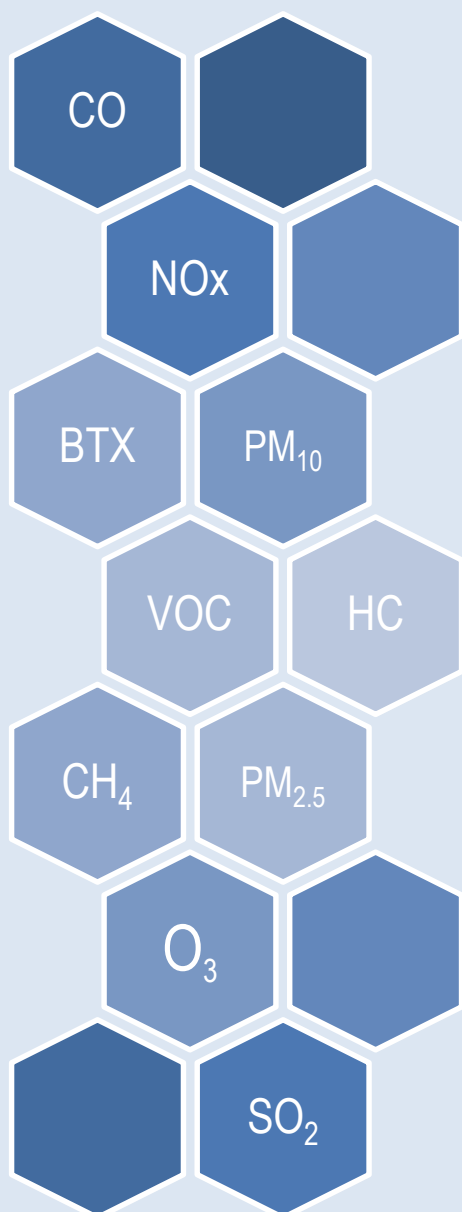


Air Quality Status of Maharashtra

2015-16



Maharashtra Pollution Control Board
महाराष्ट्र प्रदूषण नियंत्रण मंडळ



The Energy & Resources Institute

Air Quality Status of Maharashtra 2015 - 16



Maharashtra Pollution Control Board

महाराष्ट्र प्रदूषण नियंत्रण मंडळ

Prepared by



teri

The Energy and Resources Institute

...towards global
sustainable development



Team Members

Maharashtra Pollution Control Board

Shri. V. M Motghare
Joint Director APC

Shri. S C Kollur,
Scientific Officer

Mrs. Dipti Damushte Gurav,
Data Entry Operator

The Energy and Resources Institute

Advisor

Dr Anjali Parasnis,
Associate Director, TERI WRC (Western Regional Centre)

Principal Investigator

Mr. Prathmesh Chourey
Associate Fellow, TERI WRC

Co-Principal Investigator

Mr. Yatish Lele
Research Associate, TERI WRC

Team Members

Pranali Chavan, *Project Associate, TERI*
Lalit Joshi, *Office Asst.-Cum-Data Entry Operator, TERI*
Swati Tomar, *Associate Fellow, TERI*

For more information

The Energy and Resources Institute (**TERI**)

Western Regional Centre (WRC)

318 Raheja Arcade, Sector 11,

Belapur CBD, Navi Mumbai,

Maharashtra, India

India +91 • Mumbai (0) 22

Tel. 27580021 or 40241615

Fax 27580022

Web www.teriin.org

PREFACE

डॉ. पी. अन्बलगन भाप्रसे
सदस्य सचिव
Dr. P. Anbalagan 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, Chandrapur, 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 2015-2016 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 Center (WRC), Mumbai and I appreciate the efforts of Dr. Anjali Parasnis, Associate Director, TERI and Shri Prathamesh Chourey Associate Fellow, TERI, Mumbai in preparing this report for the Board. I also acknowledge the monitoring agencies for their efforts in the field for monitoring work carried out to generate the air quality data. The contribution of Shri. V.M. Motghare, Joint Director and Shri S.C Kollur, Scientific Officer, MPCB is also appreciated.

(Dr.P.Anbalagan,IAS)
Member Secretary

June'2016

कल्पतरु पोईट, सायन सर्कल, सायन (पूर्व), मुंबई - ४०० ०२२. टेलि. : २४०१ ०७०६ • फॅक्स : २४०२ ३५१६

TABLE OF CONTENTS

ABBREVIATIONS.....	XI
LIST OF FIGURES	XIII
LIST OF TABLES	XIV
EXECUTIVE SUMMARY	XV
INTRODUCTION.....	1
Air Pollution.....	1
Challenges and initiatives in India.....	3
Central Pollution Control Board	3
Maharashtra Pollution Control Board	4
AIR QUALITY MONITORING IN MAHARASHTRA.....	5
Monitoring Network.....	5
Pollutants Monitored.....	7
Air Quality Monitoring Data.....	7
STATUS OF AIR QUALITY	9
Sulphur dioxide	9
Trend in sulphur dioxide concentrations in Maharashtra	10
SO ₂ concentrations in industrial areas	12
SO ₂ concentrations in residential areas.....	14
SO ₂ concentrations in rural and other areas.....	16
SO ₂ concentrations in commercial areas.....	18
Oxides of Nitrogen.....	19
Trend in concentrations of oxides of nitrogen in Maharashtra	20
NO _x concentrations in industrial areas.....	22
NO _x concentrations in residential areas	24
NO _x concentrations in rural and other areas	26
NO _x concentrations in commercial areas	28
Particulate Matter	29
Trend in concentrations of Particulate Matter in Maharashtra	30
RSPM concentrations in industrial areas.....	32
RSPM concentrations in residential areas	34
RSPM concentrations in rural and other areas	36
RSPM concentrations in commercial areas.....	38
Ozone	39
Carbon Monoxide.....	41
National Air Quality Index	43

Calculation of AQI.....	44
AQI for 2015-16	45
CONCLUSION.....	49
ANNEX – I: LIST OF AAQMS IN MAHARASHTRA – 2015-16	51
ANNEX – II: DATA RECORDED BY AAQMS IN MAHARASHTRA 2015-1657	
RO – Amravati.....	59
Akola – LRT Commerce College.....	60
Akola - MIDC Water Works	62
Akola – Akola College of Engg & Technology	64
Amravati – Raj Kamal Chowk.....	66
Amravati – Govt. College of Engineering	68
Amravati - Godhadiwala Private Limited.....	70
RO – Aurangabad	73
Aurangabad – SBES College.....	74
Aurangabad – Collector Office, Aurangabad	76
Aurangabad – C.A.D.A. Office	78
Jalna – Bachat Bhavan	80
Jalna – Krishnadhan Seeds Ltd	82
Latur – MIDC Water Works	84
Latur – Shyam Nagar – KshewrajVidyalaya.....	86
Latur – GanjGolai – Sidhsheshwar Bank.....	88
Nanded - GaneshNagar	90
Nanded – MuthaChowk	92
Nanded – Industrial Area CIDCO.....	94
RO – Chandrapur.....	97
Chandrapur - Ghuggus.....	98
Chandrapur – Chandrapur - MIDC	100
Chandrapur – Chandrapur – SRO MPCB	102
Chandrapur Tadali MIDC	104
Chandrapur Ballarshah.....	106
Chandrapur - Rajura.....	108
RO – Kalyan.....	111
Ambarnath	112
Badlapur – Badlapur – BIWA House	114
Bhiwandi – IGM Hospital.....	116
Bhiwandi – Prematai hall.....	118
Dombivali.....	120

Dombivali – MIDC Office Dombivali	122
Kalyan – MPCB RO Kalyan office	124
Ulhasnagar – Smt. CHM College Campus	126
Ulhasnagar - Powai Chowk.....	128
RO – Kolhapur	131
Chiplun – Chiplun – MIDC Chalkewadi.....	132
Chiplun – Chiplun – Water Treatment	134
Kolhapur – Shivaji University Campus	136
Kolhapur – Ruikar Trust	138
Kolhapur – Mahadwar Road.....	140
Sangli – Terrace of SRO – Sangli, Udyog Bhavan.....	142
Sangli – Sangli – Miraj Primary Municipal School	144
Sangli – Krishna Valley School.....	146
RO – Mumbai	149
Mumbai - Bandra	150
Mumbai - Sion	152
RO – Nagpur	155
Nagpur – IOE North Ambazari road	156
Nagpur – MIDC Office, Hingna Road	158
Nagpur – Govt Polytechnic Col, Sadar	160
Nagpur – Nagpur Civil Lines.....	162
RO – Nashik	165
Jalgaon – Old B. J. Market	166
Jalgaon – Girna Water Tank	168
Jalgaon – MIDC Jalgaon	170
Nashik - RTO Colony	172
Nashik – MIDC Satpur - VIP	174
Nashik – NMC Nashik	176
Nashik - SRO Office Nashik	178
RO – Navi Mumbai	181
Navi Mumbai - Rabale	182
Navi Mumbai – Nerul – DY Patil.....	184
Navi Mumbai – Mahape, MPCB – NirmalBhavan.....	186
Navi Mumbai - Airoli.....	188
Taloja – Kharghar – CIDCO Nodal Office	190
Taloja – MIDC Building	192
RO – Pune	195
Pune - Bhosari.....	196

Pune - Nal Stop.....	198
Pune – Swargate, pune.....	200
Pune – Pimpri – Chinchwad – BOB Building	202
Pune - Karve Road - CAAQMS.....	204
Solapur – WIT Campus	206
Solapur – Saat Rasta – Chithale Clinic	208
Solapur - Solapur	210
RO – Raigad	213
Panvel – Panvel – Water Supply Plant.....	214
RO – Thane	217
Thane – Kopri	218
Thane - Naupada.....	220
Thane – BalkumGlaxo	222
ANNEX – III: AQI OF SO_x, NO_x AND RSPM OF ALL AAQMS ACROSS MAHARASHTRA	225
APPENDIX – A: REVISED NAAQS 2009.....	239

Abbreviations

AAQM	Ambient Air Quality Monitoring
AAQMS	Ambient Air quality monitoring stations
ALRI	Acute Lower Respiratory Infections
AMR	Amravati
AQI	Air Quality Index
Ar	Argon
AUR	Aurangabad
CAAQMS	Continuous Ambient Air quality monitoring stations
CDP	Chandrapur
CH4	Methane
CIDCO	City and Industrial Development Corporation of Maharashtra Ltd
CO	Carbon monoxide
CO2	Carbon-di-oxide
CPCB	Central Pollution Control Board
GoM	Government of Maharashtra
H2	Hydrogen
He	Helium
IIT	Indian Institute of Technology
INAQS	Indian National Air Quality Standards
KOP	Kolhapur
Kr	Krypton
Max	Maximum
MIDC	Maharashtra Industrial Development Corporation
Min	Minimum
MPCB	Maharashtra Pollution Control Board
MVD	Motor Vehicle Department
N2	Nitrogen
NAAQM	National Ambient Air Quality Monitoring
NAAQS	National Ambient Air Quality Standards
NAMP	National Ambient Monitoring Programme
Ne	Neon
NEERI	National Environmental Engineering Research Institute
NGP	Nagpur

NHK	Nashik
NO2	Oxides of Nitrogen
NOX	Nitrogen Oxides
NVM	Navi Mumbai
O2	Oxygen
O3	Ozone
Pb	Lead
PM	Particulate Matter
PM10	Particulate Matter less than 10 microns
PM2.5	Particulate Matter less than 2.5 microns
PUN	Pune
RGD	Raigad
RO	Regional Office
RSPM	Respirable Suspended Particulate Matter
SAMP	State Air Monitoring Program
SO2	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
µg/m ³	Micrograms per cubic meter

List of Figures

Figure No. 1: Trend in annual SO ₂ concentrations at select AAQMS in Kalyan region	xvi
Figure No. 2: Share of AQI category for air quality for monitored observations across all AAQMS in Maharashtra (2015-16).....	xix
Figure No. 3: Annual trend of AQI across Maharashtra for 5 years.....	xix
Figure No. 4: Number of active AAQMS in Maharashtra in respective financial year	5
Figure No. 5: Trend in annual SO ₂ concentrations across different regions.....	10
Figure No. 6: Parametric values of SO ₂ concentrations recorded by AAQMS representing industrial regions (2015-16).....	13
Figure No. 7: Parametric values of SO ₂ concentrations recorded by AAQMS representing residential regions (2015-16)	15
Figure No. 8: Parametric values of SO ₂ concentrations recorded by AAQMS representing Rural and Other Areas regions (2015-16).....	17
Figure No. 9: Parametric values of SO ₂ concentrations recorded by AAQMS representing Commercial regions (2015-16)	18
Figure No. 10: Trend in annual NO _x concentrations across different regions.....	20
Figure No. 11: Parametric values of NO _x concentrations recorded by AAQMS representing industrial areas (2015-16)	23
Figure No. 12: Parametric values of NO _x concentrations recorded by AAQMS representing residential areas (2015-16)	25
Figure No. 13: Parametric values of NO _x concentrations recorded by AAQMS representing rural and other areas (2015-16)	27
Figure No. 14: Parametric values of NO _x concentrations recorded by AAQMS representing commercial areas (2015-16)	28
Figure No. 15: Trend in annual RSPM concentrations across different regions	30
Figure No. 16: Parametric values of RSPM concentrations recorded by AAQMS representing industrial areas (2015-16)	33
Figure No. 17: Parametric values of RSPM concentrations recorded by AAQMS representing residential areas (2015-16)	35
Figure No. 18: Parametric values of RSPM concentrations recorded by AAQMS representing rural and other areas (2015-16)	37
Figure No. 19: Parametric values of RSPM concentrations recorded by AAQMS representing commercial areas (2015-16)	38
Figure No. 20: 8 hourly Ozone concentration recorded at CAAQMS in Maharashtra	40
Figure No. 21: 8 hourly CO concentrations recorded at CAAQMS in Maharashtra.....	42
Figure No. 22: Share of AQI category for air quality for monitored observations across all AAQMS in Maharashtra (2015-16).....	45
Figure No. 23: Percentage occurrence for the classes of AQI across AAQMS in Maharashtra - 2015-16	47

List of Tables

Table No. 1: Top five AAQMS with highest annual SO ₂ concentrations in Maharashtra 2015-16.....	xv
Table No. 2: Regions with high NO _x concentrations across Maharashtra	xvii
Table No. 3: Regions with high RSPM concentrations across Maharashtra	xviii
Table No. 4: Major air pollutants, their sources and their effects on humans.....	2
Table No. 5: MPCB RO wise tally of active AAQMS (2015-16)	6
Table No. 6: Molecular formula, sources and harmful impacts of Sulphur dioxide	9
Table No. 7: MPCB RO-wise annual average concentrations of SO ₂	11
Table No. 8: Data for SO ₂ recorded at AAQMS representing industrial areas (2015-16).....	12
Table No. 9: Data for SO ₂ recorded at AAQMS representing residential area (2015-16).....	14
Table No. 10: Data for SO ₂ recorded at AAQMS representing rural and other area (2015-16)	16
Table No. 11: Data for SO ₂ recorded at AAQMS representing commercial area (2015-16)....	18
Table No. 12: Molecular formula, sources and harmful impacts of oxides of nitrogen.....	19
Table No. 13: MPCB RO-wise annual average concentrations of NO _x	21
Table No. 14: Data for NO _x recorded at AAQMS representing industrial areas (2015-16)	22
Table No. 15: Data for NO _x recorded at AAQMS representing residential areas (2015-16) ...	24
Table No. 16: Data for NO _x recorded at AAQMS representing rural and other areas (2015-16)	26
Table No. 17: Data for NO _x recorded at AAQMS representing commercial areas (2015-16)..	28
Table No. 18: Relative size sources and harmful impacts of PM _{2.5} and PM ₁₀	29
Table No. 19: MPCB RO-wise annual average concentrations of RSPM	31
Table No. 20: Data for RSPM recorded at AAQMS representing industrial areas (2015-16) ..	32
Table No. 21: Data for RSPM recorded at AAQMS representing residential areas (2015-16).	34
Table No. 22: Data for RSPM recorded at AAQMS representing rural and other types of areas (2015-16).....	36
Table No. 23: Data for RSPM recorded at AAQMS representing commercial areas (2015-16)	38
Table No. 24: Molecular formula, sources and harmful impacts of Ozone	39
Table No. 25: Molecular formula, sources and harmful impacts of Carbon monoxide.....	41
Table No. 26: Health advisories for various range of Air Quality Indices and respective colour codes.....	43
Table No. 27: Sub-index and breakpoint pollutant concentration for Indian Air Quality Index	44

Executive Summary

Maharashtra is one of the fastest growing state in India in terms of economic and industrial development. This translates to increased consumption of fossil fuels as well as construction activities to meet the energy as well as infrastructure demands. Increased combustion of fossil fuel directly results in the increase of air pollutant emissions and hence it is of utmost importance to continuously monitor the air quality of the state in order to ensure safe health of the citizens as well as take necessary regulatory action & measures.

MPCB (Maharashtra Pollution Control Board) implements a range of environmental legislation on air quality in the Maharashtra state and in 2015-16 monitored ambient air quality at 71 locations, which comprised of 62 locations under NAMP (National Ambient Monitoring Program), 4 under SAMP (State Ambient Monitoring Program) and 5 CAAQMS (Continuous Ambient Air Quality Monitoring). Parameters like SO₂ (Sulphur dioxide), NO₂ (Oxides of Nitrogen) and RSPM (Respirable Suspended Particulate Matter) are monitored by all AAQMS. Along with these parameters CO (Carbon monoxide), Ozone, Benzene are also monitored by CAAQMS sites at Pune, Bandra and Solapur. This report presents a statistical overview of the daily, monthly and annual data for SO₂, NO_x, RSPM, CO, Benzene and Ozone pollutants through illustrations of the data recorded in the financial year 2015-16.

Sulphur dioxide

Considering the annual average concentrations, almost all the regions in Maharashtra recorded annual average SO₂ concentrations well within the annual standards of 50µg/m³, set by CPCB in 2009 except for the area represented by the AAQMS at Industrial Area CIDCO, Nanded in Aurangabad region of MPCB. Enlisted in Table No. 1 are the top five AAQMS with highest annual SO₂ concentrations in Maharashtra during the year 2015-16 and these AAQMS are the same which were amongst the worst five sites in last fiscal year. In terms of SO₂ pollution it is the Kalyan region which is of concern. Although the region has until now recorded annual SO₂ concentrations well within the standards but there is a gradual increase in SO₂ concentrations especially at the AAQMS in Bhiwandi city (Prematai hall & IGM Hospital) and the area represented by AAQMS at MPCB RO Kalyan office. (Figure No. 1). In the past years the annual concentrations at these locations have gradually increased from around 20µg/m³ in (2011-12) to around 34µg/m³ in 2015-16 registering an increase by 70%. The cities of Nashik, Amravati, Aurangabad, Kolhapur, Nagpur and Chandrapur were amongst the cleanest for SO₂ pollution and recorded annual average SO₂ concentrations less than 15µg/m³ which is almost 1/3rd the standard.

Table No. 1: Top five AAQMS with highest annual SO₂ concentrations in Maharashtra 2015-16

Sr No.	MPCB RO	City	Station Name	Annual Average SO ₂ (µg/m ³) Standard (50 µg/m ³)	
				FY 15-16	FY 14-15
1	Aurangabad	Nanded	Industrial Area CIDCO	80	82
2			Mutha Chowk	38	39
3	Kalyan	Bhiwandi	Prematai hall	34	31
4			I.G.M. Hospital	34	30
5		Kalyan	MPCB RO Kalyan office	32	29

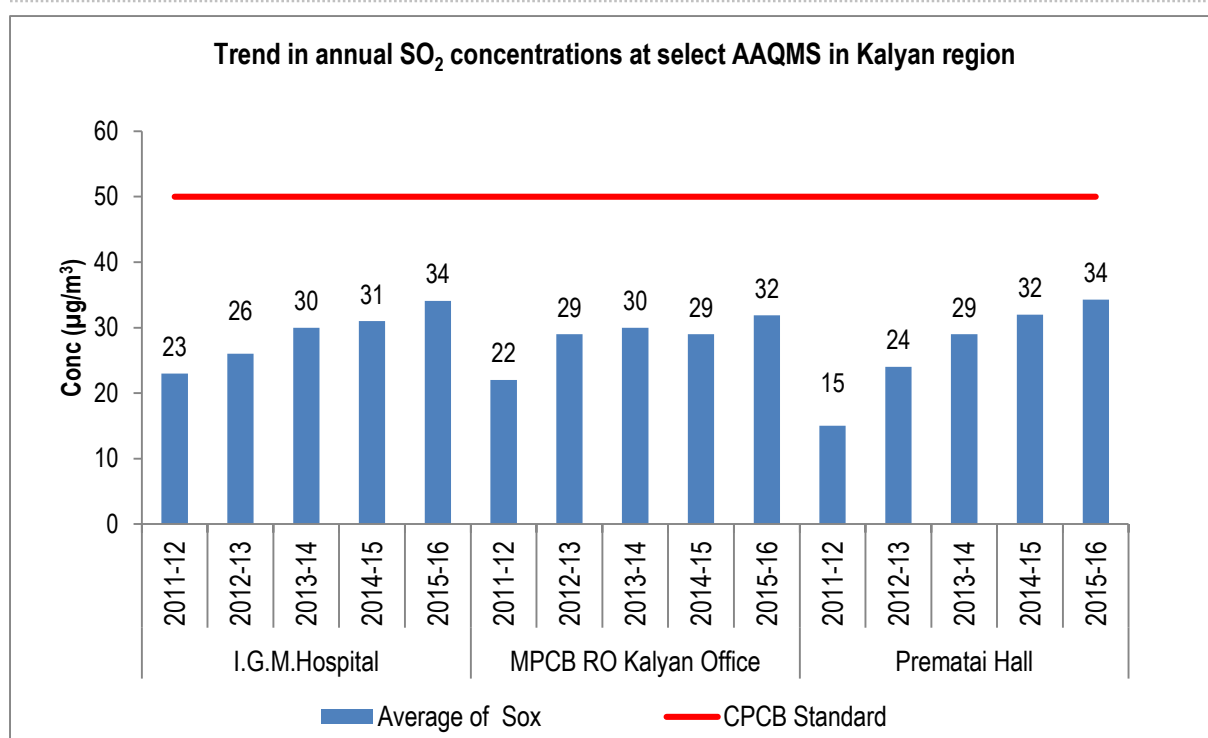


Figure No. 1: Trend in annual SO₂ concentrations at select AAQMS in Kalyan region

Oxides of Nitrogen

Out of total AAQMS, 32 stations exceeded the annual NO_x standard (40µg/m³) while at 8 locations the NO_x concentrations was recorded between 35-40µg/m³. The lists of 10 most polluting stations for NO_x is enlisted below in Table No. 2.

The Industrial area CIDCO at Nanded in Aurangabad region recorded the highest concentration of NO_x (81µg/m³) followed by the data recorded by the AAQMS at Sion Hospital in Mumbai region. The later has been consistently violating the NO_x standards for the past 10 years and recorded annual average of 81µg/m³ which is twice the annual standard for NO_x. High density traffic and vehicular emissions can be major source for NO_x levels in this region.

All AAQMS in Kalyan region recorded NO_x concentration in the range of 58-67 µg/m³ thus exceeds 1.5-1.7 times the annual NO_x standard. The I.G.M Hospital area in Kalyan region, identified as a sensitive area, recorded annual concentrations of 43µg/m³ which 1.4 times the standards set for sensitive areas (30µg/m³).

The areas of Pune and Thane region recorded the annual averages for NO_x concentrations more than 1.6 to 1.7 times the annual standards. The Navi Mumbai region and Raigad region also recorded an increase in NO_x concentrations and could be categorised as borderline case as they both registered annual NO_x concentrations just above annual standards.

The Chandrapur and Nashik region registered a decrease in NO_x concentration as compared to previous year thus indicating improvement in the air quality for NO_x pollution. This may be attributed to ease in traffic congestion owing to completion major road repair works.

Table No. 2: Regions with high NO_x concentrations across Maharashtra

Sr No	MPCB RO	City	Station Name	Annual Average NO _x (µg/m ³) concentrations Standard (40 µg/m ³)	
				FY 15-16	FY 14-15
1	Aurangabad	Nanded	Industrial Area CIDCO	81	83
2	Mumbai	Mumbai	Sion	81	91
3	Kalyan	Ulhasnagar	Powai Chowk	67	56
4	Pune	Pune	Swargate, Pune	66	51
5		Pune	Nal Stop	64	49
6	Thane	Thane	Naupada	63	62
7		Thane	Kopri	62	61
8	Kalyan	Badlapur	Badlapur - BIWA House	61	50
9		Ulhasnagar	Smt. CHM College Campus	59	42
10		Dombivali	MIDC Office Dombivali	58	65

Particulate Matter

The PM pollution in the state was once again recorded to be high as the PM concentrations recorded at almost all the AAQMS violated the annual standards standard (60µg/m³). The AAQMS (Industrial Area CIDCO) in Nanded city of Aurangabad region (212µg/m³) recorded the highest concentration of RSPM which is more than 3 times the standard. The station of Ghuggus, Chandrapur (180µg/m³) and Chiplun- Water Treatment, Kolhapur (172µg/m³) followed next to Aurangabad. The Raigad (137µg/m³) and Thane (123µg/m³) regions also violated the annual standards and recorded annual concentrations of RSPM twice the standard. The city of Nagpur recorded the lowest annual concentrations of RSPM (78 µg/m³). Aurangabad, Pune and Kalyan stations overall displayed an increasing trend as compared to the data for the past 3 years for those regions. The stations which recorded the highest annual average concentration of RSPM for the fiscal year 2015-16 is presented in Table No. 3.

Ozone and Carbon- Monoxide

The carbon-monoxide and ozone levels were recorded at the 3 CAAQMS in Maharashtra. The Solapur, Pune and Bandra regions exceeded the standards for almost 42%, 16% and 7% of the observations respectively which indicates that these areas are severely affected by CO pollution. The standards have been mostly found to be violated during the winter season i.e from November to February. As of for Ozone, Pune and Bandra regions were recorded clean almost throughout the year. The highest ozone concentrations at Solapur, Bandra and Pune were recorded to be 176, 101 and 79µg/m³ respectively. The Solapur region recorded high ozone concentrations in summer as well as winter seasons as compared to the last year when the concentrations were high in the winter season. The reason for this phenomenon needs further investigation as ozone is a secondary pollutant and is formed by photolysis of NO_x.

Air Quality Index

In the year 2015-16, 8,504 observations were recorded across 71 active AAQMS in Maharashtra. As shown in Figure No. 2, maximum observations (43%) revealed that the air quality is in the 'Moderate' category. While 41% & 12% of the observations belong to the 'Satisfactory' and 'Good' category respectively. Mere 5% of the observations were classified as 'Poor' quality of air while 'Very Poor' and 'Severe' category accounted for 0.19% and 0.04% of the total observations.

As compared to the previous 5 years, there is a slight improvement in terms of overall air quality of the state. This is significant from the trend of share of various categories of air quality indices (Figure No. 3). In 2011-12 the share for 'Poor', 'Very Poor' and 'Severe' quality observation was about 20%. While this it has now gradually decreased to less than 5% (2015-16) of the observations over the years and these have now transformed to 'Moderate' air quality observations, marking a significant improvement in the overall air quality.

Table No. 3: Regions with high RSPM concentrations across Maharashtra

Sr No	MPCB RO	City	Station Name	Annual Average RSPM ($\mu\text{g}/\text{m}^3$) concentrations Standard ($60 \mu\text{g}/\text{m}^3$)	
				FY 15-16	FY 14-15
1	Aurangabad	Nanded	Industrial Area CIDCO	212	186
2	Chandrapur	Chandrapur	Ghuggus	180	148
3	Kolhapur	Chiplun	Water Treatment	173	117
4	Aurangabad	Nanded	Mutha Chowk	173	128
5	Kolhapur	Chiplun	MIDC Chalkewadi	170	118
6	Navi Mumbai	Navi Mumbai	Taloja - MIDC Building	148	142
7	Mumbai	Mumbai	Sion	148	117
8	Amravati	Akola	College of Engg & Technology	139	146
9	Pune	Pune	Karve Road - CAAQMS	138	123
10	Raigad	Panvel	Water Supply Plant	137	136

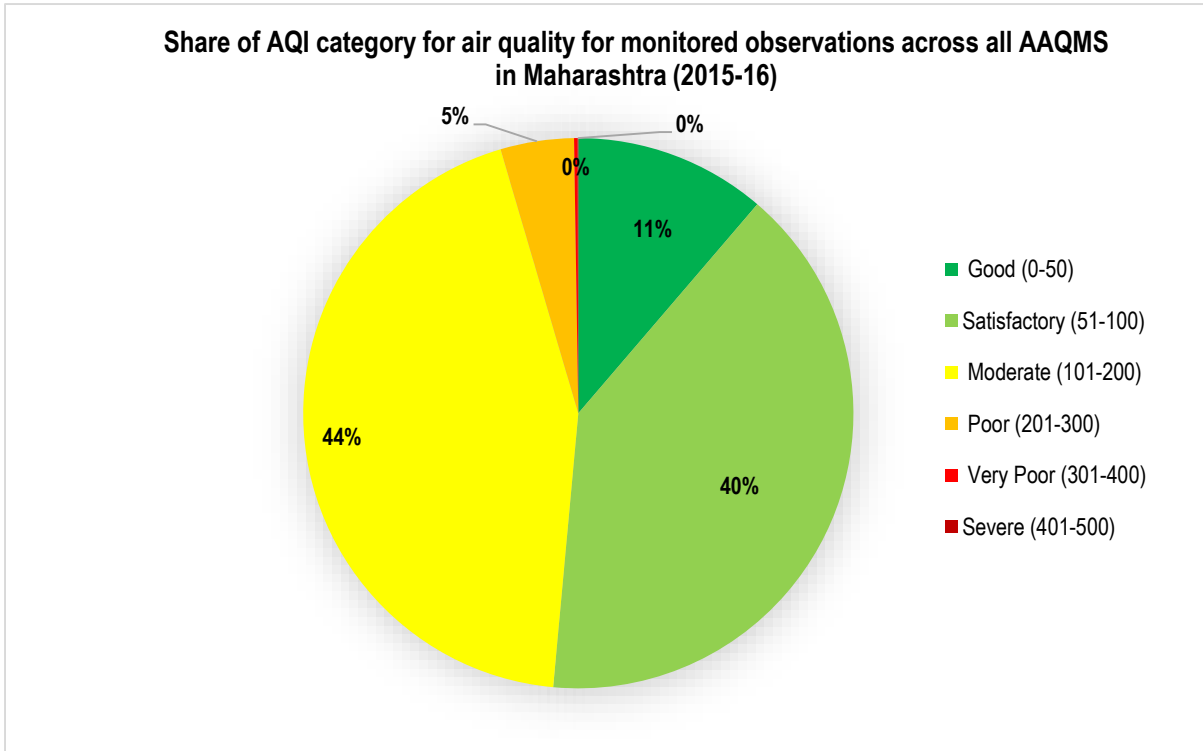


Figure No. 2: Share of AQI category for air quality for monitored observations across all AAQMS in Maharashtra (2015-16)

Note: Since the values have been rounded up some values may appear as zero.

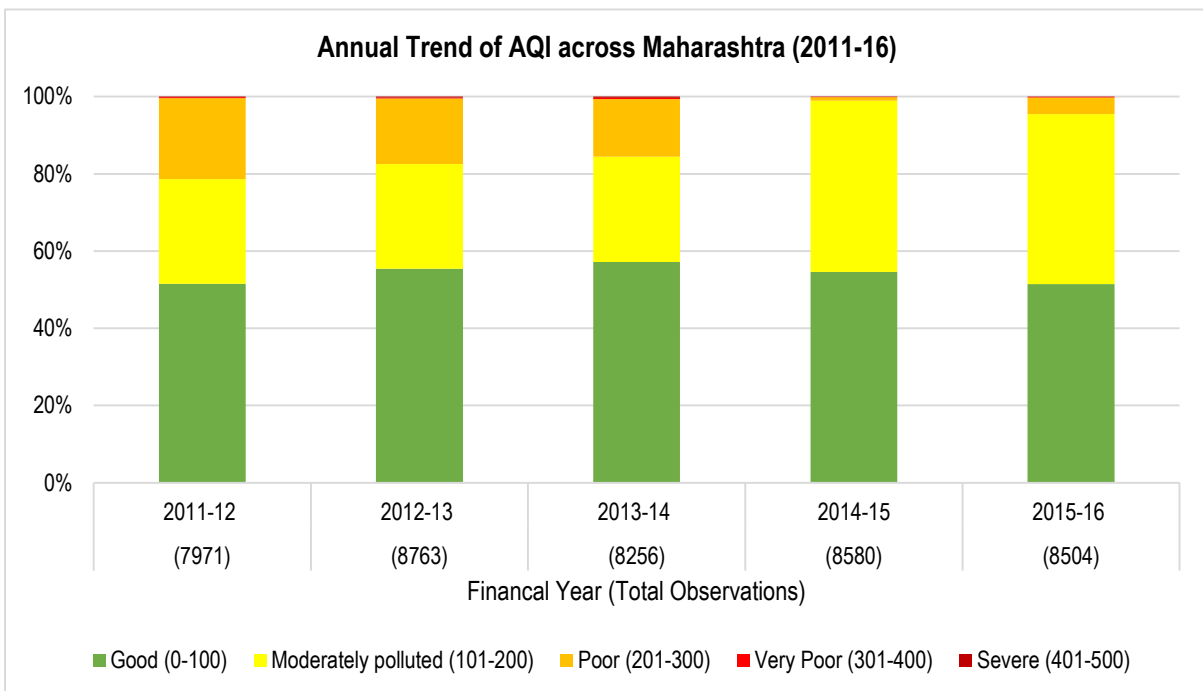


Figure No. 3: Annual trend of AQI across Maharashtra for 5 years

Introduction

Air is colourless, odourless, tasteless, gaseous mixture with varying amounts of moisture and particulate matter, enveloping the earth¹ and every living organism is dependent on air one way or the other for its survival. Pure air is a mixture of several gases which consists of about 78% nitrogen, 21% oxygen, and less than 1% of argon, carbon dioxide, and other gases — as well as varying amounts of water vapour². It is necessary to maintain the levels of the gases present in the air in order to ensure a balance in the atmosphere. An average human adult at rest inhales and exhales about 7 or 8 litres of air per minute which totals to about 11,520 litres of air in a day³. The ratio of inhaling and exhaling requirement of the person may sometimes change if there is a change in the composition of air. This change in the composition of air results in deteriorating the health of the human and may also prove to be harmful to plants and other organisms. The composition of air usually changes due to change in quantity of gases, dust, fumes or odour causing air pollution⁴.

Air Pollution

Air is considered to be polluted when it contains certain substances in concentrations high enough and for duration long enough to cause harm or undesirable effects. As per the Air (Prevention and Control of Pollution) Act, 1981, the term "air pollutant" refers to any solid, liquid or gaseous substance present in the atmosphere in such concentration that may be or tend to be injurious to human beings or other living creatures or plants or property or environment⁵.

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

1) Primary pollutants:

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

2) Secondary pollutants:

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

¹<http://www.thefreedictionary.com/air>

²<http://www.bcairquality.ca/101/what-is-air.html>

³<http://health.howstuffworks.com/human-body/systems/respiratory/question98.htm>

⁴<http://www.epa.vic.gov.au/air/aq4kids/pollution.asp>

⁵<http://www.moef.nic.in/legis/air/air1.html>

The National Ambient Air Quality Standards for six principal pollutants set by USEPA (United States Environmental Protection Agency) include –Sulphur dioxide, lead, nitrogen dioxide, carbon monoxide, Ozone, Particulate matter⁶. The effects of these criteria pollutants have been drafted in Table No. 4. Air pollution is global issue contributing many diseases such as ischemia, myocardial infarction, stroke, chronic obstructive pulmonary disease and cancers.

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

Pollutants	Sources	Effects
Nitrogen dioxide (NO _x)	Combustion processes (heating, power generation, and vehicles)	<ul style="list-style-type: none"> • Bronchitis in asthmatic children. • Reduced lung function
Particulate Matter (PM _{2.5} , PM ₁₀)	Vehicles, industrial sources, domestic fuel burning, road dust re-suspension,	<ul style="list-style-type: none"> • Cardiovascular and respiratory diseases, • Lung cancer, • ALRI (Acute Lower Respiratory Infections)
Carbon monoxide (CO)	Incomplete fuel combustion (as in motor vehicles)	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • 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).	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Breathing problems, asthma, reduced lung function.

⁶<http://www.epa.gov/air/criteria.html>

Challenges and initiatives in India

Increase in technological, industrial and agricultural advancement, along with the growing population, has exacerbated the deterioration of air quality, which is now a serious problem throughout the world. In India, rapidly growing cities, increasing traffic, growing energy consumption, waste production, fuel adulteration, combustion of fire wood and traffic congestion¹⁰ are often attributed as the key reasons for deteriorating air quality. Rapidly growing Indian cities are suffering from some of the worst air quality problems in the world.

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

Central Pollution Control Board

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

CPCB initiated NAAQM (National Ambient Air Quality Monitoring) programme in the year 1984. Subsequently, expanding the network to have representation of various regions in the country, various stations under the programme were established nationwide. The program was subsequently renamed as NAMP (National Air Quality Monitoring Programme). In the year 2010-11 CPCB was executing NAMP for generating air quality database at 456 air quality monitoring stations throughout the nation covering 190 cities in 26 States and 4 union territories⁷. 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.

⁷ 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 2015-16.

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 2015-16.

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 2015-16 there were 71 active AAQMS, 62 under NAMP (National Ambient Monitoring Program), 4 under SAMP (State Ambient Monitoring Program) and 5 under CAAQMS (Continuous Ambient Air Quality Monitoring). Parameters like SO₂ (Sulphur dioxide), NO₂ (Oxides of Nitrogen) and RSPM (Respirable Suspended Particulate Matter) are monitored by all AAQMS. Along with these parameters CO (Carbon monoxide), Ozone, Benzene are also monitored by CAAQMS sites at Pune, Bandra and Solapur. As per data availability each year the corresponding tally of AAQMS is presented below in Figure No. 4.

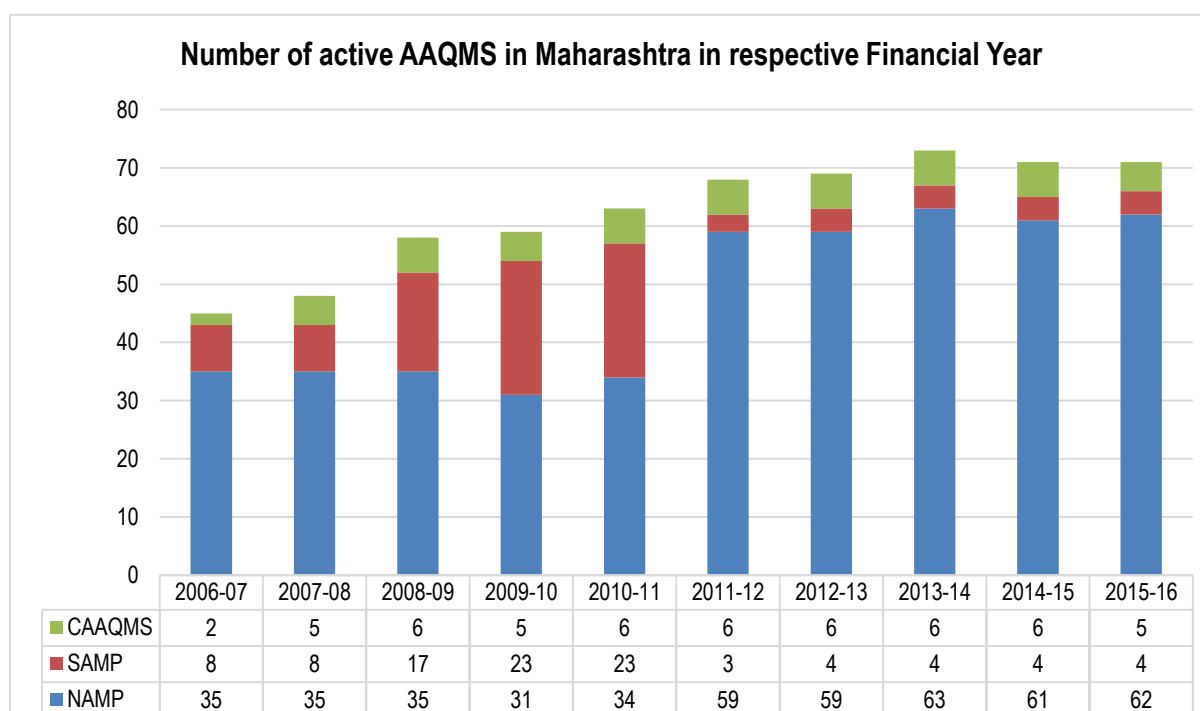


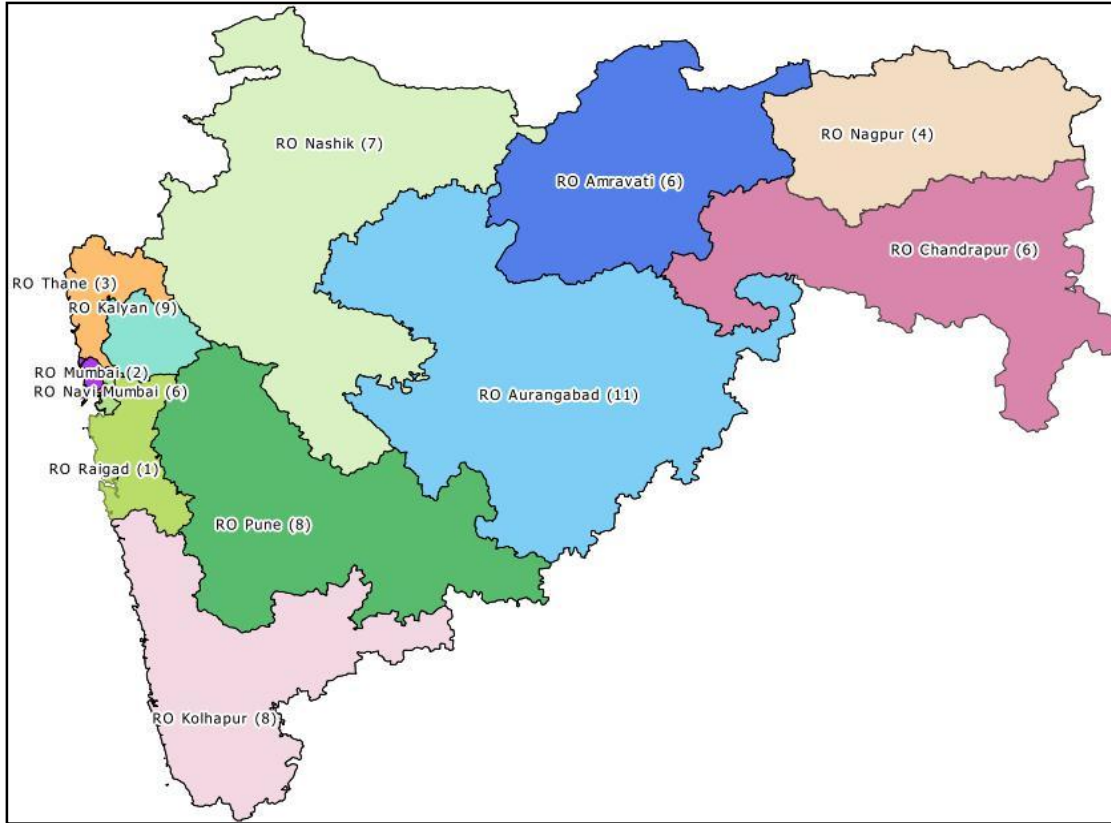
Figure No. 4: Number of active AAQMS in Maharashtra in respective financial year

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 2015-16 is presented in Table No. 5. The detailed list of the active stations is presented in Annex-I of this report. The jurisdiction boundaries and the tally of the AAQMS in each RO are presented in Map No. 1.

Table No. 5: MPCB RO wise tally of active AAQMS (2015-16)

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	2	1	6
Pune	-	1	6	1	8
Raigad	-	-	1	-	1
Thane	-	1	1	1	3
Grand Total	4	20	33	13	71

Data Source: MPCB



Map No. 1: Boundaries and tally of AAQMS in each RO of MPCB (2015-16)

Pollutants Monitored

SO₂ (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 health⁸. 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 2015-16 have been compiled in this report. A pollutant wise overview for the air quality recorded at the areas representing residential, industrial, commercial, rural & other areas and sensitive monitoring is presented in the following section. Monitoring station wise annual trend for the recent 5-7 years (as per data availability) and monthly trend for the year 2015-16 have been presented in Annex – II.

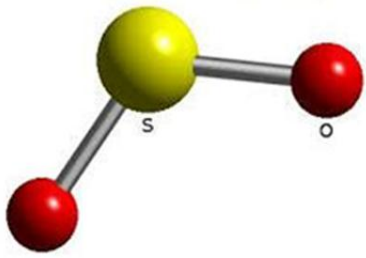
⁸ CPCB 2012, *National Ambient Air Quality Status & Trends In India-2010*, Chapter 6, Pg 83

Status of Air Quality

Sulphur dioxide

Sulphur Dioxide (SO₂), a colourless gas with a pungent, irritating odour and taste belongs to the family of reactive oxides of sulphur. Sulphur dioxide is formed by two molecules of oxygen and one molecule of sulphur having covalent bond with angle of 119⁰⁹. The natural source for SO₂ emissions are volcanoes while the manmade emission sources include industrial and vehicular emissions. It is also a precursor to particulate matter. Being polar in nature, it readily dissolves in water to give acidic solution which oxidizes to sulphuric acid and is transported by wind currents over hundreds of miles, and deposited as acid rain. Acid rain causes acidification of water bodies, corrosion to metals structures, skin diseases and so on. A recent incident in 2014, the Dombivali area in Maharashtra, India, witnessed the acid rain in form of 'green rain' where the rainwater collected was green in colour¹⁰. The molecular structure along with sources and effects are tabulated in Table No. 6.

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

	Common name	Molecular formula	Life span in air	Nature
	Sulphur dioxide	SO ₂	4-10 days	Polar (soluble in water)
Molecular structure				
Sources	<ul style="list-style-type: none"> • Natural: Volcanoes, biological decay and forest fires • Anthropogenic: Fossil fuel combustion from industries and power plants, Smelting of metals, manufacture of sulphuric acid, incineration of refuse and production of elemental sulfur. 			
Effects	<ul style="list-style-type: none"> • Human Health: Respiratory illness, asthma, chronic bronchitis, affects lung function, coughing, irritation to skin and eyes. • Environment: Acid rain 			

⁹AK Srivastava and PC Jain, *Chemistry*, Published by V.K Enterprises, 7.8 Oxides of sulphur, Pg 581

¹⁰<http://www.niohervis.nic.in/newsbulletin/Jan2014/Green%20rain%20in%20Dombivli.pdf>

Trend in sulphur dioxide concentrations in Maharashtra

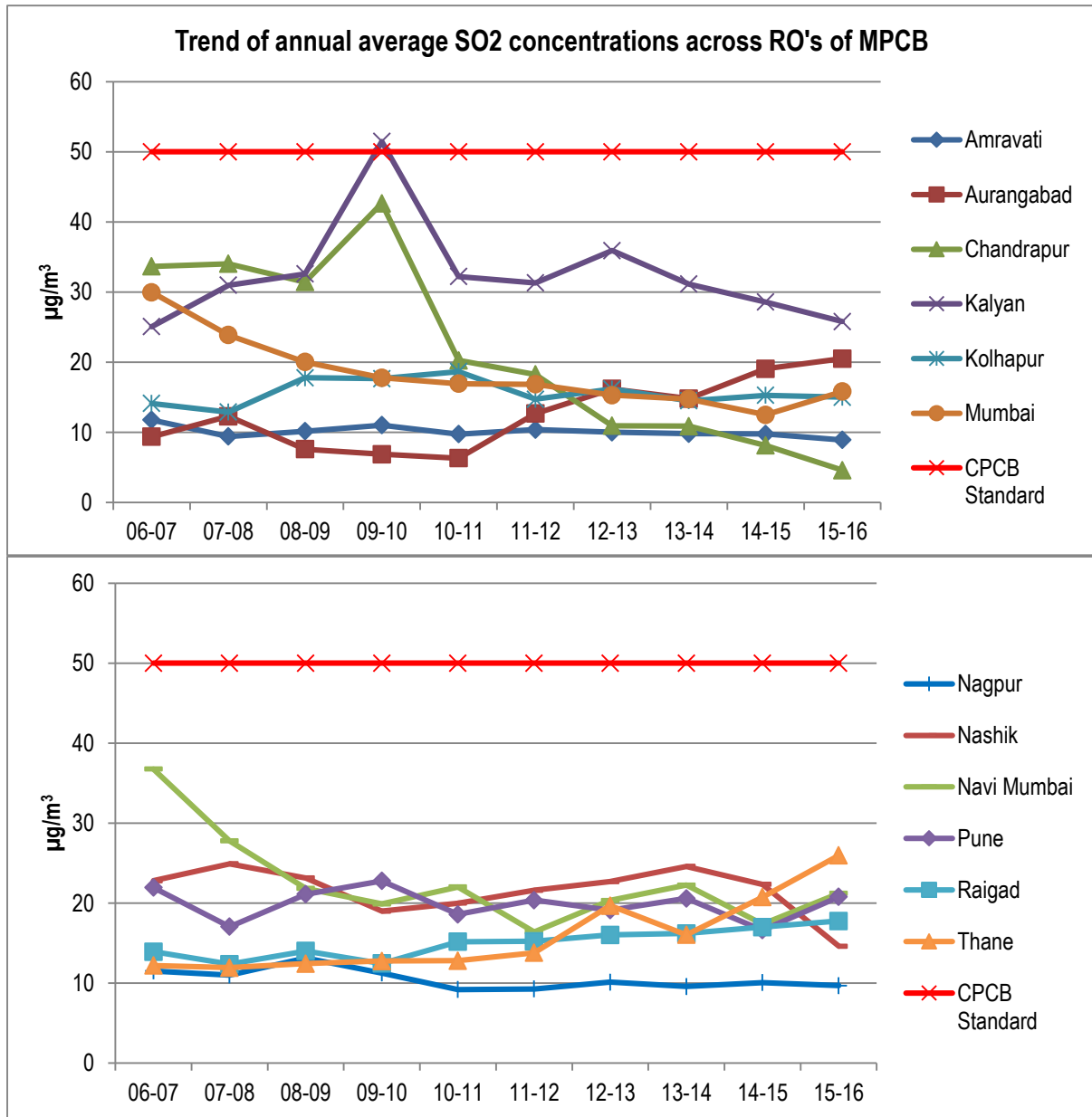


Figure No. 5: Trend in annual SO₂ concentrations across different regions

*Note: Considers annual average of all the active AAQMS in that RO under MPCB

Table No. 7: MPCB RO-wise annual average concentrations of SO₂

FY	AMR	AUR	CDP	KYN	KOP	MUM	NGP	NHK	NVM	PUN	RGD	TNA
06-07	12	9	34	25	14	30	12	23	37	22	14	12
07-08	9	12	34	31	13	24	11	25	28	17	12	12
08-09	10	8	31	33	18	20	13	23	22	21	14	12
09-10	11	7	43	51	18	18	11	19	20	23	12	13
10-11	10	6	20	32	19	17	9	20	22	19	15	13
11-12	10	13	18	31	15	17	9	22	16	20	15	14
12-13	10	16	11	36	16	15	10	23	20	19	16	20
13-14	10	15	11	31	15	15	10	25	22	21	16	16
14-15	10	19	8	29	15	12	10	22	17	17	17	21
15-16	9	21	5	26	15	16	10	15	21	21	18	26

**Note: Considers annual average of all the active AAQMS in that RO under MPCB*

It is evident from the Figure No. 5 and Table No. 7, that Maharashtra state has been clean for SO₂ pollution for the past decade. All the regions in Maharashtra recorded annual average SO₂ concentrations well within the annual standards of 50µg/m³, set by CPCB in 2009. Amravati, Aurangabad, Kolhapur, Nagpur, Raigad and Thane regions recorded annual SO₂ average concentrations for all the AAQMS in these regions less than 20µg/m³. While the remaining regions Chandrapur, Kalyan, Nashik, Navi Mumbai & Pune SO₂ concentrations in the range of 18 to 31µg/m³ which is relatively higher as compared to the afore mentioned regions.

Although the regions like Amravati, Chandrapur and Nagpur comply with the annual standards they recorded a slight increase in the annual SO₂ concentrations in 2015-16 as compared to the previous year. While the regions like Raigad, Kalyan and Aurangabad recorded slight dip in the annual average concentrations during the same period. The Kalyan region, which comprises of the MIDC areas of Dombivali, Ambernath and Badlapur, deserves a special mention. This region has always recorded relatively high SO₂ concentrations as compared to other regions in the state, but in 2015-16 it recorded a remarkable decline in the annual SO₂ concentrations. This region consistently recorded SO₂ concentrations above 30µg/m³ between 2007 and 2014, however last year it recorded less than 30µg/m³. The Nagpur Region has consistently been the cleanest of all the regions averaging about 10µg/m³ of SO₂ concentrations for the past 7 years.

The following section presents the status of SO₂ concentrations recorded at the active AAQMS representing industrial, residential, commercial and other areas in Maharashtra during the fiscal year 2015-16.

SO₂ concentrations in industrial areasTable No. 8: Data for SO₂ recorded at AAQMS representing industrial areas (2015-16)

RO	Station name	Station code	Max of SO ₂ conc	98th percentile SO ₂ conc	Average of SO ₂ conc	Min of SO ₂ conc
	<i>CPCB Standard</i>		<i>80</i>	<i>80</i>	<i>50</i>	<i>80</i>
AMR	Godhadiwala Private Limited	549	15	15	11	5
	MIDC Water Works - Akola	701	12	10	7	4
AUR	Industrial Area CIDCO	705	<i>92</i>	<i>89</i>	<i>80</i>	11
	Jalna- Krishnadhan seeds Ltd	707	22	18	12	5
	MIDC Water Works - Latur	641	12	7	5	4
CDP	Chandrapur - MIDC	281	40	31	7	4
	Rajura	640	4	4	4	4
	Tadali MIDC	638	14	10	4	3
KYN	Dombivali	265	44	42	23	13
	MIDC Office Dombivali	-	51	43	21	14
KOP	Chiplun - Water Treatment	490	12	12	11	11
	Krishna Valley school	576	25	19	11	7
NGP	MIDC Office, Hingna Road	288	16	14	10	6
NHK	MIDC Jalgaon	646	24	23	16	11
	MIDC Satpur - VIP	269	28	26	14	3
NVM	Mahape, MPCB-Nirmal Bhavan	493	42	38	20	8
	Rabale	491	29	28	21	11
	Taloja - MIDC Building	496	42	35	21	10
PUN	Bhosari	312	<i>97</i>	<i>89</i>	31	9
TNA	Balkum/Glaxo	-	30	28	24	17

Data Source: MPCB

Units: µg/m³

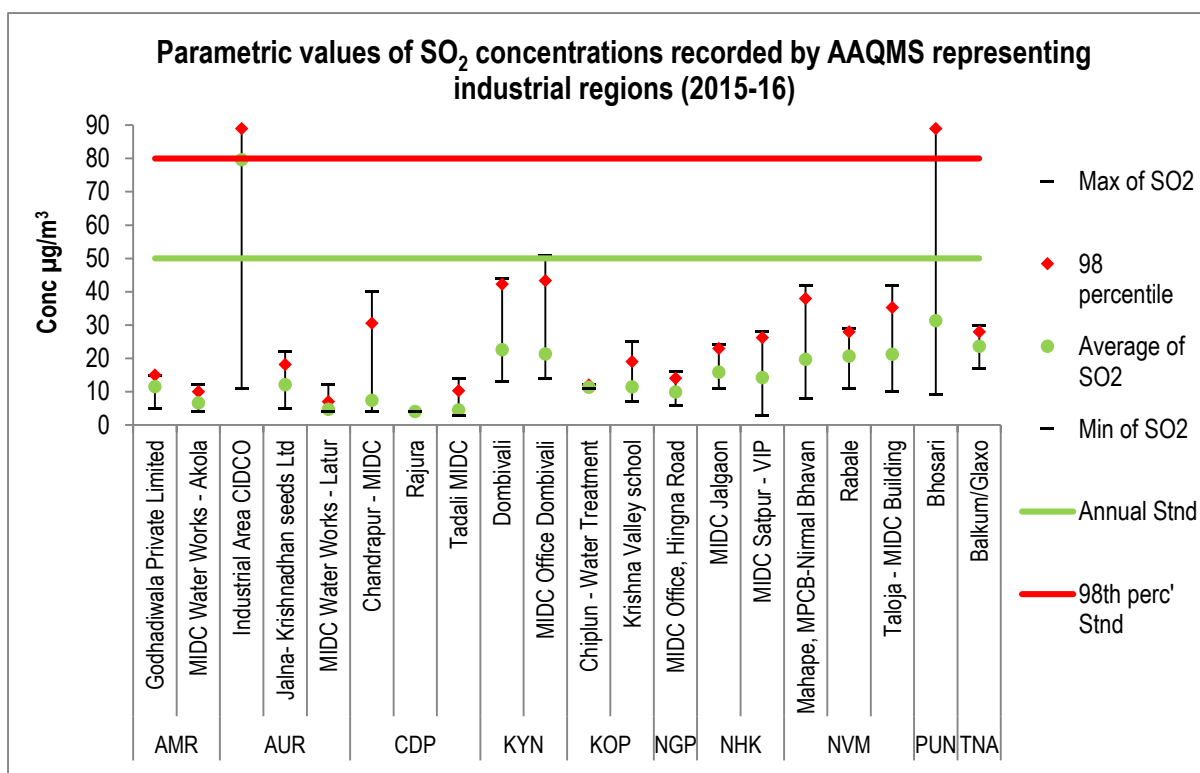


Figure No. 6: Parametric values of SO₂ concentrations recorded by AAQMS representing industrial regions (2015-16)

SO₂ concentrations were recorded well within the annual permissible standards at almost all the industrial areas in which the air quality was monitored in 2015-16 (Figure No. 6) except for the AAQMS representing Industrial area of CIDCO at Nanded city and Bhosari MIDC in Pimpri Chinchwad are of Pune region. Apart from these two industrial areas all the other sites recorded annual SO₂ concentrations less than 25µg/m³ which is almost half the annual standard (50µg/m³).

The highest annual average SO₂ concentrations were recorded at the Industrial area of CIDCO in Nanded city of Aurangabad region (80µg/m³) which is almost 1.6 times the annual standard (50µg/m³). This was followed by the AAQMS site at Bhosari (31µg/m³) industrial area in which recorded air quality well within the standards.

As for the daily maximum concentrations, the 98th percentile values for both the locations were around 89µg/m³ which indicates that the daily standards of (80µg/m³) were violated for more than 2% of the observation days.

The Dombivali MIDC area, needs a special mention as it has been amongst the most highly polluted stations for SO₂ pollution and this year the area did not violate the annual as well as daily standards for even a single observation day.

