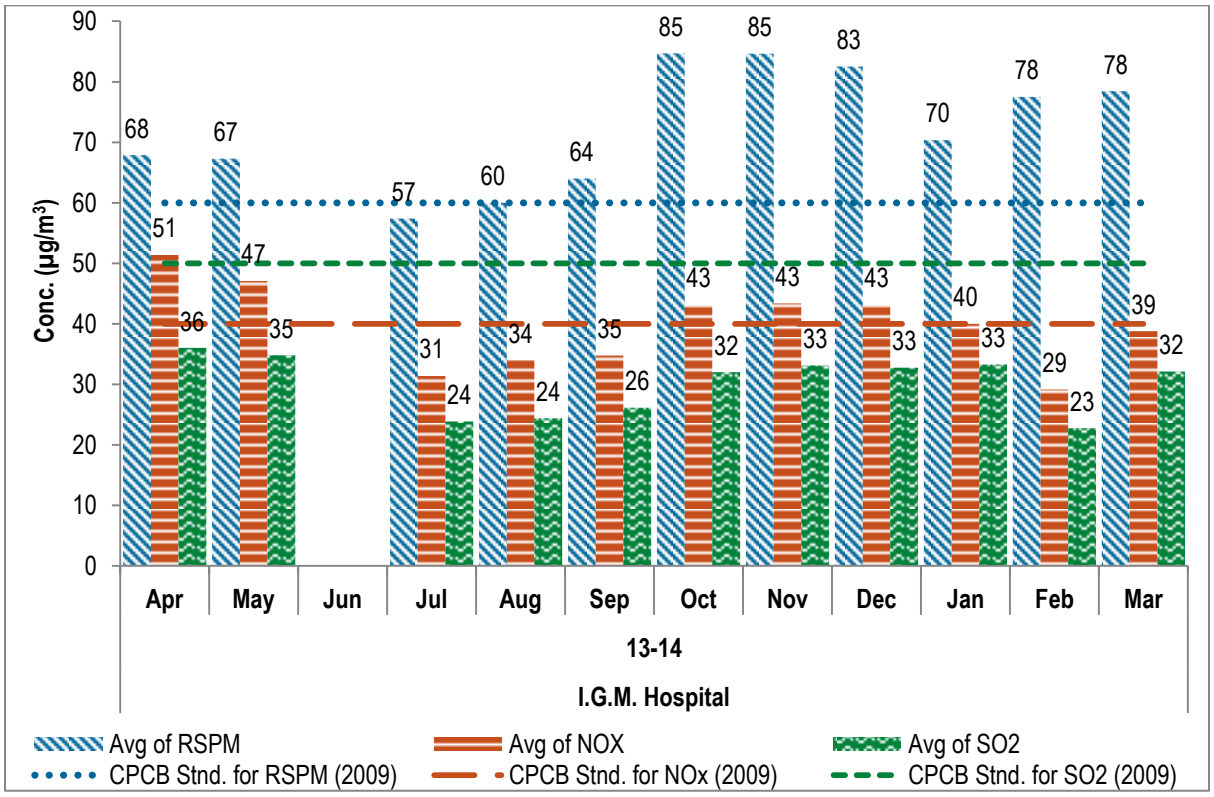


Figure No. 84: Monthly average reading recorded at IGM Hospital -Bhiwandi

Table No. 70: Data for annual average trend of RSPM, NO_X and SO_2 at I.G.M. Hospital

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

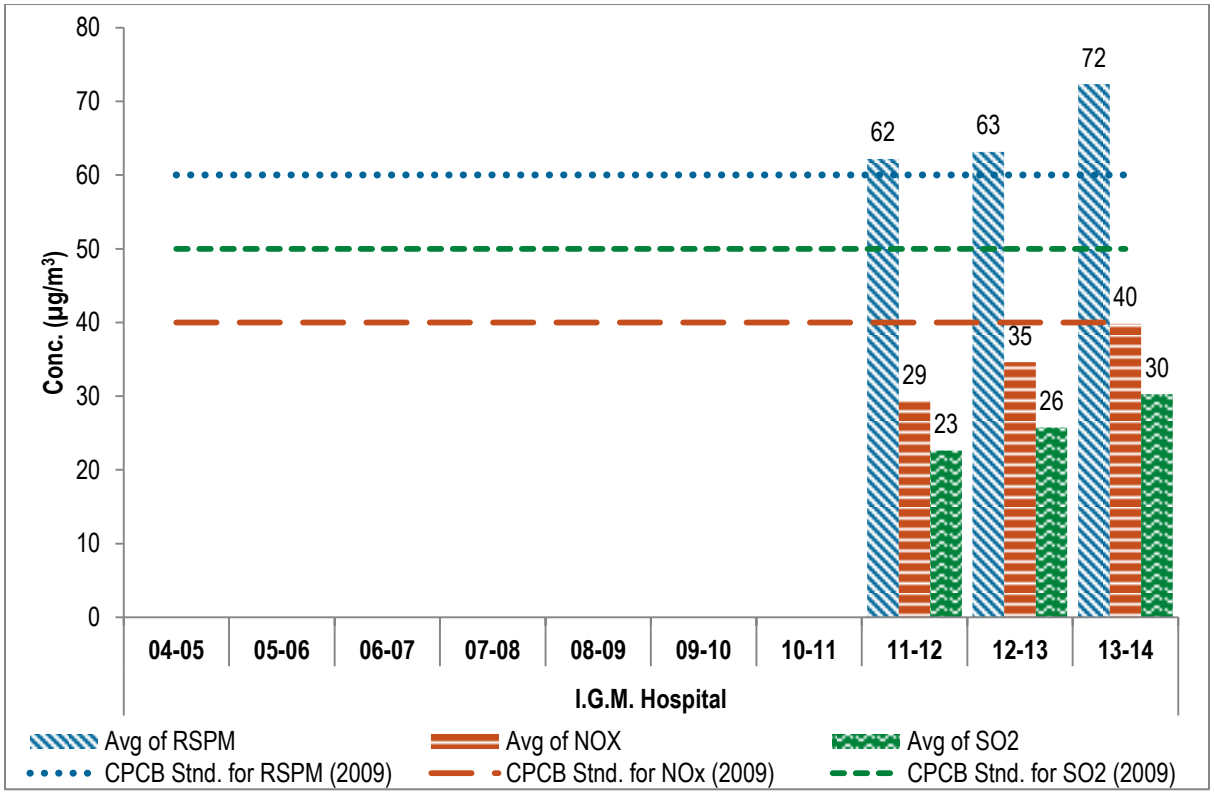


Figure No. 85: Annual average trend of SO_2, NOx and RSPM at IGM Hospital -Bhiwandi

Bhiwandi - Prematai hall

Table No. 71: Data for monthly average reading recorded at Prematai hall

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	*10*	67	47	35
May	*8*	66	34	25
Jun				
Jul	*9*	49	23	17
Aug	*8*	59	35	23
Sep	*10*	70	38	27
Oct	*8*	68	44	35
Nov	*8*	70	44	36
Dec	*8*	70	45	36
Jan	*10*	80	42	33
Feb	*8*	47	23	23
Mar	*10*	80	42	33
	Total N	**% of exceedence of daily readings for 2013-14**		
	97	0.0	0.0	0.0

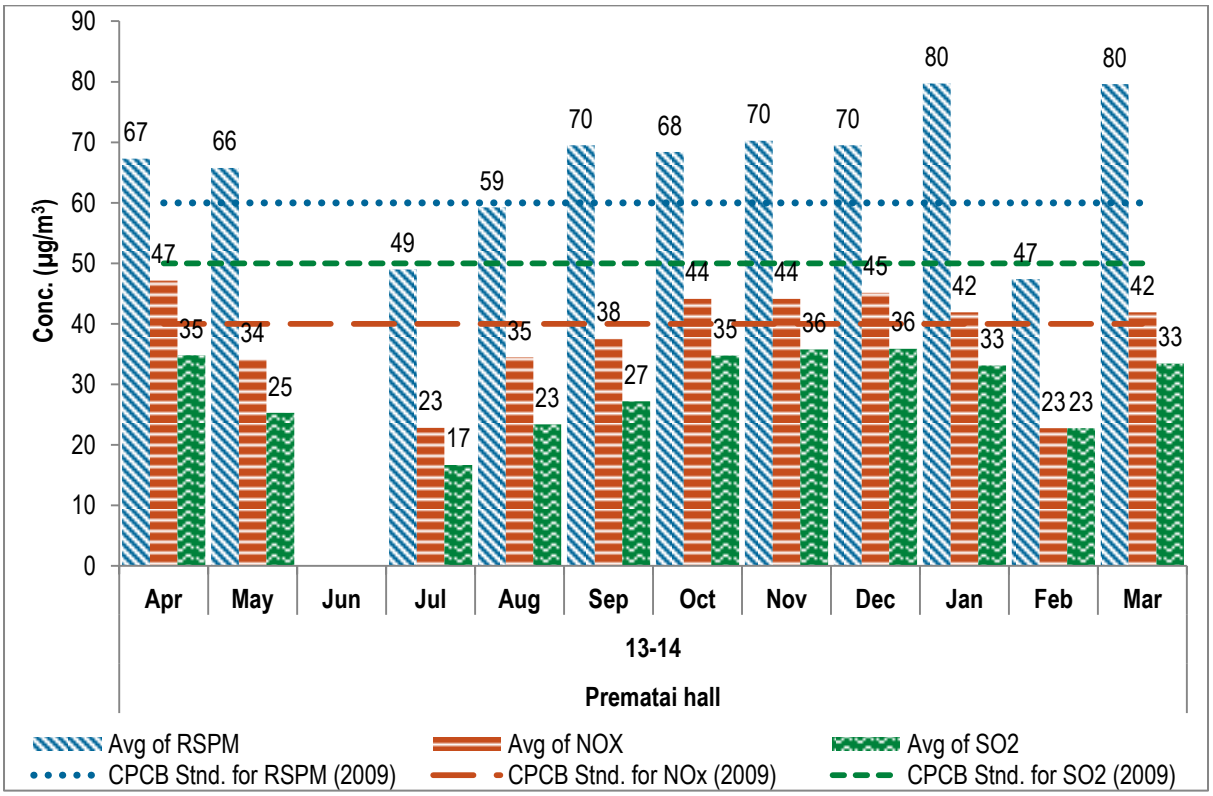


Figure No. 86: Monthly average reading recorded at Prematai hall -Bhiwandi

Table No. 72: Data for annual average trend of RSPM, NO_X and SO_2 at Prematai hall

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

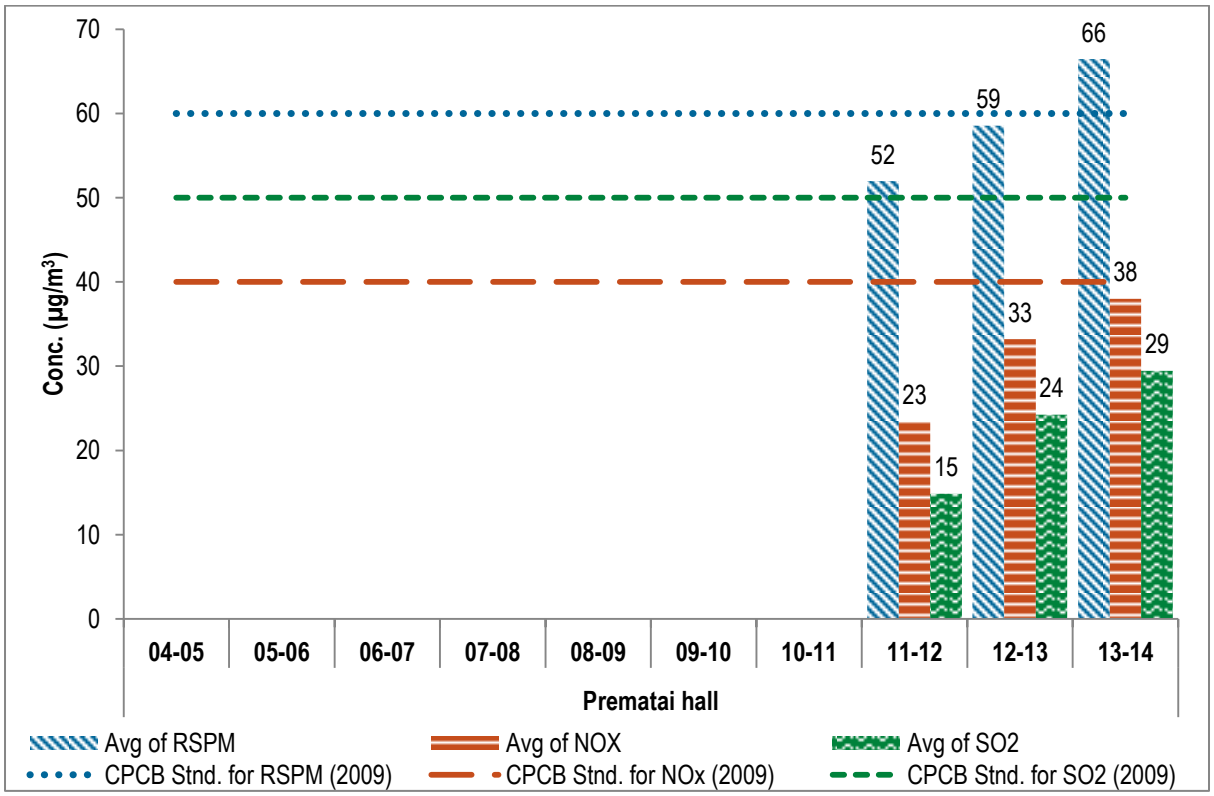


Figure No. 87: Annual average trend of SO_2, NOx and RSPM at Prematai hall -Bhiwandi

Dombivali

Table No. 73: Data for monthly average reading recorded at Dombivali

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	9	101	70	36
May	9	72	48	41
Jun	8	78	46	30
Jul	8	73	39	25
Aug	8	80	45	23
Sep	8	50	35	26
Oct	9	95	59	25
Nov	7	111	59	22
Dec	9	111	59	22
Jan	9	231	135	85
Feb	6	243	139	49
Mar				
Total N		% of exceedence of daily readings for 2013-14		
90		37.8	24.4	4.4

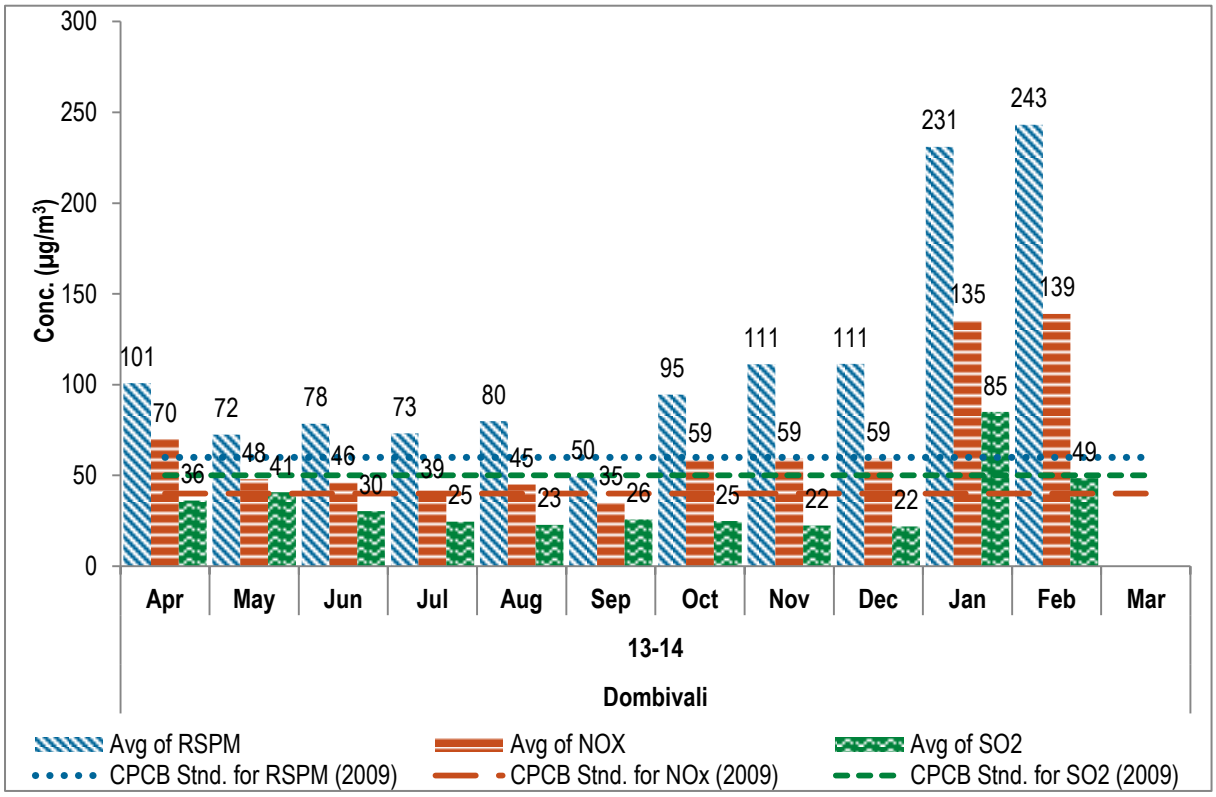


Figure No. 88: Monthly average reading recorded at Dombivali

Table No. 74: Data for annual average trend of RSPM, NO_X and SO_2 at Dombivali

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
04-05	*55*	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

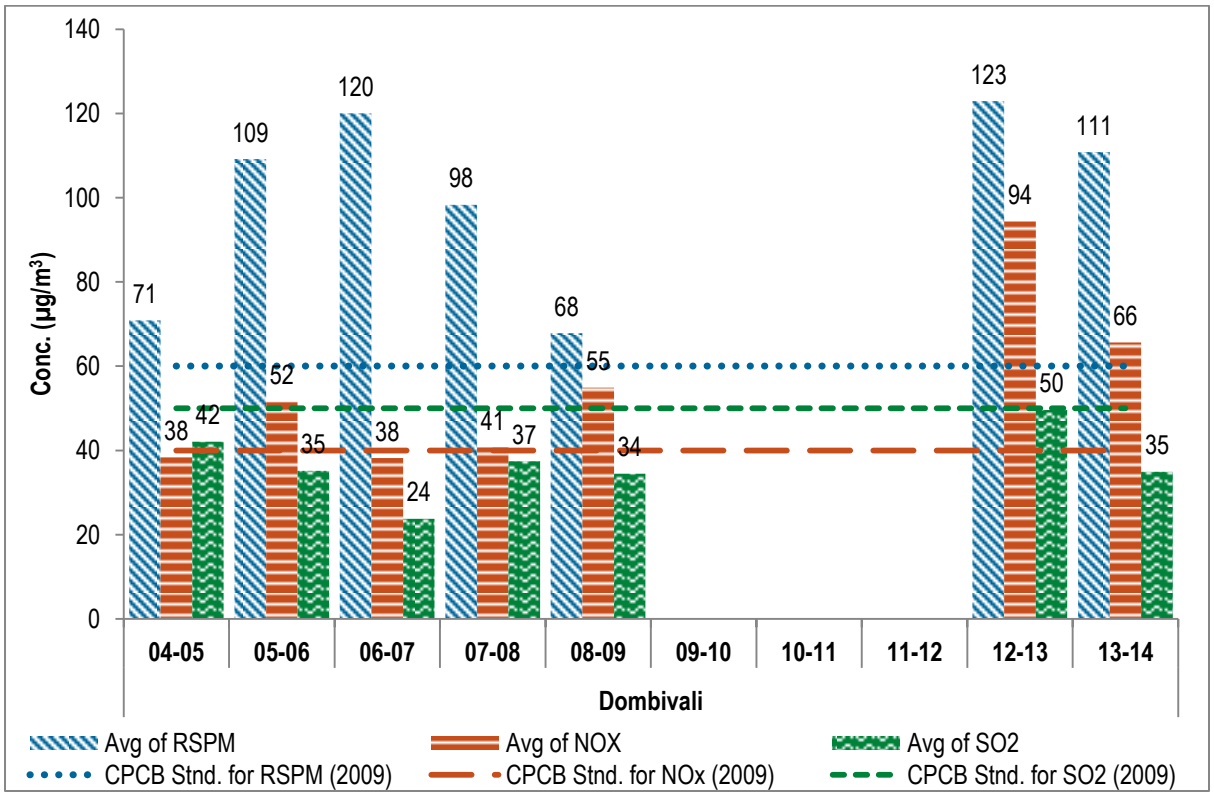


Figure No. 89: Annual average trend of SO_2, NOx and RSPM at Dombivali

Dombivali - MIDC Office Dombivali

Table No. 75: Data for monthly average reading recorded at MIDC Office Dombivali

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	9	81	55	34
May				
Jun	9	67	36	32
Jul	7	75	44	22
Aug	8	66	37	22
Sep	9	64	38	19
Oct	9	55	30	23
Nov	8	106	56	22
Dec	9	135	73	19
Jan	9	201	115	77
Feb	8	237	135	50
Mar				
Total N		% of exceedence of daily readings for 2013-14		
85		36.5	21.2	5.9

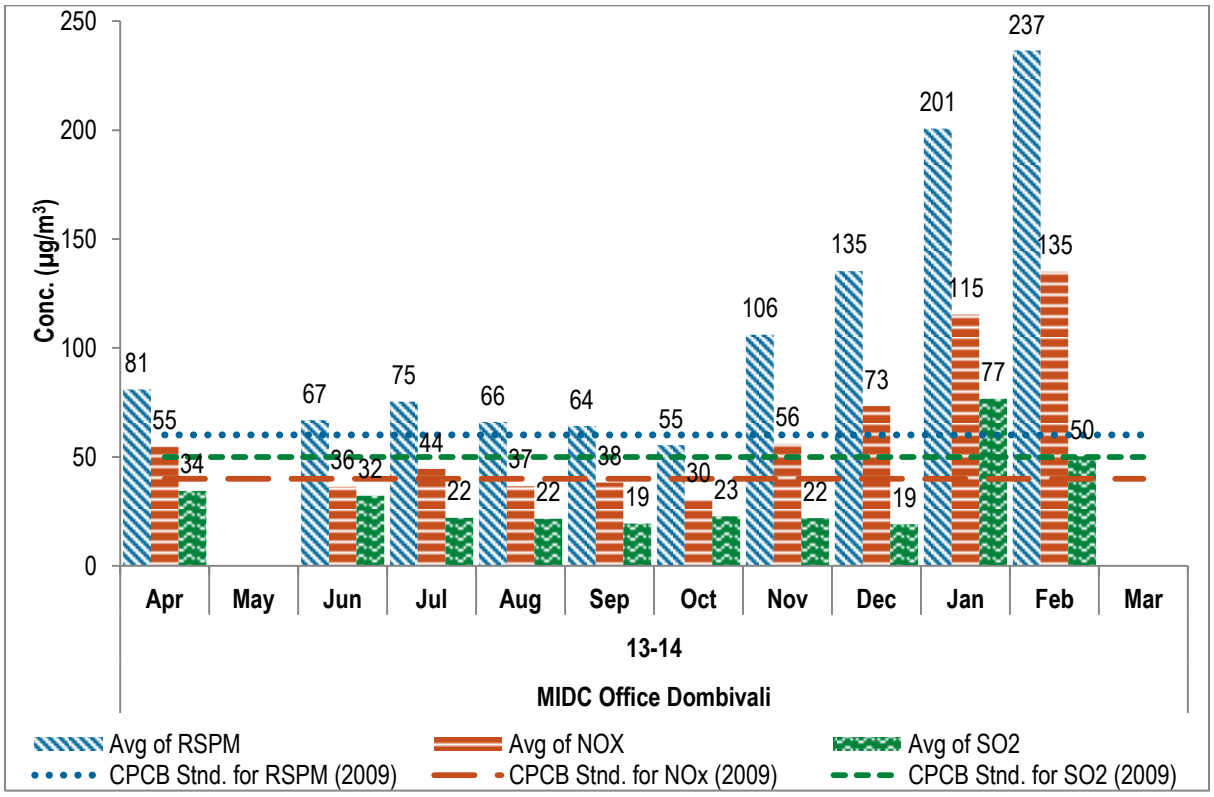


Figure No. 90: Monthly average reading recorded at MIDC Office -Dombivali

Table No. 76: Data for annual average trend of RSPM, NO_X and SO_2 at MIDC Office DOmbivali

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

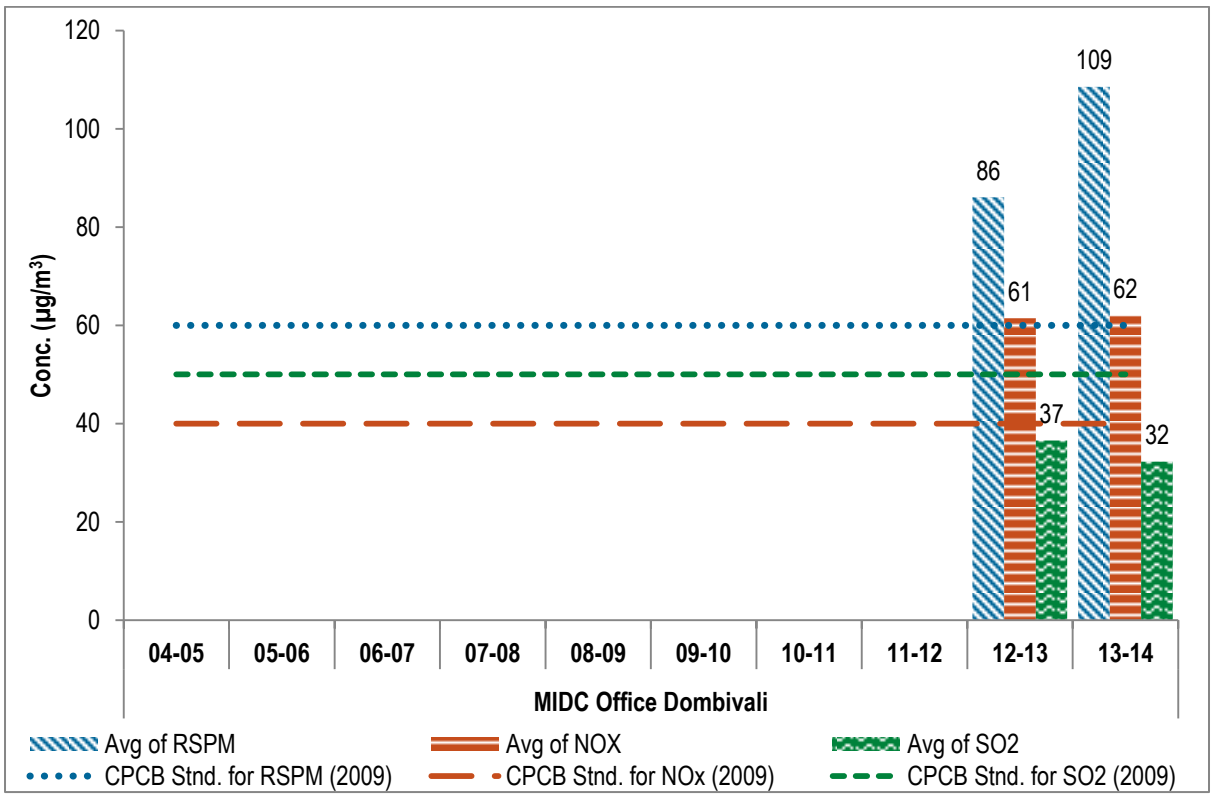


Figure No. 91: Annual average trend of SO_2, NOx and RSPM at MIDC Office -Dombivali

Kalyan - MPCB RO Kalyan office

Table No. 77: Data for monthly average reading recorded at MPCB RO Kalyan office

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	*8*	66	34	25
May	*8*	68	51	36
Jun				
Jul	*10*	59	32	24
Aug	*8*	63	33	26
Sep	*10*	67	42	36
Oct				
Nov	*10*	83	38	35
Dec				
Jan				
Feb	*8*	71	34	25
Mar	*8*	76	42	35
Total N		**% of exceedence of daily readings for 2013-14**		
70		0.0	0.0	0.0

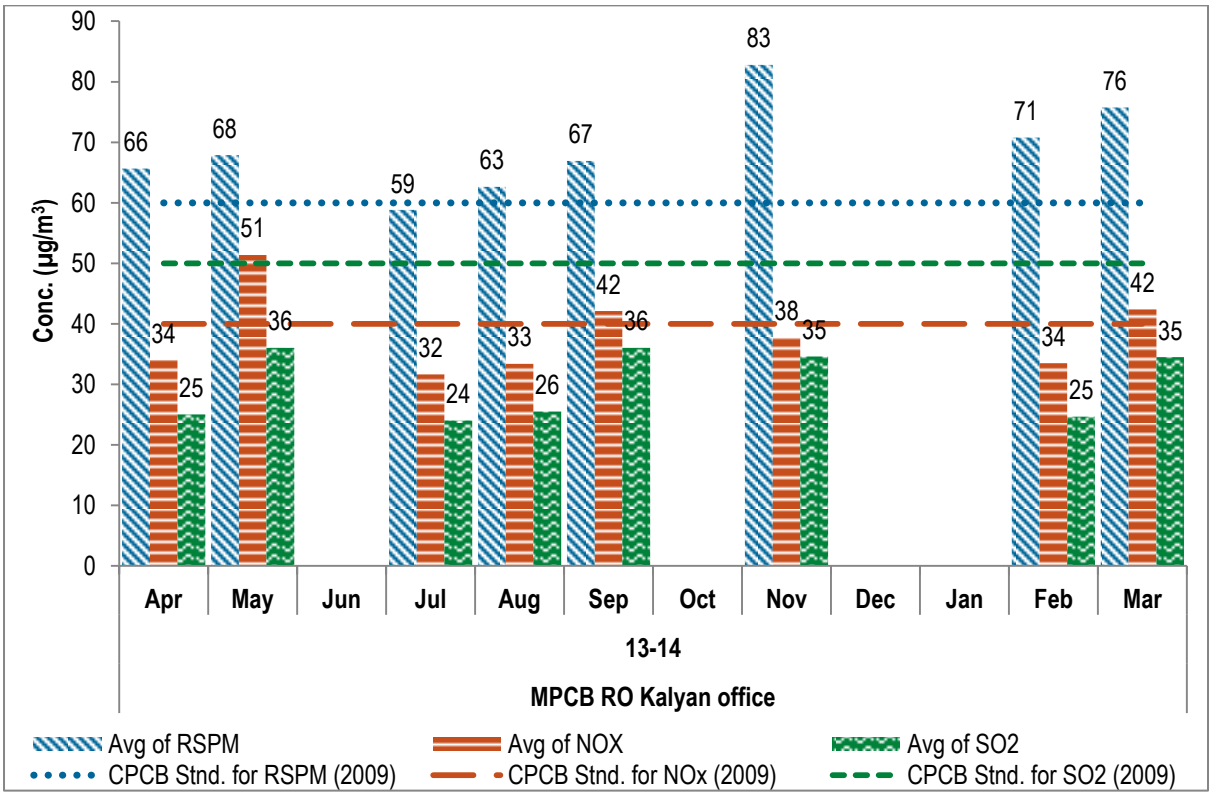


Figure No. 92: Monthly average reading recorded at MPCB RO Kalyan Office

Table No. 78: Data for annual average trend of RSPM, NO_X and SO_2 at MPCB RO Kalyan office

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

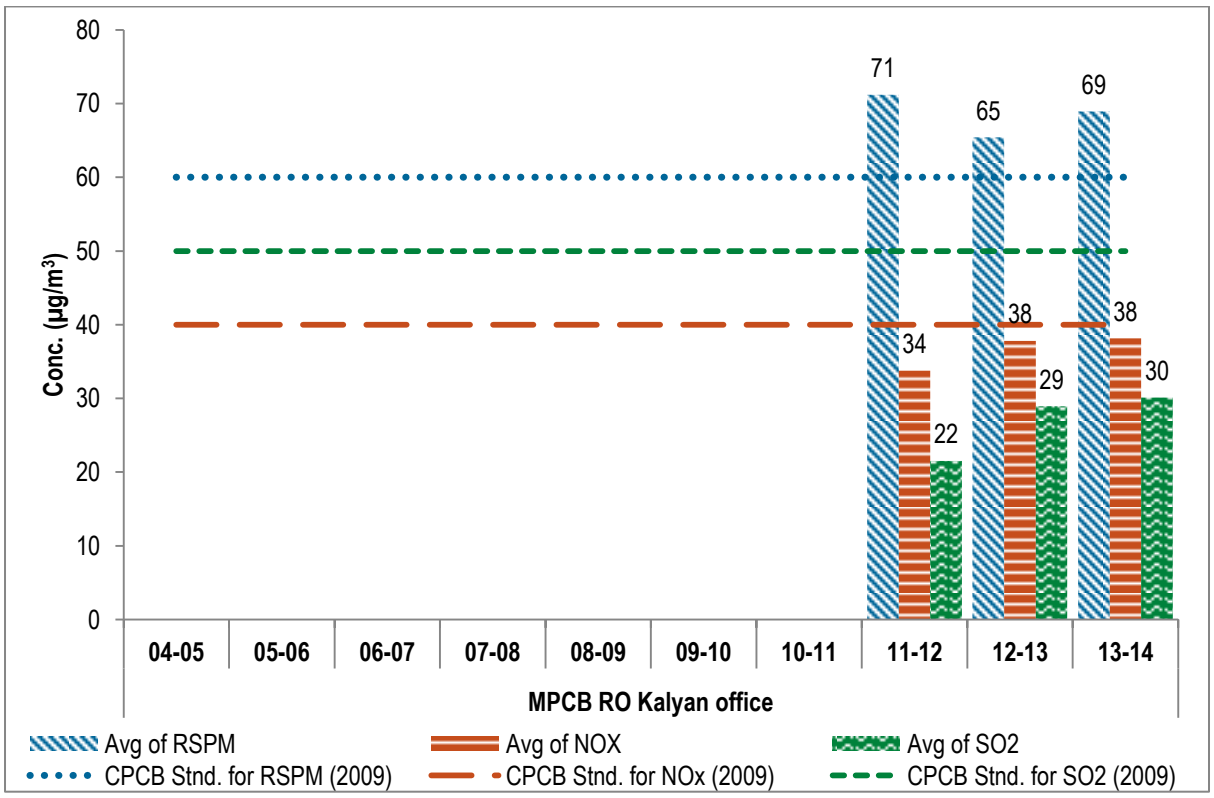


Figure No. 93: Annual average trend of SO_2, NOx and RSPM at MPCB RO Kalyan Office

Ulhasnagar - Smt. CHM College Campus

Table No. 79: Data for monthly average reading recorded at Smt. CHM College Campus, Ulhasnagar

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	*8*	70	46	36
May	*9*	47	29	28
Jun	*8*	59	31	20
Jul	*8*	61	35	19
Aug	*8*	55	30	19
Sep	*9*	48	24	18
Oct	*9*	54	31	21
Nov	*8*	65	31	20
Dec	*13*	72	38	20
Jan	*9*	105	56	43
Feb	*8*	111	59	35
Mar				
Total N		% of exceedence of daily readings for 2013-14		
97		11.3	1.0	0.0

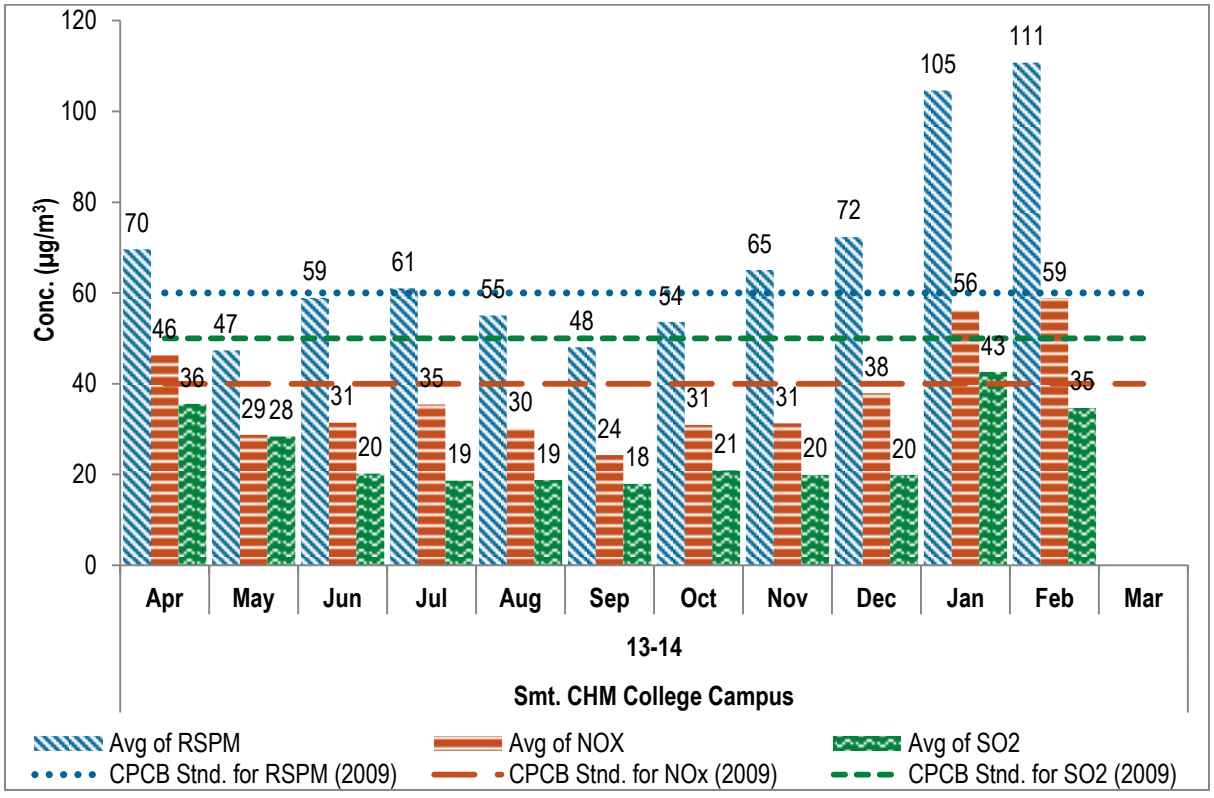


Figure No. 94: Monthly average reading recorded at -Smt.CHM Collage Campus, Ulhasnagar

Table No. 80: Data for annual average trend of RSPM, NO_X and SO_2 at Smt. CHM College Campus, Ulhasnagar

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

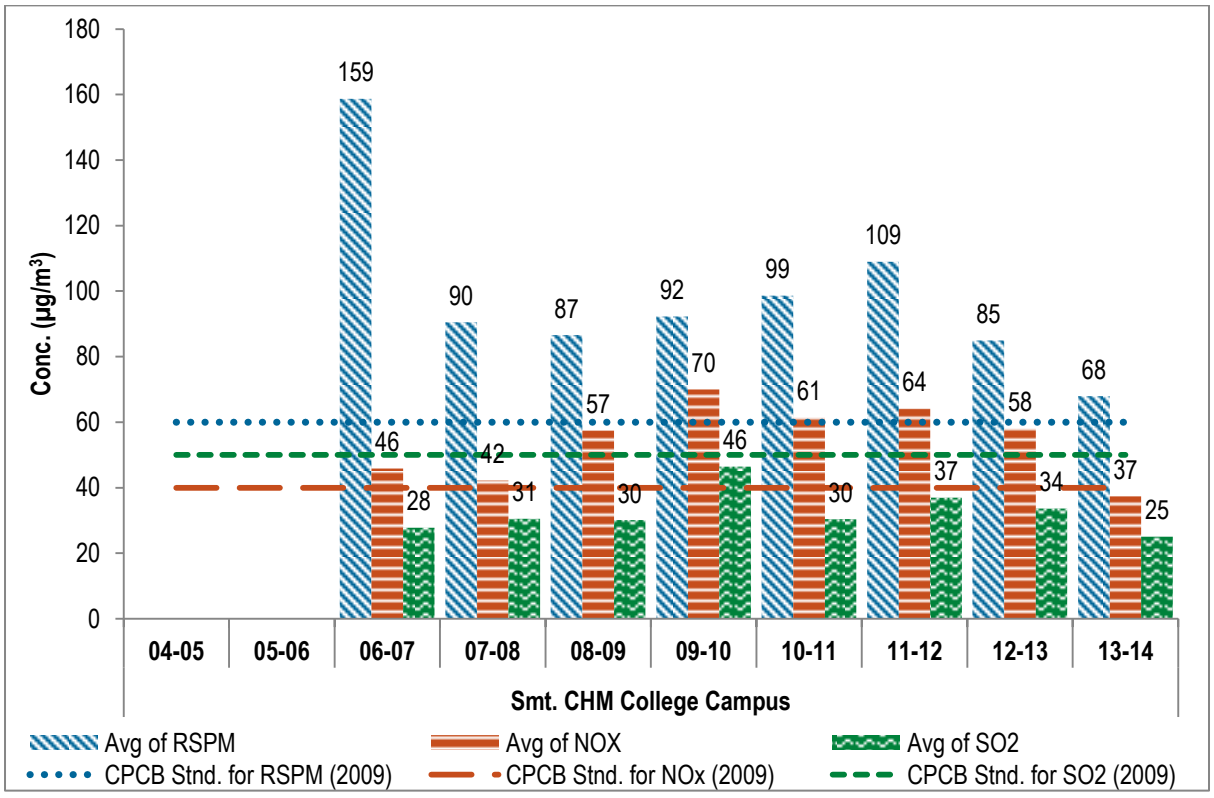


Figure No. 95: Annual average trend of SO_2, NOx and RSPM at -Smt.CHM Collage Campus, Ulhasnagar

Ulhasnagar - Powai Chowk

Table No. 81: Data for monthly average reading recorded at Powai Chowk, Ulhasnagar

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	8	87	59	36
May	9	69	45	38
Jun	6	66	53	51
Jul	7	70	39	18
Aug	8	77	39	20
Sep	9	50	26	19
Oct	9	74	46	21
Nov	8	124	66	21
Dec	9	138	75	19
Jan	9	187	109	74
Feb	8	135	73	48
Mar				
	Total N	% of exceedence of daily readings for 2013-14		
	90	35.6	16.7	5.6

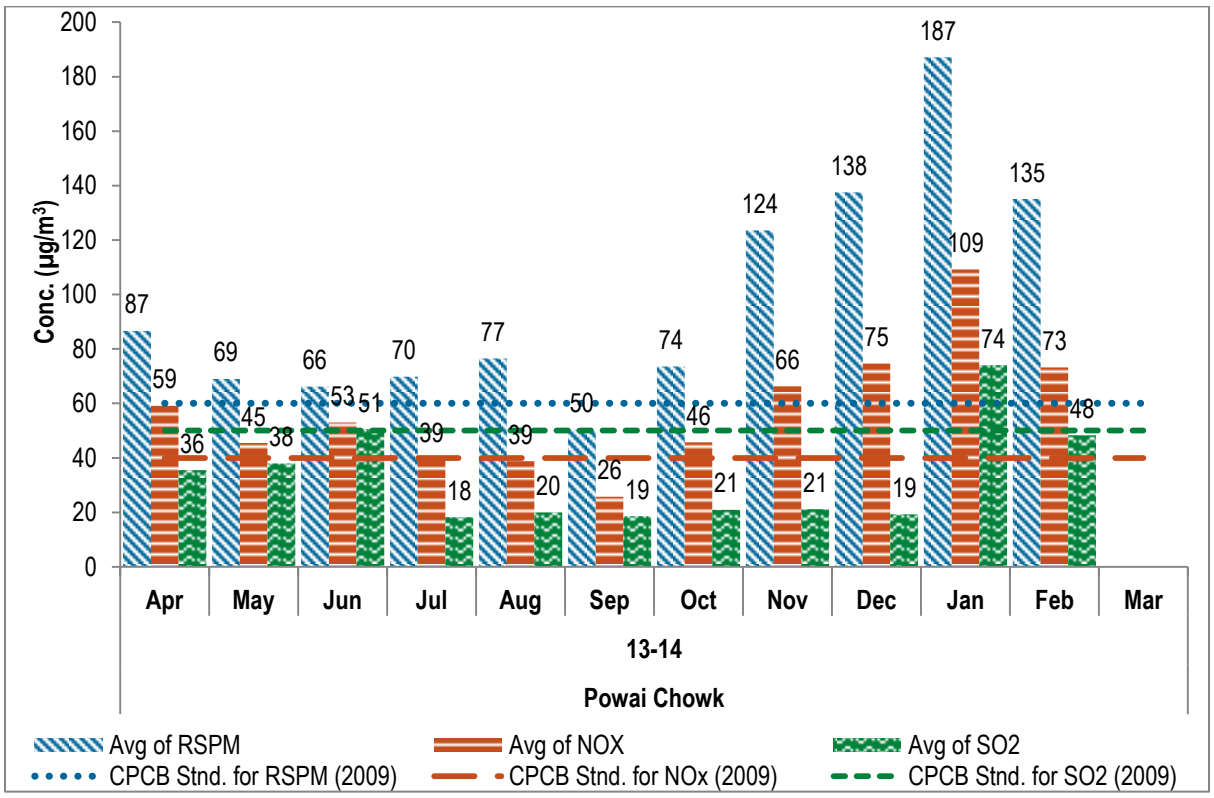


Figure No. 96: Monthly average reading recorded at -Pawai Chowk, Ulhasnagar

Table No. 82: Data for annual average trend of RSPM, NO_X and SO_2 at Powai Chowk, Ulhasnagar

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

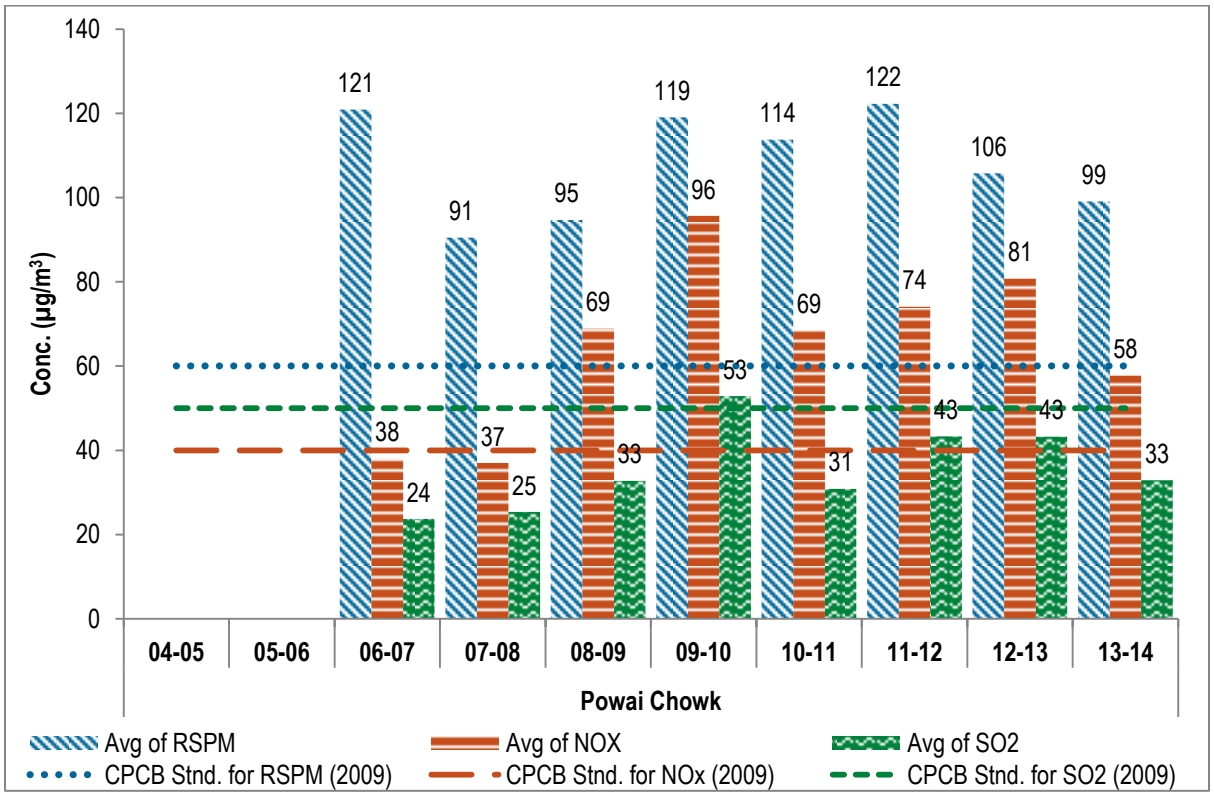


Figure No. 97: Annual average trend of SO_2, NOx and RSPM at -Pawai Chowk, Ulhasnagar