SO₂ concentrations in residential areasTable No. 9: Data for SO₂ recorded at AAQMS representing residential area (2015-16)

RO	Station name	Station code	Max of SO ₂ conc	98 th percentile SO ₂ conc	Average of SO ₂ conc	Min of SO ₂ conc
	<i>CPCB Standard</i>		<i>80</i>	<i>80</i>	<i>50</i>	<i>80</i>
AMR	Govt. College of Engineering	548	14	14	11	5
	LRT Commerce College	700	10	9	7	5
AUR	C.A.D.A. Office	513	28	27	15	9
	Collector Office, Aurangabad	512	21	19	12	7
	Ganeshnagar	703	30	29	27	22
	Jalna- Bachat Bhavan	706	26	17	11	5
	SBES College	511	32	29	16	9
	Shyam Nagar-Kshewraj Vidyalaya	642	13	7	5	4
CDP	Ballarshah	639	13	6	4	1
	Chandrapur - SRO MPCB	396	21	9	4	2
	Ghuggus	267	32	7	4	4
KOP	Chiplun - MIDC Chalkewadi	489	12	12	11	11
	Mahadwar Road	510	30	30	21	10
	Shivaji University Campus	508	18	18	13	7
	Terrace of Udyog Bhavan	574	16	15	10	4
MUM	Bandra	-	54	44	18	2
	Sion	-	41	30	14	2
NGP	Civil lines Nagpur	711	42	14	9	6
	IOE North Ambazari road	287	16	15	10	6
NHK	Girna Water Tank	645	19	18	13	9
	NMC Nashik	280	29	26	15	3
	Old B. J. Market	644	22	21	14	11
	RTO Colony	259	30	29	14	3
	SRO Office Nashik	710	29	27	15	3
NVM	Kharghar - CIDCO Nodal Office	494	27	26	17	8
	Nerul - DY Patil	492	36	27	17	9
PUN	Karve Road - CAAQMS	-	50	43	25	4
	Pimpri-Chinchwad - BOB Building	708	84	63	27	9
	Saat Rasta- Chithale Clinic	300	42	15	13	9
	Solapur	0	36	18	13	7
	Swargate, Pune	381	55	45	21	6
	WIT Campus	299	15	15	13	12
RGD	Panvel- Water Supply Plant	495	43	30	18	8
TNA	Kopri	303	36	34	27	19

Data Source: MPCB

Units: µg/m³

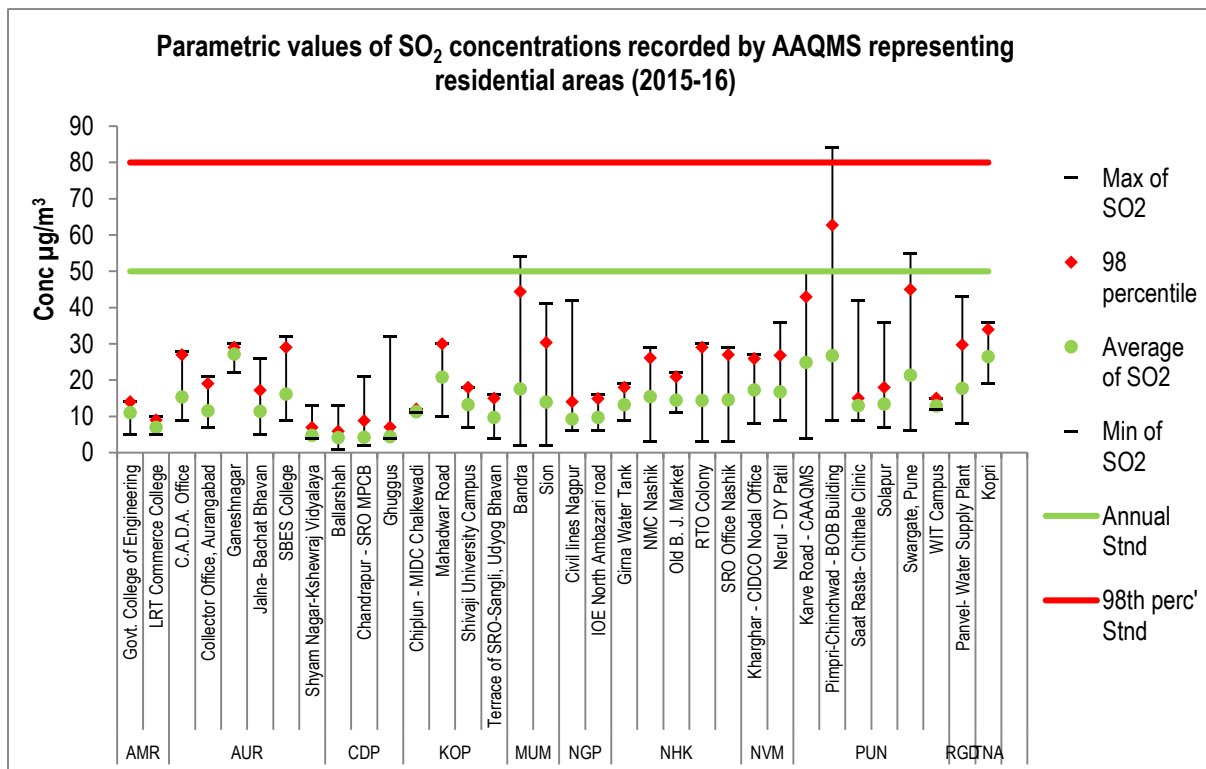


Figure No. 7: Parametric values of SO₂ concentrations recorded by AAQMS representing residential regions (2015-16)

All the residential areas of Maharashtra in which the air quality monitoring was conducted were recorded clean for SO₂ pollution. One may note from Figure No. 7, that all the AAQMS representing residential areas were well below the annual (50µg/m³) as well as daily (80µg/m³). The maximum annual concentration of 27µg/m³ was recorded at Pimpri, Ganeshnagar (Nanded) and Thane locations which itself was almost half than the annual standards.

The Bandra and Sion AAQMS in Mumbai had been recording SO₂ concentrations higher than standards for the past few years however this year both the sites recorded SO₂ concentrations in limits and did not violate the standards even for a single observation day. Both the sites are under CAAQMS programme and monitor air quality almost every day.

The regions of Aurangabad, Chandrapur, Kolhapur, Nagpur & Raigad annual SO₂ concentrations below 20µg/m³ and even the highest concentrations were less than 45µg/m³, given this statistics we can conclude that the residential areas in Maharashtra are relatively non polluted for SO₂ pollution.

SO₂ concentrations in rural and other areasTable No. 10: Data for SO₂ recorded at AAQMS representing rural and other area (2015-16)

RO	Station name	Station code	Max of SO ₂ conc	98th percentile SO ₂ conc	Average of SO ₂ conc	Min of SO ₂ conc
	<i>CPCB Standard</i>		80	80	50	80
AMR	Raj Kamal Chowk	547	16	15	12	7
AUR	Ganj Golai - Sidheshwar Bank	643	12	7	5	4
KYN	Ambernath	445	50	45	22	13
	Badlapur - BIWA House	649	97	45	23	14
	I.G.M. Hospital	-	53	44	34	28
	Powai Chowk	648	47	44	25	16
	Smt. CHM College Campus	647	54	45	22	9
KOP	Ruikar Trust	509	39	38	25	13
	Sangli-Miraj Primary Municipal school	575	17	17	11	6
NGP	Govt Polytechnic Col, Sadar	314	45	16	10	6
NVM	Airoli	-	70	50	26	8
PUN	Nal Stop	379	74	50	21	8
TNA	Naupada	304	37	35	28	18

Data Source: MPCB

Units: µg/m³

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

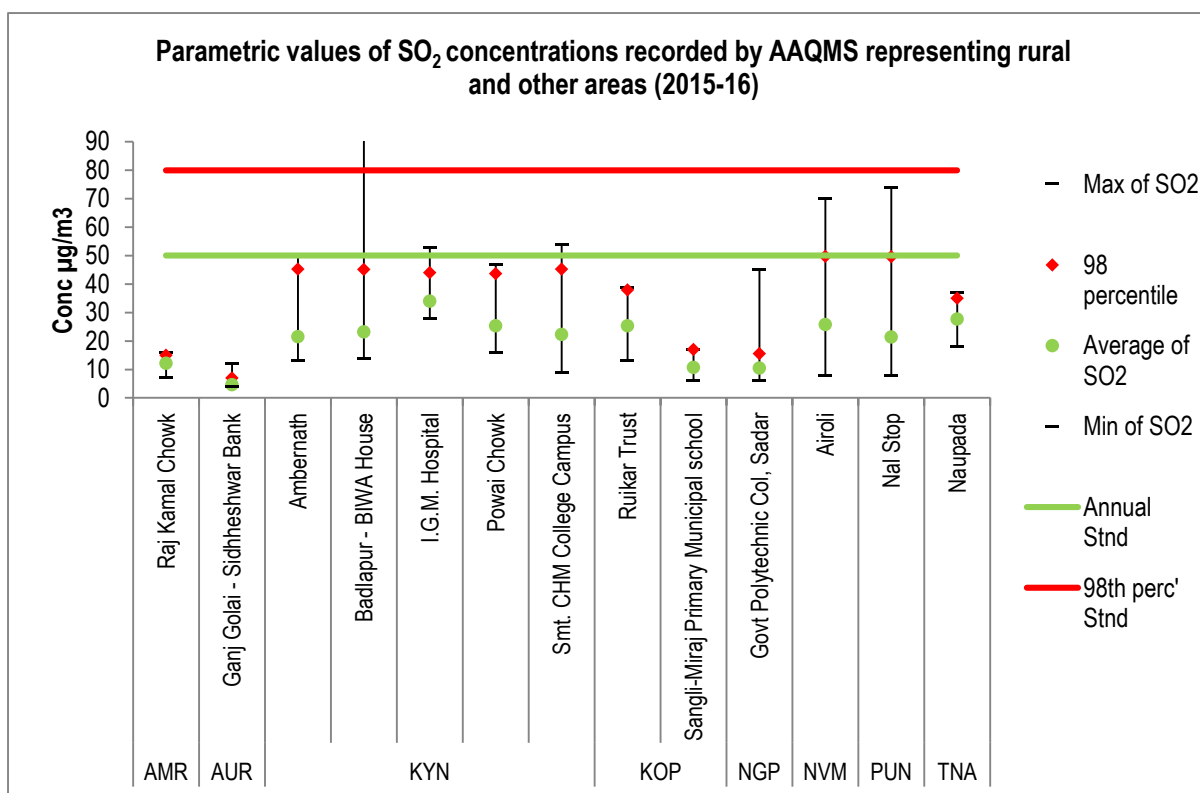


Figure No. 8: Parametric values of SO₂ concentrations recorded by AAQMS representing Rural and Other Areas regions (2015-16)

**Note: I.G.M Hospital is categorized as a sensitive type of monitoring zone by MPCB and has annual standards of 20µg/m³ and daily standards of 80µg/m³*

All the 13 AAQMS representing rural and other areas in Maharashtra recorded the annual SO₂ well under the annual standards (50µg/m³) (Figure No. 8). The AAQMS at Naupada , of Thane region recorded the highest annual average among the rural and other zones of about 28µg/m³.

Although the AAQMS representing the sensitive area near IGM Hospital did not violate the daily standard set for sensitive areas but it violated the annual standards (20µg/m³) set for sensitive areas and recorded annual concentration of about 34µg/m³ for the year 2015-16.

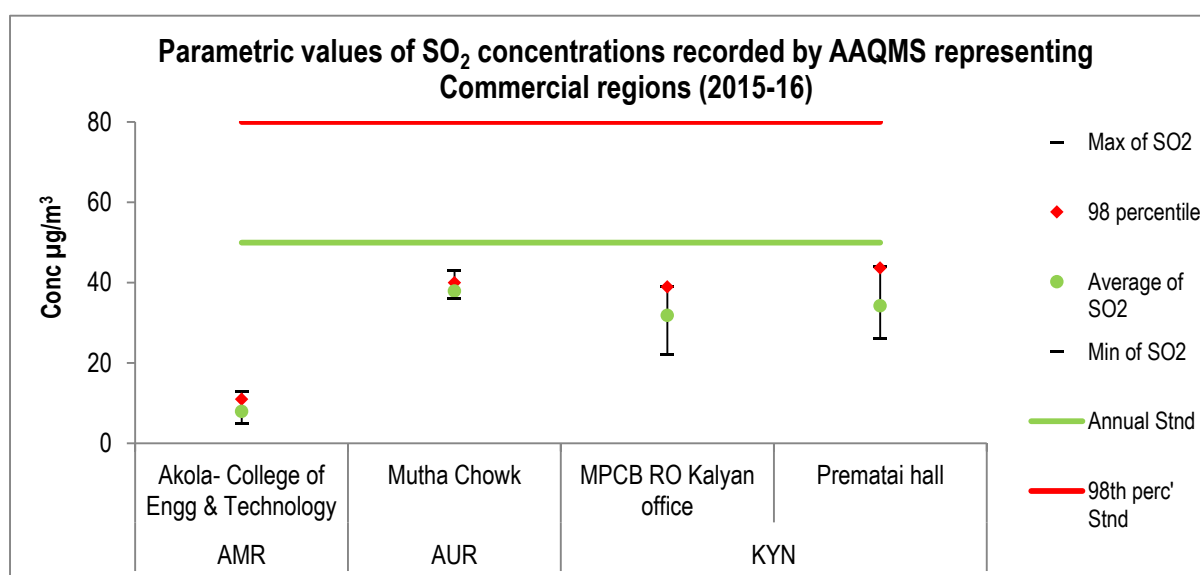
The AAQMS at Ambarnath and Badlapur in the Kalyan region which recorded daily concentrations in between 60 to 80 µg/m³, in the last financial year, recorded improvement in SO₂ pollution, as this year the same areas were recorded with annual SO₂ concentrations below 45µg/m³ (98th percentile value) which is almost half the daily standards (80µg/m³) set by CPCB in 2009.

The remaining regions of Pune, Thane and Nagpur were recorded amongst the cleanest in terms of SO₂ pollution.

SO₂ concentrations in commercial areasTable No. 11: Data for SO₂ recorded at AAQMS representing commercial area (2015- 16)

RO	Station name	Station code	Max of SO ₂ conc	98th percentile SO ₂ conc	Average of SO ₂ conc	Min of SO ₂ conc
	<i>CPCB Standard</i>		80	80	50	80
AMR	Akola- College of Engg & Technology	702	13	11	8	5
AUR	Mutha Chowk	704	43	40	38	36
KYN	MPCB RO Kalyan office	-	39	39	32	22
	Prematai hall	-	44	44	34	26

Data Source: MPCB

Units: µg/m³Figure No. 9: Parametric values of SO₂ concentrations recorded by AAQMS representing Commercial regions (2015-16)

Air quality in the commercial areas of Maharashtra is clean for SO₂ pollution and all the AAQMS recorded annual average well below the annual as well as daily standards (Figure No. 9). Even the maximum daily peak and 98th percentile concentration at all the four commercial locations were below 44µg/m³ which is even less than the annual standard (50µg/m³) set by CPCB. It is only the AAQMS at Mutha Chowk at Nanded Aurangabad region which may require some introspection as it recorded all the observations in the range of 24-44µg/m³. In terms of all the commercials represented by these AAQMS, the site at College of engineering and technology at Akola was recorded to be the cleanest with even the maximum SO₂ concentrations recorded to be under 13µg/m³.

Oxides of Nitrogen

Nitrogen oxides (NO_x) are a mixture of gases that are composed of nitrogen and oxygen. Two of the most toxicologically significant nitrogen oxides are nitric oxide (NO) and nitrogen dioxide (NO₂). The other component of the family includes nitrous oxide (N₂O) which is also known as laughing gas. Nitric oxide has no colour, odour, or taste and is non-toxic. In the air it gets rapidly oxidized to nitrogen dioxide. Nitrogen dioxide is a reddish-brown gas with a pungent, irritating odour. In the presence of sunlight the oxides of nitrogen react with the unburned hydrocarbons to form photochemical smog which causes damage to plants and is also detrimental to human health. These compounds play an important role in the atmospheric reactions that create ozone (O₃) and acid rain¹¹. Nitrogen dioxide is known to irritate the lungs and increase susceptibility to respiratory infections. Direct acute effects of Nitrogen dioxide includes damage of the cell membranes in the lung tissues and causes constriction of the Lung way passages. Eye and nasal irritation along with pulmonary discomfort is commonly observed between concentrations of 15 to 25 ppm¹². Table No. 12 summarises the highlights of the sources and effects of the oxides of nitrogen

Table No. 12: Molecular formula, sources and harmful impacts of oxides of nitrogen

Common name	Nitrogen dioxide	Nitric oxide	Nitrous oxide
Molecular formula	NO ₂	NO	N ₂ O
Life span in air *	1-7 days	1-7 days	170 years
Nature	Polar	Polar	Polar
Molecular structure			
Sources	<ul style="list-style-type: none"> • Natural: Lightning, Forest fires and Bacterial activity • Anthropogenic: High temperature combustion (internal combustion engines, fossil fuel-fired power stations, industrial), Burning of Bio-mass and Fossil Fuels 		
Effects	<ul style="list-style-type: none"> • Human Health: Irritation of nose and throat, reduced lung function, Bronchitis in asthmatic children, visibility impairment, swelling of tissues in the throat and upper respiratory tract, reduced oxygenation of body tissues. • Environment: Acid rain, precursor for photochemical smog 		

¹¹ Agency for Toxic Substances and Disease Registry, U.S. Department of health and human services, Public Health Service, (April 2002)

¹²R.Khan, *Review on effects of Particulates; Sulfur Dioxide and Nitrogen Dioxide on Human Health*, April (2014), Pg.71

Trend in concentrations of oxides of nitrogen in Maharashtra

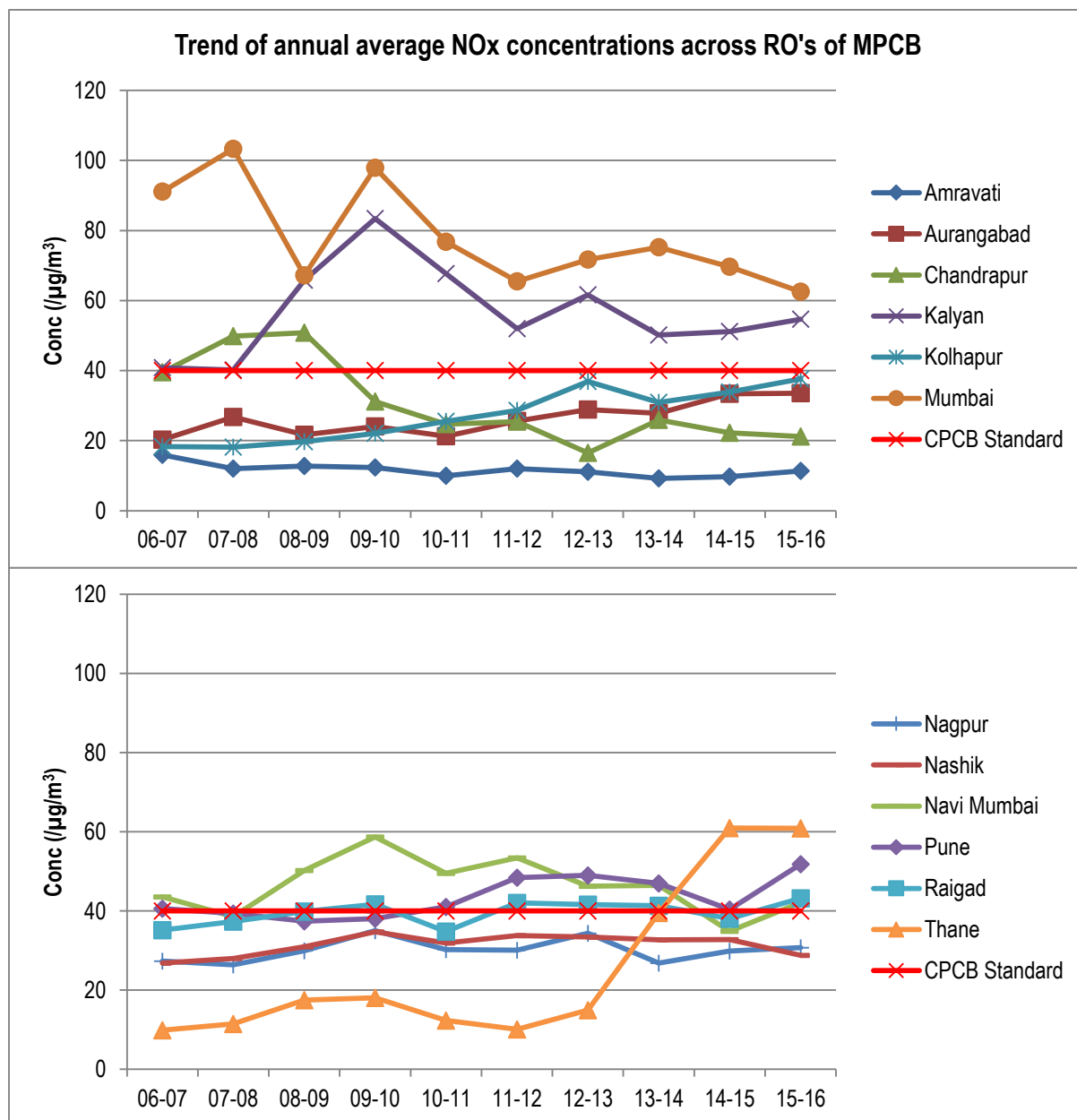


Figure No. 10: Trend in annual NOx concentrations across different regions

*Note: Considers annual average of all the active AAQMS in that RO under MPCB

Table No. 13: MPCB RO-wise annual average concentrations of NO_x

FY	AMR	AUR	CDP	KYN	KOP	MUM	NGP	NHK	NVM	PUN	RGD	TNA
06-07	16	20	40	41	18	91	27	27	44	41	35	10
07-08	12	27	50	40	18	103	26	28	39	39	37	11
08-09	13	22	51	66	20	67	30	31	50	37	40	17
09-10	12	24	31	83	22	98	35	35	59	38	42	18
10-11	10	21	25	68	26	77	30	32	49	41	35	12
11-12	12	26	25	52	29	66	30	34	53	48	42	10
12-13	11	29	17	62	37	72	34	33	46	49	42	15
13-14	9	28	26	50	31	75	27	33	46	47	41	40
14-15	10	33	22	51	34	70	30	33	35	40	38	61
15-16	11	34	21	55	38	63	31	29	42	52	43	61

*Note: Considers annual average of all the active AAQMS in that RO under MPCB

As seen in Figure No. 10 and Table No. 13, the trend for NO_x concentrations has rather been a fluctuating one across various regions of the state. The NO_x levels for Kolhapur, Aurangabad, Chandrapur, Amravati, Nashik and Nagpur are below the CPCB standards indicating that the air in those regions is less polluted with NO_x pollution while the regions like Mumbai, and Kalyan are severely affected by high NO_x concentrations.

The Mumbai region recorded NO_x concentration in range of 70-100 µg/m³ which is almost 2 times the annual standard 40µg/m³ for past 8 years. However, a declining curve in NO_x concentration for Mumbai region can be observed from past 3 years. The Kalyan Region recorded the second highest NO_x concentration in range of 50µg/m³ which 1.2 times the standard. The NO_x concentration in Kalyan region is observed to be slightly increasing in year 2015-16.

The Pune region shows increase in NO_x concentration for last 6 years. Raigad region which has been on borderline for past three years records increase in NO_x concentration in current year 2015-16. Similarly increase curve is observed in Navi Mumbai which recorded the NO_x concentration within the permissible limits till last year. The drastic increase in Thane region is observed and a spike in the 2012-13 has elevated the annual NO_x concentration in Thane (60µg/m³) above the standard limits. Although Nagpur shows the NO_x concentration within permissible limit, a steady increase in curve is observed from past 3 years. The Nashik region shows decline in curve thus indicating improve the air quality in terms of NO_x concentrations.

The following sections discusses the AAQMS wise details of the sites which recorded either polluted or clean for NO_x pollution in the year 2015-16.

NO_x concentrations in industrial areas

Table No. 14: Data for NO_x recorded at AAQMS representing industrial areas (2015-16)

RO	Station name	Station code	Max of NO _x conc	98th percentile NO _x conc	Average of NO _x conc	Min of NO _x conc
	<i>CPCB Standard</i>		80	80	40	80
AMR	Godhadiwala Private Limited	549	17	16	13	6
	MIDC Water Works - Akola	701	53	23	12	7
AUR	Industrial Area CIDCO	705	91	91	81	31
	Jalna- Krishnadhan seeds Ltd	707	40	37	30	16
	MIDC Water Works - Latur	641	53	48	15	9
CDP	Chandrapur - MIDC	281	97	69	26	8
	Rajura	640	36	31	17	4
	Tadali MIDC	638	54	51	20	5
KYN	Dombivali	265	106	94	58	39
	MIDC Office Dombivali	-	104	96	58	35
KOP	Chiplun - Water Treatment	490	12	12	11	11
	Krishna Valley school	576	73	67	37	14
NGP	MIDC Office, Hingna Road	288	63	59	32	17
NHK	MIDC Jalgaon	646	53	52	41	31
	MIDC Satpur - VIP	269	37	35	22	7
NVM	Mahape, MPCB-Nirmal Bhavan	493	81	66	43	16
	Rabale	491	84	80	48	23
	Taloja - MIDC Building	496	72	66	47	24
PUN	Bhosari	312	124	100	50	19
TNA	Balkum/Glaxo	-	75	67	58	42

Data source: MPCB

Units: µg/m³

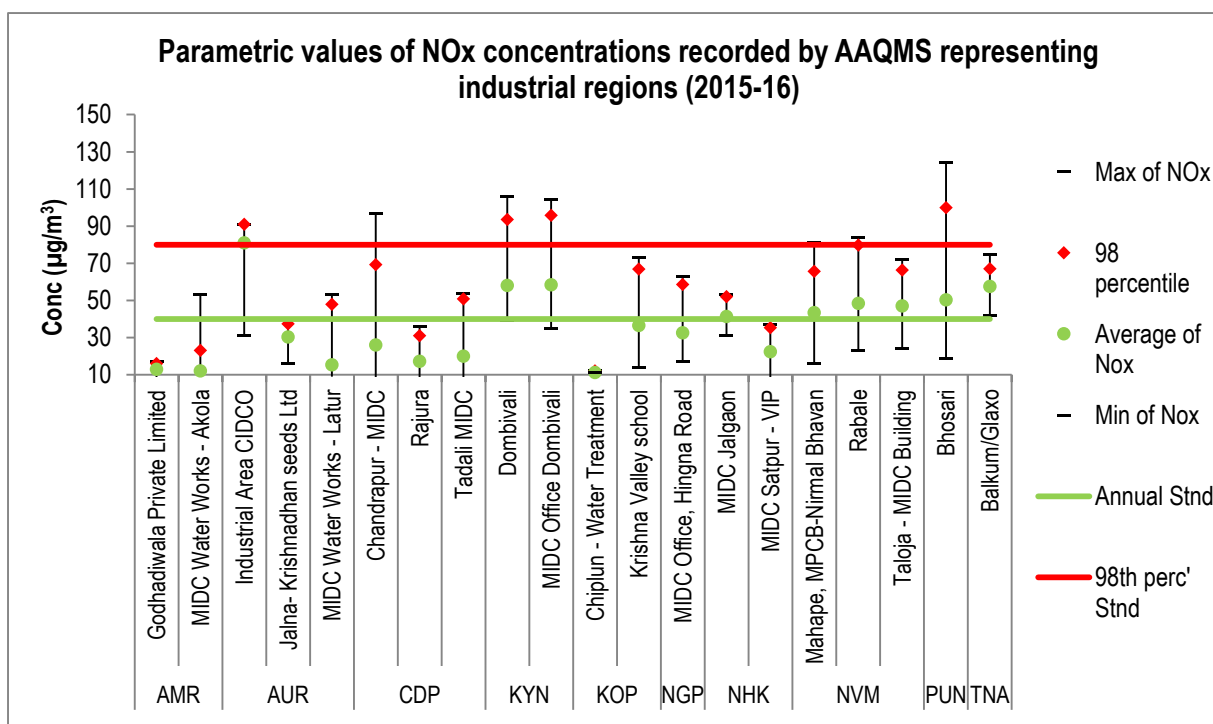


Figure No. 11: Parametric values of NOx concentrations recorded by AAQMS representing industrial areas (2015-16)

One may observe from Figure No. 11 that 9 AAQMS representing industrial areas exceeded the annual concentration of NOx ($40\mu\text{g}/\text{m}^3$). The Industrial area of CIDCO of Aurangabad region recorded the highest annual NOx concentration of $81\mu\text{g}/\text{m}^3$ which is twice the standard.

The Kalyan region recorded high annual NOx concentration and both the AAQMS in the Dombivali MIDC area recorded annual NOx concentrations of about $58\mu\text{g}/\text{m}^3$ which is 1.5 times the standard value. Similarly all the 3 industrial AAQMS in Navi Mumbai violated the annual standard for NOx and recorded annual concentrations of NOx in the range of $43-48\mu\text{g}/\text{m}^3$.

The Thane region which is adjacent to Navi Mumbai also recorded annual NOx concentrations of $58\mu\text{g}/\text{m}^3$ (Balkum/Glaxo). However it is striking to note that even the minimum observed daily concentration at the same site was $42\mu\text{g}/\text{m}^3$, was higher than the annual concentrations, indicating that on any given observation day the area represented by this AAQMS was highly polluted with NOx pollution.

The Bhosari station of Pune region records the highest 98 percentile of $100\mu\text{g}/\text{m}^3$ which is 1.2 times the standard ($80\mu\text{g}/\text{m}^3$). Even at the MIDC Dombivali area there were certain days on which the NOx pollution exceed daily standards, as the 98th percentile value for both AAQMS in Dombivali were about $95\mu\text{g}/\text{m}^3$.

The Amravati, Kolhapur, Chandrapur were observed to be less polluted as compared to other region.

NO_x concentrations in residential areasTable No. 15: Data for NO_x recorded at AAQMS representing residential areas (2015-16)

RO	Station code	Station name	Max of NO _x conc	98th percentile NO _x conc	Average of NO _x conc	Min of NO _x conc
	<i>CPCB Standard</i>		<i>80</i>	<i>80</i>	<i>40</i>	<i>80</i>
AMR	Govt. College of Engineering	548	15	15	12	6
	LRT Commerce College	700	10	10	7	6
AUR	C.A.D.A. Office	513	60	58	<i>43</i>	34
	Collector Office, Aurangabad	512	49	48	35	26
	Ganeshnagar	703	30	28	28	26
	Jalna- Bachat Bhavan	706	38	38	29	19
	SBES College	511	63	59	<i>44</i>	35
	Shyam Nagar-Kshewraj Vidyalaya	642	36	31	15	10
CDP	Ballarshah	639	<i>162</i>	<i>97</i>	28	9
	Chandrapur - SRO MPCB	396	51	43	20	5
	Ghuggus	267	56	29	17	4
KOP	Chiplun - MIDC Chalkewadi	489	12	12	12	11
	Mahadwar Road	510	72	70	40	16
	Shivaji University Campus	508	38	36	23	11
	Terrace of SRO-Sangli, Udyog Bhavan	574	<i>82</i>	68	38	12
MUM	Bandra	-	<i>185</i>	<i>110</i>	<i>49</i>	3
	Sion	-	<i>155</i>	<i>128</i>	<i>81</i>	19
NGP	Civil lines Nagpur	711	62	53	29	16
	IOE North Ambazari road	287	60	55	31	15
NHK	Girna Water Tank	645	43	43	33	25
	NMC Nashik	280	48	37	24	9
	Old B. J. Market	644	49	48	38	29
	RTO Colony	259	46	39	23	7
	SRO Office Nashik	710	46	39	24	7
NVM	Kharghar - CIDCO Nodal Office	494	57	57	<i>41</i>	10
	Nerul - DY Patil	492	<i>80</i>	56	<i>41</i>	15
PUN	Karve Road - CAAQMS	-	<i>193</i>	<i>100</i>	<i>57</i>	2
	Pimpri-Chinchwad - BOB Building	708	<i>136</i>	<i>102</i>	<i>52</i>	14
	Saat Rasta- Chithale Clinic	300	<i>193</i>	49	37	31
	Solapur	0	<i>232</i>	70	<i>49</i>	15
	Swargate, Pune	381	<i>142</i>	<i>133</i>	<i>66</i>	13
	WIT Campus	299	39	38	35	33
RGD	Panvel- Water Supply Plant	495	<i>90</i>	57	<i>43</i>	15
TNA	Kopri	303	<i>82</i>	<i>81</i>	<i>62</i>	29

Data source: MPCB

Units: µg/m³

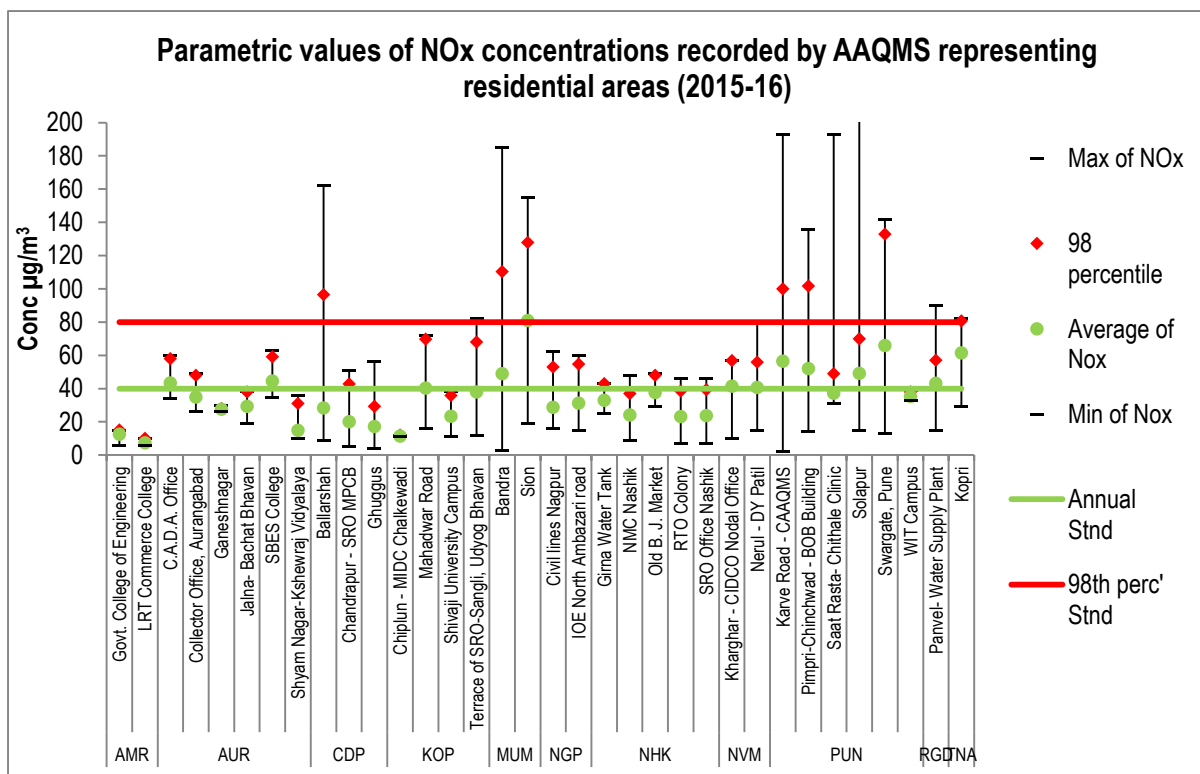


Figure No. 12: Parametric values of NOx concentrations recorded by AAQMS representing residential areas (2015-16)

As seen in Figure No. 12, 13 out of 35 AAQMS representing residential areas, exceeded the annual standards for NOx concentration ($40\mu\text{g}/\text{m}^3$).

The AAQMS at Sion, Mumbai region recorded the highest annual NOx concentrations at $81\mu\text{g}/\text{m}^3$ which is more than twice the standard value. This was followed by the Swargate station of Pune region ($66\mu\text{g}/\text{m}^3$) which recorded 1.6 times the annual standard for NOx. The same station in Pune region recorded the highest 98 percentile of $133\mu\text{g}/\text{m}^3$ exceeding 1.7 times the daily standard ($80\mu\text{g}/\text{m}^3$).

Though the SBES college of Aurangabad recorded NOx concentration within the permissible limit, the station recorded $35\mu\text{g}/\text{m}^3$ as minimum concentration which lies close to the annual standard. Similarly the Old B.J station in Nashik region recorded annual NOx concentration equal to annual standard. This indicates that these area may soon be vulnerable to above standard NOx levels if appropriate initiatives are not taken.

The Kopri station in Thane region recorded the NOx concentration in range of $29-82\mu\text{g}/\text{m}^3$ and recorded annual concentrations of $62\mu\text{g}/\text{m}^3$ which violated the annual standard indicating the region to be severely affected by NOx.

The residential areas of Amravati, Aurangabad, Chandrapur, Kolhapur were observed to be less polluted than other regions in terms of Nox pollution.

NO_x concentrations in rural and other areasTable No. 16: Data for NO_x recorded at AAQMS representing rural and other areas (2015-16)

RO	Station name	Station code	Max of NO _x conc	98th percentile NO _x conc	Average of NO _x conc	Min of NO _x conc
	<i>CPCB Standard</i>		80	80	40	80
AMR	Raj Kamal Chowk	547	18	16	14	8
AUR	Ganj Golai - Sidhleshwar Bank	643	46	40	17	10
KYN	Ambarnath	445	106	99	58	39
	Badlapur - BIWA House	649	163	95	61	42
	I.G.M. Hospital	-	53	53	43	29
	Powai Chowk	648	112	107	67	37
	Smt. CHM College Campus	647	114	103	59	27
KOP	Ruikar Trust	509	87	84	52	25
	Sangli-Miraj Primary Municipal school	575	95	85	44	12
NGP	Govt Polytechnic Col, Sadar	314	101	60	33	18
NVM	Airoli	-	113	75	39	8
PUN	Nal Stop	379	142	127	64	26
TNA	Naupada	304	84	79	63	43

Data source: MPCB

Units: µg/m³

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

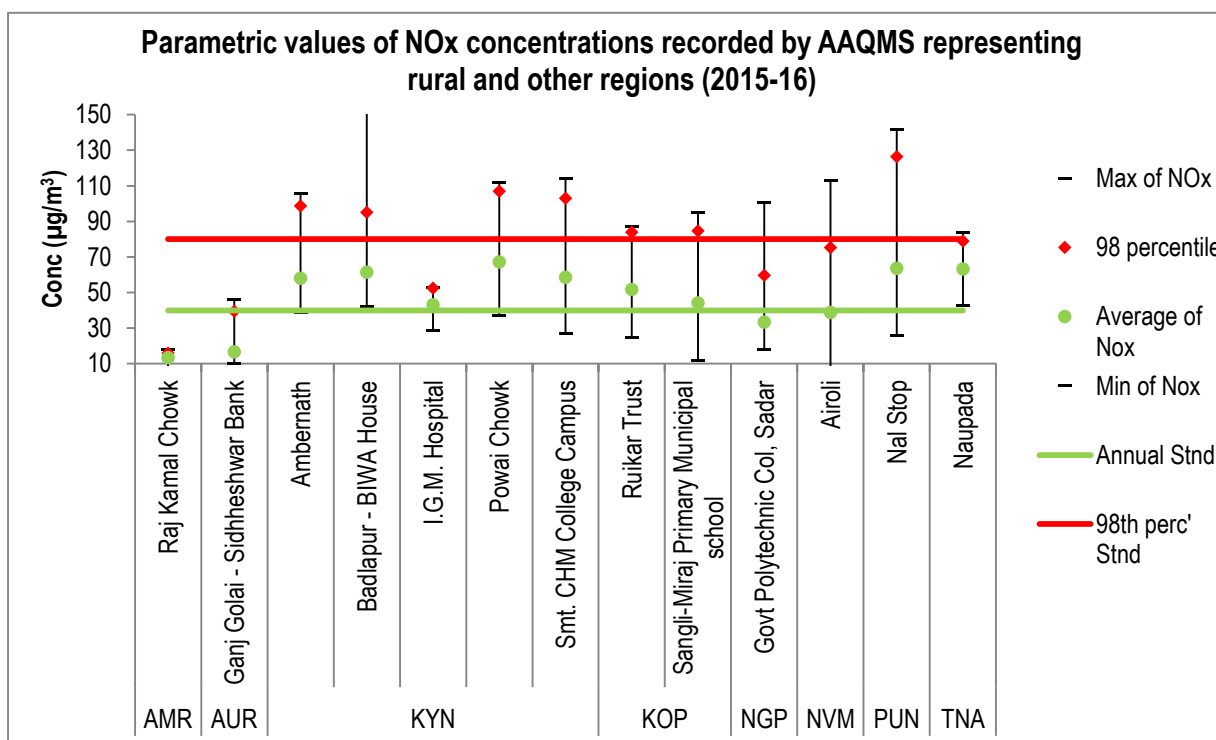


Figure No. 13: Parametric values of NOx concentrations recorded by AAQMS representing rural and other areas (2015-16)

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

Out of all AAQMS representing rural and other areas in Figure No. 13, 9 stations were recorded to exceed the annual standard of NOx (40 µg/m³).

All AAQMS of Kalyan region recorded annual NOx in range of 43-67 µg/m³ exceeding the annual concentration of NOx. The Powai Chowk of Kalyan region recorded the highest annual NOx concentration (67 µg/m³) which is 1.7 times the standard value. The I.G.M Hospital area, in Kalyan region recorded annual concentrations of 43µg/m³ which is 1.4 times more than the standards for sensitive areas (30µg/m³).

The AAQMS at Nal stop in Pune region recorded annual concentration of NOx of about 64µg/m³ which is 1.6 times the standard. The same station recorded the highest 98 percentile of NOx concentration of 127 µg/m³ which is 1.6 times the standard value (80 µg/m³).

The AAQMS at Thane (Naupada) recorded NOx concentrations in range of 43-84 µg/m³ which exceeds the annual standard of NOx. The 98 percentile recorded by same station is 79 µg/m³ which lies close to standard value (80 µg/m³). This indicates that the region is severely affected by NOx pollution throughout the year.

The regions of Amravati, Aurangabad and Nagpur were observed to be less polluted in terms of NOx as compared to other regions.

NO_x concentrations in commercial areas

Table No. 17: Data for NO_x recorded at AAQMS representing commercial areas (2015-16)

RO	Station name	Station code	Max of NO _x conc	98th percentile NO _x conc	Average of NO _x conc	Min of NO _x conc
	<i>CPCB Standard</i>		80	80	40	80
AMR	Akola- College of Engg & Technology	702	13	12	9	7
AUR	Mutha Chowk	704	36	33	32	28
KYN	MPCB RO Kalyan office	0	45	45	40	33
	Prematai hall	0	48	48	44	39

Source: MPCB

Units: µg/m³

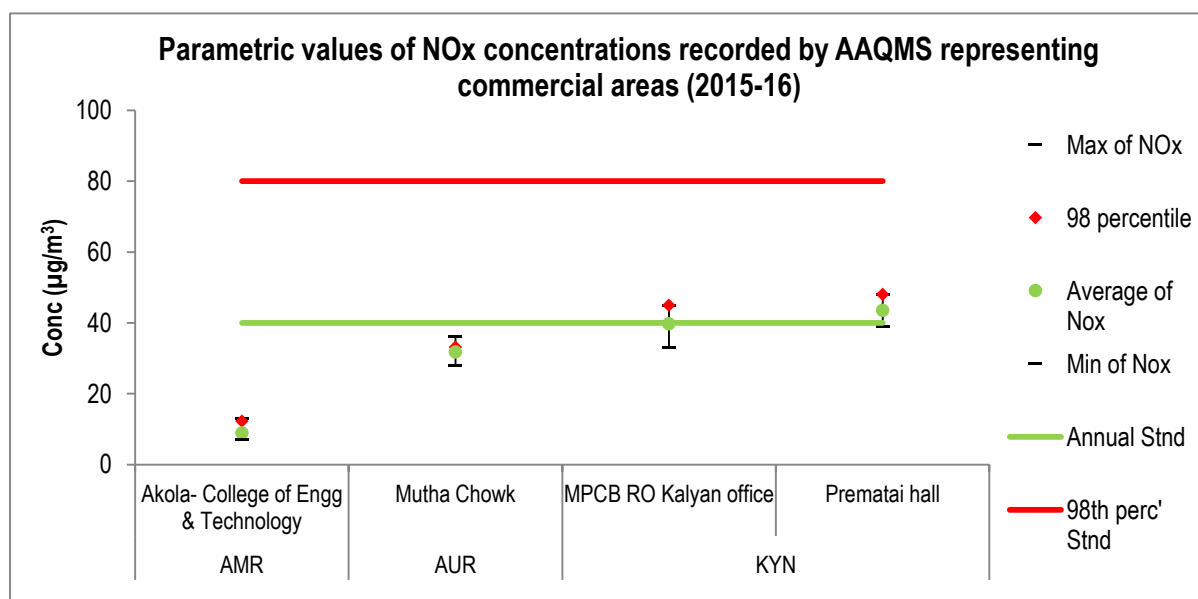


Figure No. 14: Parametric values of NO_x concentrations recorded by AAQMS representing commercial areas (2015-16)

From Figure No. 14, it is observed that only 50% (2 out of 4) of the AAQMS representing commercial areas in Maharashtra recorded annual NO_x concentration within permissible limit (40 µg/m³). AAQMS at Prematai Hall in Kalyan region which recorded annual NO_x concentrations of 44µg/m³ while the MPCB RO Kalyan office was at the borderline category as it recorded annual NO_x concentration of 40µg/m³. The commercial areas of Amravati and Aurangabad region recorded less NO_x concentration as compared to standard and were recorded clean for NO_x pollution.

Particulate Matter

Particulate matter (PM) is a complex mixture of extremely small particles and liquid droplets made up of a number of components, including acids (nitrates and sulphates), organic chemicals, metals, and soil or dust particles¹³. PM generally includes a fine fraction of particles ranging between 10-2.5 μm 10 times finer than the hair follicle (Table No. 18). PM is described using terms based on the complexity and the importance of particle size in determining exposure and human dose. PM can be directly emitted into the atmosphere because some natural and anthropogenic processes or formed secondarily from precursor gases. Today, PM emissions are highly regulated in most countries due to the environmental concerns. PM's are also responsible in affecting the climate of the earth by changing the amount of radiation retained in the earth's system.

Table No. 18: Relative size sources and harmful impacts of PM_{2.5} and PM₁₀

Common name	Respirable Suspended Particulate Matter (RSPM)		
Size in microns	PM _{2.5} &PM ₁₀	Nature	Non Polar ¹⁴
Relative Comparison	<p>The diagram illustrates the relative sizes of different particles. A human hair is shown with a diameter of 50-70 microns. Fine beach sand has a diameter of 90 microns. PM_{2.5} particles are shown as very small red dots with a diameter less than 2.5 microns. PM₁₀ particles are shown as larger blue dots with a diameter less than 10 microns. The source is cited as the U.S. EPA.</p>		
Major sources	<ul style="list-style-type: none"> • Natural: Volcanoes, Dust storms, Forest and grassland fires, Living vegetation, and Sea spray • Anthropogenic: Power plants and industrial processes, Vehicular traffic, Domestic coal burning, Industrial and Municipal waste incinerators 		
Effects	<ul style="list-style-type: none"> • Human Health: premature death, aggravated asthma, acute respiratory symptoms including aggravated coughing and difficult or painful breathing, chronic bronchitis and decreased lung function. • Vegetation: Can clog stomatal openings of plants and interfere with photosynthesis functions. 		

¹³US Environmental Protection Agency: <http://www.epa.gov/pm/>

¹⁴Dasgupta et al. *Fine Particulates in Ambient Air And Its Organic Component*

¹⁵US Environmental Protection Agency: <http://www.epa.gov/nheerl/humanstudies/images/PM2.5%20scale-large.jpg>

Trend in concentrations of Particulate Matter in Maharashtra

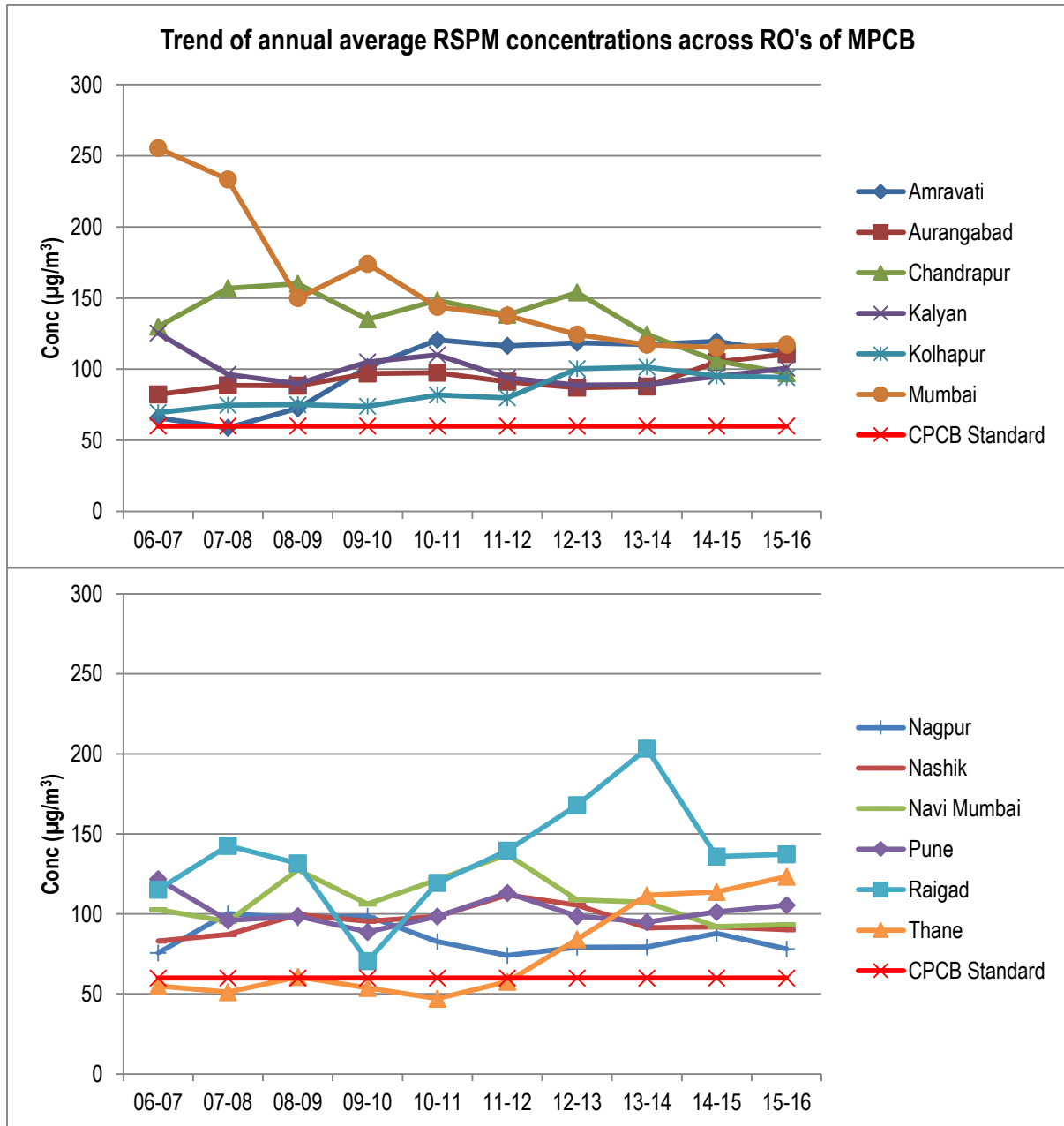


Figure No. 15: Trend in annual RSPM concentrations across different regions

*Note: Considers annual average of all the active AAQMS in that RO under MPCB

Table No. 19: MPCB RO-wise annual average concentrations of RSPM

FY	AMR	AUR	CDP	KYN	KOP	MUM	NGP	NHK	NVM	PUN	RGD	TNA
05-06		132	126	97	72	231	57	84		126		51
06-07	66	82	130	125	70	255	76	83	103	122	115	55
07-08	59	89	157	96	75	233	100	87	95	96	143	51
08-09	72	88	160	90	75	150	98	100	128	99	132	61
09-10	101	97	135	105	74	174	99	96	106	89	71	54
10-11	121	97	148	110	82	144	83	98	121	98	119	47
11-12	116	91	138	94	80	138	74	112	137	113	140	58
12-13	119	87	154	89	100	124	79	105	109	99	168	84
13-14	117	88	125	89	102	117	79	91	107	95	203	112
14-15	119	105	106	95	95	115	88	92	92	101	136	114
15-16	112	111	97	101	94	117	78	90	93	105	137	123

*Note: Considers annual average of all the active AAQMS in that RO under MPCB

The illustration in Figure No. 15 and the corresponding data tabulated in Table No. 19 indicate that the PM concentrations are recorded to be high across all the regions in Maharashtra. This indicates that all the AAQMS have exceeded the standards ($60\mu\text{g}/\text{m}^3$) for almost all the years excepts for Thane which recorded the concentration to be lower than the standards from 2009-12.

The regions of Raigad ($137\mu\text{g}/\text{m}^3$) and Thane ($123\mu\text{g}/\text{m}^3$) have recorded the highest concentrations of RSPM which are almost double the standards for this year. Even though Chandrapur region recorded the concentration of $106\mu\text{g}/\text{m}^3$ for the year 2014-15, a decline could be observed this years and the concentration of RSPM ($97\mu\text{g}/\text{m}^3$) has also been reduced. This indicates that initiatives have been taken in Chandrapur to lower the concentrations of RSPM.

Irrespective of the fact that the concentrations are exceeding, Nagpur recorded the lowest concentrations of RSPM ($78\mu\text{g}/\text{m}^3$) compared to all other stations followed by Nashik ($90\mu\text{g}/\text{m}^3$) and Navi Mumbai ($93\mu\text{g}/\text{m}^3$). An increasing trend could be observed for Aurangabad, Pune and Kalyan over the past 3 years. Raigad station has recorded a drastic decline in its concentration of RSPM of about 70% ($137\mu\text{g}/\text{m}^3$) compared to its concentration level ($203\mu\text{g}/\text{m}^3$) in 2013- 14. The concentrations for Amravati, Kolhapur and Mumbai are in the range of 70 -120 $\mu\text{g}/\text{m}^3$ for almost all the years.

The following section discuss the AAQMS wise parametric values and observations recorded for RSPM across various type of monitoring station in Maharashtra for the year 2015-16.

RSPM concentrations in industrial areas

Table No. 20: Data for RSPM recorded at AAQMS representing industrial areas (2015-16)

RO	Station name	Station code	Max of RSPM conc	98th percentile RSPM conc	Average of RSPM conc	Min of RSPM conc
	<i>CPCB Standard</i>		100	100	60	100
AMR	Godhadiwala Private Limited	549	158	147	110	56
	MIDC Water Works - Akola	701	240	143	106	16
AUR	Industrial Area CIDCO	705	237	235	212	110
	Jalna- Krishnadhan seeds Ltd	707	202	197	103	33
	MIDC Water Works - Latur	641	186	163	81	16
CDP	Chandrapur - MIDC	281	192	159	75	9
	Rajura	640	395	252	127	25
	Tadali MIDC	638	253	188	58	6
KYN	Dombivali	265	189	168	112	70
	MIDC Office Dombivali	-	186	172	110	72
KOP	Chiplun - Water Treatment	490	217	212	173	131
	Krishna Valley school	576	205	199	92	7
NGP	MIDC Office, Hingna Road	288	218	211	110	51
NHK	MIDC Jalgaon	646	132	129	114	85
	MIDC Satpur - VIP	269	276	172	78	8
NVM	Mahape, MPCB-Nirmal Bhavan	493	227	178	85	12
	Rabale	491	240	213	131	45
	Taloja - MIDC Building	496	251	236	148	44
PUN	Bhosari	312	215	202	97	21
TNA	Balkum/Glaxo	-	326	251	132	39

Data Source: MPCB

Units: $\mu\text{g}/\text{m}^3$

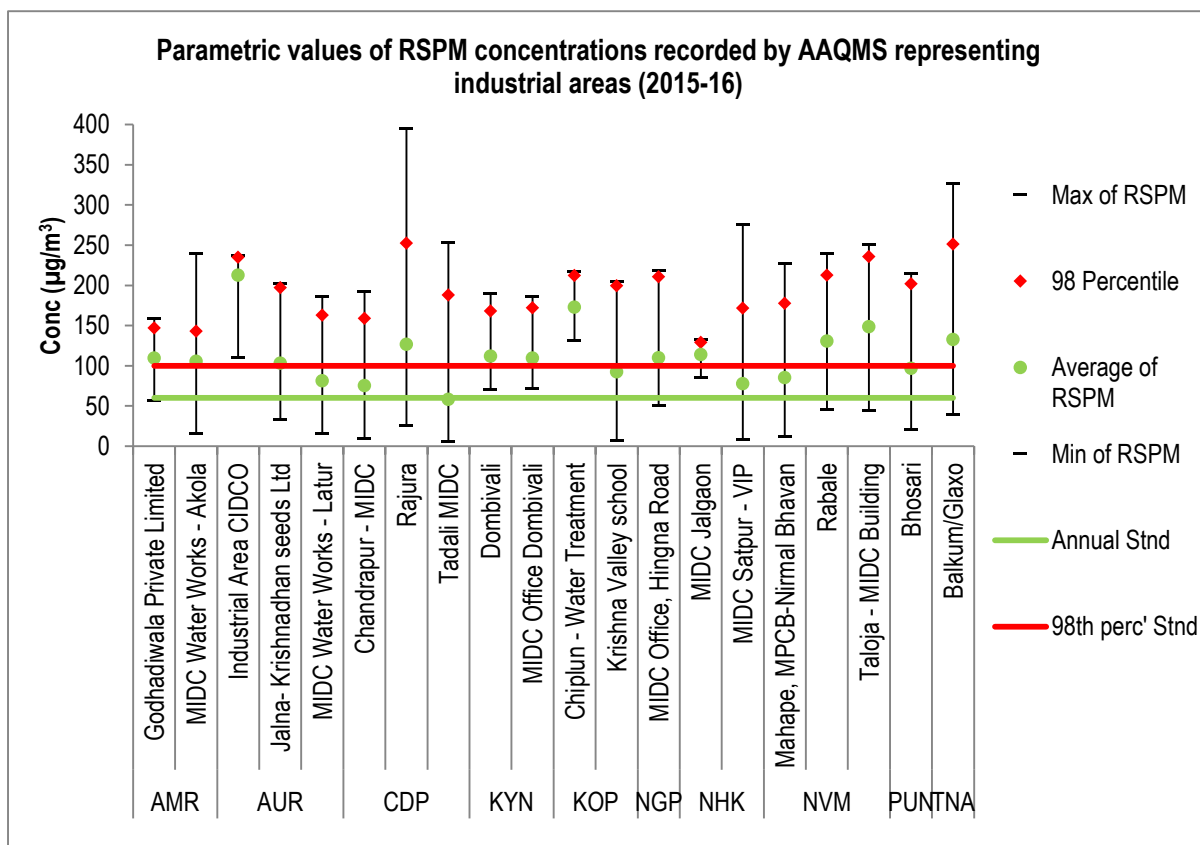


Figure No. 16: Parametric values of RSPM concentrations recorded by AAQMS representing industrial areas (2015-16)

As seen in Figure No. 16, except for one station, all the AAQM sites representing industrial areas violated the annual and daily standards prescribed by CPCB ($60\mu\text{g}/\text{m}^3$). The highest annual average concentration of RSPM is recorded at Industrial Area CIDCO, Aurangabad ($212\mu\text{g}/\text{m}^3$) which is almost triple the standard followed by Chiplun Water Treatment, Kolhapur ($173\mu\text{g}/\text{m}^3$) and Taloja MIDC, Navi Mumbai ($148\mu\text{g}/\text{m}^3$). The lowest concentrations ($58\mu\text{g}/\text{m}^3$) was recorded at Tadali MIDC, Chandrapur. Stations such as MIDC Water works Latur, Aurangabad ($81\mu\text{g}/\text{m}^3$); Chandrapur MIDC, Chandrapur ($75\mu\text{g}/\text{m}^3$) and MIDC Satpur- VIP, Nashik ($78\mu\text{g}/\text{m}^3$) have recorded the annual average concentrations to be slightly above the annual standards.

The highest 98th percentile value was recorded at the Rajura, Chandrapur ($252\mu\text{g}/\text{m}^3$) AAQMS which is almost 2.5 times the 98th percentile standard ($100\mu\text{g}/\text{m}^3$). The highest daily max ($374\mu\text{g}/\text{m}^3$) is also recorded to be highest at the same site. After Chandrapur; Balkum Glaxo, Thane ($251\mu\text{g}/\text{m}^3$) and Taloja MIDC, Navi Mumbai ($236\mu\text{g}/\text{m}^3$) have recorded the highest 98th percentile values. The lowest 98th percentile value was observed at MIDC Jalgaon, Nashik ($129\mu\text{g}/\text{m}^3$) followed by MIDC work Akola, Amravati ($143\mu\text{g}/\text{m}^3$) and Godhadiwala Pvt Ltd, Amravati ($147\mu\text{g}/\text{m}^3$).

None of the industrial sites were observed to meet the RSPM standard limits or meet the prescribed standards by CPCB.

RSPM concentrations in residential areas

Table No. 21: Data for RSPM recorded at AAQMS representing residential areas (2015-16)

RO	Station name	Station code	Max of RSPM conc	98 th percentile RSPM conc	Average of RSPM conc	Min of RSPM conc
	<i>CPCB Standard</i>		<i>100</i>	<i>100</i>	<i>60</i>	<i>100</i>
AMR	Govt. College of Engineering	548	97	93	73	38
	LRT Commerce College	700	158	146	115	98
AUR	C.A.D.A. Office	513	169	155	75	21
	Collector Office, Aurangabad	512	139	126	73	10
	Ganeshnagar	703	133	121	117	110
	Jalna- Bachat Bhavan	706	406	183	111	48
	SBES College	511	206	191	111	28
	Shyam Nagar-Kshewraj Vidyalaya	642	236	175	85	16
CDP	Ballarshah	639	274	233	123	29
	Chandrapur - SRO MPCB	396	180	150	70	5
	Ghuggus	267	359	309	180	45
KOP	Chiplun - MIDC Chalkewadi	489	220	212	170	131
	Mahadwar Road	510	158	150	106	61
	Shivaji University Campus	508	81	77	63	35
	Terrace of SRO-Sangli, Udyog Bhavan	574	289	186	82	20
MUM	Bandra	-	239	229	93	39
	Sion	-	374	297	148	23
NGP	Civil lines Nagpur	711	144	80	54	36
	IOE North Ambazari road	287	305	166	101	7
NHK	Girna Water Tank	645	151	124	103	63
	NMC Nashik	280	359	219	94	22
	Old B. J. Market	644	173	144	108	69
	RTO Colony	259	147	145	73	16
	SRO Office Nashik	710	280	159	76	14
NVM	Kharghar - CIDCO Nodal Office	494	267	230	116	16
	Nerul - DY Patil	492	272	225	136	17
PUN	Karve Road - CAAQMS	-	680	277	138	43
	Pimpri-Chinchwad - BOB Building	708	234	207	101	20
	Saat Rasta- Chithale Clinic	300	229	137	78	52
	Solapur	0	279	187	100	29
	Swargate, Pune	381	286	235	106	18
	WIT Campus	299	89	88	76	59
RGD	Panvel- Water Supply Plant	495	230	203	137	63
TNA	Kopri	303	321	290	136	40

Data source: MPCB

Units: µg/m³

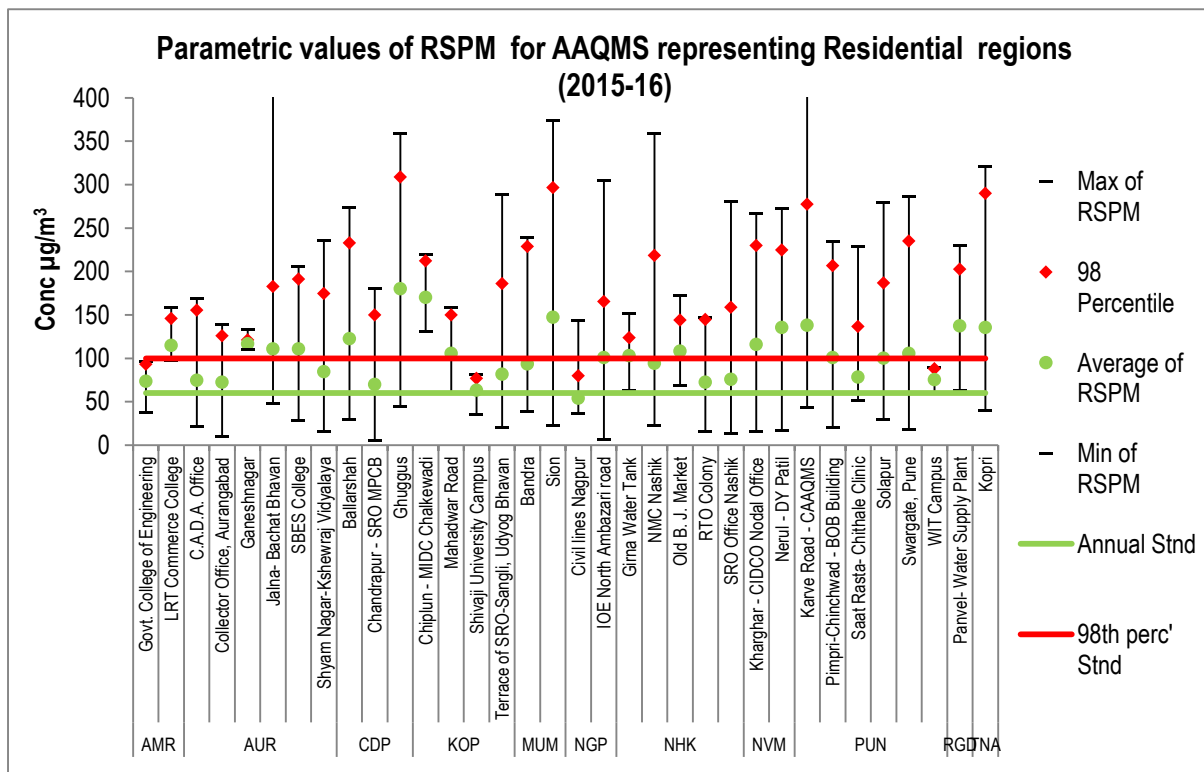


Figure No. 17: Parametric values of RSPM concentrations recorded by AAQMS representing residential areas (2015-16)

It could be observed in Figure No. 17 that except for Civil Lines (54µg/m³), Nagpur; all the stations have exceeded the annual average concentration for RSPM which is 60µg/m³. The highest concentrations (180µg/m³) are recorded at Ghuggus, Chandrapur which are almost 3 times the annual standard. The reason for the same could be due to the presence of the industries. Chiplun MIDC Chalkewadi, Kolhapur (170µg/m³) and Sion, Mumbai (148 µg/m³) follows next in recording the high concentration of RSPM.

Out of all the stations, only 4 stations have recorded the 98th percentile value to be less than the 98th percentile standard which is 100 µg/m³. The highest value is seen to be recorded at Ghuggus, Chandrapur (309µg/m³) which almost triple the standard followed by Sion, Mumbai (297 µg/m³) and Kopri, Thane (290 µg/m³). The lowest values are recorded at Shivaji University campus, Kolhapur (77 µg/m³) followed by Civil Lines, Nagpur (80 µg/m³) and WIT campus, Pune (88 µg/m³).

The highest daily value is recorded Karve road CAAQMS to be 680 µg/m³ which is almost 7 times higher than the 98th percentile standard followed by Jalna Bachat Bhavan, The Maximum daily RSPM concentration at Aurangabad (406µg/m³) was observed to be 4 times higher the standards, however the 98th percentile value was 183µg/m³ hence it can be considered as an outlier.

RSPM concentrations in rural and other areas

Table No. 22: Data for RSPM recorded at AAQMS representing rural and other types of areas (2015-16)

RO	Station name	Station code	Max of RSPM conc	98th percentile RSPM conc	Average of RSPM conc	Min of RSPM conc
	<i>CPCB Standard</i>		100	100	60	100
AMR	Raj Kamal Chowk	547	186	158	135	68
AUR	Ganj Golai - Sidhshwar Bank	643	293	150	80	21
KYN	Ambernath	445	190	177	111	78
	Badlapur - BIWA House	649	283	168	113	66
	I.G.M. Hospital	-	83	83	73	61
	Powai Chowk	648	201	224	126	50
	Smt. CHM College Campus	647	203	185	109	58
KOP	Ruikar Trust	509	179	167	120	44
	Sangli-Miraj Primary Municipal school	575	203	158	77	16
NGP	Govt Polytechnic Col, Sadar	314	173	152	91	41
NVM	Airoli	-	250	75	36	8
PUN	Nal Stop	379	257	162	88	25
TNA	Naupada	304	208	192	102	38

Data Source: MPCB

.... Units: $\mu\text{g}/\text{m}^3$

*Note: I.G.M hospital is categorised as a sensitive type of monitoring zone by MPCB and the standards are $100 \mu\text{g}/\text{m}^3$ and $60 \mu\text{g}/\text{m}^3$ for 24 and annual averages

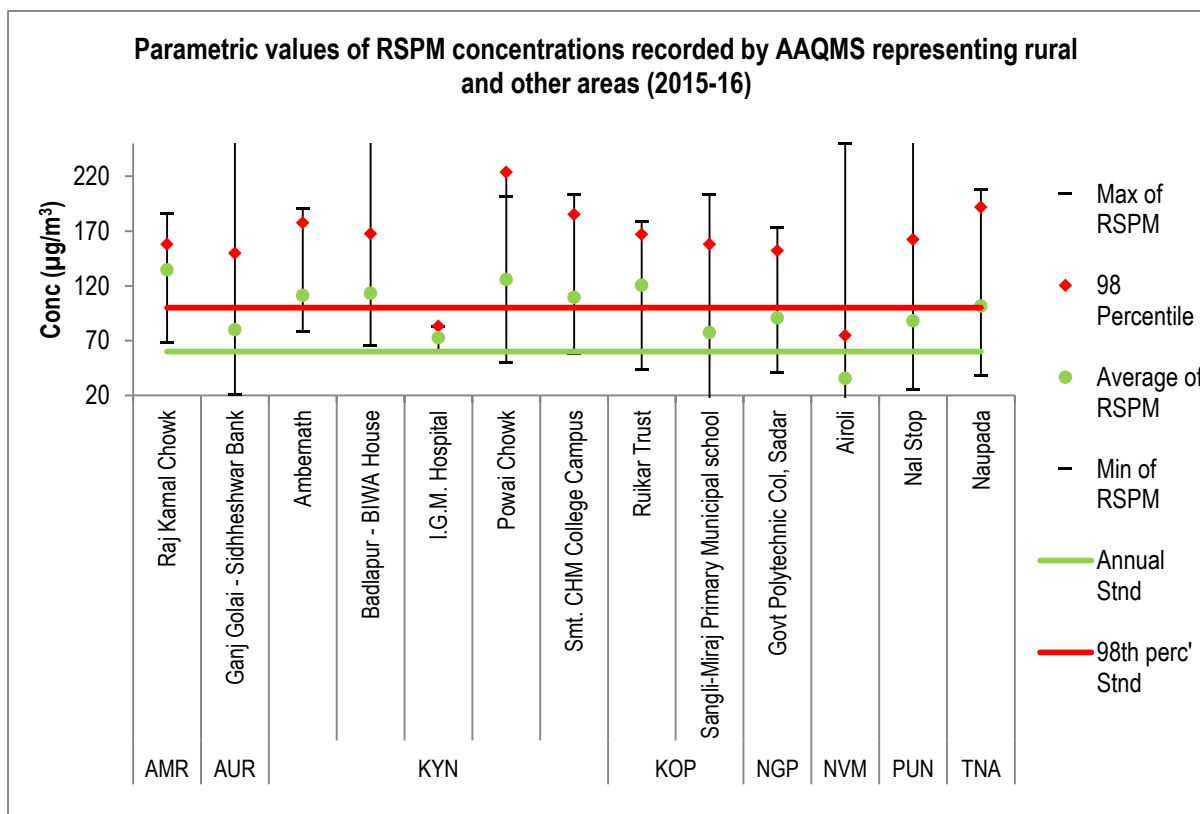


Figure No. 18: Parametric values of RSPM concentrations recorded by AAQMS representing rural and other areas (2015-16)

As seen in Figure No. 18 almost all AAQMS, under rural and other areas exceeded the annual average standard ($60\mu\text{g}/\text{m}^3$), except for Airoli station from Navi Mumbai which has recorded the lowest concentration of annual RSPM as $36\mu\text{g}/\text{m}^3$ lying within the limit set by CPCB ($60\mu\text{g}/\text{m}^3$). The AAQMS site at Raj Kamal Chowk, Amravati recorded the highest concentration of RSPM which is almost double ($135\mu\text{g}/\text{m}^3$) the standard followed by Powai chowk, Kalyan ($126\mu\text{g}/\text{m}^3$) and Ruikar trust, Kolhapur ($120\mu\text{g}/\text{m}^3$).

The highest 98th percentile (daily) value was observed at Powai chowk, Kalyan which was double ($224\mu\text{g}/\text{m}^3$) the 98th percentile standard ($100\mu\text{g}/\text{m}^3$). The lowest 98th percentile values ($75\mu\text{g}/\text{m}^3$) was recorded at the Airoli CAAQMS, Navi Mumbai followed by the sensitive IGM Hospital, Kalyan ($83\mu\text{g}/\text{m}^3$). Only these 2 stations have recorded the 98th percentile value to be less than the standard.

The daily maximum of RSPM was recorded at Badlapur BIWA house, Kalyan to be $649\mu\text{g}/\text{m}^3$ while the 98th percentile value was $150\mu\text{g}/\text{m}^3$ indicating that the former is an outlier. The minimum of RSPM was recorded at Airoli, Navi Mumbai to be $8\mu\text{g}/\text{m}^3$.

RSPM concentrations in commercial areas

Table No. 23: Data for RSPM recorded at AAQMS representing commercial areas (2015-16)

RO	Station name	Station code	Max of RSPM conc	98th percentile RSPM conc	Average of RSPM conc	Min of RSPM conc
	<i>CPCB Standard</i>		100	100	60	100
AMR	Akola- College of Engg & Technology	702	174	167	139	8
AUR	Mutha Chowk	704	717	177	173	74
KYN	MPCB RO Kalyan office	0	90	86	71	63
	Prematai hall	0	88	86	72	59

Data Source: MPCB

Units: $\mu\text{g}/\text{m}^3$

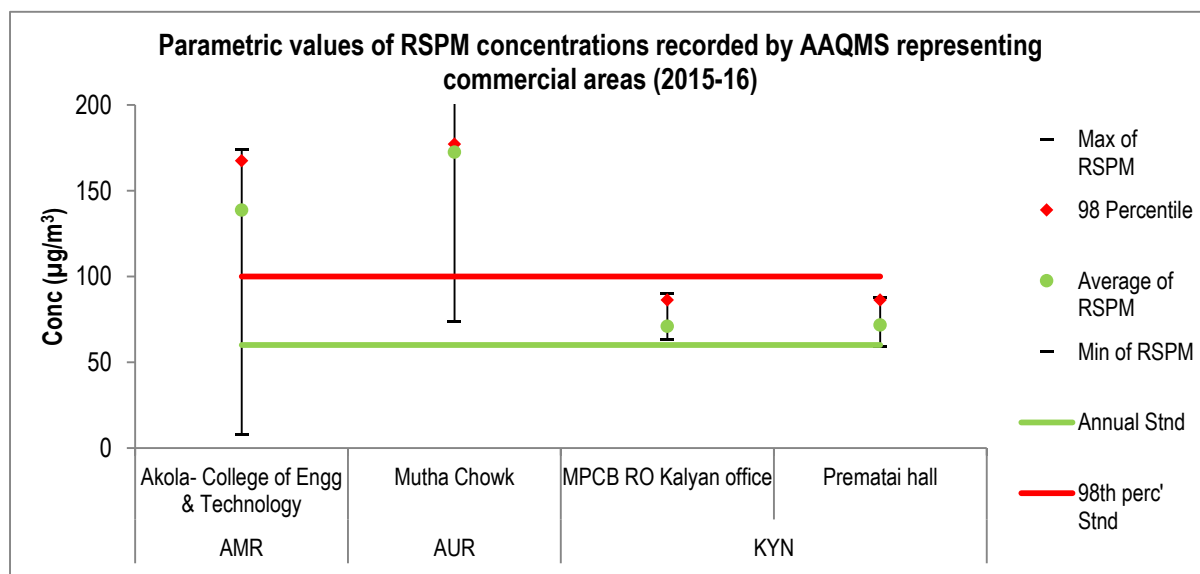


Figure No. 19: Parametric values of RSPM concentrations recorded by AAQMS representing commercial areas (2015-16)

As seen in Figure No. 19, the highest concentration of annual RSPM was observed at Mutha Chowk, Aurangabad with record of $173\mu\text{g}/\text{m}^3$ followed by Akola college of Engineering and Technology, Amravati ($139\mu\text{g}/\text{m}^3$) compared to the annual standard ($60\mu\text{g}/\text{m}^3$). The AAQMS at Kalyan recorded the concentration to be just above the annual average standard. Thus all the stations were observed to be violating the annual average concentration of RSPM.

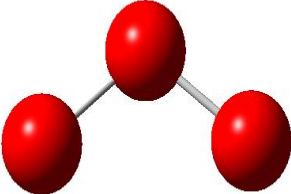
The highest 98th percentile value was also recorded at Mutha chowk, Aurangabad ($177\mu\text{g}/\text{m}^3$) followed by AAQMS at Amravati ($167\mu\text{g}/\text{m}^3$). Both the station were found to be violating the 98th percentile standard ($100\mu\text{g}/\text{m}^3$). The remaining 2 stations at Kalyan recorded the 98th percentile value to be less the standard.

Ozone

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

Breathing ozone can trigger a variety of health problems. Ozone penetrates deeper into the parts of the lungs that are more vulnerable to injury. Ozone makes people more sensitive to allergens, which are the most common triggers for asthma attacks.¹⁶ Ground level ozone can also have harmful effects on sensitive vegetation and ecosystems. The sources and effects of ozone are drafted below in Table No. 24.

Table No. 24: Molecular formula, sources and harmful impacts of Ozone

	Common name	Molecular formula	Life span in air	Nature
	Ozone	O ₃	22 +/- 2days ¹⁷	Polar
Molecular structure				
Sources	Ozone precursors come from fuel combustion from automobiles; oil based and paint industries, power plant, oil refineries, and electronic equipment such as photocopiers.			
Effects	<ul style="list-style-type: none"> • Human Health: Reduce lung function, respiratory illness, premature death, asthma, bronchitis, heart attack, and other cardiopulmonary problems. • Environment: Photochemical Smog 			

¹⁶ United States Air and Radiation EPA-452/K-99-001&Environmental Protection Washington, DC 20460 July 1999 Agency [Smog-Who does it hurt](#), Page2.

¹⁷ O. Cooper, ESRL, [Tropospheric Ozone Global distribution and Radiative Forcing](#)(2007), Slide 5

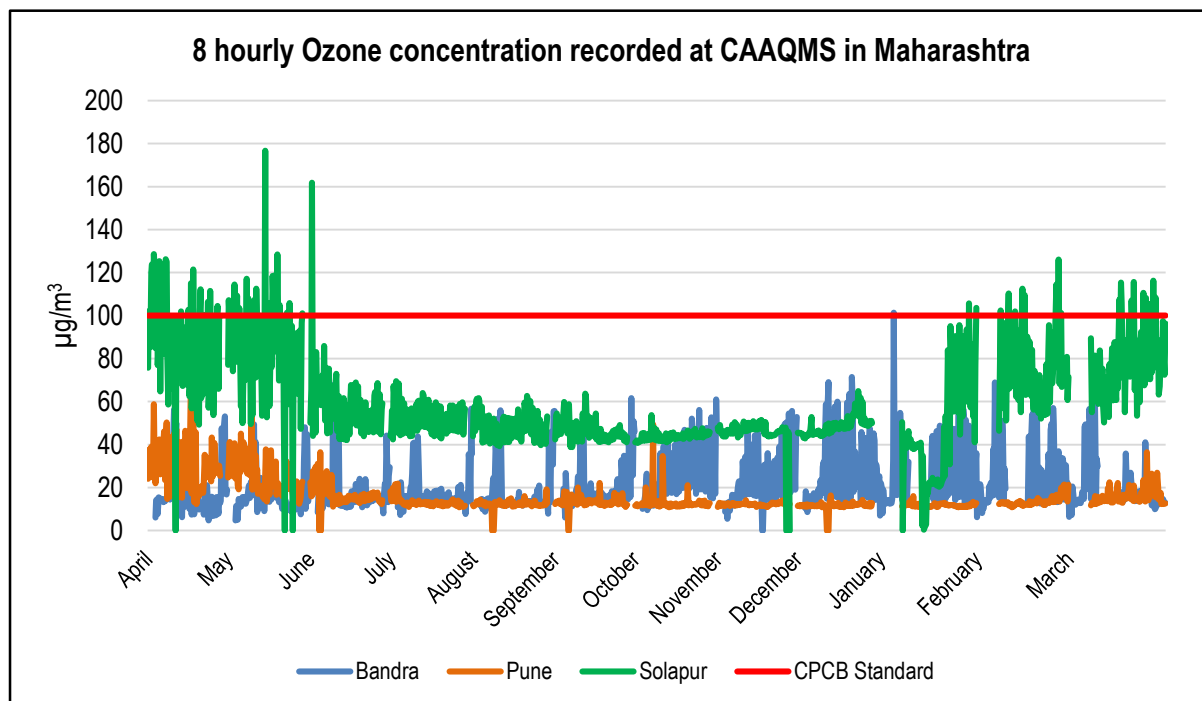


Figure No. 20: 8 hourly Ozone concentration recorded at CAAQMS in Maharashtra

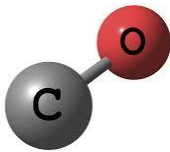
The ozone concentrations were recorded by the CAAQMS in Maharashtra at Bandra, Solapur and Pune. These CAAQMS recorded about 1098 observations each for 8 hourly concentrations in the year 2015-16. As per the data and as seen in Figure No. 20, Pune and Bandra regions were recorded clean almost throughout the year while the Solapur station exceeded for almost 63 observation accounting to about 5.75% of the observations, 1% lower than the exceedance recorded at the same site last year. The reason higher CO concentrations in Solapur city may need further introspection.

The highest ozone concentrations at Solapur, Bandra and Pune were recorded to be 176, 101 and 79 µg/m³ respectively. The Solapur region recorded high ozone concentrations in summer as well as winter seasons as compared to the last year when the concentrations were high in the winter season. The Bandra region recorded high ozone concentrations between October to December months. The pune region recorded all its 8 hourly average concentrations below 60 µg/m³.

Carbon Monoxide

Carbon monoxide (CO) is a colourless, odourless, tasteless, non-irritating, and poisonous gas consisting of one carbon and oxygen atom, connected by a triple bond (Table No. 25). CO is produced when carbon-based fuels undergo incomplete combustion. The largest proportion of these emissions are produced as exhausts of internal combustion engines, especially by motor vehicles with petrol engines. Carbon monoxide has a shelf life of about 2 months and eventually, carbon monoxide reacts with other compounds in the atmosphere thus converting to carbon dioxide¹⁸. Human activities are attributed to the release of about 60% of the carbon monoxide whereas natural processes account for the remaining 40%¹⁹. The most important health effects associated with exposure to CO is due to its strong bond with the haemoglobin molecule, forming carboxy haemoglobin (COHb) which is then incapable of releasing oxygen to the tissue such as the heart and the brain.²⁰ At low concentrations (10 ppm) CO pollutant affects cardiovascular activities, nervous system and respiration, which may lead to unconsciousness and also death after prolonged exposures. Studies have recorded death due to acute exposure to high concentration of CO (>500ppm)²¹.

Table No. 25: Molecular formula, sources and harmful impacts of Carbon monoxide

	Common name	Molecular formula	Life span in air	Nature
	Carbon Monoxide	CO	2 months	Polar
Molecular structure				
Sources	<ul style="list-style-type: none"> • Natural: Volcanoes and forest fires • Anthropogenic: Emissions from automobiles, coal- gas- or oil-fired heating or power generating plants, combustion of waste in municipal and other incinerators, burning of forest and agricultural materials, smoldering coal refuse material 			
Effects	<ul style="list-style-type: none"> • Human Health: dizziness, nausea (feeling sick) and vomiting, tiredness and confusion, stomach pain, shortness of breath and difficulty in breathing, Blue baby syndrome. 			

¹⁸ U.S. Department of Health And Human Services Public Health Service Agency for Toxic Substances and Disease Registry, [Toxicological Profile For Carbon Monoxide](#), Page 2

¹⁹ WHO [Environmental Health Criteria 213: Carbon Monoxide \(second edition\)](#), Sources of carbon monoxide. Page 38

²⁰ T. Greiner, Department of Agricultural and Biosystems Engineering, Iowa State University, [Carbon Monoxide Poisoning: Dangers, Detection, Response, and Poisoning \(AEN-193\)](#)

²¹ M. Fierro, The University of Arizona, College of Public Health, [Adverse Health Effects Of Exposure To Ambient Carbon Monoxide](#) (September 2001), Page 4

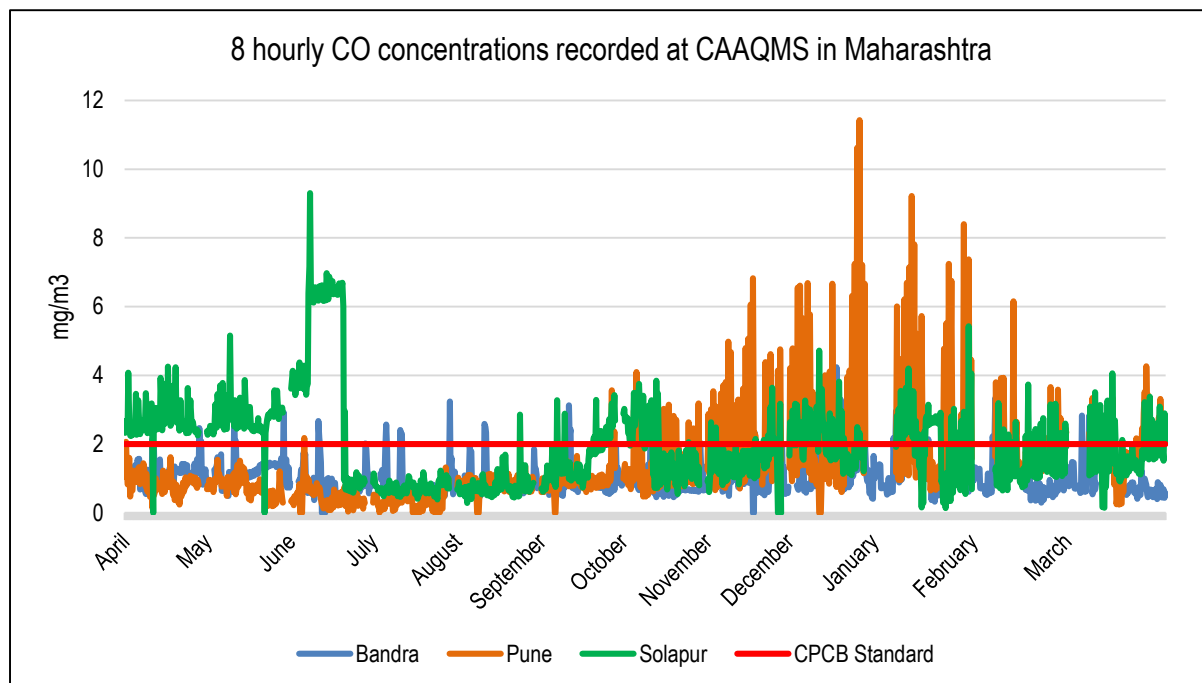


Figure No. 21: 8 hourly CO concentrations recorded at CAAQMS in Maharashtra

The CO concentrations are recorded by the CAAQMS sites at Bandra, Pune and Solapur and recorded about 1098 observations for eight hourly averages. A graphical representation of the 8 hourly average CO concentrations is presented in Figure No. 21.

As against the 8hourly standards of 2mg/m³ set by CPCB, the Solapur, Pune and Bandra regions exceeded the standards for almost 42%, 16% and 7% of the observations respectively which helps us conclude that these areas are severely affected by CO pollution. Both, Pune and Solapur regions violated the standards in the winter month i.e between November to February. The Bandra region recorded significant decrease in the % exceedance from 30% to 7% as compared to the last financial year while Solapur recorded decrease from 62% to 42% in the % exceedance values.

National Air Quality Index

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

In order to develop a calculation of AQI specific to India, CPCB in consultation with IIT (Indian Institute of Technology) Kanpur, devised an AQI system after conducting a literature review, understanding the air quality monitoring procedures and protocols, INAQS (Indian National Air Quality Standards), and dose-response relationships of pollutants. In October 2014 CPCB published the report titled National Air Quality Index²² and has elaborated the procedure of calculation and the subsequent categories of the AQI. There are six AQI categories, namely Good, Satisfactory, Moderately polluted, Poor, Very Poor, and Severe associated to various health adversaries (Table No. 26).

Table No. 26: Health advisories for various range of Air Quality Indices and respective colour codes

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

²² CPCB 2014, [National Air Quality Index](#), Central Pollution Control Board, Ministry of Environment & Climate Change, Government of India

Calculation of AQI

Each of these categories is decided based on ambient concentration values of air pollutants and their likely health impacts (known as health breakpoints). AQ sub-index and health breakpoints are evolved for eight pollutants (PM₁₀, PM_{2.5}, NO₂, SO₂, CO, O₃, NH₃, and Pb) for which short-term (upto 24-hours) NAAQS are prescribed. Based on the measured ambient concentrations of a pollutant, sub-index is calculated, which is a linear function of concentration (e.g. the sub-index for PM_{2.5} will be 51 at concentration 31µg/m³, 100 at concentration 60µg/m³, and 75 at concentration of 45µg/m³). The worst sub-index determines the overall AQI. The sub-indices for individual pollutants at a monitoring location are calculated using its 24-hourly average concentration value (8-hourly in case of CO and O₃) and health breakpoint concentration range (Table No. 27).

The worst sub-index is the AQI for that location. All the eight pollutants may not be monitored at all the locations. Overall AQI is calculated only if data are available for minimum three pollutants out of which one should necessarily be either PM_{2.5} or PM₁₀. Else, data are considered insufficient for calculating AQI. Similarly, a minimum of 16 hours' data is considered necessary for calculating sub index. The sub-indices for monitored pollutants are calculated and disseminated, even if data are inadequate for determining AQI. The Individual pollutant-wise sub-index will provide air quality status for that pollutant.

Table No. 27: Sub-index and breakpoint pollutant concentration for Indian Air Quality Index

AQI Category (Range)	PM10 24-hr	PM2.5 24-hr	NO2 24-hr	O3 8-hr	CO 8-hr (mg/m ³)	SO2 24-hr	NH3 24-hr	Pb 24-hr
Good (0-50)	0-50	0-30	0-40	0-50	0-1.0	0-40	0-200	0-0.5
Satisfactory (51-100)	51-100	31-60	41-80	51-100	1.1-2.0	41-80	201-400	0.5-1.0
Moderate (101-200)	101-250	61-90	81-180	101-168	2.1- 10	81-380	401-800	1.1-2.0
Poor (201-300)	251-350	91-120	181-280	169-208	10-17	381-800	801-1200	2.1-3.0
Very poor (301-400)	351-430	121-250	281-400	209-748*	17-34	801-1600	1200-1800	3.1-3.5
Severe (401-500)	430 +	250+	400+	748+*	34+	1600+	1800+	3.5+

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

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

AQI for 2015-16

An overview of the AQI for the reading recorded by the AAQMS in Maharashtra has been calculated using three parameters viz, SO₂, NO_x and RSPM as per the calculation and AQI categories released by CPCB and IIT Kanpur in October 2014. After determining the sub-indices for a region the highest sub-index from that AAQMS has been considered as the AQI for the area represented by that AAQMS. Annex-III presents the occurrence of a respective category of AQI out of the total observations recorded at that AAQMS in 2015-16.

In the year 2015-16, 8,504 observations were recorded across 71 active AAQMS in Maharashtra. As shown in Figure No. 22, maximum observations (43%) revealed that the air quality is in the 'Moderate' category. While 41% & 12% of the observations belong to the 'Satisfactory' and 'Good' category respectively. Mere 5% of the observations were classified as 'Poor' quality of air while 'Very Poor' and 'Severe' category accounted for 0.19% and 0.04% of the total observations.

The Amravati region recorded air quality about for 95% of observations under 'Satisfactory' in 'Moderate' category followed by remaining 4% under 'Good' category. The AAQMS at Govt. college of Engineering recorded 98% under 'Good' category, while AAQMS at LRT commerce and Akola college of Engineering at Akola region recorded 98% of observations under 'Moderate' category.

In the Aurangabad region almost 48% of the observation days were regarded under 'Satisfactory' category while 32% observations were in 'Moderate' and 17% observations in 'Good' category. The Industrial area CIDCO AAQMS at Nanded have been the cause of concern in terms of 'Poor air quality in this region. The air quality in Chandrapur region was observed majorly in 'Satisfactory' category (32%) followed by 'Moderate (29%)'. Out of the all the AAQMS in Chandrapur, the Ghuggus station recorded about 40% under 'Poor' and 'Very Poor' category.

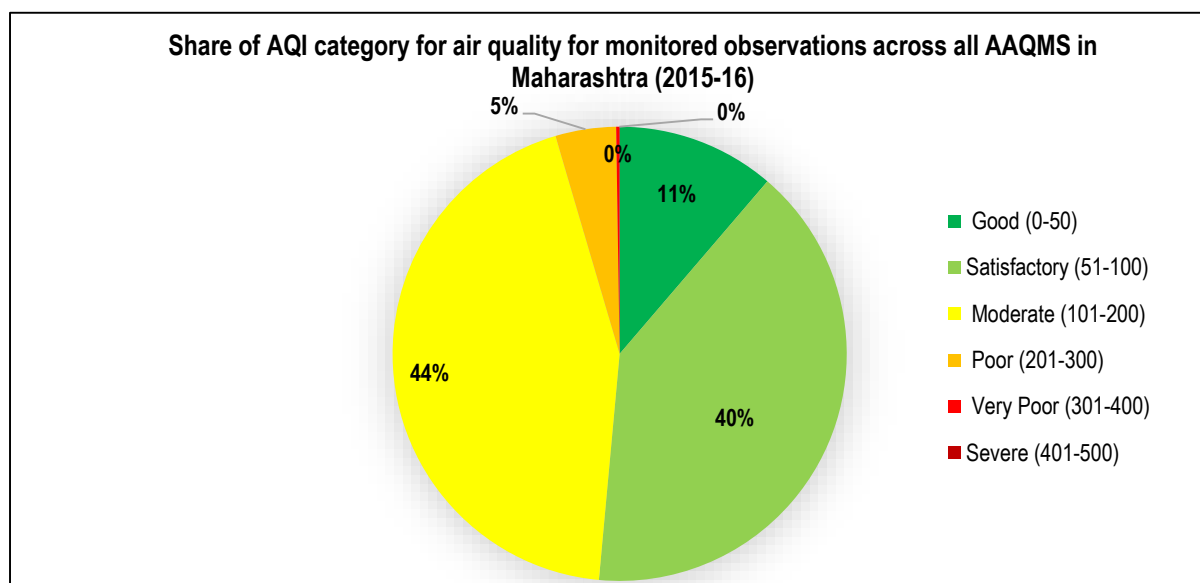


Figure No. 22: Share of AQI category for air quality for monitored observations across all AAQMS in Maharashtra (2015-16)

Note: Since the values have been rounded up some values may appear as zero.

The region of Kalyan recorded more than 50% of the observation days of air quality in the 'Good' category. All the three AAQMS in Bhiwandi city, including the sensitive type AAQMS at IGM hospital, recorded almost 100% of their observation in the 'Good' category. While the AAQMS at Badlapur, Powai chowk and Smt.CHM College campus recorded few observations of 'Poor' category and recorded more than 50% observations under 'Moderate' category.

The Kolhapur region recorded air quality majorly under 'Moderate' category. The AAQMS at Water treatment plant at MIDC Chiplun recorded air quality in 'Poor' category for almost 12% and 5% of observations while the sites at Sangli and Kolhapur recorded more than 35% under 'Moderate' category. The Shivaji University at Kolhapur recorded 90% of observations under 'Satisfactory' while remaining 10% under 'Good' category.

The AAQMS in Mumbai region recorded 10% of observation under 'Poor' category. About 20% of observations at Sion were observed under 'Poor' category and mere 3% of the values in 'Good, category. The air quality at the AAQMS at Bandra recorded 56% under 'Satisfactory' category, 39% of 'Moderate', 3% under 'Good' and remaining 3% under 'Poor category'.

The AAQMS of Nagpur region recorded air quality of 'Good' to 'Moderate' category .The Nagpur region recorded more than 55% under 'Satisfactory' category followed by 22% of 'Moderate' category and 21% under 'Good' category. The area represented by the AAQMS at MIDC Office, Higna Road and IOE Ambazari road recorded 'Poor' and 'Very Poor' air quality for 1% of observation days.

In Nashik region 71% of observation were recorded in Satisfactory to Moderate category while 27% were observed under 'Good' category. The AAQMS at NMC Nashik and MIDC Satpur-VIP recorded about mere 1% under 'Poor' and 'Very Poor' category.

Navi Mumbai region recorded about 54% of air quality under 'Good' to 'Satisfactory' category while 41% under 'Moderate' category and remaining 4% under 'Poor' and 'Very Poor' category. The AAQMS at Taloja and Nerul DY patil recorded 11% and 10% under 'Poor' category. The stations at Rabale and Kharghar recorded 5% of observations under 'Poor' category. The Airoli station recorded 50% of observations under 'Good' category and 48% under 'Satisfactory' category.

The Air quality in Pune region was 'Satisfactory to 'Moderate' quality for about 89% of the observations. The WIT campus of Solapur region recorded 100% observations under 'Satisfactory' category. The most polluted station in Pune was recorded at Karve Road with 10% under 'Poor' and 3% under Very Poor category. The station at Swargate recorded 48% under 'Moderate' and 5 % of observations under 'Poor' category.

The Raigad region, represented by the AAQMS at Panvel-Water supply plant, recorded air quality majorly under 'Moderate' category (89%) followed by 8% under 'Satisfactory' and remaining 3% under 'Poor' category. Not even a single day of 'Good' air quality was recorded at this site.

In Thane region majority of the observations were recorded in the 'Moderate' category at Kolshet (60%), Kopri (47%), Naupada (43%) while the 'Good' category of air quality was not even recorded for 10% of the observations.

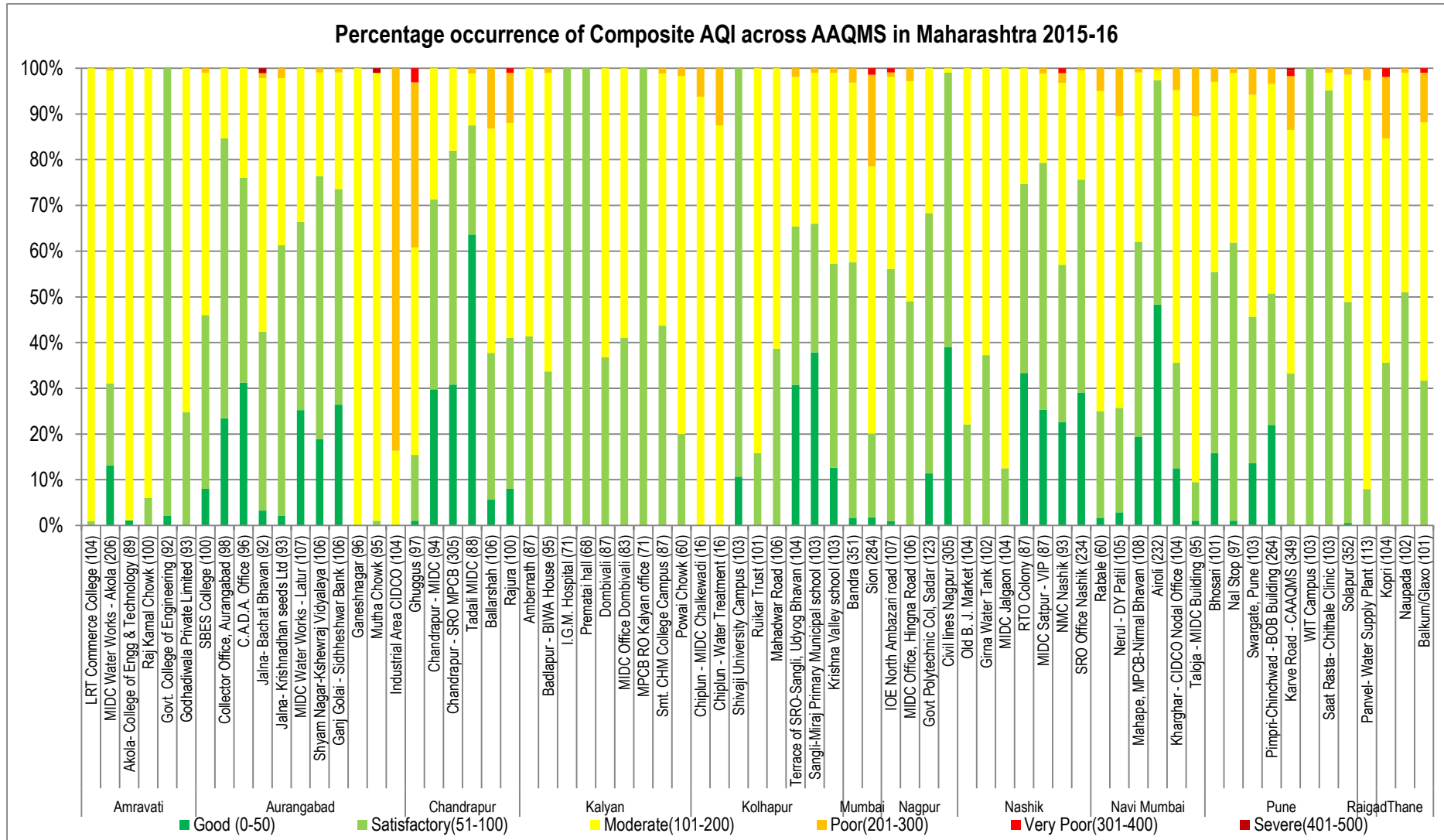


Figure No. 23: Percentage occurrence for the classes of AQI across AAQMS in Maharashtra - 2015-16

Conclusion

Out of the 3 criteria pollutants, RSPM (PM_{10}) is of major concern, since it exceeded the daily as well as the annual standard across all AAQMS. The high concentration of RSPM may be due to emission from industries, construction sector, road dust re-suspension due to vehicular movement, vehicular emissions, quarrying and mining activities in the region. Proper operation and maintenance practices at mines and quarry sites like use of water mists, wind screens, low dump sites, Construction of even and smooth roads, appropriate sweeping of roads and strict norms for construction sector should be regulated to minimize the dispersion of RSPM in the air.

The NO_x concentration which was observed to exceeded at around 32 out of 71 AAQMS, primarily in the areas of Kalyan, Pune, Mumbai and Thane. Practicing and implementation of appropriate vehicular norms and ease of traffic congestion is highly desired in these cities. Appropriate traffic management and strict adherence to traffic rules may also help in reducing the traffic congestion, idling time and help in reducing NO_x concentrations in those areas.

The state of Maharashtra was recorded to be relatively clean for SO_2 pollution. However a few regions like Nanded and Kalyan may need further investigation to identify the source of SO_2 pollution as they recorded, although under standard, relatively high levels of SO_2 .

The area in an around the AAQMS of Industrial Area CIDCO in Nanded city needs proper investigation as the region recorded high levels annual of all the pollutants for SO_2 ($80\mu g/m^3$), NO_x ($81\mu g/m^3$) and RSPM ($212\mu g/m^3$).

Annex – I: List of AAQMS in Maharashtra – 2015-16

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

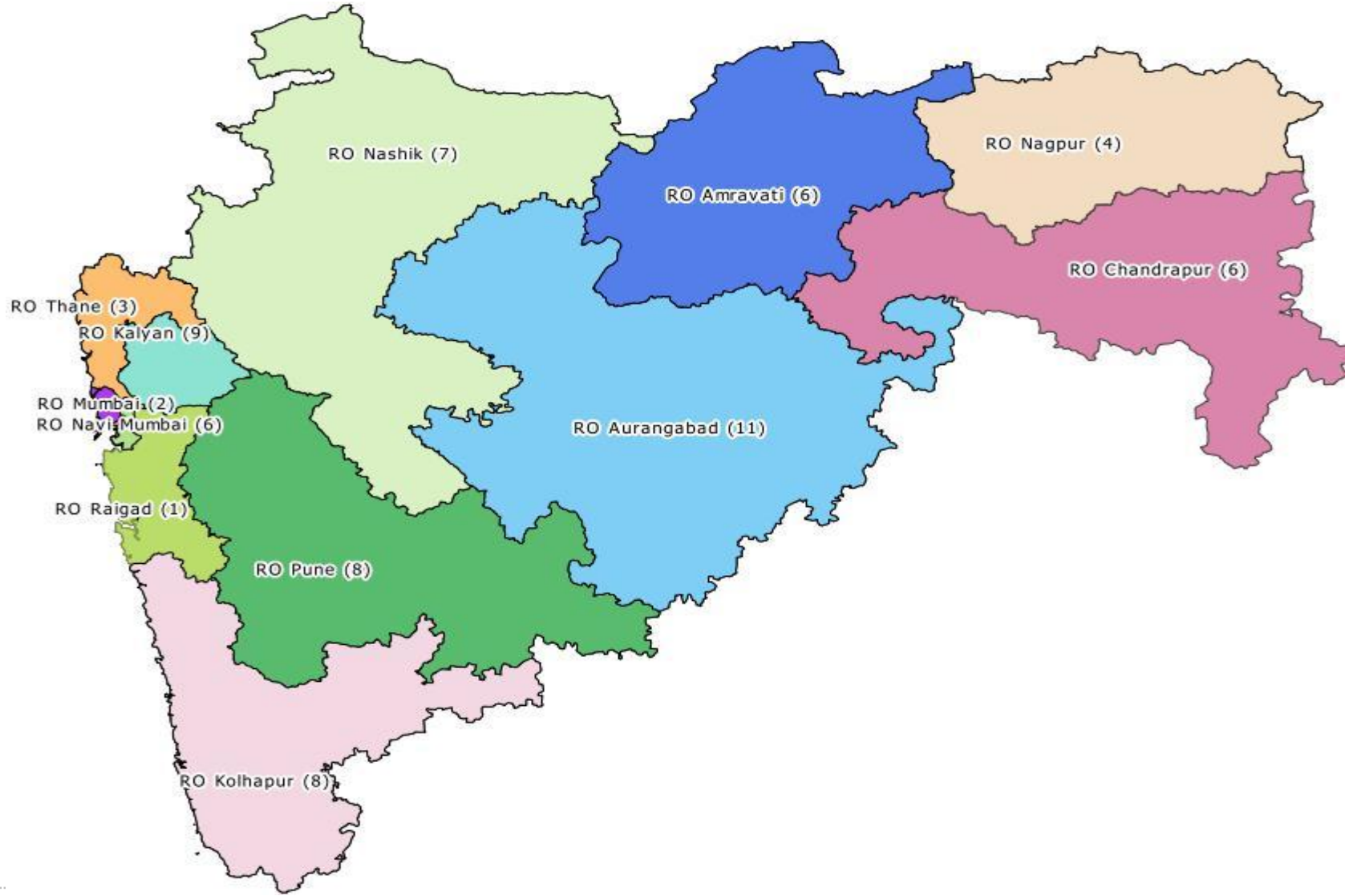
MPCB RO	Region	Station code	Station name	Location	Type	Program
		704	Mutha Chowk	Nanded	Commercial	NAMP
		705	Industrial Area CIDCO	Nanded	Industrial	NAMP
Chandrapur	Chandrapur	267	Ghuggus	Office of GramPanchayat Ghuggus	Residential	NAMP
		281	Chandrapur - MIDC	M/s Multiorganic Pvt. Ltd. Chandrapur	Industrial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

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

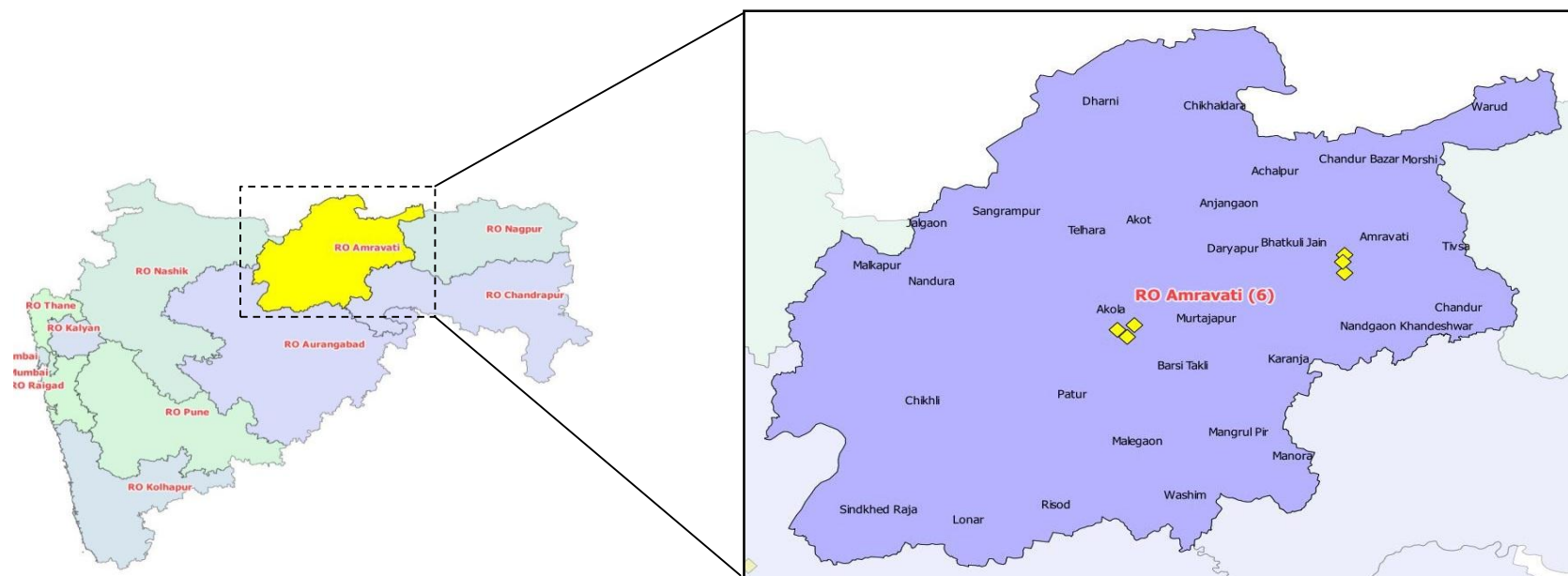
MPCB RO	Region	Station code	Station name	Location	Type	Program
	Nashik	259	RTO Colony	RTO Colony Water Tank near Golf Club Nashik	Residential	NAMP
		269	MIDC Satpur - VIP	VIP industries ltd, MIDC satpur, Nashik	Industrial	NAMP
		280	NMC Nashik	Nashik Municipal Council Building, Nashik	Residential	NAMP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

MPCB RO	Region	Station code	Station name	Location	Type	Program
			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
			Balkum /Glaxo	Industrial Premises of Glaxo Company, Pokharan Road No.2, Thane (W)	Industrial	NAMP

Annex – II: Data recorded by AAQMS in Maharashtra 2015-16



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

		Average of SO ₂	Average of NO _x	Average of RSPM	
LRT Commerce College	2015	Apr	6	7	112
		May	7	7	113
		Jun	6	7	107
		Jul	6	7	108
		Aug	6	7	110
		Sep	6	6	109
		Oct	7	7	112
		Nov	8	8	115
		Dec	8	9	147
	2016	Jan	7	8	115
		Feb	9	8	114
		Mar	7	8	119

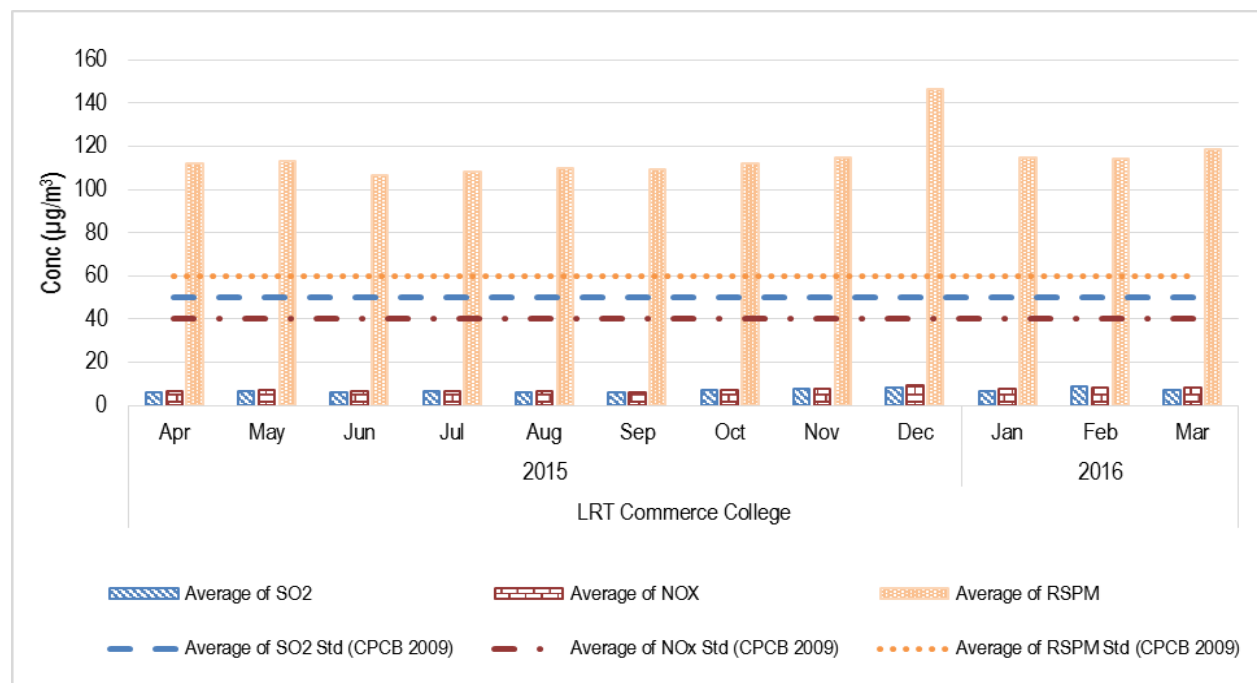


Figure No. 24: Monthly average reading recorded at LRT Commerce College. – Akola

Table No. 29: Data for Annual average trend of SO₂, NO_x, and RSPM at LRT Commerce College. – Akola

		Average of SO ₂	Average of NO _x	Average of RSPM
LRT Commerce College	09-10	6	2	87
	10-11	6	3	107
	11-12	7	7	125
	12-13	8	8	126
	13-14	7	3	122
	14-15	7	3	117
	15-16	7	7	115

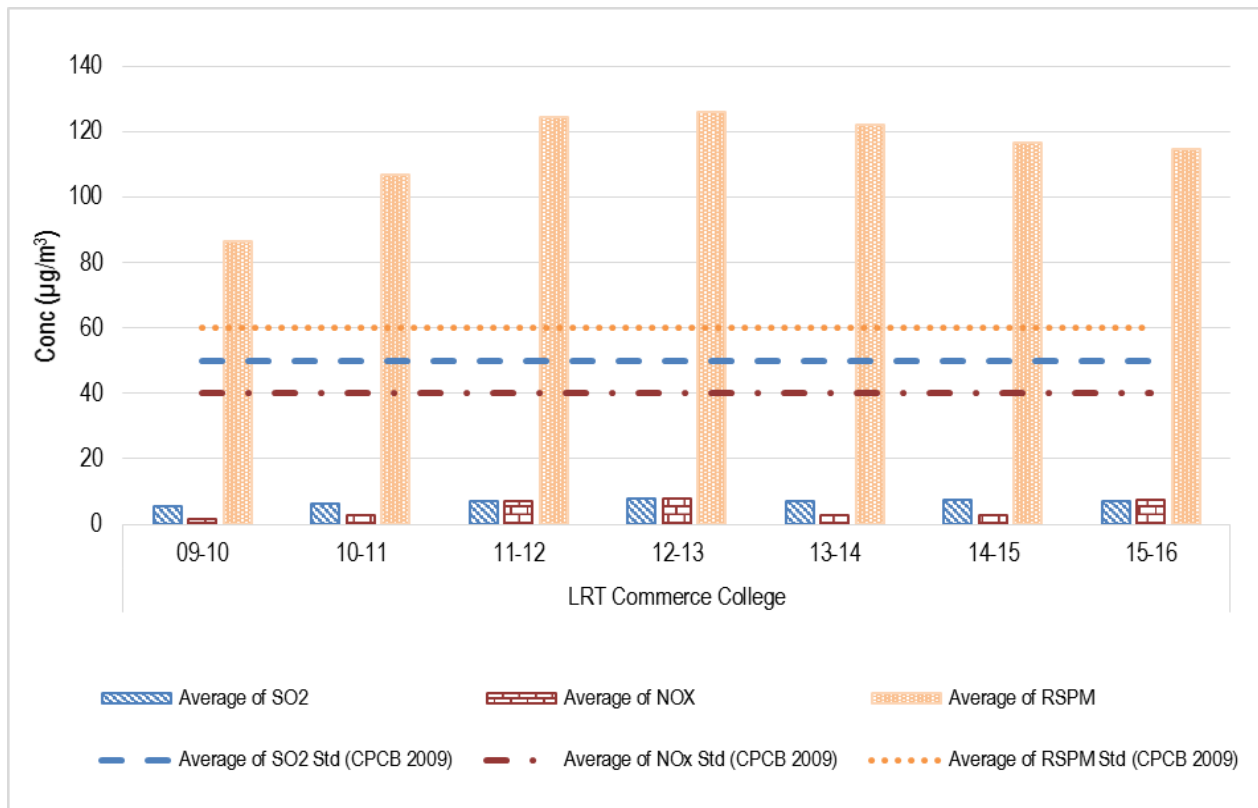


Figure No. 25: Annual average trend of SO₂, NO_x, and RSPM at LRT Commerce College. – Akola

Akola - MIDC Water Works

Table No. 30: Data for Monthly average reading recorded at MIDC Water Works. - Akola

			Average of SO ₂	Average of NO _x	Average of RSPM
MIDC Water Works - Akola	2015	Apr	6	10	117
		May	6	12	116
		Jun	6	11	83
		Jul	6	11	86
		Aug	6	11	71
		Sep	7	11	87
		Oct	8	13	115
		Nov	7	13	105
		Dec	7	13	119
	2016	Jan	7	16	121
		Feb	7	10	120
		Mar	8	14	126

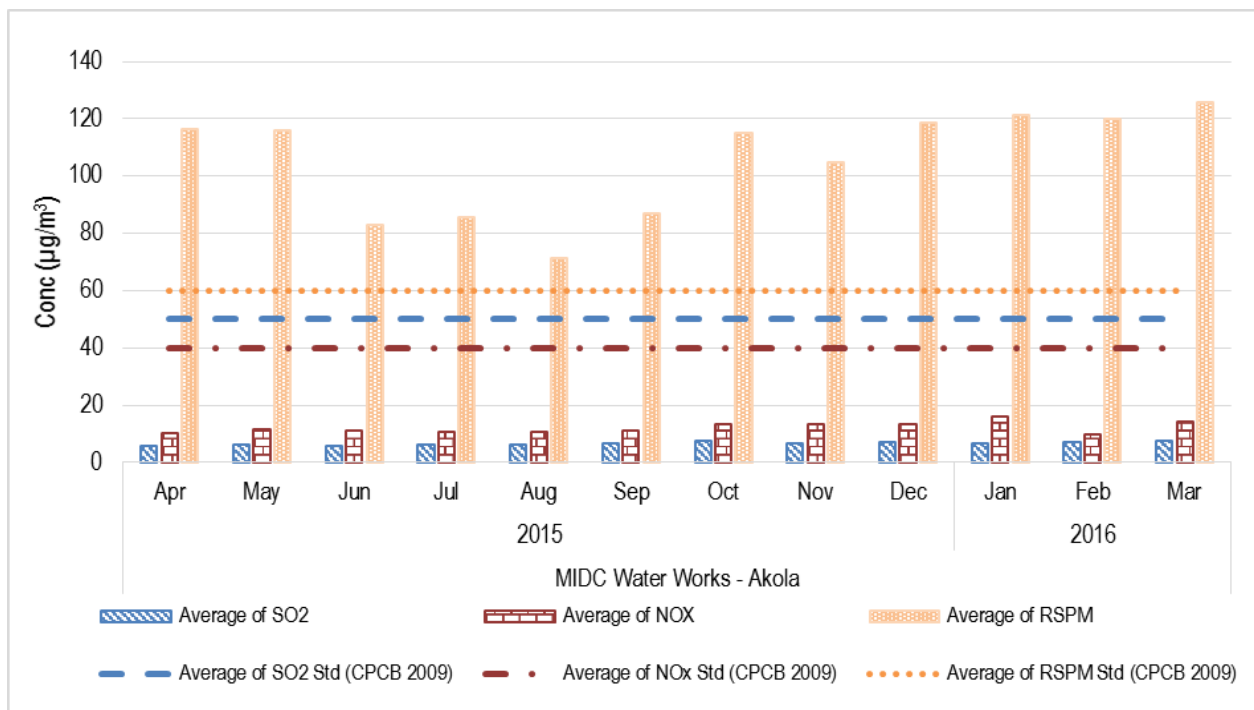


Figure No. 26: Monthly average reading recorded at MIDC Water Works. - Akola

Table No. 31: Data for Annual average trend of SO₂, NO_x, and RSPM at MIDC Water Works. - Akola

		Average of SO ₂	Average of NO _x	Average of RSPM
MIDC Water Works - Akola	09-10	8	10	88
	10-11	9	7	131
	11-12	10	11	141
	12-13	10	11	142
	13-14	9	7	136
	14-15	9	9	129
	15-16	7	12	106