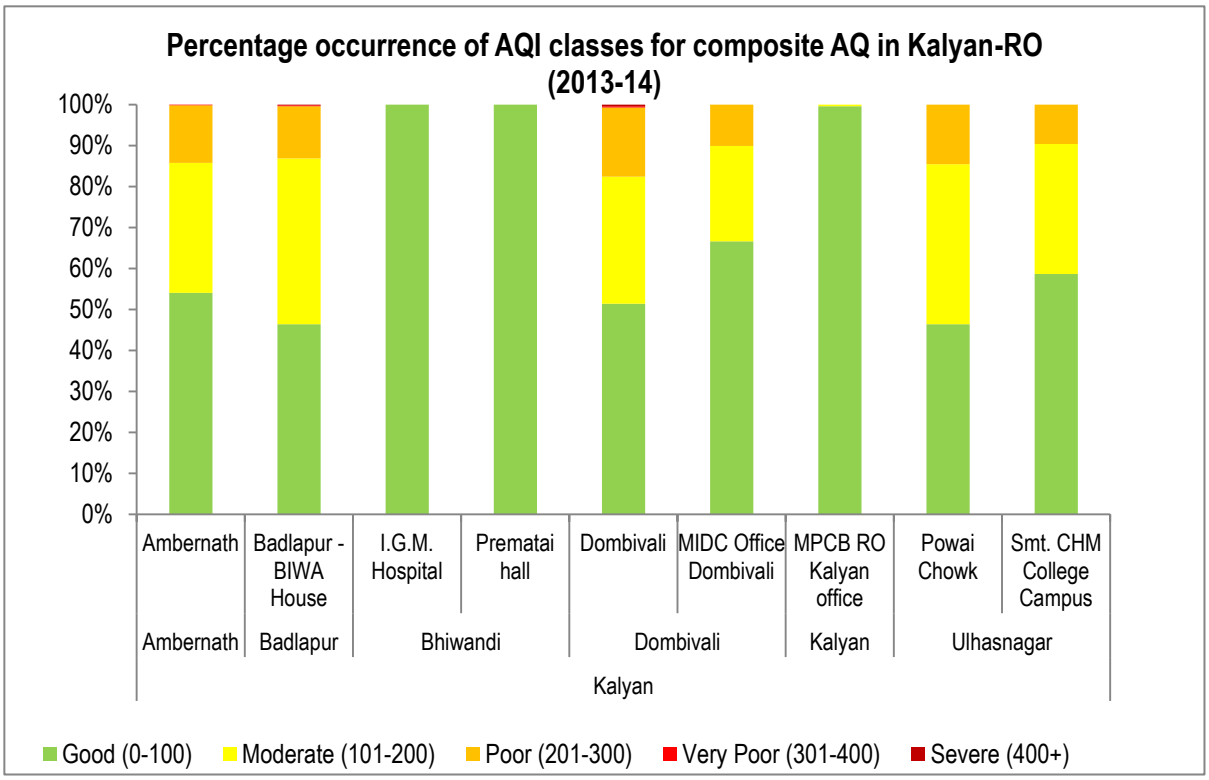
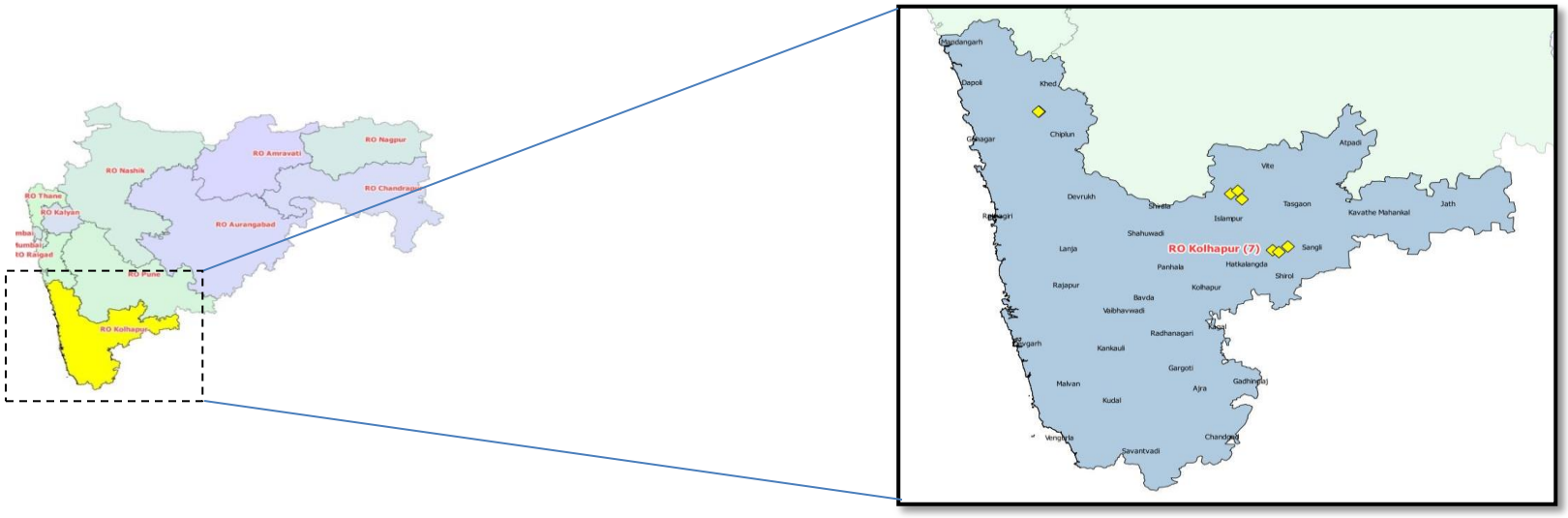


Figure No. 98: Percentage occurrence of AQI classes for composite AQ in Kalyan-RO (2013-14)

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. 83: Data for monthly average reading recorded at Chiplun - MIDC Chalkewadi, Chiplun

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr				
May	8	48	9	11
Jun	6	147	2	12
Jul	8	184	7	9
Aug	8	182	9	9
Sep	8	172	10	10
Oct	8	91	10	10
Nov	8	107	10	10
Dec	8	102	10	10
Jan	8	117	11	11
Feb	8	131	10	11
Mar				
	Total N	% of exceedence of daily readings for 2013-14		
	78	71.8	0.0	0.0

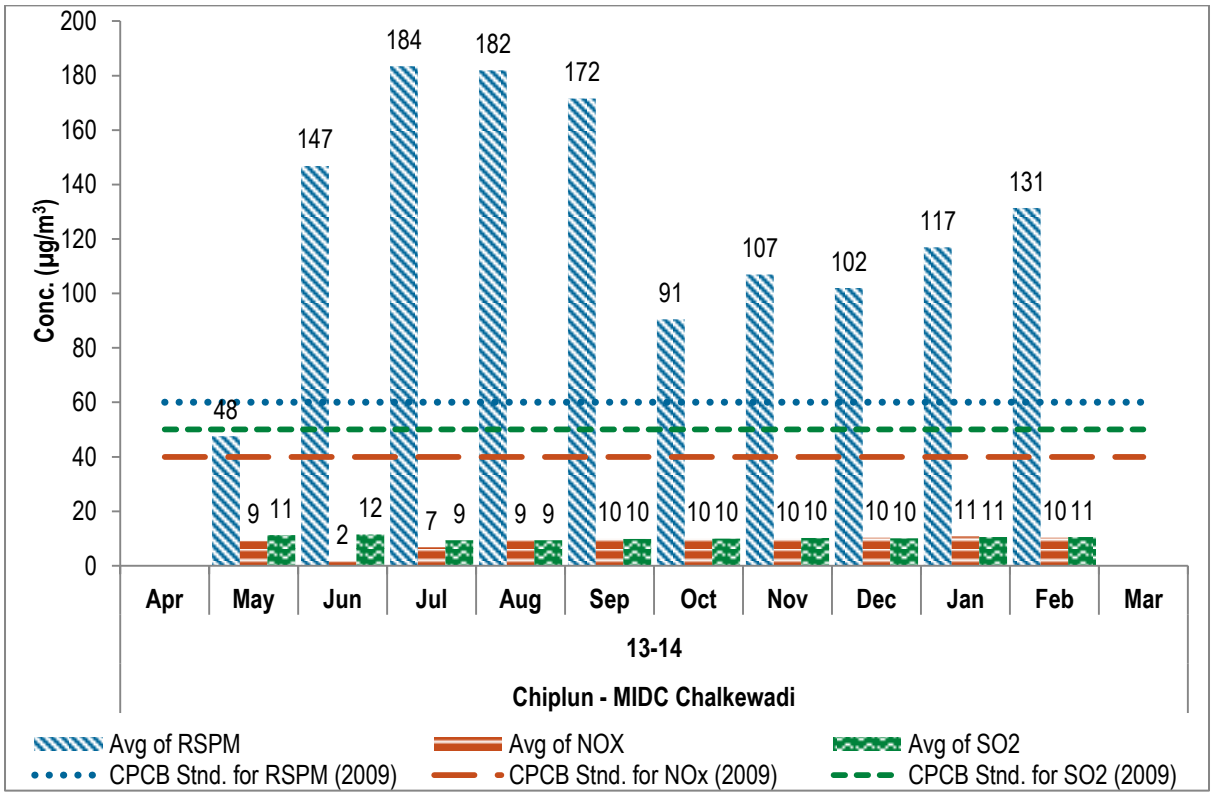


Figure No. 99: Monthly average reading recorded at -MIDC Chalkewadi, Chiplun

Table No. 84: Data for annual average trend of RSPM, NO_X and SO_2 at Chiplun - MIDC Chalkewadi, Chiplun

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

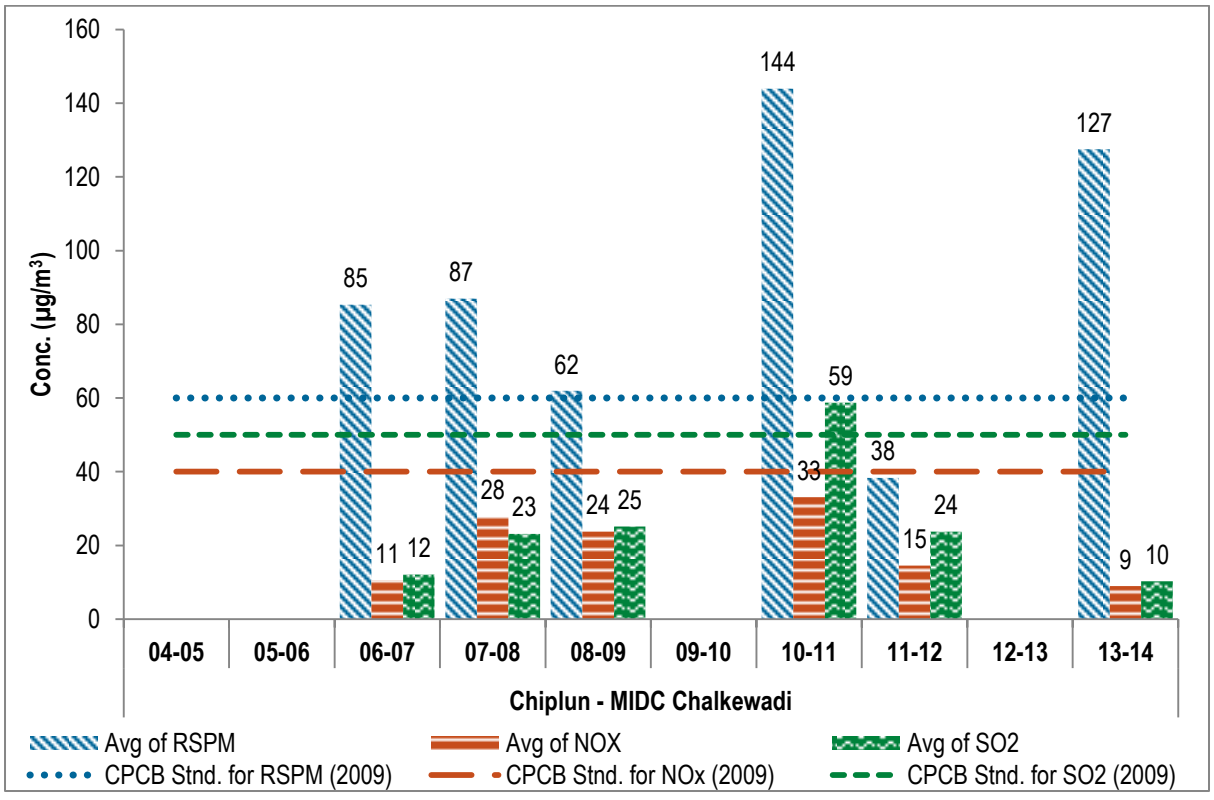


Figure No. 100: Annual average trend of SO_2, NOx and RSPM at -MIDC Chalkewadi, Chiplun

Chiplun - Chiplun - Water Treatment

Table No. 85: Data for monthly average reading recorded at Chiplun - Water Treatment

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr				
May	*8*	89	9	11
Jun	*6*	135	3	11
Jul	*8*	177	8	9
Aug	*8*	186	9	9
Sep	*8*	194	10	10
Oct	*8*	88	10	10
Nov	*8*	115	10	10
Dec	*8*	111	10	10
Jan	*8*	102	11	11
Feb	*6*	134	10	11
Mar				
	Total N	% of exceedence of daily readings for 2013-14		
	76	78.9	0.0	0.0

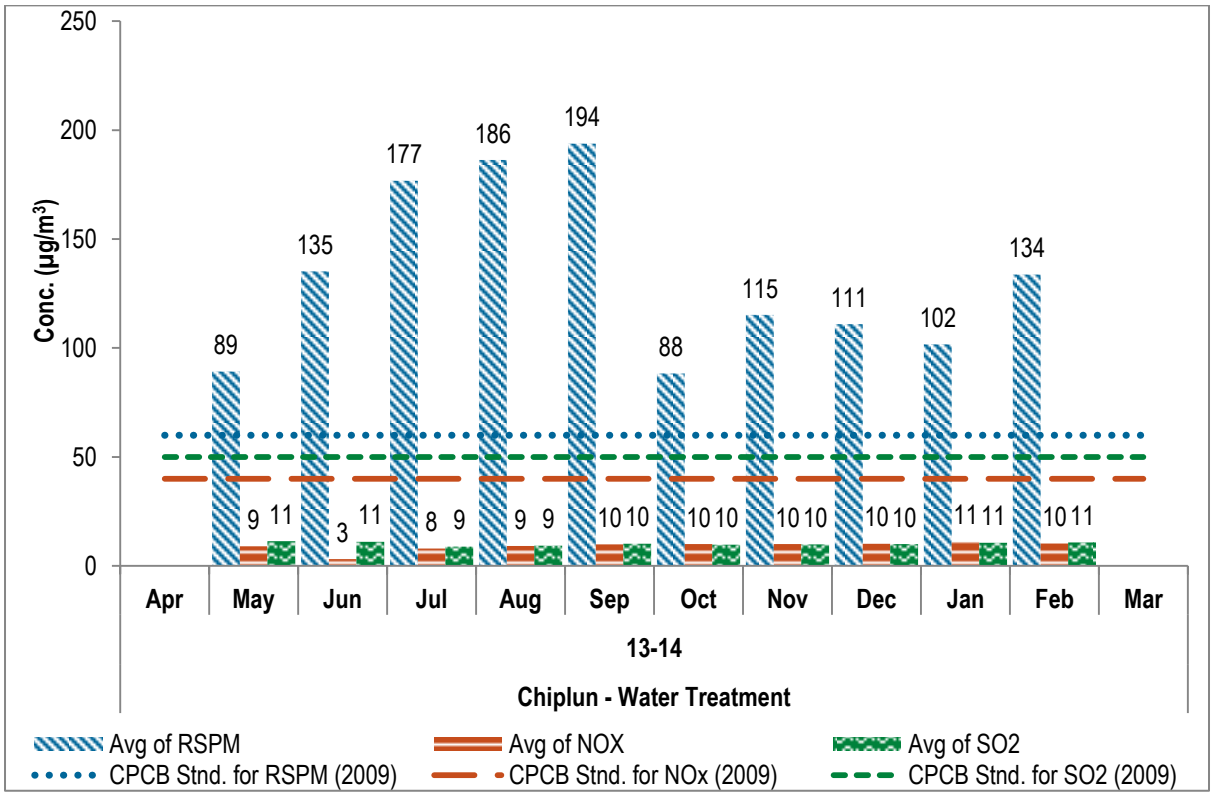


Figure No. 101: Monthly average reading recorded at - Chiplun - Water Treatment

Table No. 86: Data for annual average trend of RSPM, NO_X and SO_2 at Chiplun - Water Treatment

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

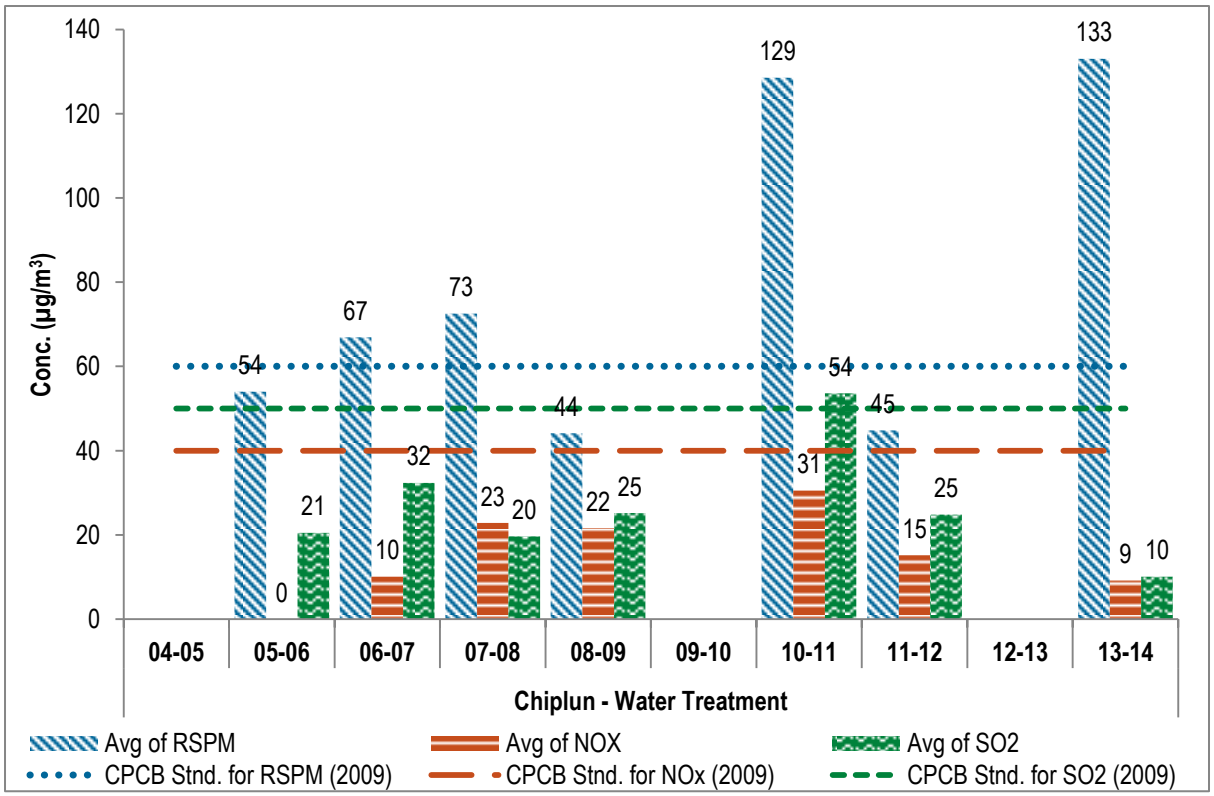


Figure No. 102: Annual average trend of SO_2, NOx and RSPM at Chiplun - Water Treatment

Kolhapur - Shivaji University Campus

Table No. 87: Data for monthly average reading recorded at Shivaji University Campus

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	9	74	25	17
May	1	63	22	15
Jun				
Jul	9	51	12	8
Aug	9	66	18	13
Sep	2	65	23	16
Oct	2	62	19	14
Nov	7	62	19	15
Dec	9	72	20	16
Jan	9	73	24	18
Feb	8	56	23	15
Mar	9	54	23	13
Total N		% of exceedence of daily readings for 2013-14		
74		0.0	0.0	0.0

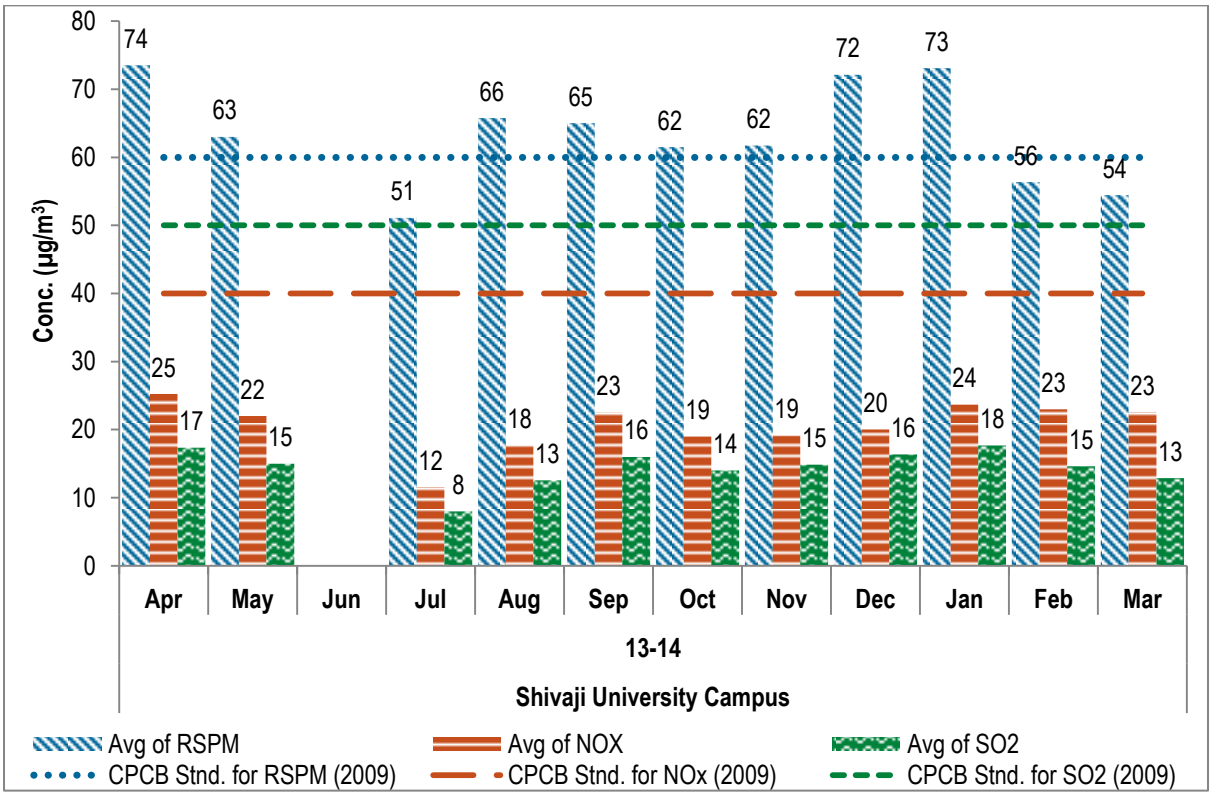


Figure No. 103: Monthly average reading recorded at - Shivaji University Campus

Table No. 88: Data for annual average trend of RSPM, NO_X and SO_2 at Shivaji University Campus

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

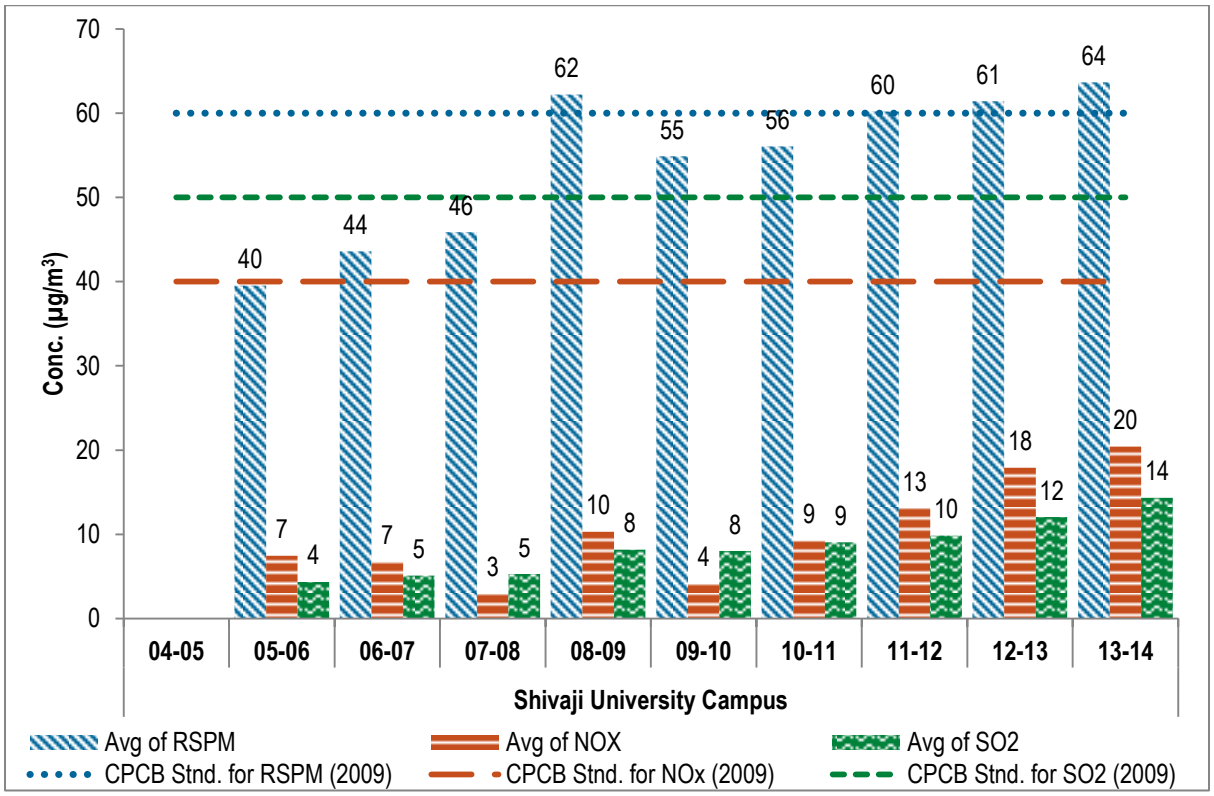


Figure No. 104: Annual average trend of SO_2, NOx and RSPM at -Shivaji University Campus

Kolhapur - Ruikar Trust

Table No. 89: Data for monthly average reading recorded at -Ruikar Trust, Kolhapur

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	9	166	58	28
May	9	178	55	26
Jun	8	76	22	15
Jul	9	68	24	14
Aug	9	92	29	20
Sep	8	119	39	28
Oct	9	139	47	30
Nov	9	123	43	26
Dec	9	149	53	30
Jan	9	192	66	36
Feb	7	211	75	39
Mar	8	186	65	37
	Total N	% of exceedence of daily readings for 2013-14		
	103	75.7	1.9	0.0

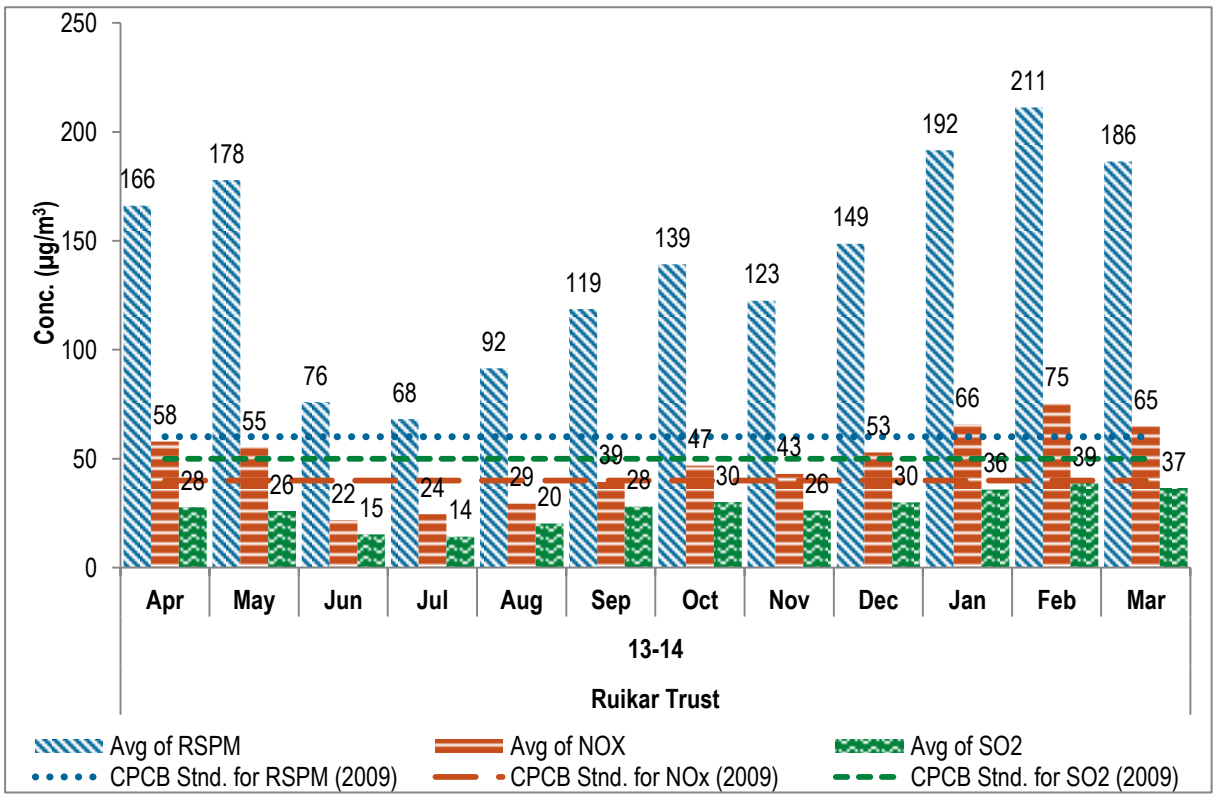


Figure No. 105: Monthly average reading recorded at -Ruikar Trust Kolhapur

Table No. 90: Data for annual average trend of RSPM, NO_X and SO_2 at Ruikar Trust, Kolhapur

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

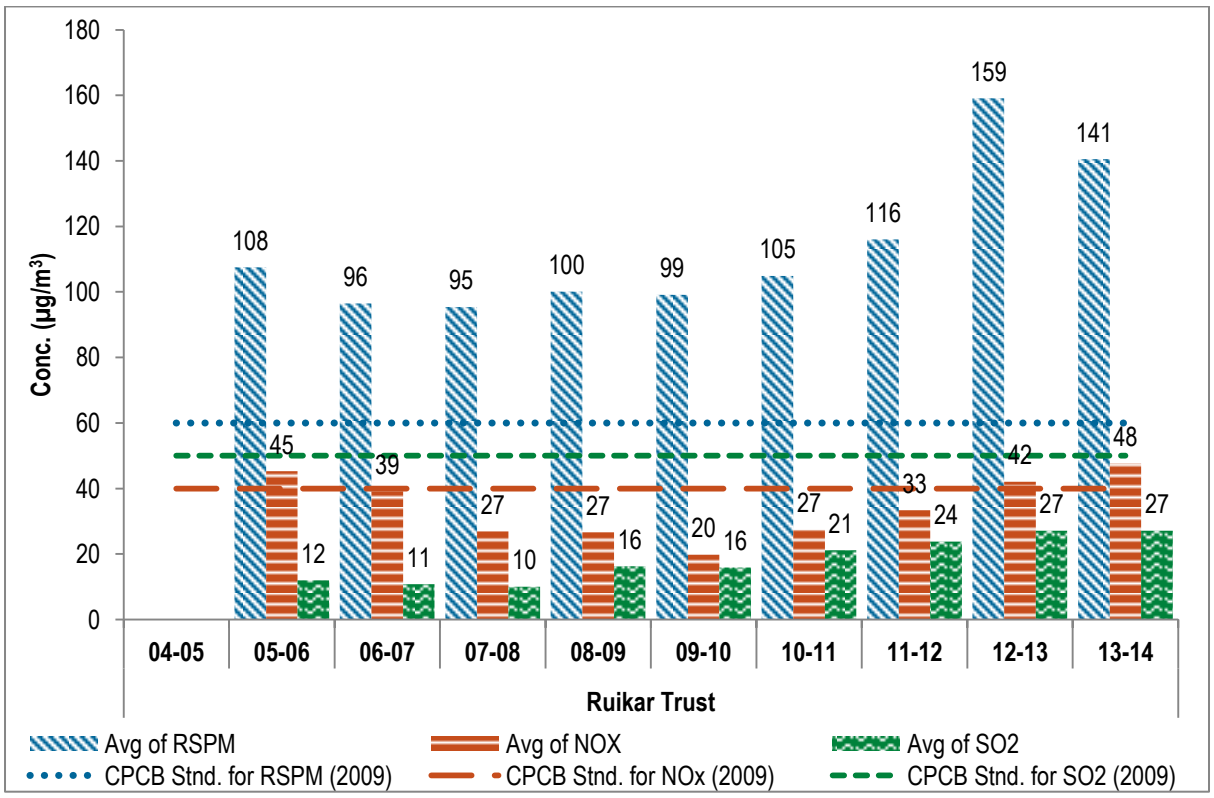


Figure No. 106: Annual average trend of SO_2, NOx and RSPM at - Ruikar Trust Kolhapur

Kolhapur - Mahadwar Road

Table No. 91: Data for monthly average reading recorded at -Mahadwar Road Kolhapur

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	8	136	49	26
May	9	139	36	23
Jun	8	70	19	13
Jul	5	62	18	10
Aug	8	82	26	17
Sep	8	106	32	26
Oct	9	121	35	27
Nov	9	101	31	22
Dec	7	116	41	25
Jan	9	136	50	29
Feb	8	131	49	28
Mar	9	126	47	30
Total N		% of exceedence of daily readings for 2013-14		
97		68.0	0.0	0.0

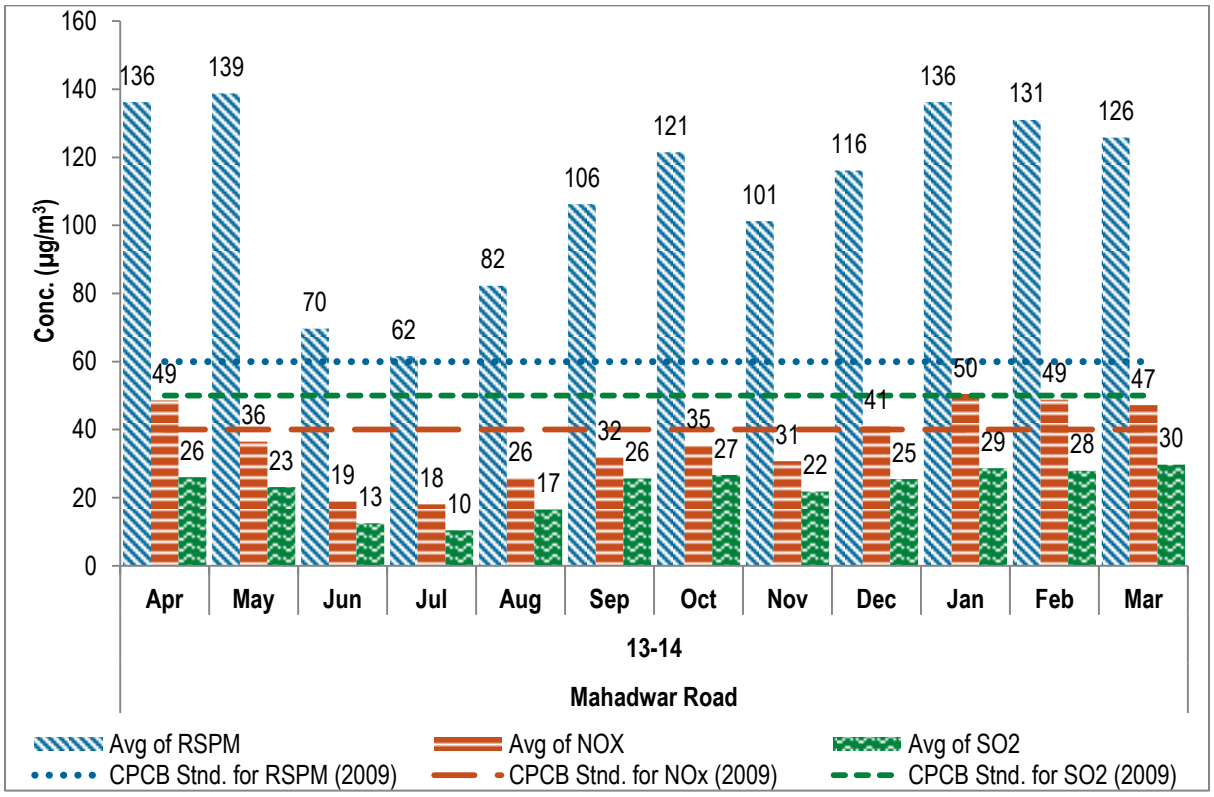


Figure No. 107: Monthly average reading recorded at –Mahadwar Road

Table No. 92: Data for annual average trend of RSPM, NO_X and SO_2 at -Mahadwar Road Kolhapur

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

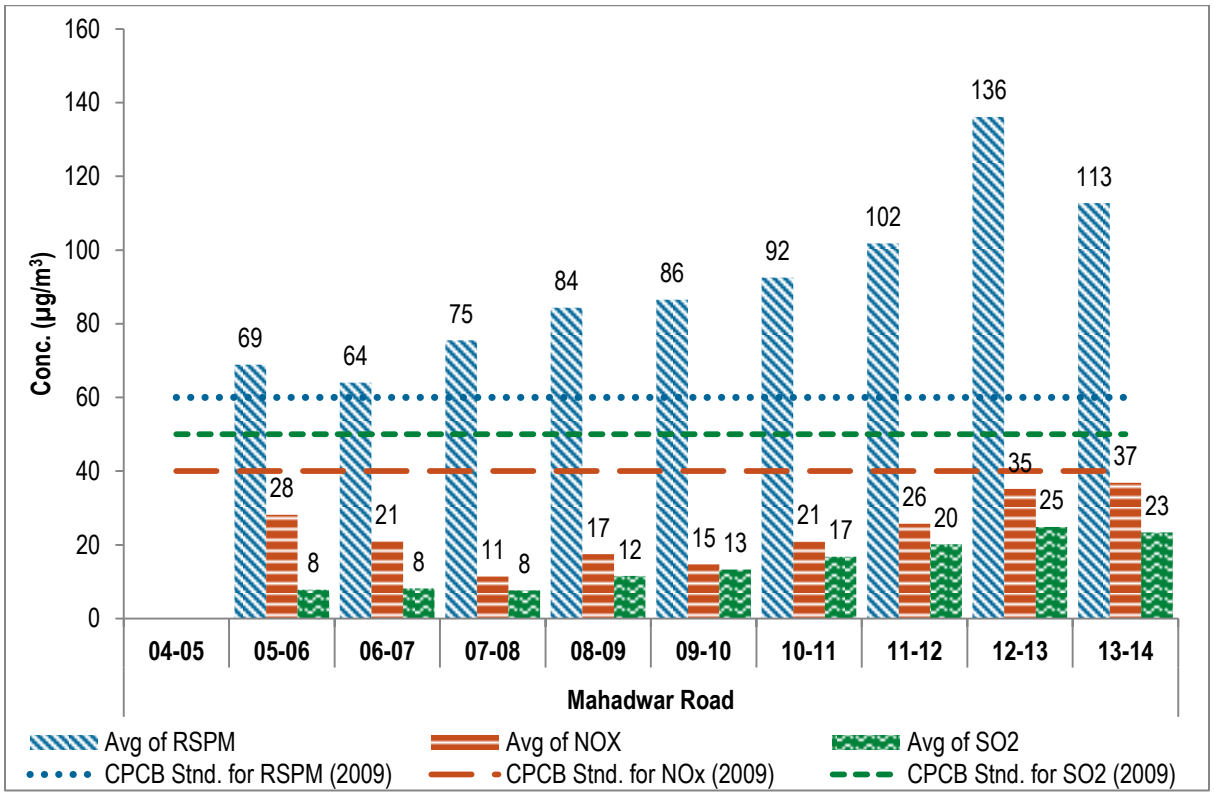


Figure No. 108: Annual average trend of SO_2, NOx and RSPM at –Mahadwar Road

Sangli - Terrace of SRO-Sangli, Udyog Bhavan

Table No. 93: Data for monthly average reading recorded at Terrace of SRO-Sangli, Udyog Bhavan

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	8	77	43	11
May	9	63	31	9
Jun	8	44	24	9
Jul	9	31	19	9
Aug	9	38	20	8
Sep	9	30	22	7
Oct	8	36	25	8
Nov	9	64	31	8
Dec	9	76	49	10
Jan	9	113	54	6
Feb	8	121	60	7
Mar	9	139	35	14
Total N		% of exceedence of daily readings for 2013-14		
104		19.2	1.0	0.0

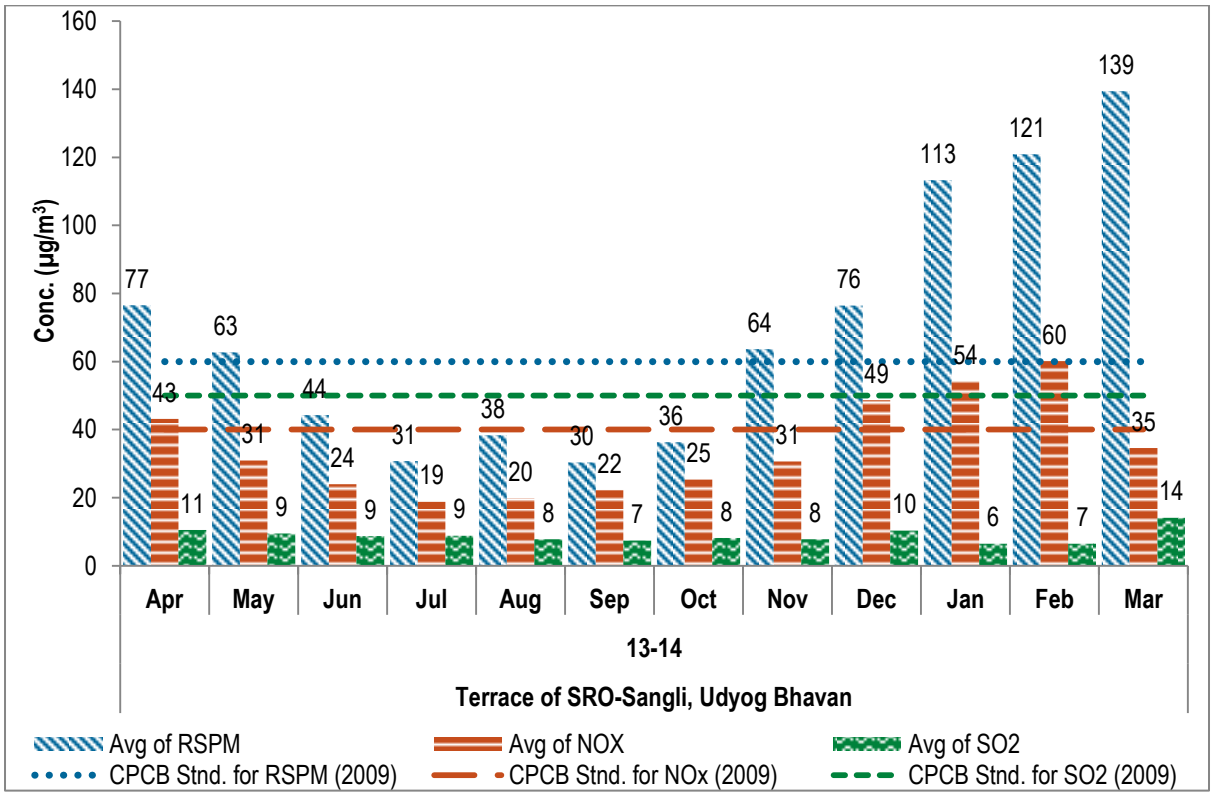


Figure No. 109**: Monthly average reading recorded at –Terrece of SRO-Sangli, Udyog Bhavan**

Table No. 94: Data for annual average trend of RSPM, NO_X and SO_2 at Terrace of SRO-Sangli, Udyog Bhavan

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

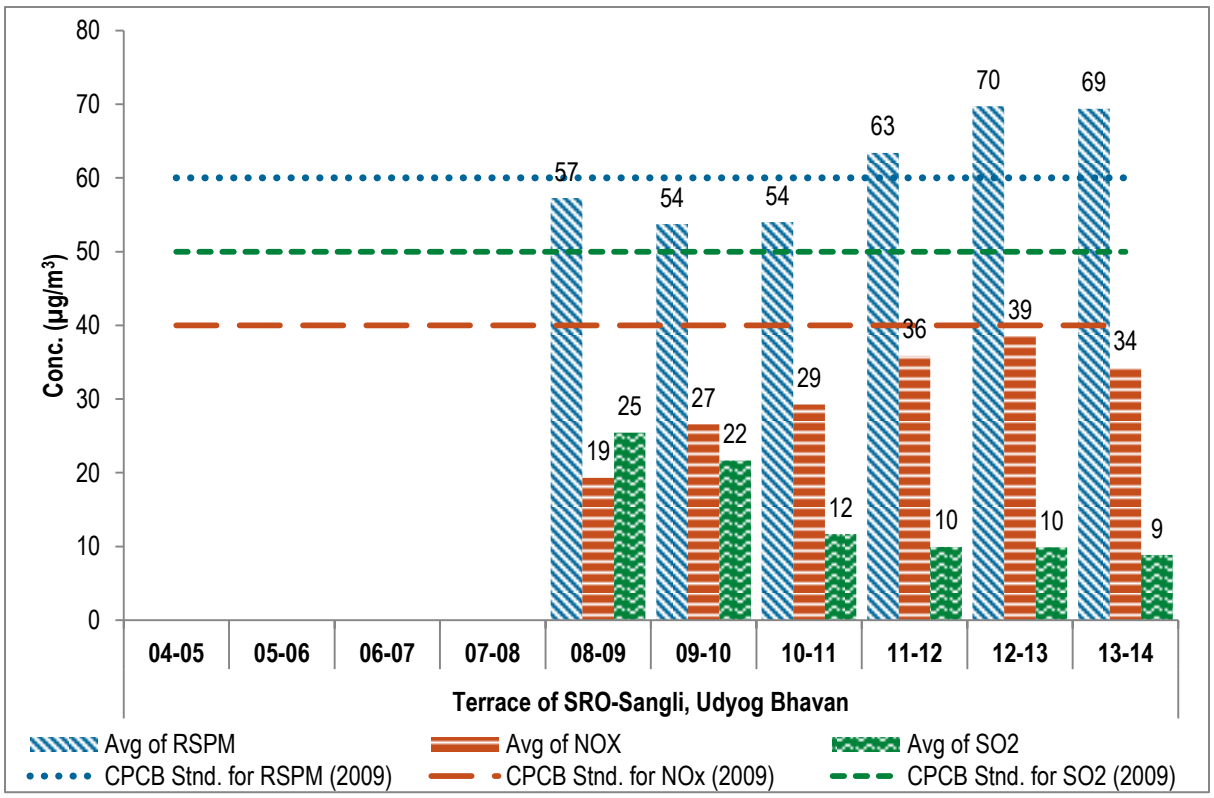


Figure No. 110: Annual average trend of SO_2, NOx and RSPM at -Terrece of SRO-Sangli, Udyog Bhavan

Sangli - Sangli-Miraj Primary Municipal school

Table No. 95: Data for monthly average reading recorded at Sangli-Miraj Primary Municipal school

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	9	67	35	8
May	9	58	32	11
Jun	9	40	25	10
Jul	8	30	18	9
Aug	9	36	20	9
Sep	9	38	24	8
Oct	9	53	36	9
Nov	8	98	50	10
Dec	9	127	65	10
Jan	9	141	72	10
Feb	8	127	65	8
Mar				
Total N		% of exceedence of daily readings for 2013-14		
96		27.1	6.3	0.0

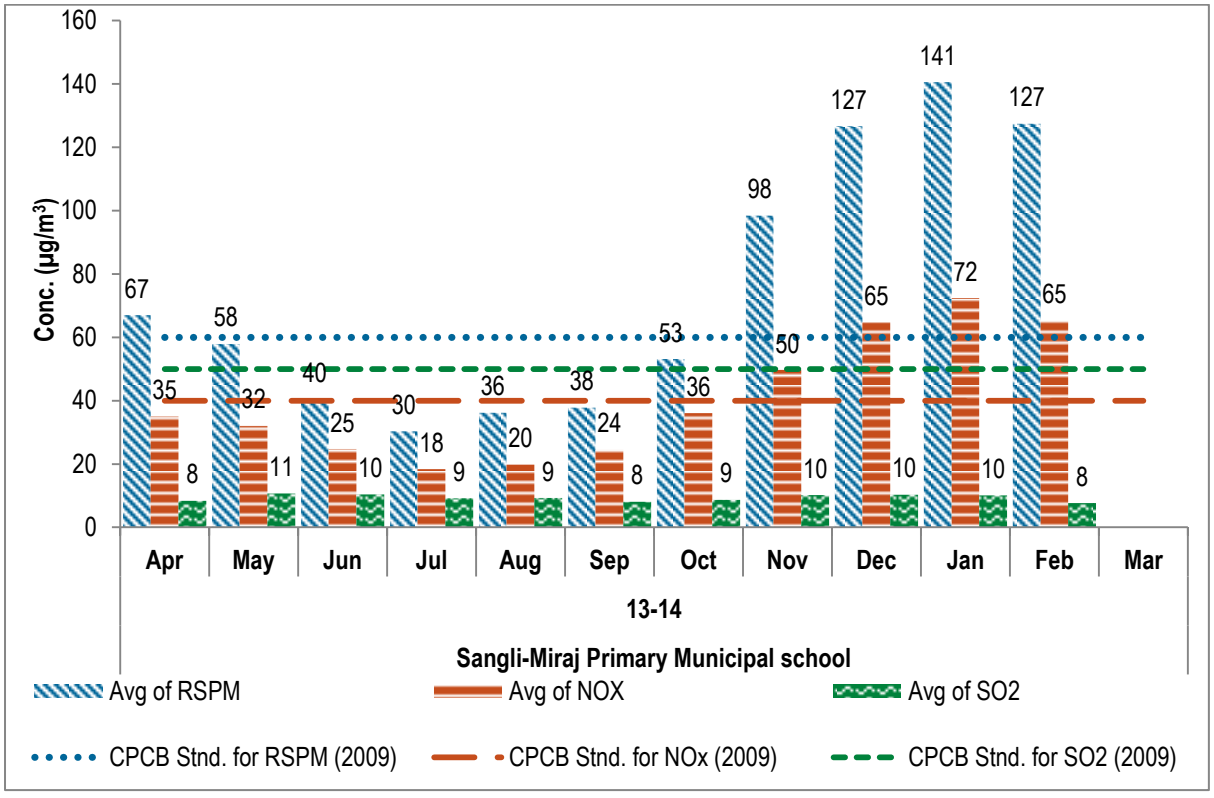


Figure No. 111: Monthly average reading recorded at - Sangli-Miraj Primary Municipal school

Table No. 96: Data for annual average trend of RSPM, NO_X and SO_2 at Sangli-Miraj Primary Municipal school

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

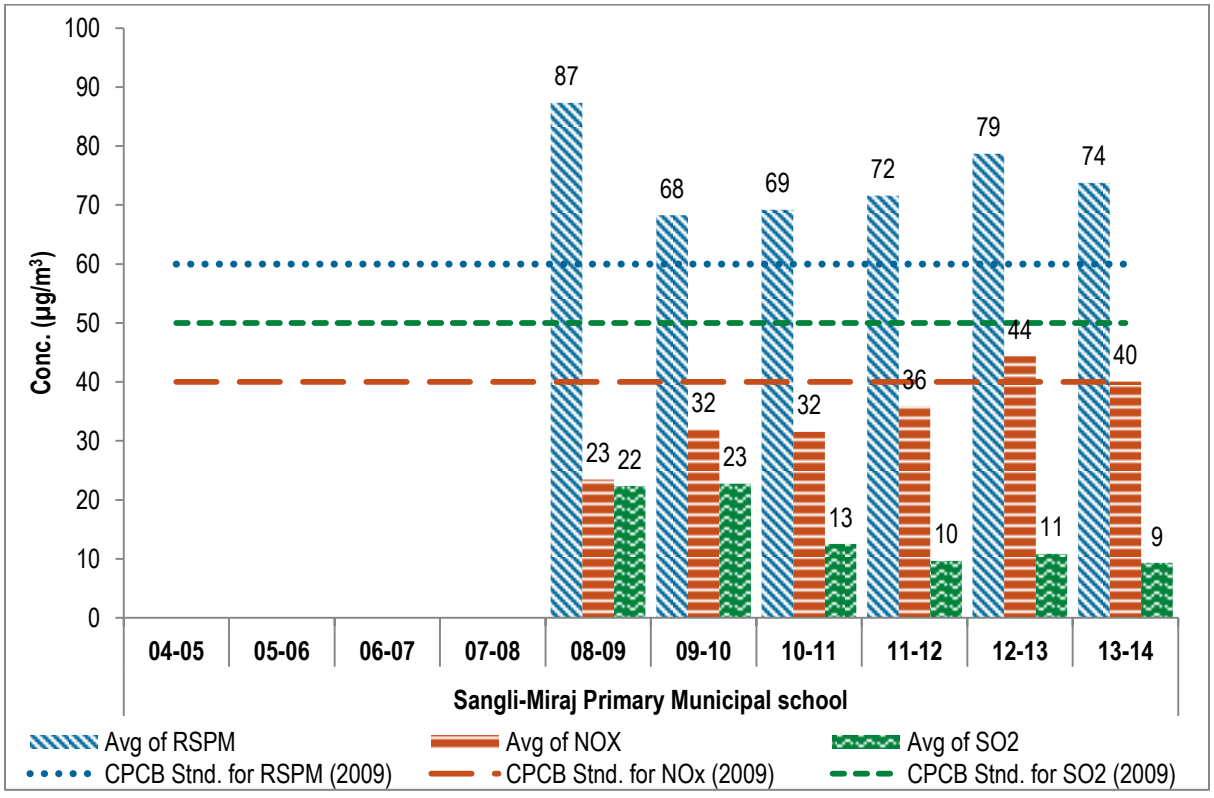


Figure No. 112: Annual average trend of SO_2, NOx and RSPM at - Sangli-Miraj Primary Municipal school

Sangli - Krishna Valley school

Table No. 97: Data for monthly average reading recorded at Krishna Valley school

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	*8*	119	46	12
May	*9*	68	33	11
Jun	*9*	54	29	10
Jul	*9*	35	17	9
Aug	*9*	57	21	11
Sep	*8*	48	26	9
Oct	*9*	85	34	10
Nov	*9*	81	40	10
Dec	*8*	120	53	11
Jan	*9*	144	42	9
Feb	*8*	156	49	12
Mar	*9*	179	52	13
	Total N	% of exceedence of daily readings for 2013-14		
	104	38.5	1.9	0.0

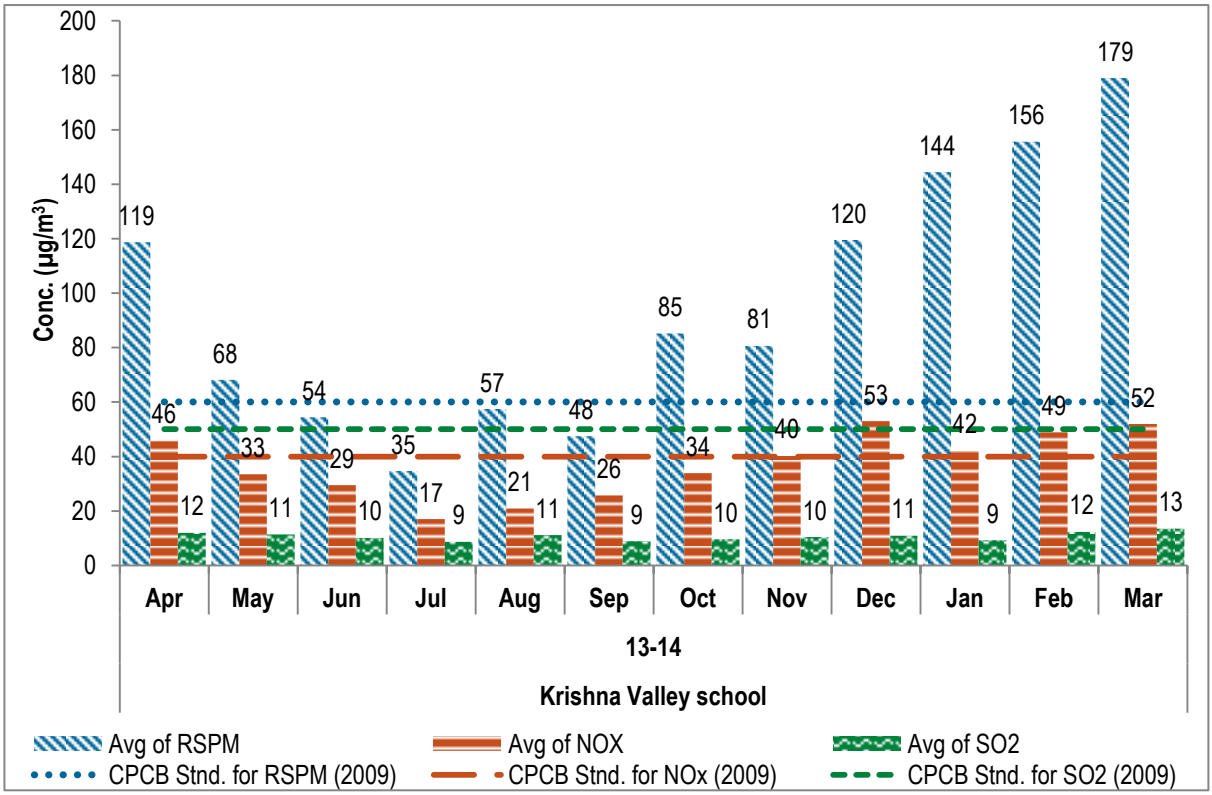


Figure No. 113: Monthly average reading recorded at -Krishna Valley School

Table No. 98: Data for annual average trend of RSPM, NO_X and SO_2 at Krishna Valley school

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

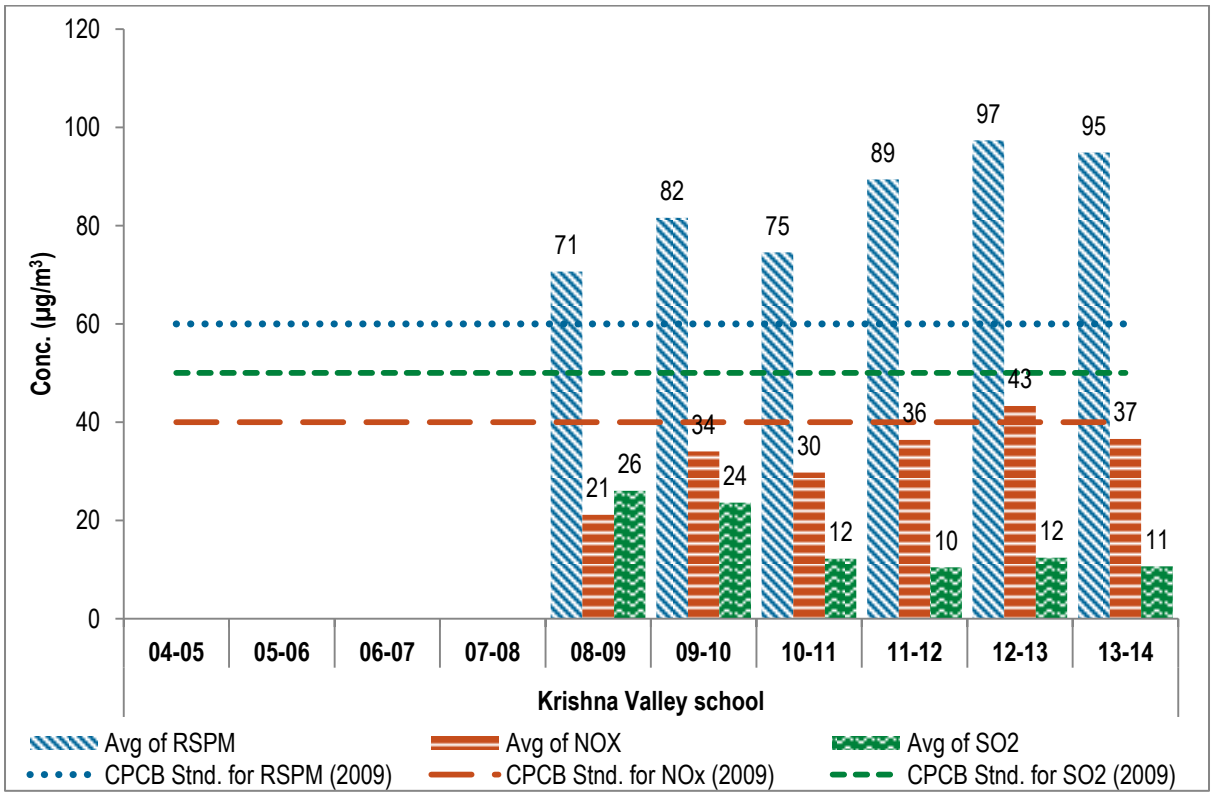


Figure No. 114: Annual average trend of SO_2, NOx and RSPM at -Krishna Valley School

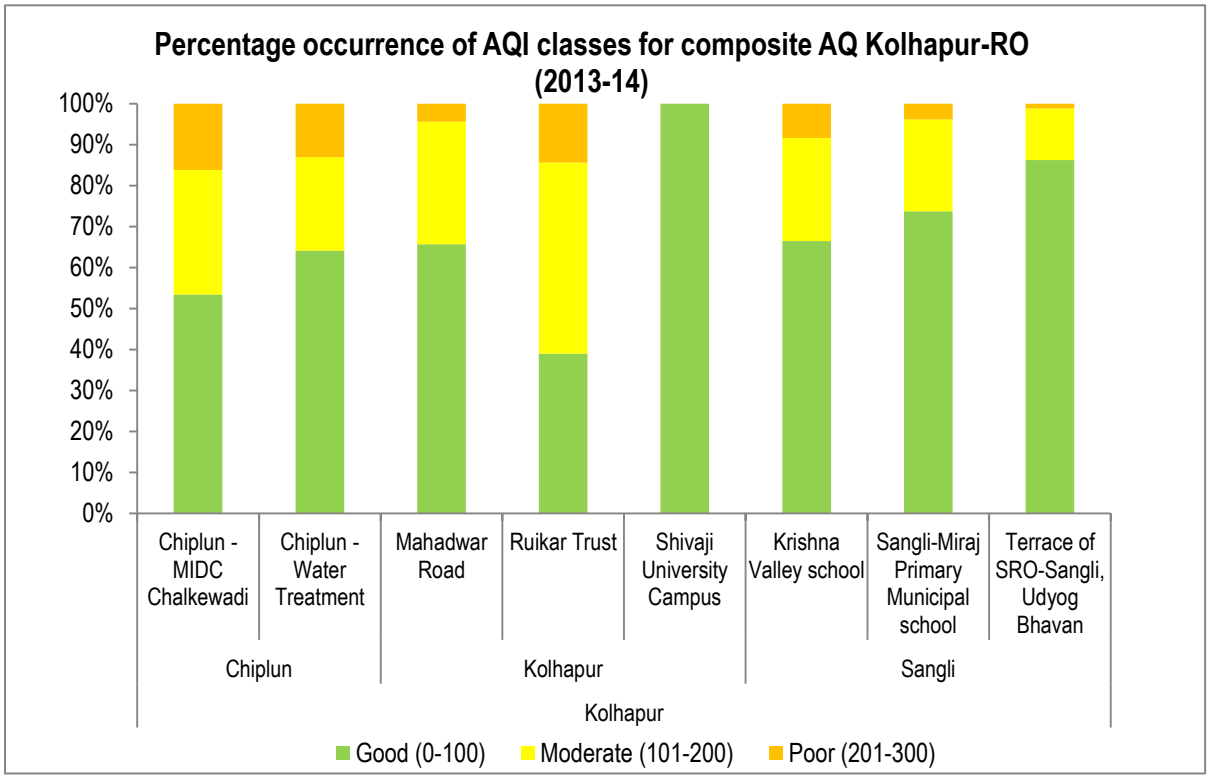
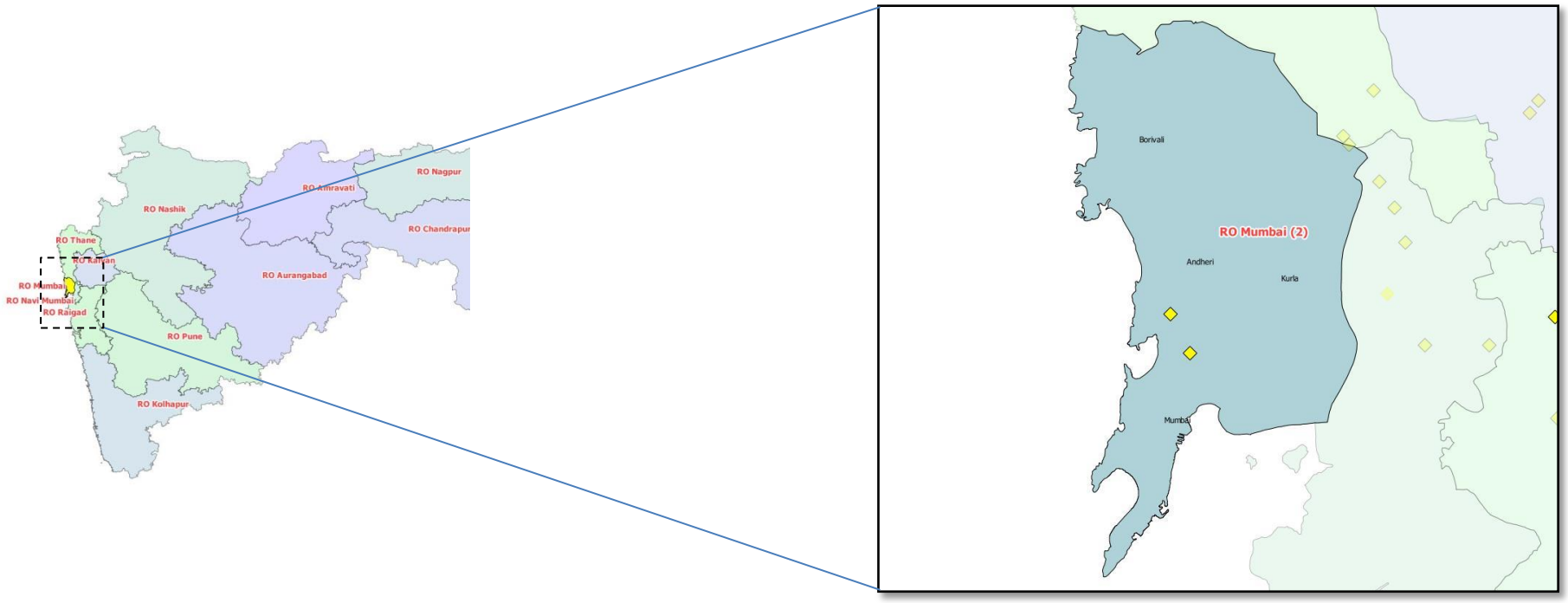


Figure No. 115: Percentage occurrence of AQI classes for composite AQ in Kolhapur-RO (2013-14)

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. 99: Data for monthly average reading recorded at Bandra

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	30	109	27	20
May	31	89	23	18
Jun	29	70	16	20
Jul	29	76	19	18
Aug	28	73	19	19
Sep	29	50	35	17
Oct	31	79	55	17
Nov	30	152	113	23
Dec	27	156	121	26
Jan	31	141	79	31
Feb	27	141	39	23
Mar	27	142	38	12
Total N		% of exceedence of daily readings for 2013-14		
349		50.7	18.3	0.0

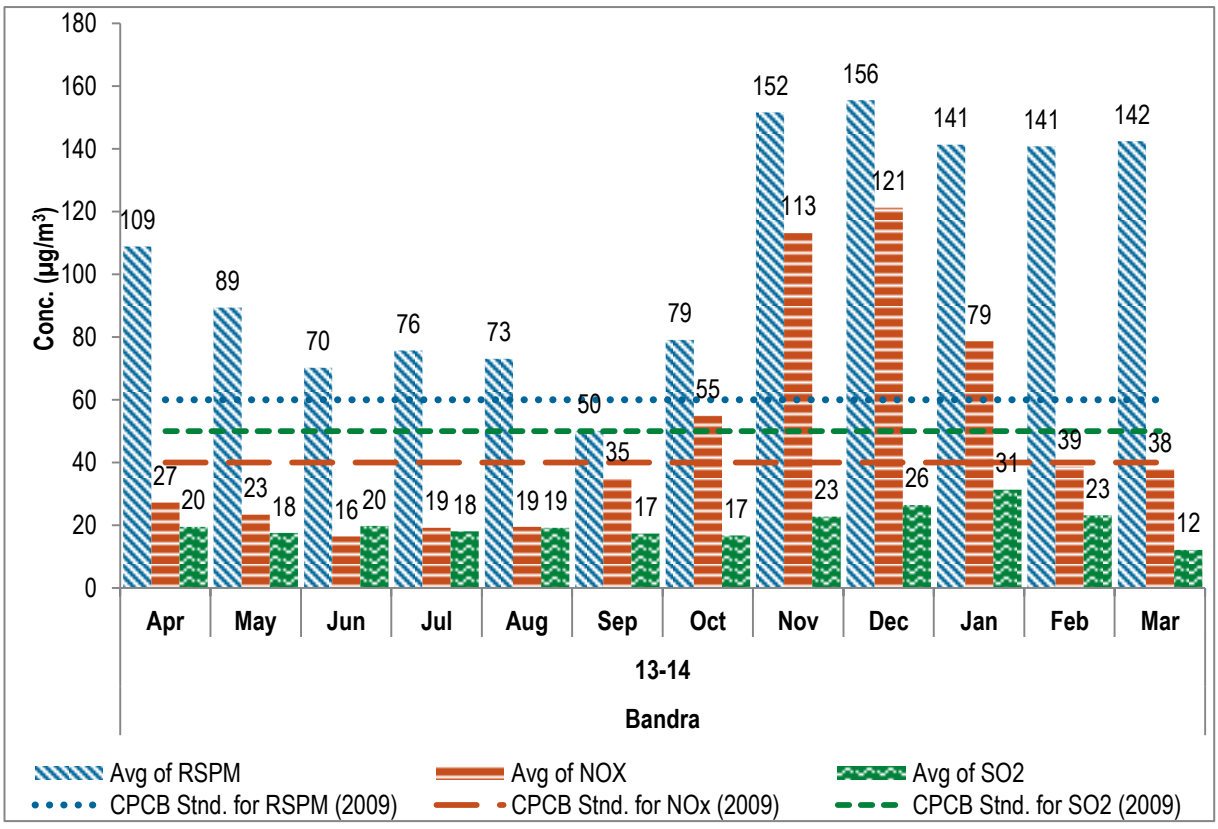


Figure No. 116: Monthly average reading recorded at -Bandra

Table No. 100: Data for annual average trend of RSPM, NO_X and SO_2 at Bandra

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

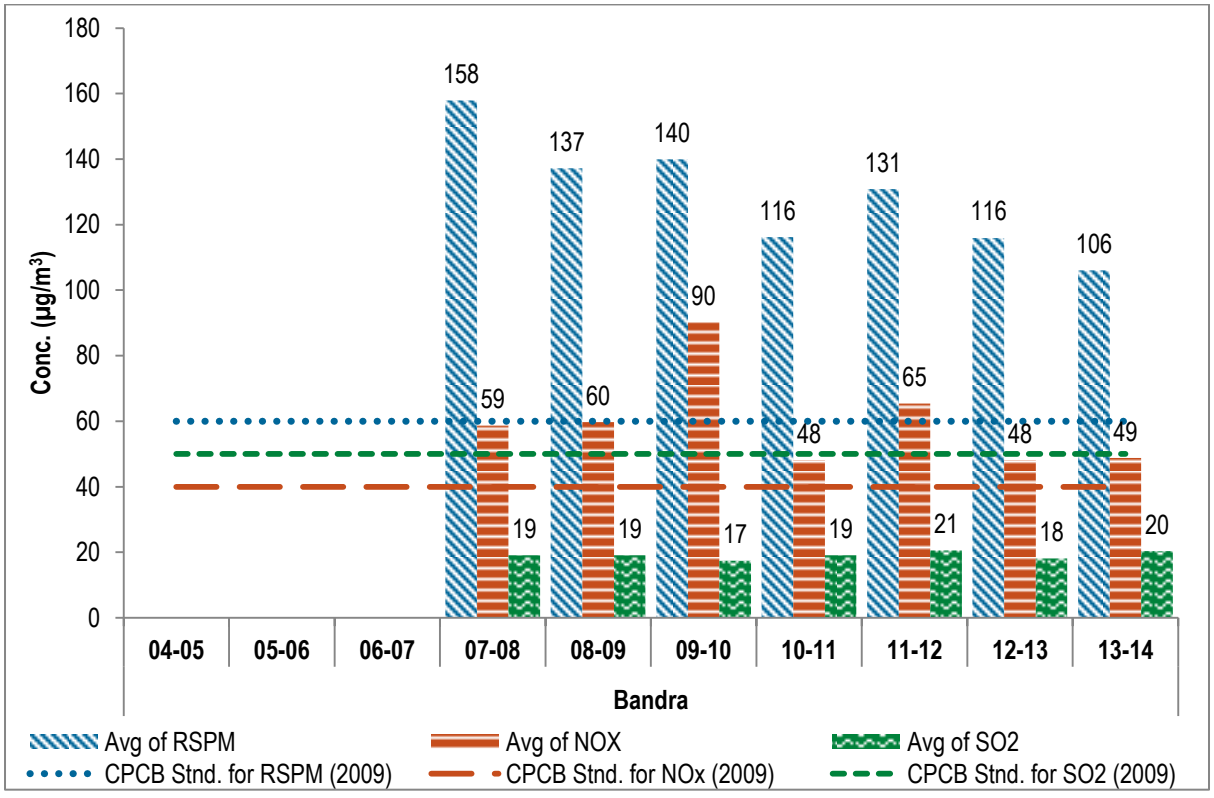


Figure No. 117: Annual average trend of SO_2, NOx and RSPM at -Bandra

Mumbai - Sion

Table No. 101: Data for monthly average reading recorded at Sion

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	22	149	110	5
May	22	110	85	4
Jun	17	72	84	4
Jul	21	71	64	4
Aug	25	70	59	3
Sep	25	79	98	4
Oct	26	134	134	4
Nov	23	151	178	4
Dec	27	177	117	12
Jan	25	207	146	16
Feb	22	179	116	16
Mar	25	151	97	13
Total N		% of exceedence of daily readings for 2013-14		
280		65.7	73.2	0.4

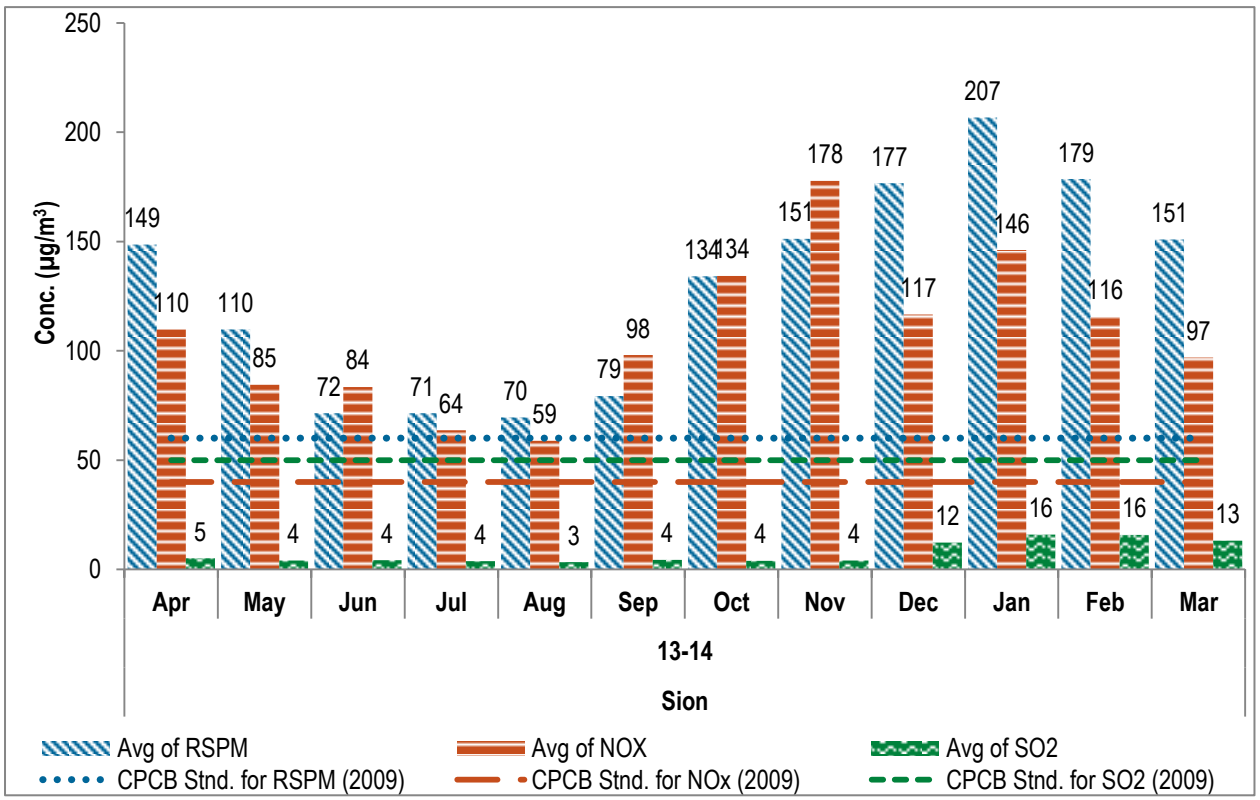


Figure. 118: Monthly average reading at Sion

Table No. 102: Data for annual average trend of RSPM, NO_X and SO_2 at Sion

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
04-05	*266*	**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

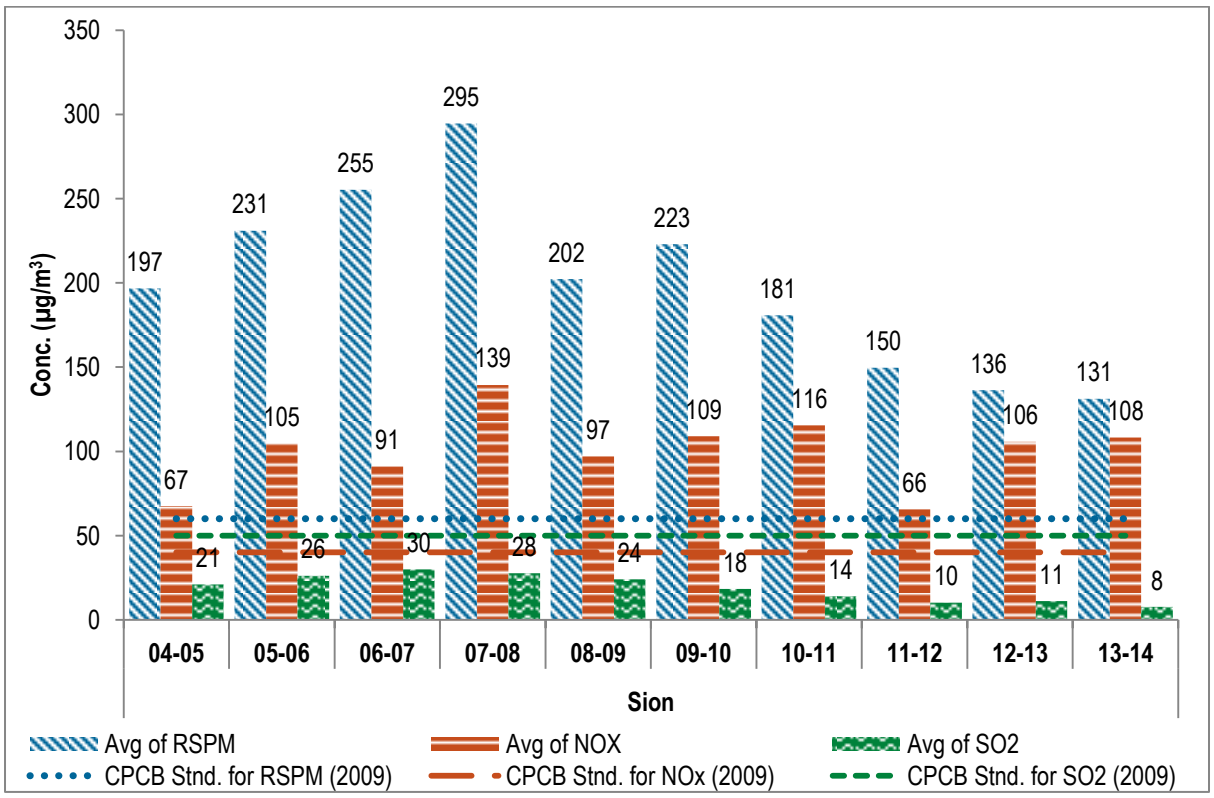


Figure No. 119: Annual average trend of SO_2, NOx and RSPM at -Sion

AAQMS monitored by NEERI in Mumbai

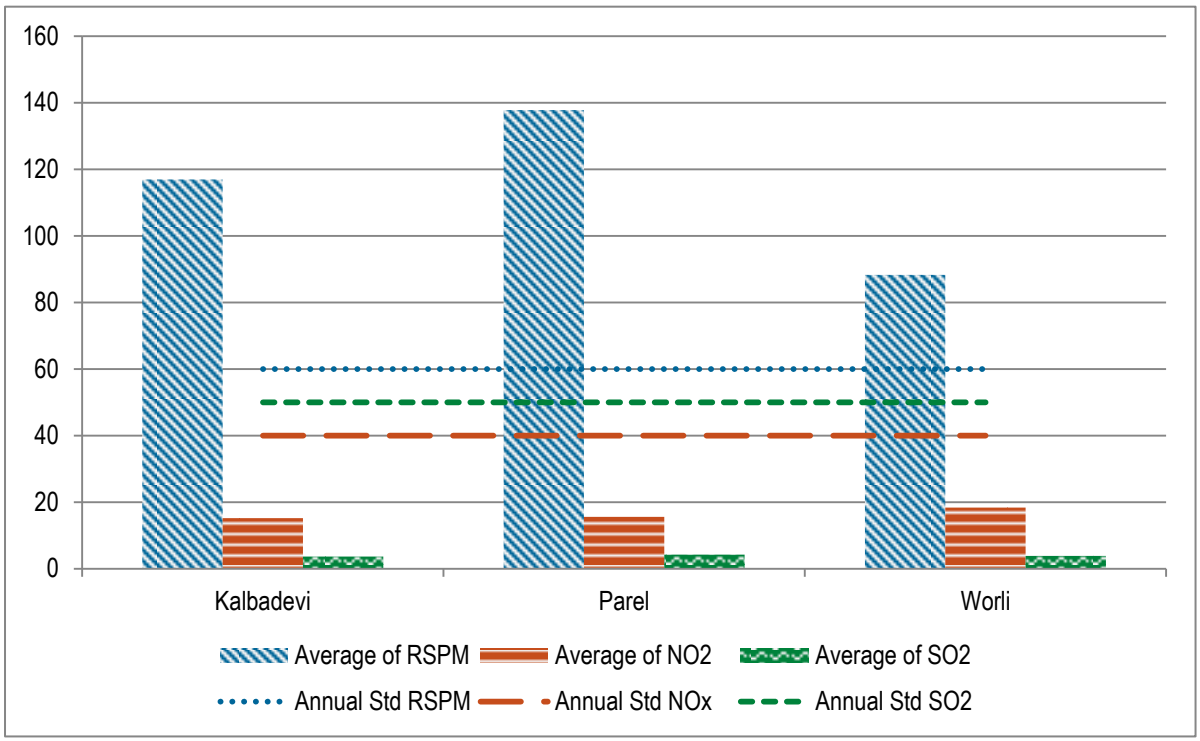


Figure No. 120: Annual average trend of SO_2, NOx and RSPM at AAQMS monitored by NEERI in Mumbai (2013-14)

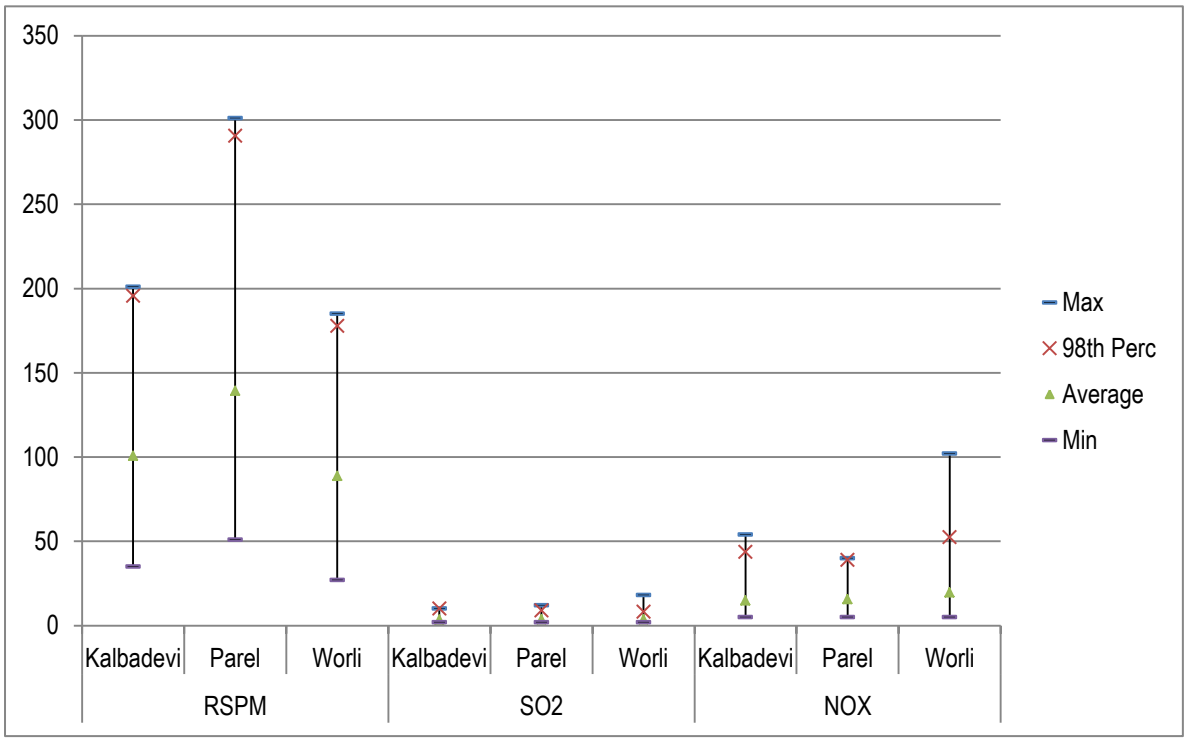


Figure No. 121: Parametric values of RSPM, SO_2 and NOx for AAQMS monitored by NEERI in Mumbai (2013-14)

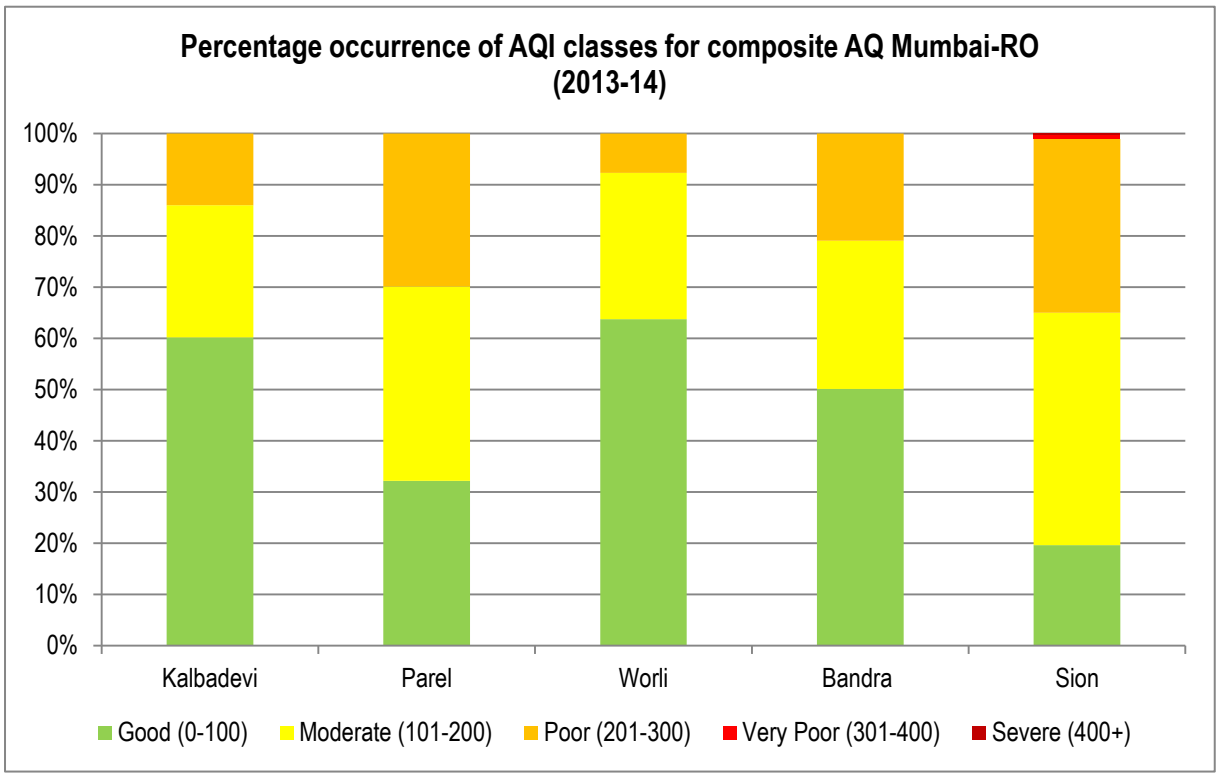
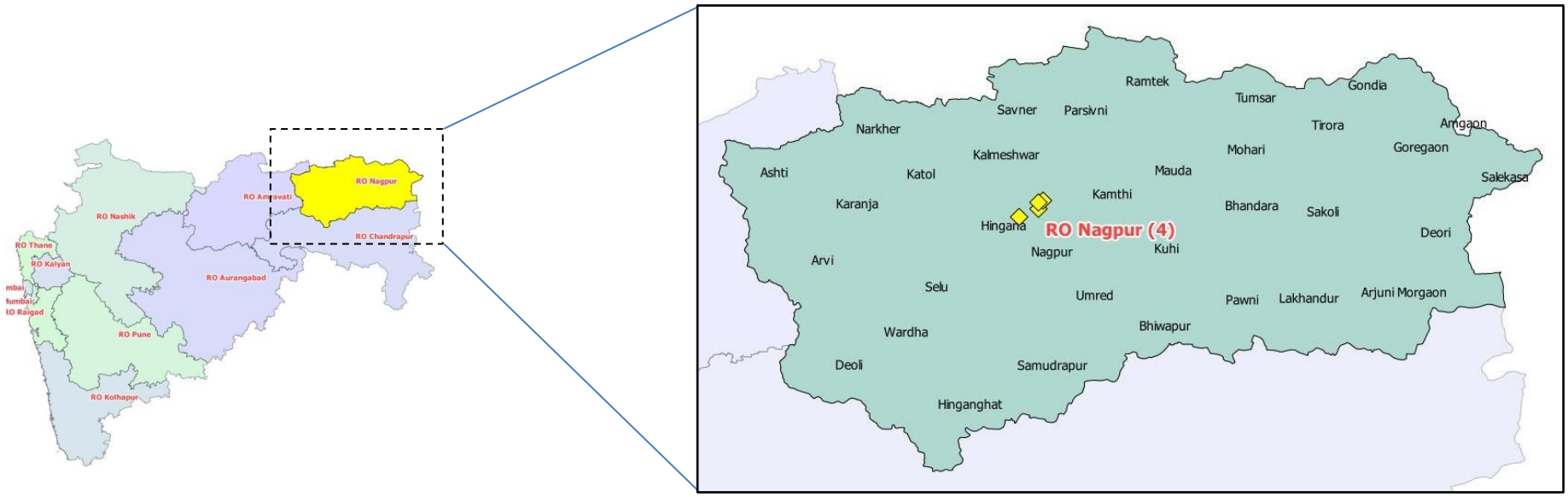


Figure No. 122: Percentage occurrence of AQI classes for composite AQ in Mumbai-RO (2013-14)

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. 103: Data for monthly average reading recorded at IOE North Ambazari road

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	9	87	25	9
May	9	84	30	9
Jun	7	83	26	8
Jul	7	128	27	10
Aug	9	114	25	9
Sep	9	103	26	10
Oct	9	11	29	11
Nov	11	115	32	11
Dec	8	100	37	11
Jan	9	81	33	11
Feb				
Mar				
	Total N	% of exceedence of daily readings for 2013-14		
	87	40.2	0.0	0.0

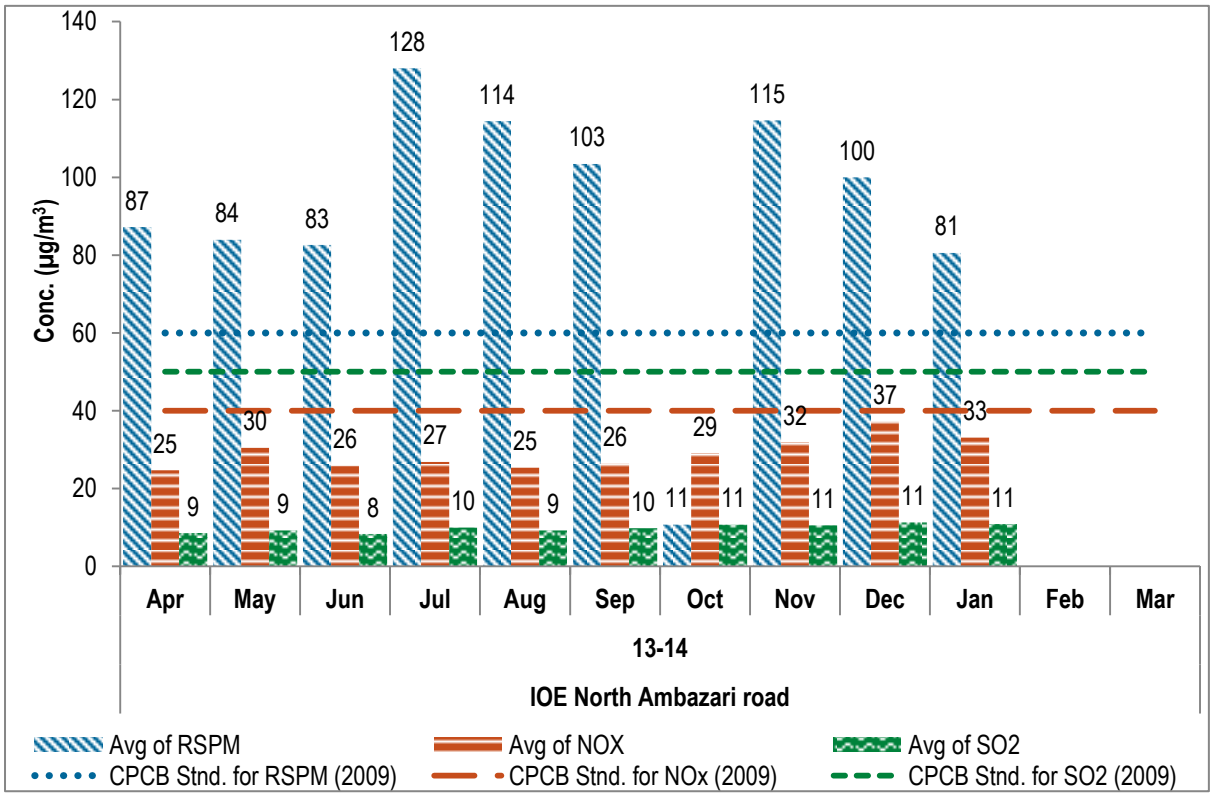


Figure No. 123: Monthly average reading recorded at -IOE North Ambazari road

Table No. 104: Data for annual average trend of RSPM, NO_X and SO_2 at IOE North Ambazari road

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
04-05	*77*	52	21	8
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

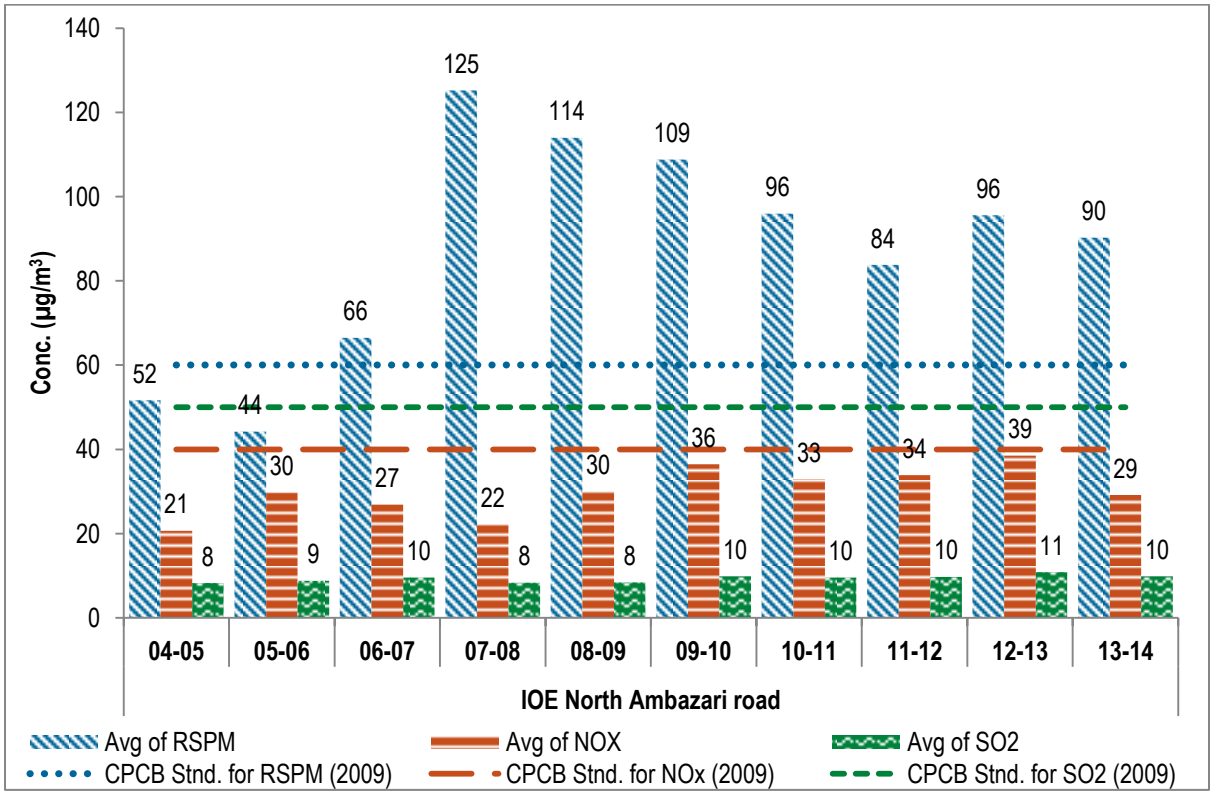


Figure No. 124: Annual average trend of SO_2, NOx and RSPM at -IOE North Ambazari road

Nagpur - MIDC Office, Hingna Road

Table No. 105: Data for monthly average reading recorded at MIDC Office, Hingna Road

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	9	89	29	9
May	9	122	28	9
Jun	7	111	32	10
Jul	8	149	30	11
Aug	10	148	27	10
Sep	9	129	29	10
Oct	9	149	29	11
Nov	9	107	37	11
Dec	9	103	38	12
Jan	8	75	34	11
Feb				
Mar				
Total N		% of exceedence of daily readings for 2013-14		
87		64.4	0.0	0.0