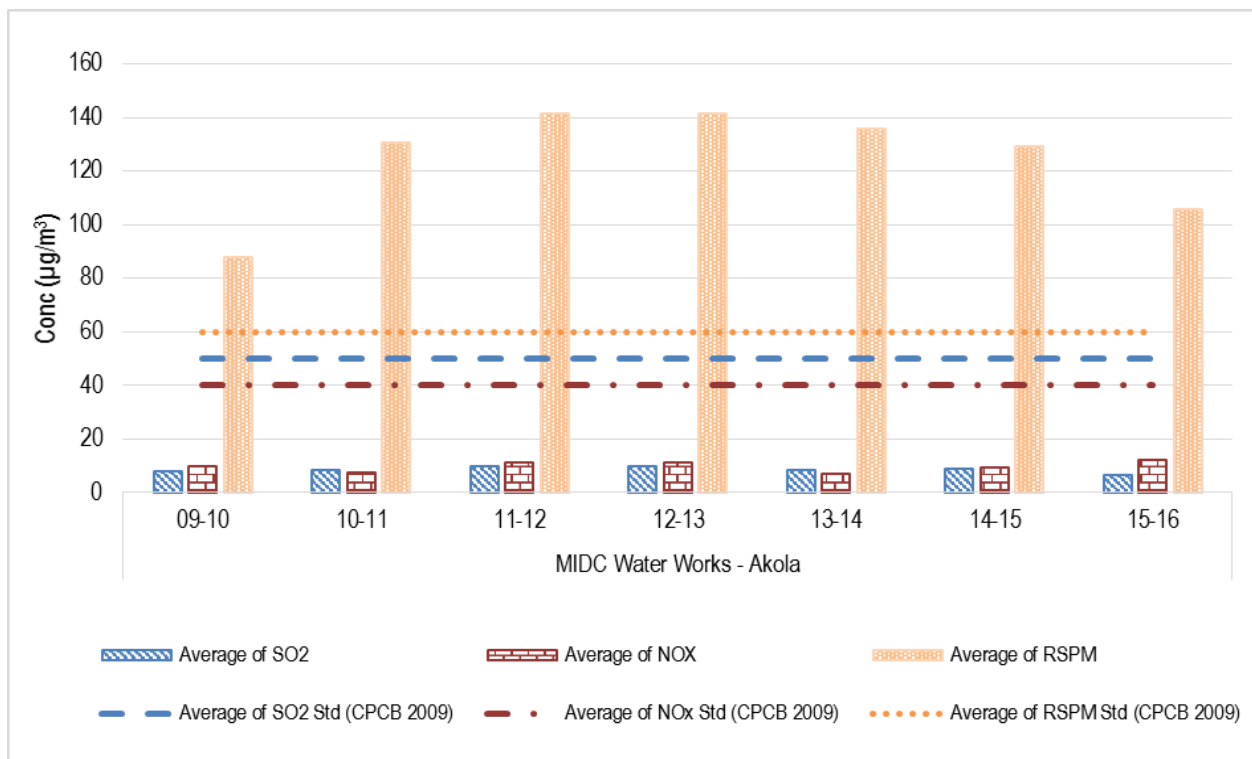


Figure No. 27: Annual average trend of SO₂, NO_x, and RSPM at MIDC Water Works. - Akola

Akola – Akola College of Engg & Technology

Table No. 32: Data for Monthly average reading recorded at College of Engg & Technology Akola (Architecture Branch) – Akola

		Average of SO2	Average of NOX	Average of RSPM	
Akola- College of Engg & Technology	2015	Apr	9	9	149
		Jun	7	8	138
		Jul	8	9	138
		Aug	6	7	139
		Sep	7	8	138
		Oct	8	9	141
		Nov	9	10	151
		Dec	7	7	100
	2016	Jan	9	10	147
		Feb	10	12	147
		Mar	9	10	149

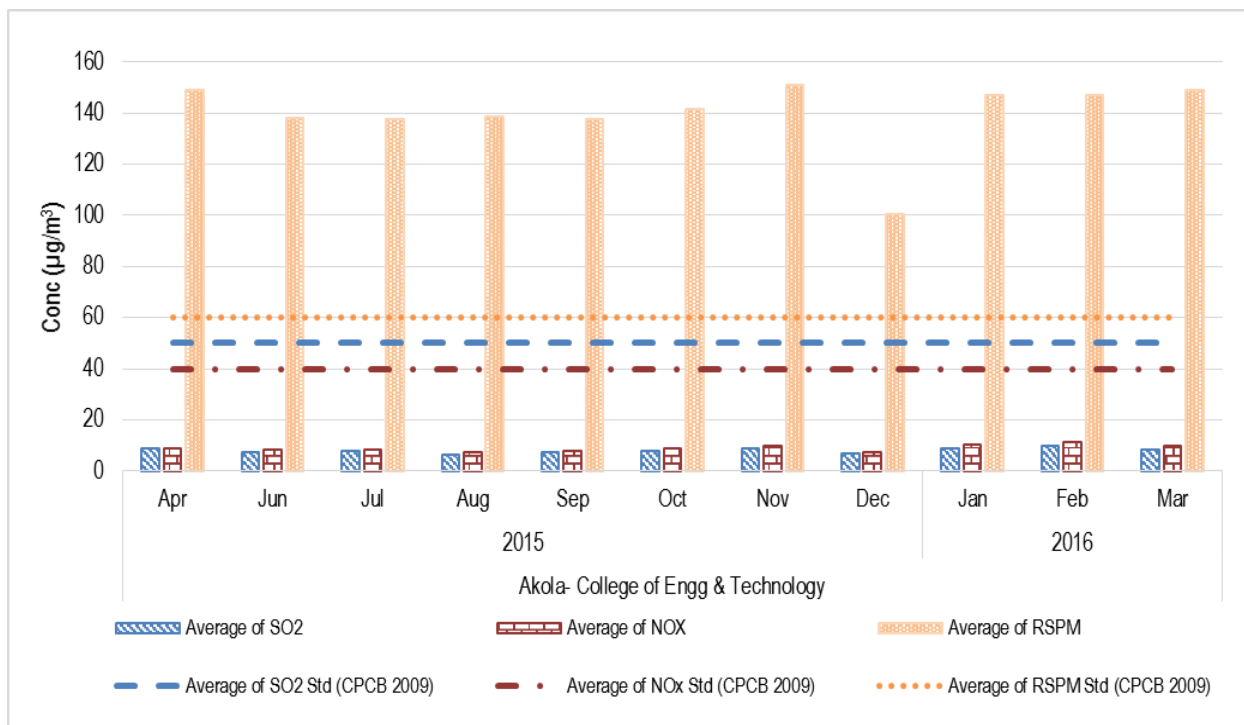


Figure No. 28: Monthly average reading recorded at College of Engg & Technology Akola (Architecture Branch) - Akola

Table No. 33: Data for Annual average trend of SO₂, NO_x, and RSPM at College of Engg & Technology Akola (Architecture Branch) – Akola

		Average of SO ₂	Average of NO _x	Average of RSPM
Akola- College of Engg & Technology	09-10	6	2	117
	10-11	7	5	142
	11-12	9	9	150
	12-13	9	8	151
	13-14	8	6	149
	14-15	8	8	146
	15-16	8	9	139

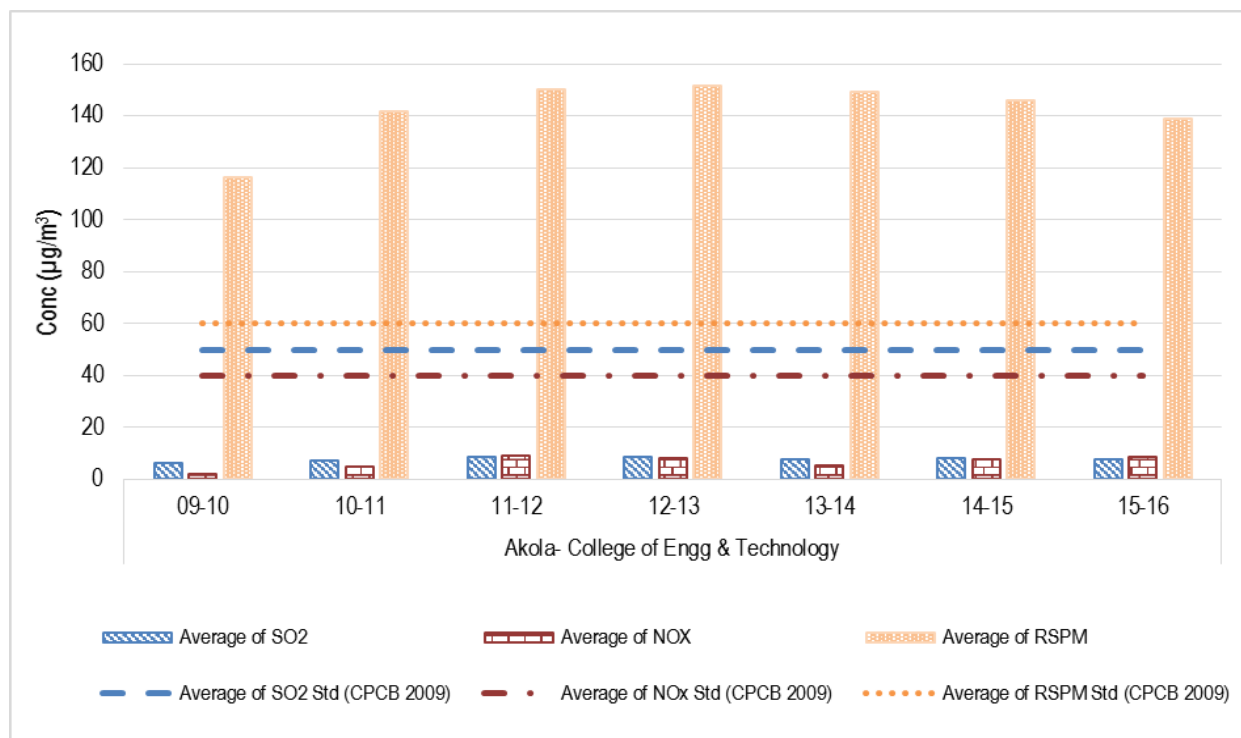


Figure No. 29: Annual average trend of SO₂, NO_x, and RSPM at College of Engg & Technology Akola (Architecture Branch) - Akola

Amravati – Raj Kamal Chowk

Table No. 34: Data for Monthly average reading recorded at Raj Kamal Chowk. - Amravati

		Row Labels	Average of SO2	Average of NOX	Average of RSPM
Raj Kamal Chowk	2015	Apr	12	14	129
		Jun	13	14	135
		Jul	13	14	144
		Aug	11	13	128
		Sep	12	13	135
		Oct	13	14	143
		Nov	13	14	151
		Dec	12	13	140
	2016	Jan	12	14	139
		Feb	12	13	117
		Mar	11	13	132

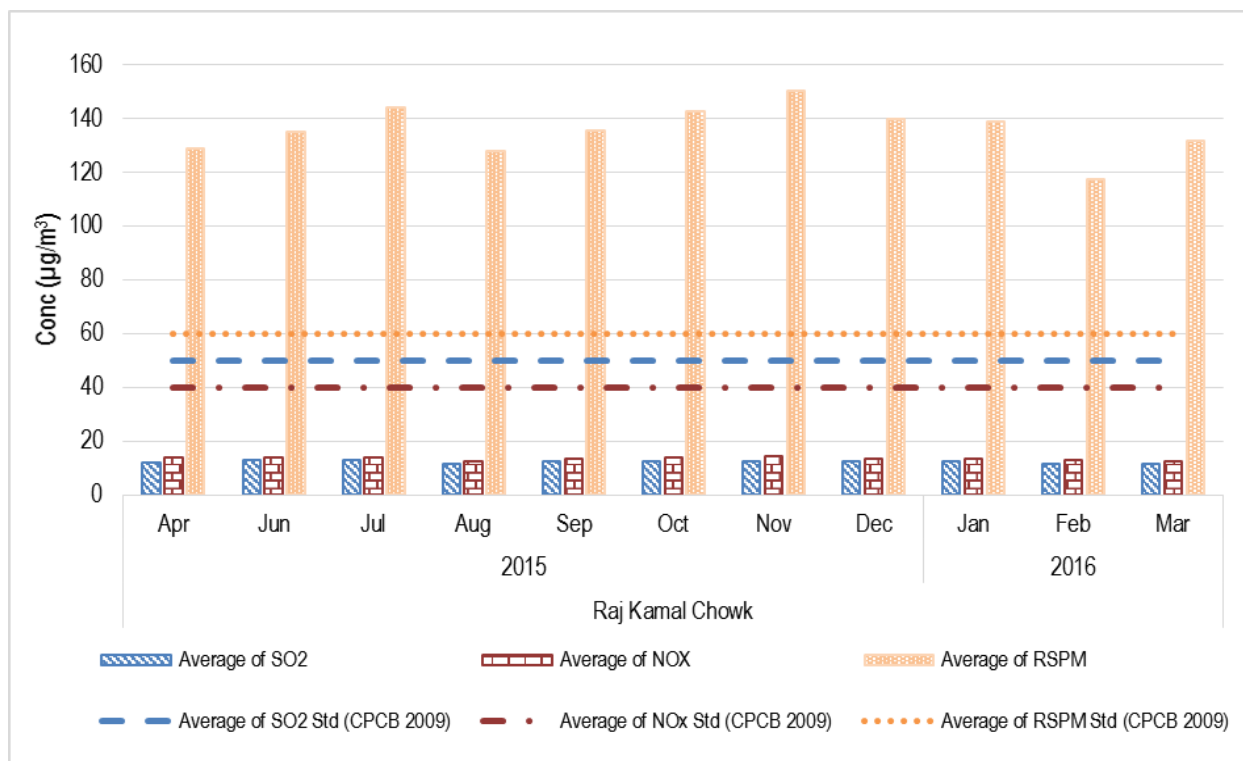
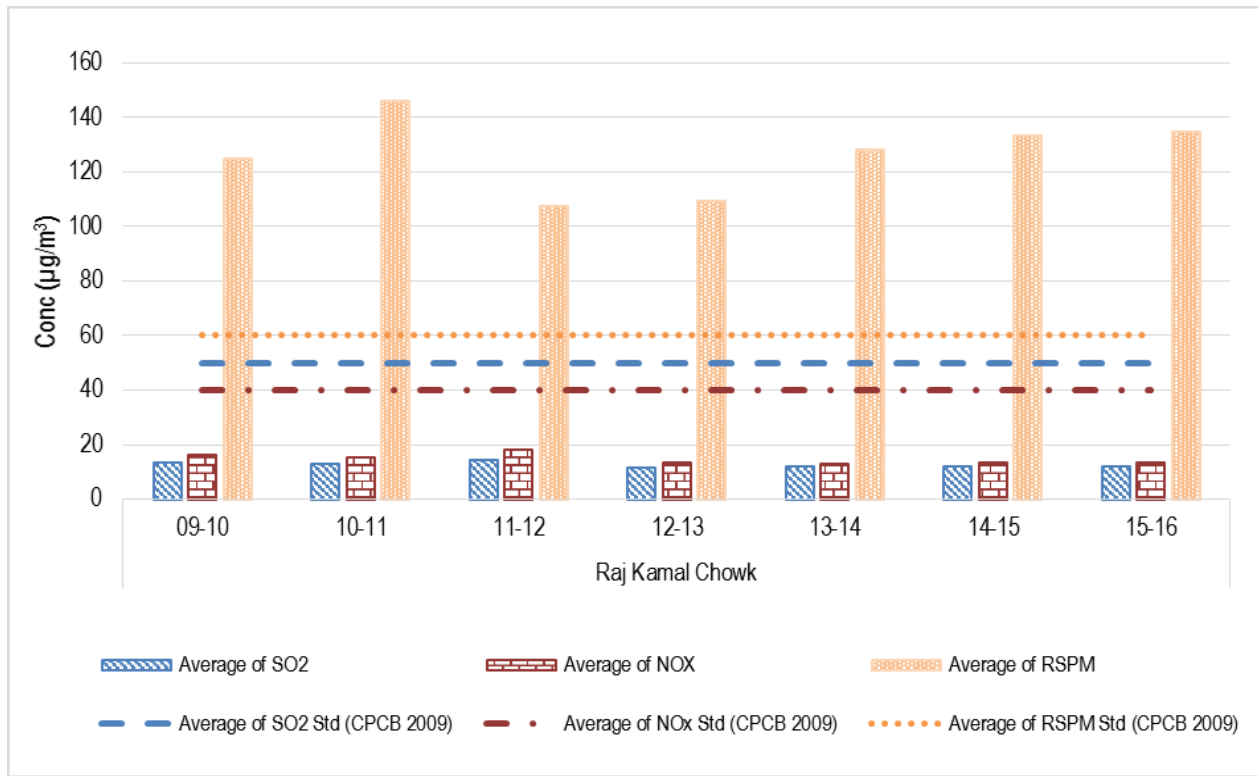


Figure No. 30: Monthly average reading recorded at Raj Kamal Chowk. - Amravati

Table No. 35: Annual average trend of SO₂, NO_x, and RSPM at Raj Kamal Chowk. - Amravati

		Average of SO ₂	Average of NO _x	Average of RSPM
Raj Kamal Chowk	09-10	14	16	125
	10-11	13	15	146
	11-12	15	18	108
	12-13	12	13	109
	13-14	12	13	128
	14-15	12	14	133
	15-16	12	14	135

Figure No. 31: Annual average trend of SO₂, NO_x, and RSPM at Raj Kamal Chowk. - Amravati

Amravati – Govt. College of Engineering

Table No. 36: Data for Monthly average reading recorded at Govt. College of Engineering - Amravati

			Average of SO ₂	Average of NO _X	Average of RSPM
Govt. College of Engineering	2015	Apr	11	13	80
		Jun	11	12	76
		Jul	11	12	77
		Aug	10	11	64
		Sep	11	13	72
		Oct	12	13	72
		Nov	12	13	73
		Dec	12	13	76
	2016	Jan	10	12	72
		Feb	11	13	71
		Mar	11	13	75

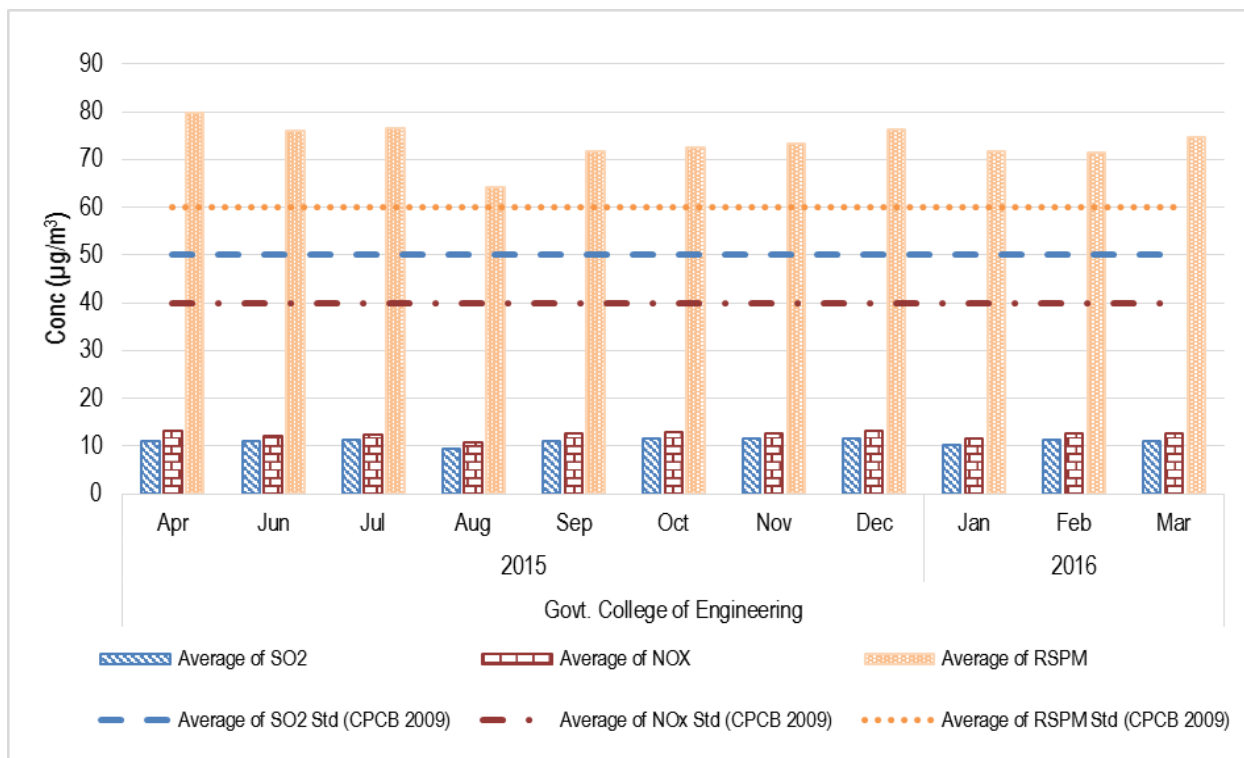
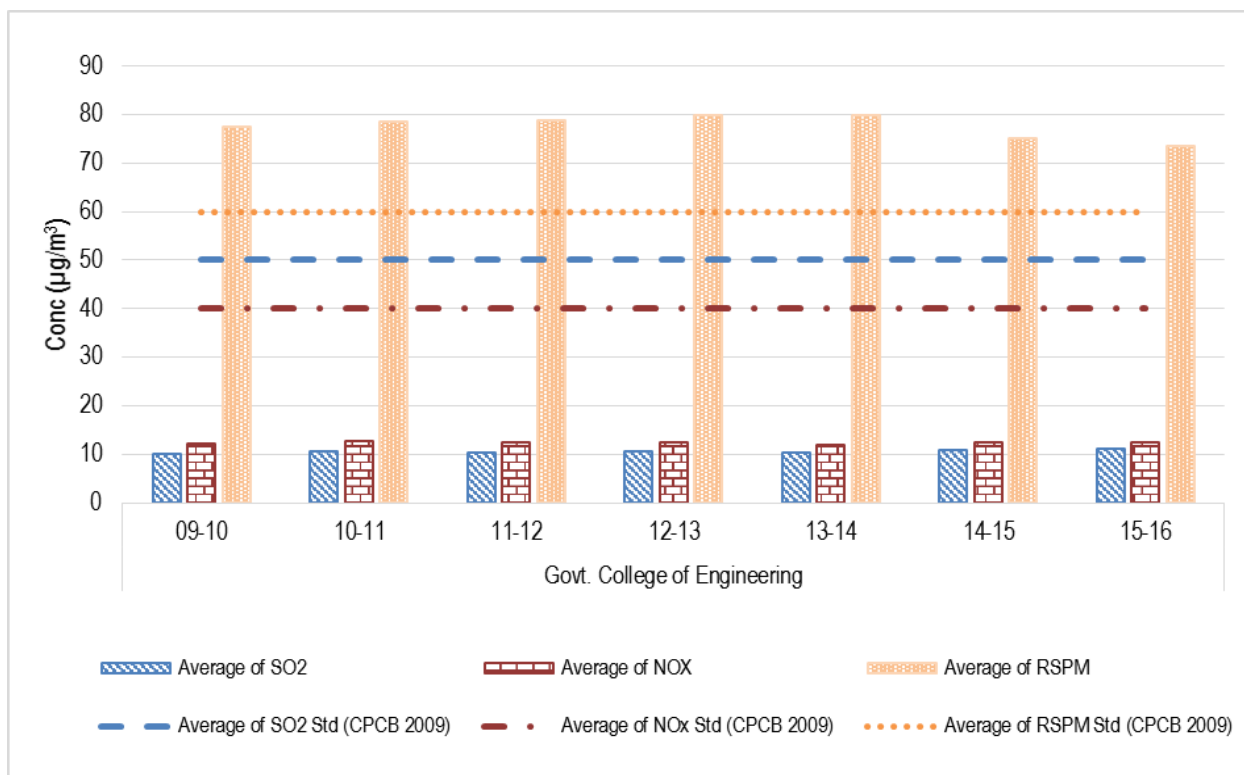


Figure No. 32: Monthly average reading recorded at Govt. College of Engineering - Amravati

Table No. 37: Data for Annual average trend of SO₂, NO_x, and RSPM at Govt. College of Engineering - Amravati

		Average of SO ₂	Average of NO _x	Average of RSPM
Govt. College of Engineering	09-10	10	12	78
	10-11	10	13	79
	11-12	10	12	79
	12-13	11	12	80
	13-14	10	12	80
	14-15	11	12	75
	15-16	11	12	73

Figure No. 33: Annual average trend of SO₂, NO_x, and RSPM at Govt. College of Engineering - Amravati

Amravati - Godhadiwala Private Limited

Table No. 38: Data for Monthly average reading recorded at Godhadiwala Private Limited - Amravati

		Average of SO ₂	Average of NO _x	Average of RSPM	
Godhadiwala Private Limited	2015	Apr	13	15	141
		Jun	12	13	111
		Jul	11	13	111
		Aug	11	14	106
		Sep	11	12	100
		Oct	12	13	105
		Nov	12	13	105
		Dec	11	13	103
	2016	Jan	11	12	106
		Feb	11	13	104
		Mar	12	13	112

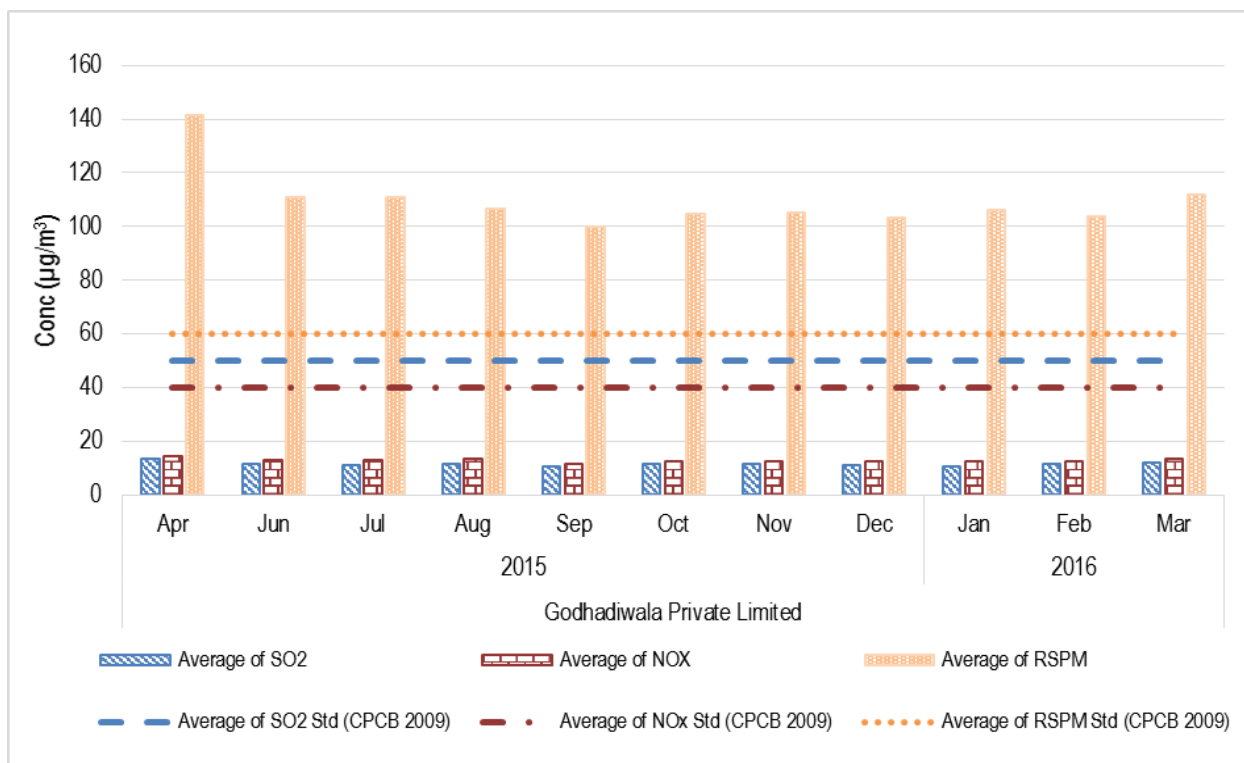


Figure No. 34: Monthly average reading recorded at Godhadiwala Private Limited Amravati

Table No. 39: Data for Annual average trend of SO₂, NO_x, and RSPM at Godhadiwala Private Limited - Amravati

		Average of SO ₂	Average of NO _x	Average of RSPM
Godhadiwala Private Limited	09-10	12	14	102
	10-11	12	14	125
	11-12	11	13	100
	12-13	12	13	101
	13-14	11	12	94
	14-15	12	14	108
	15-16	11	13	110

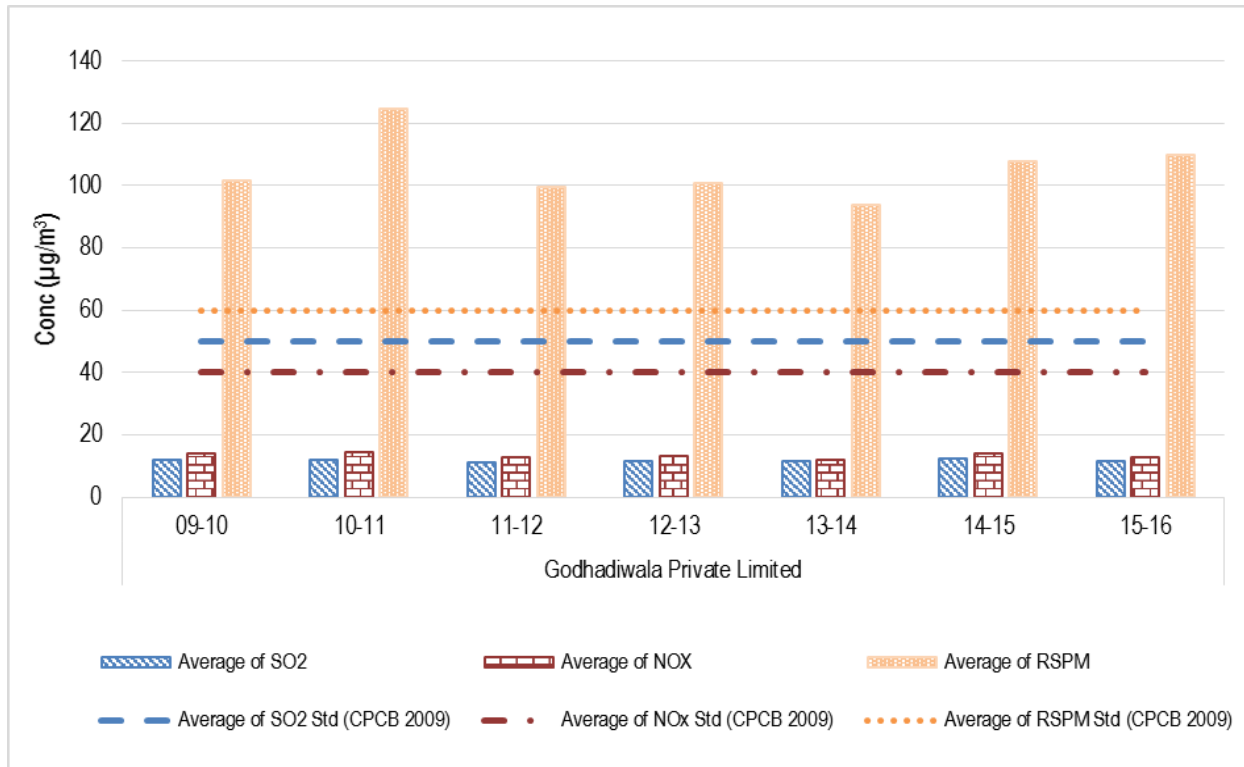
Figure No. 35: Annual average trend of SO₂, NO_x, and RSPM at Godhadiwala Private Limited - Amravati

Table No. 40: % exceedence of in the pollutants at Amravati RO

	Number of Observations				Percentage Exceedence		
	Total	Exceedence SO	Exceedence NO	Exceedence RSPM	SO	NO	RSPM
Akola- College of Engg & Technology	89	0	0	88	0	0	99
Godhadiwala Private Limited	93	0	0	70	0	0	75
Govt. College of Engineering	92	0	0	0	0	0	0
LRT Commerce College	104	0	0	103	0	0	99
MIDC Water Works - Akola	206	0	0	142	0	0	69
Raj Kamal Chowk	100	0	0	94	0	0	94

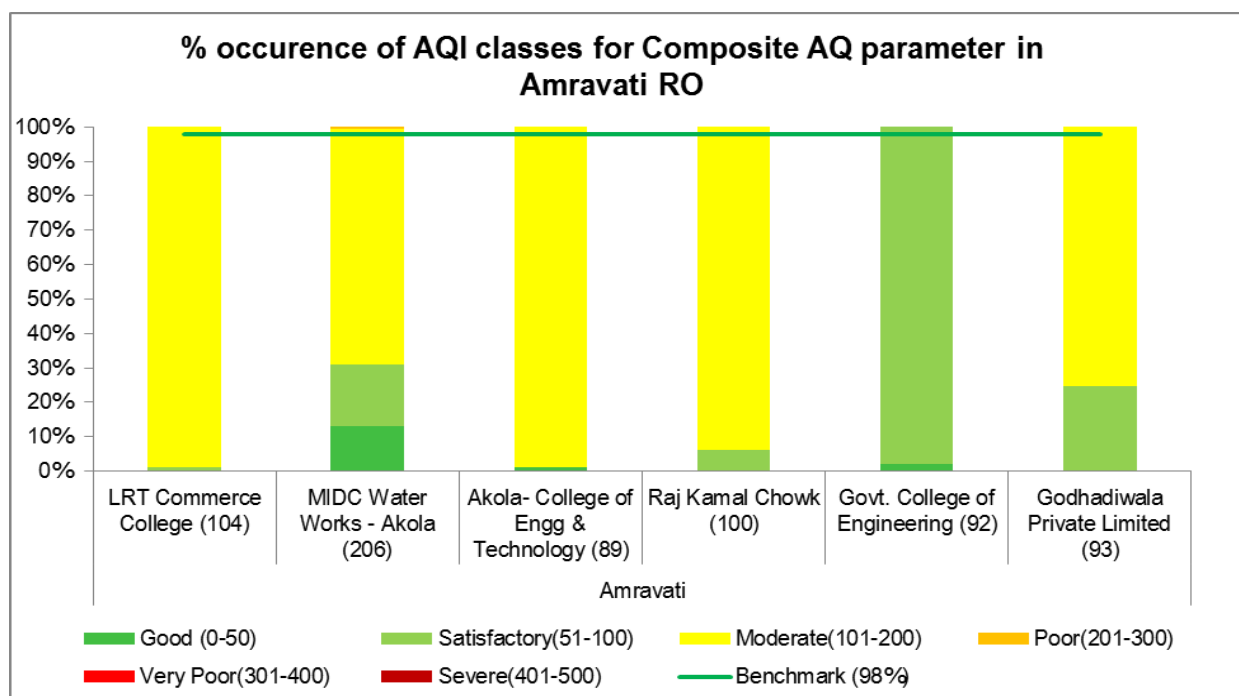
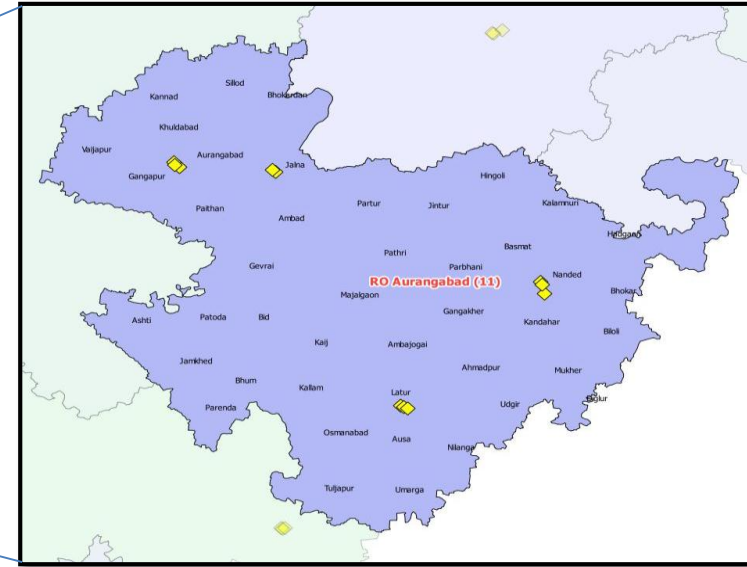
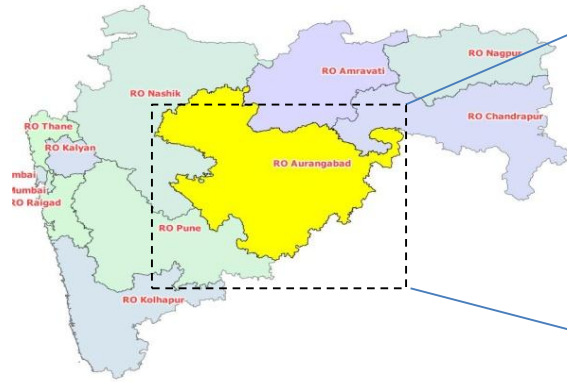


Figure No. 36: % occurrence of AQI classes for RSPM AQ parameter in Amravati RO

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- BachatBhavan	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-KshewrajVidyalaya	Residential	18° 24' 21.6" N	76° 33' 50.2" E
	Latur	643	GanjGolai - Sidhsheshwar 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	MuthaChowk	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. 41: Data for Monthly average reading recorded at SBES College - Aurangabad

			Average of SO ₂	Average of NO _x	Average of RSPM
SBES College	2015	Apr	13	41	104
		May	12	39	89
		Jun	11	37	78
		Jul	11	37	76
		Aug	11	37	66
		Sep	11	38	97
		Oct	14	42	133
		Nov	18	47	123
		Dec	25	56	133
	2016	Jan	28	60	159
		Feb	25	55	138
		Mar	17	46	137

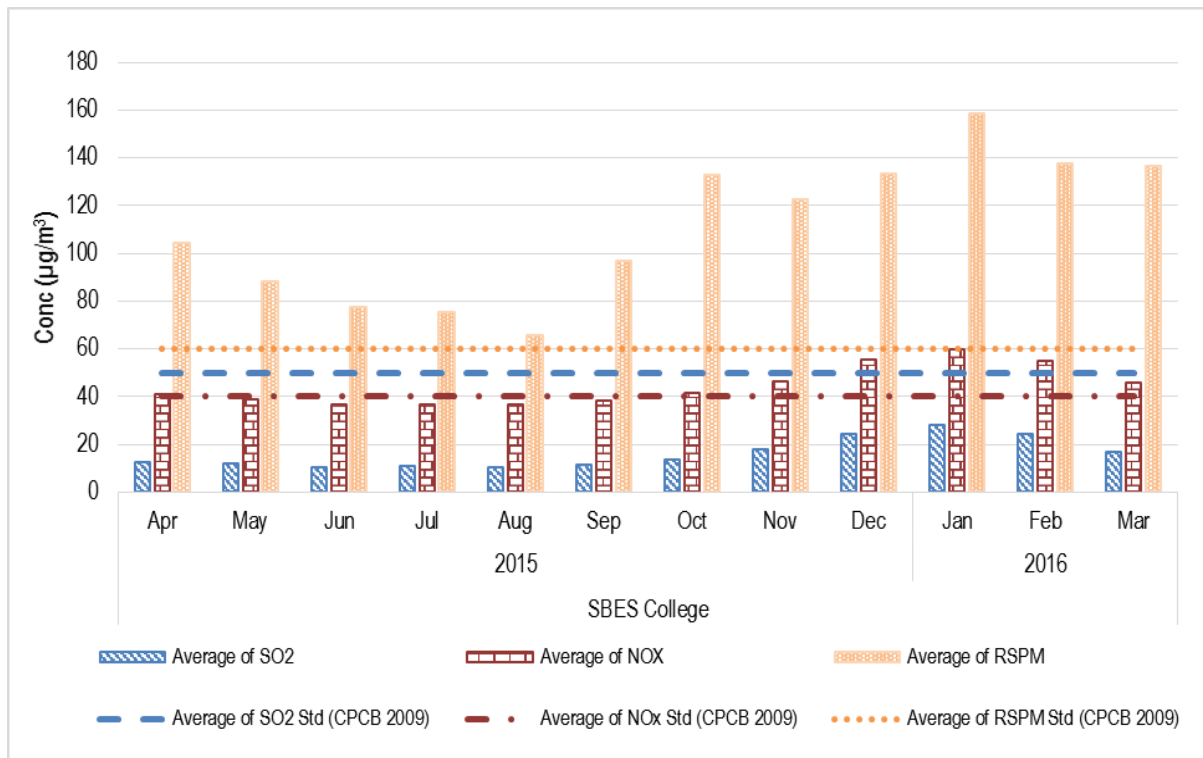


Figure No. 37: Monthly average reading recorded at SBES College - Aurangabad

Table No. 42: Data for Annual average trend of SO₂, NO_x, and RSPM at SBES College - Aurangabad

		Average of SO ₂	Average of NO _x	Average of RSPM
SBES College	09-10	7	25	98
	10-11	7	23	94
	11-12	9	33	90
	12-13	10	33	93
	13-14	11	39	102
	14-15	13	43	97
	15-16	16	44	111

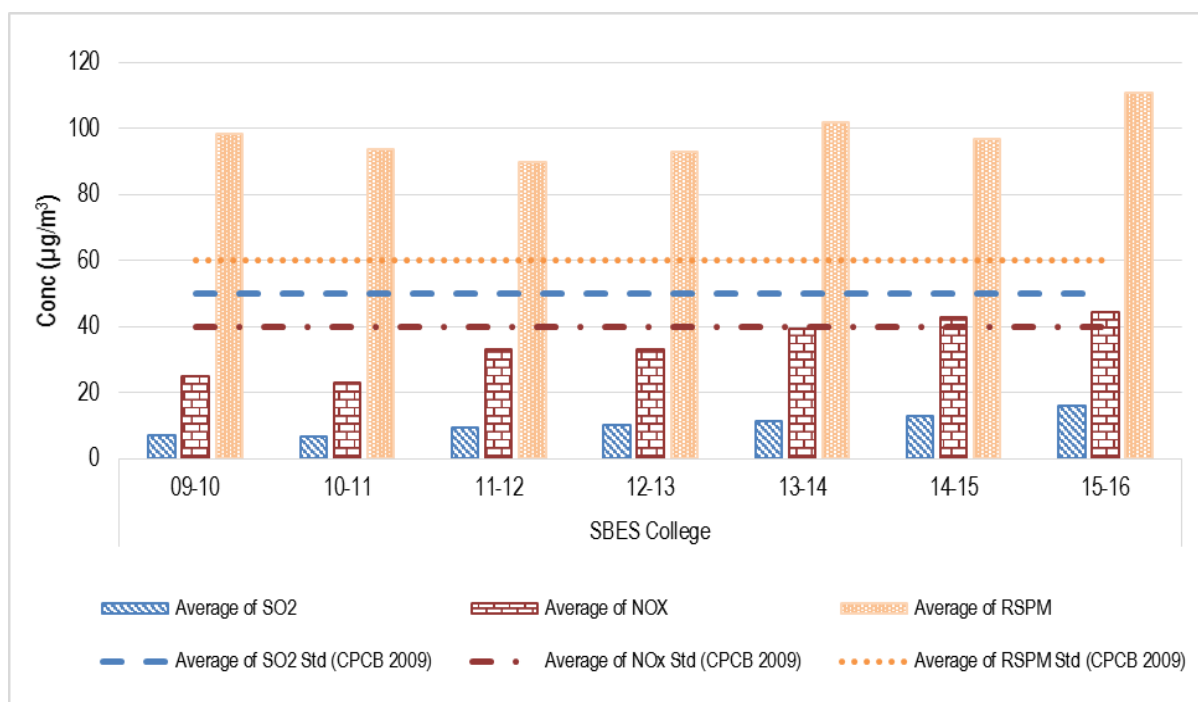


Figure No. 38: Annual average trend of SO₂, NO_x, and RSPM at SBES College - Aurangabad

Aurangabad – Collector Office, Aurangabad

Table No. 43: Data for Monthly average reading recorded at Collector Office, Aurangabad

			Average of SO ₂	Average of NO _x	Average of RSPM
Collector Office, Aurangabad	2015	Apr	9	29	71
		May	9	30	69
		Jun	9	29	49
		Jul	9	30	48
		Aug	9	30	44
		Sep	9	30	51
		Oct	10	32	77
		Nov	13	38	83
		Dec	16	43	98
	2016	Jan	18	46	112
		Feb	15	42	89
		Mar	12	36	81

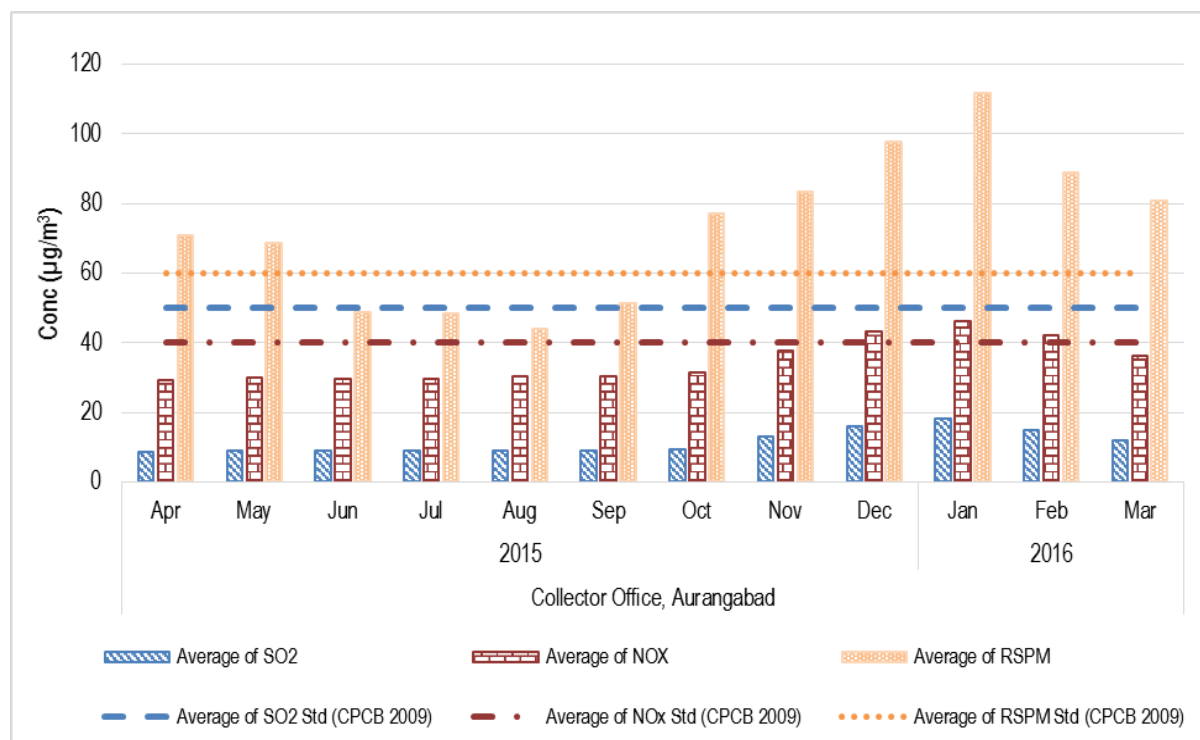
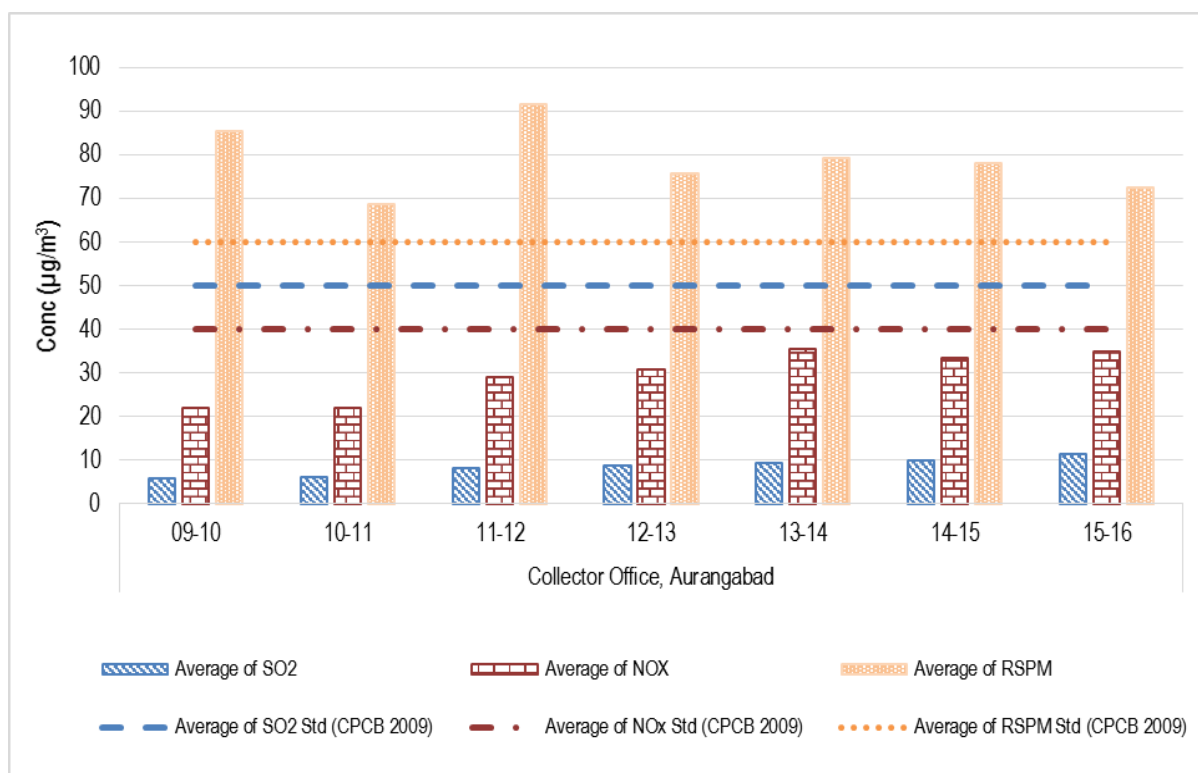


Figure No. 39: Monthly average reading recorded at Collector Office, Aurangabad

Table No. 44: Data for Annual average trend of SO₂, NO_x, and RSPM at Collector Office, Aurangabad

		Average of SO ₂	Average of NO _x	Average of RSPM
Collector Office, Aurangabad	09-10	6	22	85
	10-11	6	22	69
	11-12	8	29	92
	12-13	9	31	76
	13-14	9	36	79
	14-15	10	34	78
	15-16	12	35	73

Figure No. 40: Annual average trend of SO₂, NO_x, and RSPM at Collector Office, Aurangabad

Aurangabad – C.A.D.A. Office

Table No. 45: Data for Monthly average reading recorded at C.A.D.A. Office - Aurangabad

			Average of SO ₂	Average of NO _x	Average of RSPM
C.A.D.A. Office	2015	Apr	12	40	75
		May	11	38	67
		Jun	11	37	50
		Jul	11	36	42
		Aug	11	37	31
		Sep	11	37	39
		Oct	12	39	82
		Nov	17	45	104
		Dec	22	53	106
	2016	Jan	26	58	120
		Feb	23	54	101
		Mar	16	45	85

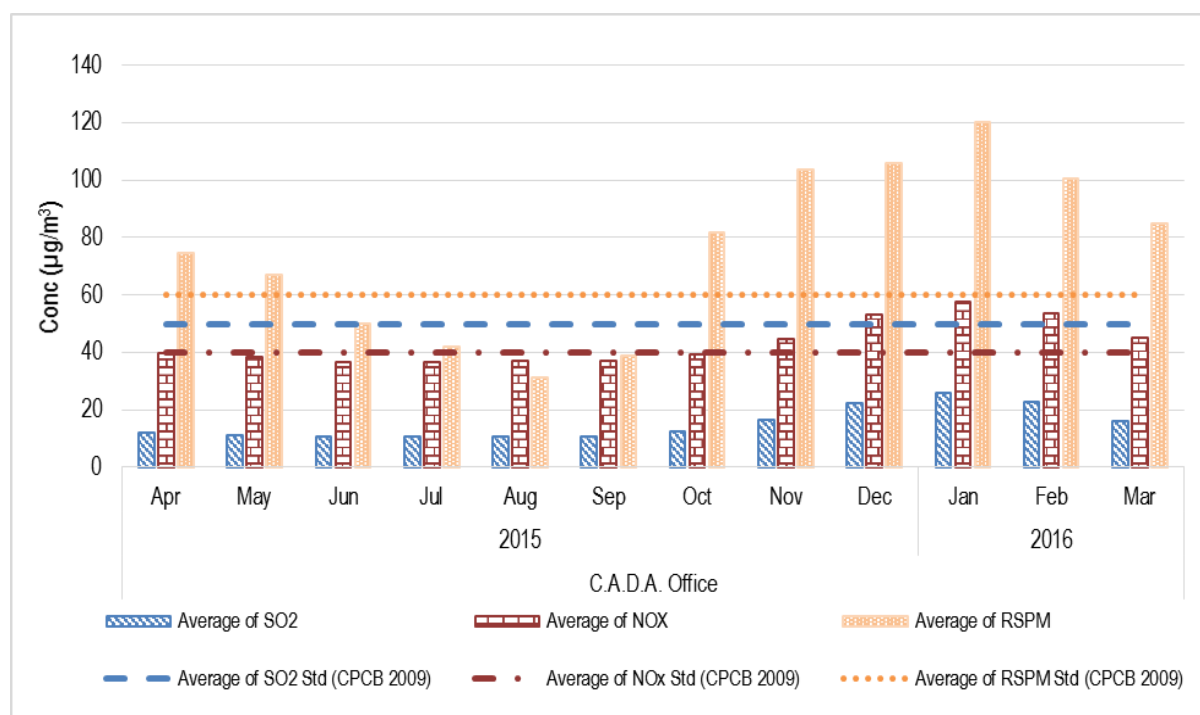


Figure No. 41: Monthly average reading recorded at C.A.D.A. Office - Aurangabad

Table No. 46: Data for Annual average trend of SO₂, NO_x, and RSPM at C.A.D.A. Office - Aurangabad

		Average of SO ₂	Average of NO _x	Average of RSPM
C.A.D.A. Office	09-10	6	22	66
	10-11	6	22	69
	11-12	10	34	75
	12-13	11	35	68
	13-14	10	38	74
	14-15	12	40	79
	15-16	15	43	75

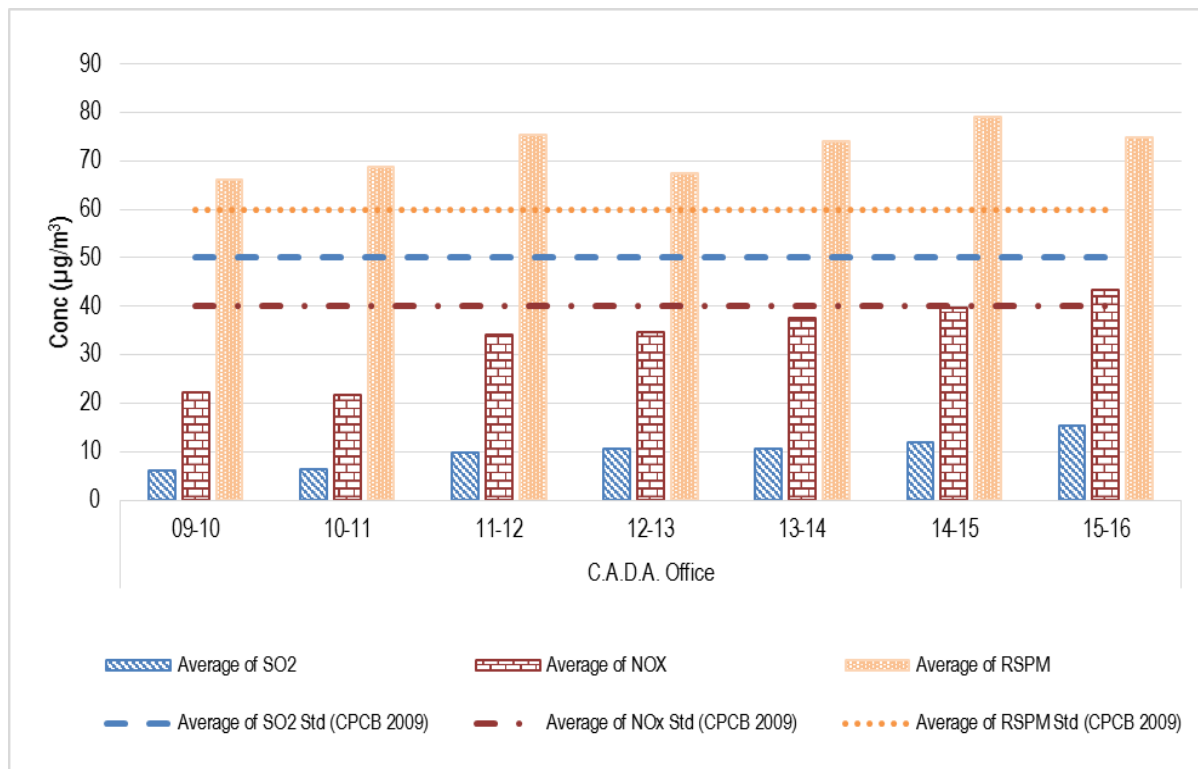


Figure No. 42: Annual average trend of SO₂, NO_x, and RSPM at C.A.D.A. Office - Aurangabad

Jalna – Bachat Bhavan

Table No. 47: Data for Monthly average reading recorded at Jalna Bachat Bhavan

			Average of SO ₂	Average of NO _x	Average of RSPM
Jalna-BachatBhavan	2015	Apr	12	32	99
		May	12	31	106
		Jun	8	27	89
		Jul	7	26	90
		Sep	10	28	77
		Oct	11	29	134
		Nov	14	31	144
		Dec	14	29	129
	2016	Jan	12	32	93
		Feb	12	30	124
		Mar	11	28	122

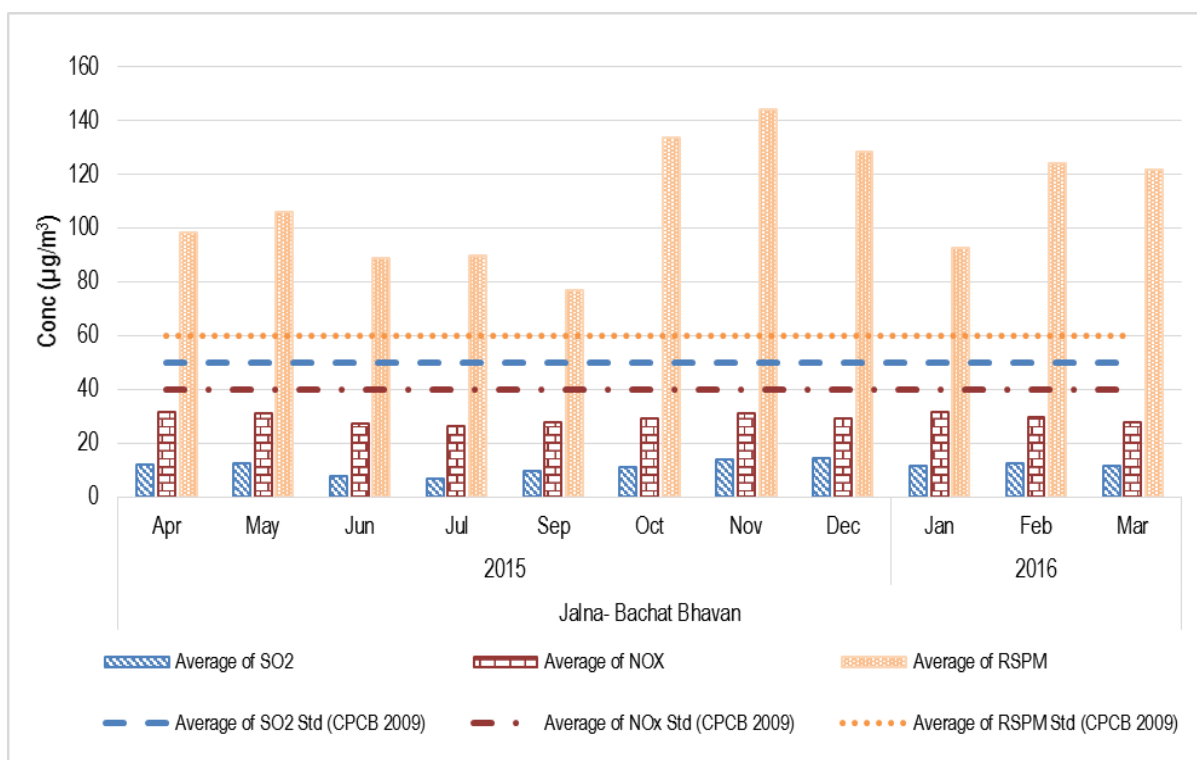


Figure No. 43: Monthly average reading recorded at Jalna Bachat Bhavan

Table No. 48: Data for Annual average trend of SO₂, NO_x, and RSPM at Jalna Bachat Bhavan

		Average of SO ₂	Average of NO _x	Average of RSPM
Jalna-BachatBhavan	09-10	5	28	84
	10-11	5	26	73
	11-12	6	25	89
	12-13	10	30	97
	13-14	10	30	100
	14-15	9	29	94
	15-16	11	29	111