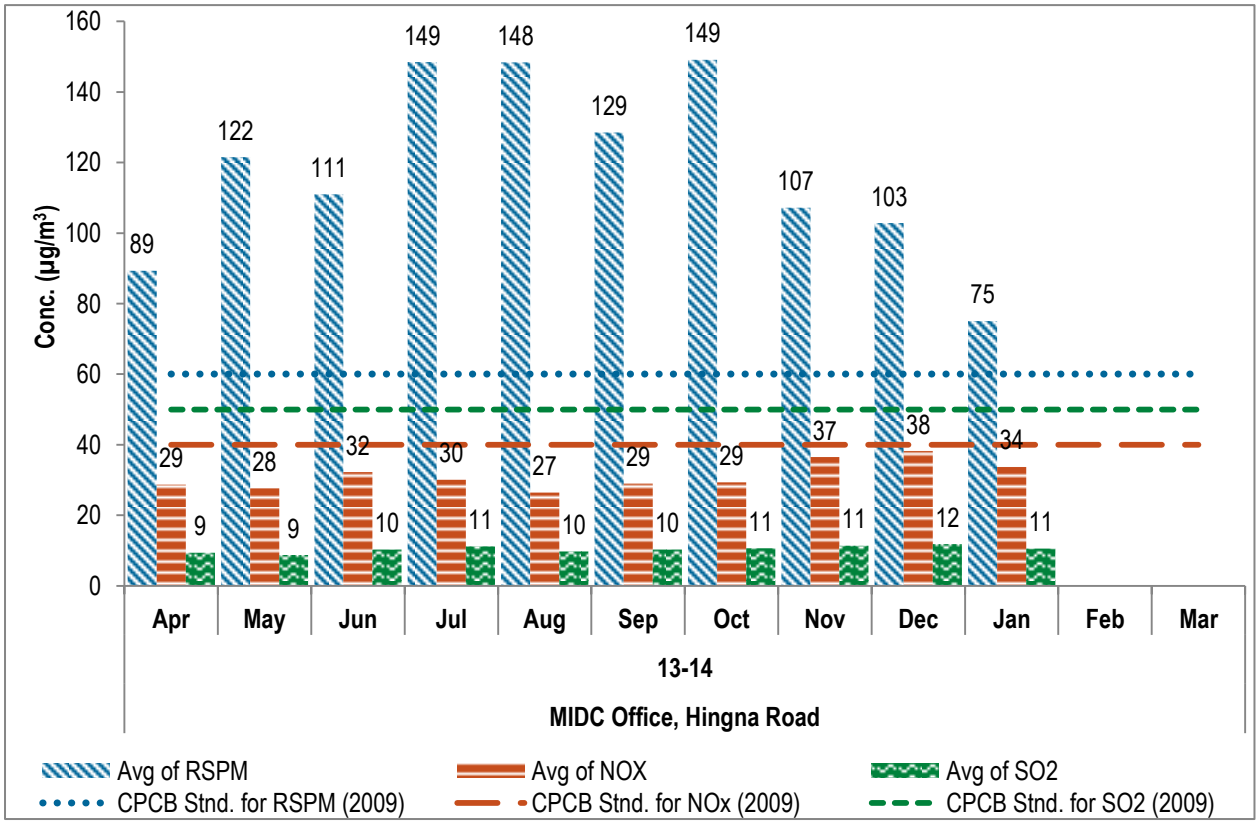


Figure No. 125: Monthly average reading recorded at -MIDC Office, Hingna Road

Table No. 106: Data for annual average trend of RSPM, NO_X and SO_2 at MIDC Office, Hingna Road

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
04-05	*75*	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

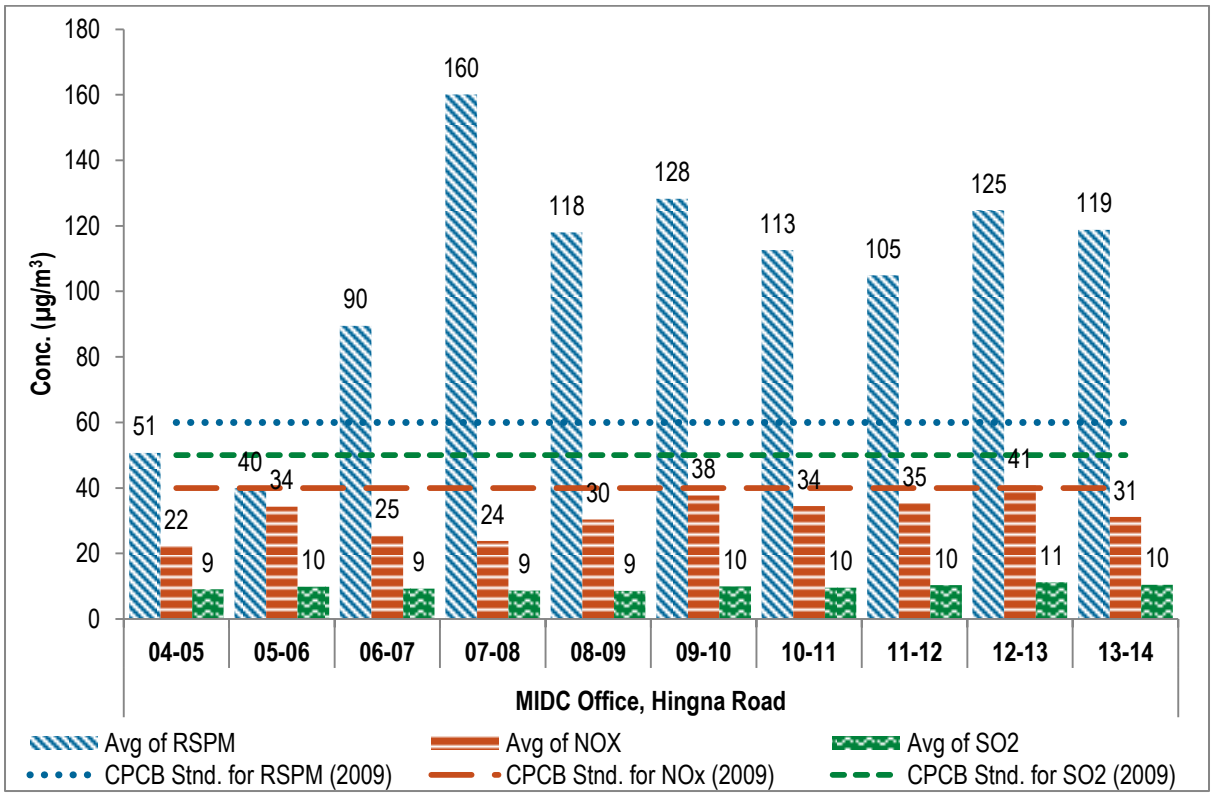


Figure No. 126: Annual average trend of SO_2, NOx and RSPM at -MIDC Office, Hingna Road

Nagpur - Govt Polytechnic Col, Sadar

Table No. 107: Data for monthly average reading recorded at Govt Polytechnic Col, Sadar

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	*10*	84	24	9
May	*9*	88	29	9
Jun	*6*	65	25	8
Jul	*9*	130	28	10
Aug	*8*	100	26	9
Sep	*9*	81	22	8
Oct	*8*	99	25	9
Nov	*11*	103	33	10
Dec	*9*	90	37	11
Jan	*9*	67	29	10
Feb				
Mar				
	Total N	% of exceedence of daily readings for 2013-14		
	88	30.7	0.0	0.0

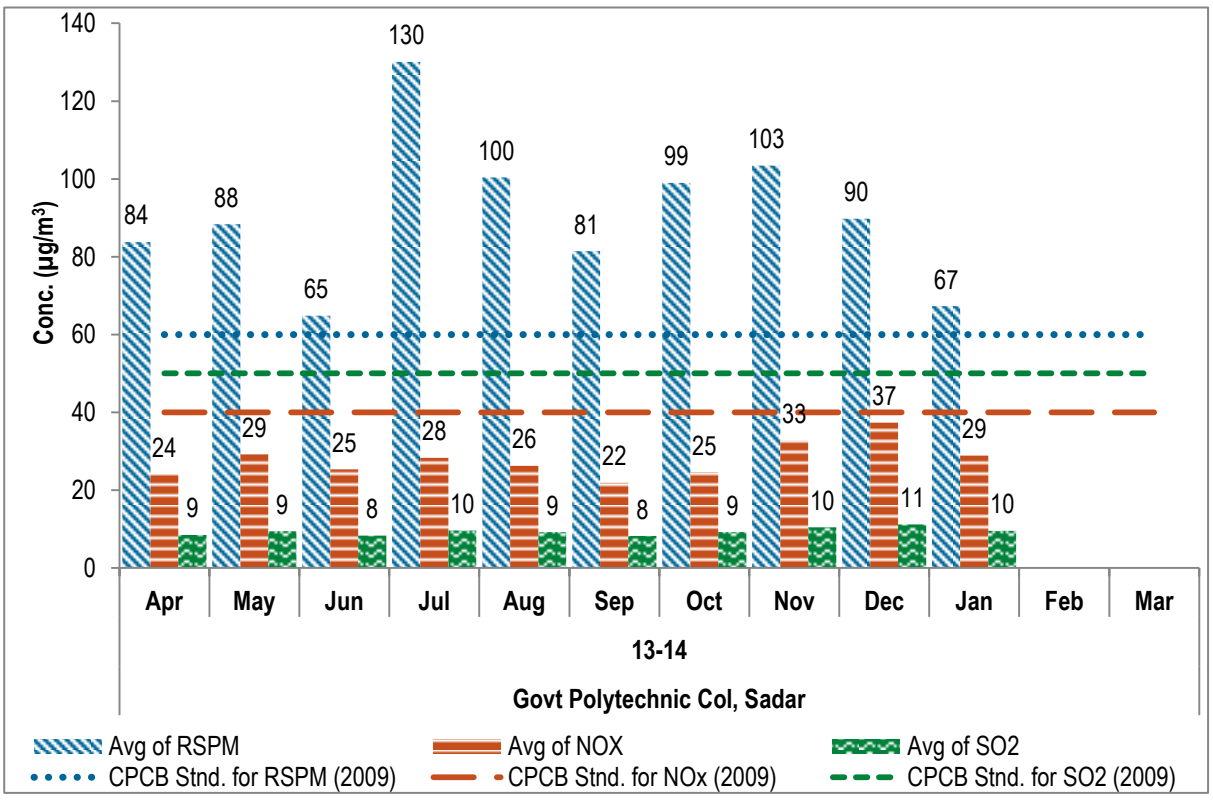


Figure No. 127: Monthly average reading recorded at -Govt Polytechnic Col, Sadar

Table No. 108: Data for annual average trend of RSPM, NO_X and SO_2 at Govt Polytechnic Col, Sadar

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
04-05	*75*	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

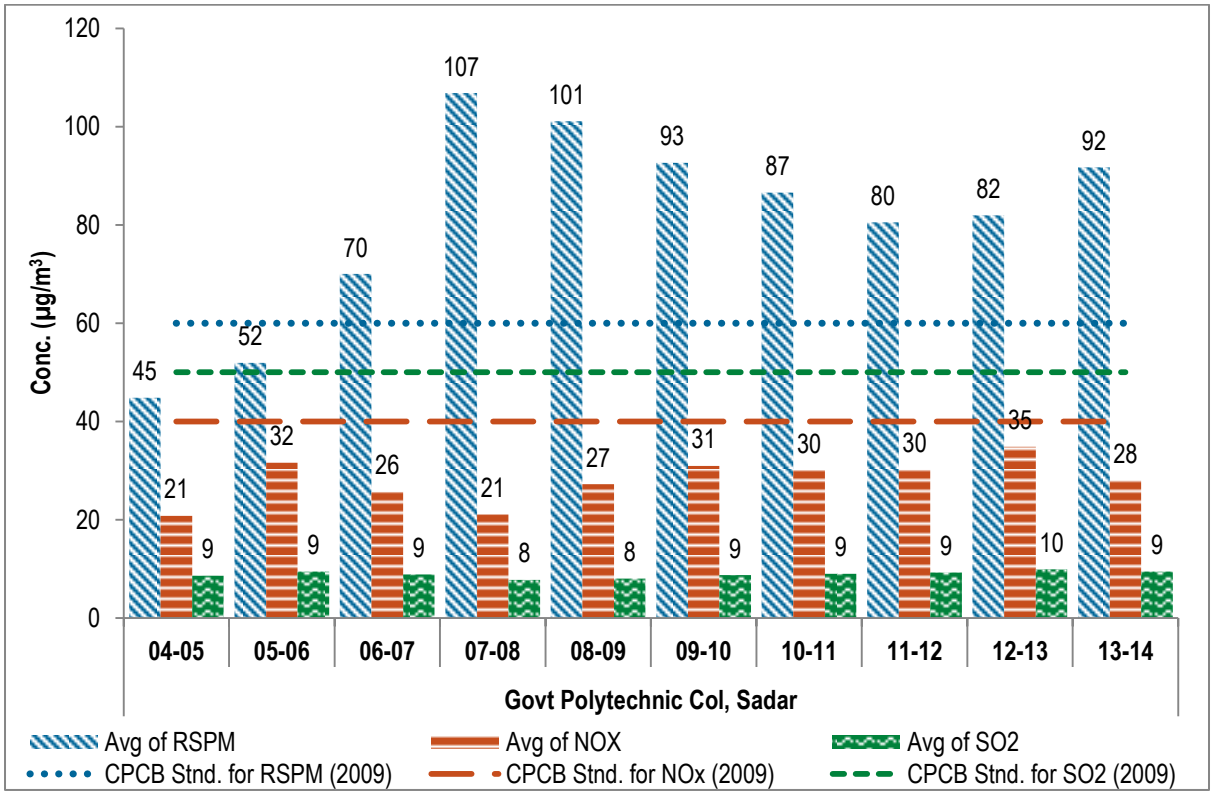


Figure No. 128: Annual average trend of SO_2, NOx and RSPM at -Govt Polytechnic Col, Sadar

Nagpur - Civil lines Nagpur

Table No. 109: Data for monthly average reading recorded at Civil lines Nagpur

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	24	60	25	9
May	25	55	21	8
Jun	21	52	21	8
Jul	23	56	21	8
Aug	26	56	22	9
Sep	24	57	22	9
Oct	25	64	22	9
Nov	25	76	30	11
Dec	27	59	29	10
Jan	24	63	27	10
Feb	22	66	27	10
Mar	23	64	27	10
Total N		% of exceedence of daily readings for 2013-14		
289		2.1	0.0	0.0

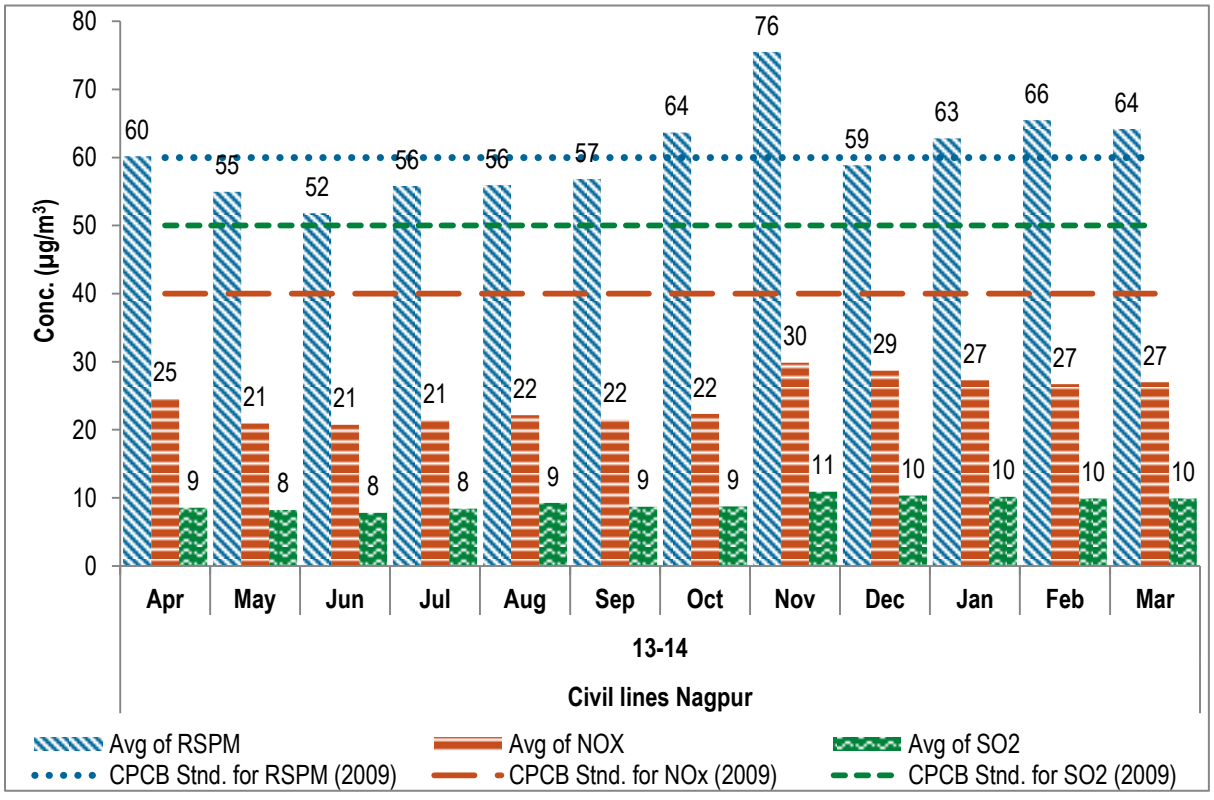


Figure No. 129: Monthly average reading recorded at -Civil lines Nagpur

Table No. 110: Data for annual average trend of RSPM, NO_X and SO_2 at Civil lines Nagpur

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
04-05	*200*	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

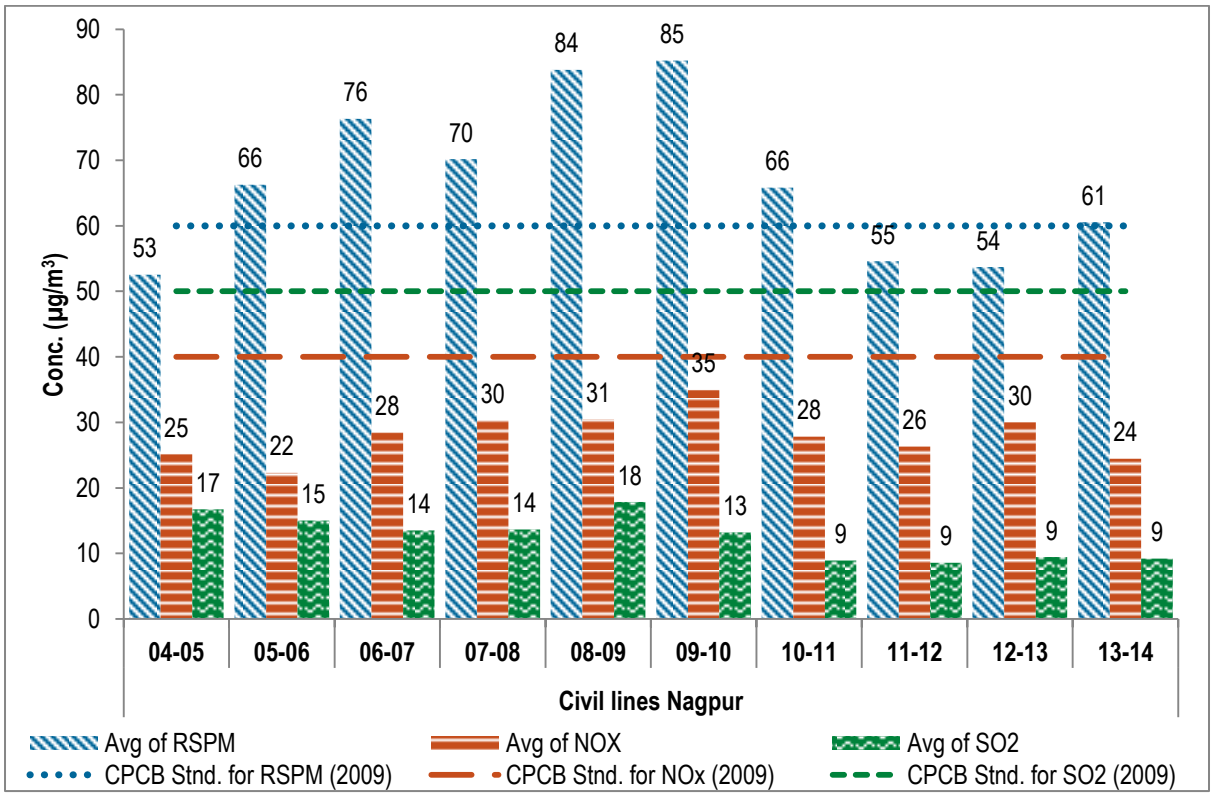


Figure No. 130: Annual average trend of SO_2, NOx and RSPM at -Civil lines

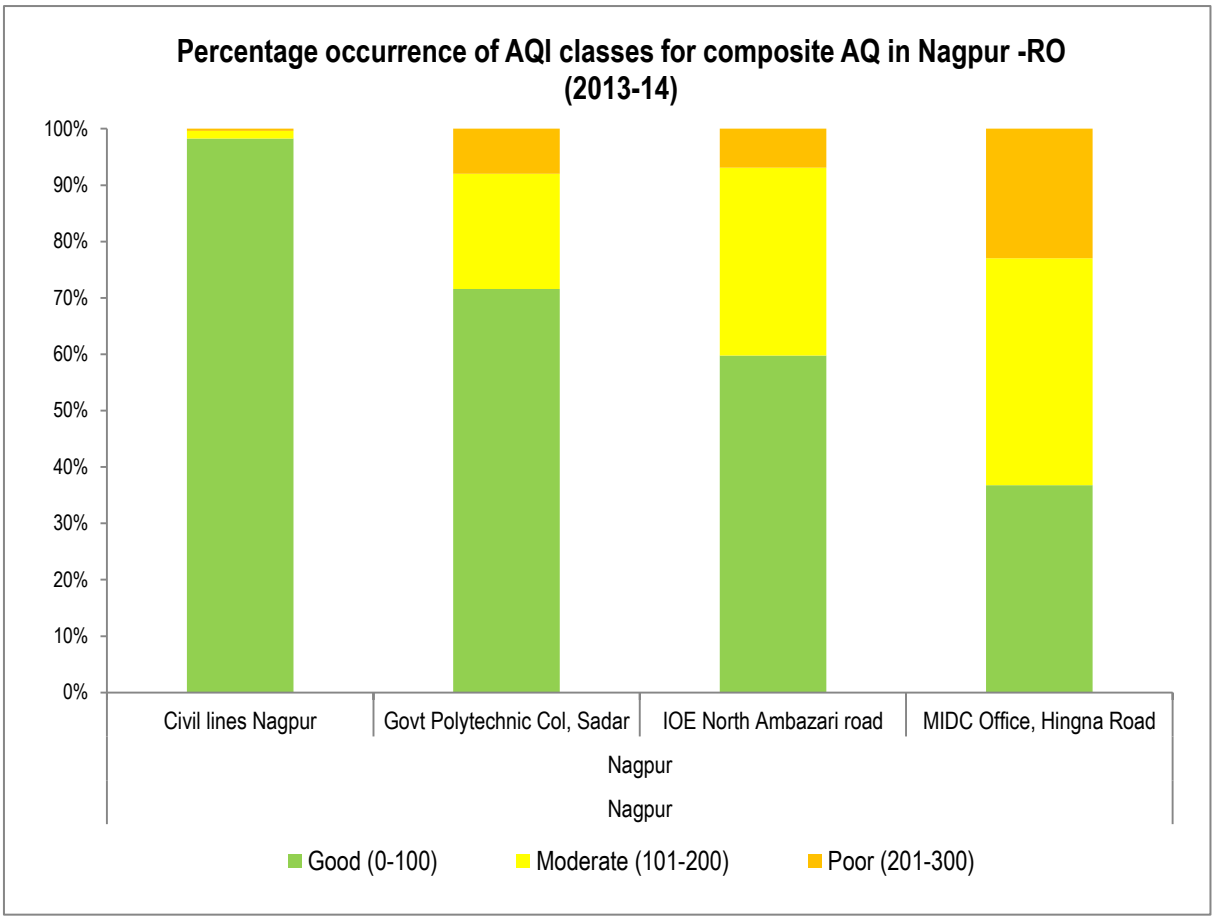
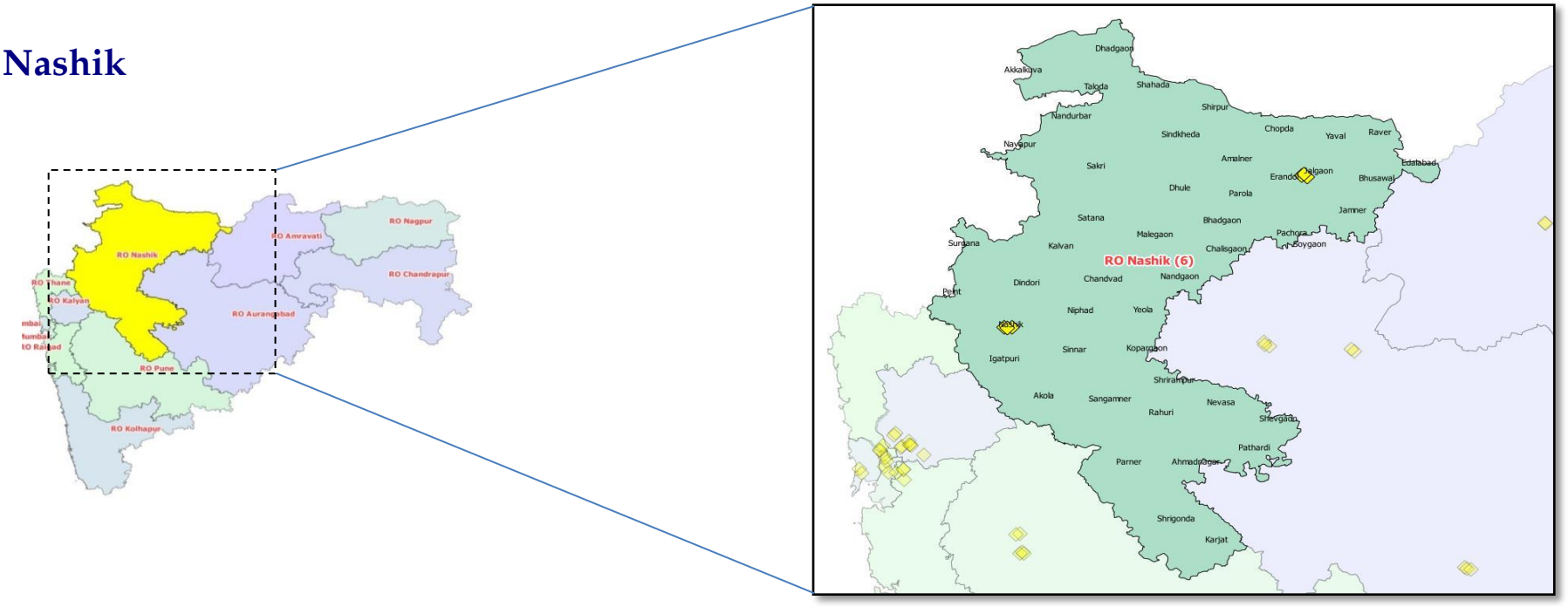


Figure No. 131: Percentage occurrence of AQI classes for composite AQ in Nagpur-RO (2013-14)

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. 111: Data for monthly average reading recorded at Old B. J. Market

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	*10*	163	52	22
May	*8*	142	55	18
Jun	*6*	97	32	14
Jul	*8*	98	31	14
Aug				
Sep	*8*	106	35	16
Oct	*16*	119	38	19
Nov	*8*	114	38	19
Dec	*9*	110	38	19
Jan	*8*	106	40	20
Feb	*7*	109	42	22
Mar	*9*	122	43	23
	Total N	% of exceedence of daily readings for 2013-14		
	97	83.5	0.0	0.0

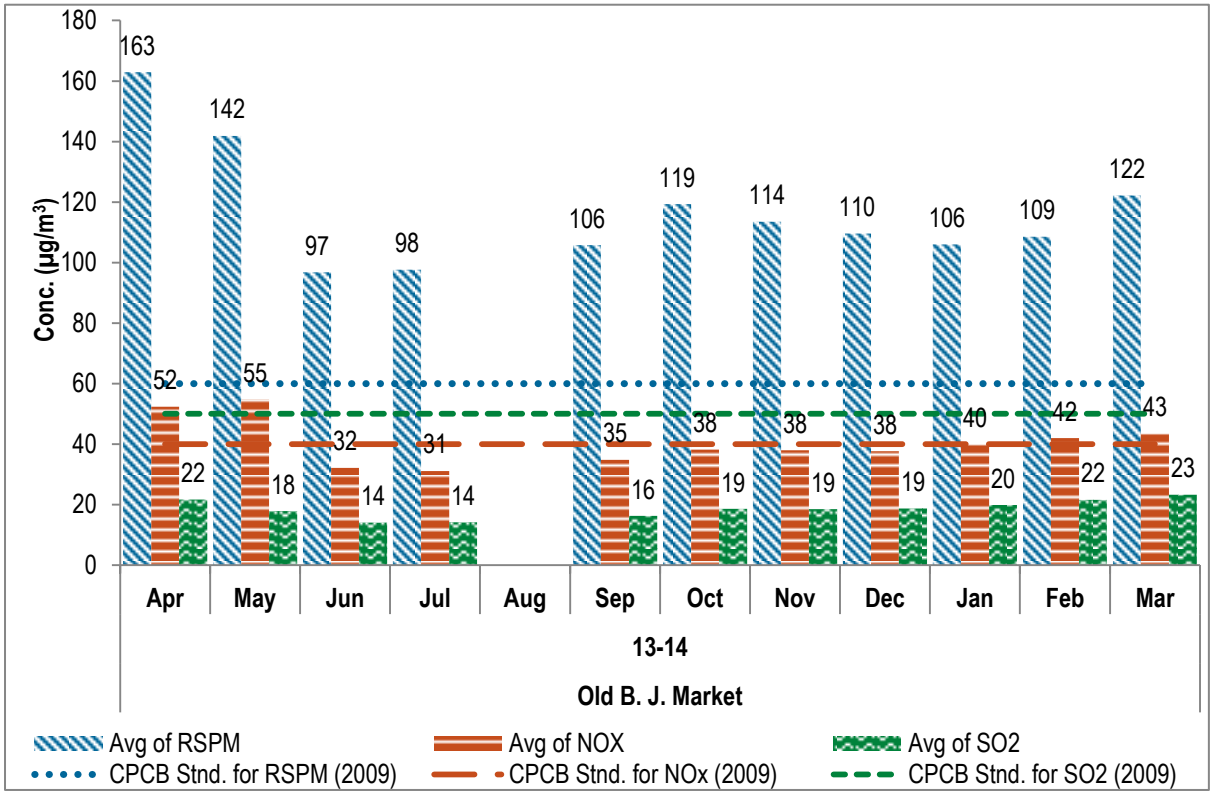


Figure No. 132: Monthly average reading recorded at- Old B. J. Market

Table No. 112: Data for annual average trend of RSPM, NO_X and SO_2 at Old B. J. Market

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

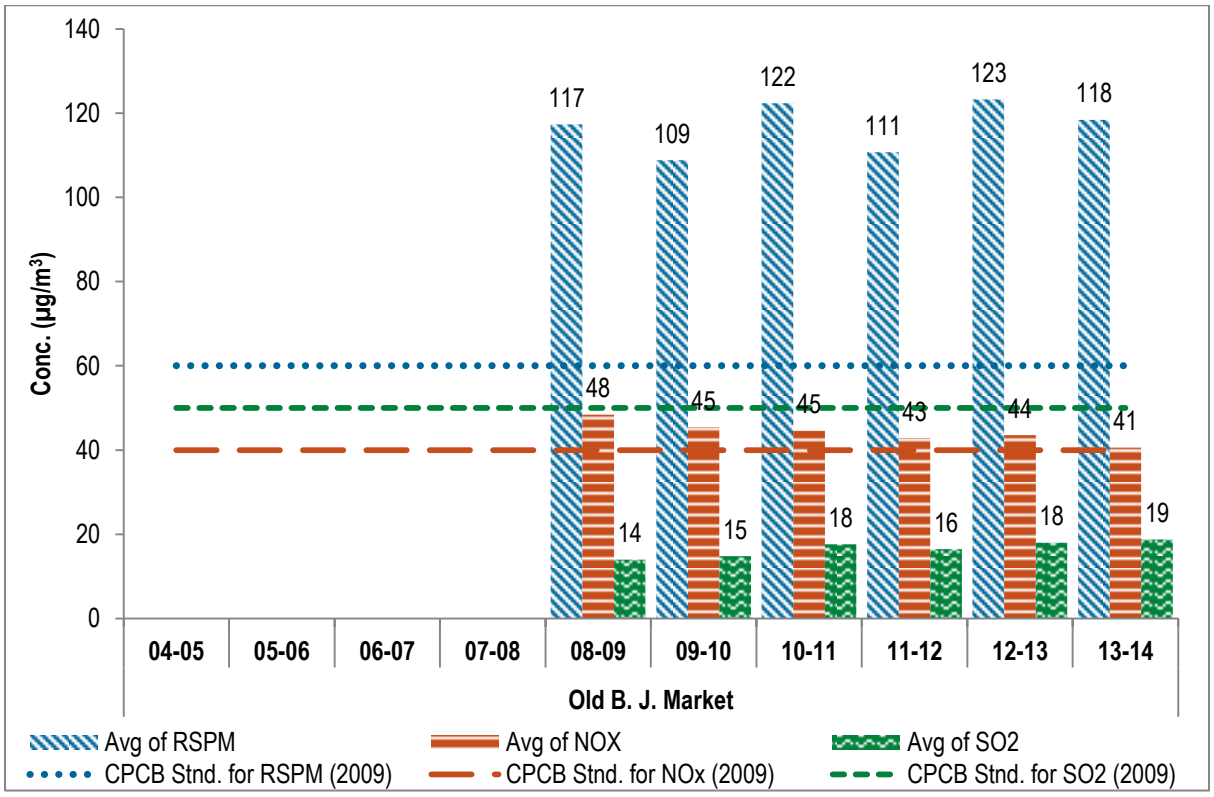


Figure No. 133: Annual average trend of SO_2, NOx and RSPM at -Old B. J. Market

Jalgaon - Girna Water Tank

Table No. 113: Data for monthly average reading recorded at Girna Water Tank

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	*8*	157	48	18
May	*8*	147	44	17
Jun	*6*	105	31	13
Jul	*7*	102	30	12
Aug	*8*	98	31	13
Sep	*7*	106	34	15
Oct	*9*	108	35	16
Nov	*10*	114	36	18
Dec	*8*	108	37	17
Jan	*9*	108	38	18
Feb	*7*	115	40	21
Mar	*9*	117	40	21
	Total N	**% of exceedence of daily readings for 2013-14**		
	96	**81.3**	0.0	0.0

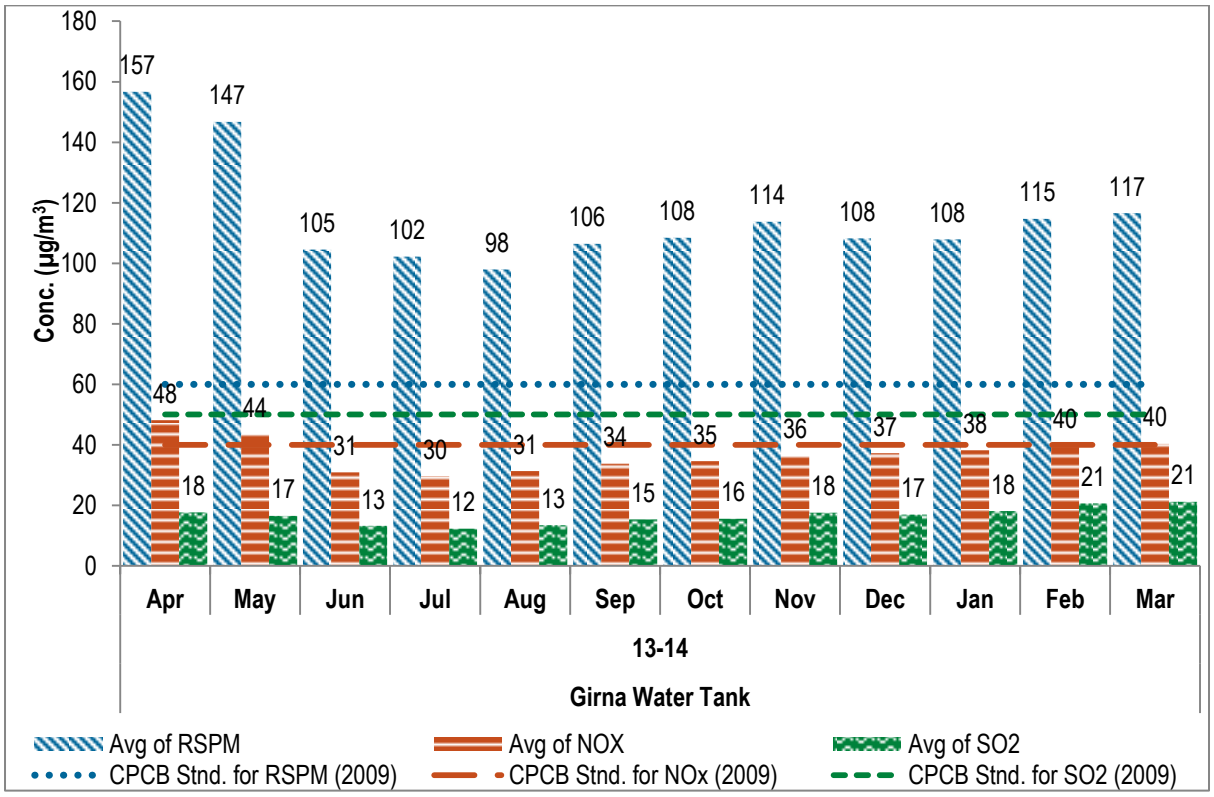


Figure No. 134: Monthly average reading recorded at -Girna Water Tank

Table No. 114: Data for annual average trend of RSPM, NO_X and SO_2 at Girna Water Tank

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

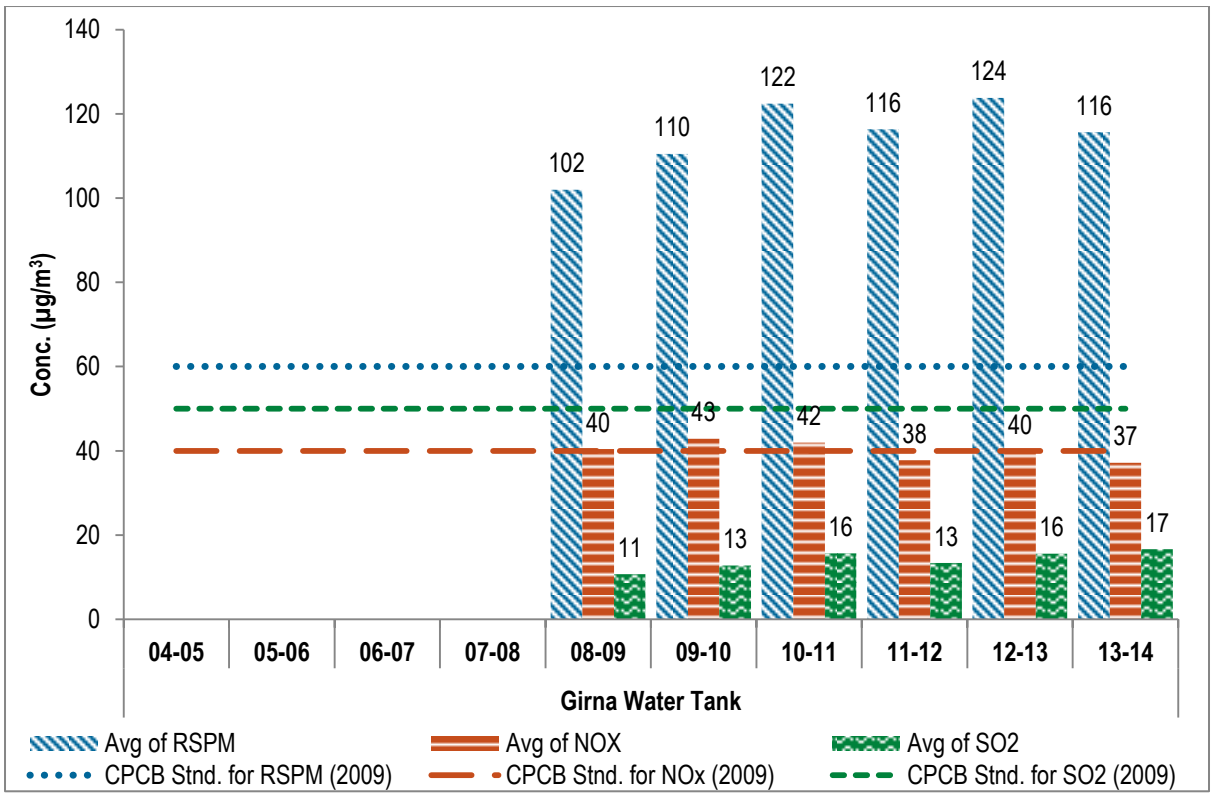


Figure No. 135: Annual average trend of SO_2, NOx and RSPM at -Girna Water Tank

Jalgaon - MIDC Jalgaon

Table No. 115: Data for monthly average reading recorded at MIDC Jalgaon

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	*8*	175	59	30
May	*10*	164	56	27
Jun	*5*	116	36	16
Jul	*6*	119	35	15
Aug	*6*	128	36	16
Sep	*8*	135	41	20
Oct	*10*	134	42	21
Nov	*8*	128	43	23
Dec	*8*	121	44	24
Jan	*10*	112	44	24
Feb	*8*	118	47	24
Mar	*8*	124	48	25
	Total N	**% of exceedence of daily readings for 2013-14**		
	95	**94.7**	0.0	0.0

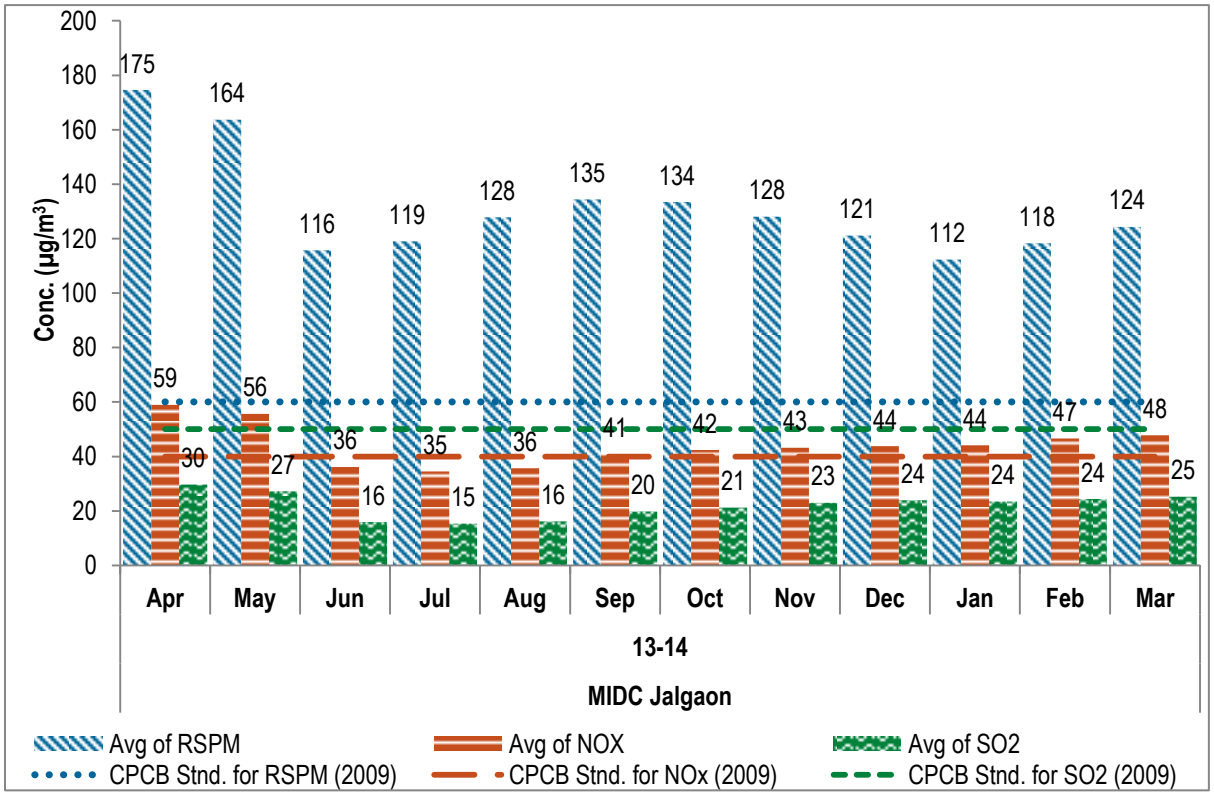


Figure No. 136: Monthly average reading recorded at -MIDC Jalgaon

Table No. 116: Data for annual average trend of RSPM, NO_X and SO_2 at MIDC Jalgaon

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

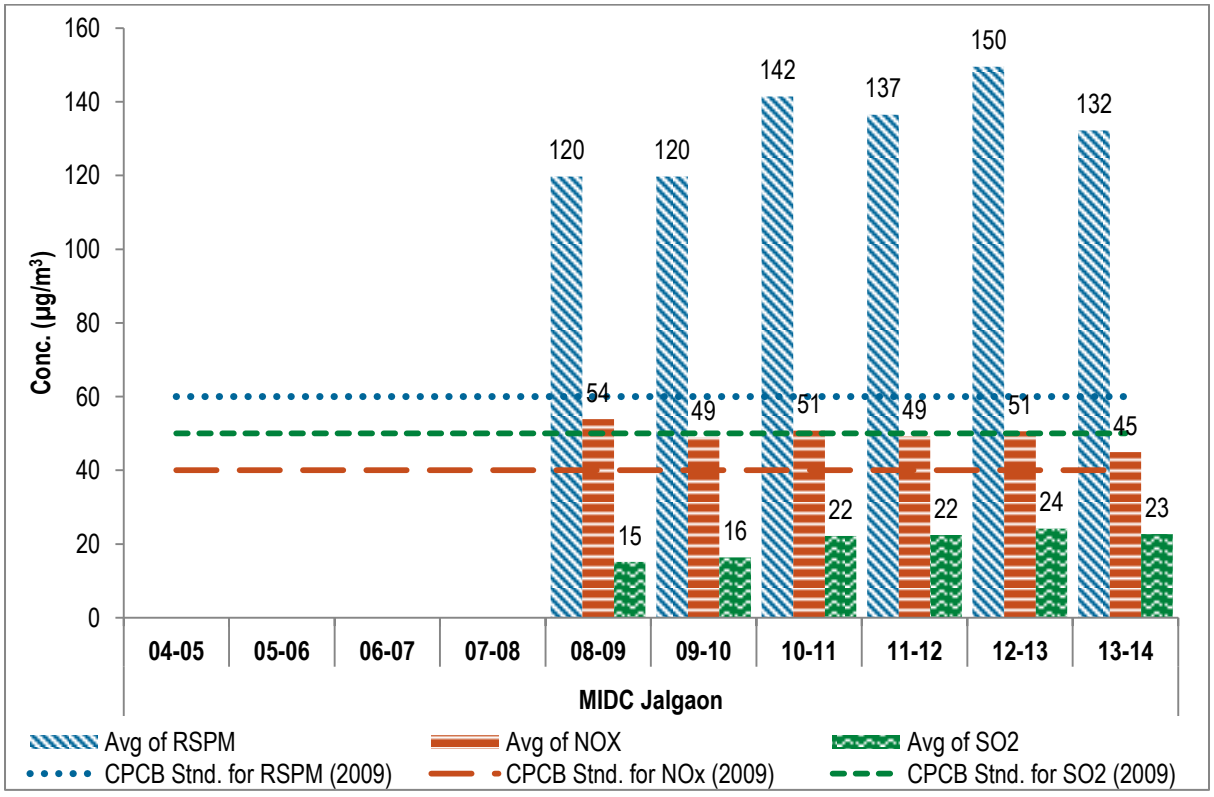


Figure No. 137: Annual average trend of SO_2, NOx and RSPM at -MIDC Jalgaon

Nashik - RTO Colony

Table No. 117: Data for monthly average reading recorded at RTO Colony

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	9	93	31	30
May	9	98	29	28
Jun	8	76	30	31
Jul	9	74	28	29
Aug	9	42	27	25
Sep	8	39	26	26
Oct	9	83	27	26
Nov	9	84	29	31
Dec	9	60	26	25
Jan	9	53	27	25
Feb	8	76	27	27
Mar				
	Total N	% of exceedence of daily readings for 2013-14		
	96	17.7	0.0	0.0

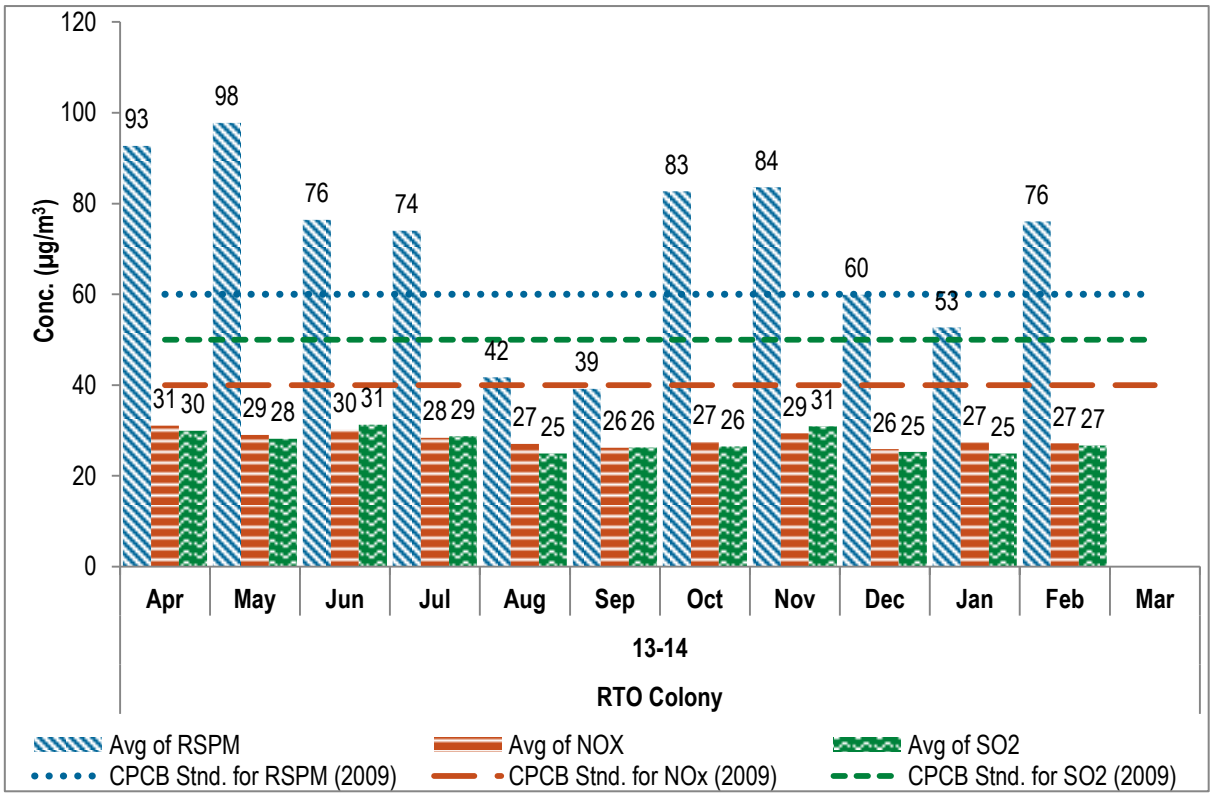


Figure No. 138: Monthly average reading recorded at -RTO Colony

Table No. 118: Data for annual average trend of RSPM, NO_X and SO_2 at RTO Colony

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
04-05	*25*	79	25	33
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

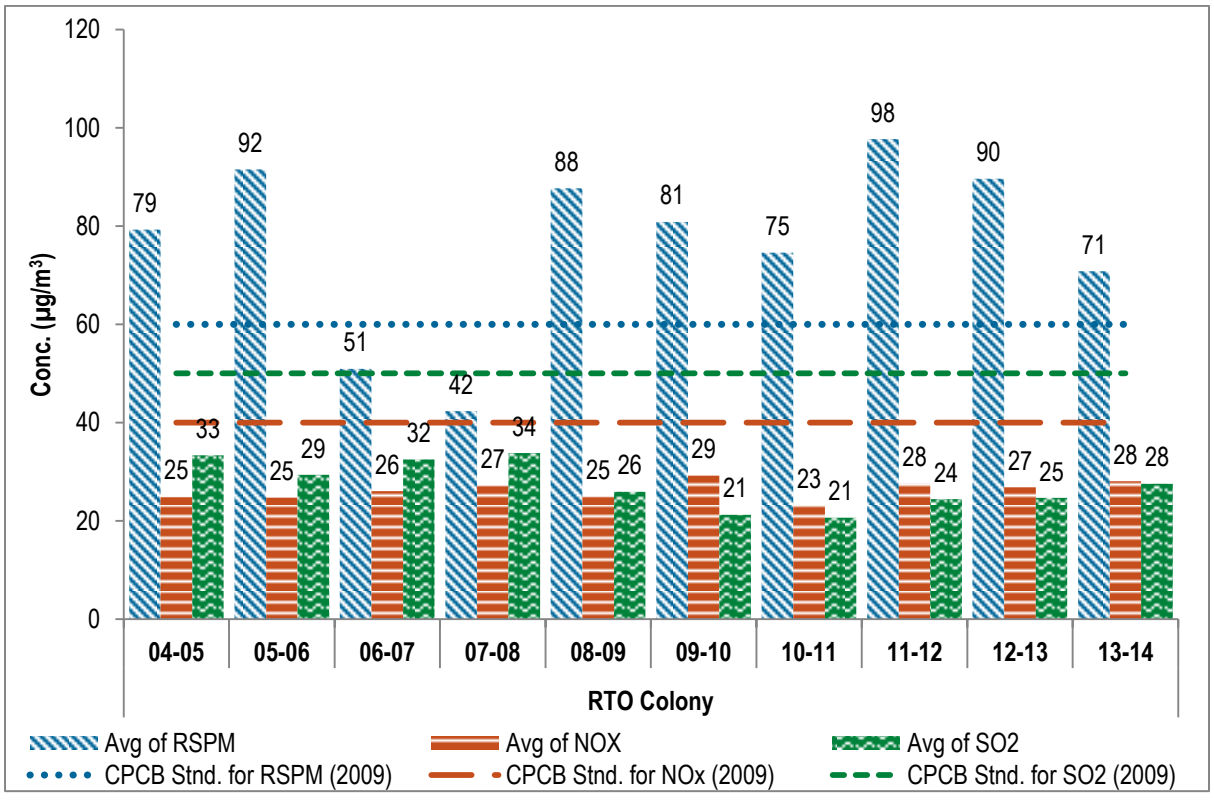


Figure No. 139: Annual average trend of SO_2, NOx and RSPM at -RTO Colony

Nashik - MIDC Satpur - VIP

Table No. 119: Data for monthly average reading recorded at MIDC Satpur - VIP

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	8	96	31	30
May	9	99	29	27
Jun	9	83	32	29
Jul	9	74	28	27
Aug	9	48	26	27
Sep	8	47	26	27
Oct	9	65	29	28
Nov	9	84	31	27
Dec	8	55	26	25
Jan	9	51	26	26
Feb	8	83	24	26
Mar				
Total N		% of exceedence of daily readings for 2013-14		
95		20.0	0.0	0.0

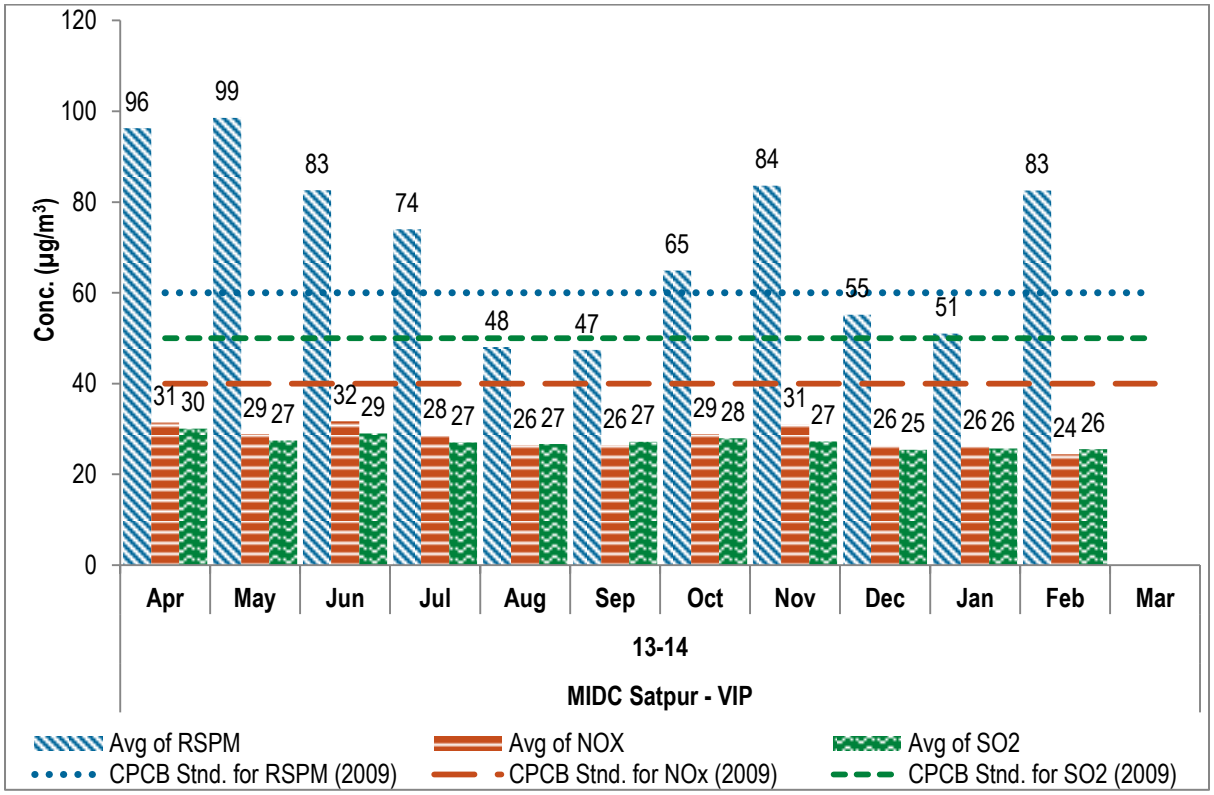


Figure No. 140: Monthly average reading recorded at MIDC Satpur - VIP

Table No. 120: Data for annual average trend of RSPM, NO_X and SO_2 at MIDC Satpur - VIP

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
04-05	*25*	90	27	36
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

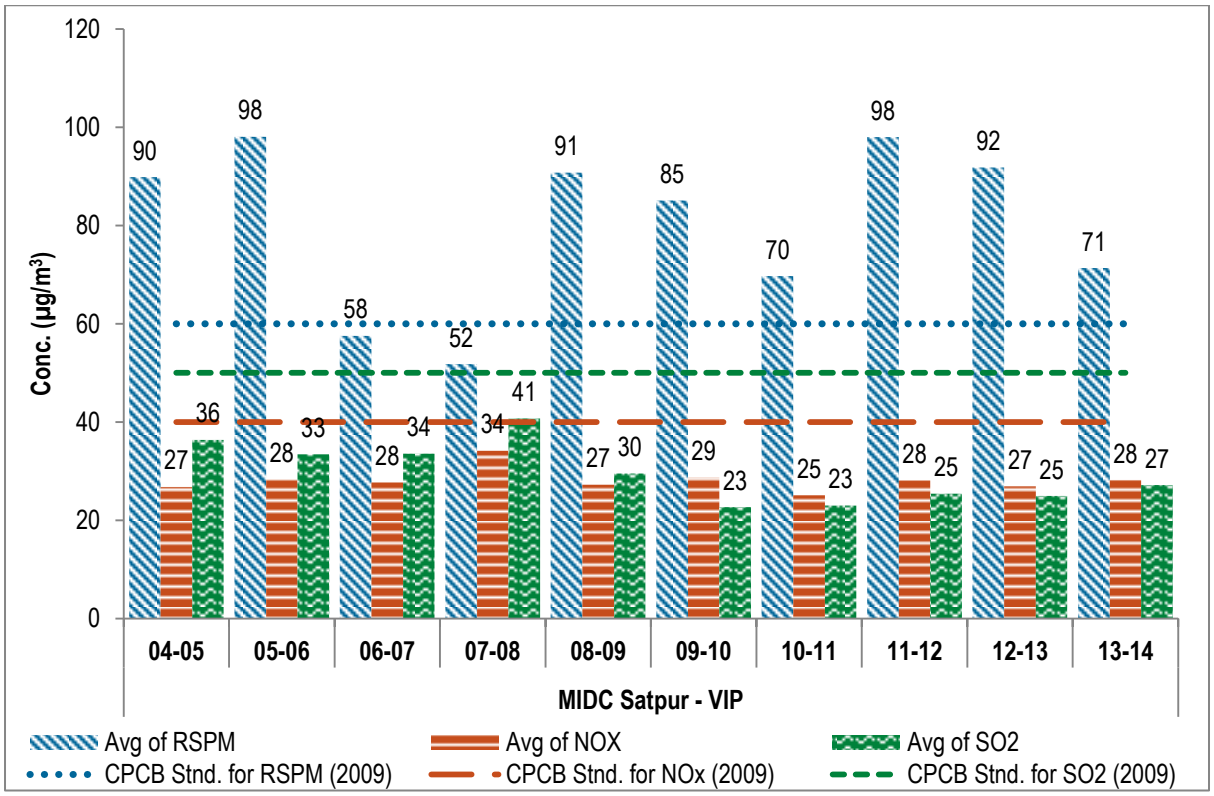


Figure No. 141: Annual average trend of SO_2, NOx and RSPM at MIDC Satpur - VIP

Nashik – NMC Nashik

Table No. 121: Data for monthly average reading recorded at NMC Nashik

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	9	90	31	30
May	9	89	31	28
Jun	8	78	29	31
Jul	9	68	28	28
Aug	8	57	27	26
Sep	9	44	27	27
Oct	9	75	28	27
Nov	8	95	32	30
Dec	9	56	26	24
Jan	9	55	28	26
Feb	8	70	26	25
Mar				
Total N		% of exceedence of daily readings for 2013-14		
95		7.4	0.0	0.0

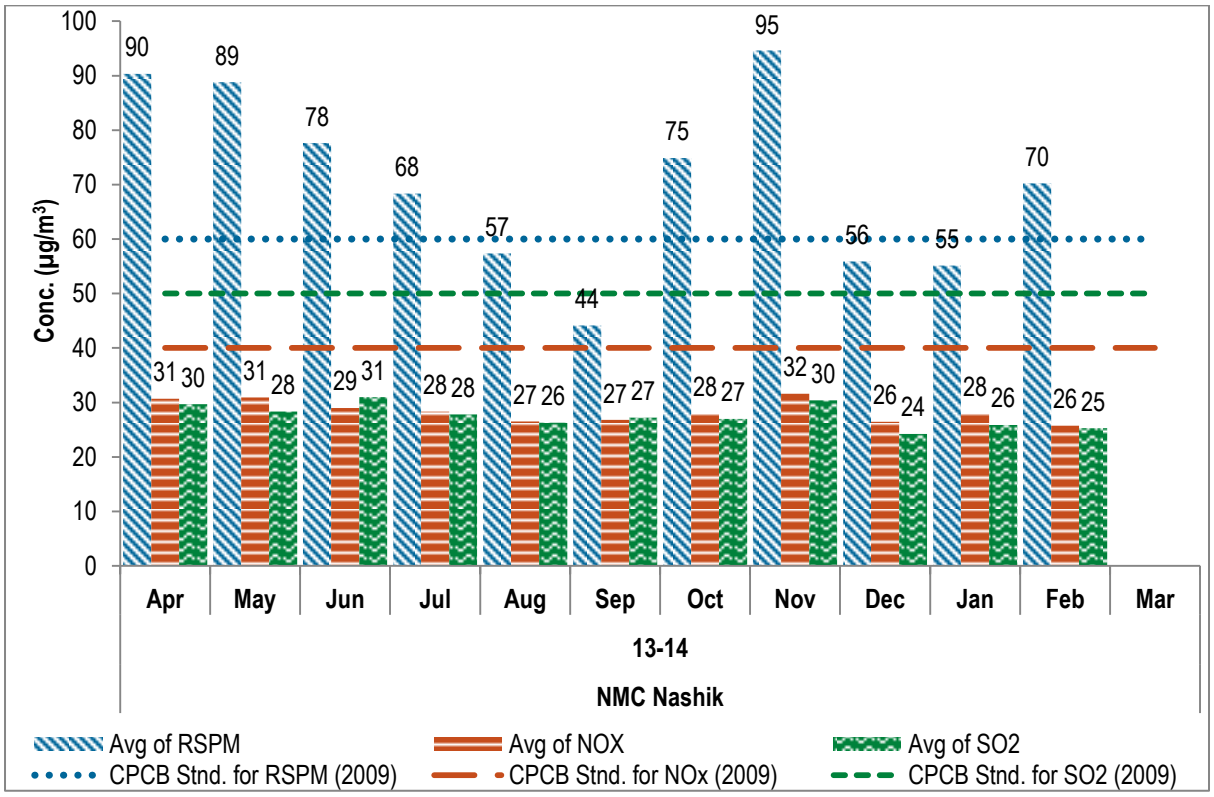


Figure No. 142: Monthly average reading recorded at - NMC Nashik

Table No. 122: Data for annual average trend of RSPM, NO_X and SO_2 at NMC Nashik

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
04-05				
05-06				
06-07				
07-08				
08-09				
09-10				
10-11				
11-12				
12-13				
13-14	*95*	70	28	28

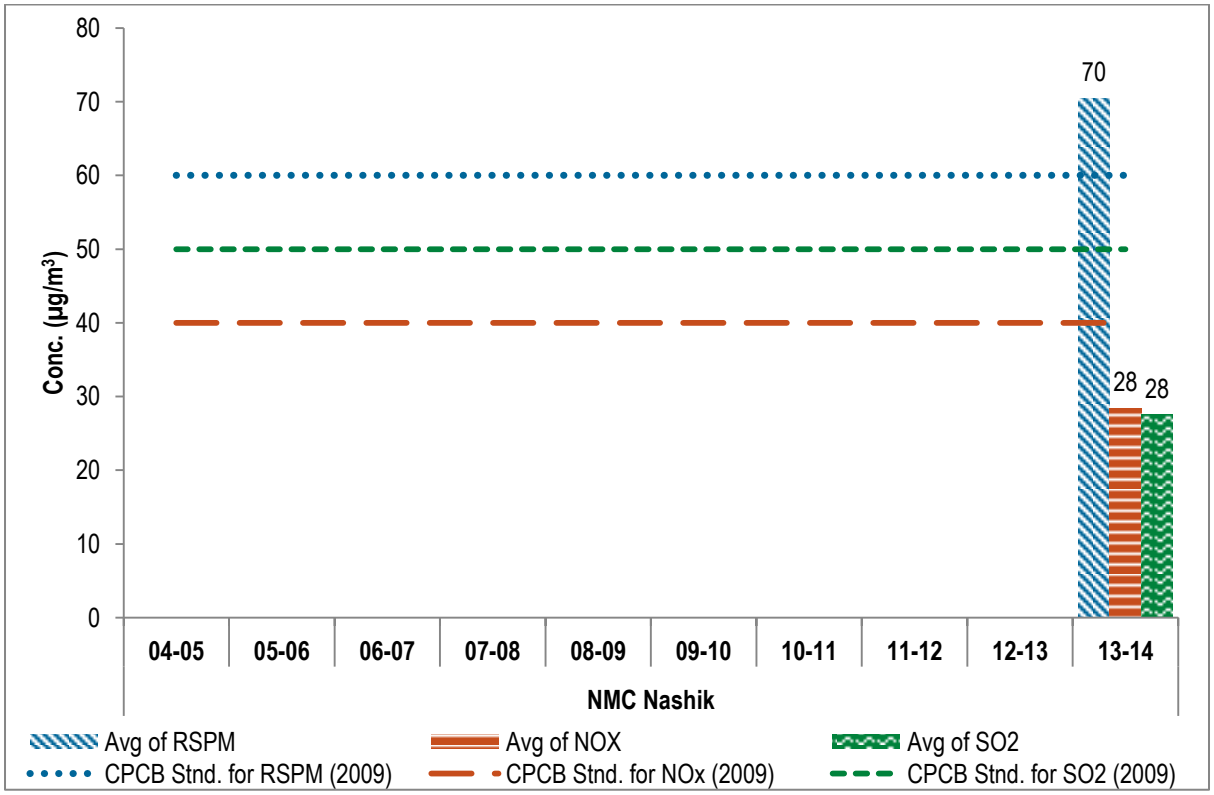


Figure No. 143: Annual average trend of SO_2, NOx and RSPM at - NMC Nashik

Nashik - SRO Office Nashik

Table No. 123: Data for monthly average reading recorded at- SRO Office Nashik

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	*26*	101	31	30
May	*11*	116	29	28
Jun	*25*	84	31	32
Jul	*17*	54	31	27
Aug	*26*	60	27	27
Sep				
Oct	*27*	63	28	27
Nov	*26*	80	30	30
Dec	*26*	62	26	25
Jan	*27*	98	25	25
Feb	*24*	80	25	25
Mar				
	Total N	% of exceedence of daily readings for 2013-14		
	235	24.7	0.0	0.0

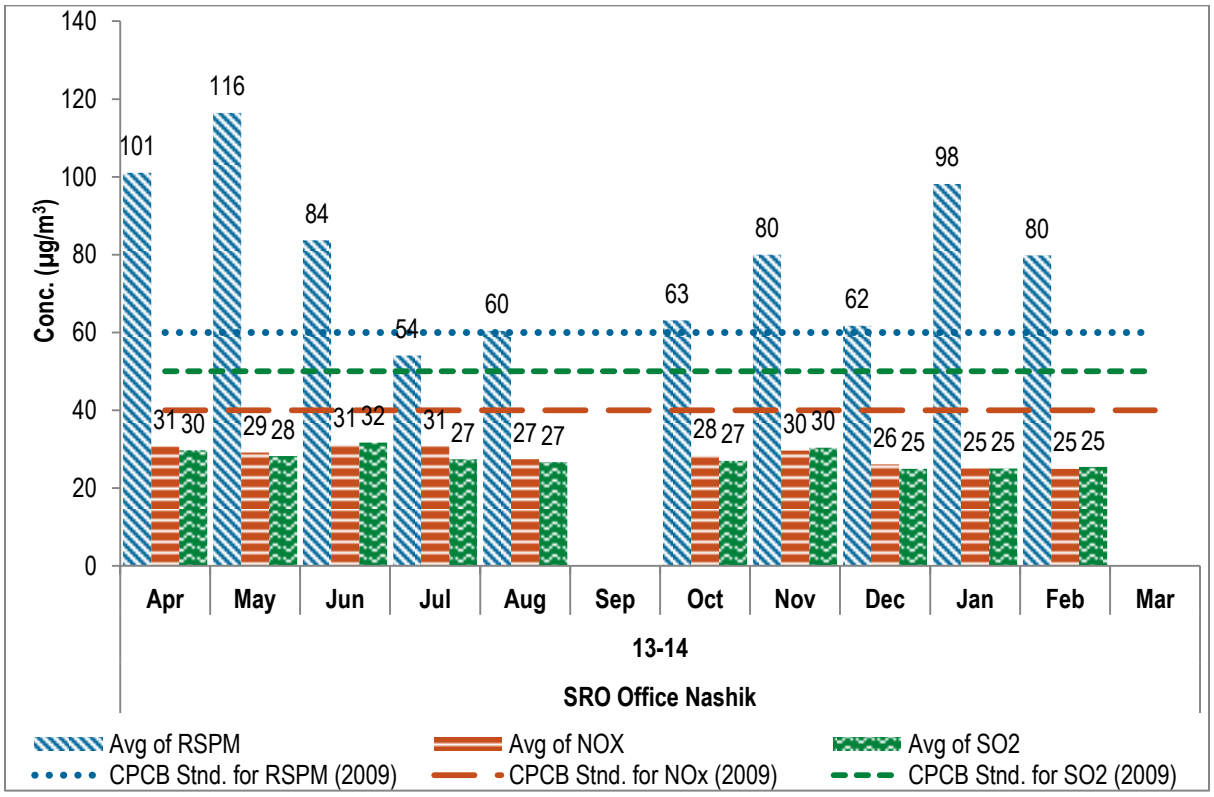


Figure No. 144: Monthly average reading recorded at -SRO Office Nashik

Table No. 124: Data for annual average trend of RSPM, NO_X and SO_2 at -SRO Office Nashik

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
04-05	*167*	**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

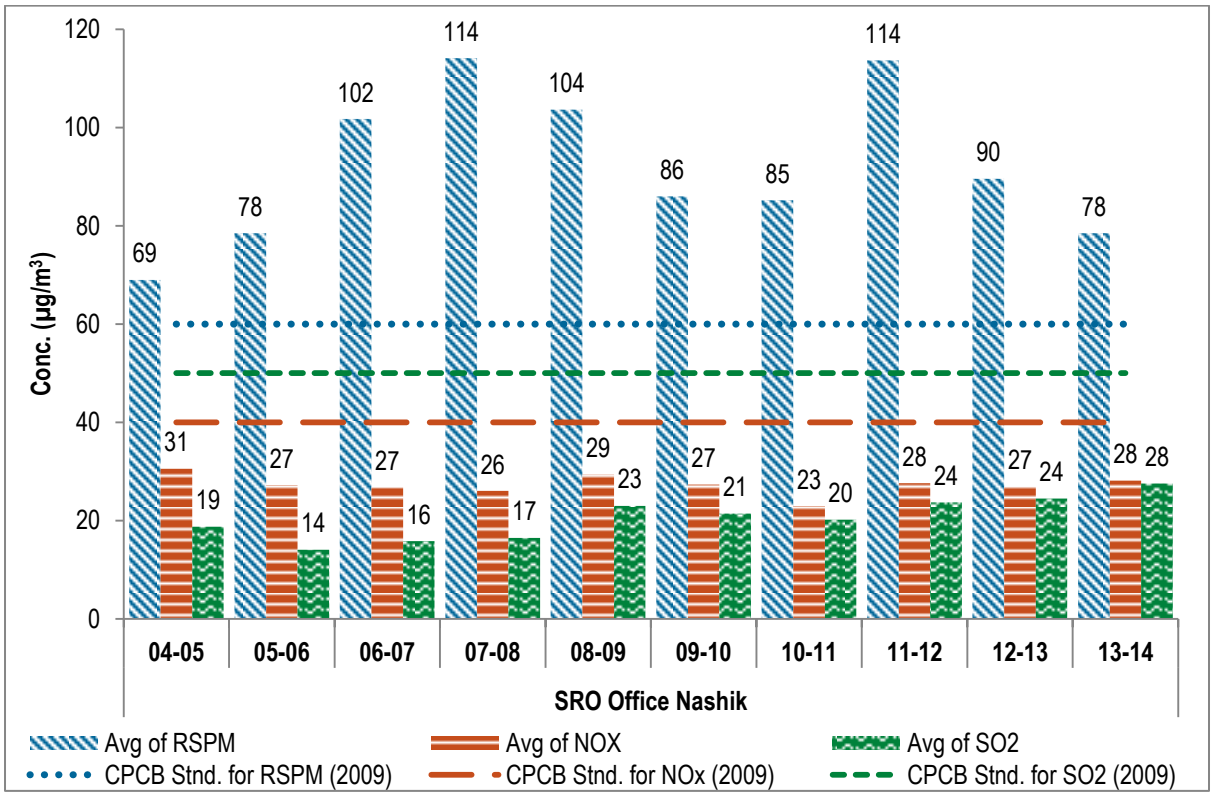


Figure No. 145: Annual average trend of SO_2, NOx and RSPM at -SRO Office Nashik

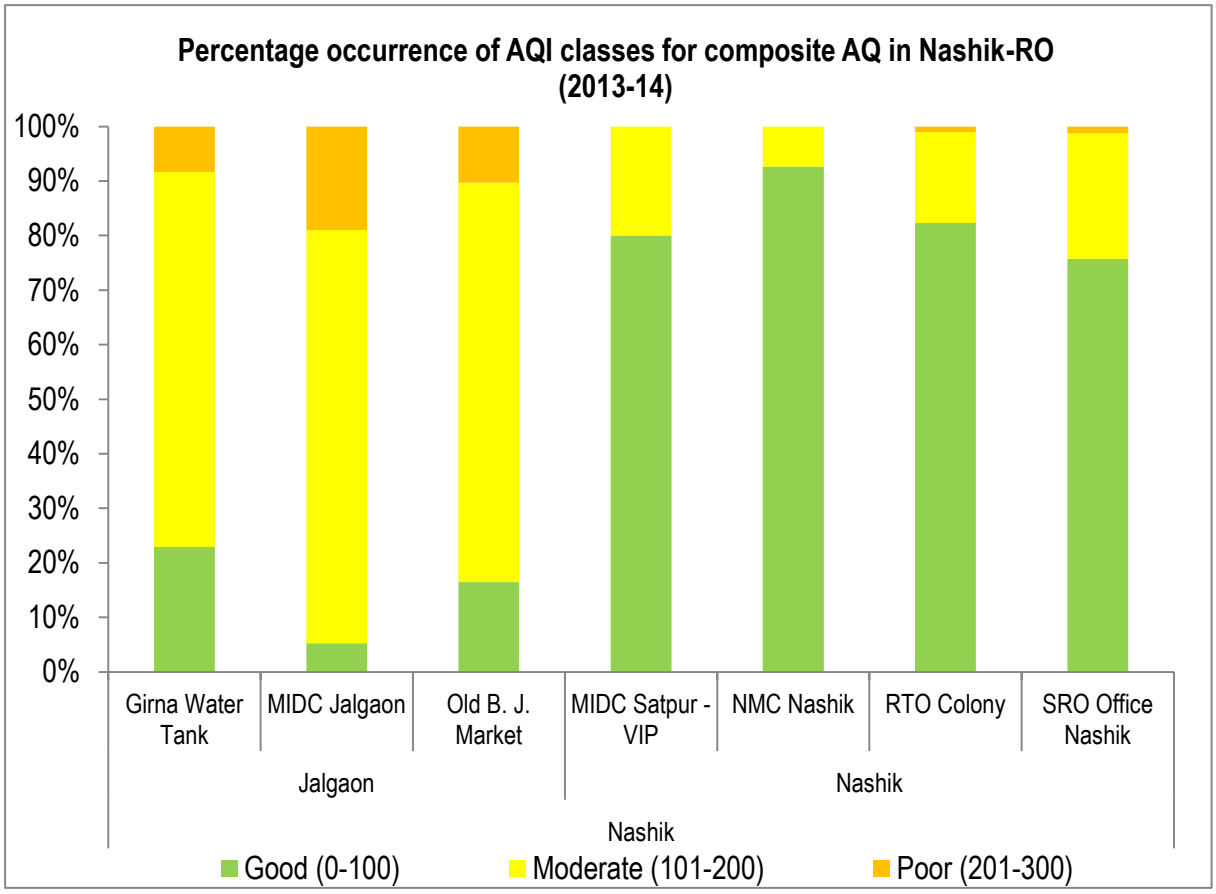
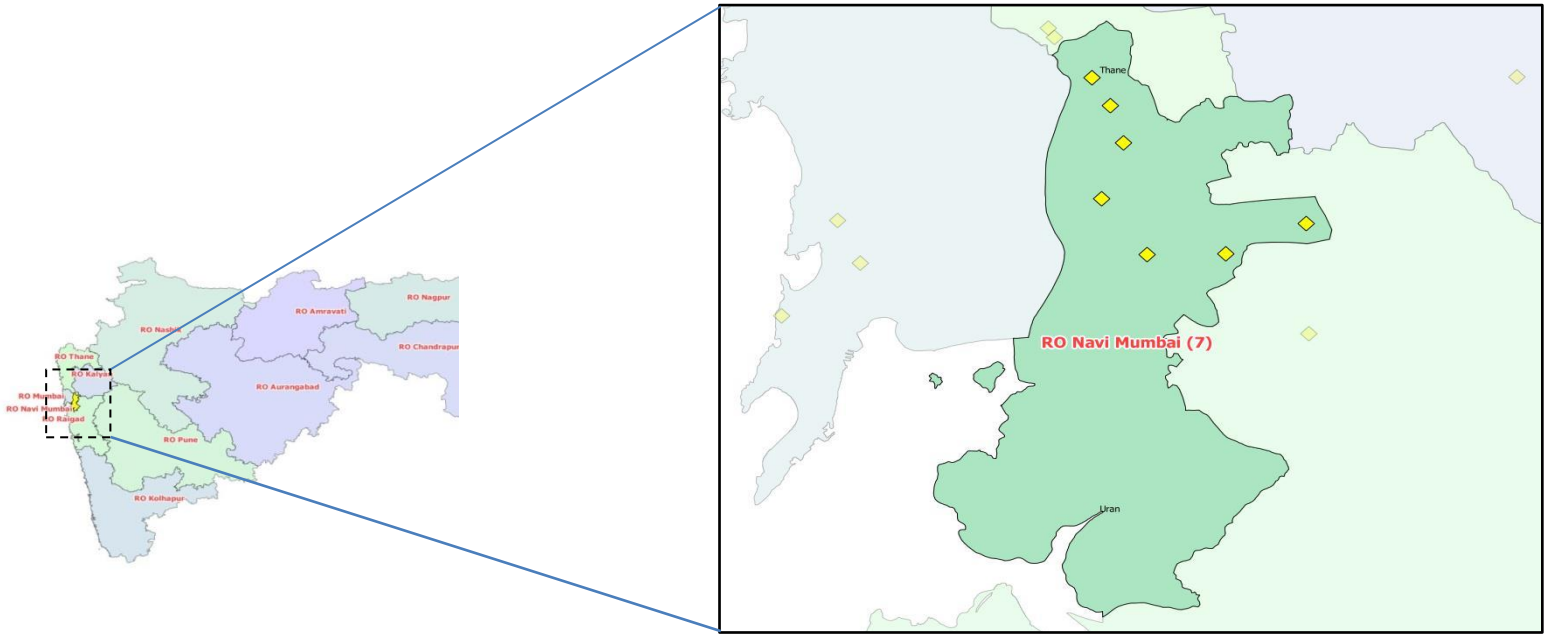


Figure No. 146: Percentage occurrence of AQI classes for composite AQ in Nashik-RO (2013-14)

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. 125: Data for monthly average reading recorded at Rabale

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	9	71	53	20
May	9	61	51	20
Jun	7	37	28	12
Jul	9	30	31	13
Aug				
Sep	8	56	38	17
Oct	9	94	51	19
Nov	9	82	48	20
Dec	9	84	50	21
Jan	5	192	50	21
Feb				
Mar	7	256	44	20
Total N		% of exceedence of daily readings for 2013-14		
81		23.5	0.0	0.0

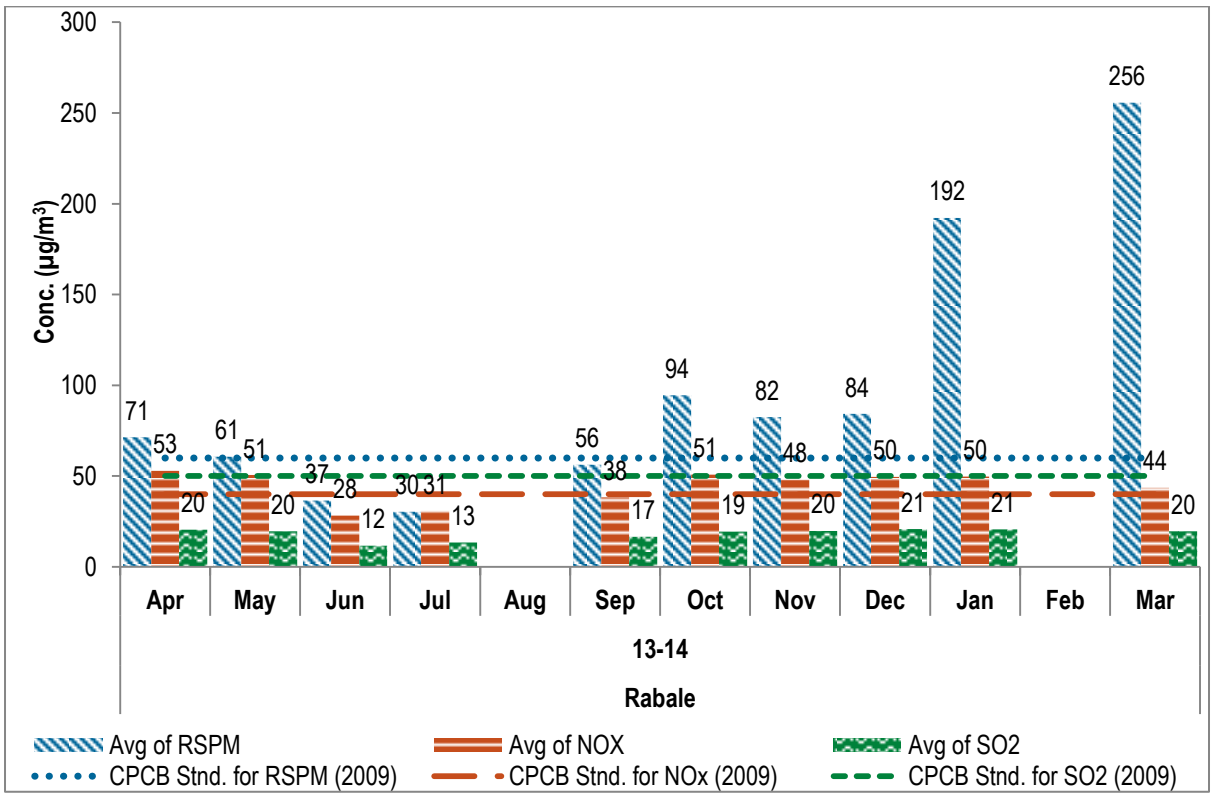


Figure No. 147: Monthly average reading recorded at -Rabale

Table No. 126: Data for annual average trend of RSPM, NO_X and SO_2 at Rabale

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

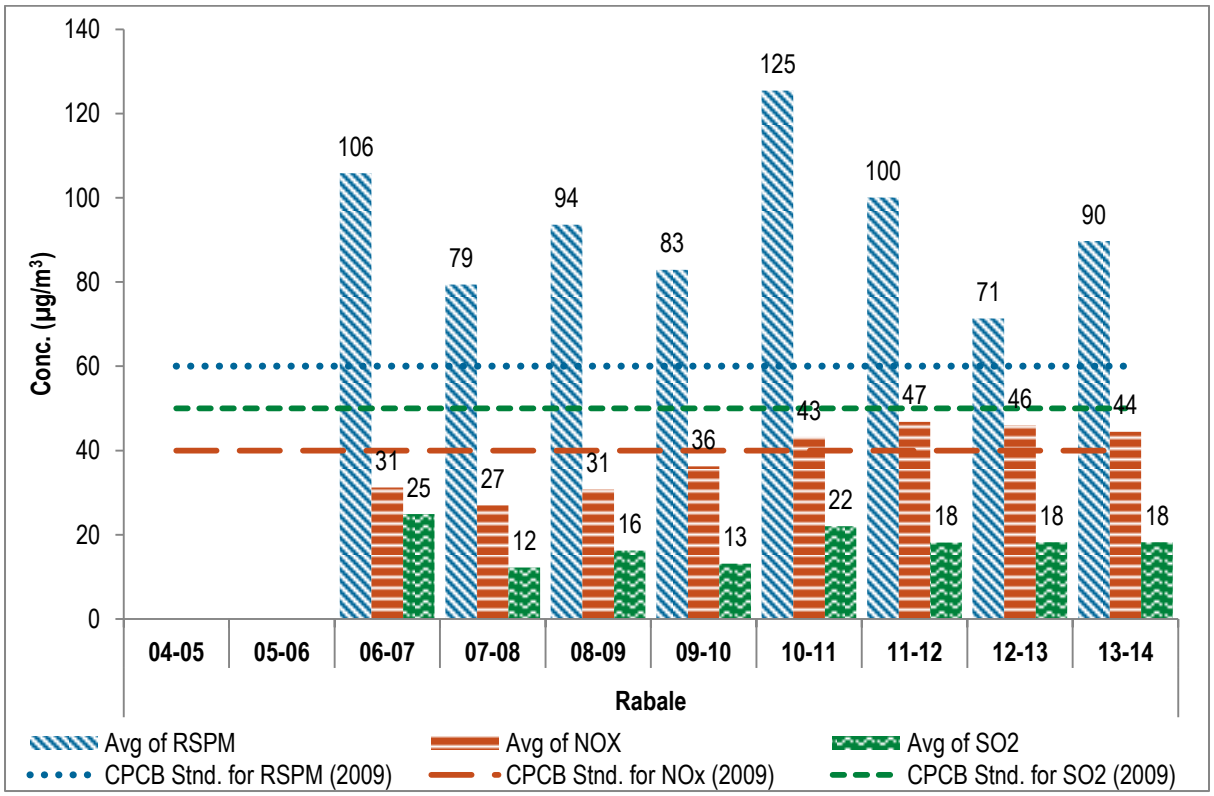


Figure No. 148: Annual average trend of SO_2, NOx and RSPM at -Rabale

Navi Mumbai - Nerul - DY Patil

Table No. 127: Data for monthly average reading recorded at Nerul - DY Patil

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	9	110	45	17
May	9	85	44	17
Jun	8	61	28	11
Jul				
Aug				
Sep	9	52	35	15
Oct	9	54	45	17
Nov	8	82	43	17
Dec	9	125	44	17
Jan	9	196	42	17
Feb				
Mar	9	210	42	20
	Total N	% of exceedence of daily readings for 2013-14		
	79	41.8	0.0	0.0

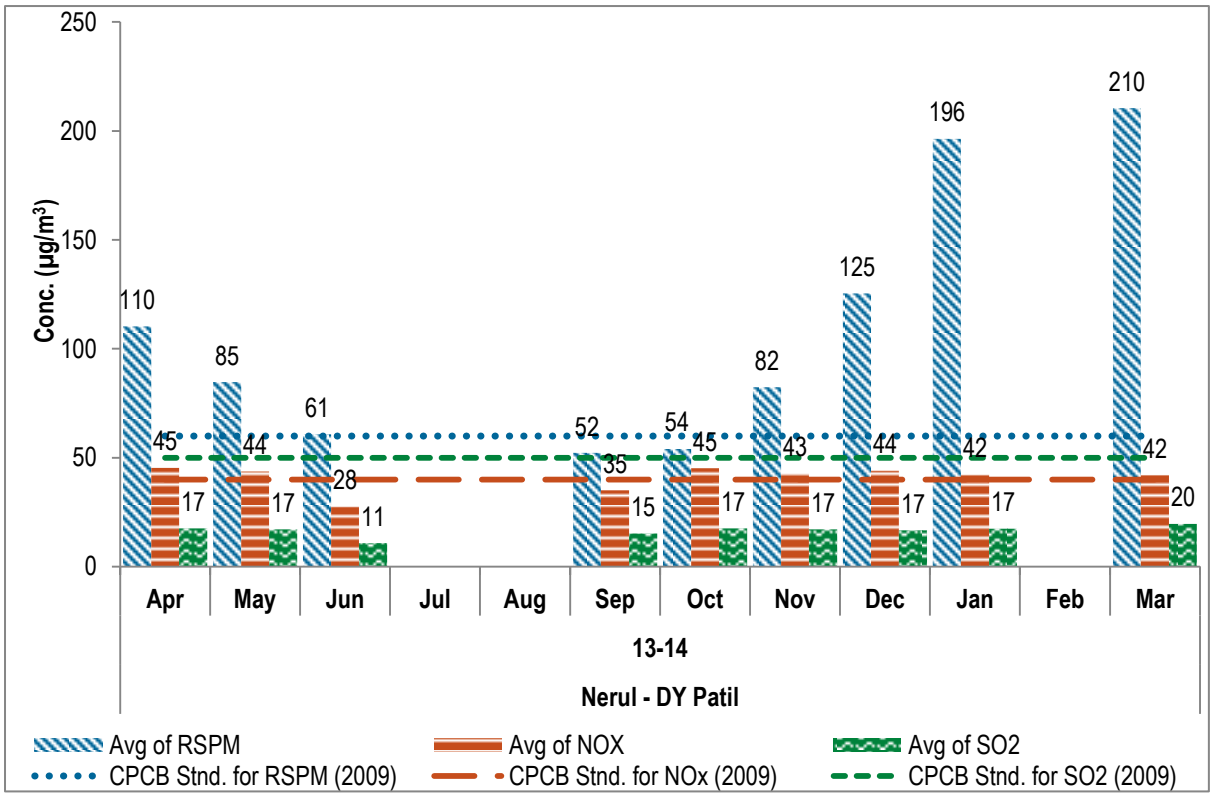


Figure No. 149: Monthly average reading recorded at Nerul - DY Patil

Table No. 128: Data for annual average trend of RSPM, NO_X and SO_2 at Nerul - DY Patil

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

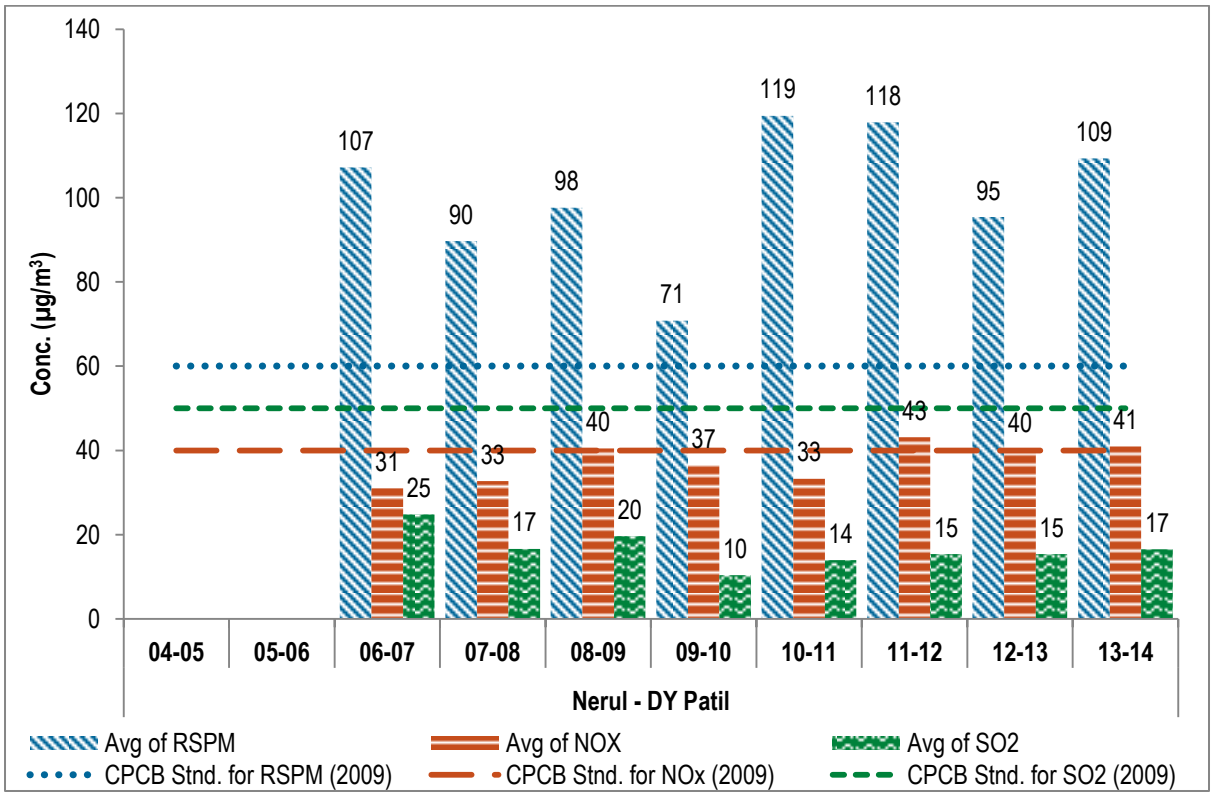


Figure No. 150: Annual average trend of SO_2, NOx and RSPM at Nerul - DY Patil

Navi Mumbai - Mahape, MPCB-Nirmal Bhavan

Table No. 129: Data for monthly average reading recorded at Mahape, MPCB-Nirmal Bhavan

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	8	169	49	19
May	9	138	46	18
Jun	9	99	33	13
Jul				
Aug				
Sep	8	107	38	16
Oct	9	184	50	19
Nov	9	179	51	20
Dec	8	218	46	19
Jan	7	318	50	20
Feb				
Mar	9	248	40	18
Total N		% of exceedence of daily readings for 2013-14		
76		76.3	0.0	0.0

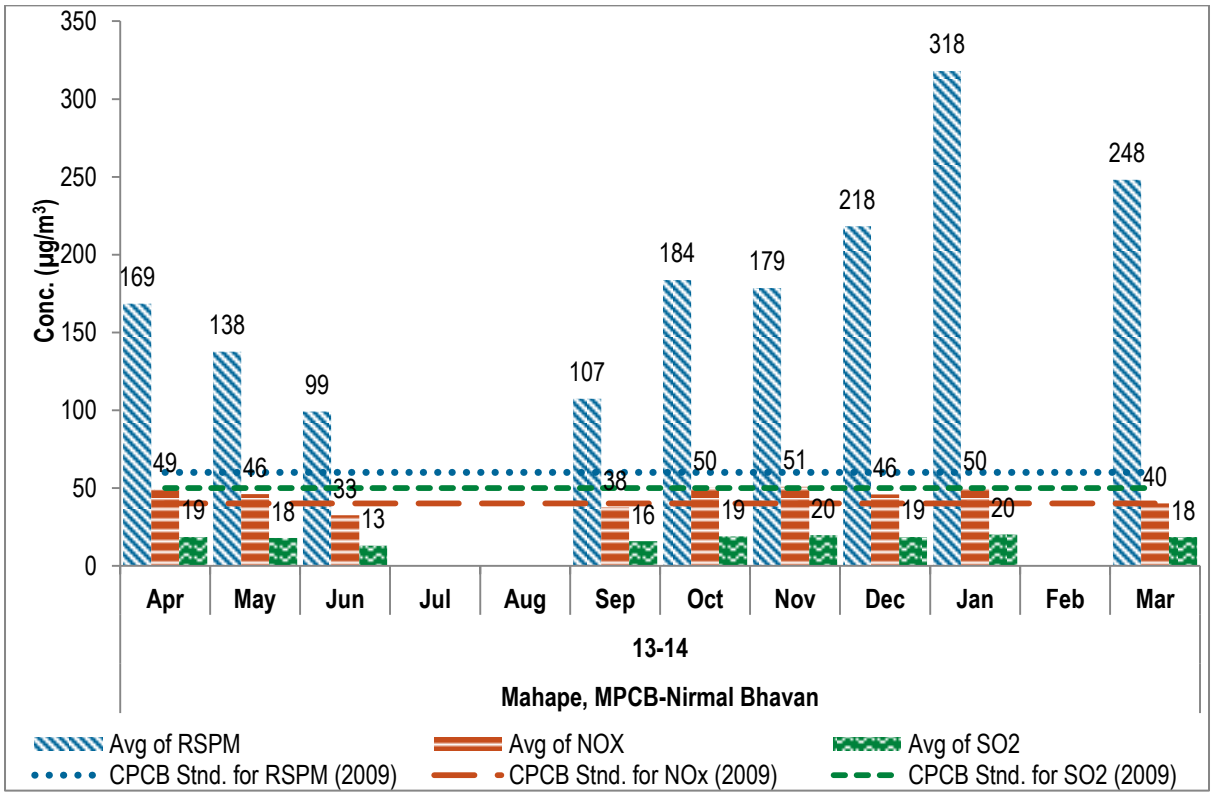


Figure No. 151: Monthly average reading recorded at Mahape, MPCB-Nirmal Bhavan

Table No. 130: Data for annual average trend of RSPM, NO_X and SO_2 at Mahape, MPCB-Nirmal Bhavan