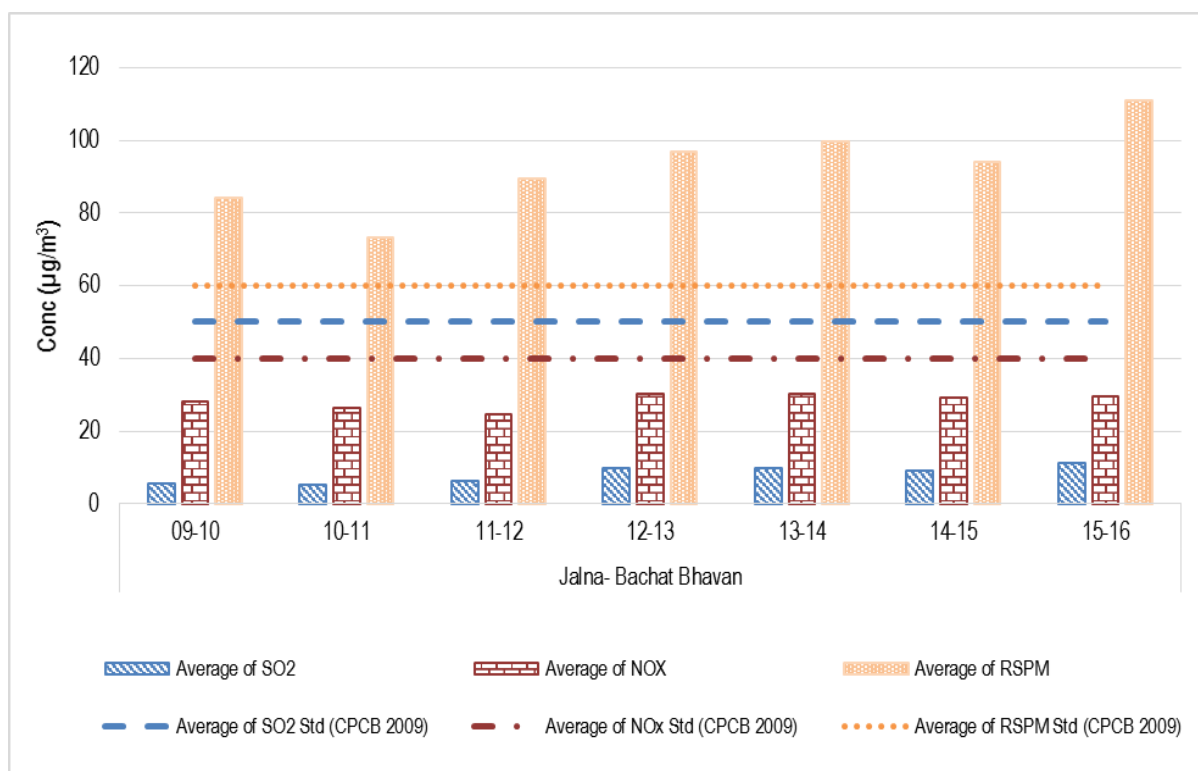


Figure No. 44: Annual average trend of SO₂, NO_x, and RSPM at Jalna Bachat Bhavan

Jalna – Krishnadhan Seeds Ltd

Table No. 49: Data for Monthly average reading recorded at JalnaKrishnadhan Seeds Ltd

			Average of SO ₂	Average of NO _x	Average of RSPM
Jalna-Krishnadhan seeds Ltd	2015	Apr	13	31	154
		May	13	31	129
		Jul	11	28	95
		Aug	9	26	97
		Sep	11	29	72
		Oct	12	31	89
		Nov	15	33	91
		Dec	12	31	91
	2016	Jan	13	29	128
		Feb	12	30	94
		Mar	14	33	95

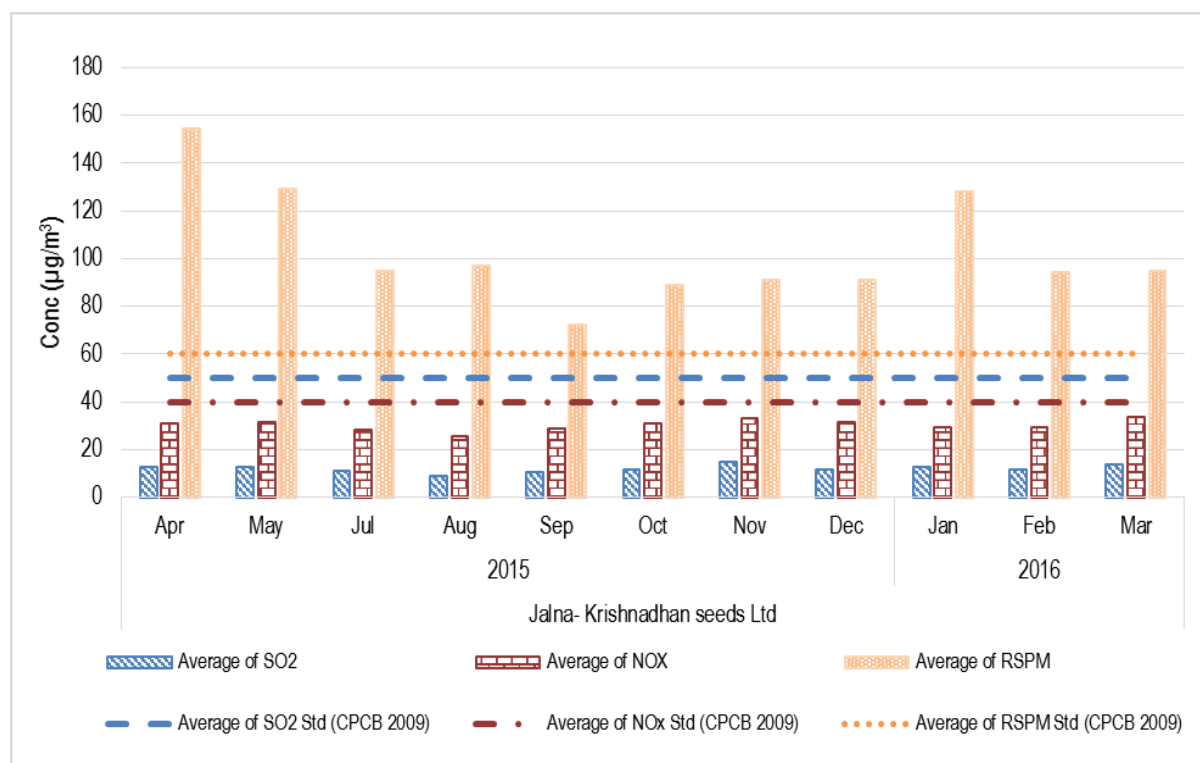
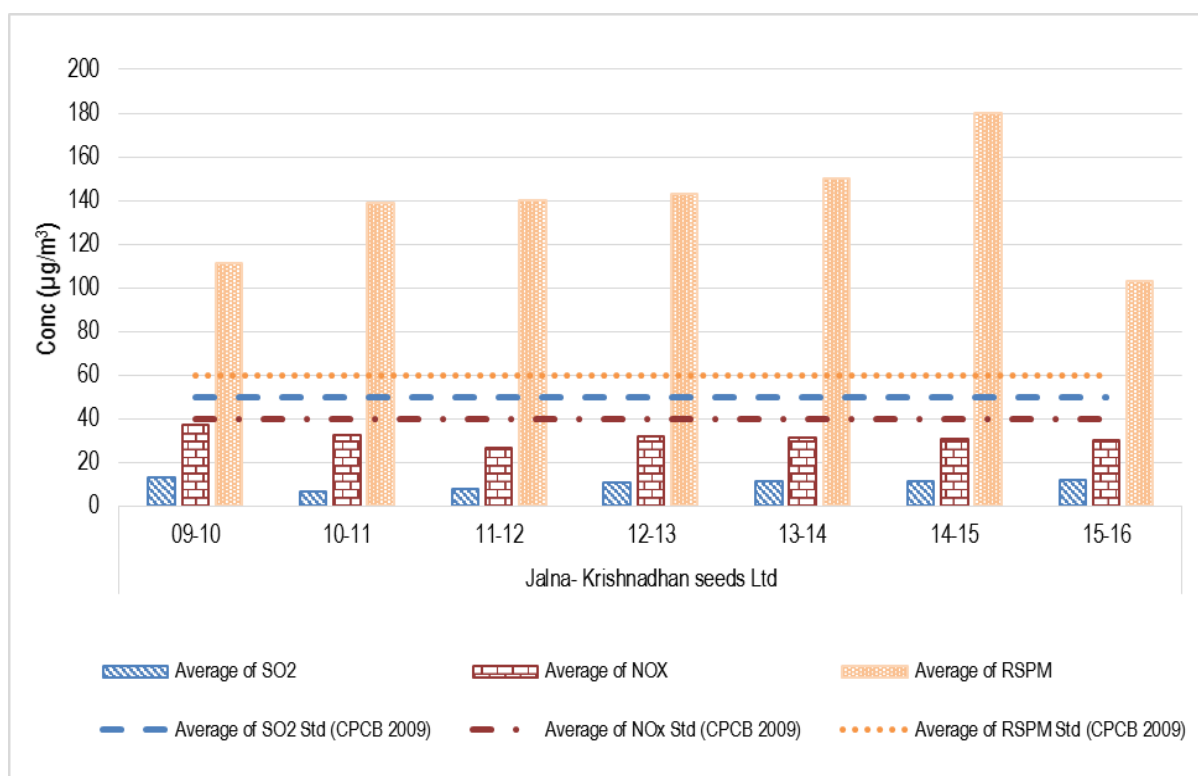


Figure No. 45: Monthly average reading recorded at JalnaKrishnadhan Seeds Ltd

Table No. 50: Data for Annual average trend of SO₂, NO_x, and RSPM at JalnaKrishnadhan Seeds Ltd

		Average of SO ₂	Average of NO _x	Average of RSPM
Jalna- Krishnadhan seeds Ltd	09-10	13	37	111
	10-11	7	33	139
	11-12	8	26	140
	12-13	11	32	143
	13-14	11	31	150
	14-15	11	31	180
	15-16	12	30	103

Figure No. 46: Annual average trend of SO₂, NO_x, and RSPM at JalnaKrishnadhan Seeds Ltd

Latur – MIDC Water Works

Table No. 51: Data for Monthly average reading recorded at Latur MIDC Water Works

			Average of SO ₂	Average of NO _x	Average of RSPM
MIDC Water Works - Latur	2015	Apr	4	11	85
		May	4	13	104
		Jun	4	12	62
		Jul	5	12	57
		Aug	5	12	30
		Sep	4	12	43
		Oct	6	16	98
		Nov	6	26	96
		Dec	4	15	104
	2016	Jan	4	21	107
		Feb	5	15	118
		Mar	5	15	78

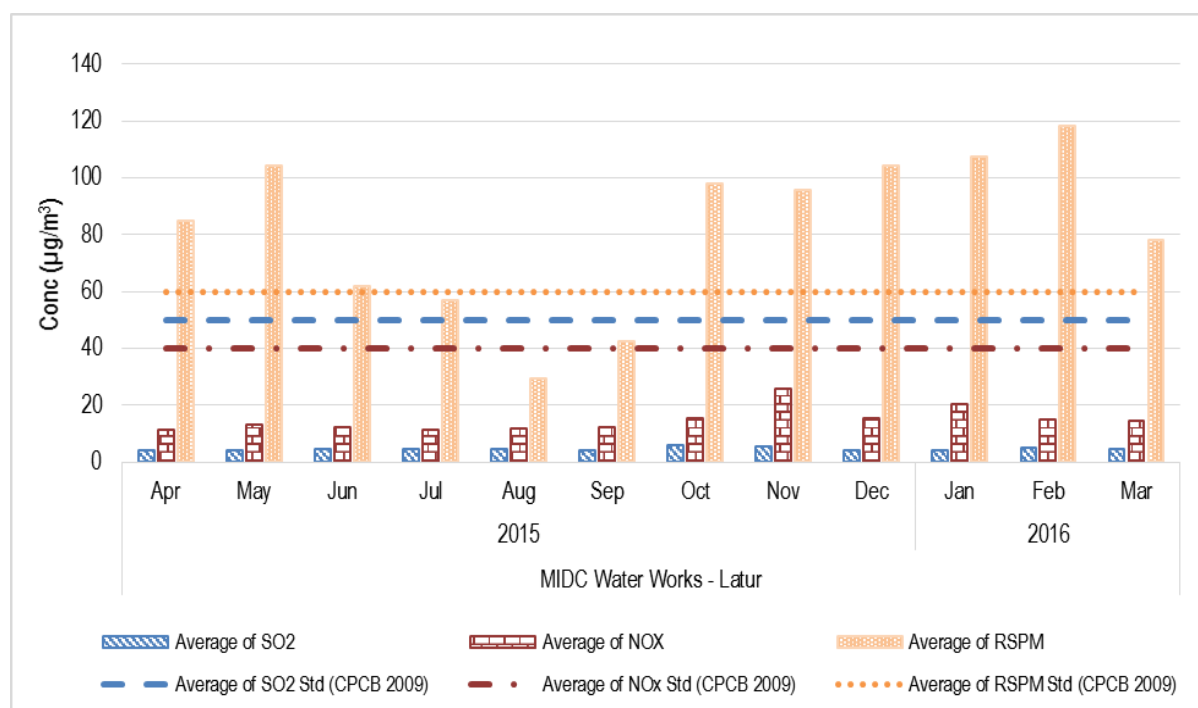
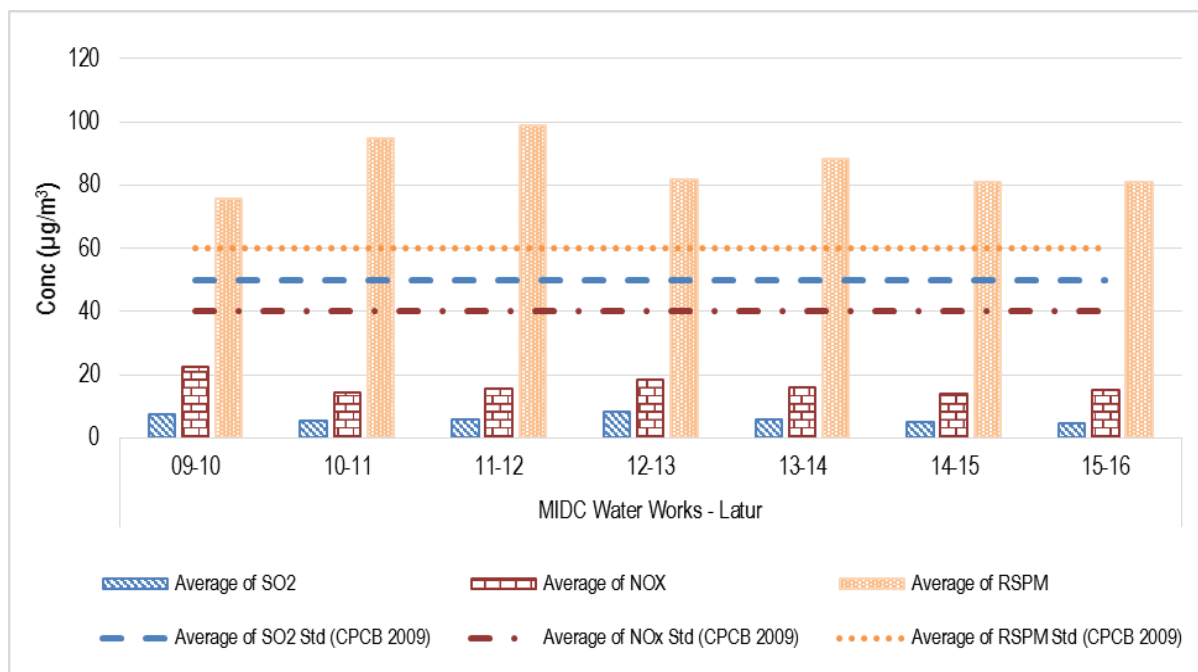


Figure No. 47: Monthly average reading recorded at Latur MIDC Water Works

Table No. 52: Data for Annual average trend of SO₂, NO_x, and RSPM at Latur MIDC Water Works

		Average of SO ₂	Average of NO _x	Average of RSPM
MIDC Water Works - Latur	09-10	7	22	76
	10-11	6	15	95
	11-12	6	16	99
	12-13	8	19	82
	13-14	6	16	88
	14-15	5	14	81
	15-16	5	15	81

Figure No. 48: Annual average trend of SO₂, NO_x, and RSPM at Latur MIDC Water Works

Latur – Shyam Nagar – KshewrajVidyalaya

Table No. 53: Data for Monthly average reading recorded at Shyam Nagar Keshwraj Vidyalaya

			Average of SO ₂	Average of NO _x	Average of RSPM
Shyam Nagar-KshewrajVidyalaya	2015	Apr	4	13	114
		May	5	13	99
		Jun	4	13	59
		Jul	5	12	76
		Aug	5	12	34
		Sep	4	12	51
		Oct	5	15	82
		Nov	6	21	78
		Dec	4	16	111
	2016	Jan	4	19	115
		Feb	5	16	118
		Mar	5	16	84

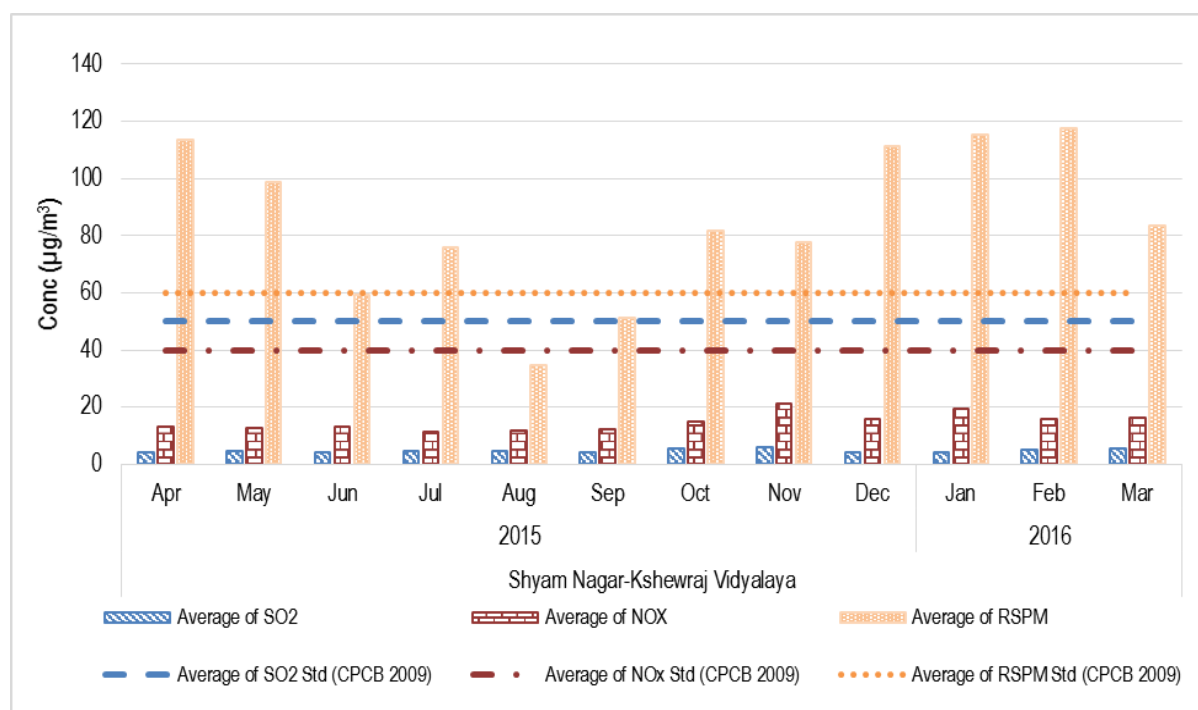


Figure No. 49: Monthly average reading recorded at Shyam Nagar Keshwraj Vidyalaya

Table No. 54: Data for Annual average trend of SO₂, NO_x, and RSPM at Shyam Nagar Keshwraj Vidyalaya

		Average of SO ₂	Average of NO _x	Average of RSPM
Shyam Nagar-Kshewraj Vidyalaya	09-10	6	19	123
	10-11	6	13	139
	11-12	6	14	124
	12-13	7	19	105
	13-14	7	17	95
	14-15	5	14	89
	15-16	5	15	85

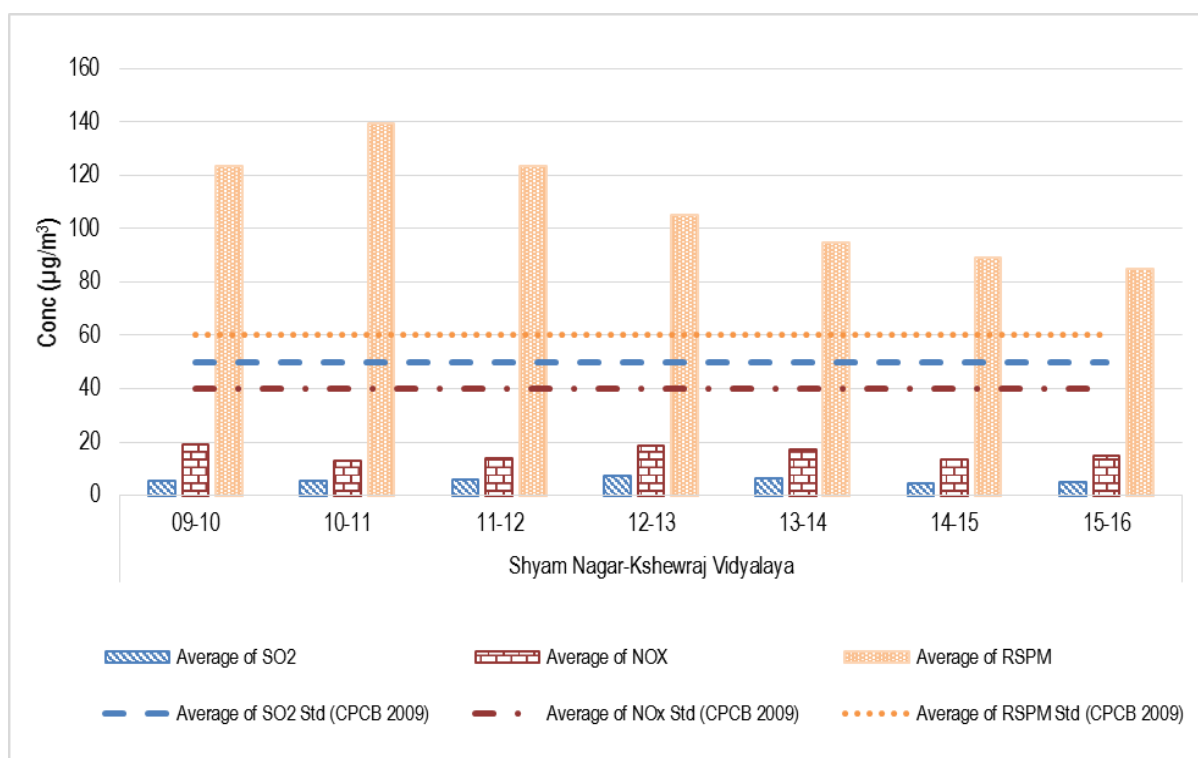


Figure No. 50: Annual average trend of SO₂, NO_x, and RSPM at Shyam Nagar Keshwraj Vidyalaya

Latur – GanjGolai – Sidhleshwar Bank

Table No. 55: Data for Monthly average reading recorded at GanjGolai Sidhleshwar bank

			Average of SO ₂	Average of NO _x	Average of RSPM
GanjGolai - Sidhleshwar Bank	2015	Apr	4	12	70
		May	5	14	88
		Jun	4	12	53
		Jul	4	12	36
		Aug	5	13	49
		Sep	5	15	43
		Oct	6	15	106
		Nov	6	28	108
		Dec	4	25	106
	2016	Jan	4	22	112
		Feb	4	18	99
		Mar	5	15	78



Figure No. 51: Monthly average reading recorded at GanjGolai Sidhleshwar bank

Table No. 56: Data for Annual average trend of SO₂, NO_x, and RSPM at GanjGolai Sidhsheshwar bank

		Average of SO ₂	Average of NO _x	Average of RSPM
GanjGolai - Sidhsheshwar Bank	09-10	6	26	144
	10-11	6	16	124
	11-12	6	17	140
	12-13	8	20	132
	13-14	7	18	107
	14-15	5	14	73
	15-16	5	17	80

Figure No. 52: Annual average trend of SO₂, NO_x, and RSPM at GanjGolai Sidhsheshwar bank

Nanded - GaneshNagar

Table No. 57: Data for Monthly average reading recorded at Ganeshnagar

			Average of SO ₂	Average of NO _x	Average of RSPM
Ganeshnagar	2015	Apr	27	28	114
		May	27	28	120
		Jun	27	28	118
		Jul	27	28	116
		Aug	27	27	116
		Sep	27	27	116
		Oct	27	28	117
		Nov	28	27	117
		Dec	28	28	117
	2016	Jan	27	28	119
		Feb	27	28	118

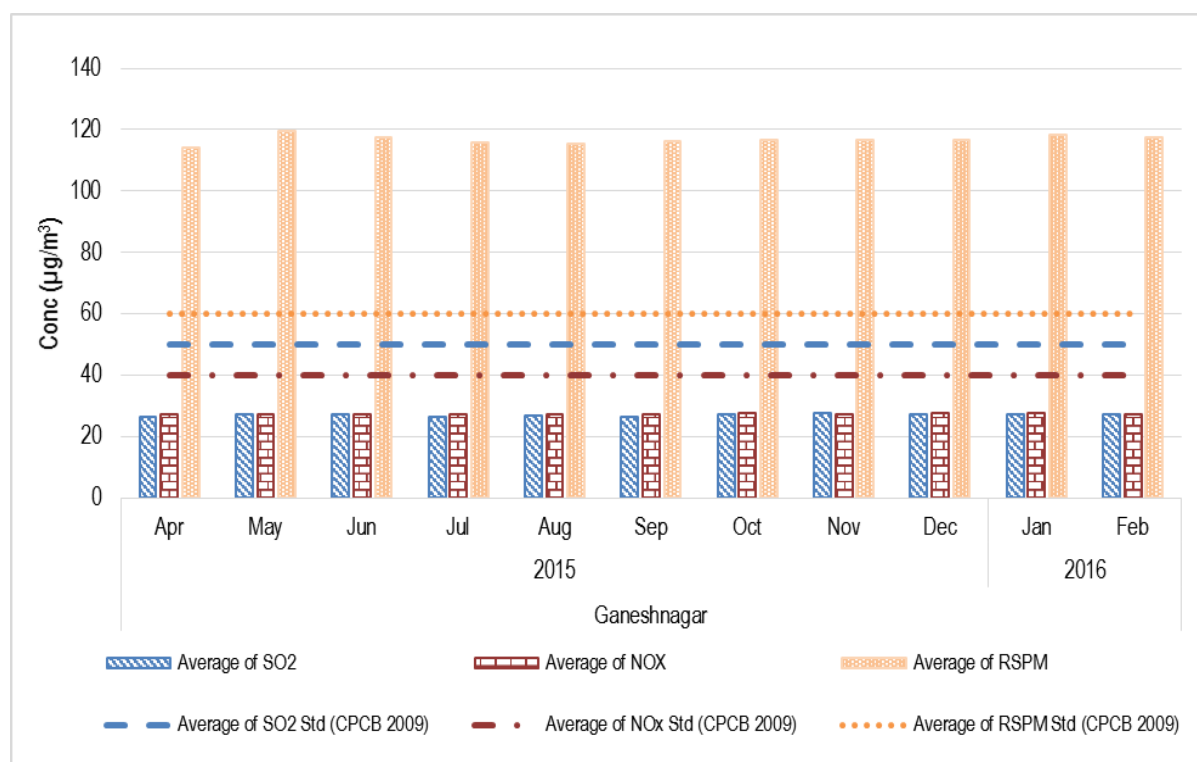
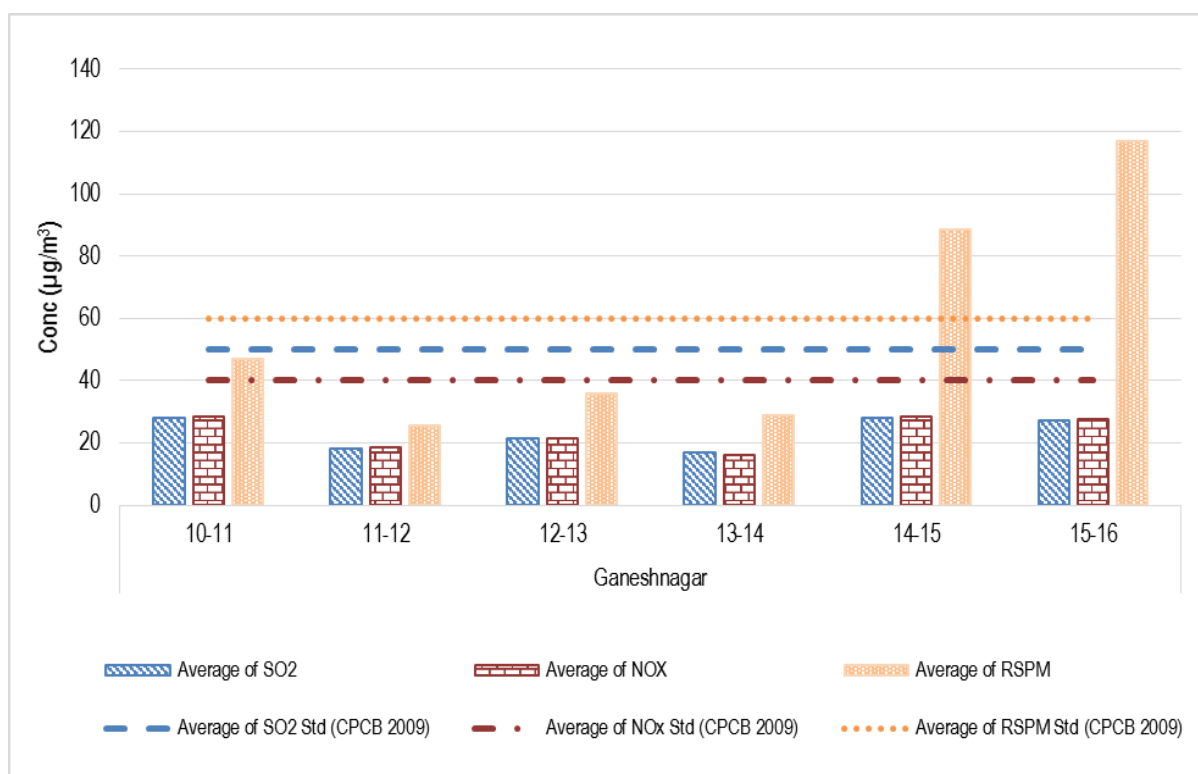


Figure No. 53: Monthly average reading recorded at Ganeshnagar

Table No. 58: Data for Annual average trend of SO₂, NO_x, and RSPM at Ganeshnagar

		Average of SO ₂	Average of NO _x	Average of RSPM
Ganeshnagar	10-11	28	29	47
	11-12	18	19	26
	12-13	22	21	36
	13-14	17	16	29
	14-15	28	28	89
	15-16	27	28	117

Figure No. 54: Annual average trend of SO₂, NO_x, and RSPM at Ganeshnagar

Nanded – MuthaChowk

Table No. 59: Data for Monthly average reading recorded at Mutha Chowk

			Average of SO ₂	Average of NO _X	Average of RSPM
MuthaChowk	2015	Apr	37	32	165
		May	38	32	169
		Jun	38	32	170
		Jul	38	32	167
		Aug	38	32	167
		Sep	37	32	166
		Oct	38	32	159
		Nov	38	32	167
		Dec	39	32	168
	2016	Jan	38	32	171
		Feb	38	32	237

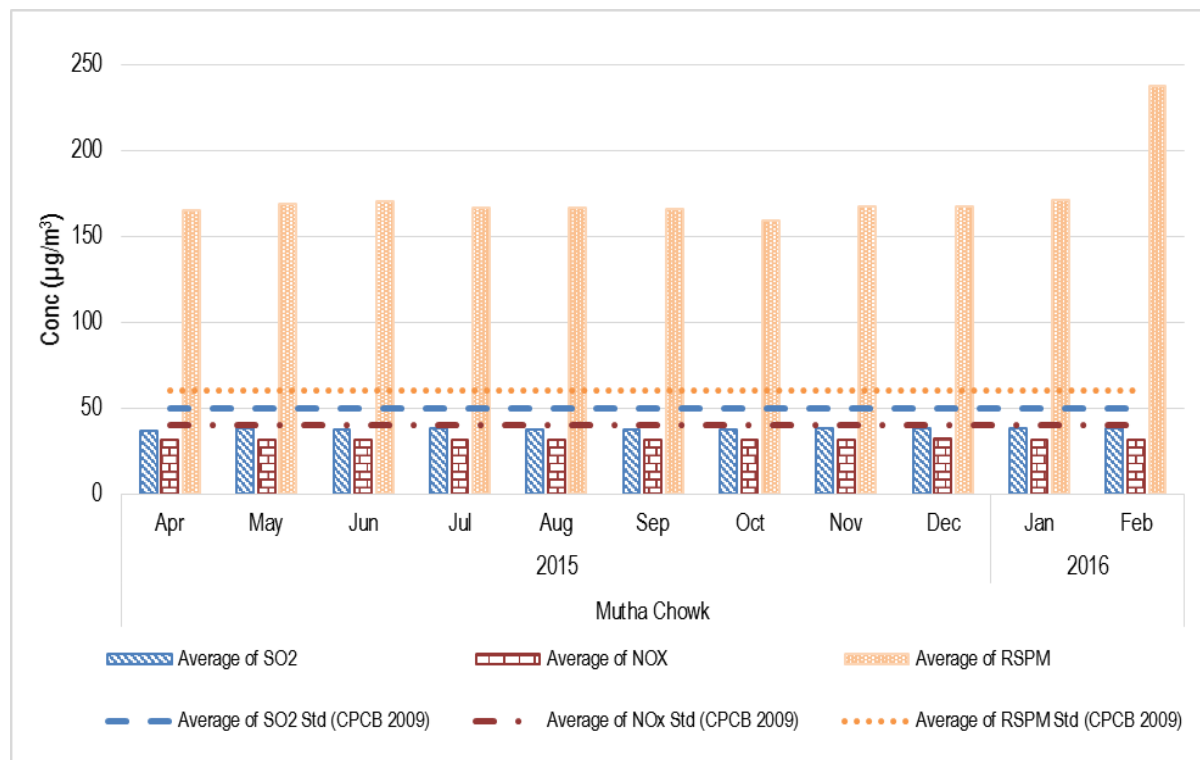
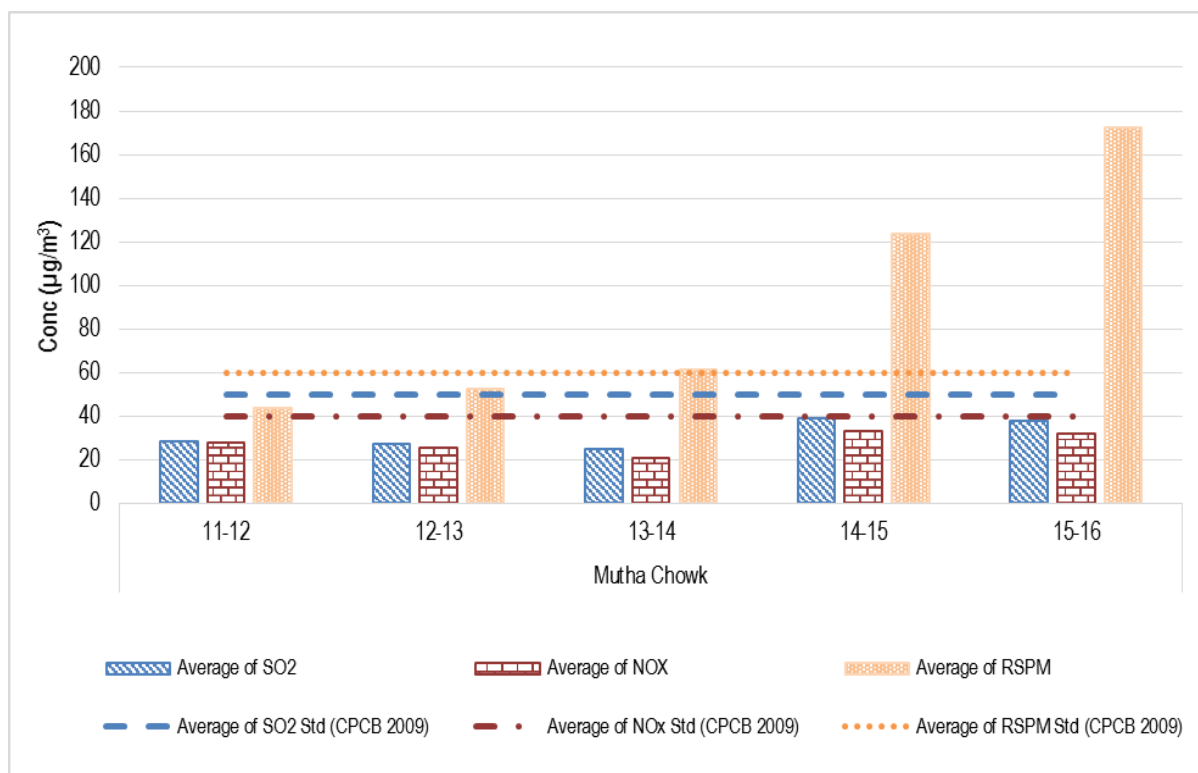


Figure No. 55: Monthly average reading recorded at Mutha Chowk

Table No. 60: Data for Annual average trend of SO₂, NO_x, and RSPM at Mutha Chowk

		Average of SO ₂	Average of NO _x	Average of RSPM
MuthaChowk	11-12	28	28	44
	12-13	27	25	53
	13-14	25	21	62
	14-15	39	33	124
	15-16	38	32	173

Figure No. 56: Annual average trend of SO₂, NO_x, and RSPM at Mutha Chowk

Nanded – Industrial Area CIDCO

Table No. 61: Data for Monthly average reading recorded at Industrial Area CIDCO – Nanded

			Average of SO ₂	Average of NO _x	Average of RSPM
Industrial Area CIDCO	2015	Apr	86	86	219
		May	87	89	219
		Jun	82	83	219
		Jul	86	89	215
		Aug	62	60	192
		Sep	85	88	216
		Oct	86	89	215
		Nov	86	88	216
		Dec	87	88	216
	2016	Jan	80	81	223
		Feb	73	77	211

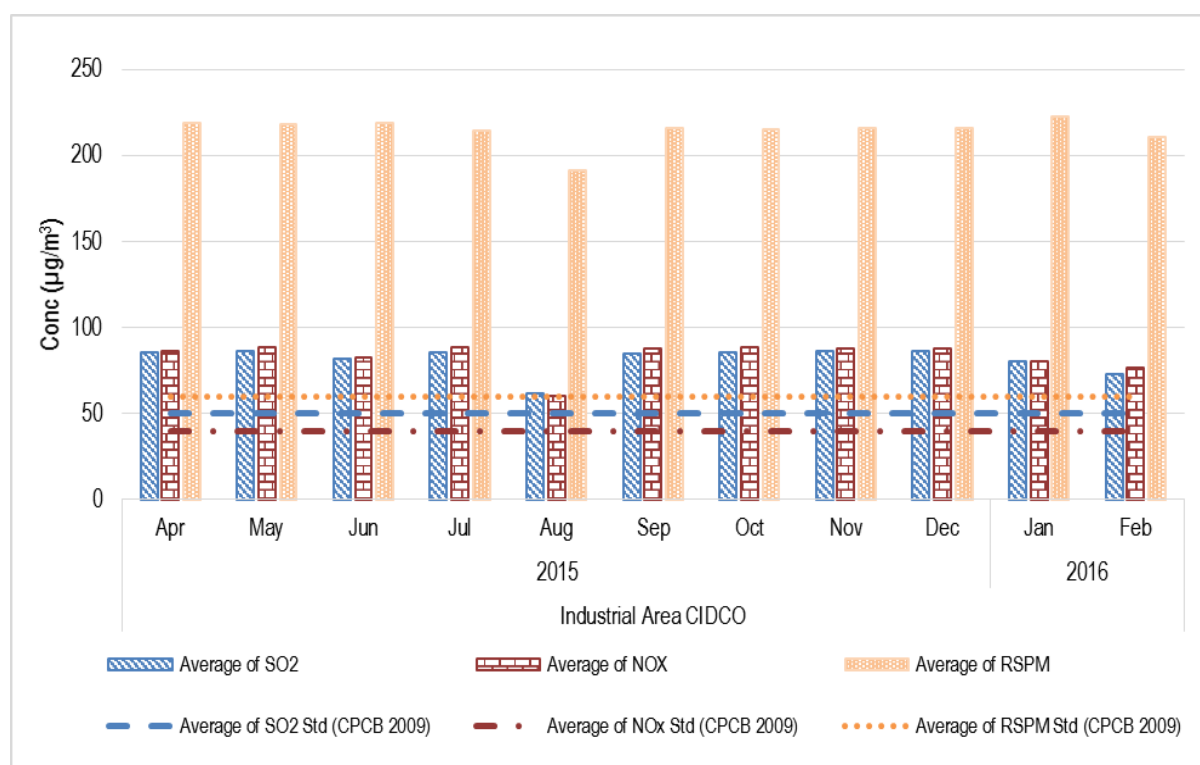


Figure No. 57: Monthly average reading recorded at Industrial Area CIDCO - Nanded

Table No. 62: Data for Annual average trend of SO₂, NO_x, and RSPM at Industrial Area CIDCO - Nanded

		Average of SO ₂	Average of NO _x	Average of RSPM
Industrial Area CIDCO	11-12	43	45	65
	12-13	53	54	88
	13-14	48	43	85
	14-15	82	83	181
	15-16	80	81	212

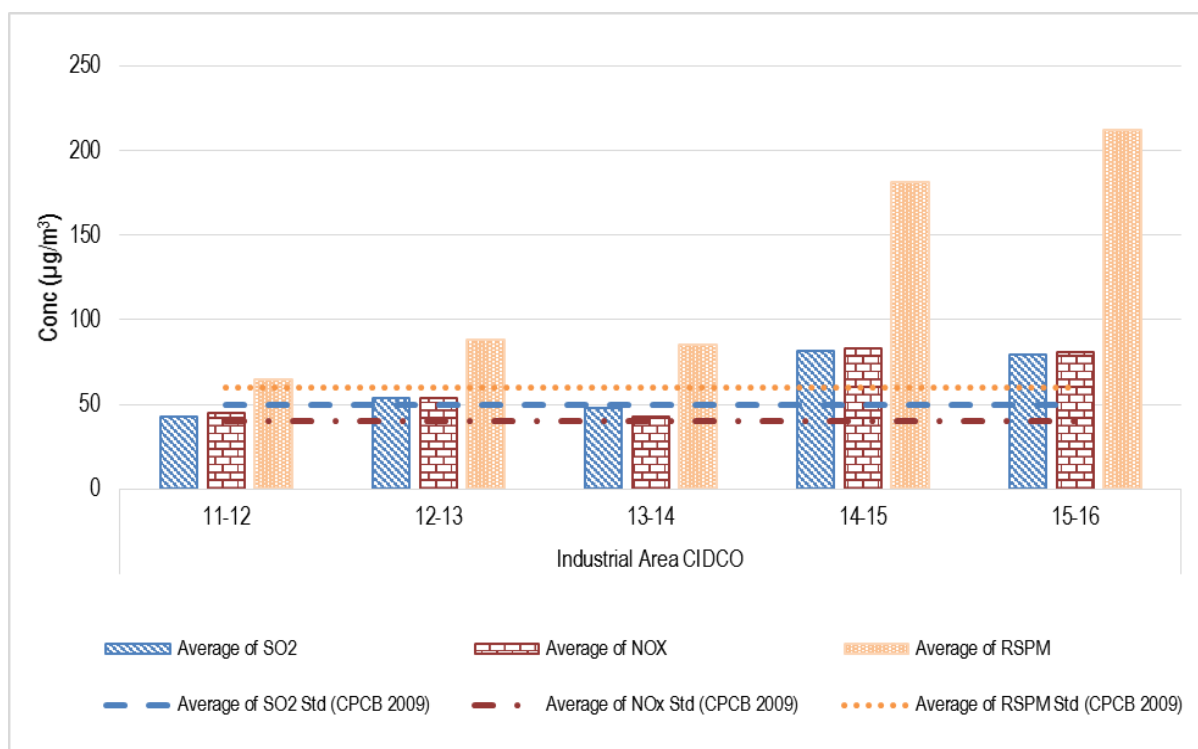
Figure No. 58: Annual average trend of SO₂, NO_x, and RSPM at Industrial Area CIDCO - Nanded

Table No. 63: % exceedence of pollutants at Aurangabad RO

	Number of Observations				Percentage Exceedence		
	Total	Exceedence SO	Exceedence NO	Exceedence RSPM	SO	NO	RSPM
C.A.D.A. Office	96	0	0	23	0	0	24
Collector Office, Aurangabad	98	0	0	15	0	0	15
Ganeshnagar	96	0	0	96	0	0	100
GanjGolai - Sidhshwar Bank	106	0	0	28	0	0	26
Industrial Area CIDCO	104	91	90	104	88	87	100
Jalna- BachatBhavan	92	0	0	53	0	0	58
Jalna- Krishnadhan seeds Ltd	93	0	0	36	0	0	39
MIDC Water Works - Latur	107	0	0	36	0	0	34
MuthaChowk	95	0	0	94	0	0	99
SBES College	100	0	0	54	0	0	54
Shyam Nagar-KshewrajVidyalaya	105	0	0	24	0	0	23

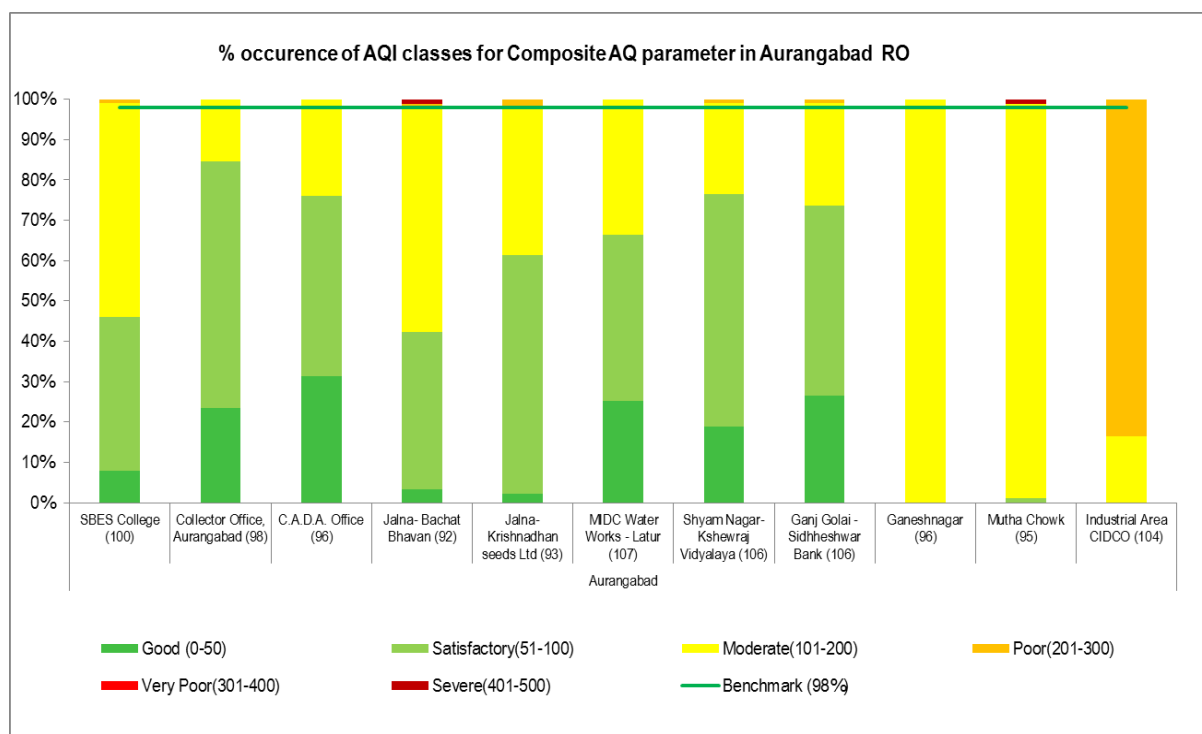
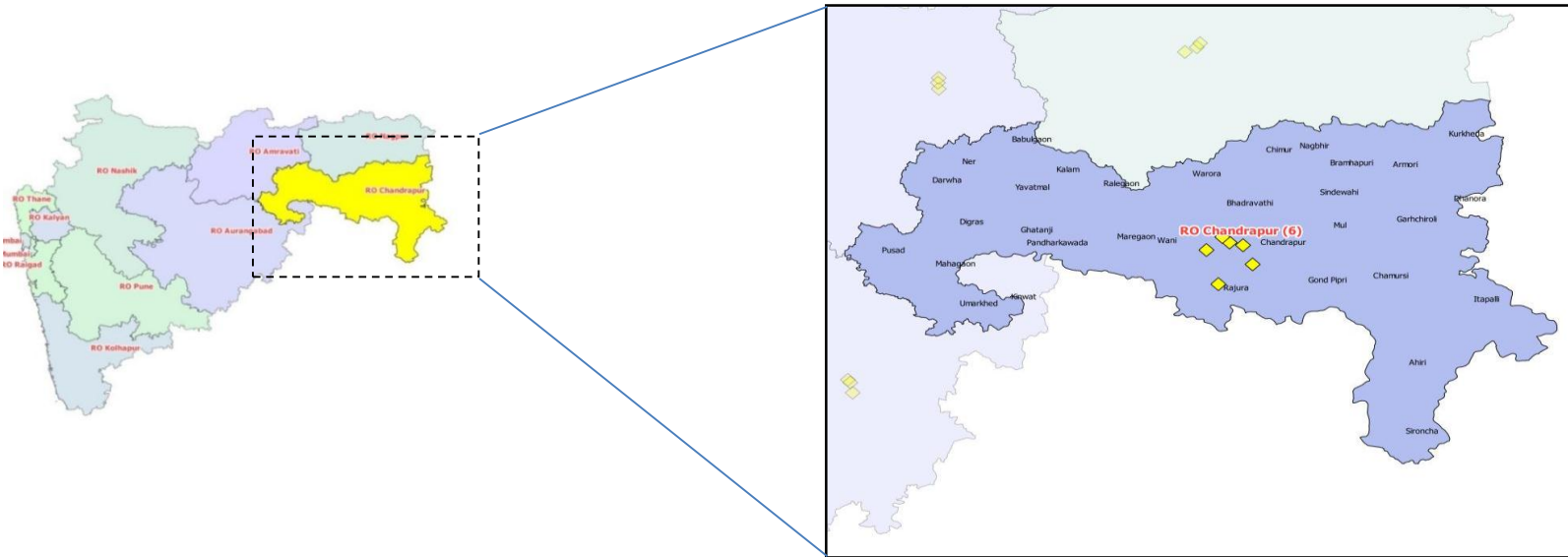


Figure No. 59: % occurrence of AQI classes for Composite AQ parameter in Aurangabad RO

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. 64: Data for Monthly average reading recorded at Ghuggus - Chandrapur

			Average of SO ₂	Average of NO _X	Average of RSPM
Ghuggus	2015	Apr	5	13	256
		May	4	12	221
		Jun	4	9	193
		Jul	4	13	146
		Aug	4	14	103
		Sep	4	20	86
		Oct	4	15	117
		Nov	8	20	185
		Dec	4	18	183
	2016	Jan	4	18	212
		Feb	4	27	243
		Mar	4	25	209

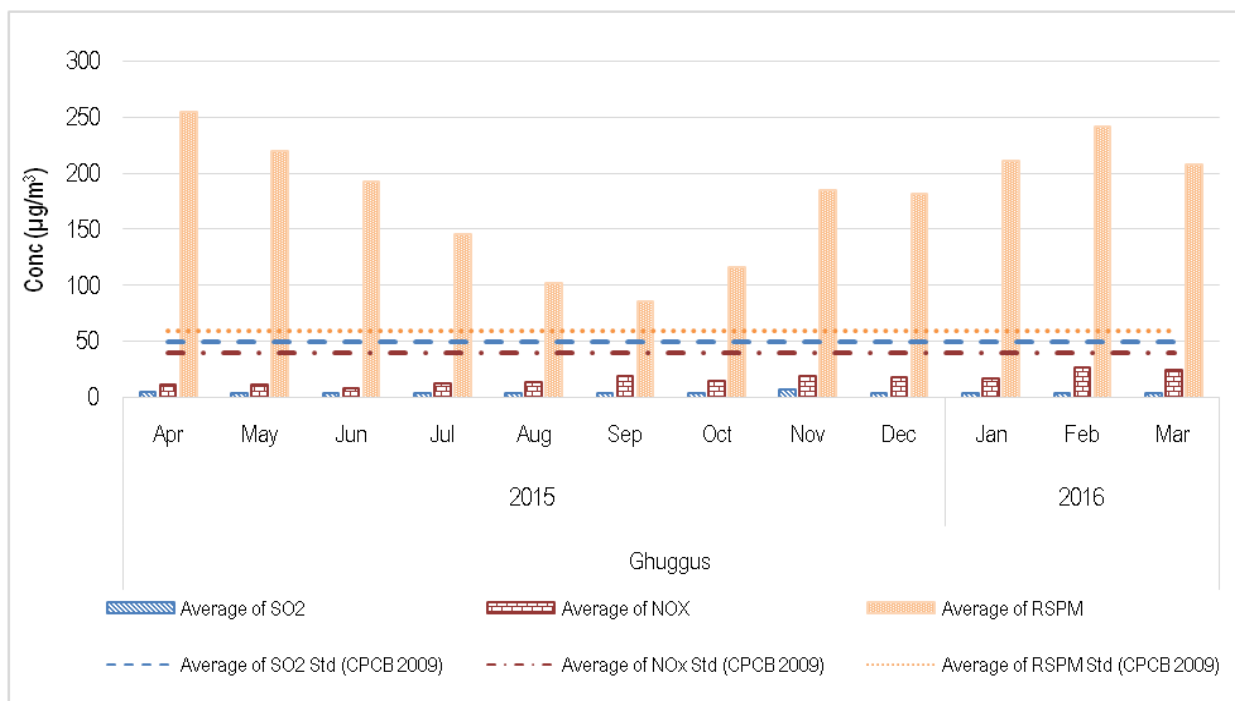
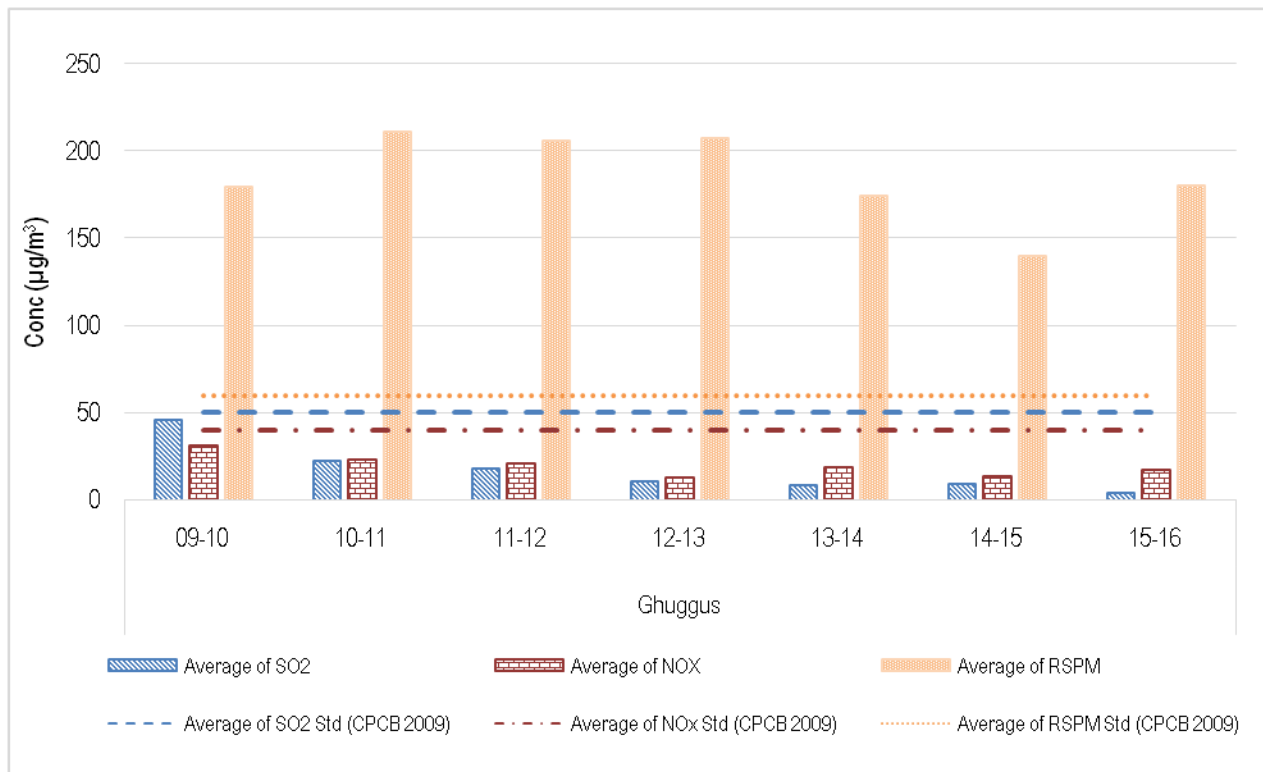


Figure No. 60: Monthly average reading recorded at Ghuggus - Chandrapur

Table No. 65: Data for Annual average trend of SO₂, NO_x, and RSPM at Ghuggus - Chandrapur

		Average of SO ₂	Average of NO _x	Average of RSPM
Ghuggus	09-10	46	32	180
	10-11	23	24	211
	11-12	18	21	206
	12-13	11	13	207
	13-14	9	19	174
	14-15	9	14	140
	15-16	4	17	180

Figure No. 61: Annual average trend of SO₂, NO_x, and RSPM at Ghuggus - Chandrapur

Chandrapur – Chandrapur - MIDC

Table No. 66: Data for Monthly average reading recorded at Chandrapur - MIDC

			Average of SO ₂	Average of NO _x	Average of RSPM
Chandrapur - MIDC	2015	Apr	4	15	58
		May	4	13	67
		Jun	4	12	55
		Jul	4	32	43
		Aug	4	23	38
		Sep	4	29	34
		Oct	4	21	75
		Nov	16	29	113
		Dec	10	41	105
	2016	Jan	11	21	112
		Feb	9	47	95

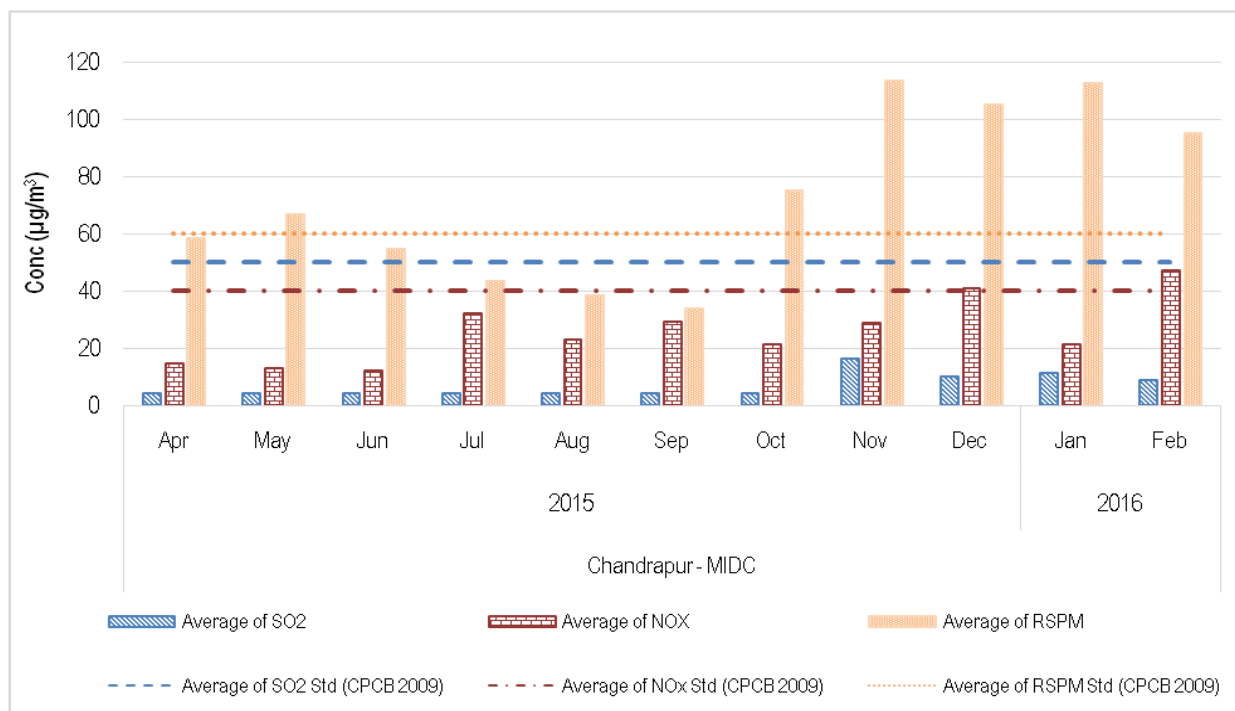
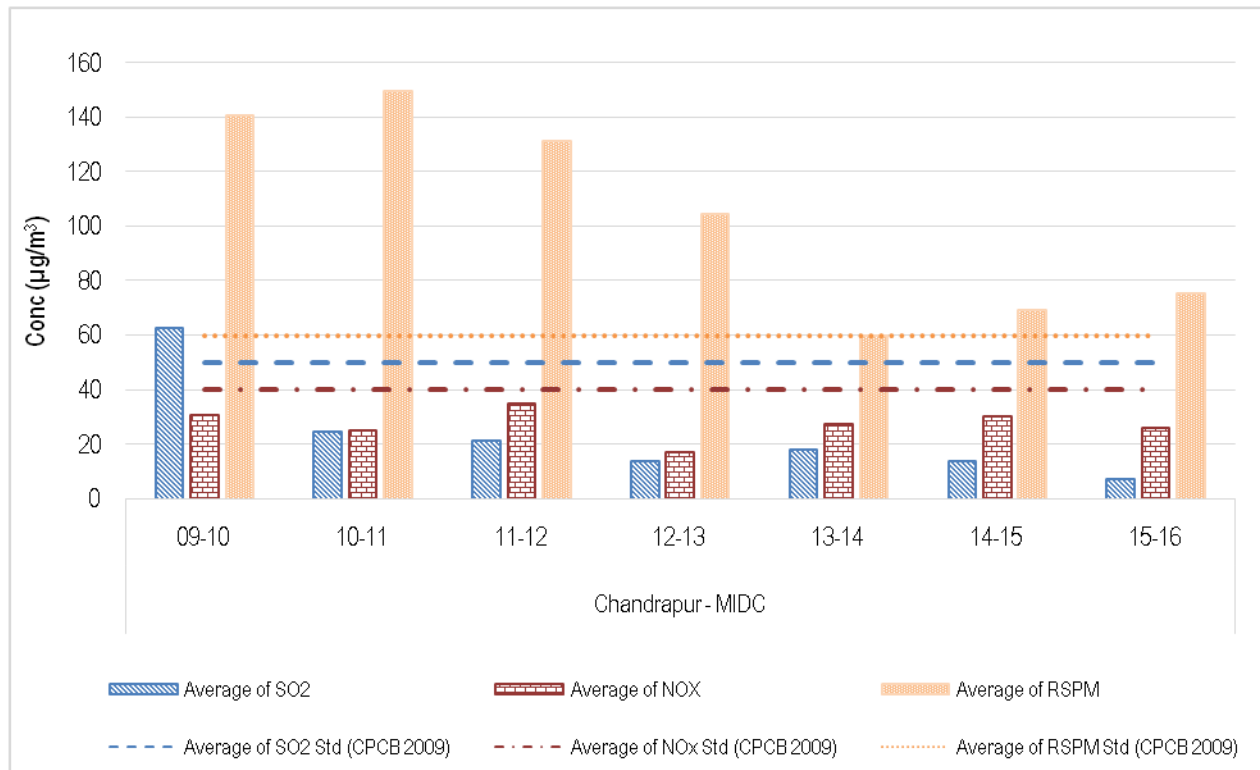


Figure No. 62: Monthly average reading recorded at Chandrapur - MIDC

Table No. 67: Data for Annual average trend of SO₂, NO_x, and RSPM at Chandrapur - MIDC

		Average of SO ₂	Average of NO _x	Average of RSPM
Chandrapur - MIDC	09-10	63	31	141
	10-11	25	25	150
	11-12	21	35	131
	12-13	14	17	105
	13-14	18	27	60
	14-15	14	30	70
	15-16	7	26	75

Figure No. 63: Annual average trend of SO₂, NO_x, and RSPM at Chandrapur - MIDC

Chandrapur – Chandrapur – SRO MPCB

Table No. 68: Data for Monthly average reading recorded at Chandrapur SRO MPCB

			Average of SO ₂	Average of NO _x	Average of RSPM
Chandrapur - SRO MPCB	2015	Apr	4	16	71
		May	4	15	72
		Jun	4	18	55
		Jul	4	24	44
		Aug	4	17	49
		Sep	4	23	56
		Oct	4	18	64
		Nov	4	22	87
		Dec	5	18	73
	2016	Jan	5	23	98
		Feb	4	25	103

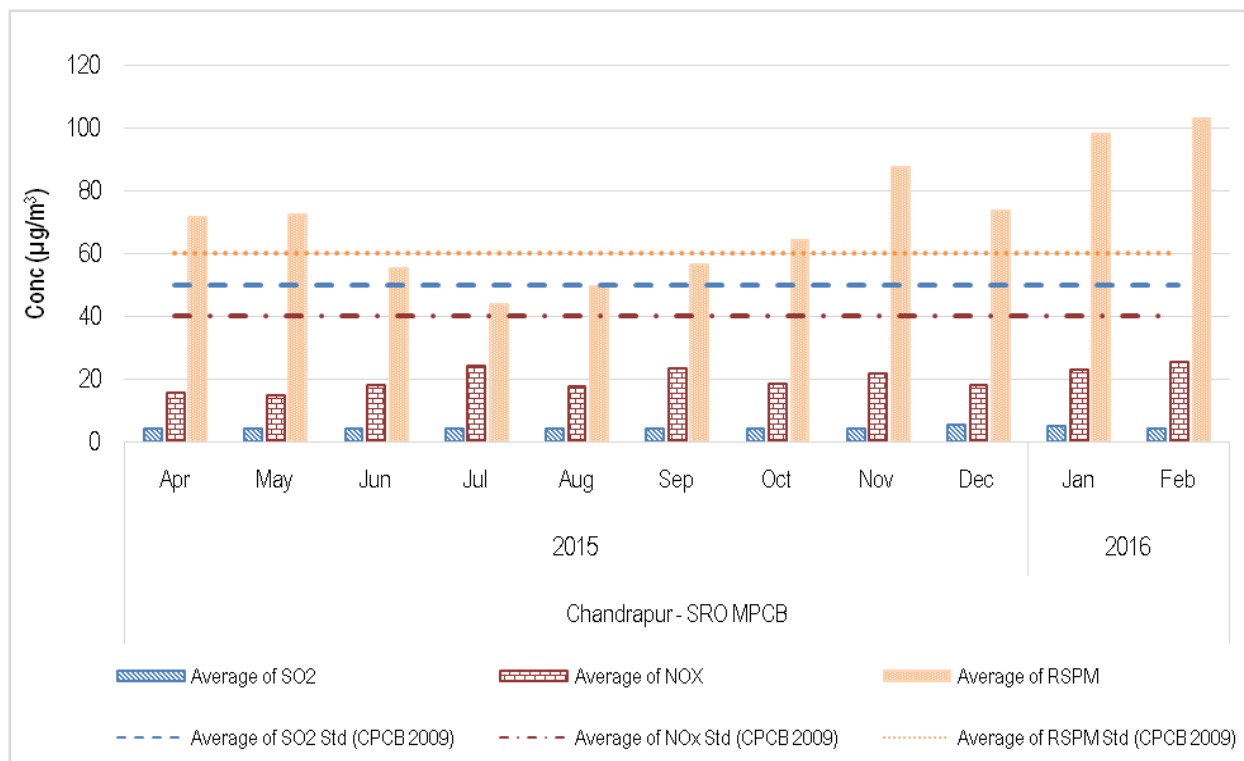
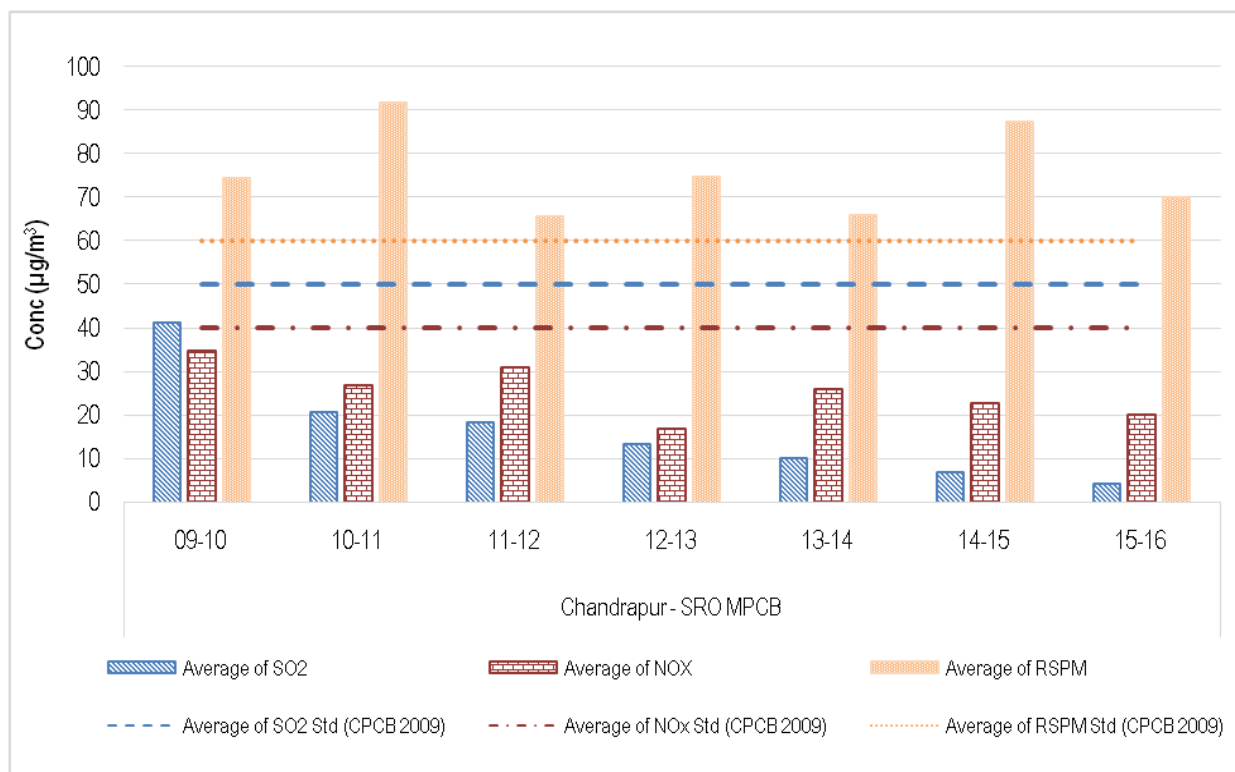


Figure No. 64: Monthly average reading recorded at Chandrapur SRO MPCB

Table No. 69: Data for Annual average trend of SO₂, NO_x, and RSPM at Chandrapur SRO MPCB

		Average of SO ₂	Average of NO _x	Average of RSPM
Chandrapur - SRO MPCB	09-10	41	35	74
	10-11	21	27	92
	11-12	18	31	66
	12-13	14	17	75
	13-14	10	26	66
	14-15	7	23	87
	15-16	4	20	70

Figure No. 65: Annual average trend of SO₂, NO_x, and RSPM at Chandrapur SRO MPCB

Chandrapur Tadali MIDC

Table No. 70: Data for Monthly average reading recorded at Tadali MIDC

			Average of SO ₂	Average of NO _x	Average of RSPM
Tadali MIDC	2015	Apr	4	12	121
		May	4	17	51
		Jun	4	21	71
		Jul	4	20	34
		Aug	4	23	35
		Sep	4	21	35
		Oct	4	16	47
		Nov	5	22	74
		Dec	7	19	45
	2016	Jan	5	22	59
		Feb	5	27	66

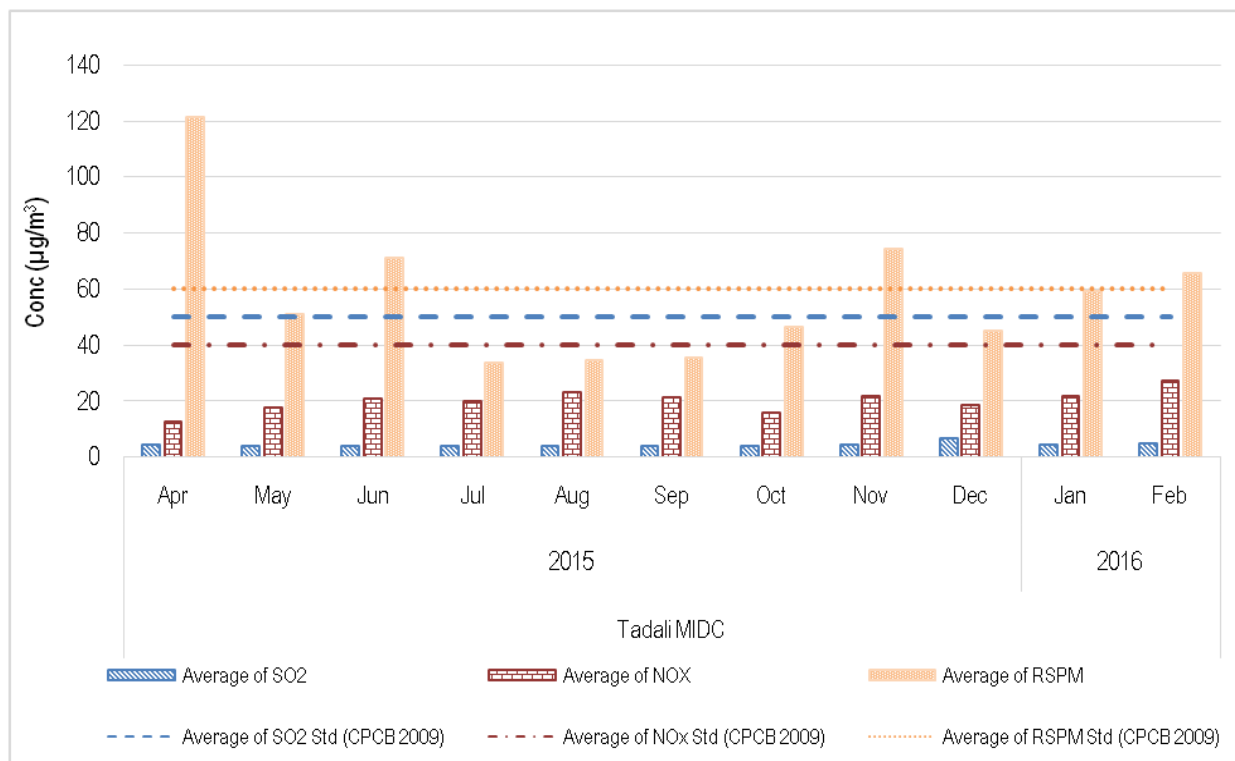
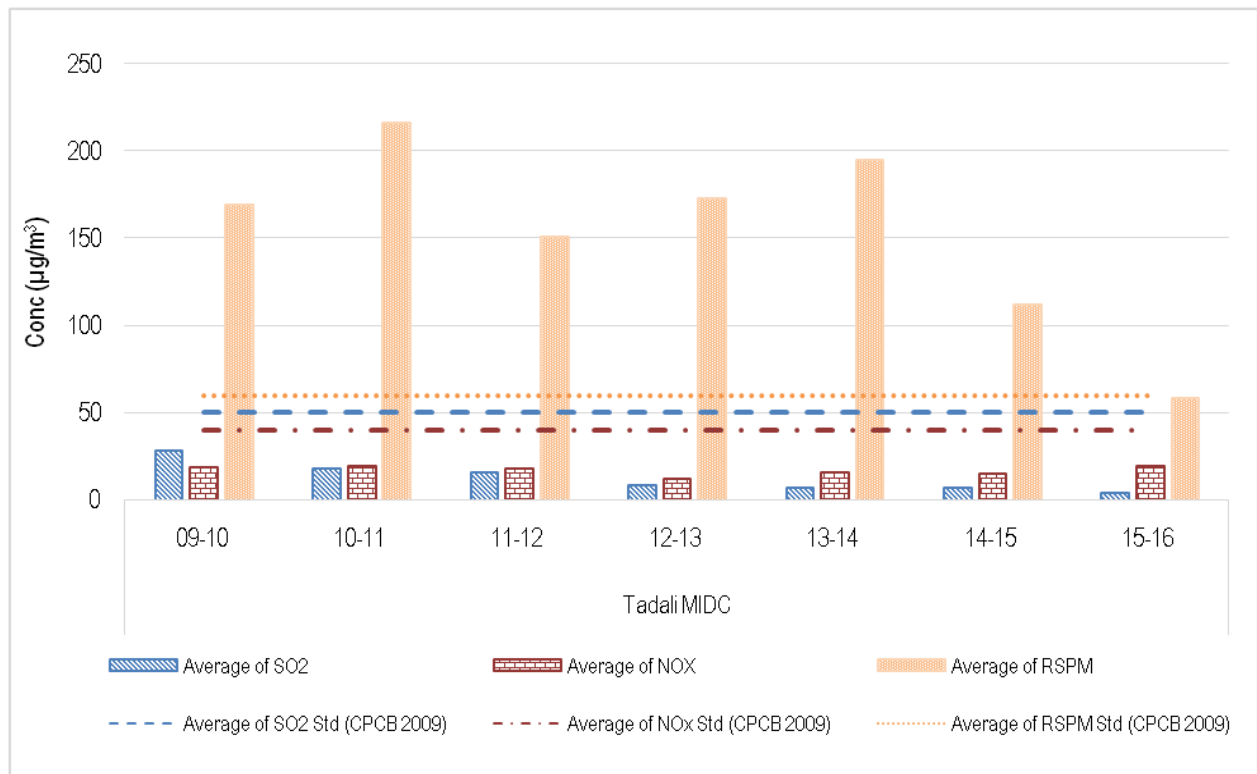


Figure No. 66: Monthly average reading recorded at Tadali MIDC

Table No. 71: Data for Annual average trend of SO₂, NO_x, and RSPM at Tadali MIDC

		Average of SO ₂	Average of NO _x	Average of RSPM
Tadali MIDC	09-10	29	19	169
	10-11	18	20	216
	11-12	16	18	151
	12-13	9	13	173
	13-14	7	16	195
	14-15	7	15	112
	15-16	4	20	58

Figure No. 67: Annual average trend of SO₂, NO_x, and RSPM at Tadali MIDC

Chandrapur Ballarshah

Table No. 72: Data for Monthly average reading recorded at Ballarshah

			Average of SO ₂	Average of NO _X	Average of RSPM
Ballarshah	2015	Apr	4	16	130
		May	5	23	129
		Jun	4	17	93
		Jul	4	26	104
		Aug	4	34	74
		Sep	4	20	99
		Oct	4	22	102
		Nov	5	23	158
		Dec	4	20	172
	2016	Jan	4	36	160
		Feb	4	26	116
		Mar	4	74	116

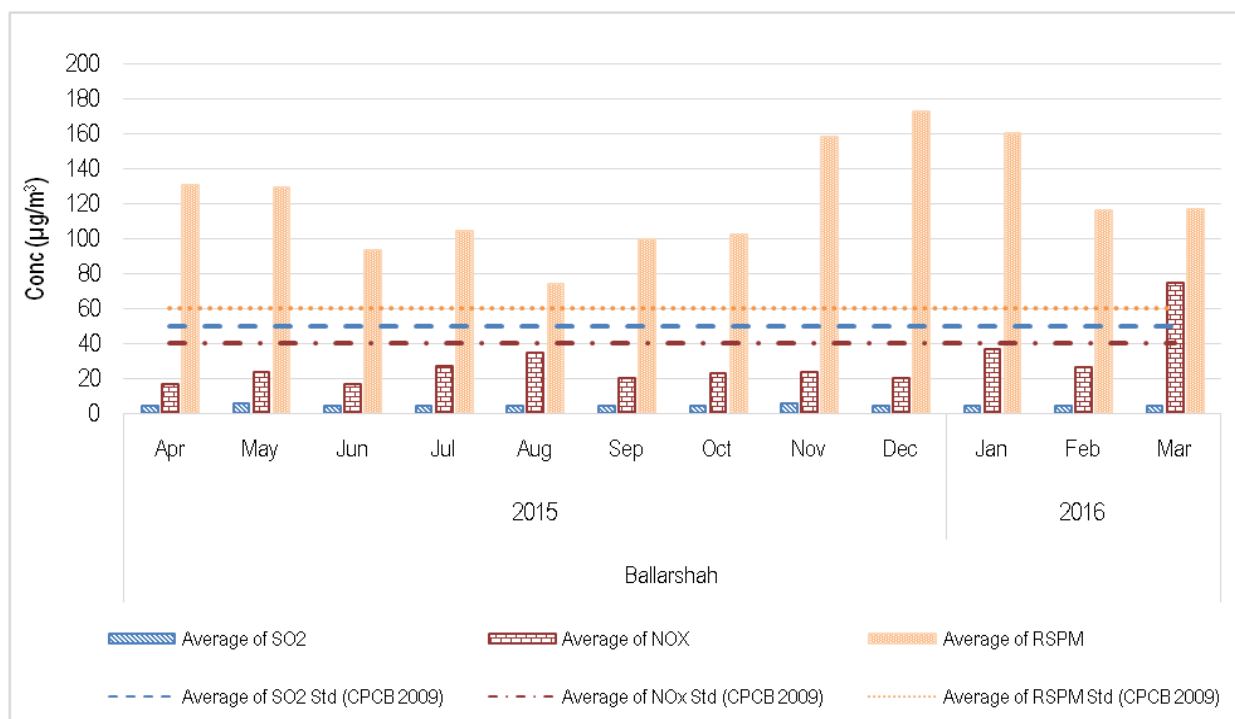
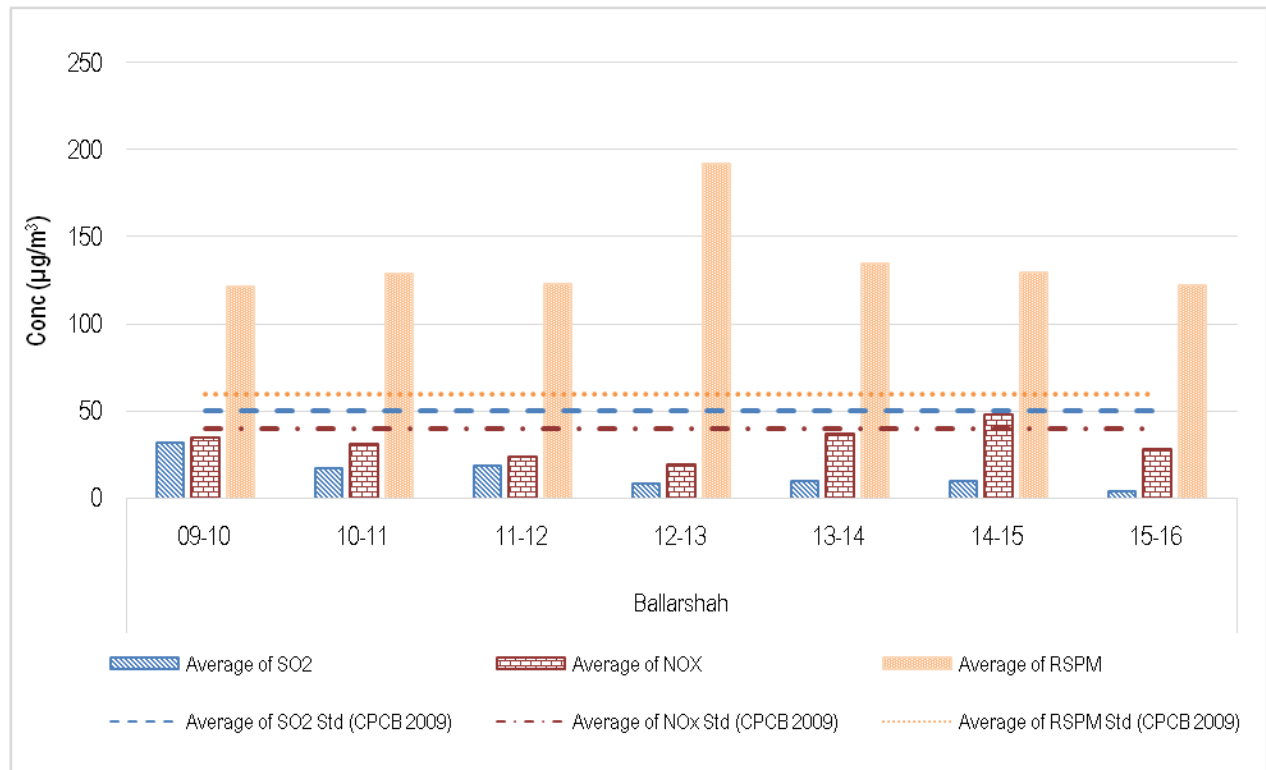


Figure No. 68: Monthly average reading recorded at Ballarshah

Table No. 73: Data for Annual average trend of SO₂, NO_x, and RSPM at Ballarshah

		Average of SO ₂	Average of NO _x	Average of RSPM
Ballarshah	09-10	32	35	122
	10-11	17	32	129
	11-12	19	24	123
	12-13	9	19	192
	13-14	10	37	135
	14-15	10	48	130
	15-16	4	28	123

Figure No. 69: Annual average trend of SO₂, NO_x, and RSPM at Ballarshah

Chandrapur - Rajura

Table No. 74: Data for Monthly average reading recorded at Rajura

			Average of SO ₂	Average of NO _X	Average of RSPM
Rajura	2015	Apr	4	16	127
		May	4	9	150
		Jun	4	10	112
		Jul	4	14	75
		Aug	4	15	105
		Sep	4	21	63
		Oct	4	14	156
		Nov	4	20	133
		Dec	4	17	127
	2016	Jan	4	21	134
		Feb	4	27	183
		Mar	4	25	153

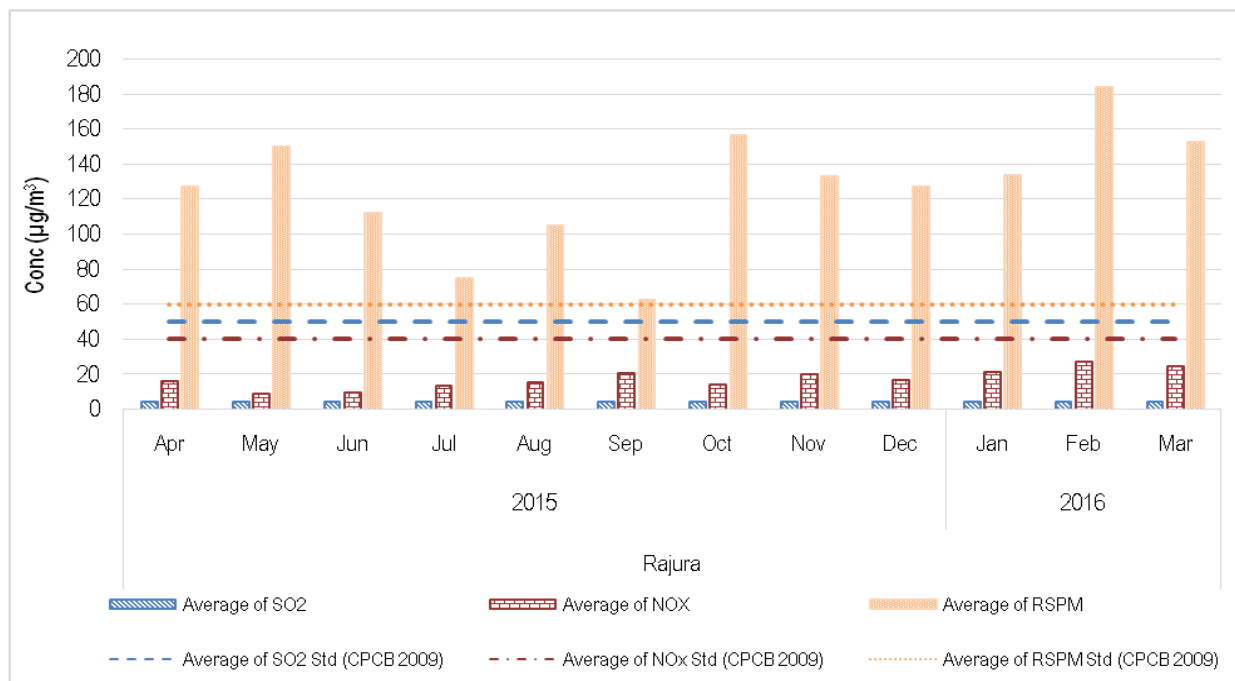


Figure No. 70: Monthly average reading recorded at Rajura

Table No. 75: Data for Annual average trend of SO₂, NO_x, and RSPM at Rajura

		Average of SO ₂	Average of NO _x	Average of RSPM
Rajura	09-10	34	37	119
	10-11	17	19	115
	11-12	16	19	159
	12-13	9	21	196
	13-14	10	31	145
	14-15	7	17	144
	15-16	4	17	127

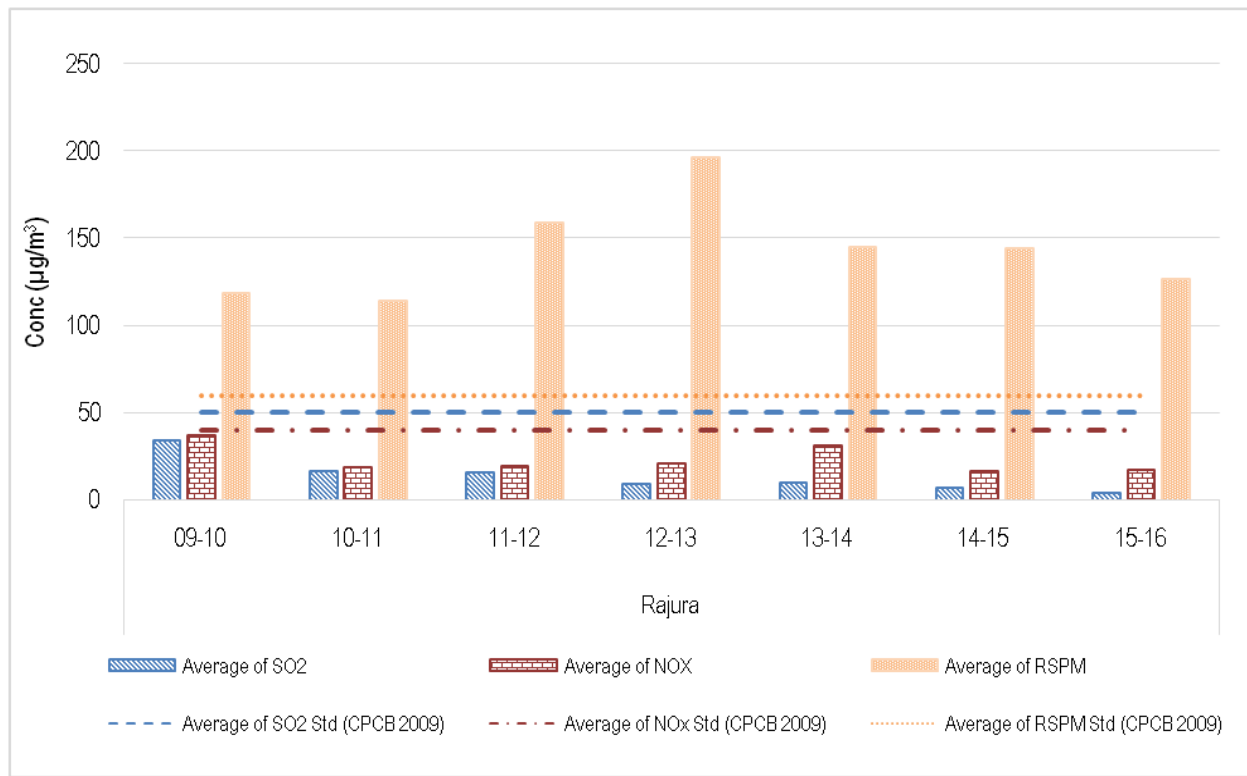
Figure No. 71: Annual average trend of SO₂, NO_x, and RSPM at Rajura

Table No. 76: % exceedence of pollutants at Chandrapur RO

	Number of Observations				Percentage Exceedence		
	Total	Exceedence SO	Exceedence NO	Exceedence RSPM	SO	NO	RSPM
Ballarshah	106	0	6	61	0	6	58
Chandrapur - MIDC	94	0	2	26	0	2	28
Chandrapur - SRO MPCB	305	0	0	55	0	0	18
Ghuggus	97	0	0	82	0	0	85
Rajura	100	0	0	59	0	0	59
Tadali MIDC	88	0	0	11	0	0	13

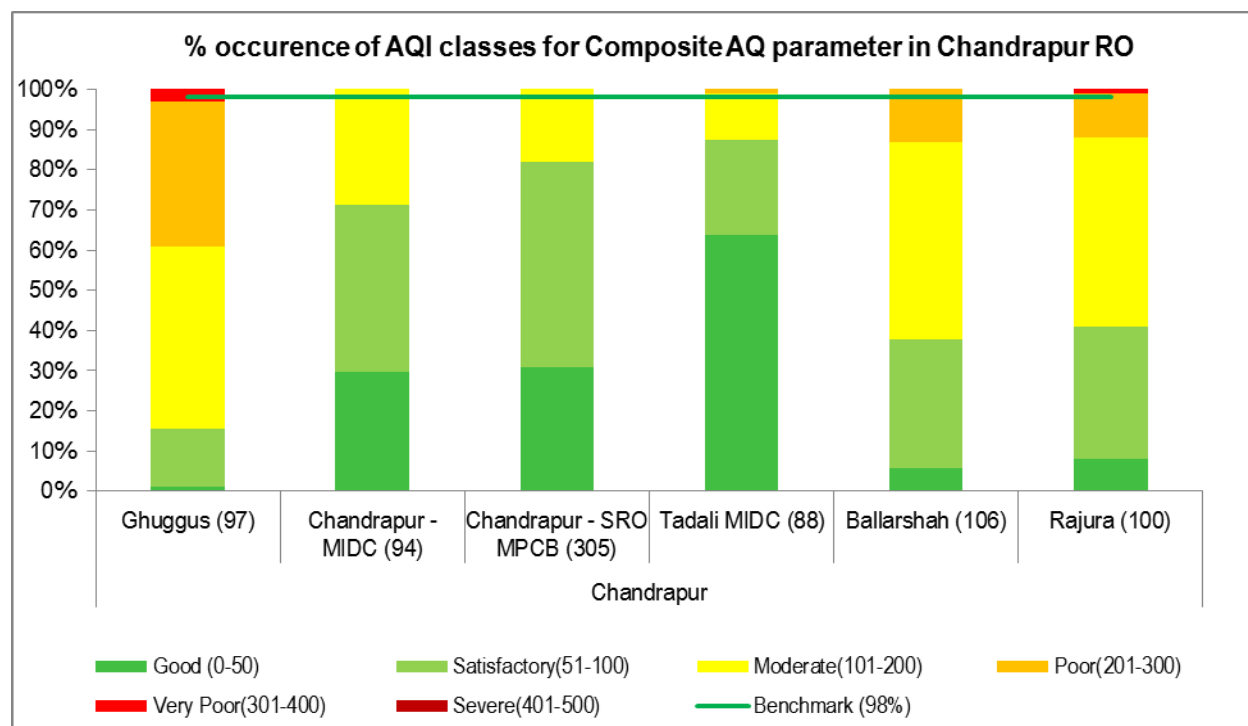
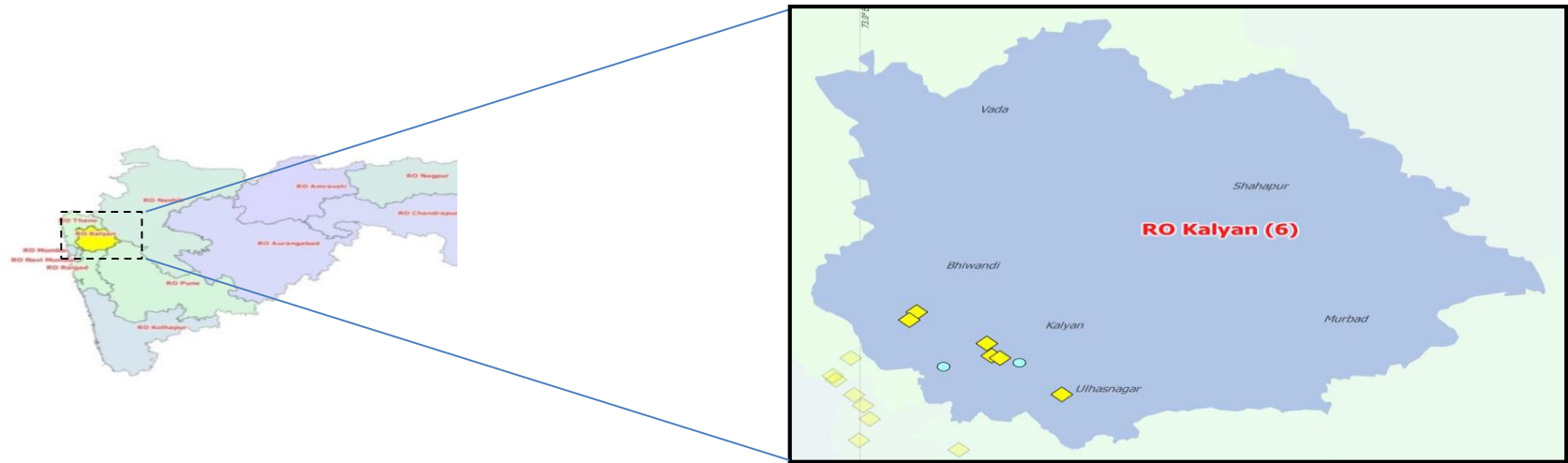


Figure No. 72: % occurrence of AQI classes for Composite AQ parameter in Chandrapur RO

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. 1: Data for Monthly average reading recorded at Ambernath

			Average of SO ₂	Average of NO _x	Average of RSPM
Ambernath	2015	Apr	17	50	98
		May	20	52	106
		Jun	18	47	92
		Jul	19	53	101
		Aug	22	45	90
		Sep	25	56	105
		Oct	20	58	107
		Nov	20	60	119
		Dec	37	89	162
	2016	Feb	18	72	133

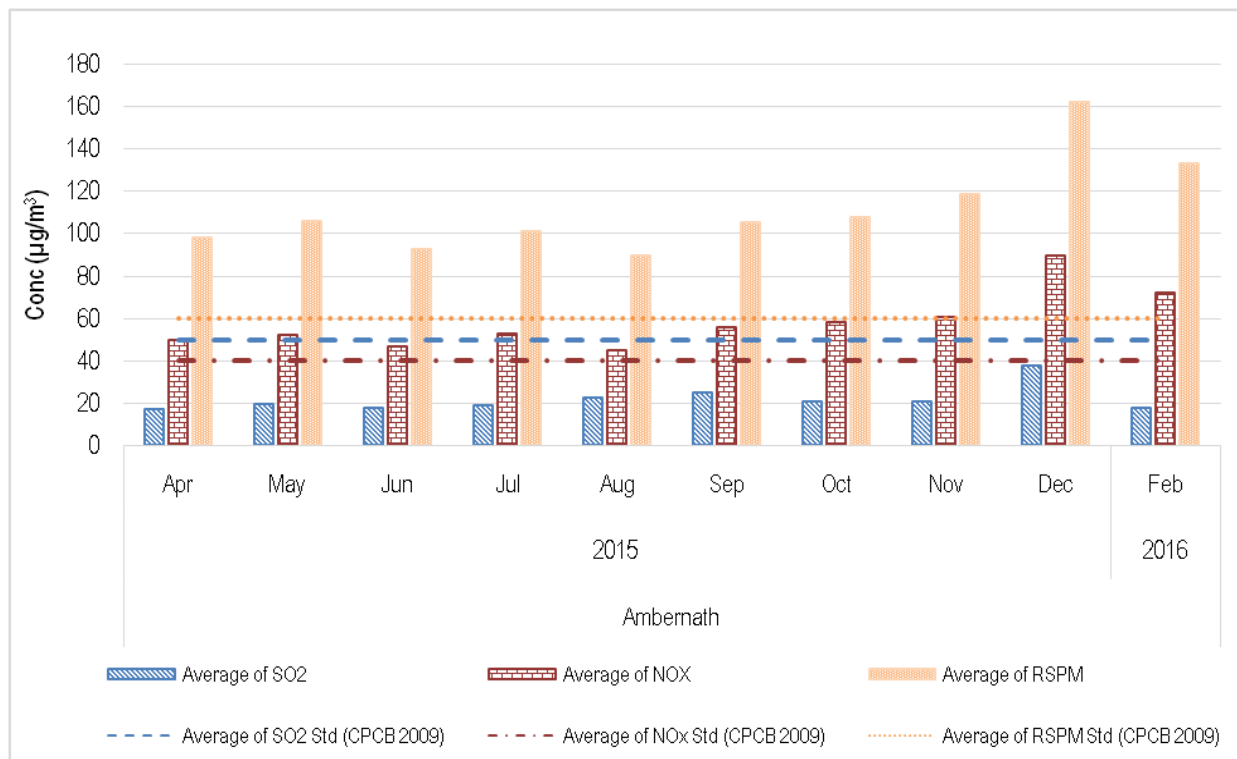
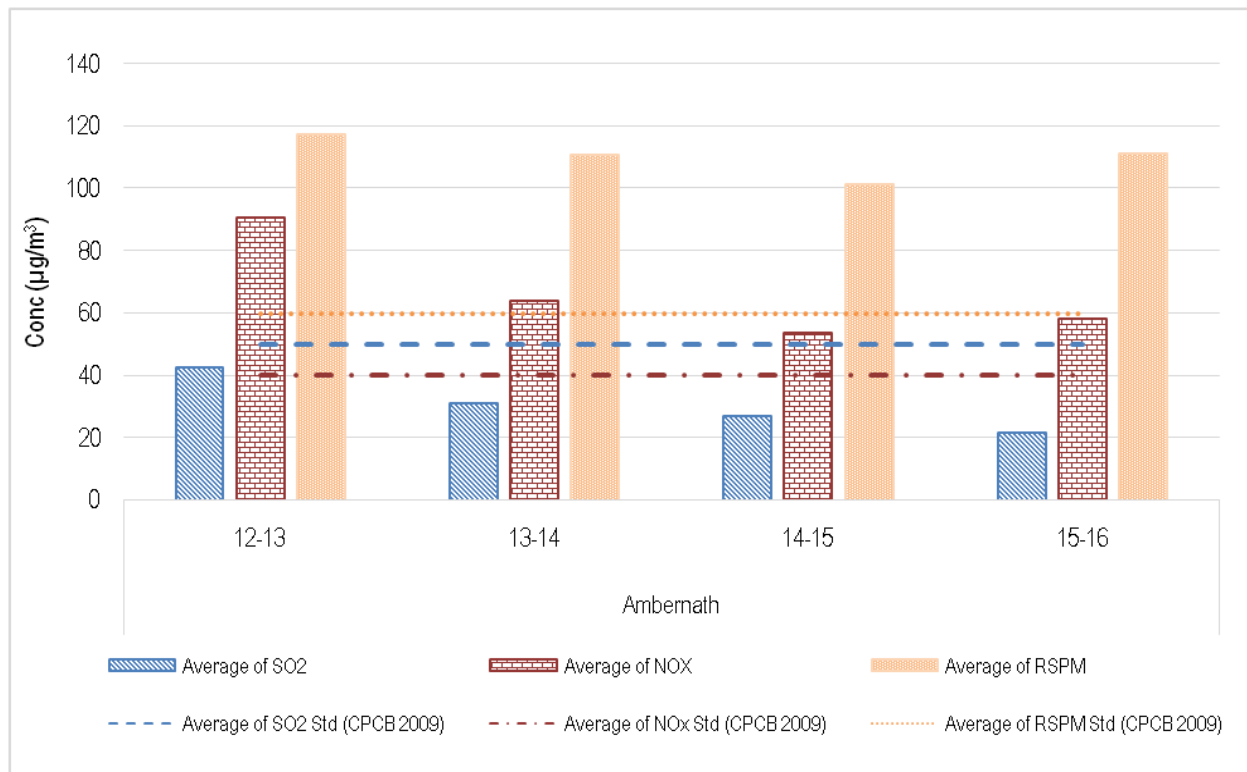


Figure No. 73: Monthly average reading recorded at Ambernath

Table. No. 2: Data for Annual average trend of SO₂, NO_x, and RSPM at Ambernath

		Average of SO ₂	Average of NO _x	Average of RSPM
Ambernath	12-13	42	91	118
	13-14	31	64	111
	14-15	27	54	101
	15-16	22	58	111

Figure No. 74: Annual average trend of SO₂, NO_x, and RSPM at Ambernath

Badlapur – Badlapur – BIWA House

Table. No. 3: Data for Monthly average reading recorded at Badlapur – BIWA House

			Average of SO ₂	Average of NO _x	Average of RSPM
Badlapur - BIWA House	2015	Apr	19	51	98
		May	21	57	108
		Jun	27	60	113
		Jul	19	55	105
		Aug	21	49	95
		Sep	25	57	108
		Oct	23	62	117
		Nov	20	61	114
		Dec	35	83	131
	2016	Jan	23	64	120
		Feb	20	75	137

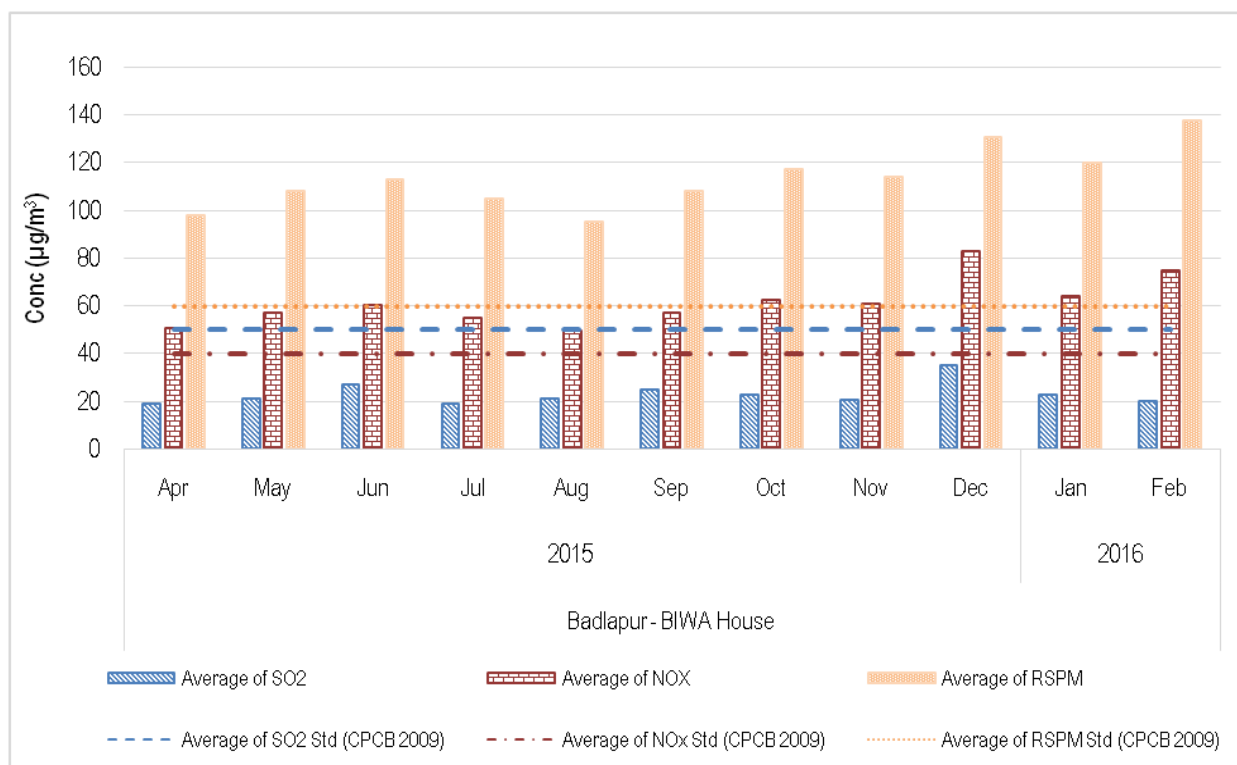


Figure No. 75: Monthly average reading recorded at Badlapur – BIWA House

Table. No. 4: Data for Annual average trend of SO₂, NO_x, and RSPM at Badlapur – BIWA House

		Average of SO ₂	Average of NO _x	Average of RSPM
Badlapur - BIWA House	09-10	55	85	103
	10-11	36	74	118
	11-12	41	68	121
	12-13	41	69	100
	13-14	35	49	96
	14-15	29	51	101
	15-16	23	61	113

Figure No. 76: Annual average trend of SO₂, NO_x, and RSPM at Badlapur – BIWA House

Bhiwandi – IGM Hospital

Table. No. 5: Data for Monthly average reading recorded at IGM Hospital - Bhiwandi

			Average of SO ₂	Average of NO _X	Average of RSPM
I.G.M. Hospital	2015	May	36	42	77
		Jun	37	42	77
		Jul	33	40	80
		Aug	33	40	80
		Sep	36	51	68
		Oct	31	47	62
		Nov	36	42	77
		Dec	29	41	66
	2016	Jan	33	42	64

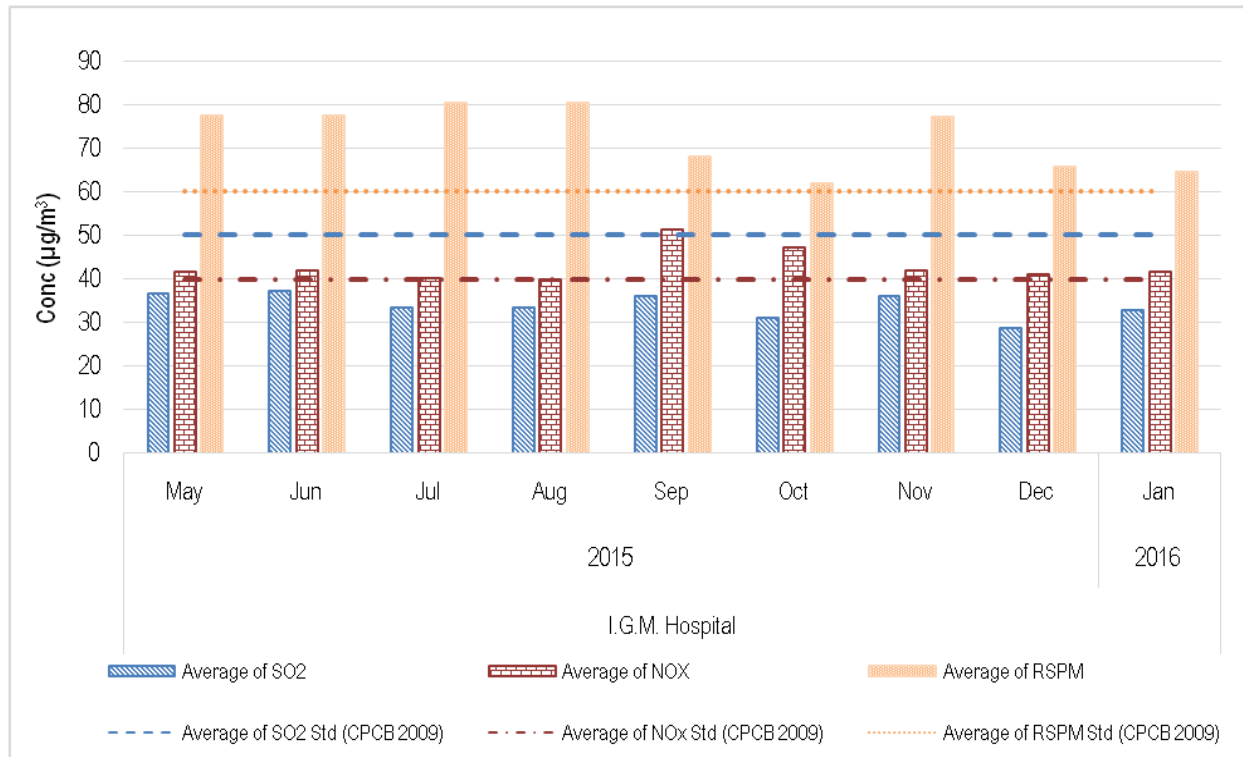
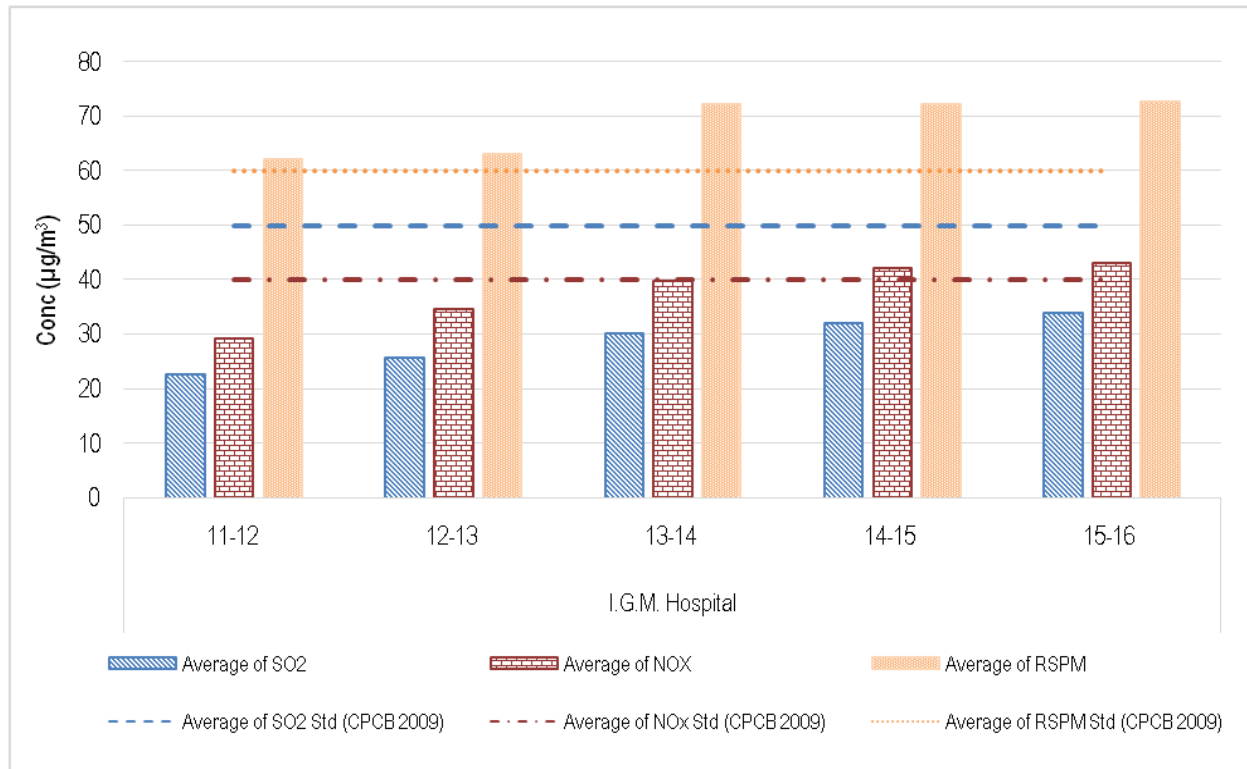


Figure No. 77: Monthly average reading recorded at IGM Hospital - Bhiwandi

Table. No. 6: Data for Annual average trend of SO₂, NO_x, and RSPM at IGM Hospital - Bhiwandi

		Average of SO ₂	Average of NO _x	Average of RSPM
I.G.M. Hospital	11-12	23	29	62
	12-13	26	35	63
	13-14	30	40	72
	14-15	32	42	72
	15-16	34	43	73

Figure No. 78: Annual average trend of SO₂, NO_x, and RSPM at IGM Hospital - Bhiwandi

Bhiwandi – Prematai hall

Table. No. 7: Data for Monthly average reading recorded at Prematai hall - Bhiwandi

			Average of SO ₂	Average of NO _X	Average of RSPM
Prematai hall	2015	May	36	44	79
		Jun	36	44	79
		Jul	33	42	80
		Aug	33	42	79
		Sep	35	47	67
		Oct	37	47	66
		Nov	36	42	62
	2016	Jan	29	42	64

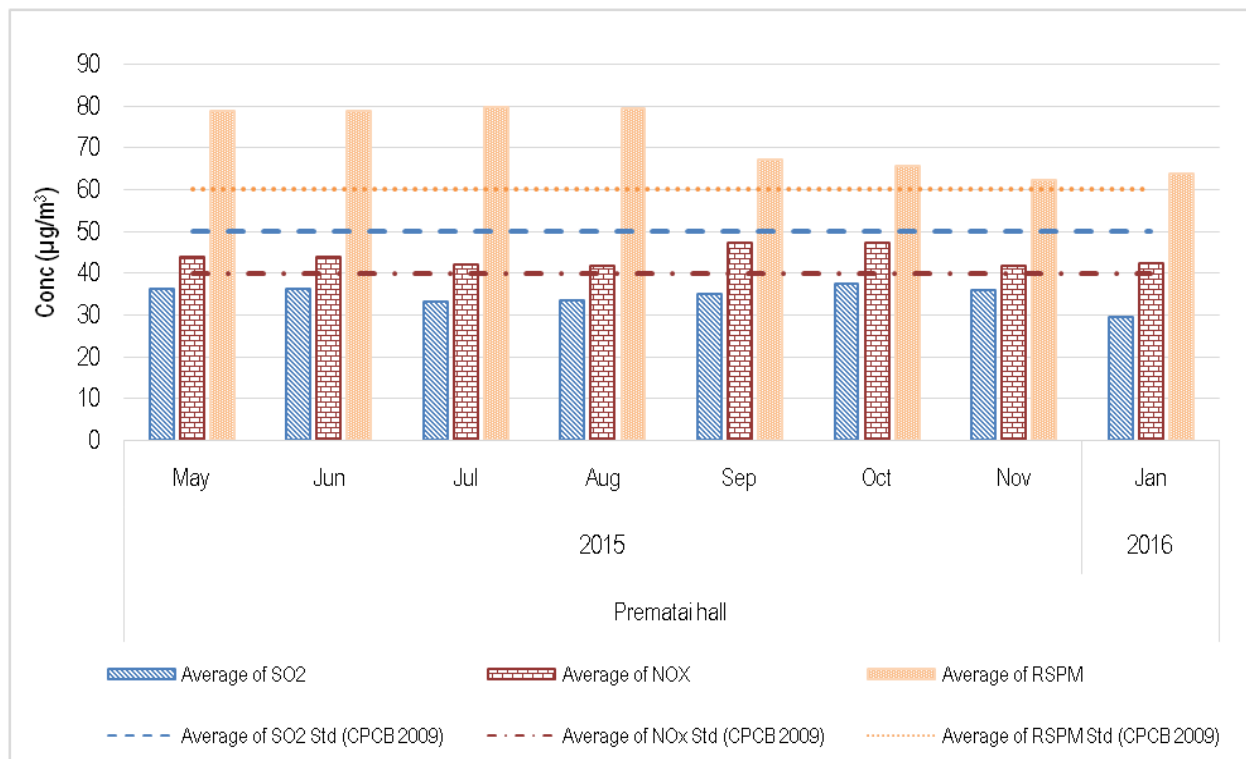
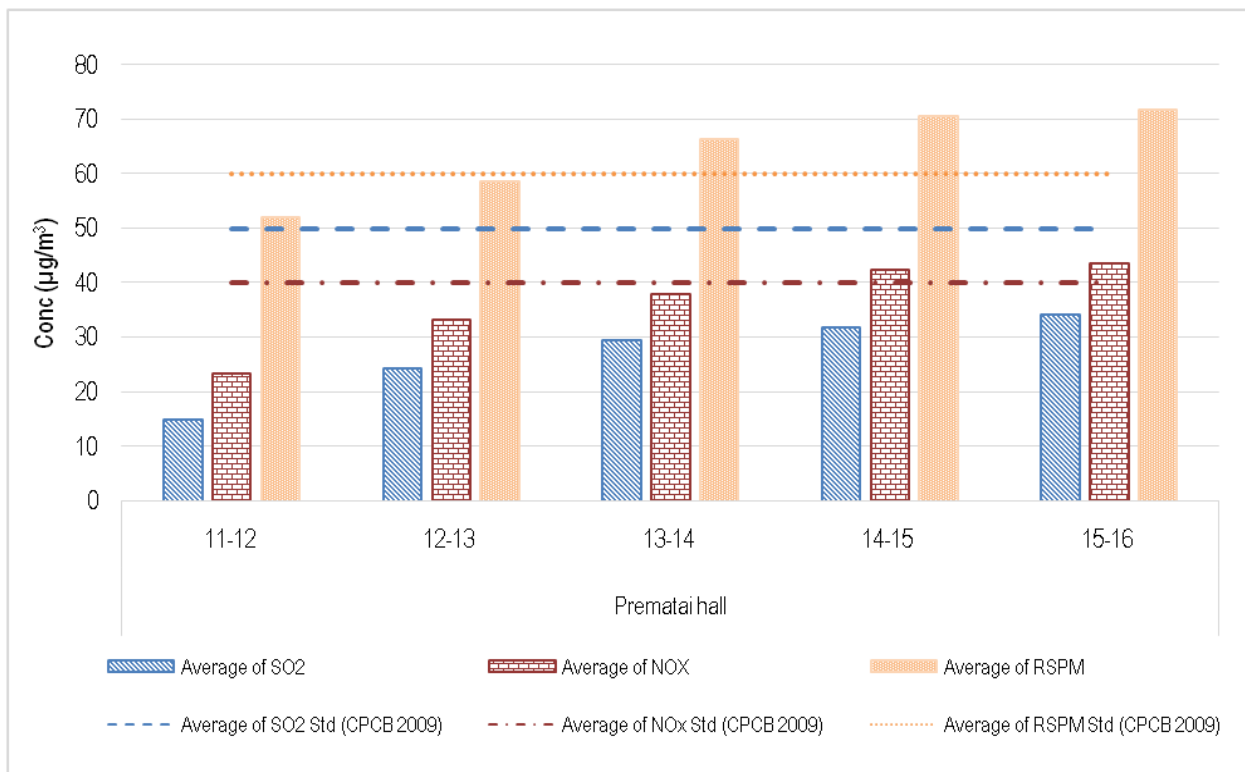