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

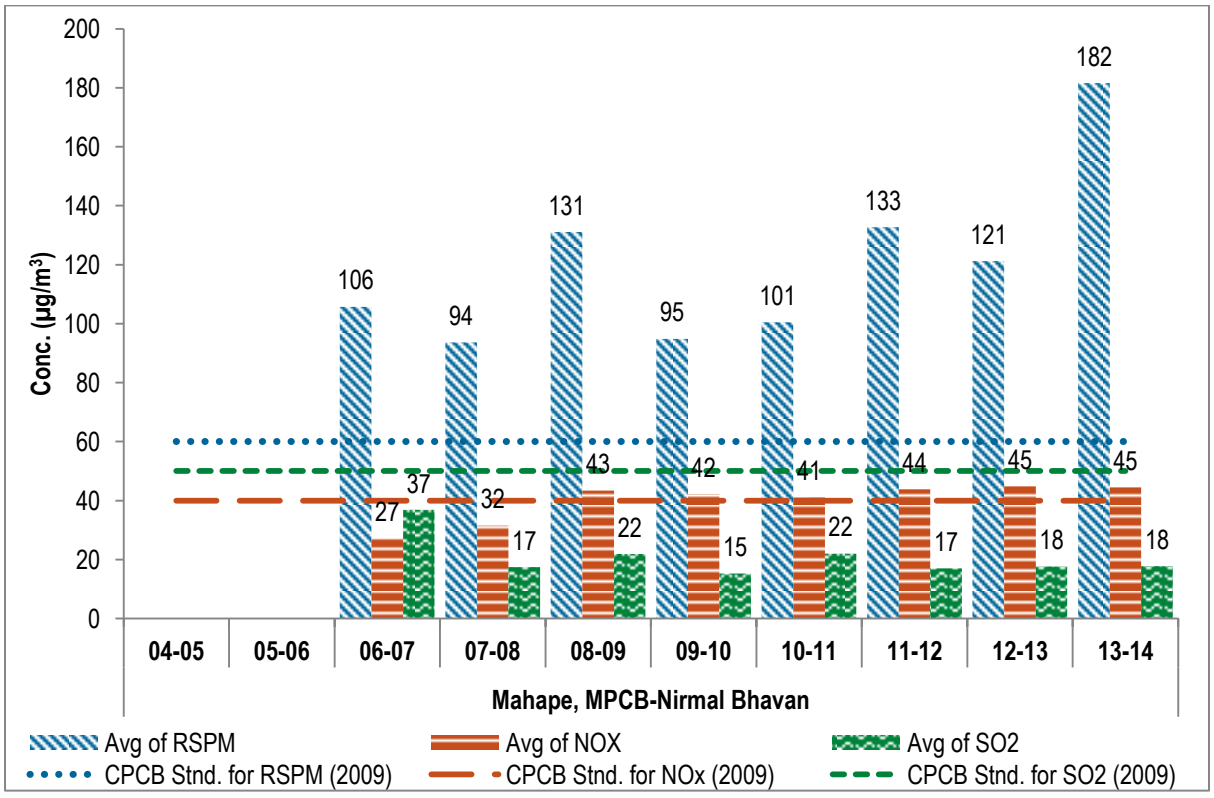


Figure No. 152: Annual average trend of SO_2, NOx and RSPM at Mahape, MPCB-Nirmal Bhavan

Navi Mumbai - Airoli

Table No. 131: Data for monthly average reading recorded at Airoli

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	27	87	50	16
May	30	86	32	13
Jun	12	62	35	12
Jul				
Aug				
Sep				
Oct	14	41	34	25
Nov	30	38	54	26
Dec	30	35	67	25
Jan	30	41	66	25
Feb	26	57	50	23
Mar	27	33	68	32
Total N		% of exceedence of daily readings for 2013-14		
226		3.1	10.6	0.0

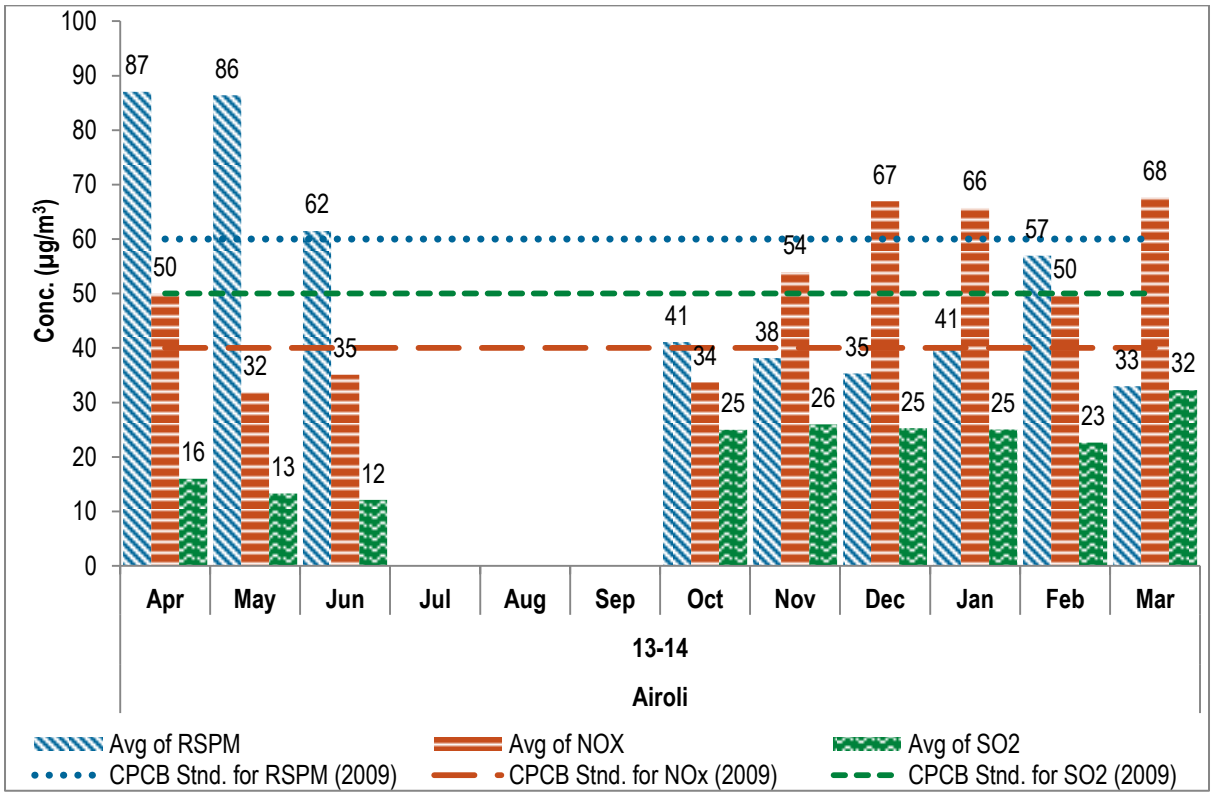


Figure No. 153: Monthly average reading recorded at -Airoli

Table No. 132: Data for annual average trend of RSPM, NO_X and SO_2 at Airoli

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

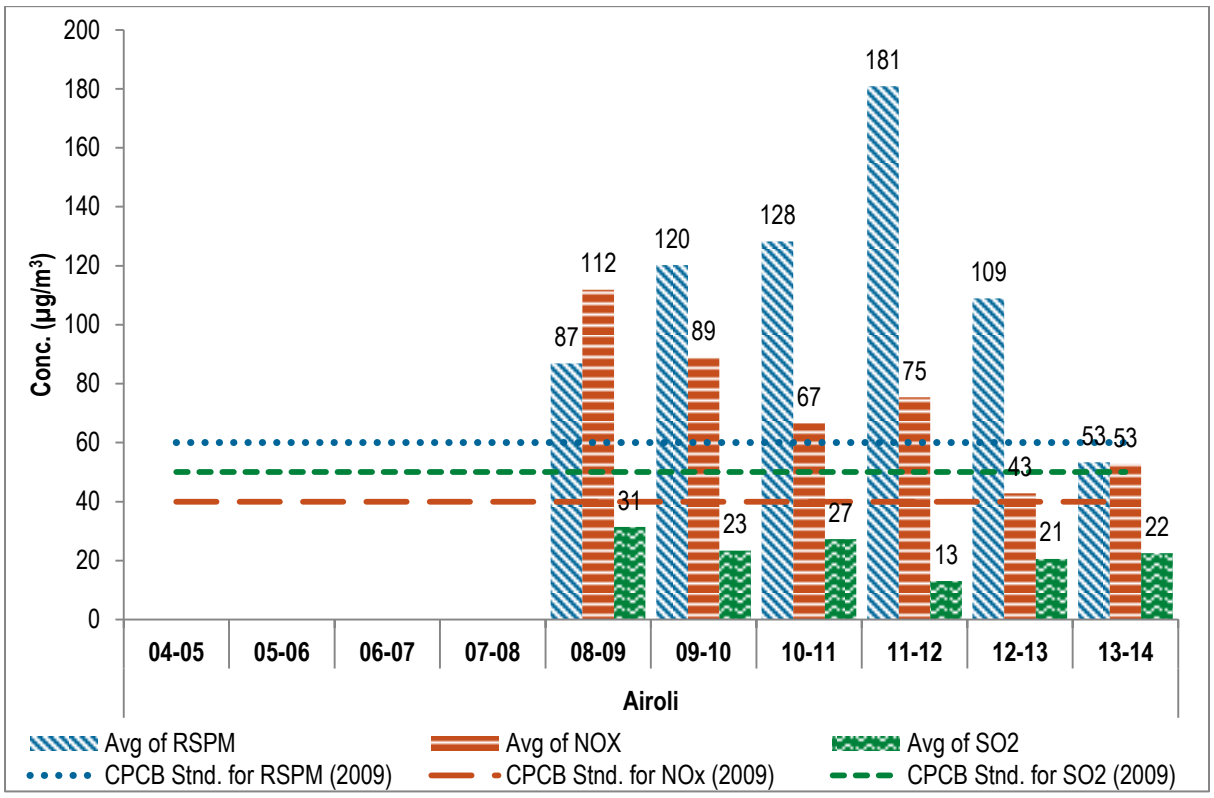


Figure No. 154: Annual average trend of SO_2, NOx and RSPM at -Airoli

Navi Mumbai - Vashi

Table No. 133: Data for monthly average reading recorded at Vashi

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	26	123	22	23
May	27	94	28	25
Jun	11	64	34	23
Jul				
Aug	21	66	46	26
Sep	22	75	54	27
Oct	31	98	49	37
Nov	29	138	58	41
Dec	25	167	59	44
Jan				
Feb				
Mar				
Total N		% of exceedence of daily readings for 2013-14		
192		51.0	4.2	0.0

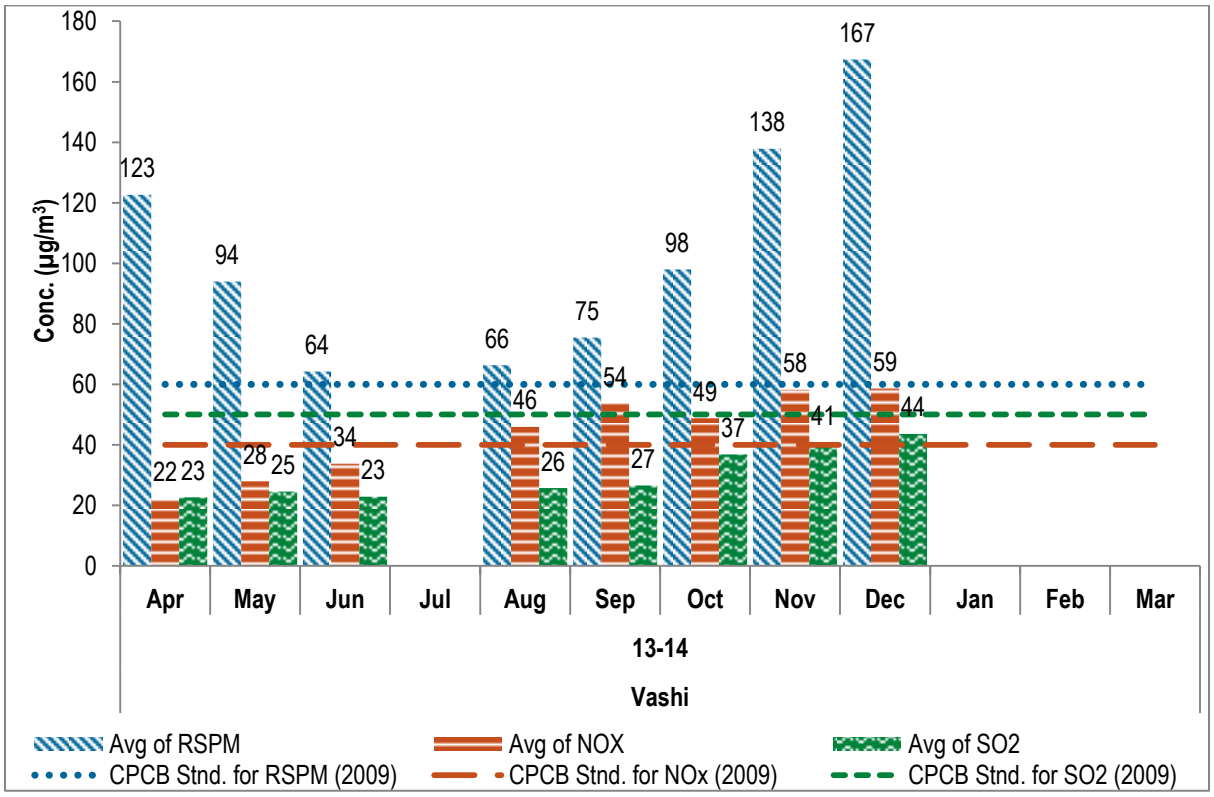


Figure No. 155: Monthly average reading recorded at -Vashi

Table No. 134: Data for annual average trend of RSPM, NO_X and SO_2 at Vashi

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
04-05				
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

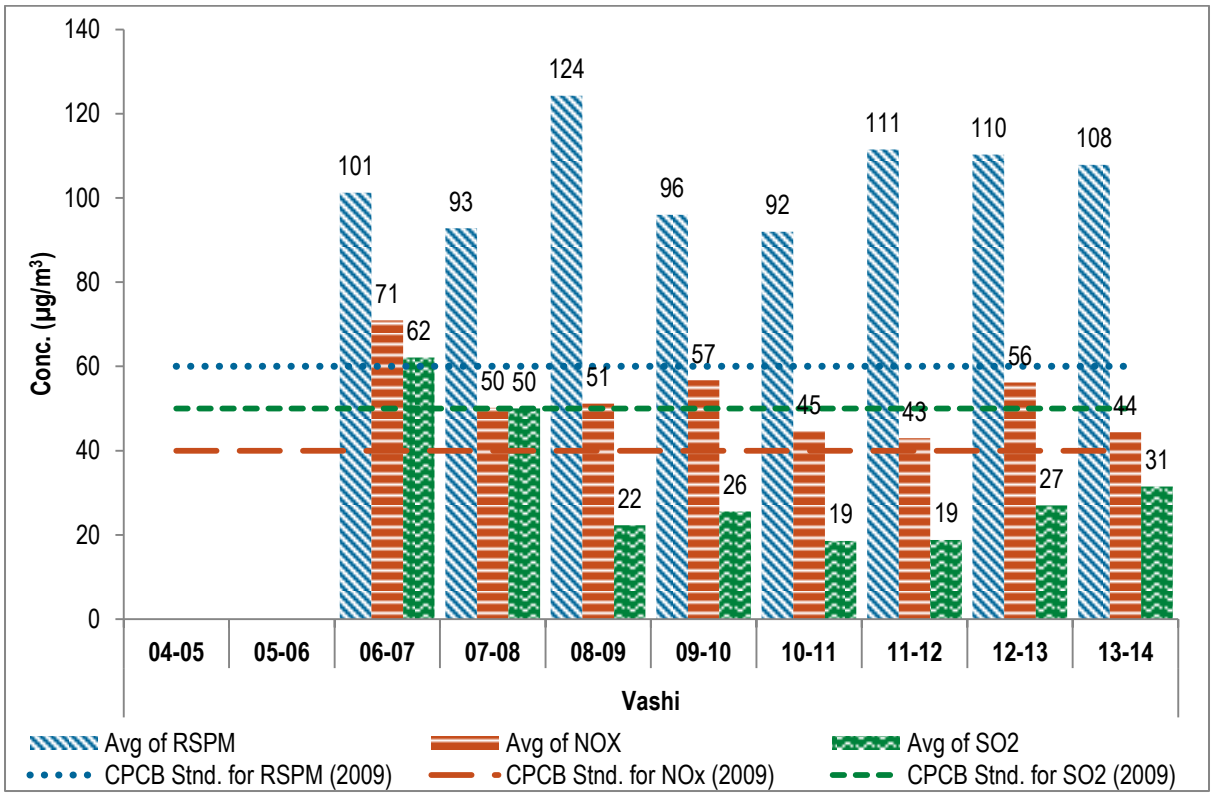


Figure No. 156: Annual average trend of SO_2, NOx and RSPM at -Vashi

Taloja - Kharghar - CIDCO Nodal Office

Table No. 135: Data for monthly average reading recorded at Kharghar - CIDCO Nodal Office

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	9	87	46	18
May	9	65	47	17
Jun	8	52	27	11
Jul				
Aug				
Sep	8	39	34	14
Oct	9	77	45	17
Nov	9	151	44	18
Dec	8	170	45	18
Jan	8	192	44	19
Feb				
Mar	8	312	46	18
	Total N	% of exceedence of daily readings for 2013-14		
	76	53.9	0.0	0.0

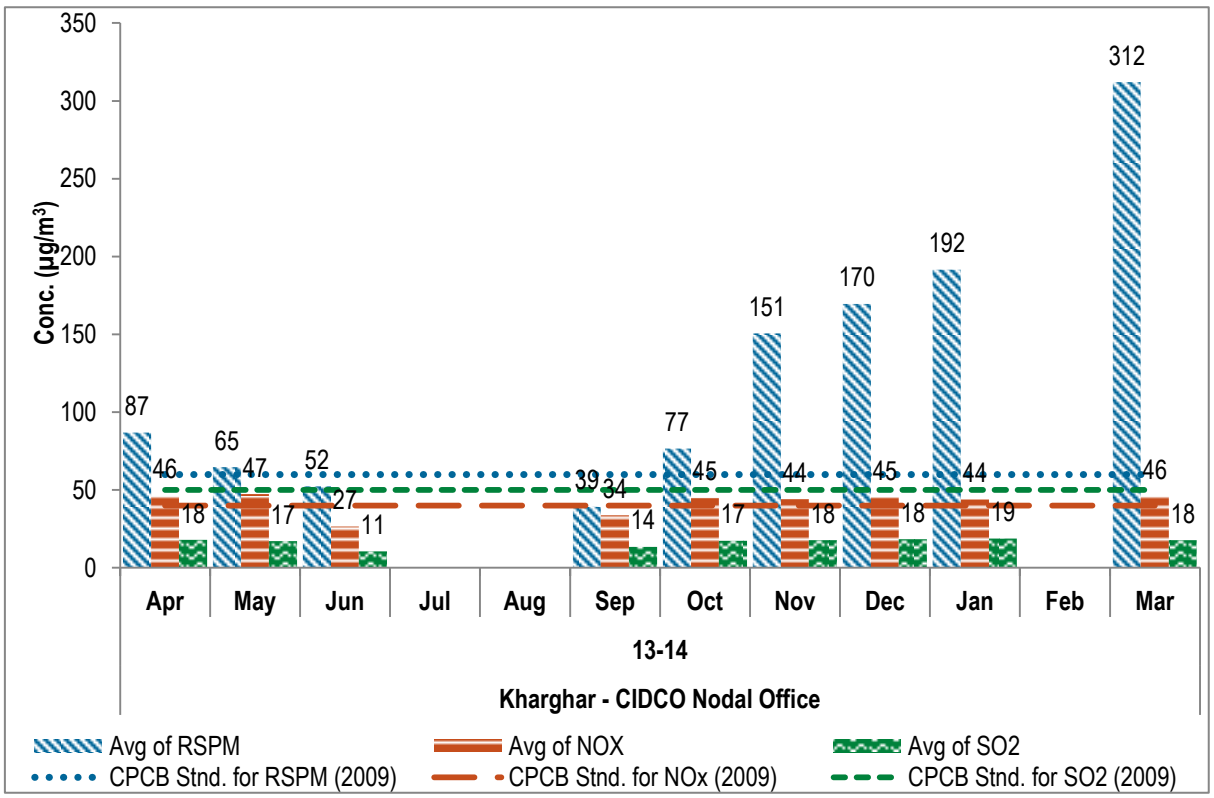


Figure No. 157: Monthly average reading recorded at Kharghar - CIDCO Nodal Office

Table No. 136: Data for annual average trend of RSPM, NO_X and SO_2 at Kharghar - CIDCO Nodal Office

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

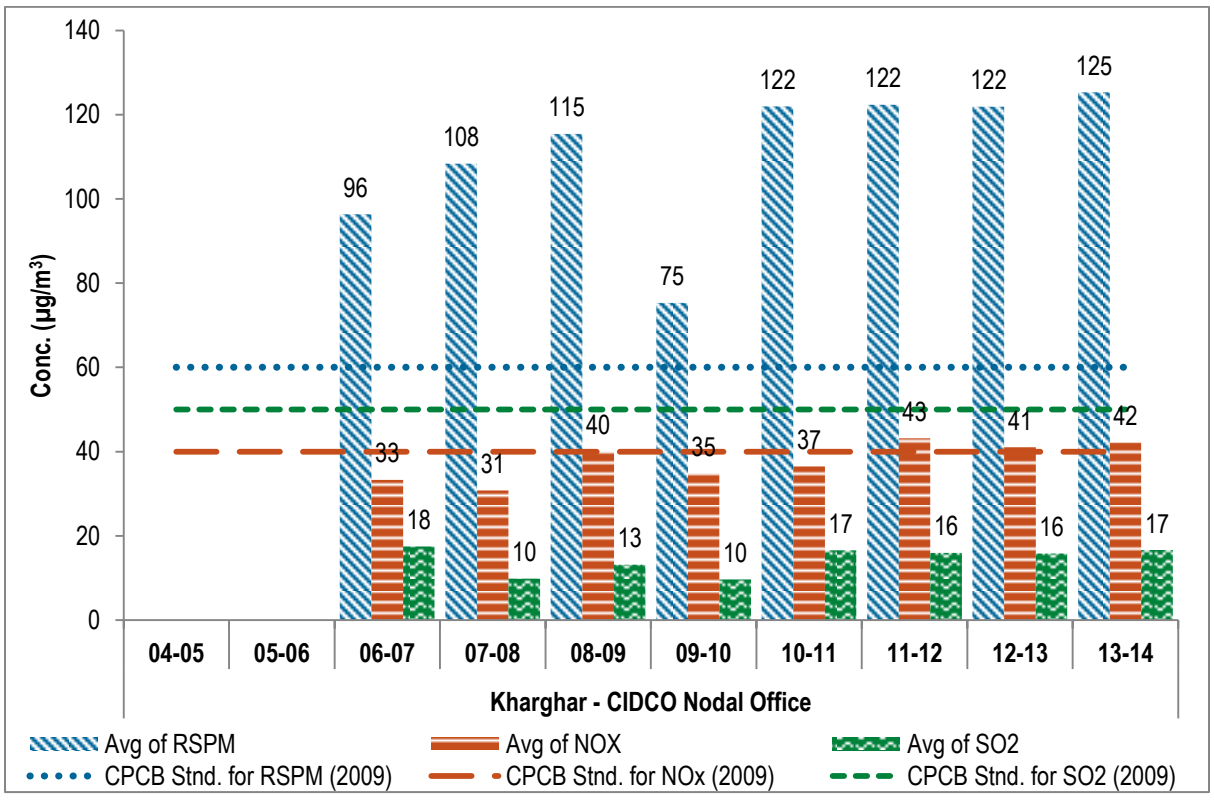


Figure No. 158: Annual average trend of SO_2, NOx and RSPM at Kharghar - CIDCO Nodal Office

Taloja - MIDC Building

Table No. 137: Data for monthly average reading recorded at Taloja - MIDC Building

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	8	243	49	19
May	10	164	49	18
Jun	8	76	30	13
Jul				
Aug				
Sep	9	108	42	17
Oct	9	134	52	20
Nov	8	245	50	21
Dec	9	196	52	21
Jan	9	223	49	20
Feb				
Mar	9	298	50	20
Total N		% of exceedence of daily readings for 2013-14		
79		78.5	0.0	0.0

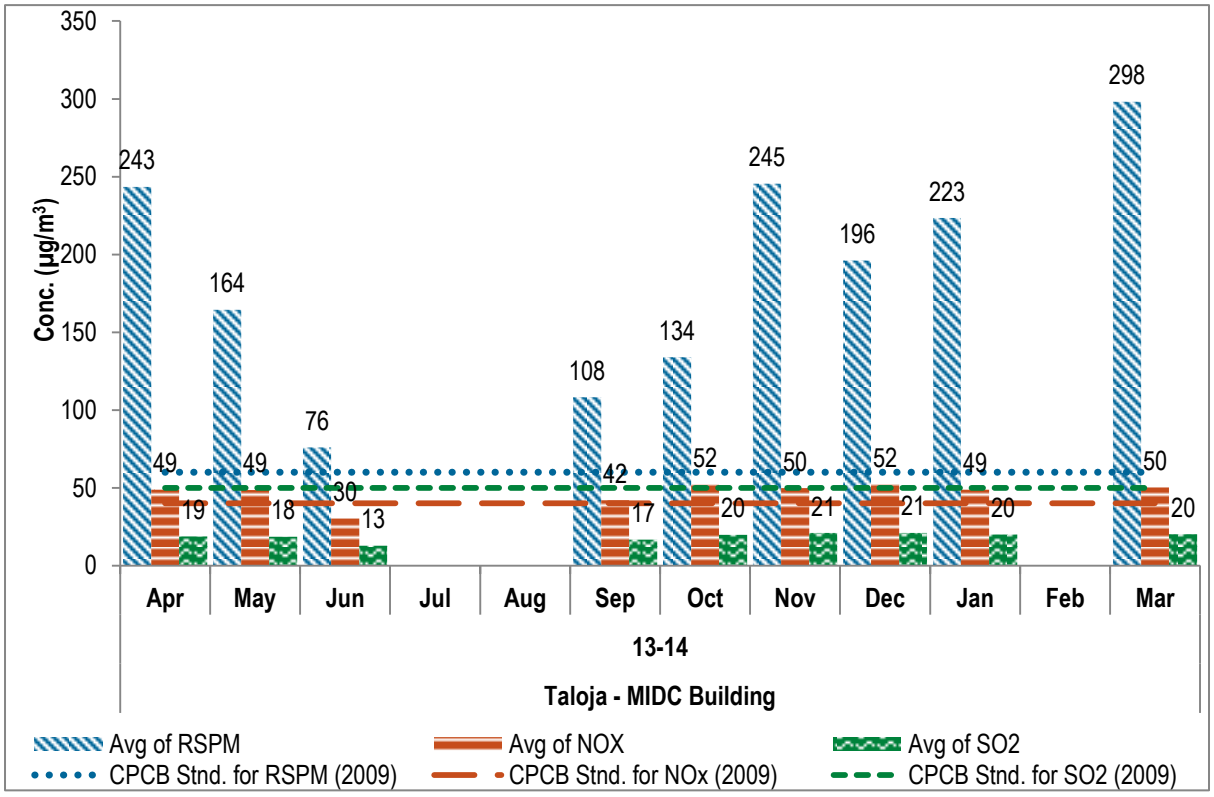


Figure No. 159: Monthly average reading recorded at Taloja - MIDC Building

Table No. 138: Data for annual average trend of RSPM, NO_X and SO_2 at Taloja - MIDC Building

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

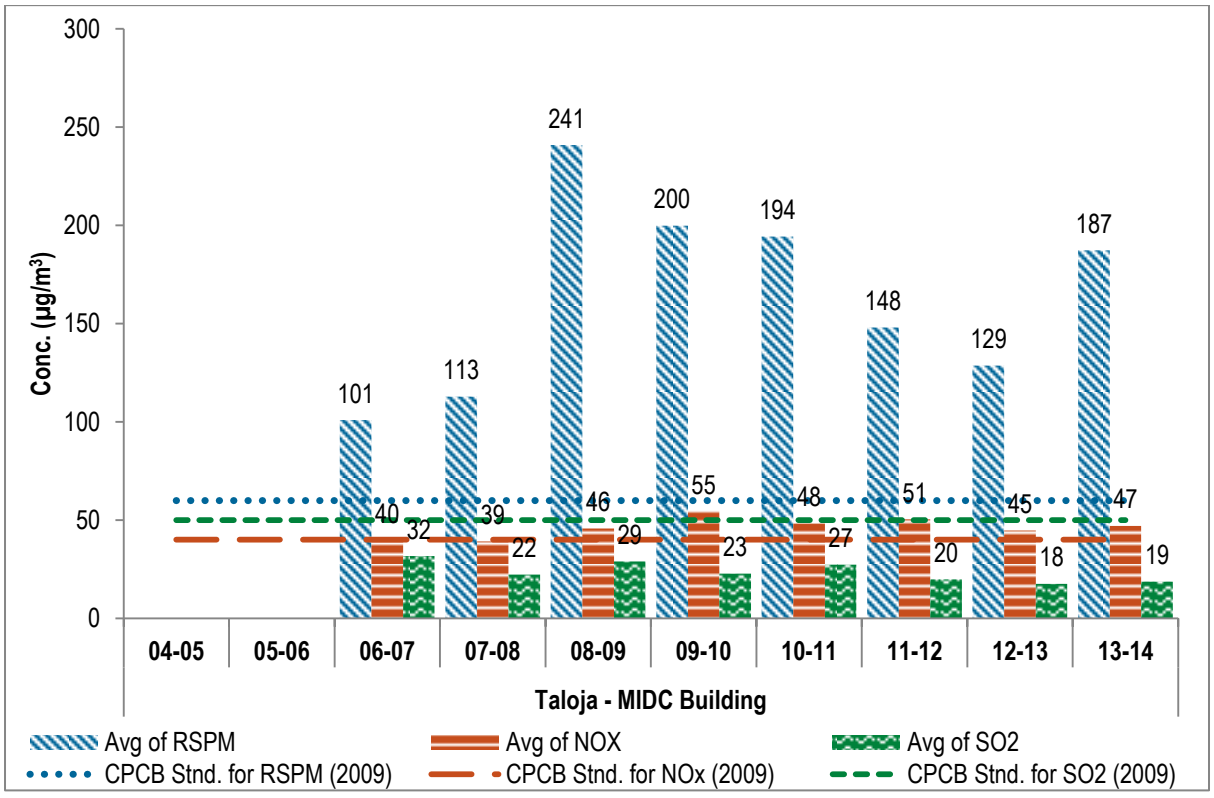


Figure No. 160: Annual average trend of SO_2, NOx and RSPM at Taloja - MIDC Building

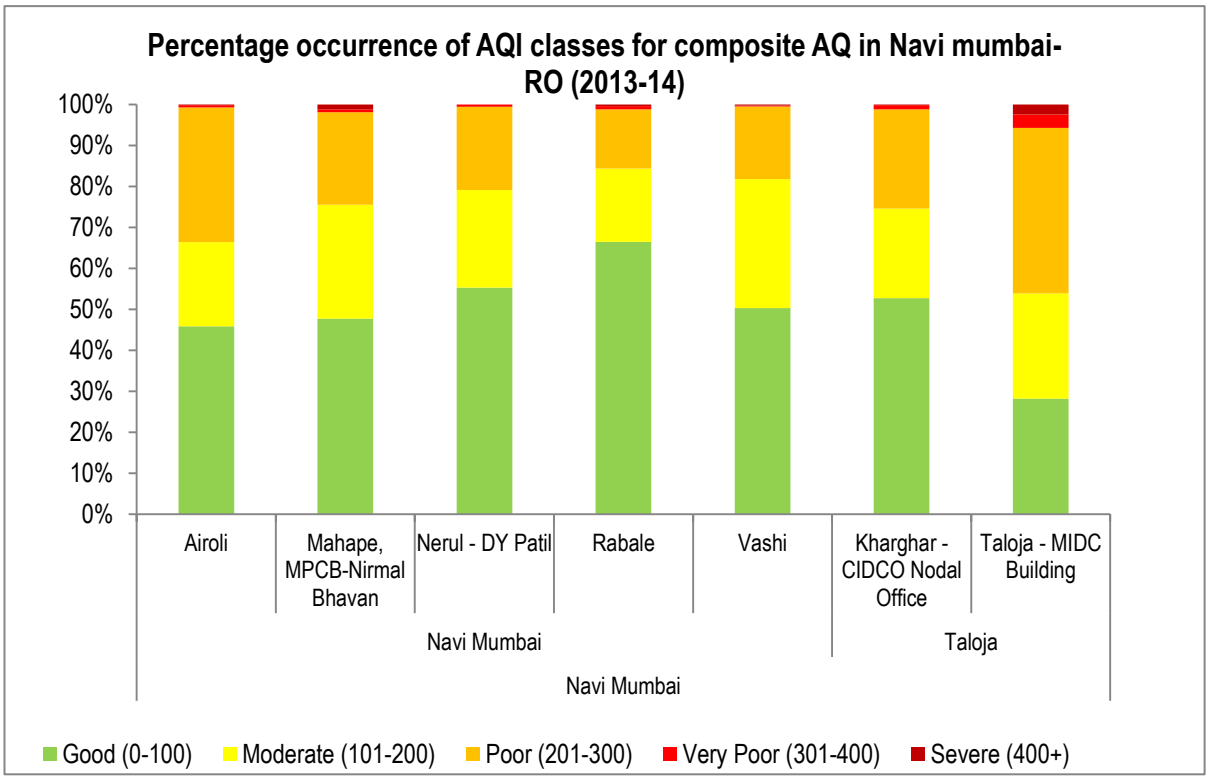
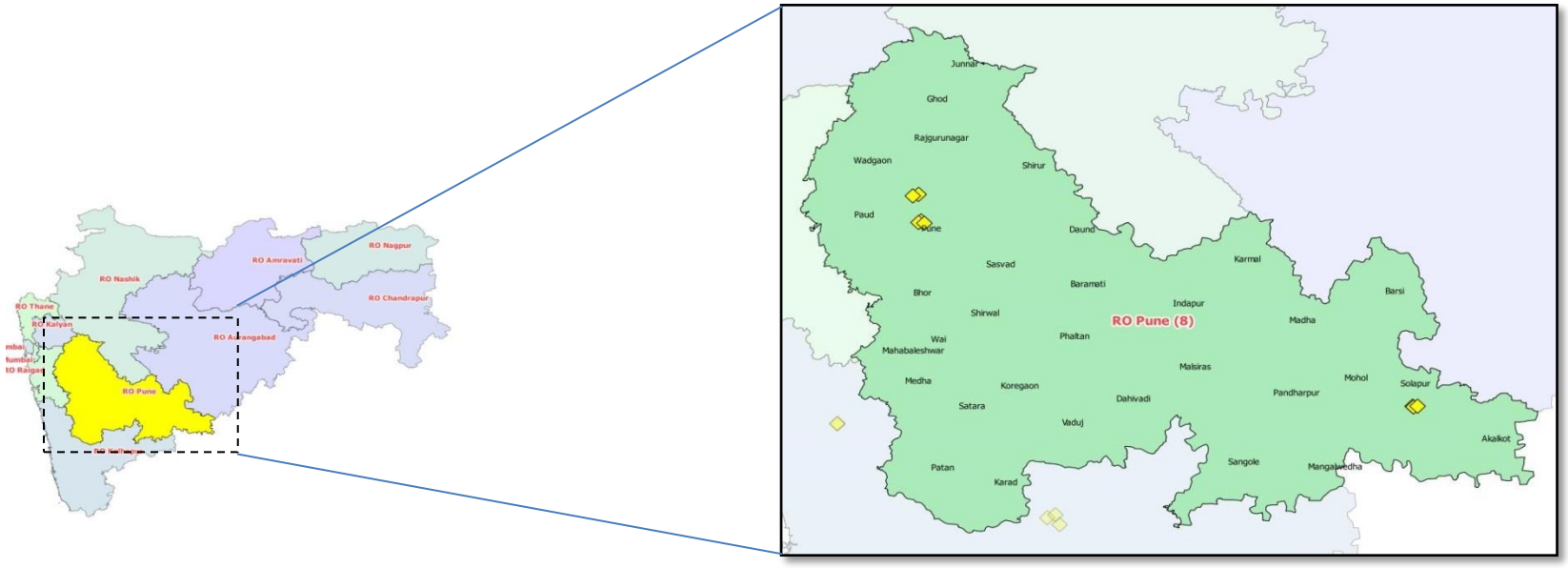


Figure No. 161: Percentage occurrence of AQI classes for composite AQ in Navi Mumbai-RO (2013-14)

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. 139: Data for monthly average reading recorded at Bhosari

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	8	99	33	28
May	9	76	33	28
Jun	9	58	26	19
Jul	9	45	18	15
Aug	9	40	26	17
Sep	8	54	30	18
Oct	7	78	29	21
Nov	8	136	32	21
Dec	8	165	58	26
Jan	9	147	48	27
Feb	8	126	48	31
Mar	9	99	35	21
	Total N	% of exceedence of daily readings for 2012-13		
	101	39.6	1.0	0.0

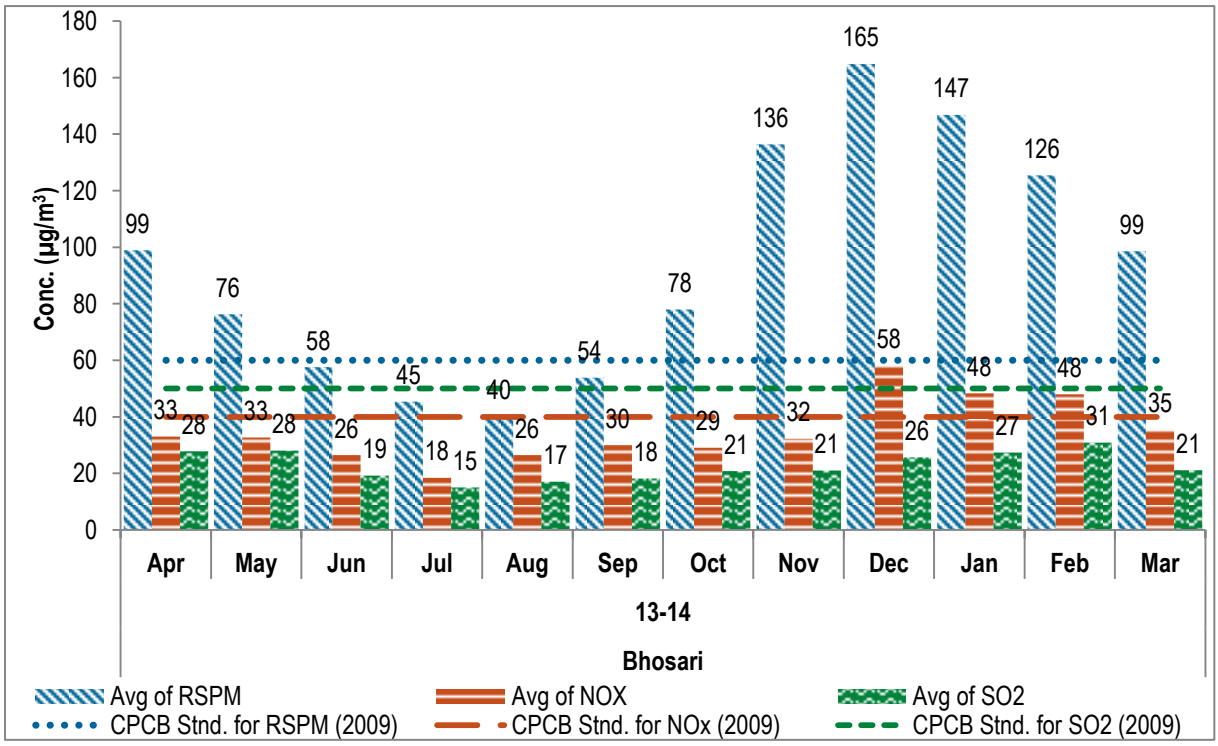


Figure No. 162: Monthly average reading recorded at Bhosari

Table No. 140: Data for annual average trend of RSPM, NO_X and SO_2 at Bhosari

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

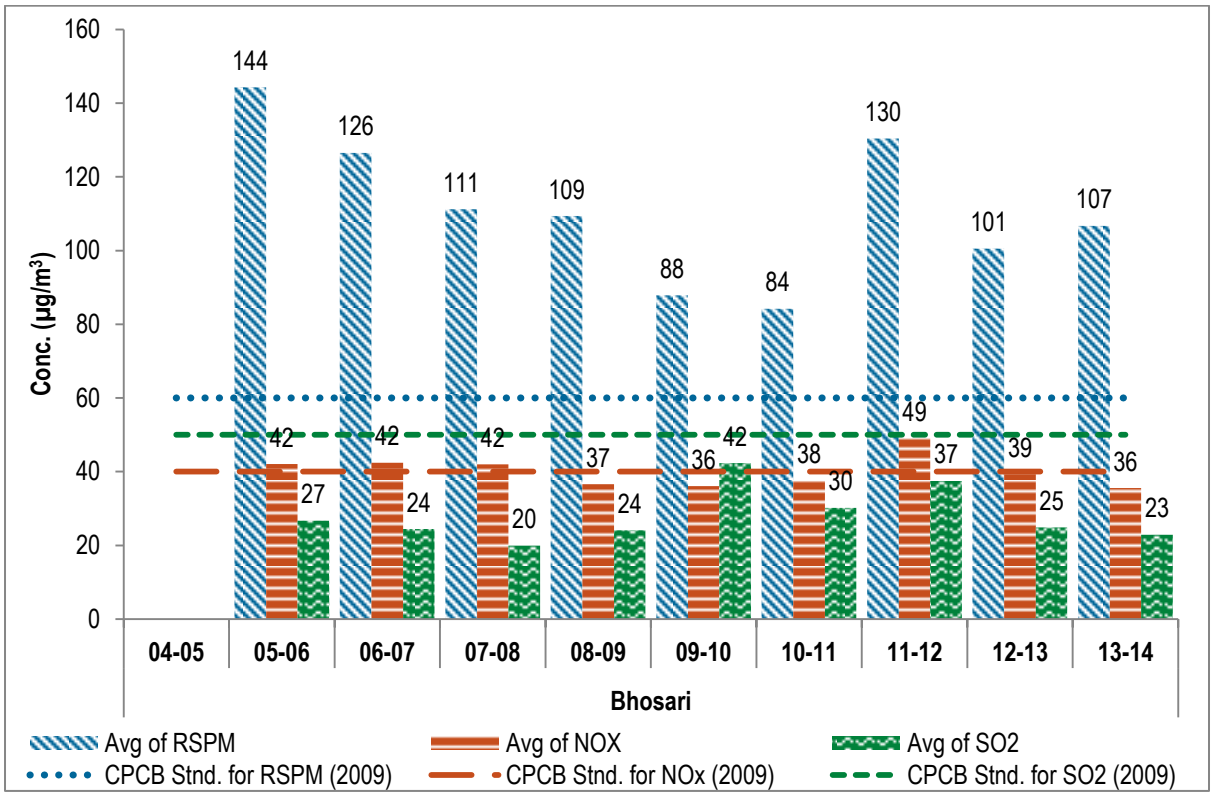


Figure No. 163: Annual average trend of SO_2, NOx and RSPM at Bhosari

Pune - Nal Stop

Table No. 141: Data for monthly average reading recorded at Nal Stop

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	9	96	40	21
May	9	79	31	28
Jun	8	51	26	16
Jul	9	42	18	14
Aug	9	43	24	17
Sep	8	48	28	17
Oct	7	53	31	18
Nov	11	115	33	19
Dec	8	118	63	17
Jan	10	127	67	28
Feb	8	87	55	20
Mar	8	100	53	20
	Total N	% of exceedence of daily readings for 2013-14		
	104	35.6	1.9	0.0

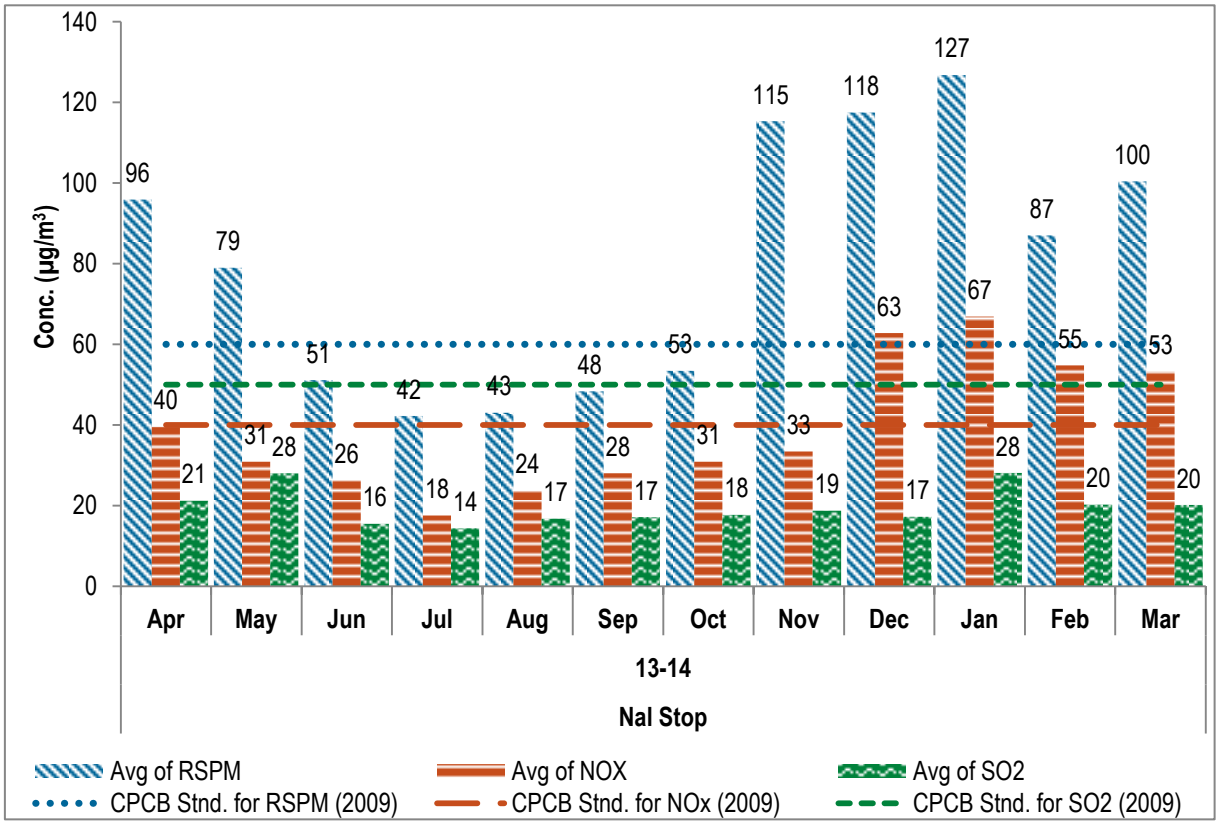


Figure No. 164: Monthly average reading recorded at Nal Stop

Table No. 142: Data for annual average trend of RSPM, NO_X and SO_2 at Nal Stop

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

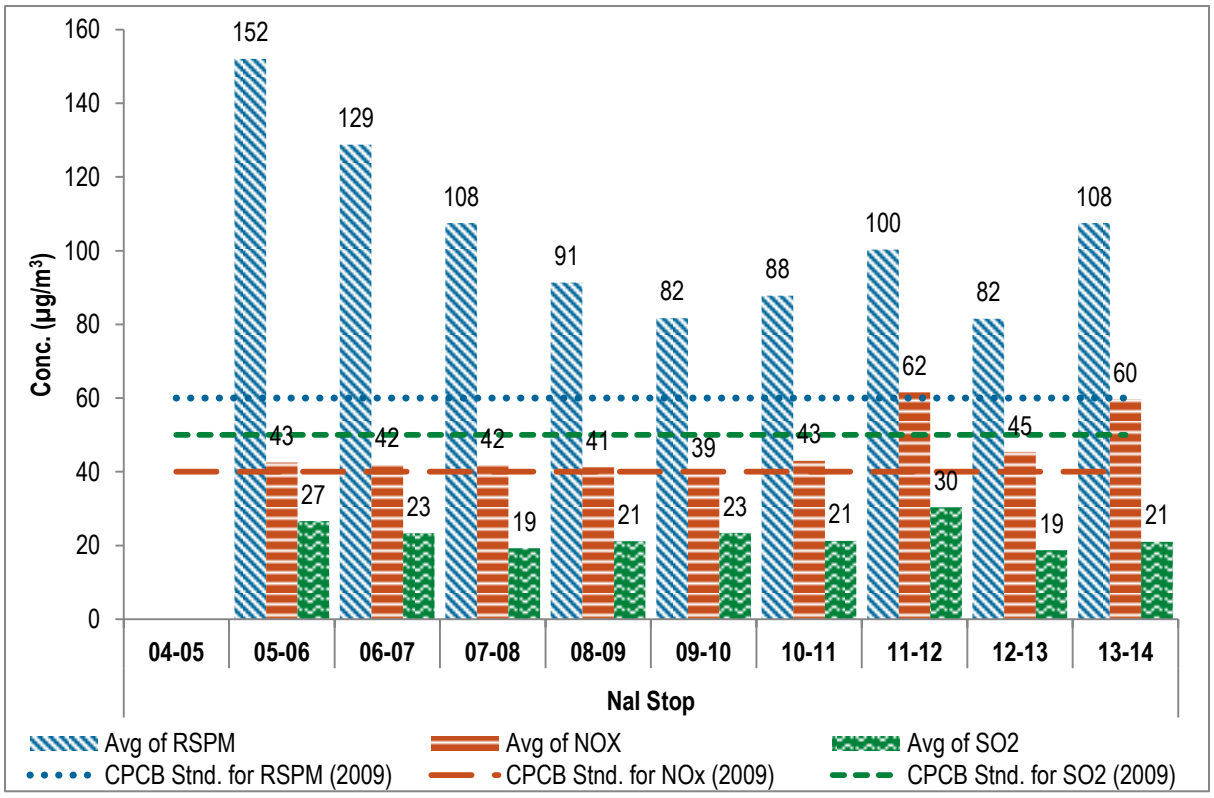


Figure No. 165: Annual average trend of SO_2, NOx and RSPM at Nal Stop

Pune - Swargate, Pune

Table No. 143: Data for monthly average reading recorded at Swargate, Pune

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	*8*	84	45	20
May	*9*	58	33	24
Jun	*8*	47	23	17
Jul	*9*	29	21	14
Aug	*8*	21	25	18
Sep	*9*	51	33	22
Oct	*9*	61	36	20
Nov	*8*	103	49	21
Dec	*9*	132	50	15
Jan	*9*	120	66	31
Feb	*8*	100	69	26
Mar	*7*	93	64	29
Total N		% of exceedence of daily readings for 2013-14		
101		27.7	5.0	0.0