Figure No. 79: Monthly average reading recorded at Prematai hall - Bhiwandi

Table. No. 8: Data for Annual average trend of SO₂, NO_x, and RSPM at Prematai hall - Bhiwandi

		Average of SO ₂	Average of NO _x	Average of RSPM
Prematai hall	11-12	15	23	52
	12-13	24	33	59
	13-14	29	38	66
	14-15	32	42	71
	15-16	34	44	72

Figure No. 80: Annual average trend of SO₂, NO_x, and RSPM at Prematai hall - Bhiwandi

Dombivali

Table. No. 9: Data for Monthly average reading recorded at Dombivali

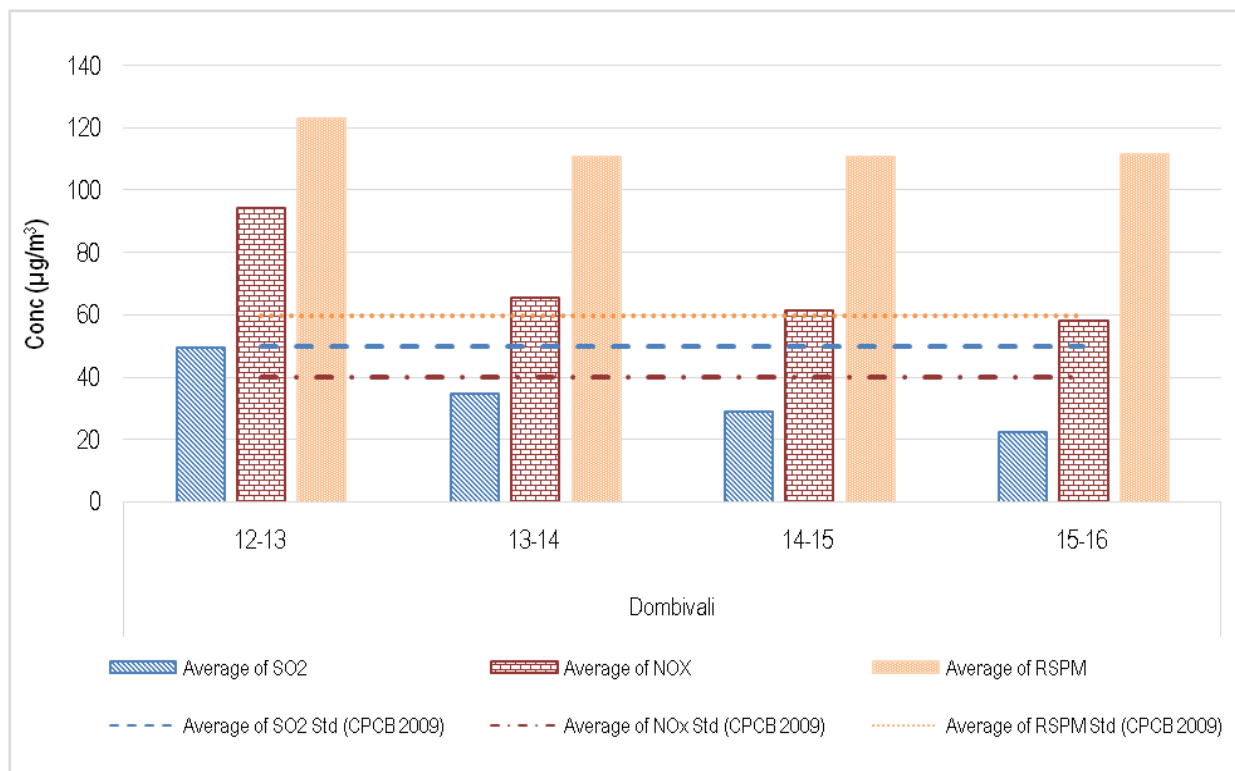
			Average of SO ₂	Average of NO _x	Average of RSPM
Dombivali	2015	Apr	18	51	98
		May	23	55	109
		Jun	19	49	100
		Jul	19	63	116
		Aug	22	48	90
		Sep	25	50	98
		Oct	21	63	120
		Nov	24	65	121
		Dec	33	76	145
	2016	Feb	21	60	115



Figure No. 81: Monthly average reading recorded at Dombivali

Table. No. 10: Data for Annual average trend of SO₂, NO_x, and RSPM at Dombivali

		Average of SO ₂	Average of NO _x	Average of RSPM
Dombivali	12-13	50	94	123
	13-14	35	66	111
	14-15	29	62	111
	15-16	23	58	112

Figure No. 82: Annual average trend of SO₂, NO_x, and RSPM at Dombivali

Dombivali – MIDC Office Dombivali

Table. No. 11: Data for Monthly average reading recorded at MIDC Office - Dombivali

		Average of SO ₂	Average of NO _x	Average of RSPM	
MIDC Office Dombivali	2015	Apr	17	49	95
		May	21	59	110
		Jun	22	53	100
		Jul	18	64	119
		Aug	24	51	99
		Sep	25	58	105
		Oct	18	55	105
		Nov	20	61	115
		Dec	33	76	139
	2016	Feb	18	63	117

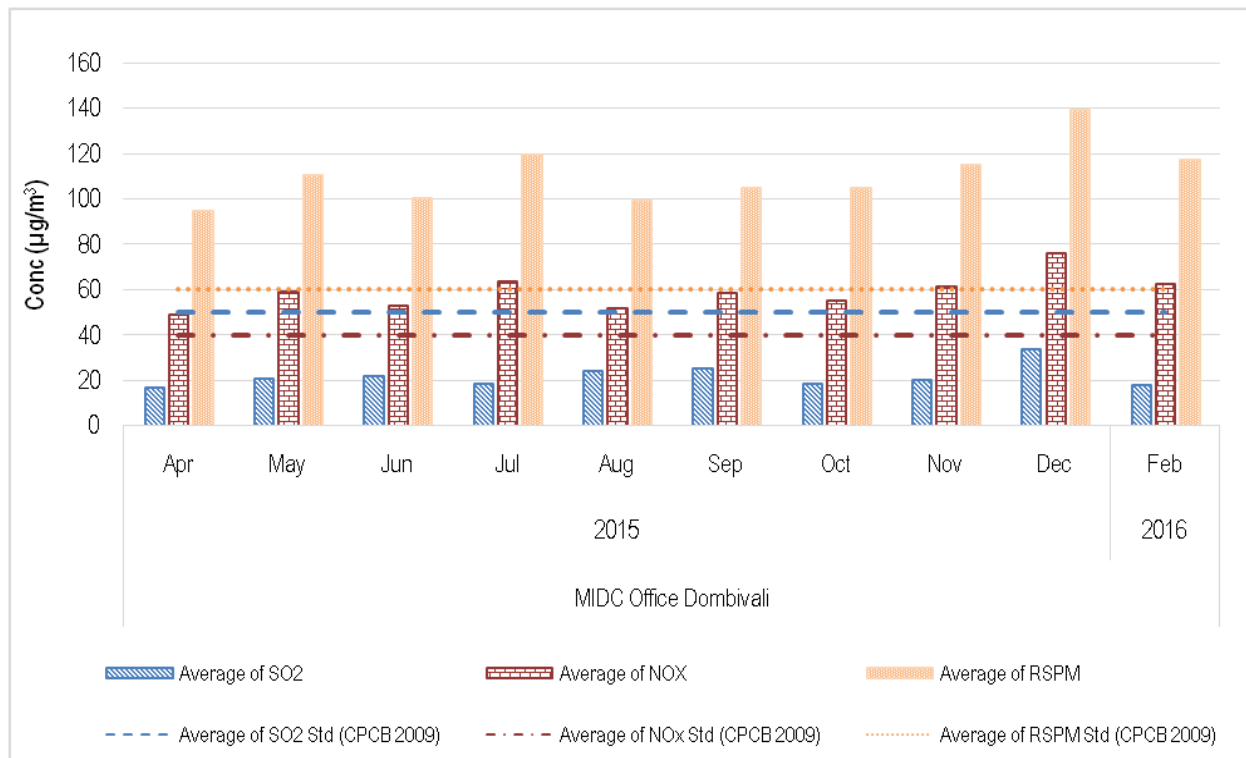
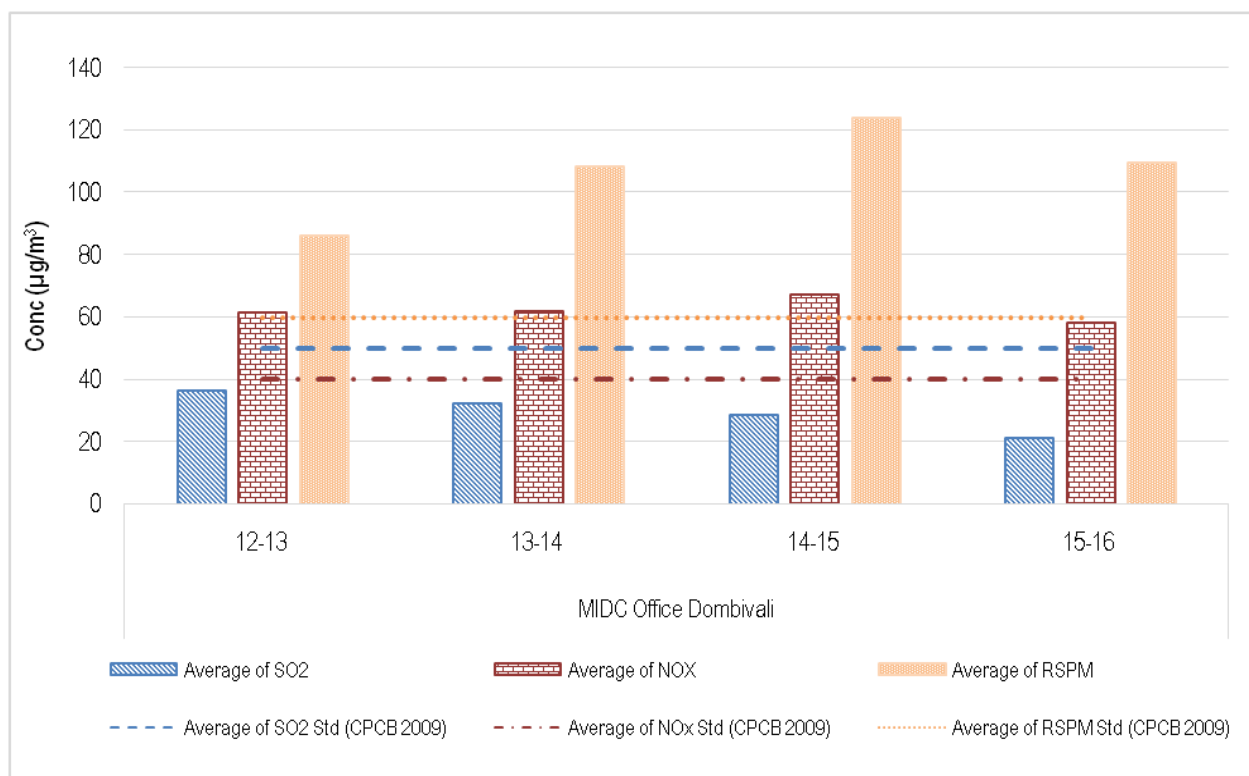


Figure No. 83: Monthly average reading recorded at MIDC Office - Dombivali

Table. No. 12: Data for Annual average trend of SO₂, NO_x, and RSPM at MIDC Office - Dombivali

		Average of SO ₂	Average of NO _x	Average of RSPM
MIDC Office Dombivali	12-13	37	61	86
	13-14	32	62	109
	14-15	29	67	124
	15-16	21	58	110

Figure No. 84: Annual average trend of SO₂, NO_x, and RSPM at MIDC Office - Dombivali

Kalyan – MPCB RO Kalyan office

Table. No. 13: Data for Monthly average reading recorded at MPCB RO Kalyan office

			Average of SO ₂	Average of NO _x	Average of RSPM
MPCB RO Kalyan office	2015	May	37	43	79
		Jun	37	43	79
		Jul	35	42	76
		Aug	34	42	75
		Sep	25	34	66
		Oct	29	37	66
		Nov	30	36	65
		Dec	29	41	66
	2016	Jan	28	41	65

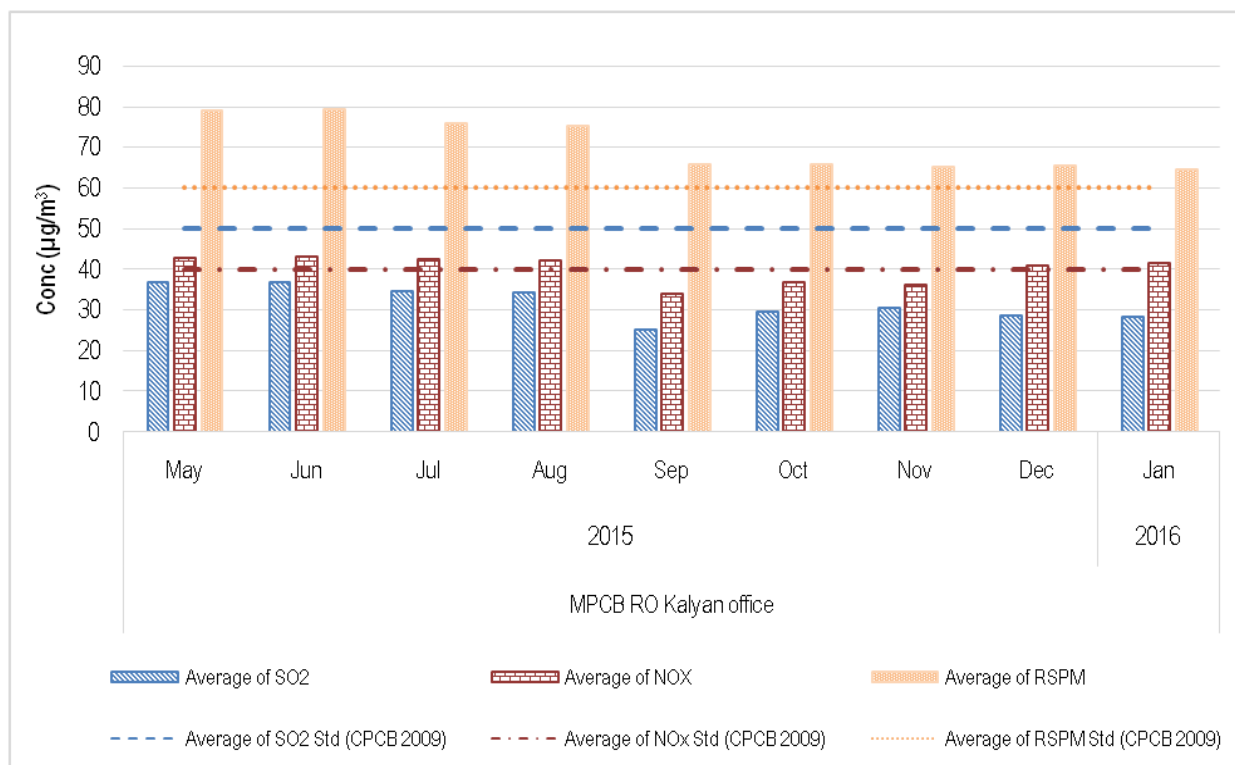
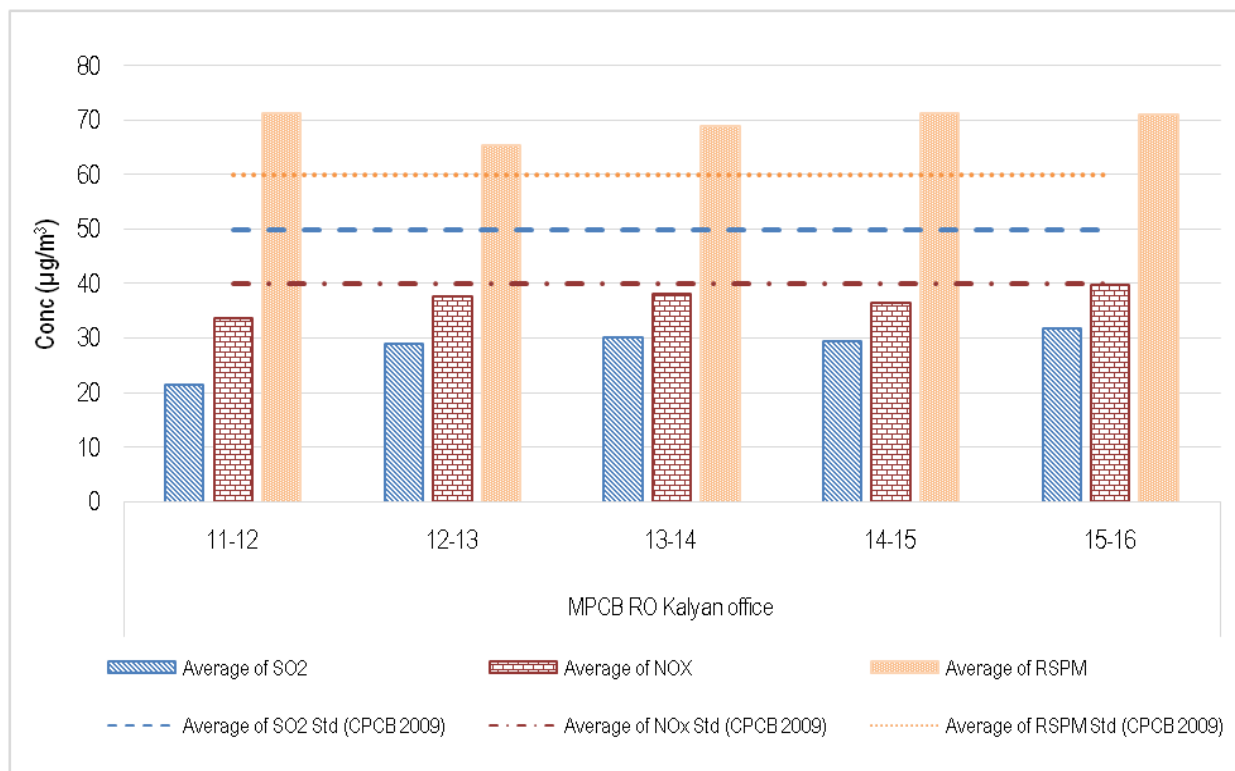


Figure No. 85: Monthly average reading recorded at MPCB RO Kalyan office

Table. No. 14: Data for Annual average trend of SO₂, NO_x, and RSPM at MPCB RO Kalyan office

		Average of SO ₂	Average of NO _x	Average of RSPM
MPCB RO Kalyan office	11-12	22	34	71
	12-13	29	38	65
	13-14	30	38	69
	14-15	30	37	71
	15-16	32	40	71

Figure No. 86: Annual average trend of SO₂, NO_x, and RSPM at MPCB RO Kalyan office

Ulhasnagar – Smt. CHM College Campus

Table. No. 15: Data for Monthly average reading recorded at Smt. CHM College Campus, Ulhasnagar

			Average of SO ₂	Average of NO _x	Average of RSPM
Smt. CHM College Campus	2015	Apr	17	46	90
		May	23	55	90
		Jun	19	40	80
		Aug	22	49	95
		Sep	23	52	100
		Oct	22	64	119
		Nov	19	59	111
		Dec	38	88	160
	2016	Jan	20	58	110
		Feb	20	74	137

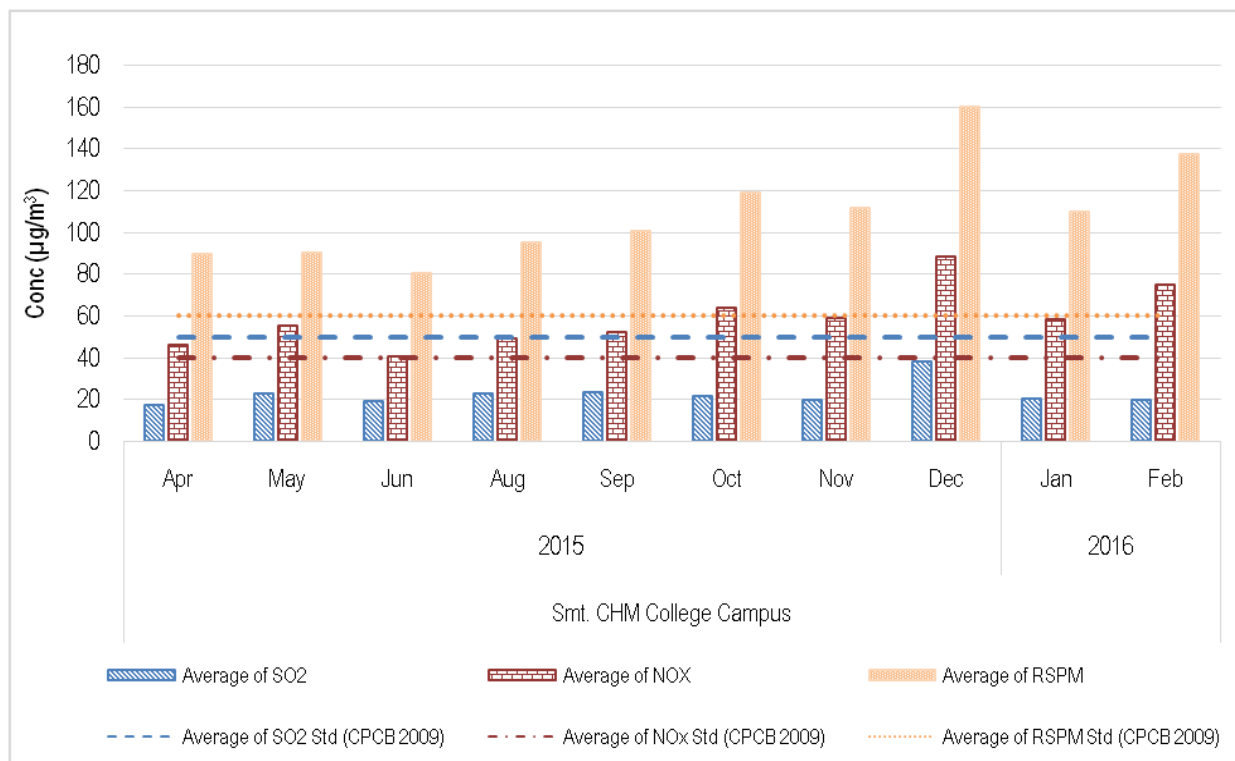


Figure No. 87: Monthly average reading recorded at Smt. CHM College Campus, Ulhasnagar

Table. No. 16: Data for Annual average trend of SO₂, NO_x, and RSPM at Smt. CHM College Campus, Ulhasnagar

		Average of SO ₂	Average of NO _x	Average of RSPM
Smt. CHM College Campus	09-10	46	70	92
	10-11	30	61	99
	11-12	37	64	109
	12-13	34	58	85
	13-14	25	37	68
	14-15	22	42	82
	15-16	22	59	109

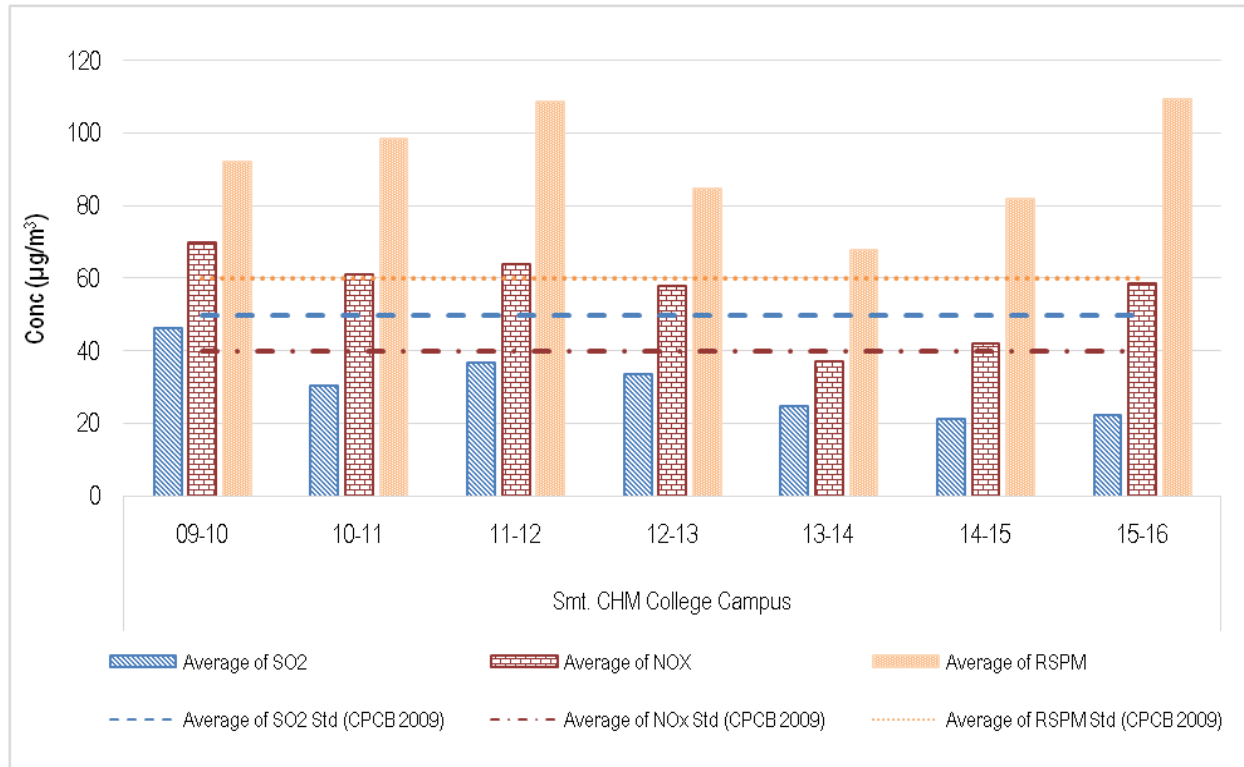


Figure No. 88: Annual average trend of SO₂, NO_x, and RSPM at Smt. CHM College Campus, Ulhasnagar

Ulhasnagar - Powai Chowk

Table. No. 17: Data for Monthly average reading recorded at Powai Chowk - Ulhasnagar

			Average of SO ₂	Average of NO _X	Average of RSPM
Powai Chowk	2015	Aug	22	47	94
		Sep	24	56	109
		Oct	25	77	149
		Nov	23	61	115
		Dec	37	89	162
	2016	Jan	25	62	116
		Feb	20	82	138

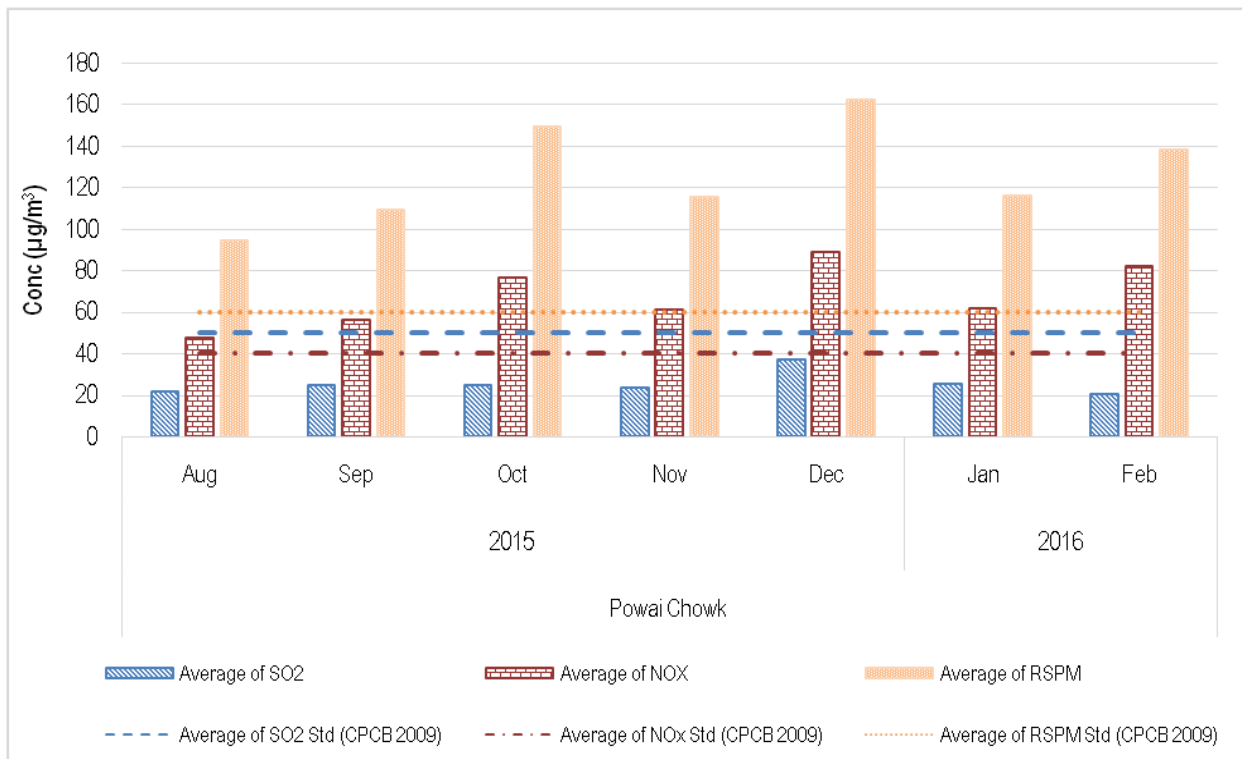


Figure No. 89: Monthly average reading recorded at Powai Chowk - Ulhasnagar

Table. No. 18: Data for Annual average trend of SO₂, NO_x, and RSPM at Powai Chowk - Ulhasnagar

		Average of SO ₂	Average of NO _x	Average of RSPM
Powai Chowk	09-10	53	96	119
	10-11	31	69	114
	11-12	43	74	122
	12-13	43	81	106
	13-14	33	58	99
	14-15	30	57	106
	15-16	25	67	126

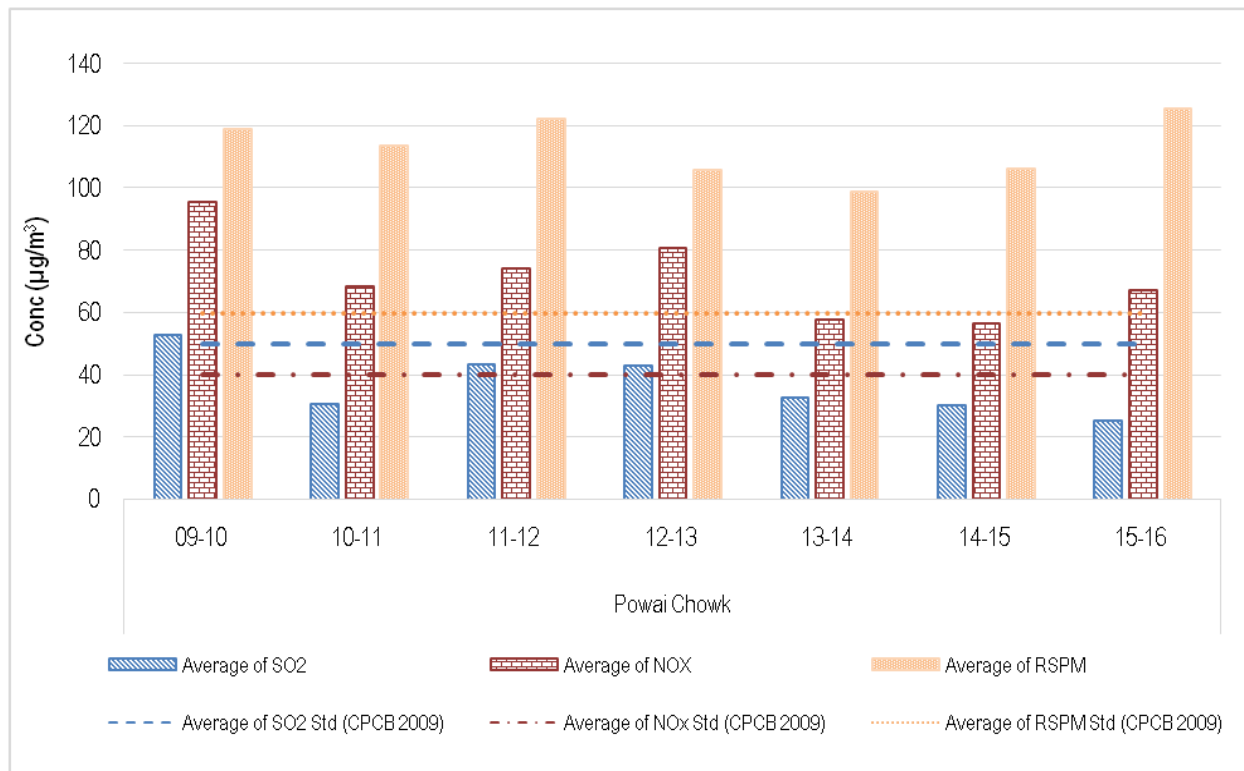
Figure No. 90: Annual average trend of SO₂, NO_x, and RSPM at Powai Chowk - Ulhasnagar

Table No. 77: % exceedence of pollutants at Kalyan RO

	Number of Observations				Percentage Exceedence		
	Total	Exceedence SO	Exceedence NO	Exceedence RSPM	SO	NO	RSPM
Ambernath	87	0	11	51	0	13	59
Badlapur - BIWA House	95	1	12	61	1	13	64
Dombivali	87	0	7	55	0	8	63
I.G.M. Hospital	71	0	0	0	0	0	0
MIDC Office Dombivali	83	0	9	49	0	11	59
MPCB RO Kalyan office	71	0	0	0	0	0	0
Powai Chowk	60	0	15	47	0	25	78
Prematai hall	68	0	0	0	0	0	0
Smt. CHM College Campus	87	0	8	49	0	9	56

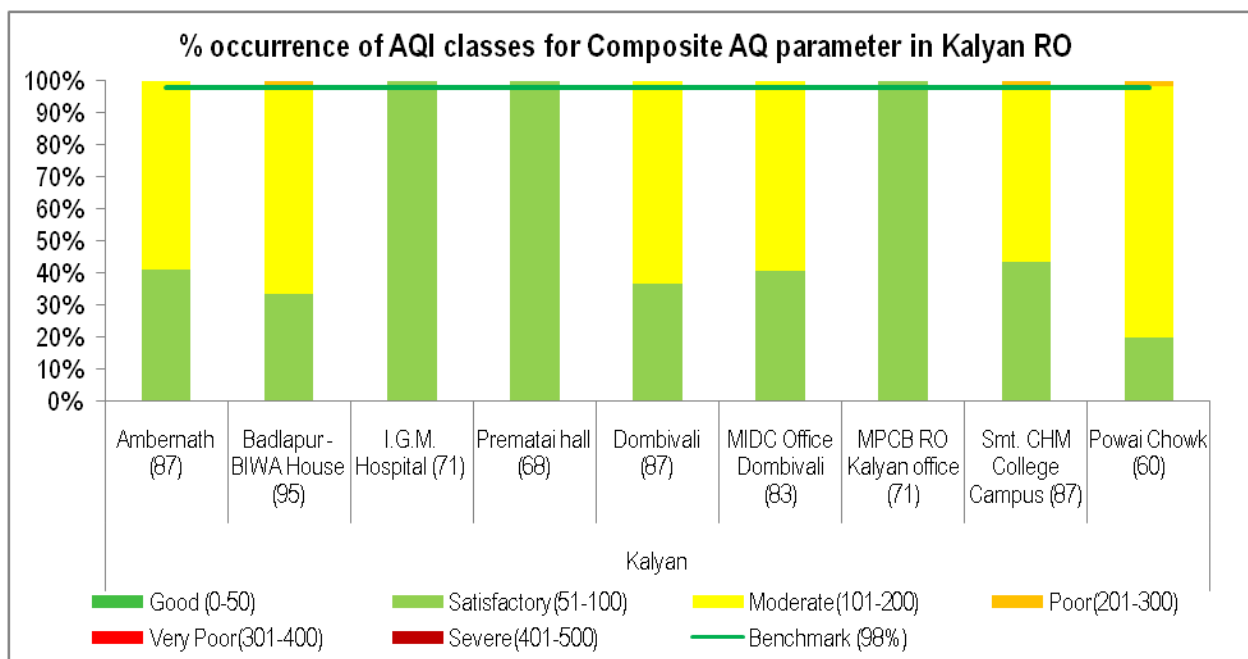
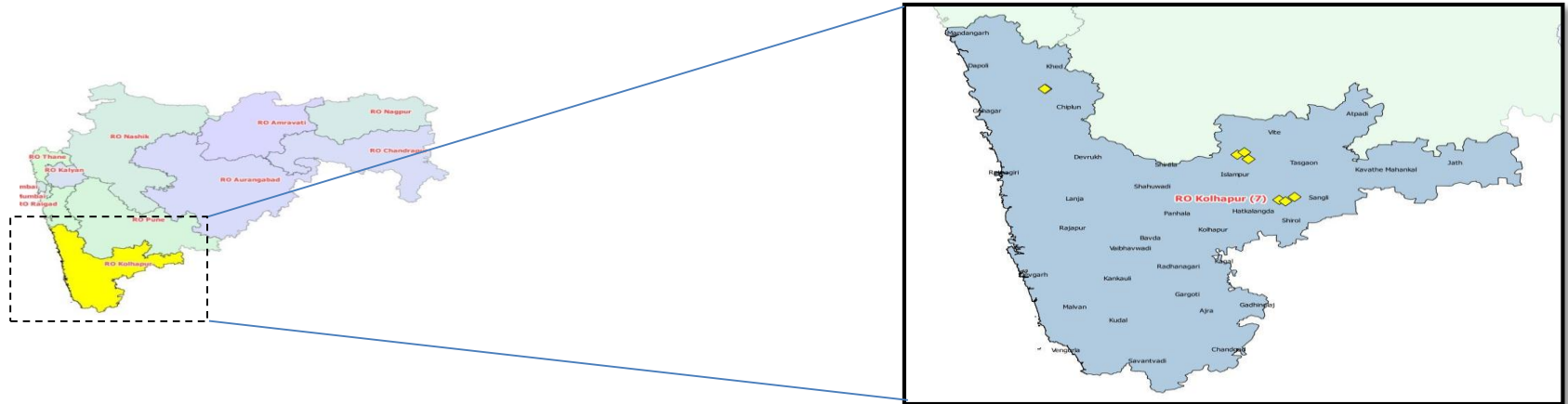


Figure No. 91: % occurrence of AQI classes for Composite AQ parameter in Kalyan RO

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. 78: Data for monthly average reading recorded at MIDC Chalkewadi Chiplun

			Average of SO ₂	Average of NO _X	Average of RSPM
Chiplun - MIDC Chalkewadi	2015	Apr	12	12	186
		May	11	11	155

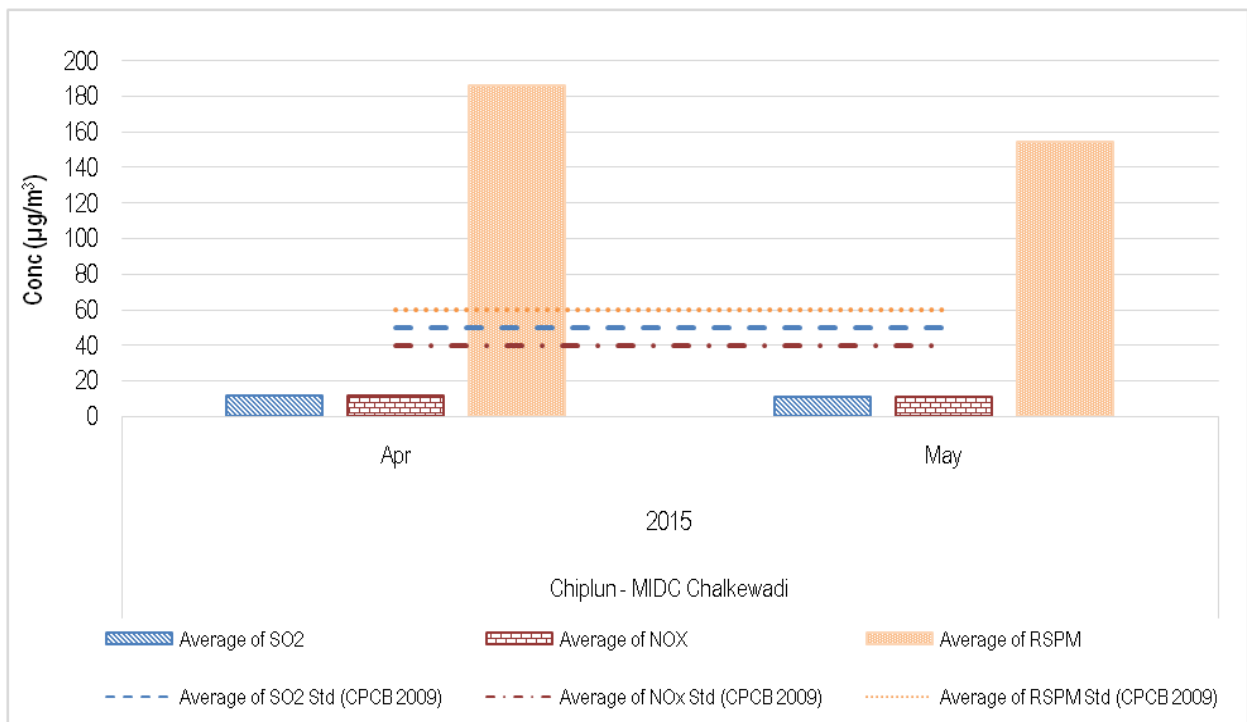


Figure No. 92: Monthly average reading recorded at MIDC Chalkewadi Chiplun

Table No. 79: Data for annual average trend of SO₂, NO_x, and RSPM at MIDC Chalkewadi Chiplun

		Average of SO ₂	Average of NO _x	Average of RSPM
Chiplun - MIDC Chalkewadi	10-11	59	33	144
	11-12	24	15	38
	13-14	10	9	127
	14-15	11	11	113
	15-16	11	12	170

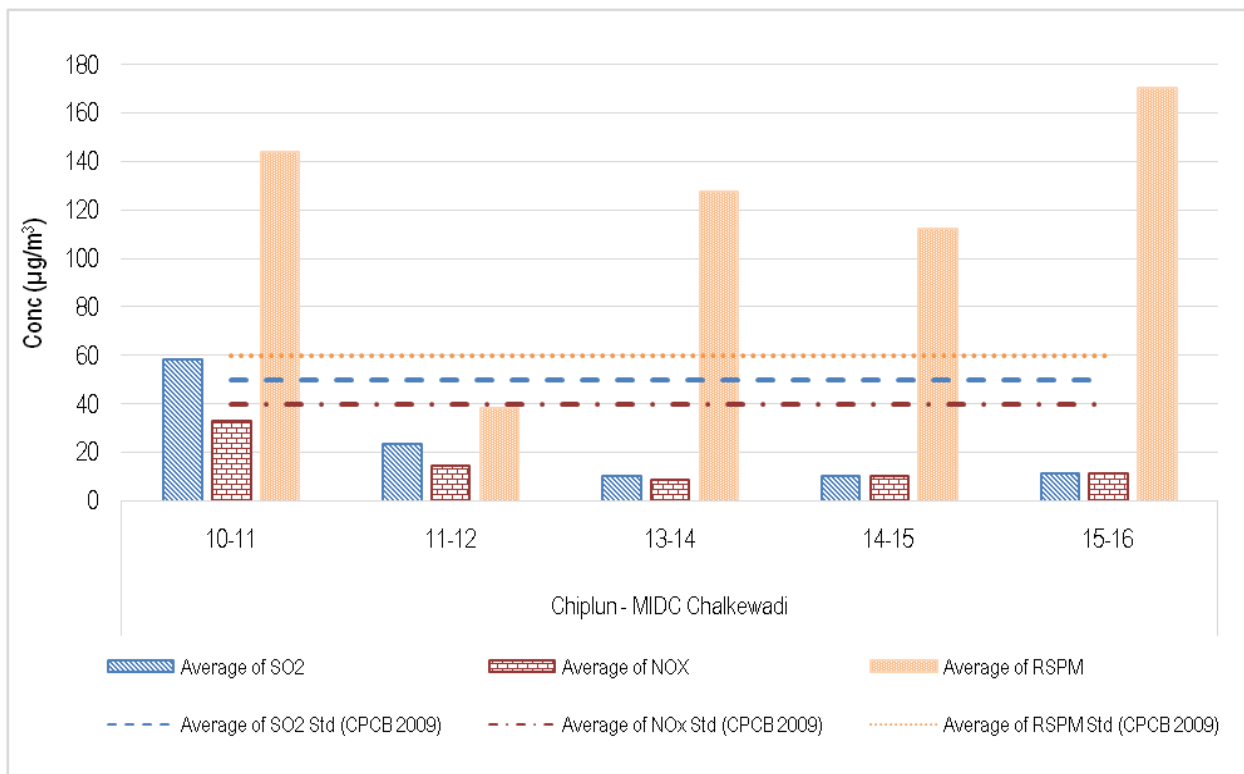


Figure No. 93: Annual average trend of SO₂, NO_x, and RSPM at MIDC Chalkewadi Chiplun

Chiplun – Chiplun – Water Treatment

Table No. 80: Data for monthly average reading recorded at Chiplun – Water Treatment

			Average of SO ₂	Average of NO _X	Average of RSPM
Chiplun - Water Treatment	2015	Apr	12	11	194
		May	11	11	152

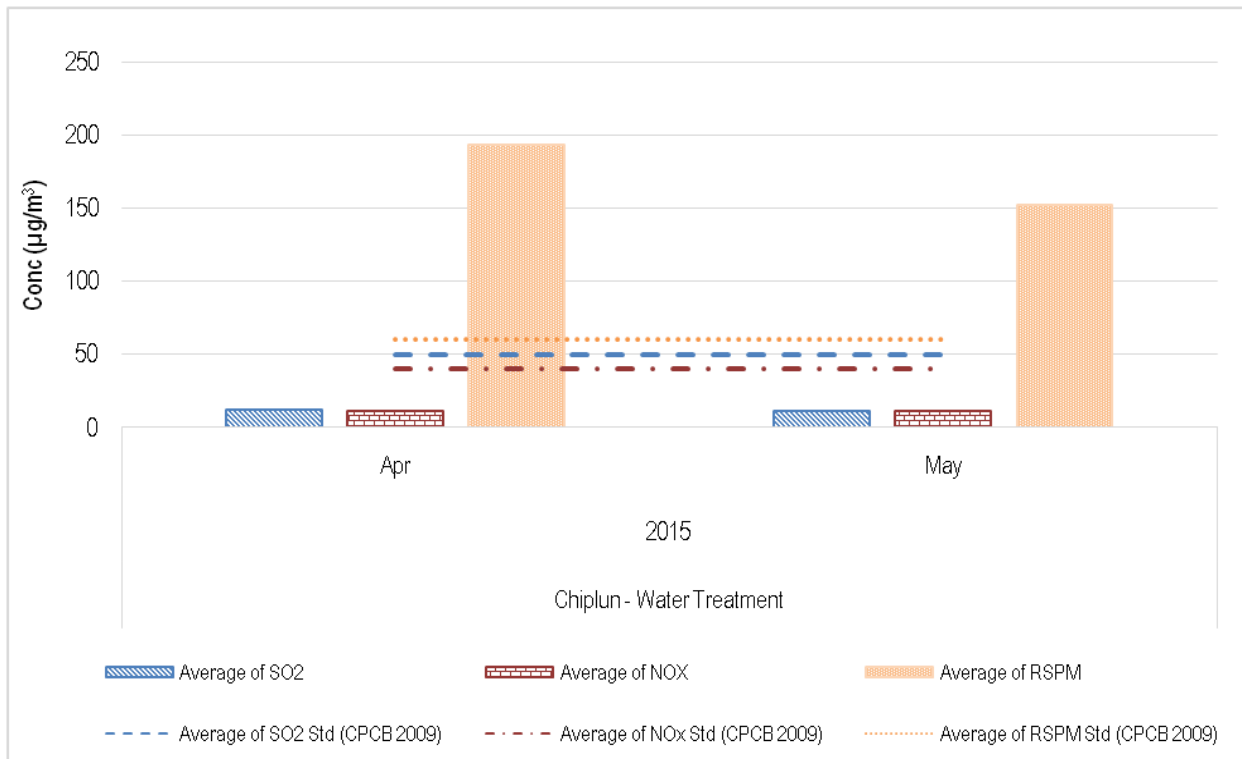


Figure No. 94: Monthly average reading recorded at Chiplun – Water Treatment

Table No. 81: Annual average trend of SO₂, NO_x, and RSPM at Chiplun – Water Treatment

		Average of SO ₂	Average of NO _x	Average of RSPM
Chiplun - Water Treatment	10-11	54	31	129
	11-12	25	15	45
	13-14	10	9	133
	14-15	10	10	113
	15-16	11	11	173

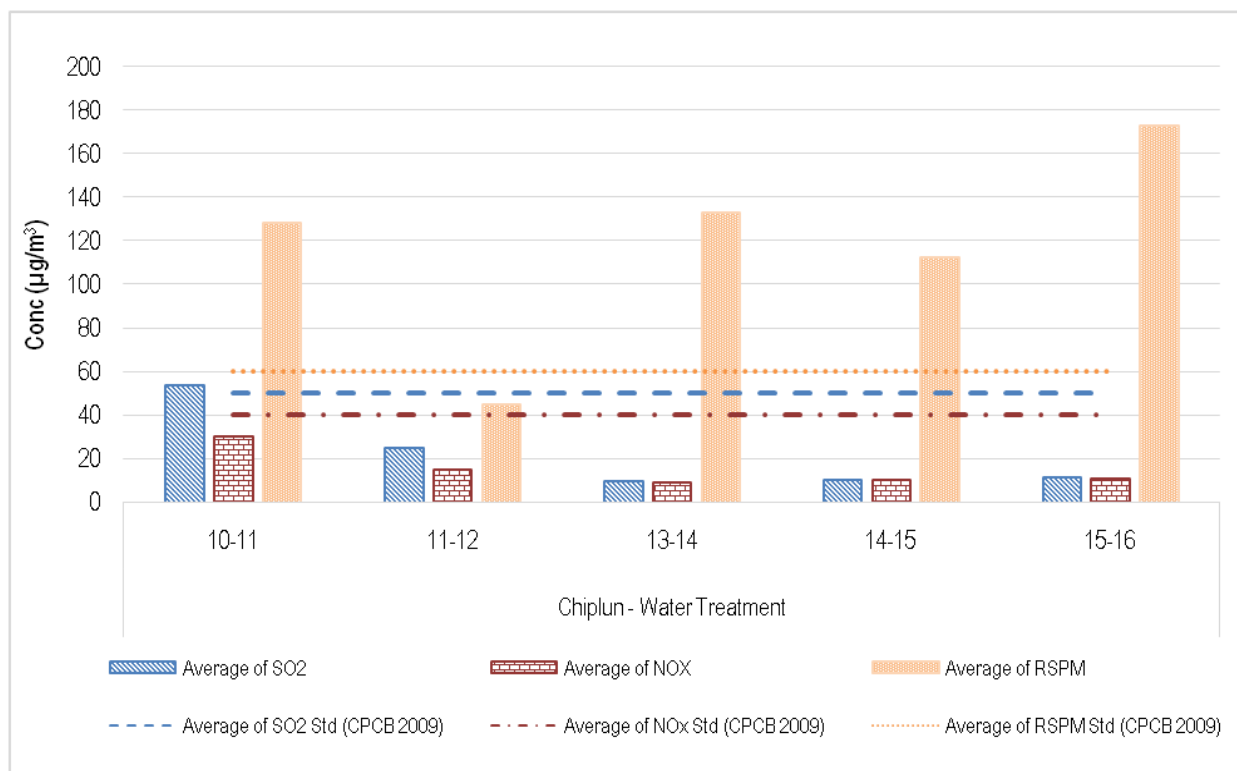


Figure No. 95: Annual average trend of SO₂, NO_x, and RSPM at Chiplun – Water Treatment

Kolhapur – Shivaji University Campus

Table No. 82: Data for monthly average reading recorded at Shivaji University Campus

			Average of SO ₂	Average of NO _X	Average of RSPM
Shivaji University Campus	2015	Apr	17	27	69
		May	15	21	60
		Jun	11	15	47
		Jul	11	16	50
		Aug	10	16	53
		Sep	14	24	71
		Oct	15	27	72
		Nov	14	29	69
		Dec	14	30	72
	2016	Jan	16	33	69
		Feb	12	23	64
		Mar	12	22	65

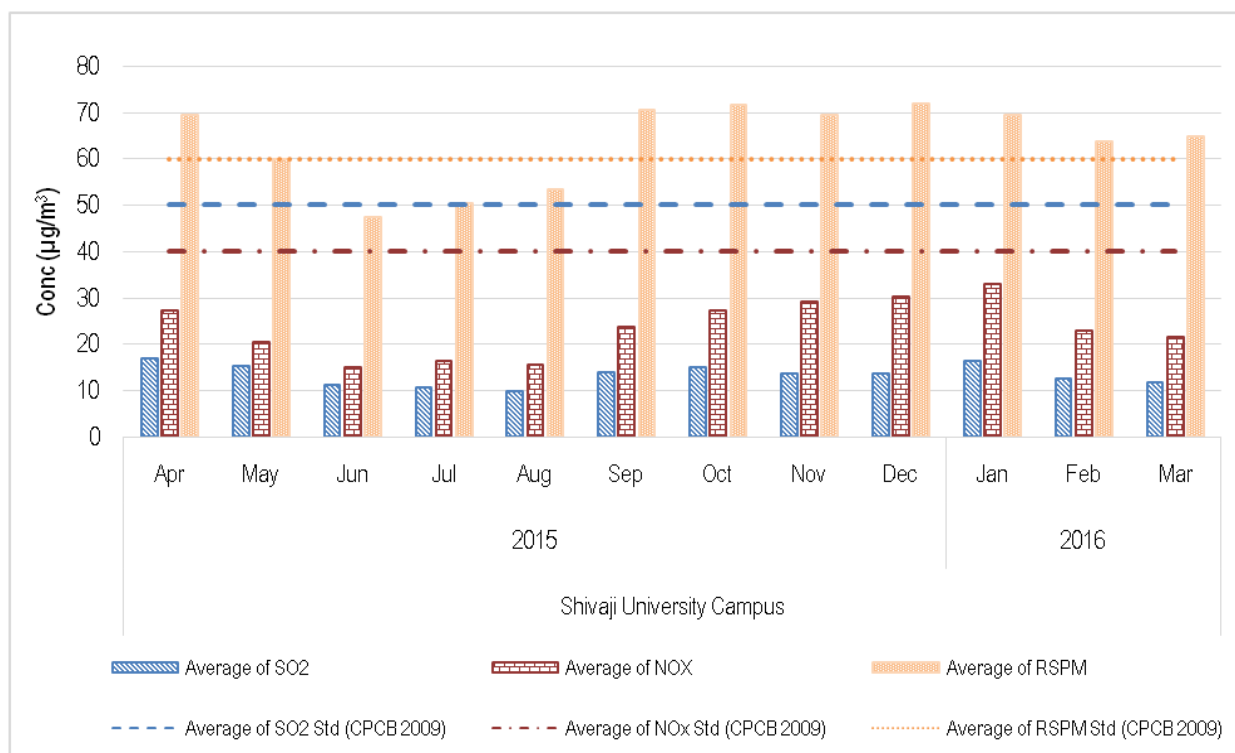


Figure No. 96: Monthly average reading recorded at Shivaji University Campus

Table No. 83: Data for annual average trend of SO₂, NO_x, and RSPM at Shivaji University Campus

		Average of SO ₂	Average of NO _x	Average of RSPM
Shivaji University Campus	09-10	8	4	55
	10-11	9	9	56
	11-12	10	13	60
	12-13	12	18	61
	13-14	14	20	64
	14-15	12	22	60
	15-16	13	23	63

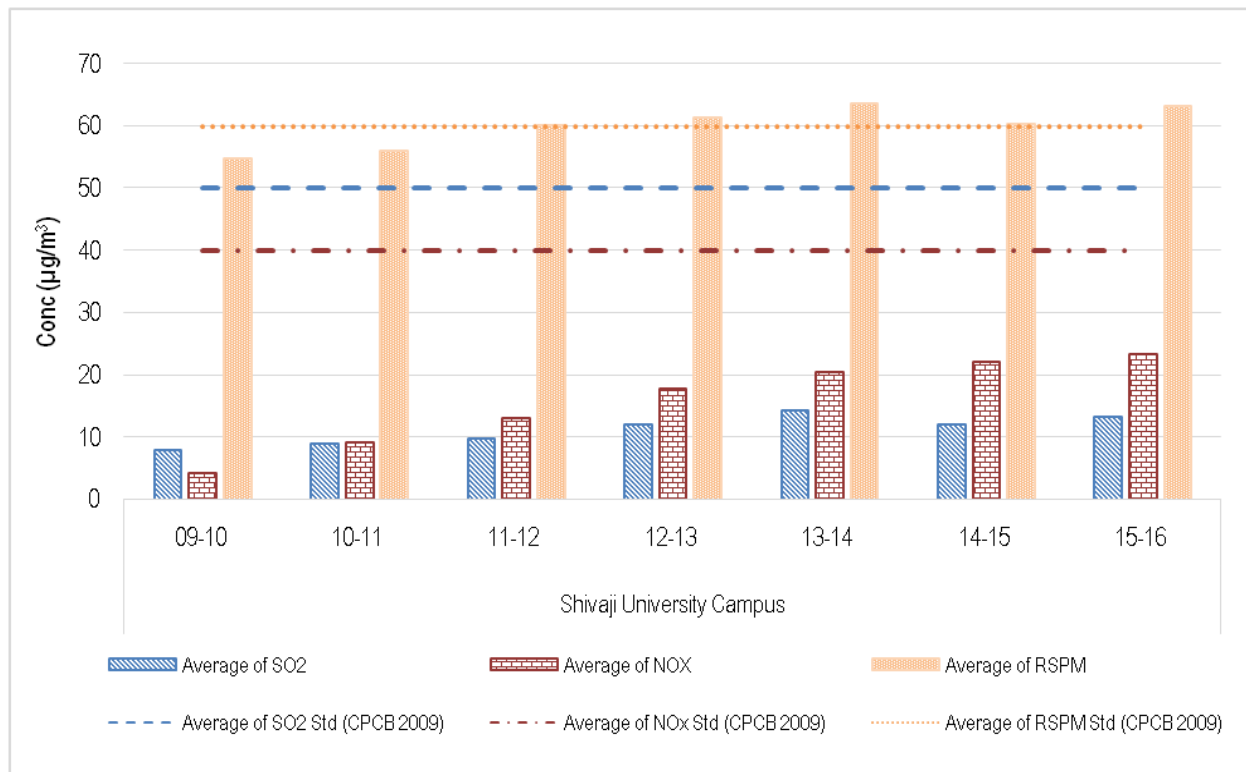


Figure No. 97: Annual average trend of SO₂, NO_x, and RSPM at Shivaji University Campus

Kolhapur – Ruikar Trust

Table No. 84: Data for monthly average reading recorded at Ruikar Trust – Kolhapur

			Average of SO ₂	Average of NO _x	Average of RSPM
Ruikar Trust	2015	Apr	35	63	161
		May	26	42	107
		Jun	19	31	100
		Jul	18	33	101
		Aug	16	34	94
		Sep	22	52	117
		Oct	25	63	116
		Nov	25	57	117
		Dec	28	61	123
	2016	Jan	36	73	144
		Feb	30	59	139
		Mar	24	51	127