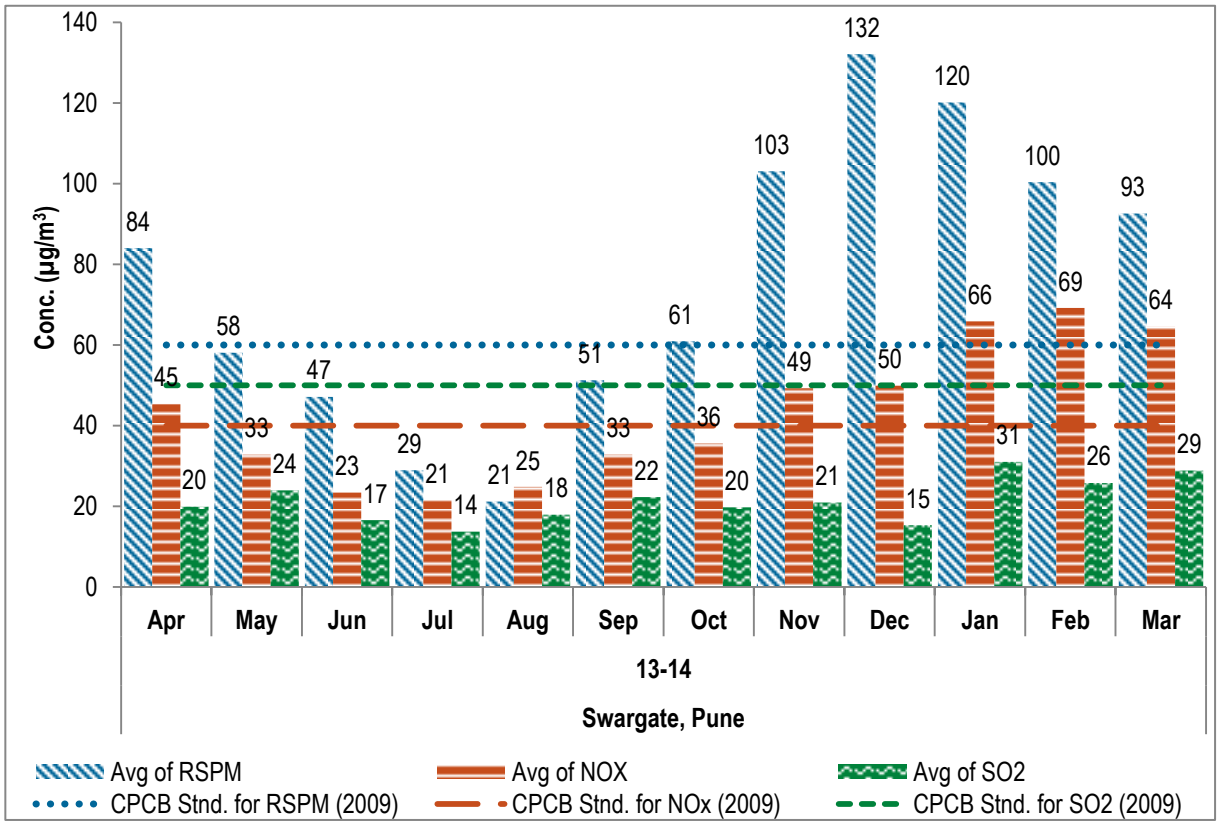


Figure No. 166: Monthly average reading recorded at Swargate, Pune

Table No. 144: Data for annual average trend of RSPM, NO_X and SO_2 at Swargate, Pune

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

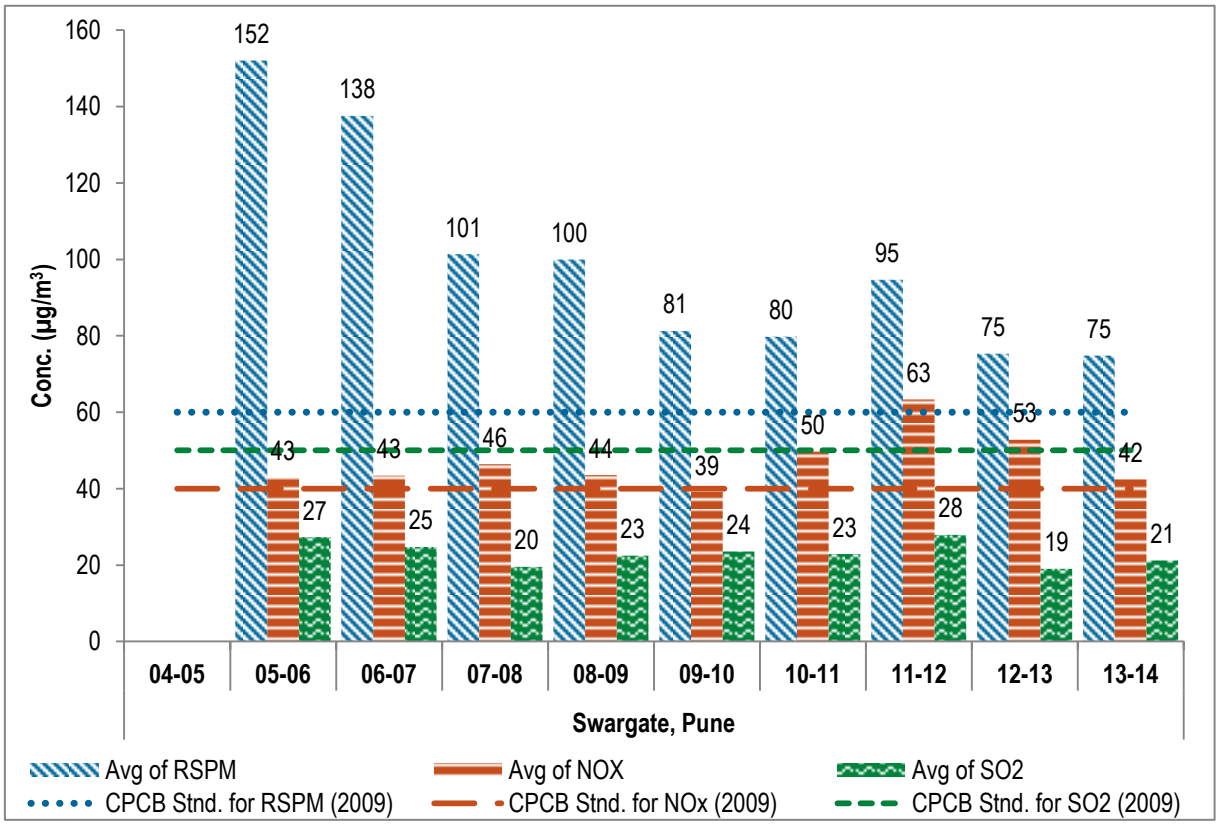


Figure No. 167: Annual average trend of SO_2, NOx and RSPM at Swargate, Pune

Pune - Pimpri-Chinchwad - BOB Building

Table No. 145: Data for monthly average reading recorded at Pimpri-Chinchwad - BOB Building

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	24	88	42	25
May	26	55	32	27
Jun	25	46	28	18
Jul	27	43	22	15
Aug	24	35	27	16
Sep	25	55	32	18
Oct	25	62	31	19
Nov	24	104	38	20
Dec	26	133	62	26
Jan	25	138	62	34
Feb	24	123	55	26
Mar	22	102	44	22
	Total N	% of exceedence of daily readings for 2013-14		
	297	34.0	3.0	0.0

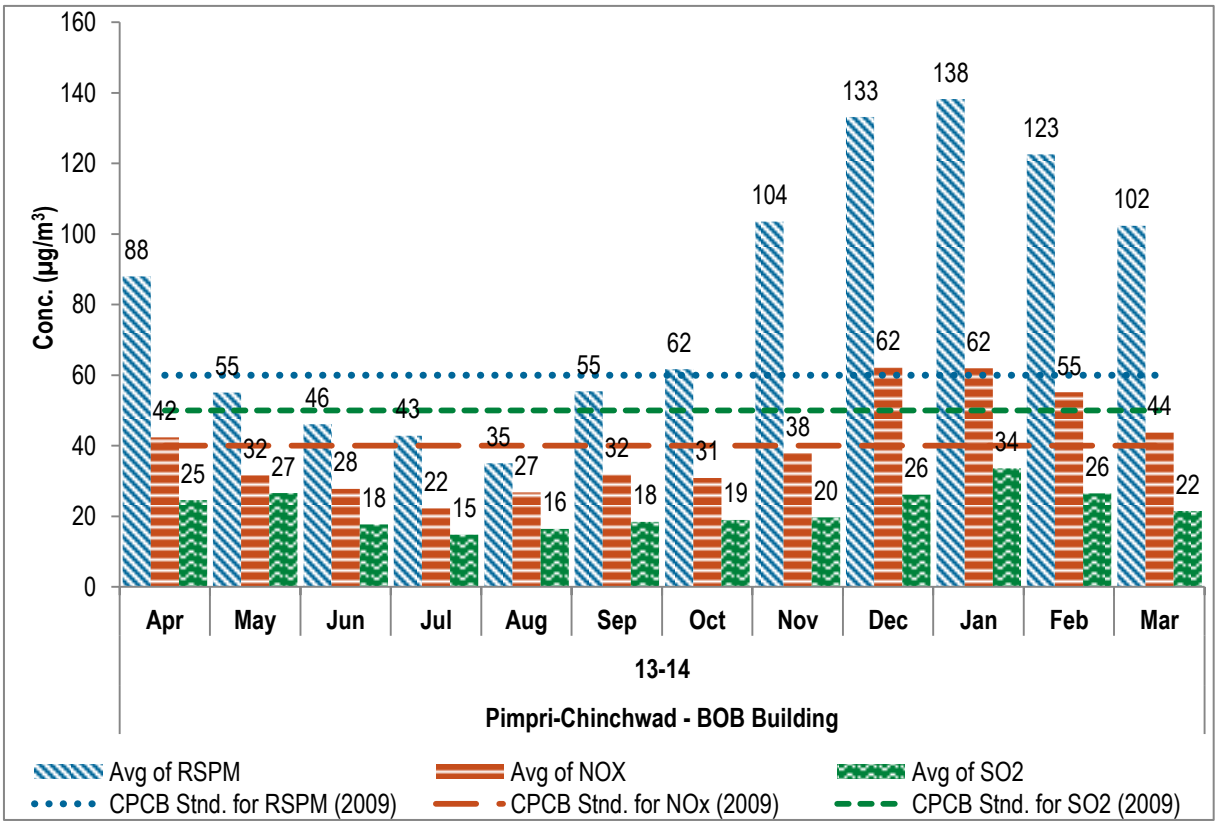


Figure No. 168: Monthly average reading recorded at Pimpri-Chinchwad - BOB Building

Table No. 146: Data for annual average trend of RSPM, NO_X and SO_2 at Pimpri-Chinchwad - BOB Building

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

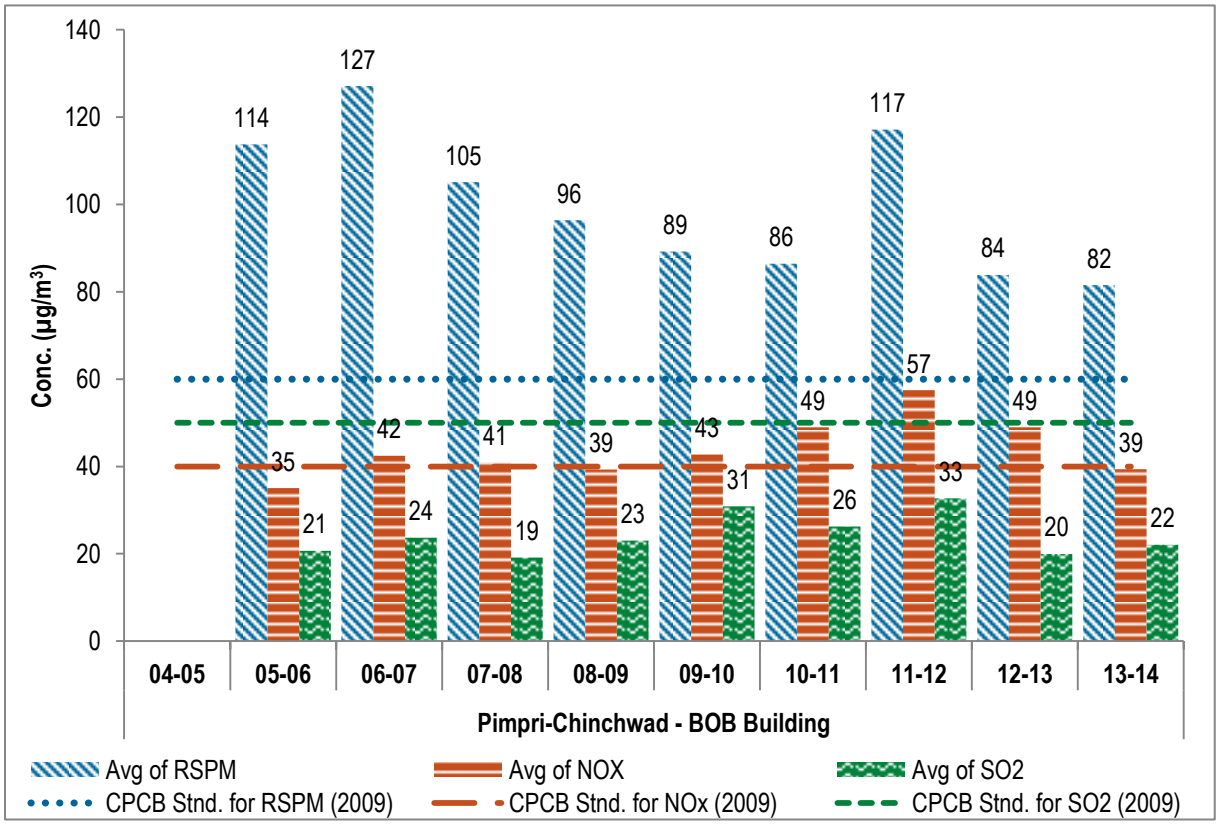


Figure No. 169: Annual average trend of SO_2, NOx and RSPM at Pimpri-Chinchwad - BOB Building

Pune - Karve Road - CAAQMS

Table No. 147: Data for monthly average reading recorded at Karve Road – CAAQMS

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	30	153	76	36
May	31	133	55	34
Jun	30	74	65	36
Jul	31	58	76	43
Aug	31	75	66	44
Sep	30	67	62	37
Oct	31	96	68	27
Nov	30	163	72	10
Dec	31	185	73	11
Jan	31	178	78	14
Feb	27	148	77	13
Mar	27	131	74	13
Total N		% of exceedence of daily readings for 2013-14		
360		60.8	23.6	0.0

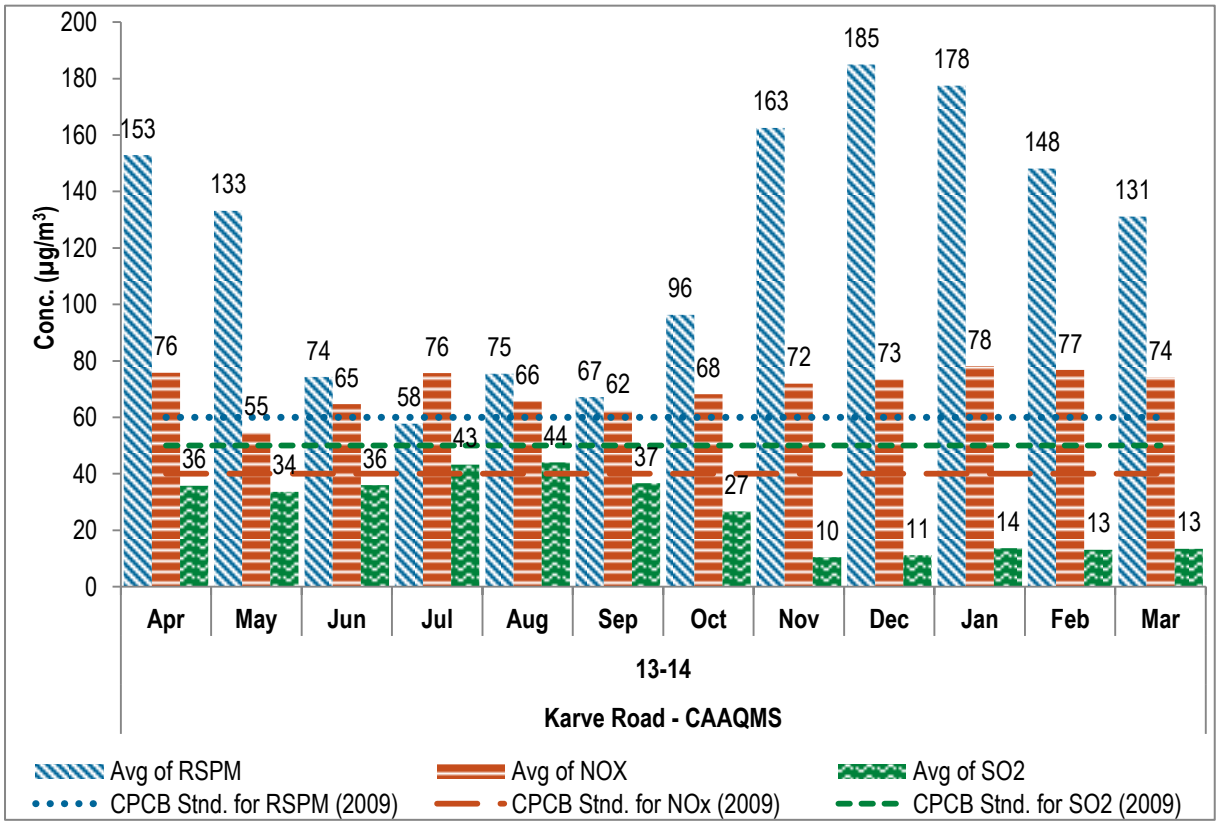


Figure No. 170: Monthly average reading recorded at Karve Road - CAAQMS

Table No. 148: Data for annual average trend of RSPM, NO_X and SO_2 at Karve Road - CAAQMS

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

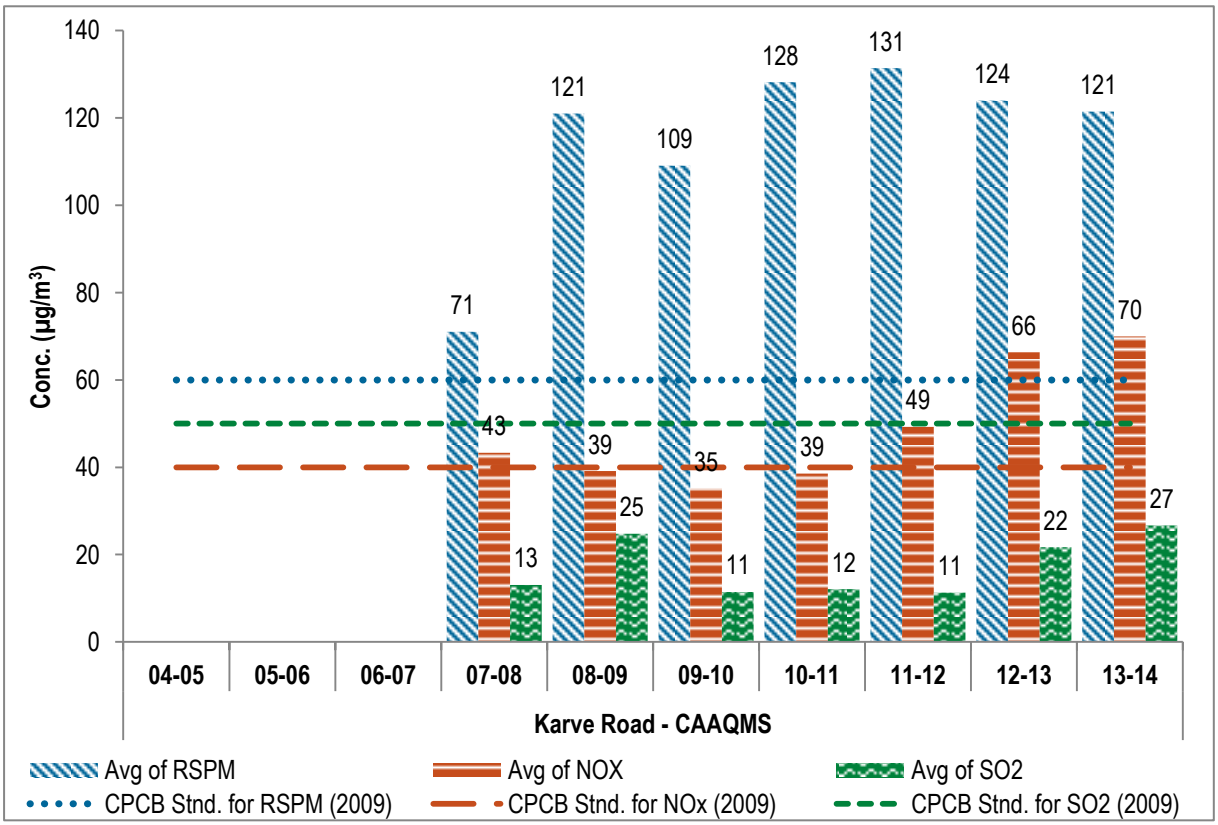


Figure No. 171: Annual average trend of SO_2, NOx and RSPM at Karve Road – CAAQMS

Solapur - WIT Campus

Table No. 149: Data for monthly average reading recorded at WIT Campus

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	9	84	34	17
May	9	95	36	15
Jun	8	79	35	15
Jul				
Aug	9	81	35	15
Sep	9	72	35	16
Oct	9	83	36	15
Nov	8	87	35	15
Dec	9	90	35	15
Jan	9	84	34	15
Feb	8	80	36	15
Mar				
Total N		% of exceedence of daily readings for 2012-13		
87		1.1	0.0	0.0

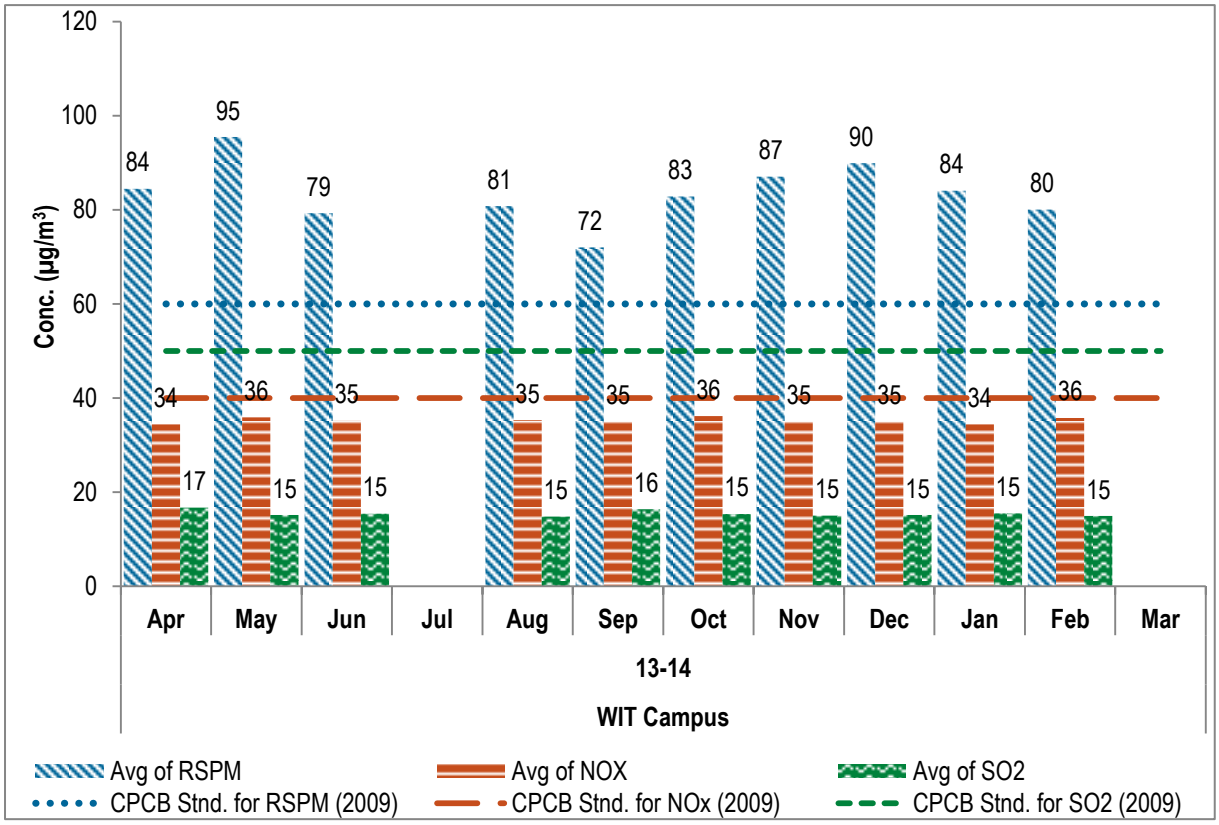


Figure No. 172: Monthly average reading recorded at WIT Campus

Table No. 150: Data for annual average trend of RSPM, NO_X and SO_2 at WIT Campus

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
04-05	*106*	**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

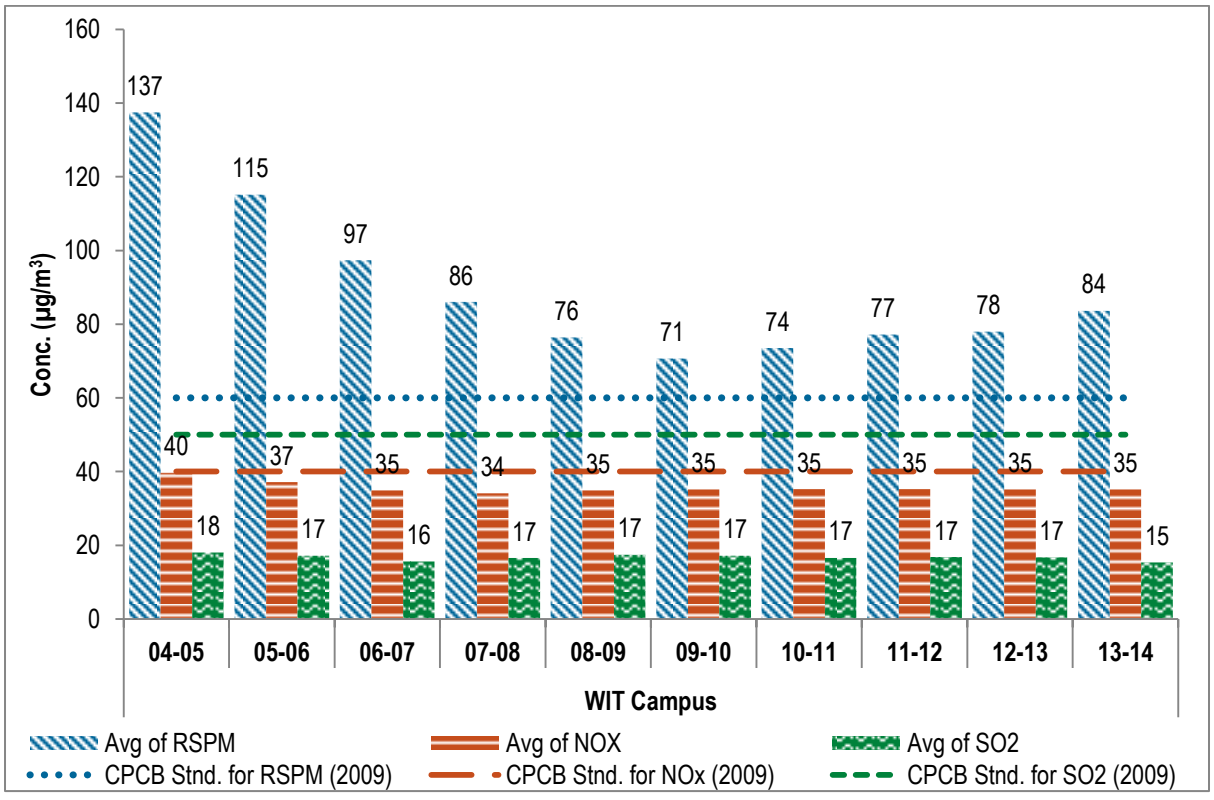


Figure No. 173: Annual average trend of SO_2, NOx and RSPM at WIT Campus

Solapur - Saat Rasta- Chithale Clinic

Table No. 151: Data for monthly average reading recorded at Saat Rasta- Chithale Clinic

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	9	87	35	17
May	9	89	34	17
Jun	8	83	35	17
Jul				
Aug	9	76	35	15
Sep	8	17	35	17
Oct				
Nov	9	83	34	14
Dec	9	83	35	15
Jan	9	93	36	16
Feb	8	77	36	16
Mar				
Total N		% of exceedence of daily readings for 2013-14		
78		1.3	0.0	0.0

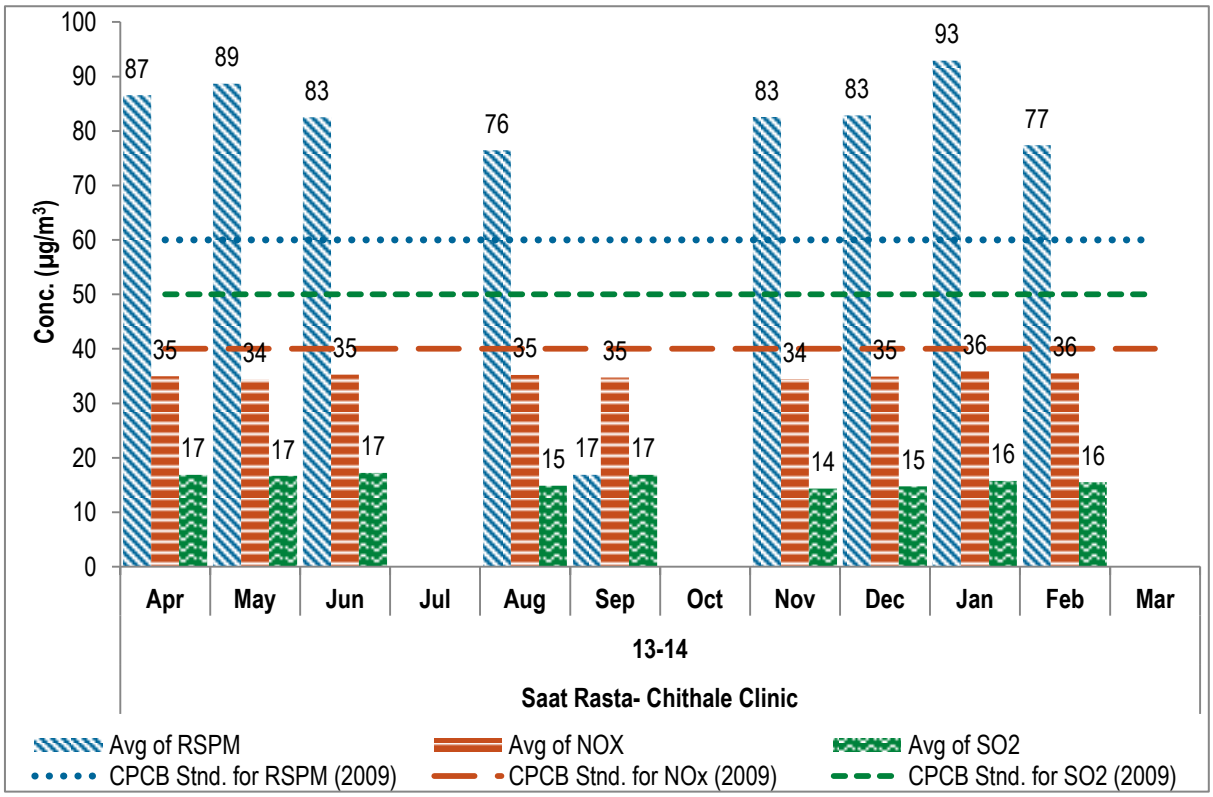


Figure No. 174: Monthly average reading recorded at Saat Rasta- Chithale Clinic

Table No. 152: Data for annual average trend of RSPM, NO_X and SO_2 at Saat Rasta- Chithale Clinic

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
04-05	*104*	**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

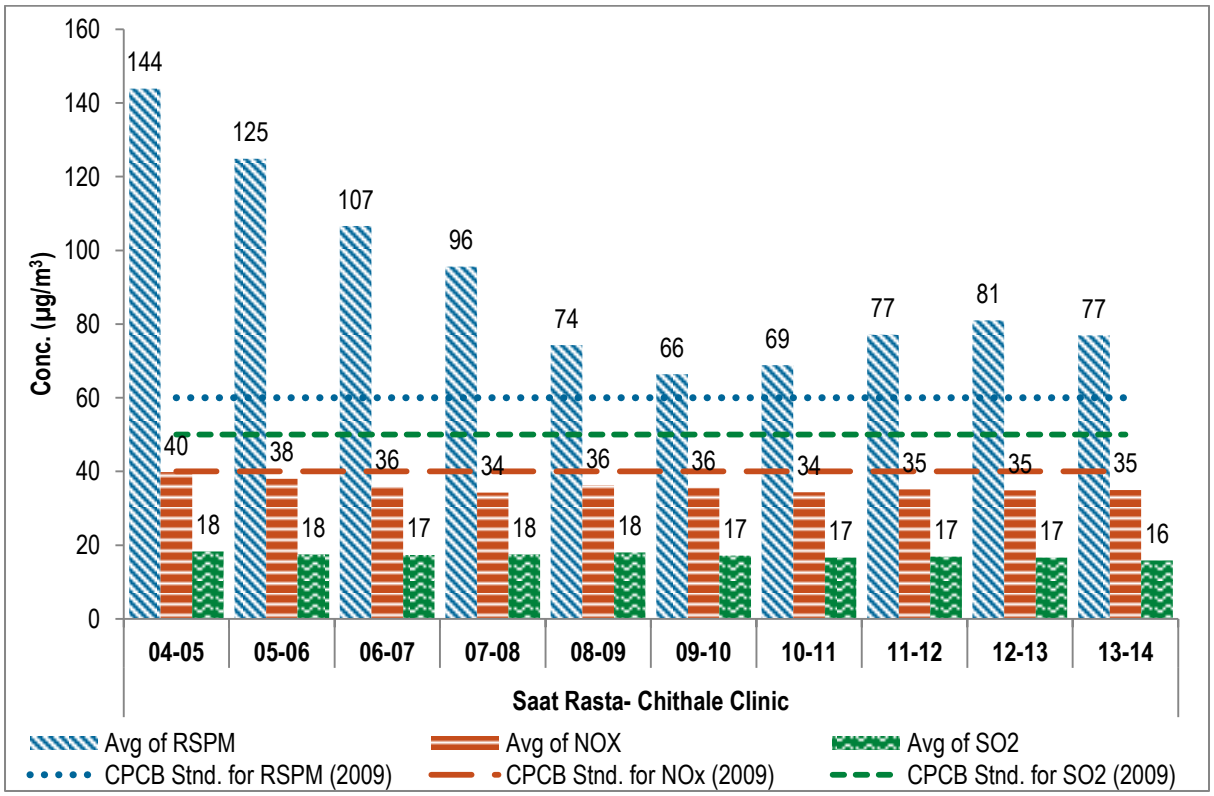


Figure No. 175: Annual average trend of SO_2, NOx and RSPM at Saat Rasta- Chithale Clinic

Solapur - Solapur

Table No. 153: Data for monthly average reading recorded at Solapur

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	*29*	97	50	17
May	*31*	90	49	16
Jun	*29*	58	41	14
Jul	*30*	44	32	14
Aug	*31*	47	31	15
Sep	*29*	52	31	14
Oct	*30*	80	36	13
Nov	*30*	130	42	15
Dec	*31*	153	41	15
Jan	*30*	154	52	17
Feb	*27*	134	52	15
Mar	*29*	117	54	14
	Total N	% of exceedence of daily readings for 2013-14		
	356	46.3	0.0	0.0

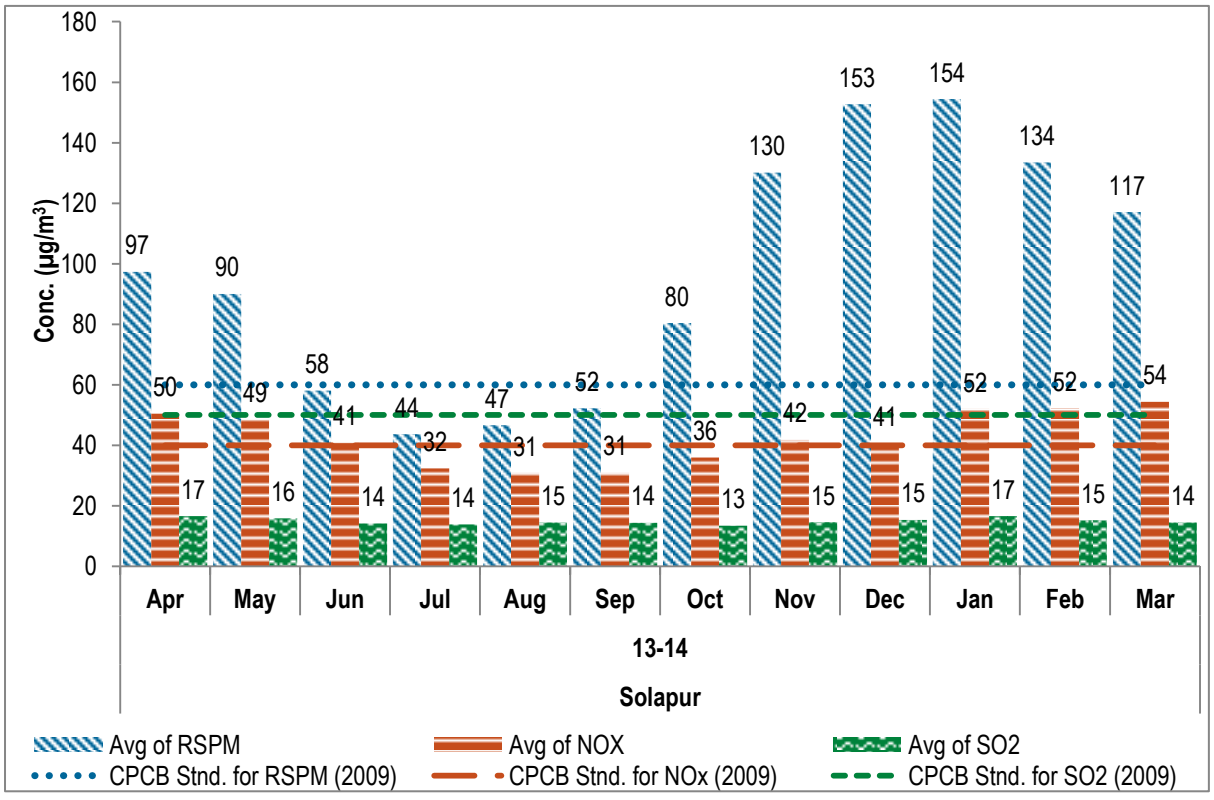


Figure No. 176: Monthly average reading recorded at Solapur

Table No. 154: Data for annual average trend of RSPM, NO_X and SO_2 at Solapur

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

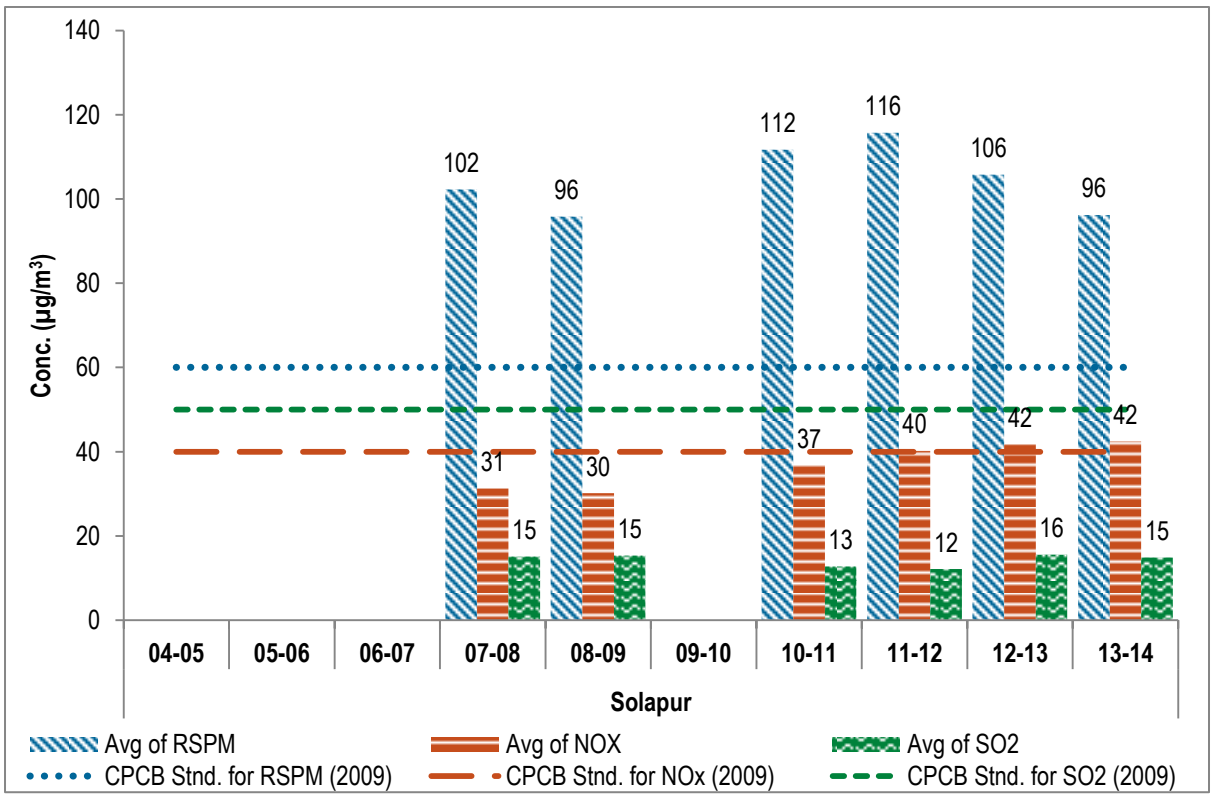


Figure No. 177: Annual average trend of SO_2, NOx and RSPM at Solapur

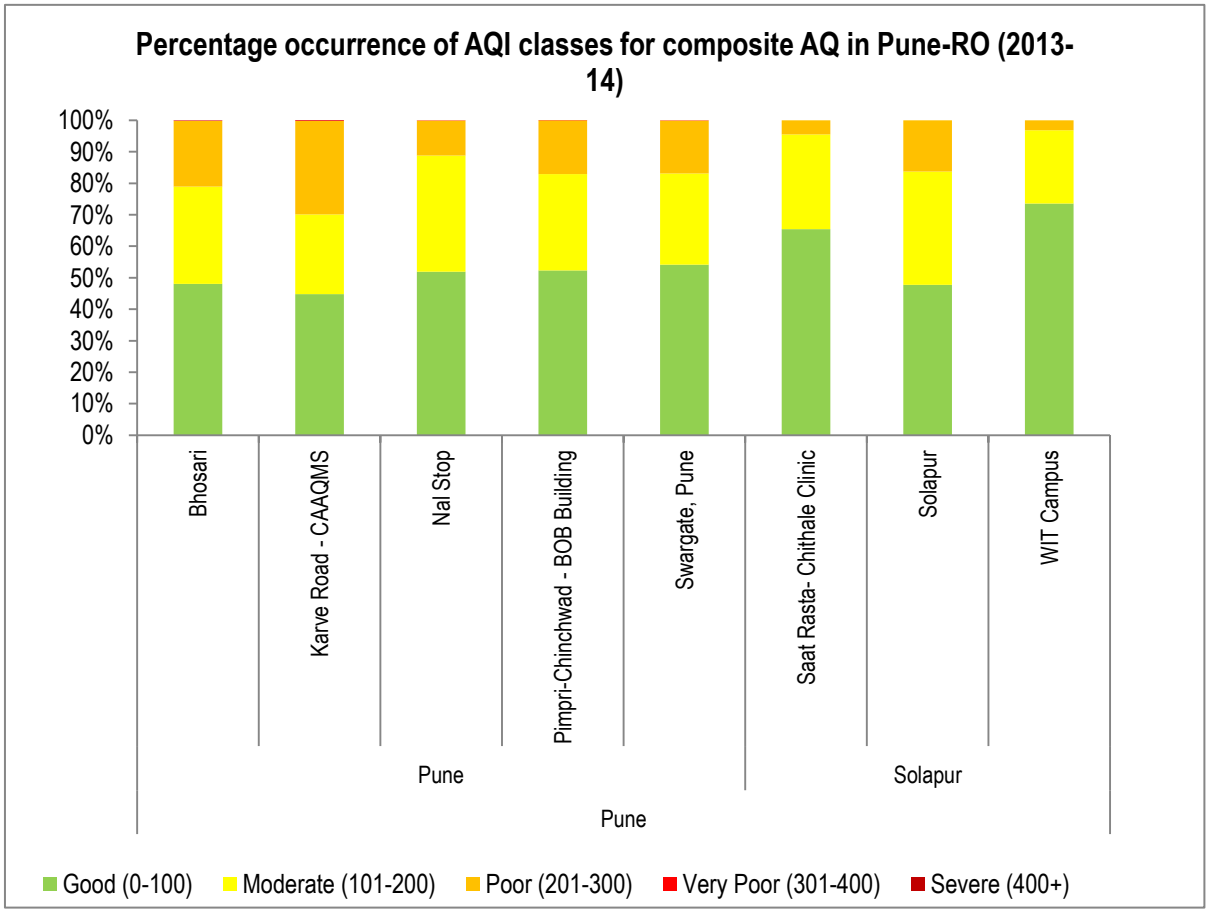
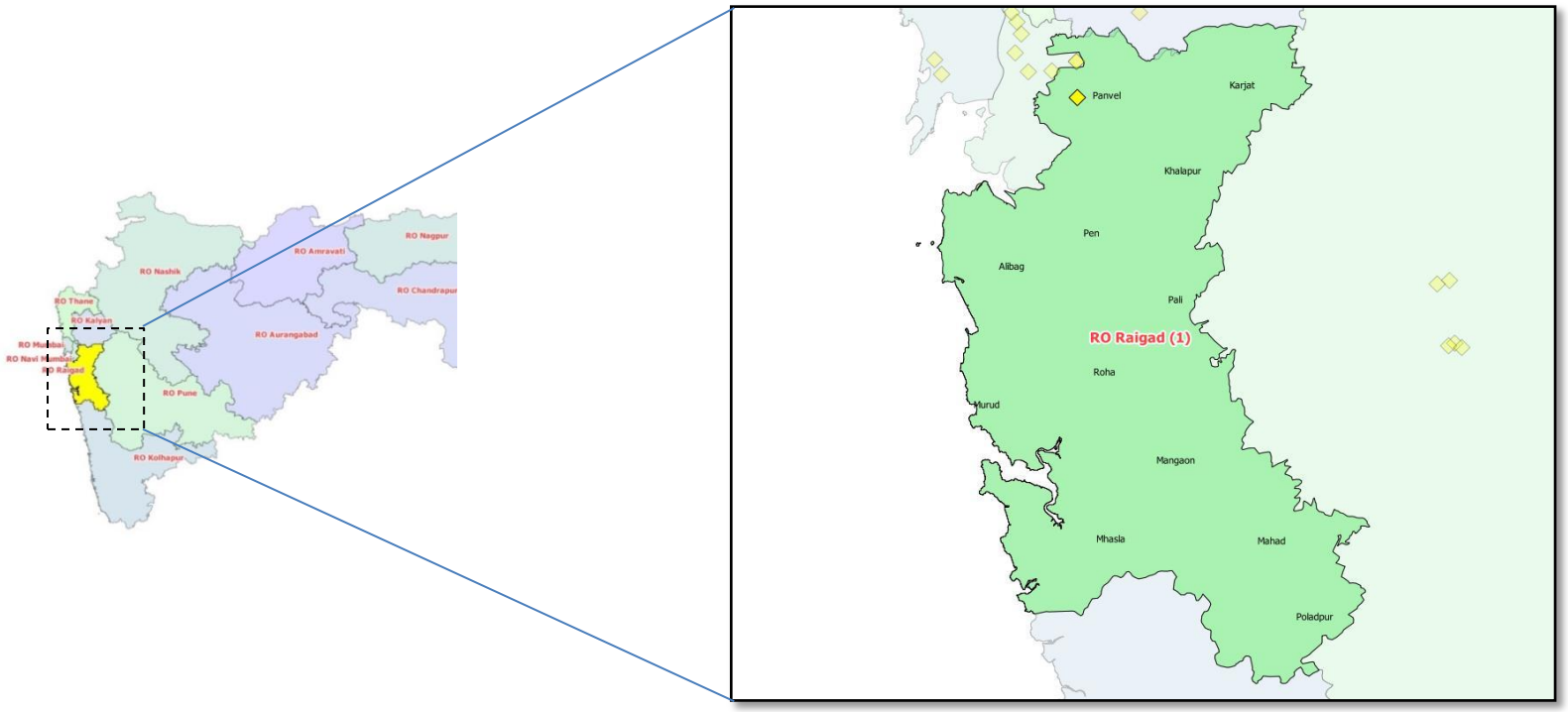


Figure No. 178: Percentage occurrence of AQI classes for composite AQ in Pune-RO (2013-14)

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. 155: Data for monthly average reading recorded at Panvel- Water Supply Plant

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	8	433	46	18
May	9	221	44	18
Jun	9	101	29	11
Jul				
Aug				
Sep	8	80	35	14
Oct	9	111	45	17
Nov	9	194	43	17
Dec	8	231	40	16
Jan	9	208	43	17
Feb				
Mar	9	265	46	18
	Total N	% of exceedence of daily readings for 2013-14		
	78	74.4	0.0	0.0

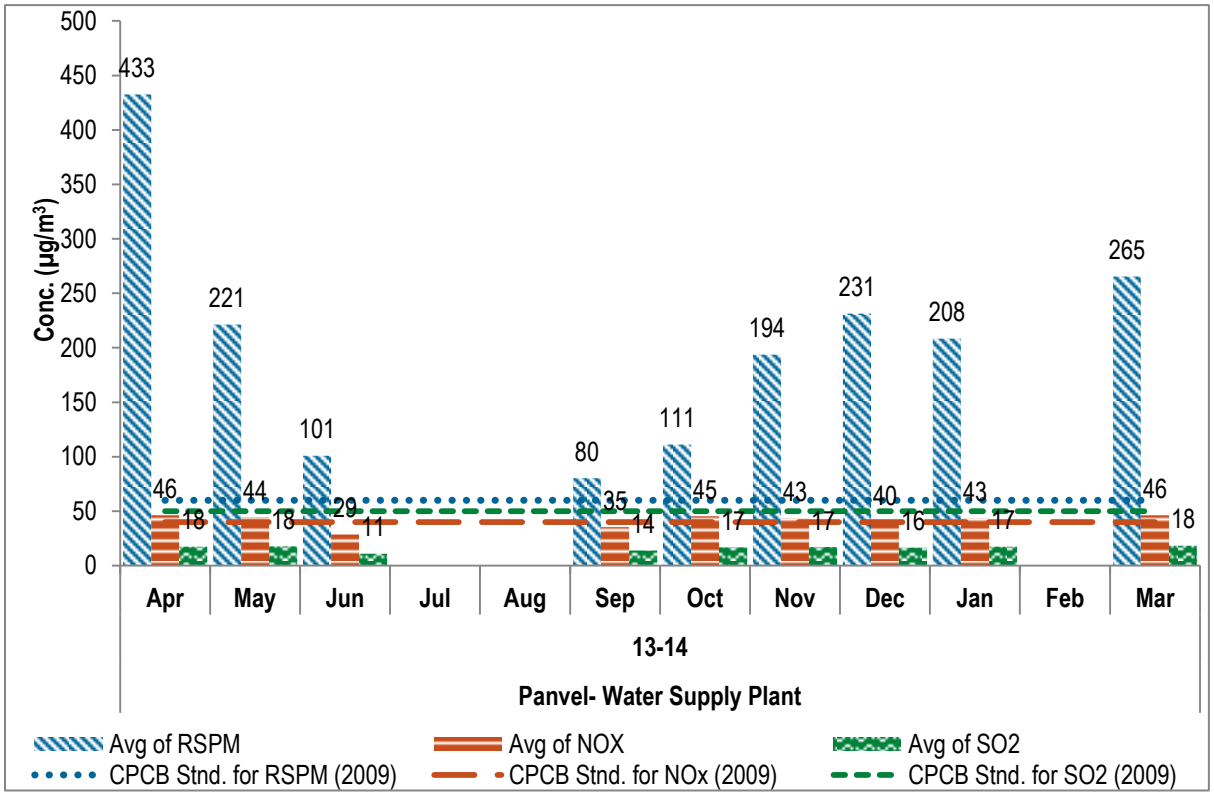


Figure No. 179: Monthly average reading recorded at Panvel- Water Supply Plant

Table No. 156: Data for annual average trend of RSPM, NO_X and SO_2 at Panvel- Water Supply Plant

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
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

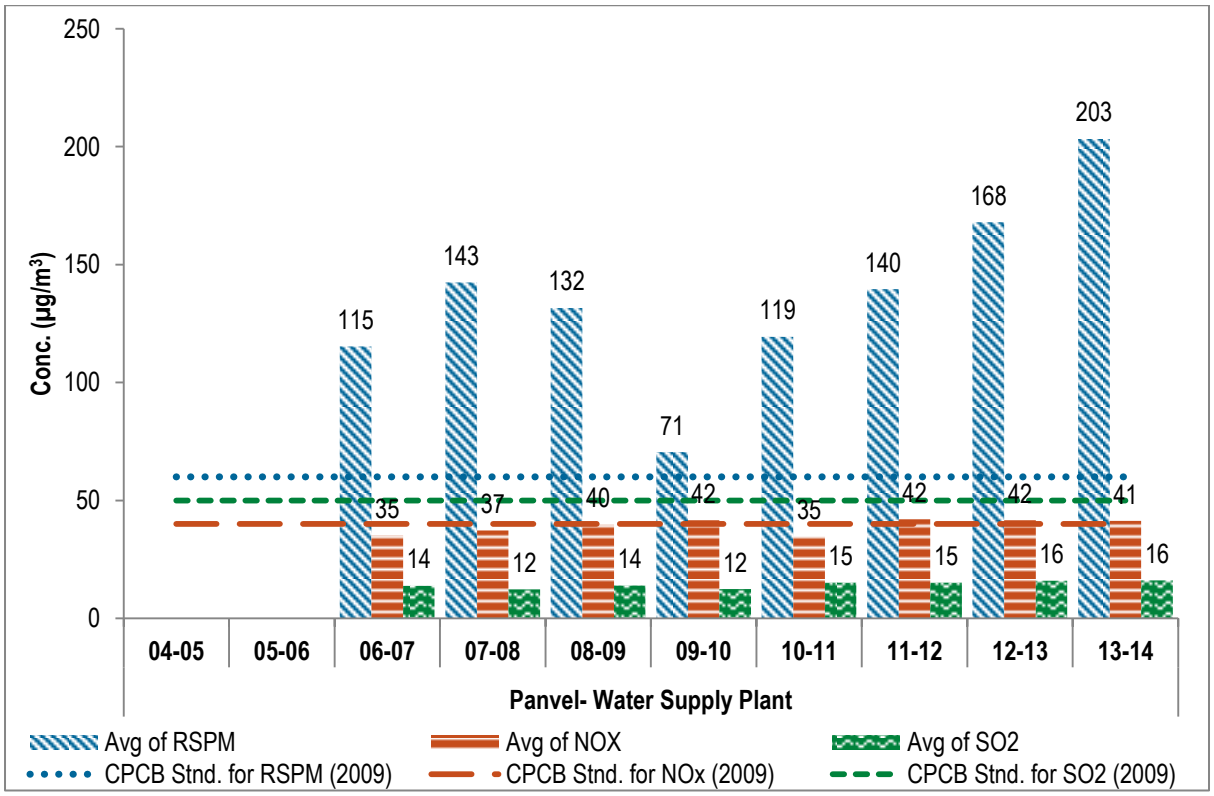


Figure No. 180: Annual average trend of SO_2, NOx and RSPM at Panvel- Water Supply Plant

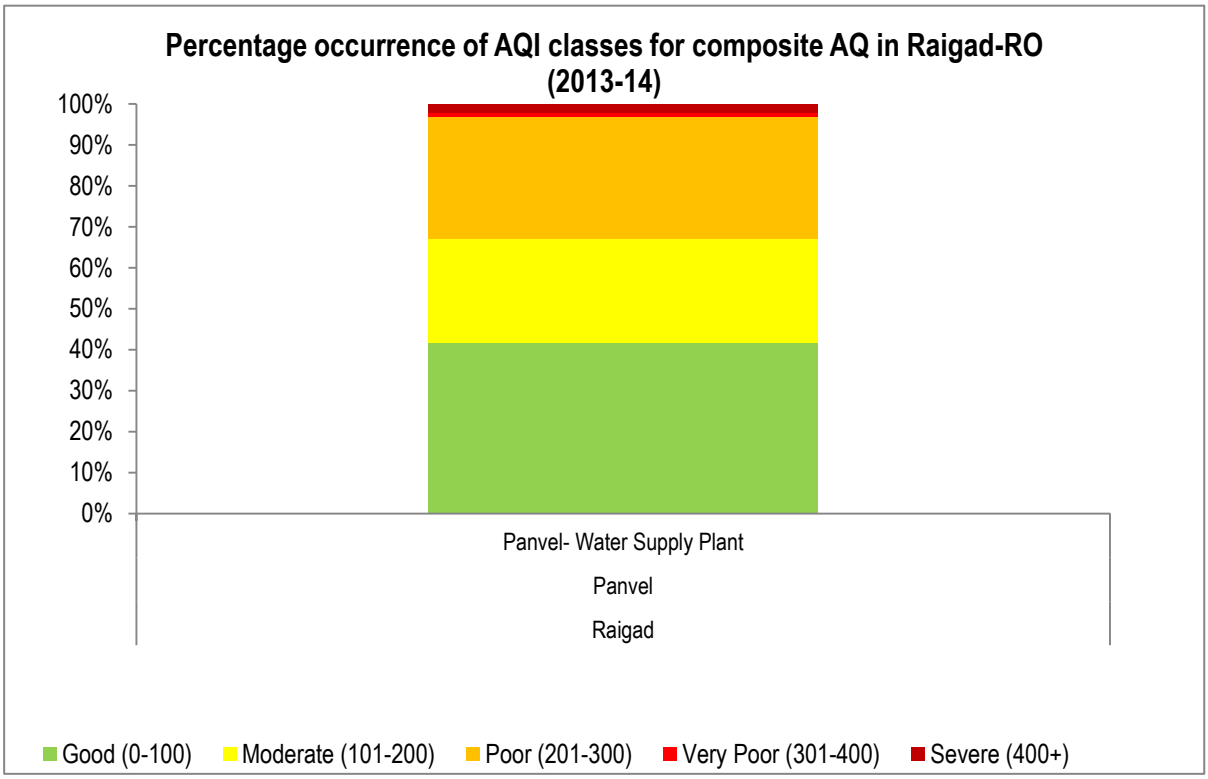
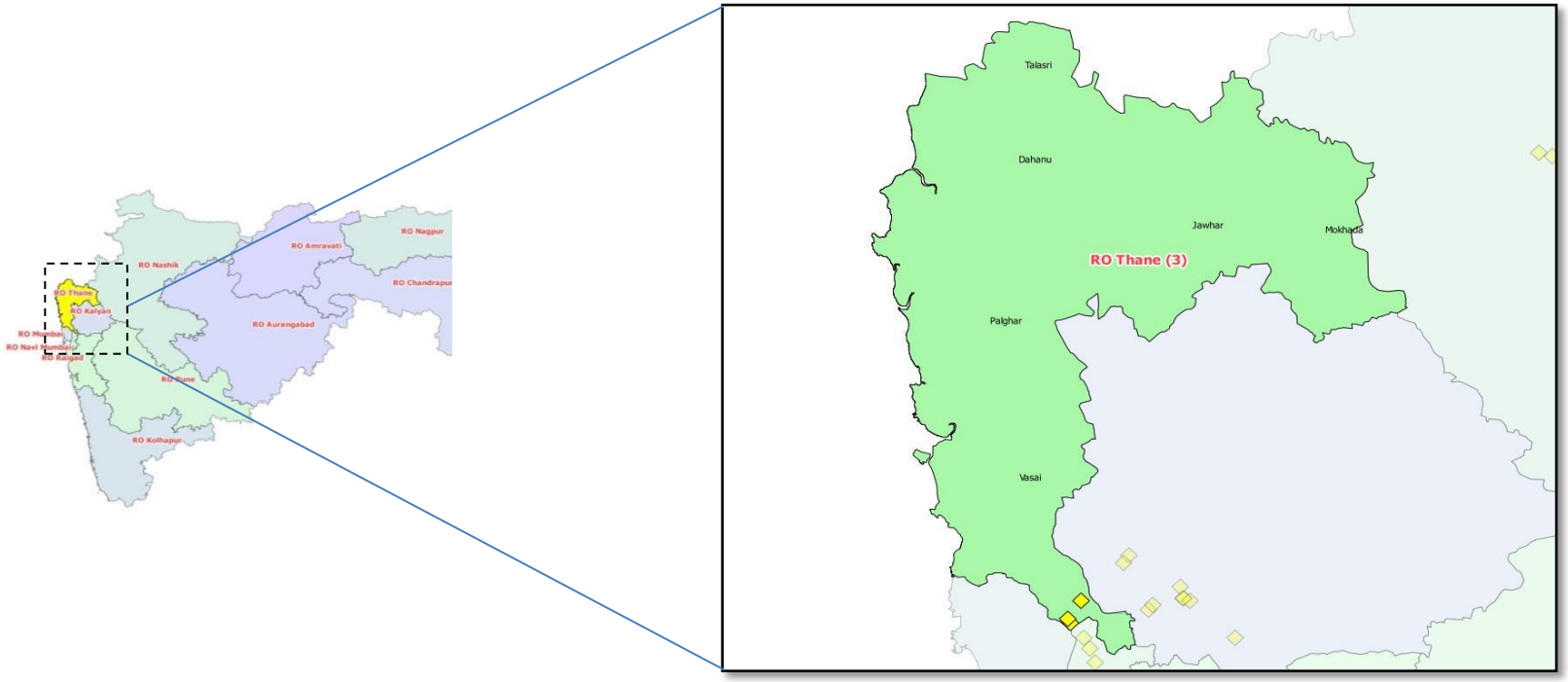


Figure No. 181: Percentage occurrence of AQI classes for composite AQ in Raigad-RO (2013-14)

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. 157: Panvel- Water Supply Plant: Data for monthly average reading recorded at Kopri

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	*8*	205	33	23
May	*18*	154	32	23
Jun	*8*	103	25	20
Jul	*9*	78	26	20
Aug	*9*	57	34	15
Sep	*8*	43	33	13
Oct	*9*	75	40	12
Nov	*10*	120	45	11
Dec	*8*	135	51	13
Jan	*9*	132	61	12
Feb	*12*	118	68	13
Mar				
	Total N	% of exceedence of daily readings for 2013-14		
	108	64.8	0.0	0.0

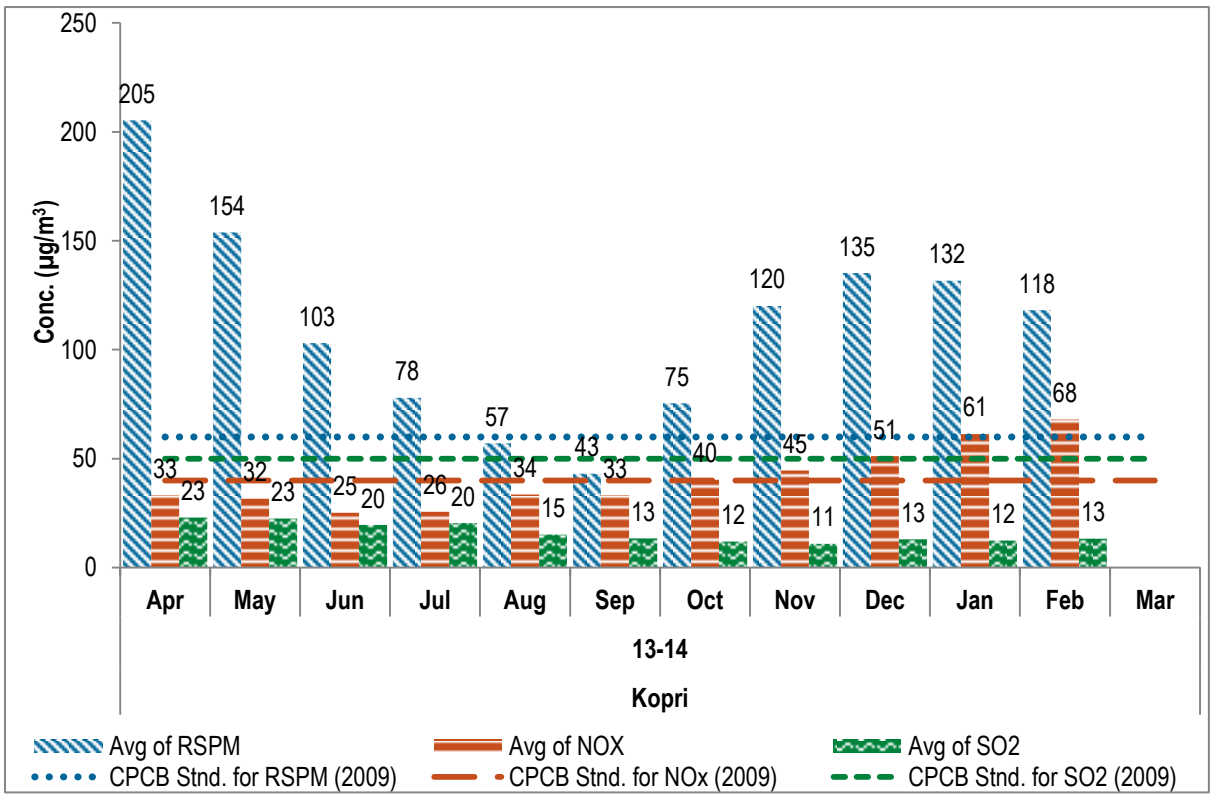


Figure No. 182: Monthly average reading recorded at -Kopri

Table No. 158: Data for annual average trend of RSPM, NO_X and SO_2 at Kopri

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
04-05	*62*	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

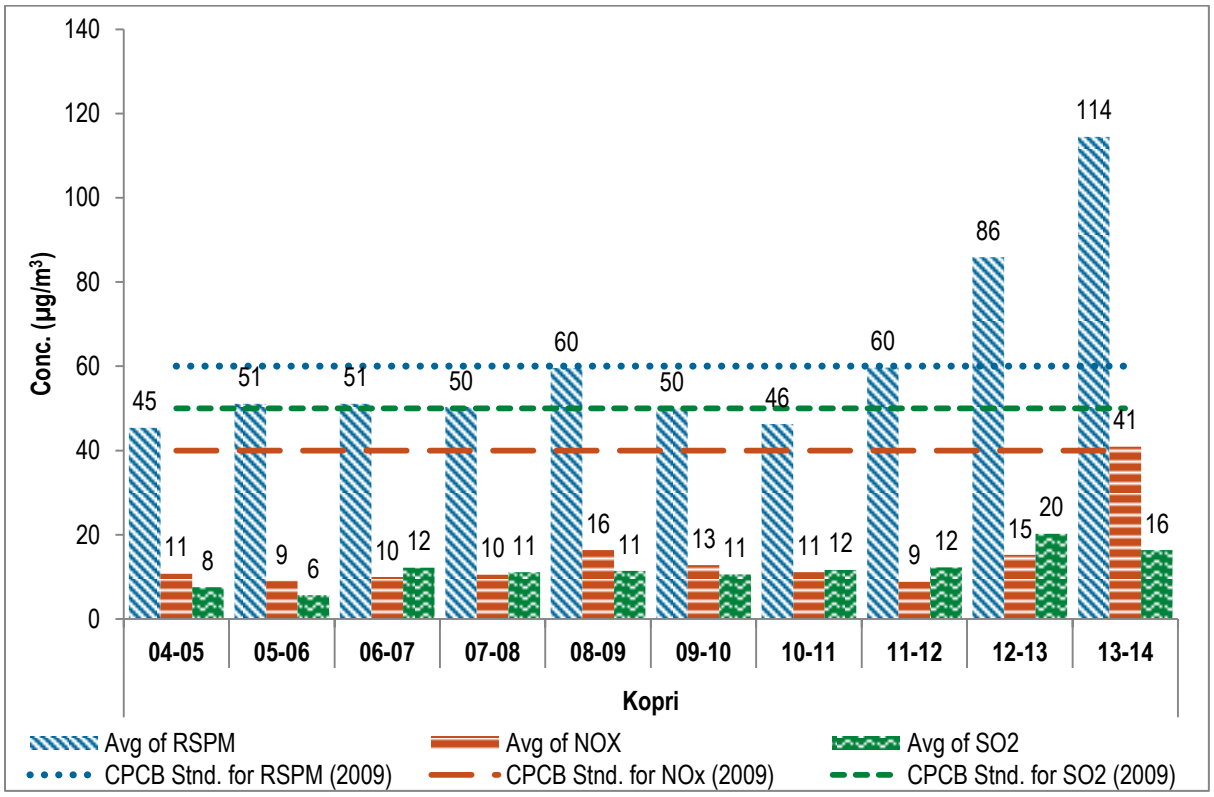


Figure No. 183: Annual average trend of SO_2, NOx and RSPM at -Kopri

Thane - Naupada

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

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
Apr	*8*	187	34	25
May	*8*	168	34	24
Jun	*10*	104	25	19
Jul	*8*	81	26	19
Aug	*9*	51	35	15
Sep	*9*	67	33	14
Oct	*9*	77	42	13
Nov	*9*	124	48	12
Dec	*9*	130	51	17
Jan	*8*	148	61	13
Feb	*12*	120	71	14
Mar				
Total N		% of exceedence of daily readings for 2013-14		
99		57.6	0.0	0.0

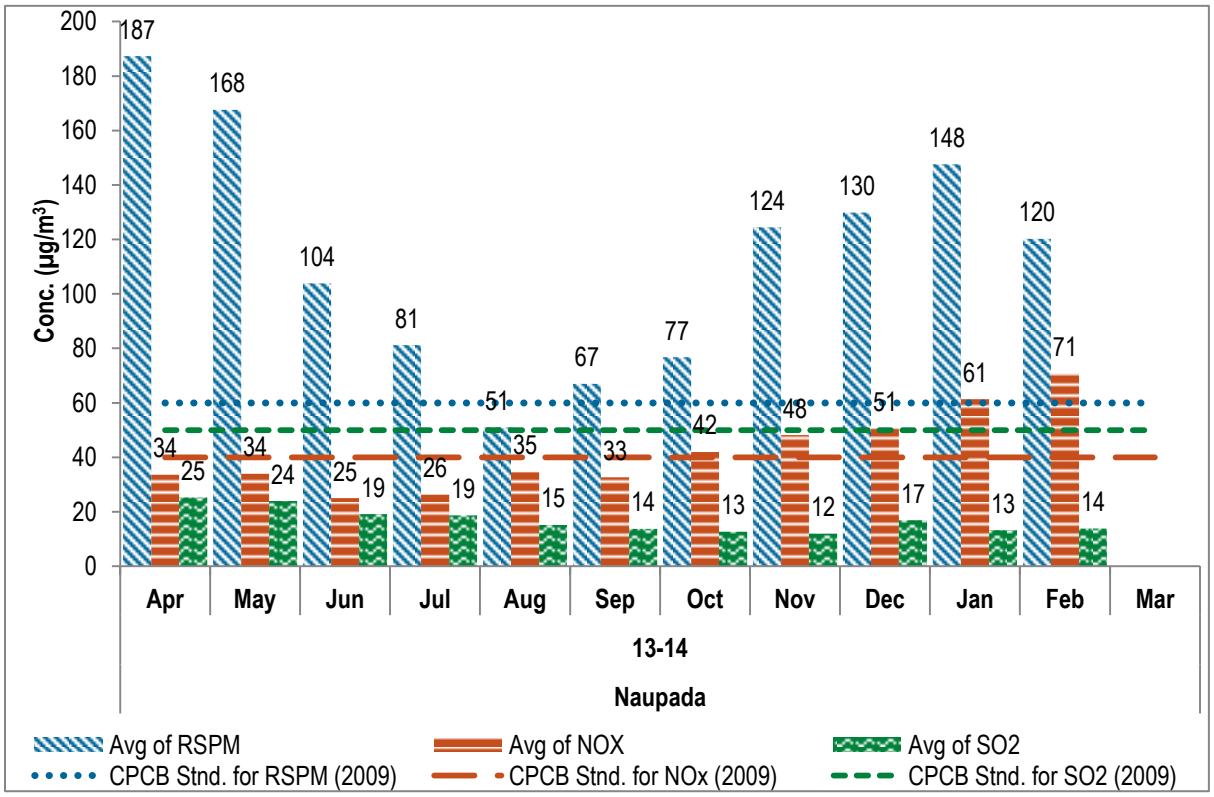


Figure No. 184: Monthly average reading recorded at Naupada

Table No. 160: Data for annual average trend of RSPM, NO_X and SO_2 at Naupada

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
04-05	*58*	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

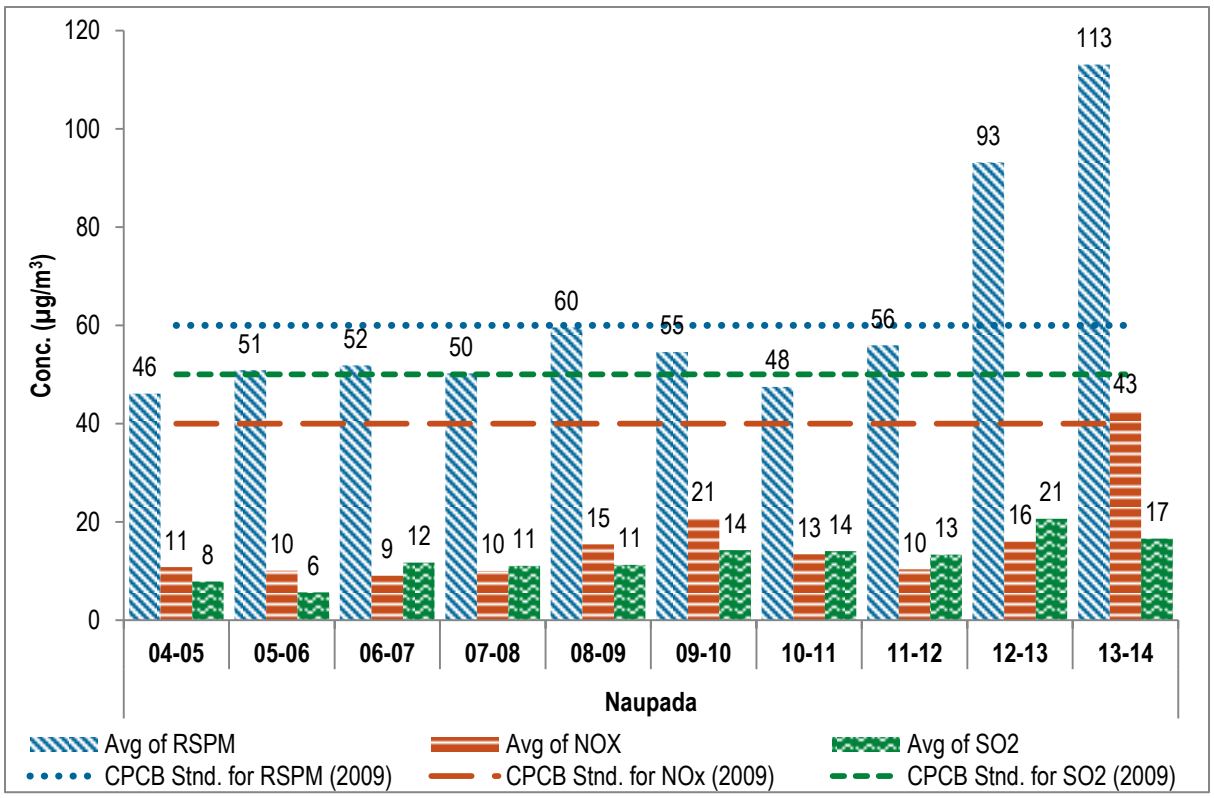


Figure No. 185: Annual average trend of SO_2, NOx and RSPM at Naupada

Thane - Kolshet

Table No. 161: Data for monthly average reading recorded at Kolshet

No Data: Station not operational

Figure No. 186: Monthly average reading recorded at Kolshet

No Data: Station not operational

Table No. 162: Data for annual average trend of RSPM, NO_X and SO_2 at Kolshet

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
04-05	*62*	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				

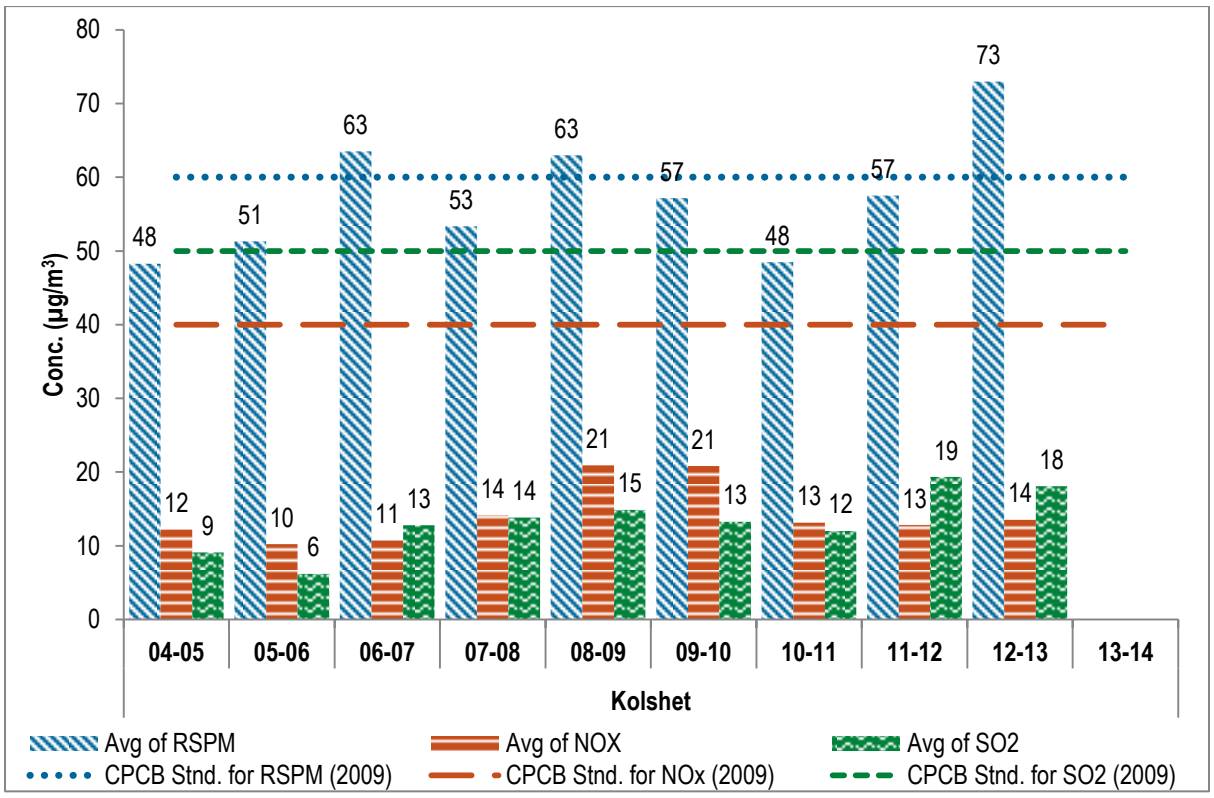


Figure No. 187: Annual average trend of SO_2, NOx and RSPM at Kolshet

Thane – Balkum Glaxo

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

FY	N	Monthly average (µg/m³)		
2013-14		RSPM	NO_X	SO_2
May	*8*	140	31	23
Jun	*8*	96	22	16
Jul	*10*	80	23	14
Aug	*8*	62	32	15
Sep	*9*	70	32	15
Oct	*10*	87	37	11
Nov	*9*	115	45	11
Dec	*8*	137	44	12
Jan	*10*	135	49	13
Feb				
Mar				
Total N		% of exceedence of daily readings for 2013-14		
80		67.5		

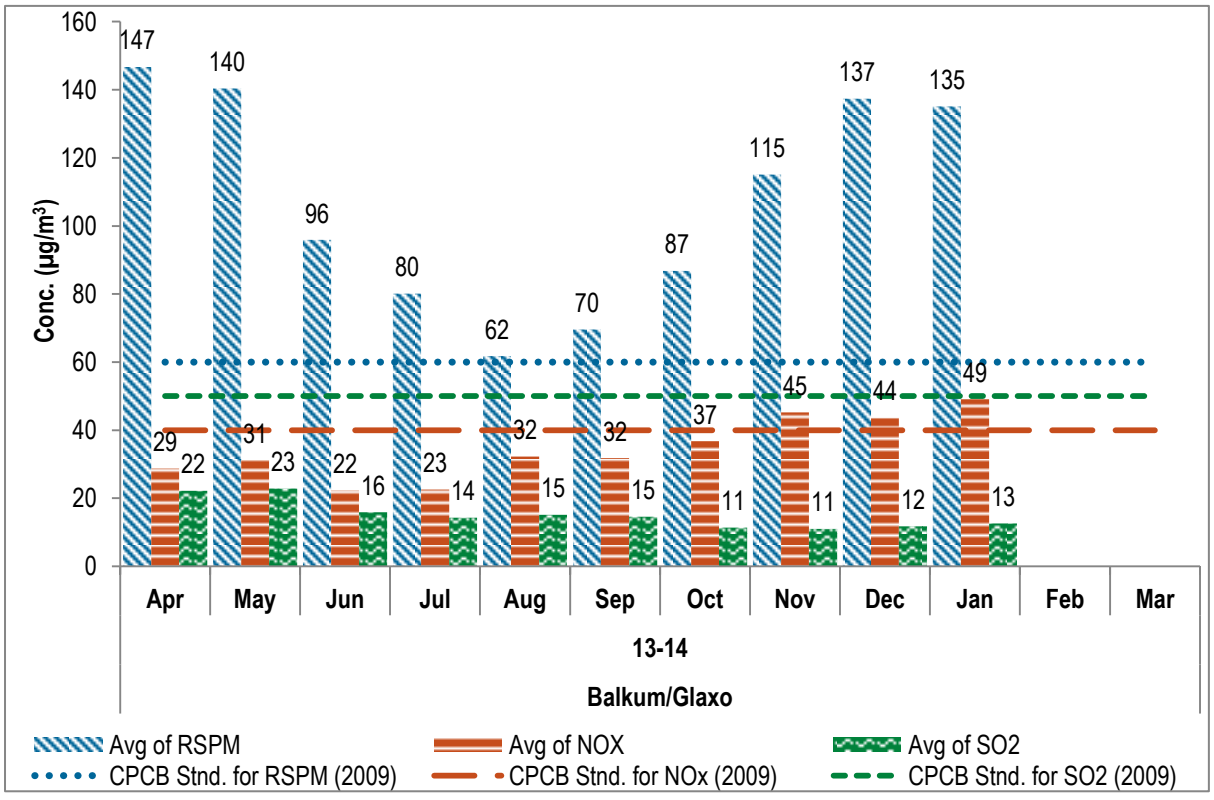


Figure No. 188: Monthly average reading recorded at Balkum Glaxo

Table No. 164: Data for annual average trend of RSPM, NO_X and SO_2 at Balkum Glaxo

Year	N	Annual average (µg/m³)		
		RSPM	NO_X	SO_2
Annual Standard		*60*	*40*	*50*
04-05				
05-06				
06-07				
07-08				
08-09				
09-10				
10-11				
11-12				
12-13				
13-14	*90*	107	34	15

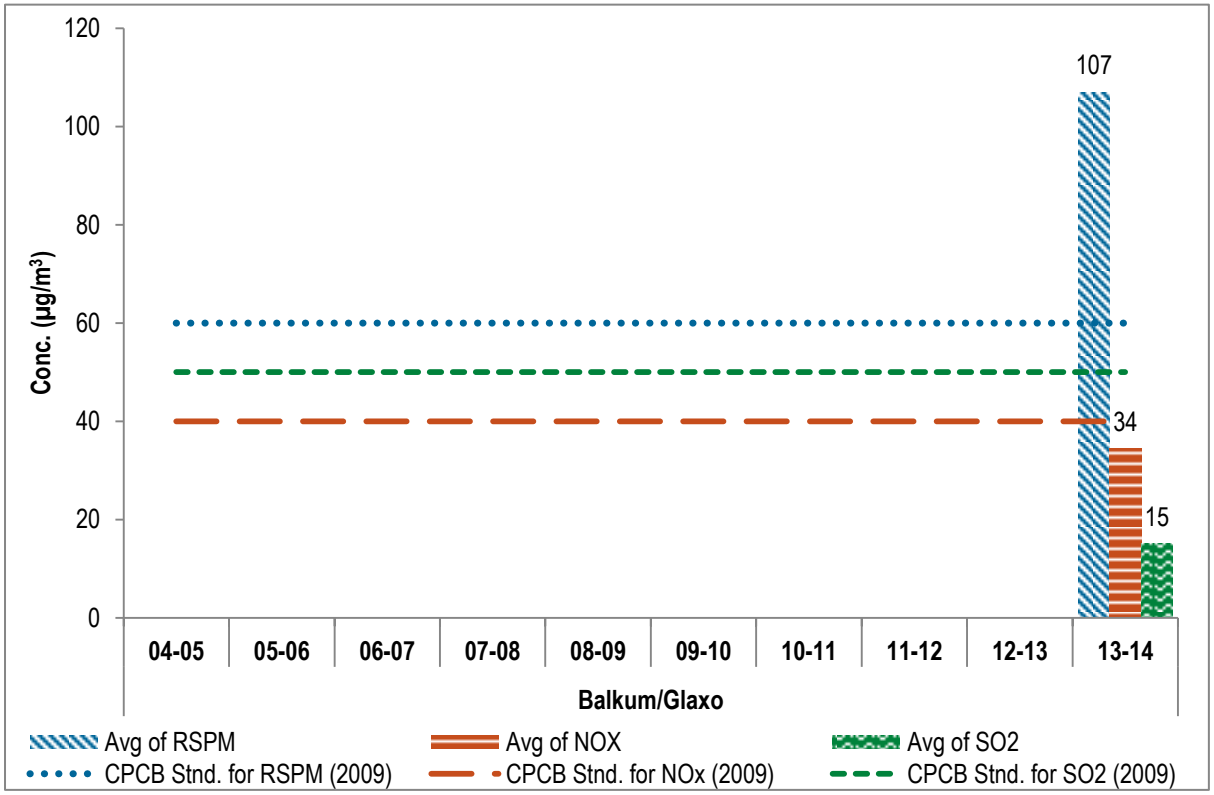


Figure No. 189: Annual average trend of SO_2, NOx and RSPM at Balkum Glaxo

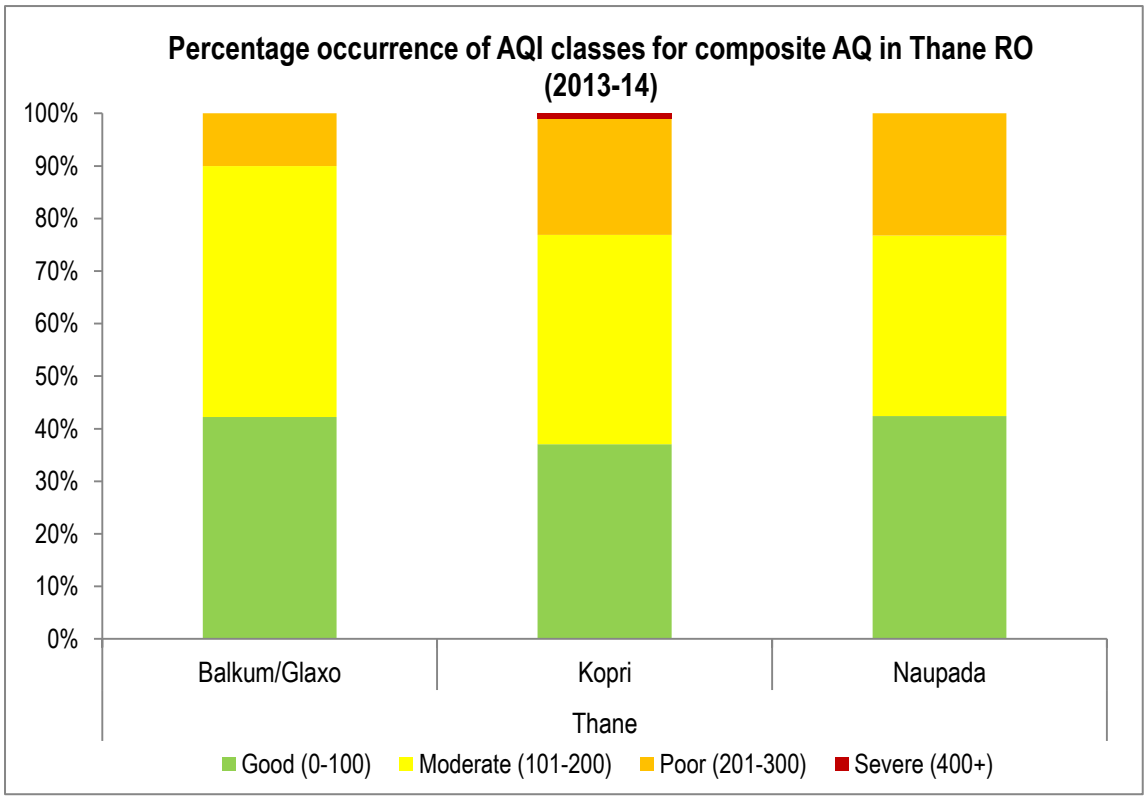


Figure No. 190: Percentage occurrence of AQI classes for composite AQ in Thane-RO (2013-14)

Appendix – A: Revised NAAQS 2009

रजिस्ट्री सं० डी० एल०-33004/99 REGD. NO. D. L.-33004/99

भारत का राजपत्र
The Gazette of India

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राष्ट्रीय परिवेशी वायु गुणवत्ता मानक
केन्द्रीय प्रदूषण नियंत्रण बोर्ड
अधिसूचना
नई दिल्ली, 18 नवम्बर, 2009

सं. बी-29016/20/90/पी.सी.आई.-I.—वायु (प्रदूषण निवारण एवं नियंत्रण) अधिनियम, 1981 (1981 का 14) की धारा 16 की उपधारा (2) (एच) द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए तथा अधिसूचना संख्या का.आ. 384(ई), दिनांक 11 अप्रैल, 1994 और का.आ. 935 (ई) दिनांक 14 अक्टूबर, 1998 के अधिक्रमण में केन्द्रीय प्रदूषण नियंत्रण बोर्ड इसके द्वारा तत्काल प्रभाव से राष्ट्रीय परिवेशी वायु गुणवत्ता मानक अधिसूचित करता है, जो इस प्रकार है:-

राष्ट्रीय परिवेशी वायु गुणवत्ता मानक

क्र. सं.	प्रदूषक	समय आधारित औसत	परिवेशी वायु में सान्द्रण		
			औद्योगिक, शिक्षायशी, ग्रामीण और अन्य क्षेत्र	पारिस्थितिकीय संवेदनशील क्षेत्र (केन्द्र सरकार द्वारा अधिसूचित)	प्रवोधन की पद्धति
(1)	(2)	(3)	(4)	(5)	(6)
1	सल्फर डाई आक्साइड (SO_2), $\mu g/m^3$	वार्षिक*	50	20	-उन्नत वैस्ट और गाईक
		24 घंटे**	80	80	-पराबैगनी परिदीप्ती
2	नाइट्रोजन डाई आक्साइड (NO_2), $\mu g/m^3$	वार्षिक*	40	30	-उपांतरित जैकब और हॉवाइजर (सोडियम-आर्सेनाईट)
		24 घंटे**	80	80	-रासायनिक संदीप्ति
3	विविक्त पदार्थ (10माइक्रान से कम आकार)या PM_{10}, $\mu g/m^3$	वार्षिक*	60	60	-हरात्मक विश्लेषण
		24 घंटे**	100	100	-टेपेम
					-बीटा तनुकरण पद्धति

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	ओजोन (O_3) $\mu g/m^3$	8 घंटे** 1 घंटा**	100 180	100 180	-पराबैगनी 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 -टेफलॉन फिल्टर पेपर का प्रयोग करते हुए ED-XRF
7	कार्बन मोनोक्साइड (CO) mg/m^3	8 घंटे** 1 घंटा**	02 04	02 04	-अविपेक्षी अवरक्त (NDIR) स्पैक्ट्रम मापन
8	अमोनिया (NH_3) $\mu g/m^3$	वार्षिक* 24 घंटे**	100 400	100 400	-रासायनिक संदीप्ती -इण्डोफिनॉल ब्ल्यू पद्धति
9	बैन्जीन (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 स्पैक्ट्रामिती 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 अंकगणीतीय औसत ।

** वर्ष में 98 प्रतिशत समय पर 24 घंटे या 8 घंटे या 1 घंटा के मानीटर मापमान, जो लागू हो , अनुपालन कये जाएंगे । दो प्रतिशत समय पर यह मापमान अधिक हो सकता है, किन्तु क्रमिक दो मानीटर करने के दिनों पर नहीं ।

टिप्पणी:

1. जब कभी और जहां भी किसी अपने-अपने प्रवर्ग के लिये दो क्रमिक प्रबोधन दिनों पर मापित मूल्य, उम्र विनिर्दिष्ट सीमा से अधिक हो तो इसे नियमित या निरंतर प्रबोधन तथा अतिरिक्त अन्वेषण करवाने के लिये पर्याप्त कारण समझा जायेगा ।

संत प्रसाद गौतम, अध्यक्ष

[विज्ञापन-III/4/184/09/असा.]

टिप्पणी: राष्ट्रीय परिवेशी वायु गुणवत्ता मानक संबंधी अधिसूचनाएँ, केन्द्रीय प्रदूषण नियंत्रण बोर्ड द्वारा भारत के राजपत्र आसाधरण में अधिसूचना संख्या का.आ. 384 (ई), दिनांक 11 अप्रैल, 1994 एवं का. आ. 935 (ई), दिनांक 14 अक्टूबर, 1998 द्वारा प्रकाशित की गयी थी ।

NATIONAL AMBIENT AIR QUALITY STANDARDS
CENTRAL POLLUTION CONTROL BOARD
NOTIFICATION

New Delhi, the 18th November, 2009

No. B-29016/20/90/PCI-L—In exercise of the powers conferred by Sub-section (2) (h) of section 16 of the Air (Prevention and Control of Pollution) Act, 1981 (Act No.14 of 1981), and in supersession of the Notification No(s). S.O. 384(E), dated 11th April, 1994 and S.O. 935(E), dated 14th October, 1998, the Central Pollution Control Board hereby notify the National Ambient Air Quality Standards with immediate effect, namely:-

NATIONAL AMBIENT AIR QUALITY STANDARDS

S. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial, Residential, Rural and Other Area	Ecologically Sensitive Area (notified by Central Government)	Methods of Measurement
(1)	(2)	(3)	(4)	(5)	(6)
1	Sulphur Dioxide (SO_2), µg/m³	Annual*	50	20	- Improved West and Gaeke
		24 hours**	80	80	-Ultraviolet fluorescence
2	Nitrogen Dioxide (NO_2), µg/m³	Annual*	40	30	- Modified Jacob & Hochheiser (Na-Arsenite)
		24 hours**	80	80	- Chemiluminescence
3	Particulate Matter (size less than 10µm) or PM_{10} µg/m³	Annual*	60	60	- Gravimetric - TOEM
		24 hours**	100	100	- Beta attenuation
4	Particulate Matter (size less than 2.5µm) or $PM_{2.5}$ µg/m³	Annual*	40	40	- Gravimetric - TOEM
		24 hours**	60	60	- Beta attenuation
5	Ozone (O_3) 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 - ED-XRF using Teflon filter
		24 hours**	1.0	1.0	
7	Carbon Monoxide (CO) mg/m³	8 hours**	02	02	- Non Dispersive Infra Red (NDIR) spectroscopy
		1 hour**	04	04	
8	Ammonia (NH_3) µg/m³	Annual*	100	100	-Chemiluminescence
		24 hours**	400	400	-Indophenol blue method

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

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

** 24 hourly or 08 hourly or 01 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.

Note. — Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category, it shall be considered adequate reason to institute regular or continuous monitoring and further investigation.

SANT PRASAD GAUTAM, Chairman
[ADVT-III/4/184/09/Exty.]

Note: The notifications on National Ambient Air Quality Standards were published by the Central Pollution Control Board in the Gazette of India, Extraordinary vide notification No(s). S.O. 384(E), dated 11th April, 1994 and S.O. 935(E), dated 14th October, 1998.

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Maharashtra Pollution Control Board
महाराष्ट्र प्रदूषण नियंत्रण मंडळ

Maharashtra Pollution Control Board
Kalpataru Point, 3rd and 4th floor,
Opp. Cine Planet, Sion Circle,
Mumbai - 400 022
Telephone : +91 22 24020781 / 24014701
Fax : +91 22 24024068
Website : http://mpcb.gov.in/

The Energy and Resources Institute
Western Regional Centre,
318, Raheja Arcade, Sector-11,
Belapur CBD,
Navi Mumbai - 400614
Telephone : +91 22 27580021/ 40241615
Fax : +91 22 27580022
Website : www.teriin.org