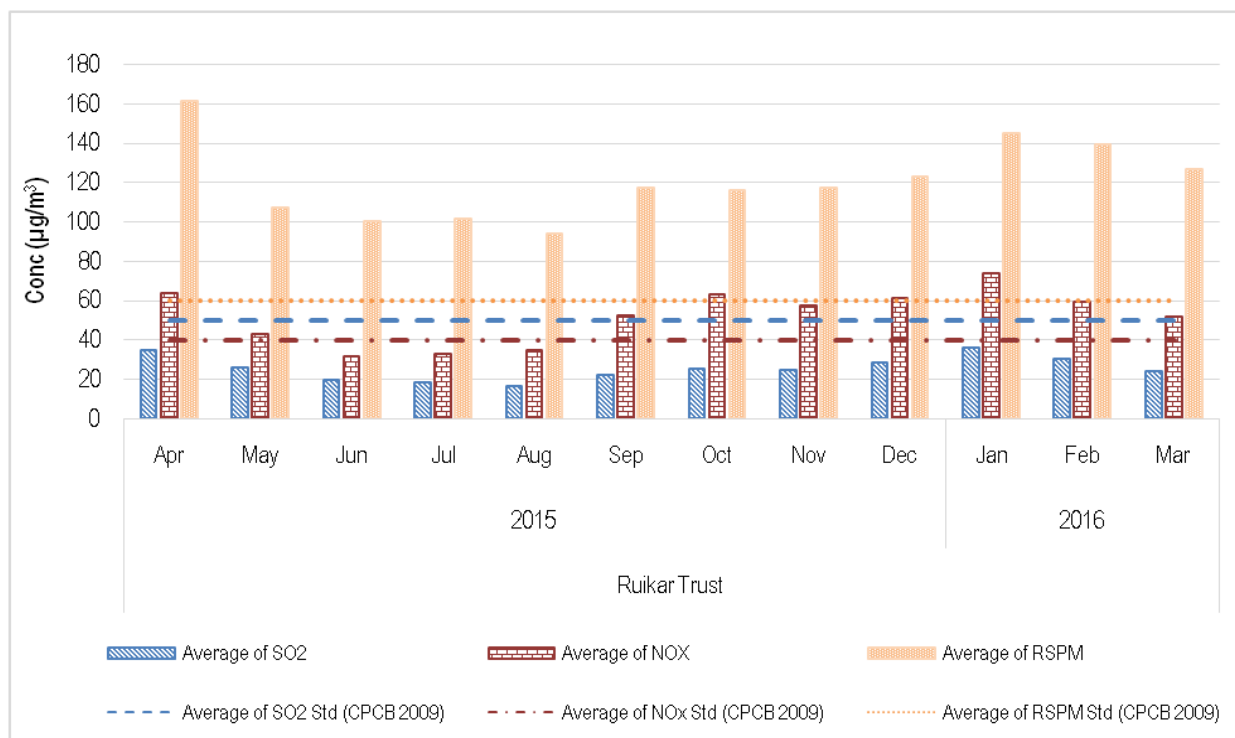


Figure No. 98: Monthly average reading recorded at Ruikar Trust - Kolhapur

Table No. 85: Data for annual average trend of SO₂, NO_x, and RSPM at Ruikar Trust - Kolhapur

		Average of SO ₂	Average of NO _x	Average of RSPM
Ruikar Trust	09-10	16	20	99
	10-11	21	27	105
	11-12	24	33	116
	12-13	27	42	159
	13-14	27	48	141
	14-15	28	50	118
	15-16	25	52	120

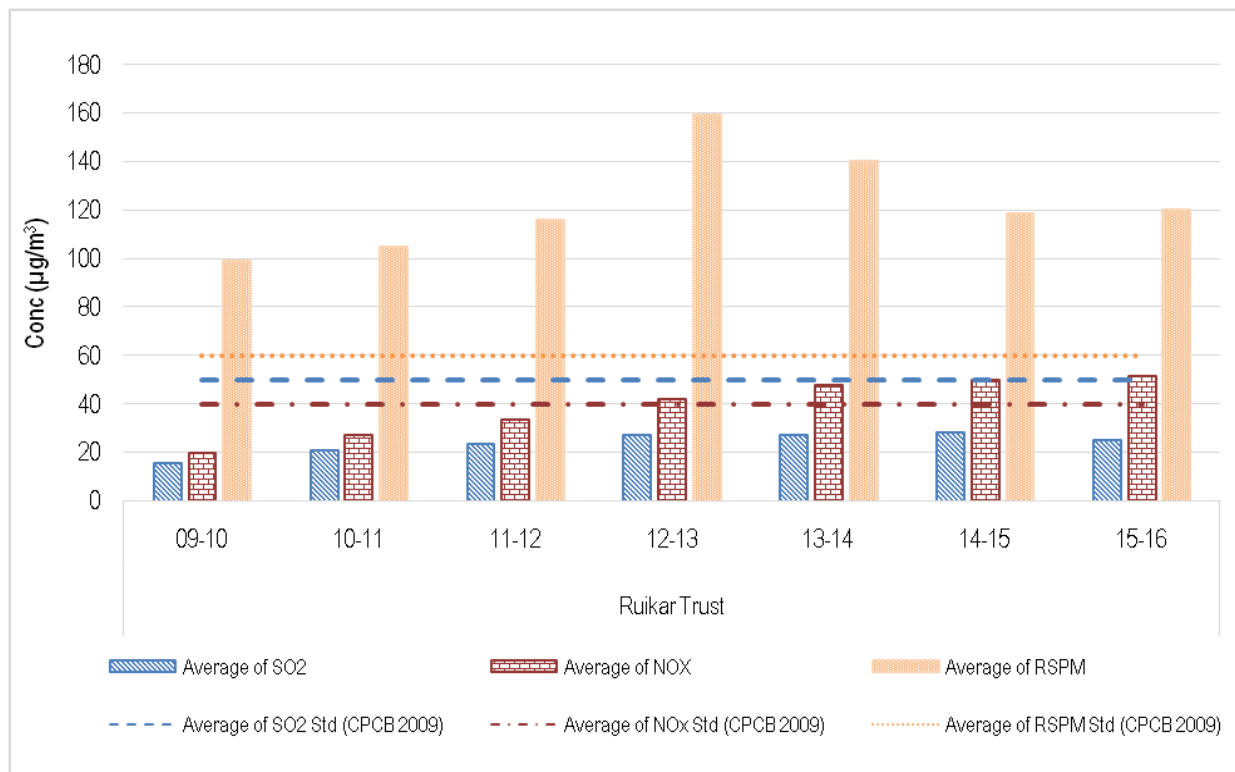


Figure No. 99: Annual average trend of SO₂, NO_x, and RSPM at Ruikar Trust - Kolhapur

Kolhapur – Mahadwar Road

Table No. 86: Data for monthly average reading recorded at Mahadwar Road

			Average of SO ₂	Average of NO _x	Average of RSPM
Mahadwar Road	2015	Apr	27	46	137
		May	22	31	104
		Jun	15	22	88
		Jul	15	27	93
		Aug	12	25	81
		Sep	18	40	101
		Oct	22	45	104
		Nov	24	53	110
		Dec	22	49	113
	2016	Jan	28	60	121
		Feb	25	45	115
		Mar	20	39	103

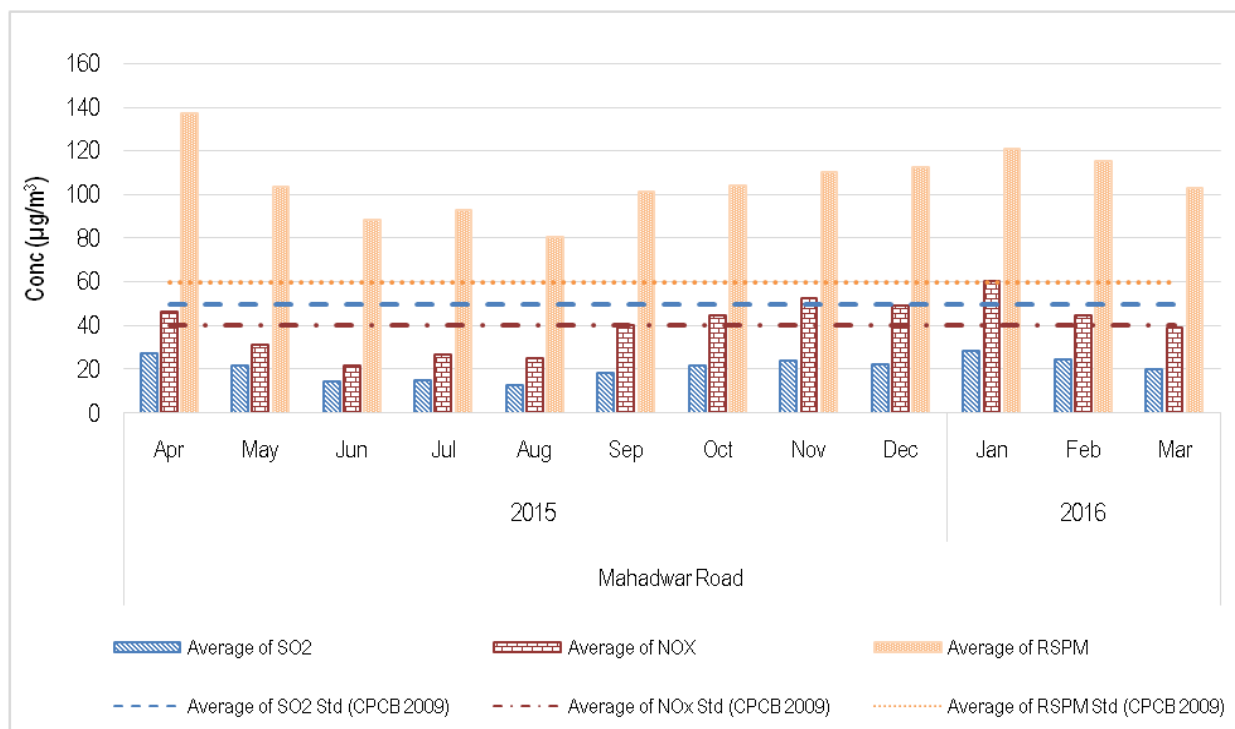


Figure No. 100: Monthly average reading recorded at Mahadwar Road

Table No. 87: Data for annual average trend of SO₂, NO_x, and RSPM at Mahadwar Road

		Average of SO ₂	Average of NO _x	Average of RSPM
Mahadwar Road	09-10	13	15	86
	10-11	17	21	92
	11-12	20	26	102
	12-13	25	35	136
	13-14	23	37	113
	14-15	24	38	104
	15-16	21	40	106



Figure No. 101: Annual average trend of SO₂, NO_x, and RSPM at Mahadwar Road

Sangli – Terrace of SRO – Sangli, Udyog Bhavan

Table No. 88: Data for monthly average reading recorded at Terrace of SRO – Sangli, Udyog Bhavan

			Average of SO ₂	Average of NO _x	Average of RSPM
Terrace of SRO-Sangli, Udyog Bhavan	2015	Apr	9	45	103
		May	8	36	56
		Jun	8	26	39
		Jul	9	25	38
		Aug	10	27	30
		Sep	10	29	39
		Oct	10	35	64
		Nov	12	42	93
		Dec	9	38	127
	2016	Jan	12	50	142
		Feb	10	58	133
		Mar	10	49	116

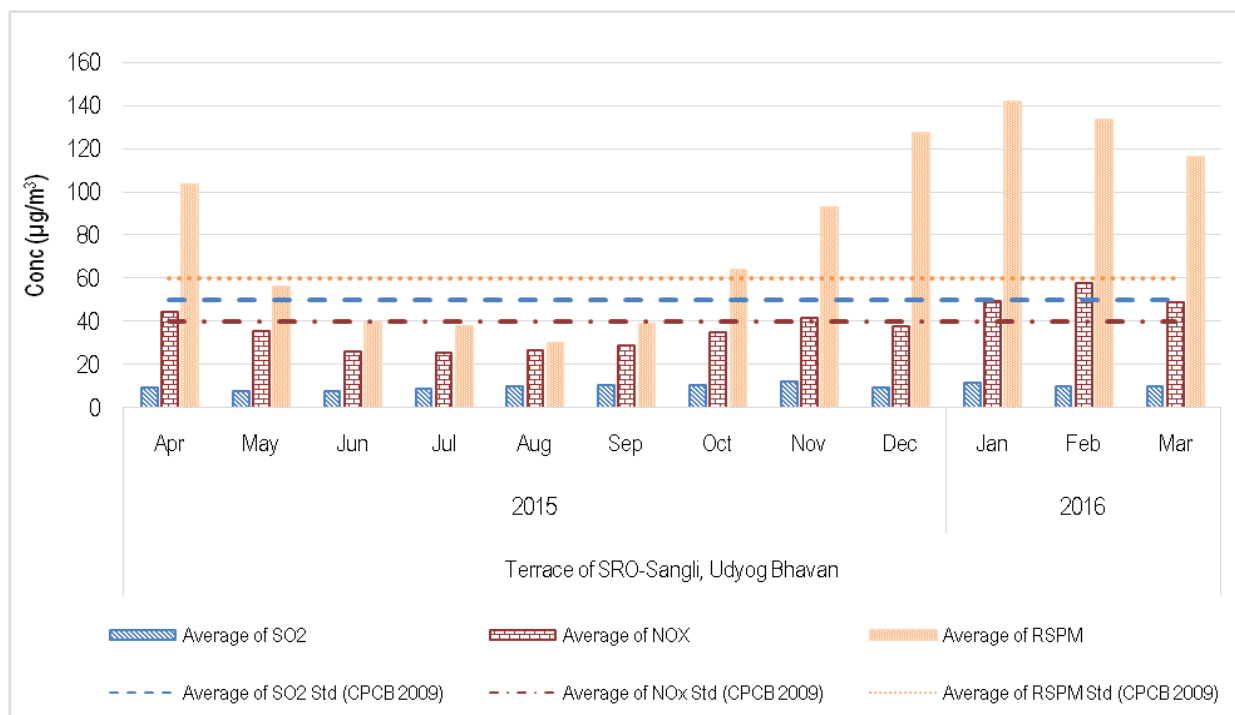


Figure No. 102: Monthly average reading recorded at Terrace of SRO – Sangli, Udyog Bhavan

Table No. 89: Data for annual average trend of SO₂, NO_x, and RSPM at Terrace of SRO – Sangli, Udyog Bhavan

		Average of SO ₂	Average of NO _x	Average of RSPM
Terrace of SRO-Sangli, Udyog Bhavan	09-10	22	27	54
	10-11	12	29	54
	11-12	10	36	63
	12-13	10	39	70
	13-14	9	34	69
	14-15	12	42	67
	15-16	10	38	82

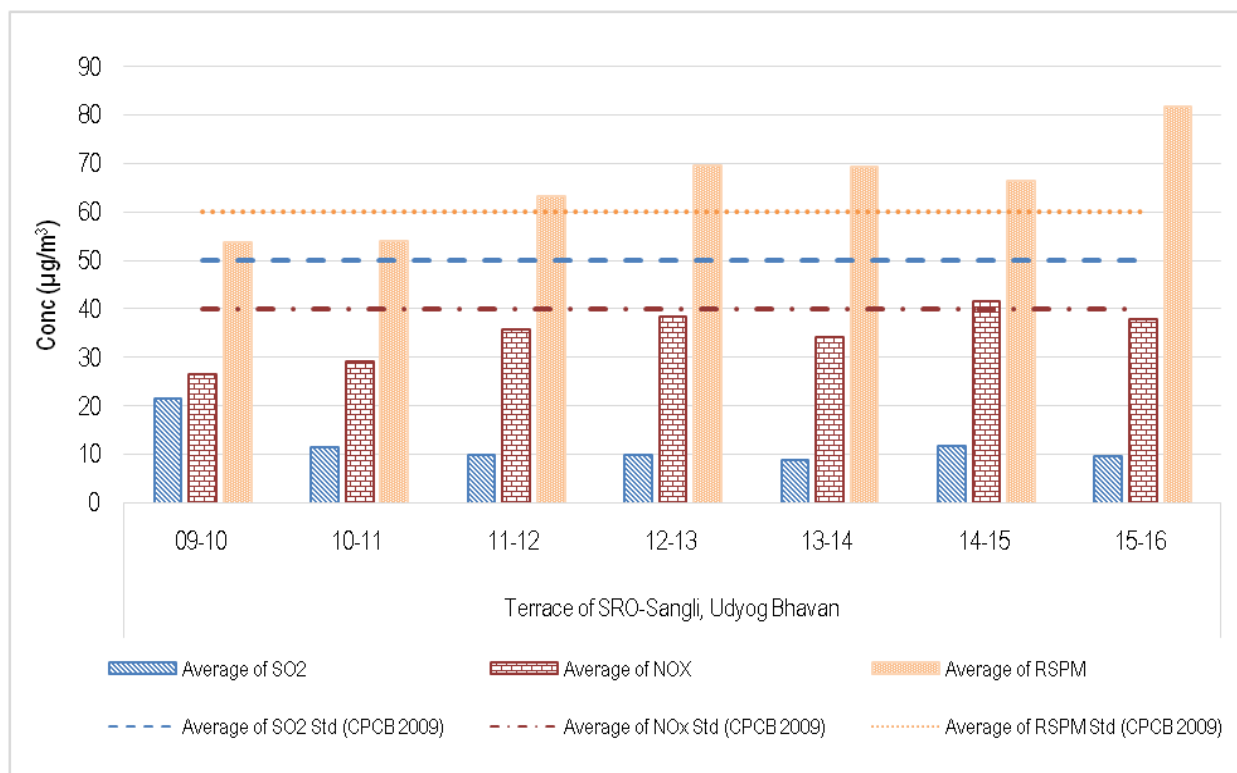


Figure No. 103: Annual average trend of SO₂, NO_x, and RSPM at Terrace of SRO – Sangli, Udyog Bhavan

Sangli – Sangli – Miraj Primary Municipal School

Table No. 90: Data for monthly average reading recorded at Sangli – Miraj Primary Municipal School

			Average of SO ₂	Average of NO _X	Average of RSPM
Sangli-Miraj Primary Municipal school	2015	Apr	10	55	93
		May	9	41	53
		Jun	9	23	27
		Jul	10	21	29
		Aug	11	23	31
		Sep	12	32	41
		Oct	11	38	81
		Nov	13	66	89
		Dec	10	64	126
	2016	Jan	12	61	142
		Feb	12	64	111
		Mar	10	51	106

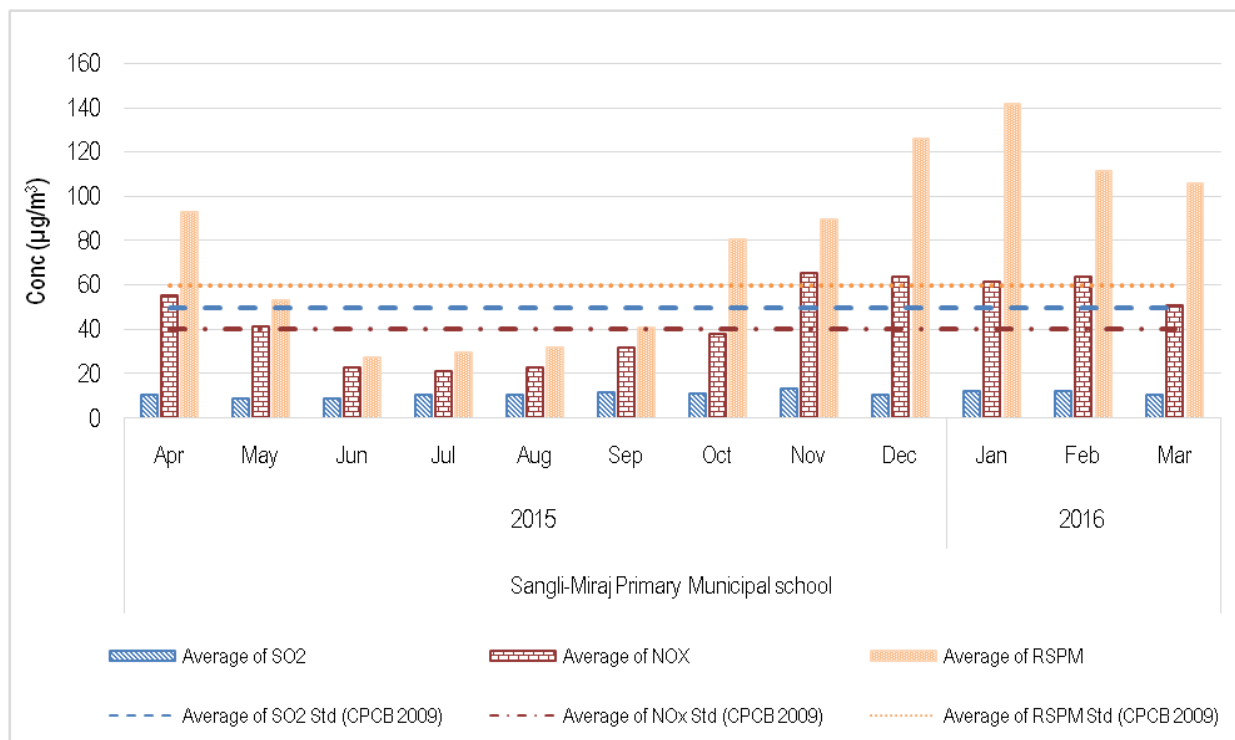


Figure No. 104: Monthly average reading recorded at Sangli – Miraj Primary Municipal School

Table No. 91: Data for annual average trend of SO₂, NO_x, and RSPM at Sangli – Miraj Primary Municipal School

		Average of SO ₂	Average of NO _x	Average of RSPM
Sangli-Miraj Primary Municipal school	09-10	23	32	68
	10-11	13	32	69
	11-12	10	36	72
	12-13	11	44	79
	13-14	9	40	74
	14-15	13	48	91
	15-16	11	44	77



Figure No. 105: Annual average trend of SO₂, NO_x, and RSPM at Sangli – Miraj Primary Municipal School

Sangli – Krishna Valley School

Table No. 92: Data for monthly average reading recorded at Krishna Valley School

		Average of SO ₂	Average of NO _x	Average of RSPM	
Krishna Valley school	2015	Apr	11	38	133
		May	12	33	72
		Jun	8	24	48
		Jul	10	22	47
		Aug	11	24	56
		Sep	11	27	67
		Oct	12	35	91
		Nov	13	45	88
		Dec	12	47	132
	2016	Jan	13	51	127
		Feb	13	49	125
		Mar	11	47	132

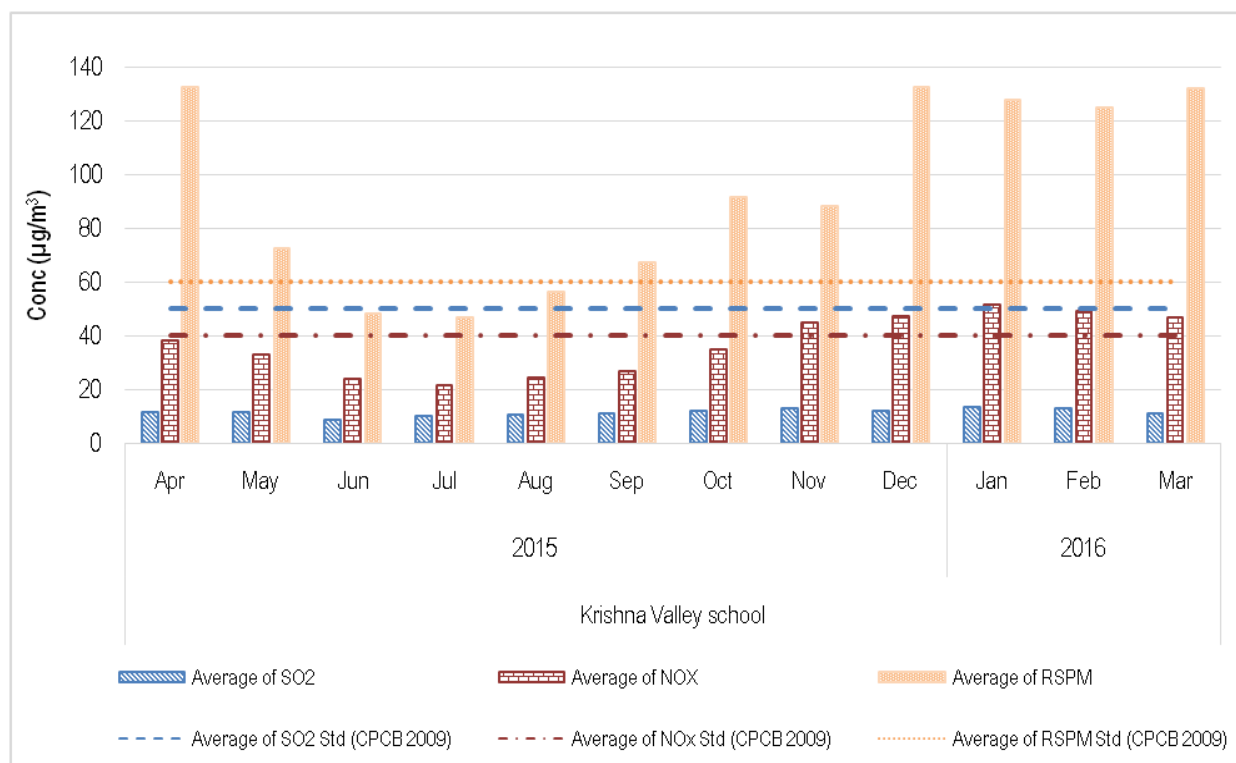


Figure No. 106: Monthly average reading recorded at Krishna Valley School

Table No. 93: Data for annual average trend of SO₂, NO_x, and RSPM at Krishna Valley School

		Average of SO ₂	Average of NO _x	Average of RSPM
Krishna Valley school	09-10	24	34	82
	10-11	12	30	75
	11-12	10	36	89
	12-13	12	43	97
	13-14	11	37	95
	14-15	13	44	103
	15-16	11	37	92

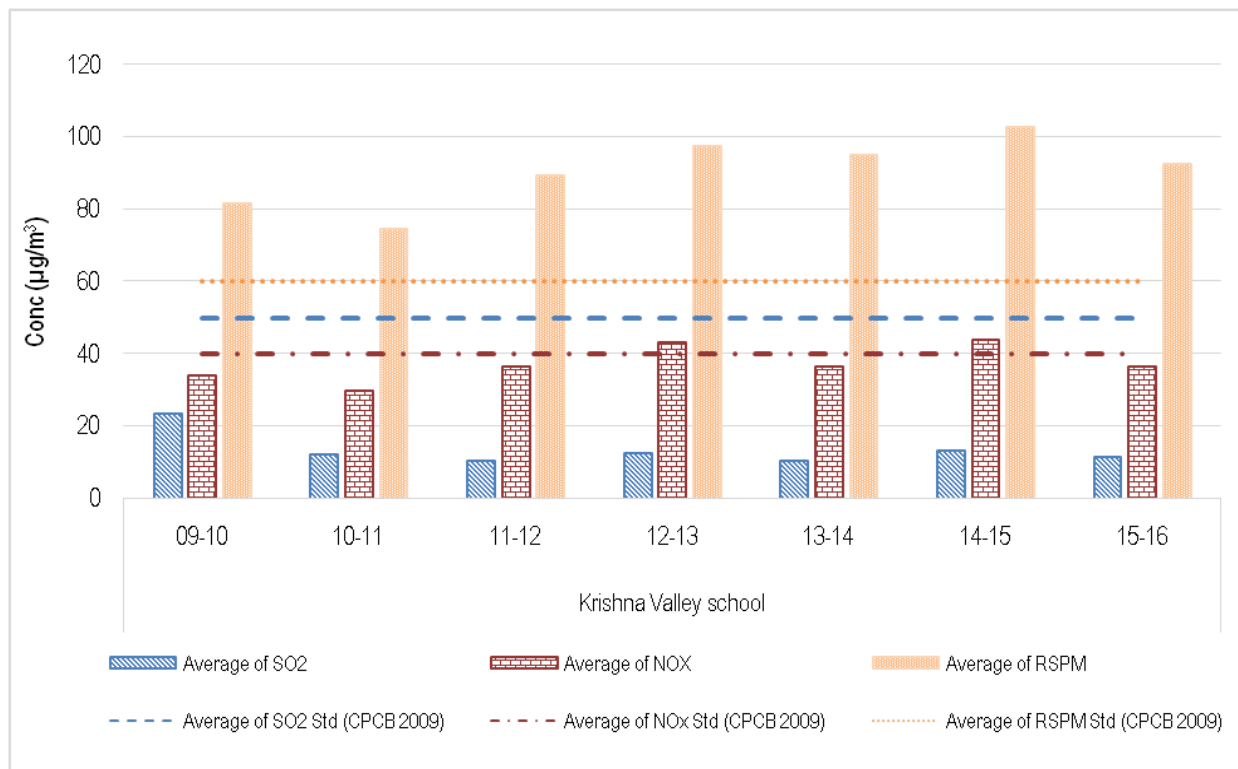


Figure No. 107: Annual average trend of SO₂, NO_x, and RSPM at Krishna Valley School

Table No. 94: % exceedence of pollutants at Kolhapur RO

	Number of Observations				Percentage Exceedence		
	Total	Exceedence SO	Exceedence NO	Exceedence RSPM	SO	NO	RSPM
Chiplun - MIDC Chalkewadi	16	0	0	16	0	0	100
Chiplun - Water Treatment	16	0	0	16	0	0	100
Krishna Valley school	103	0	0	44	0	0	43
Mahadwar Road	106	0	0	65	0	0	61
Ruikar Trust	101	0	3	85	0	3	84
Sangli-Miraj Primary Municipal school	103	0	3	35	0	3	34
Shivaji University Campus	103	0	0	0	0	0	0
Terrace of SRO-Sangli, Udyog Bhavan	104	0	1	36	0	1	35

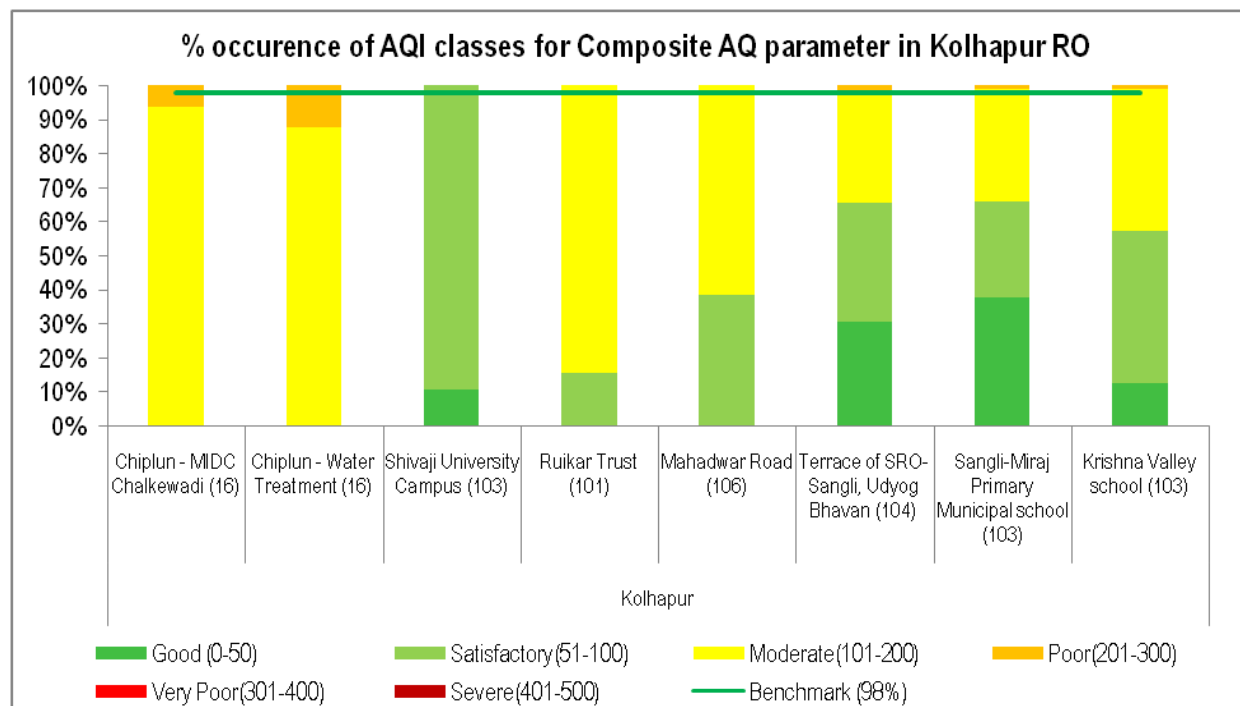
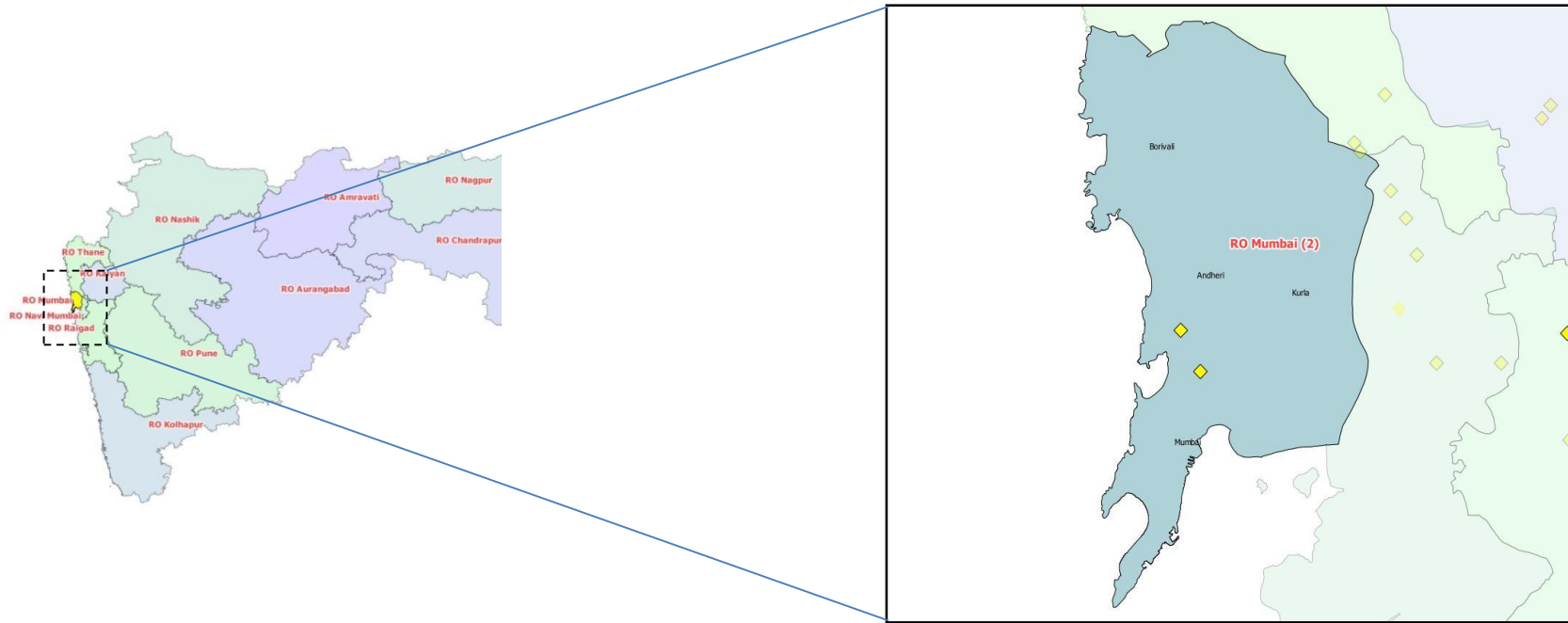


Figure No. 108: % occurrence of AQI classes for Composite AQ parameter in Kolhapur RO

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. 95: Data for monthly average reading recorded at Bandra

			Average of SO2	Average of NOX	Average of RSPM
Bandra	2015	Apr	7	59	95
		May	10	30	78
		Jun	15	25	62
		Jul	20	20	61
		Aug	21	36	59
		Sep	23	45	63
		Oct	31	80	90
		Nov	35	129	110
		Dec	30	103	142
	2016	Jan	8	27	146
		Feb	6	21	103
		Mar	5	18	111

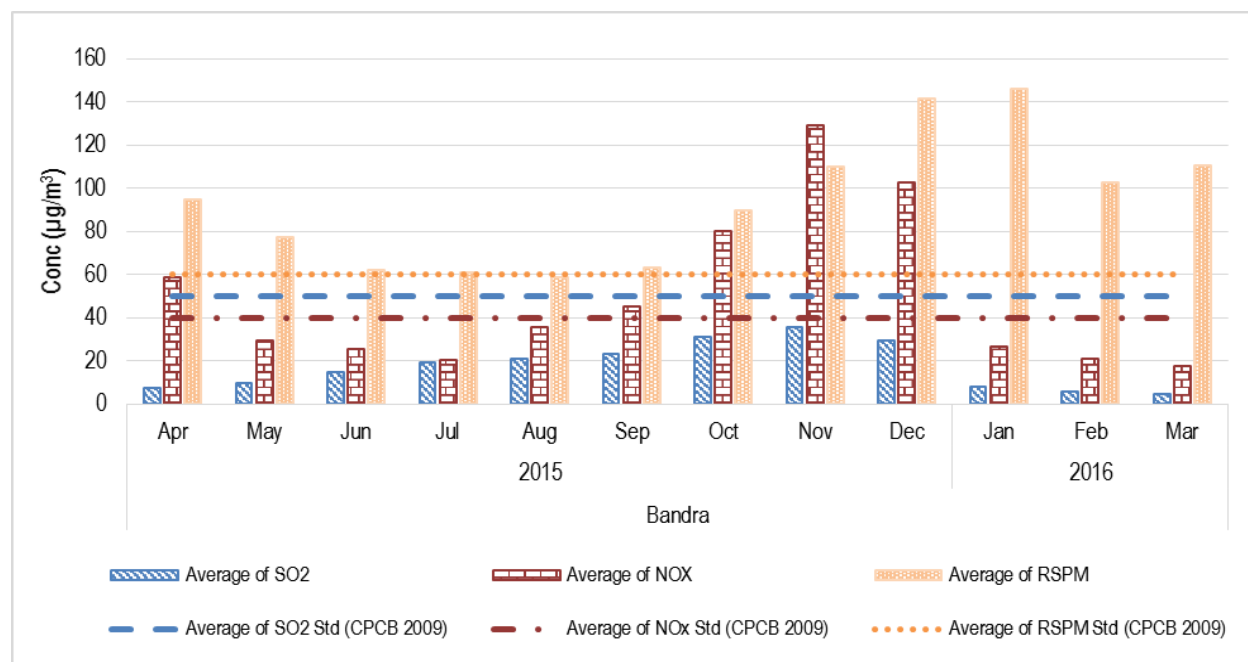


Figure No. 109: Monthly average reading recorded at Bandra

Table No. 96: Annual average trend of SO₂, NO_x, and RSPM at Bandra

		Average of SO ₂	Average of NO _x	Average of RSPM
Bandra	09-10	17	90	140
	10-11	19	48	116
	11-12	21	65	131
	12-13	18	48	116
	13-14	20	49	106
	14-15	16	52	114
	15-16	18	49	93

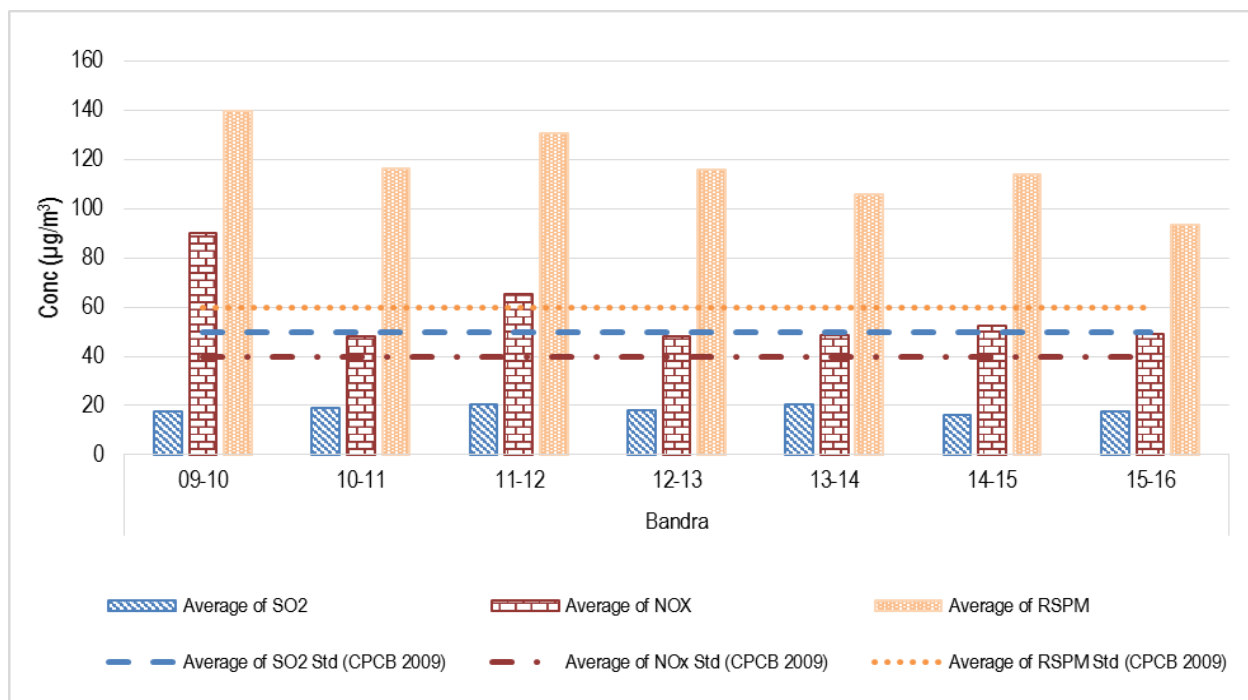


Figure No. 110: Annual average trend of SO₂, NO_x, and RSPM at Bandra

Mumbai - Sion

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

		Average of SO ₂	Average of NO _X	Average of RSPM	
Sion	2015	Apr	9	86	179
		May	11	78	173
		Jun	13	87	103
		Jul	16	56	71
		Aug	16	68	92
		Sep	14	78	108
		Oct	15	93	119
		Nov	14	87	171
		Dec	17	84	176
	2016	Jan	15	86	204
		Feb	13	94	194
		Mar	13	80	199

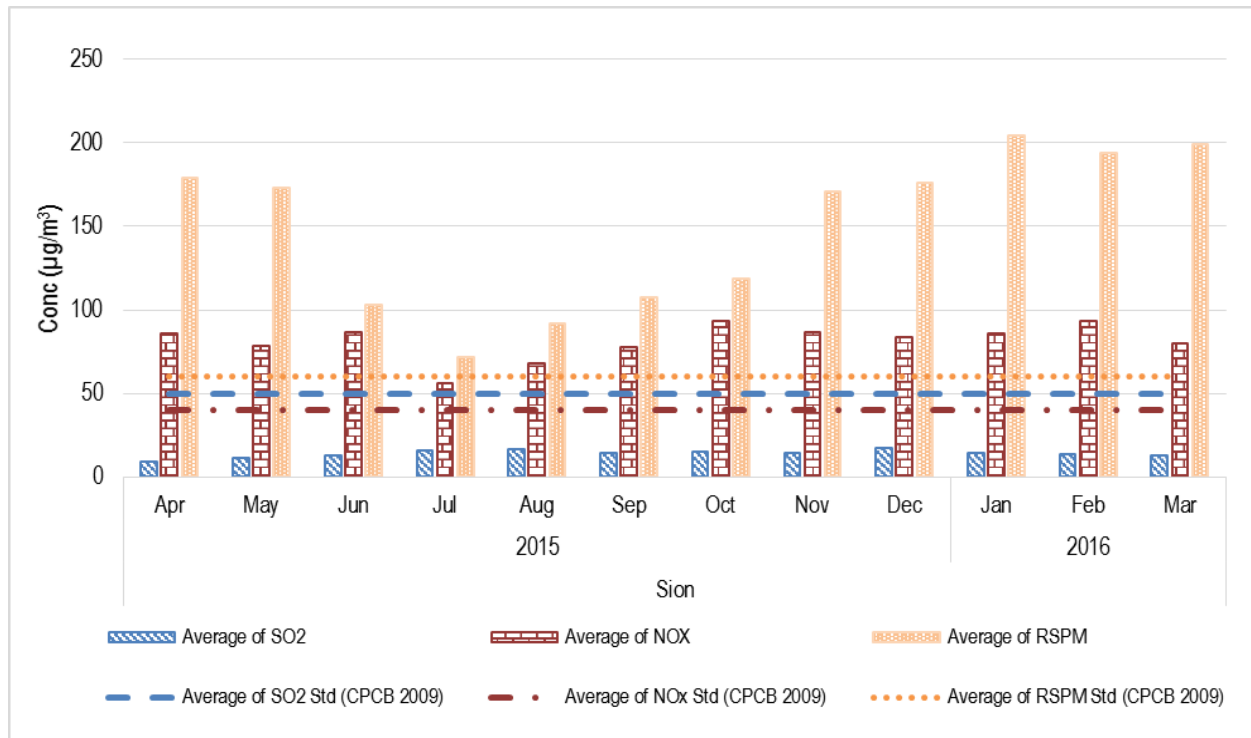


Figure No. 111: Monthly average reading recorded at Sion

Table No. 98: Data for annual average trend of SO₂, NO_x and RSPM at Sion

		Average of SO ₂	Average of NO _x	Average of RSPM
Sion	09-10	18	109	223
	10-11	14	116	181
	11-12	10	66	150
	12-13	11	106	136
	13-14	8	108	131
	14-15	8	91	117
	15-16	14	81	148

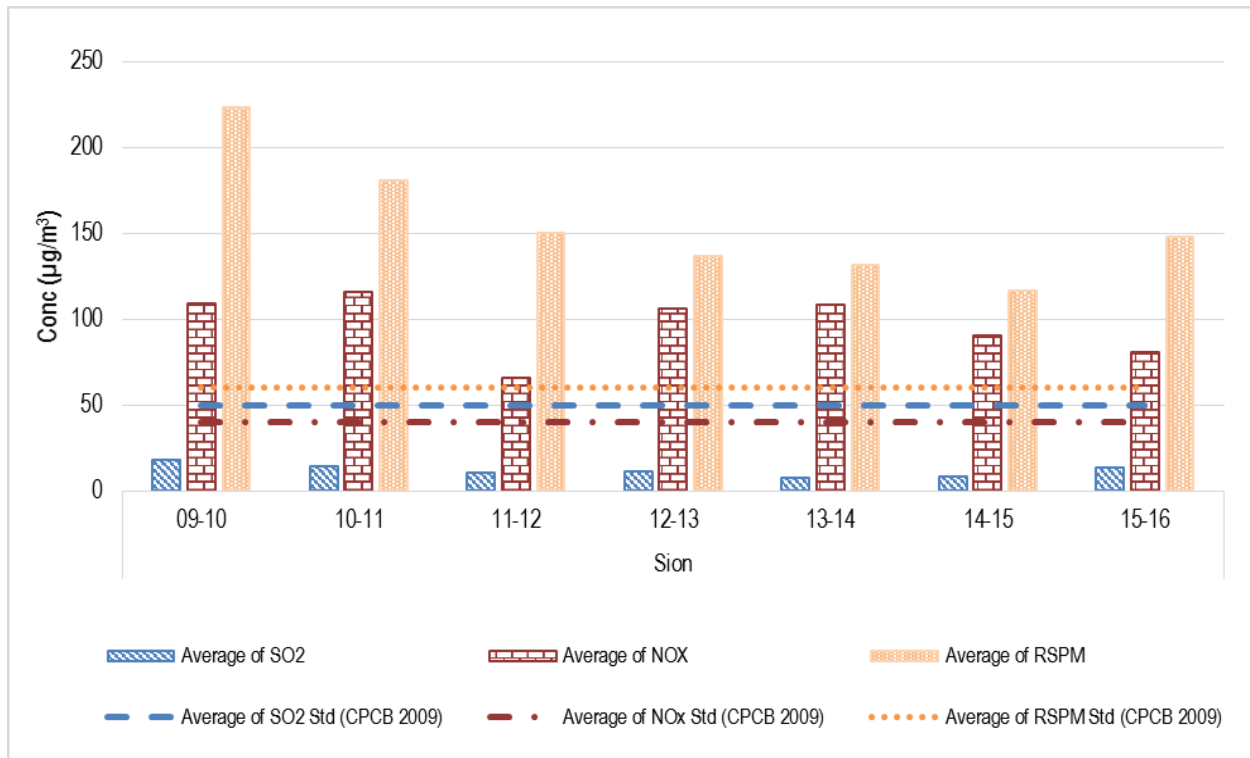


Figure No. 112: Annual average trend of SO₂, NO_x and RSPM at Sion

Table No. 99: % exceedence of pollutants at Mumbai RO

	Number of Observations				Percentage Exceedence		
	Total	Exceedence SO	Exceedence NO	Exceedence RSPM	SO	NO	RSPM
Bandra	351	0	81	119	0	23	34
Sion	284	0	148	203	0	52	71

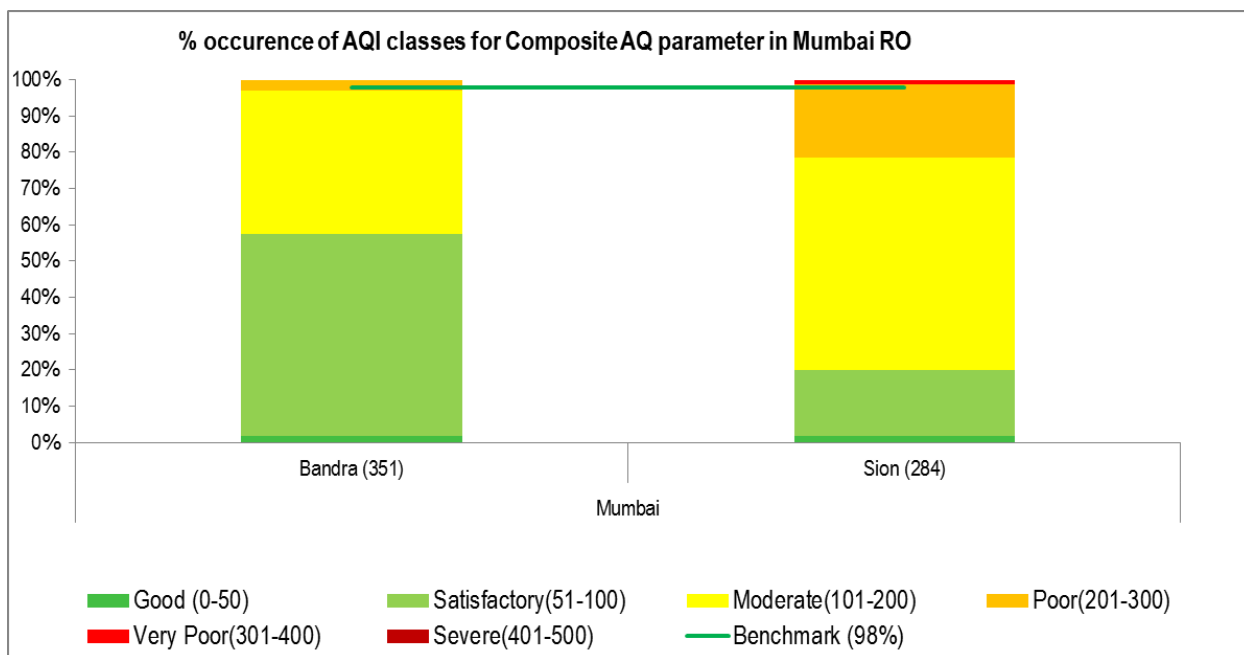
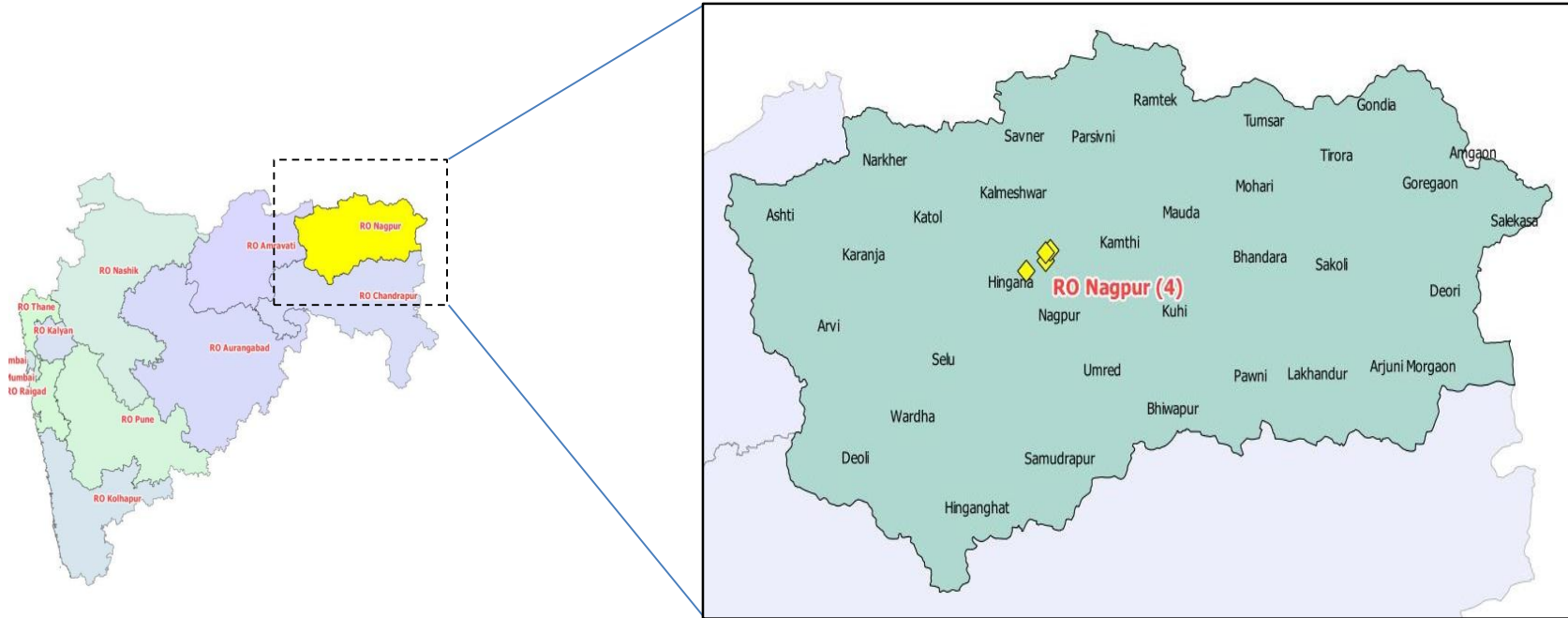


Figure No. 113: % occurrence of AQI classes for RSPM AQ parameter in Mumbai RO

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

		Average of SO2	Average of NOX	Average of RSPM	
IOE North Ambazari road	2015	Apr	8	26	113
		May	8	24	117
		Jun	8	26	117
		Jul	9	27	91
		Aug	8	24	86
		Sep	9	29	88
		Oct	11	41	87
		Nov	12	42	120
		Dec	12	44	93
	2016	Jan	11	39	109
		Feb	10	32	98
		Mar	9	28	89

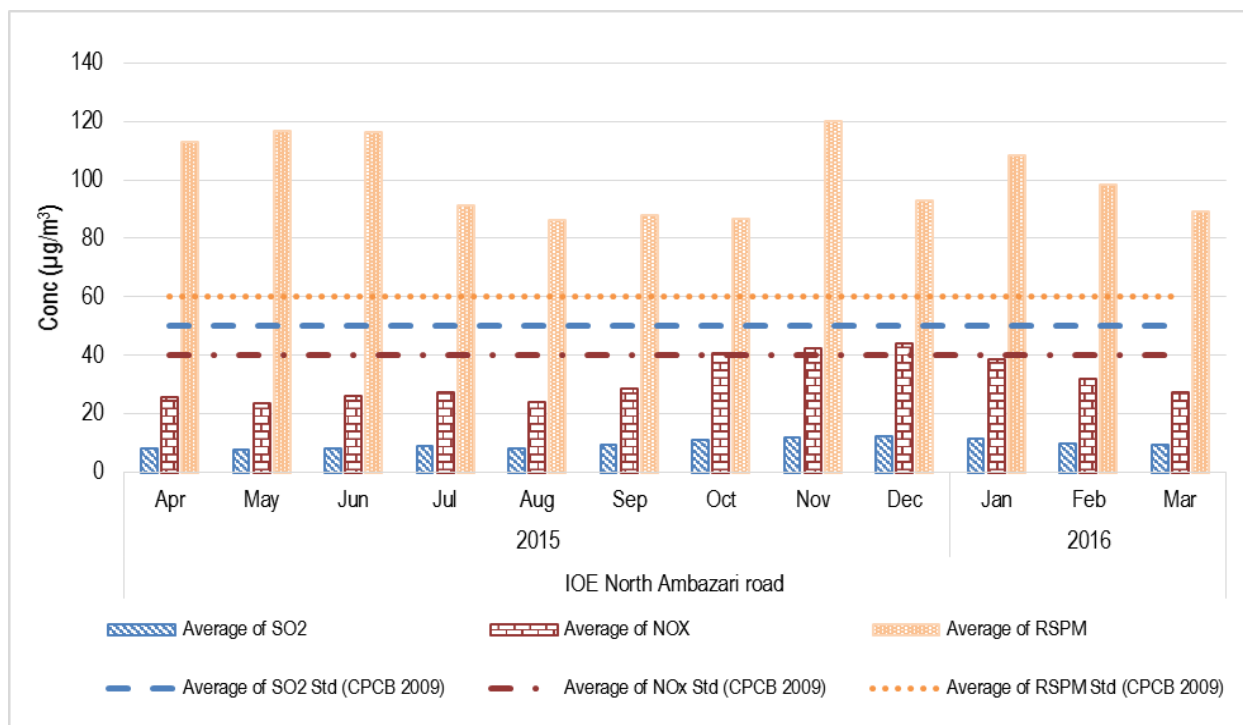


Figure No. 114: Monthly average reading recorded at IOE North Ambazari road

Table No. 101: Data for annual average trend of SO₂, NO_x, and RSPM at IOE North Ambazari road

		Average of SO ₂	Average of NO _x	Average of RSPM
IOE North Ambazari road	09-10	10	36	109
	10-11	10	33	96
	11-12	10	34	84
	12-13	11	39	96
	13-14	10	29	90
	14-15	10	32	106
	15-16	10	31	101

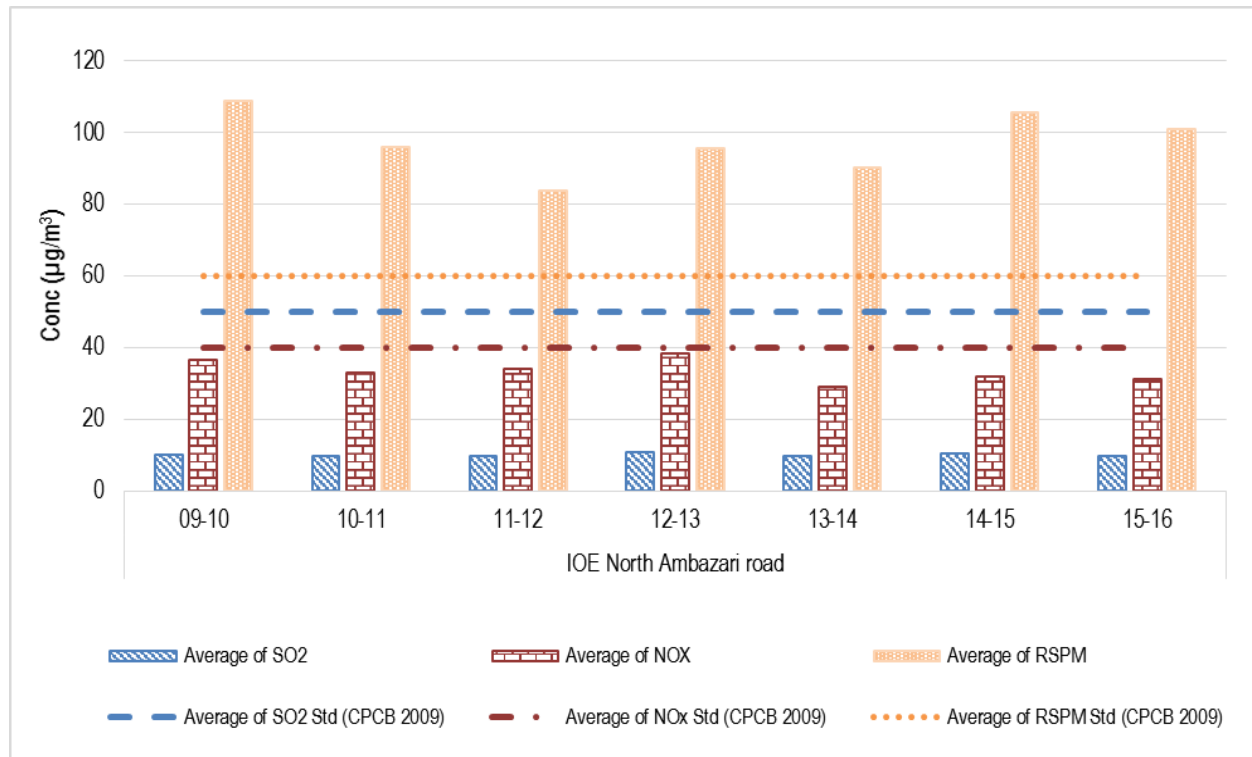


Figure No. 115: Annual average trend of SO₂, NO_x, and RSPM at IOE North Ambazari road

Nagpur – MIDC Office, Hingna Road

Table No. 102: Data for monthly average reading recorded at MIDC Office, Hingna Road

		Average of SO ₂	Average of NO _x	Average of RSPM	
MIDC Office, Hingna Road	2015	Apr	8	25	123
		May	9	28	149
		Jun	9	28	124
		Jul	9	27	100
		Aug	8	24	101
		Sep	9	27	88
		Oct	11	37	95
		Nov	12	43	100
		Dec	12	43	128
	2016	Jan	12	41	106
		Feb	10	34	102
		Mar	10	31	102

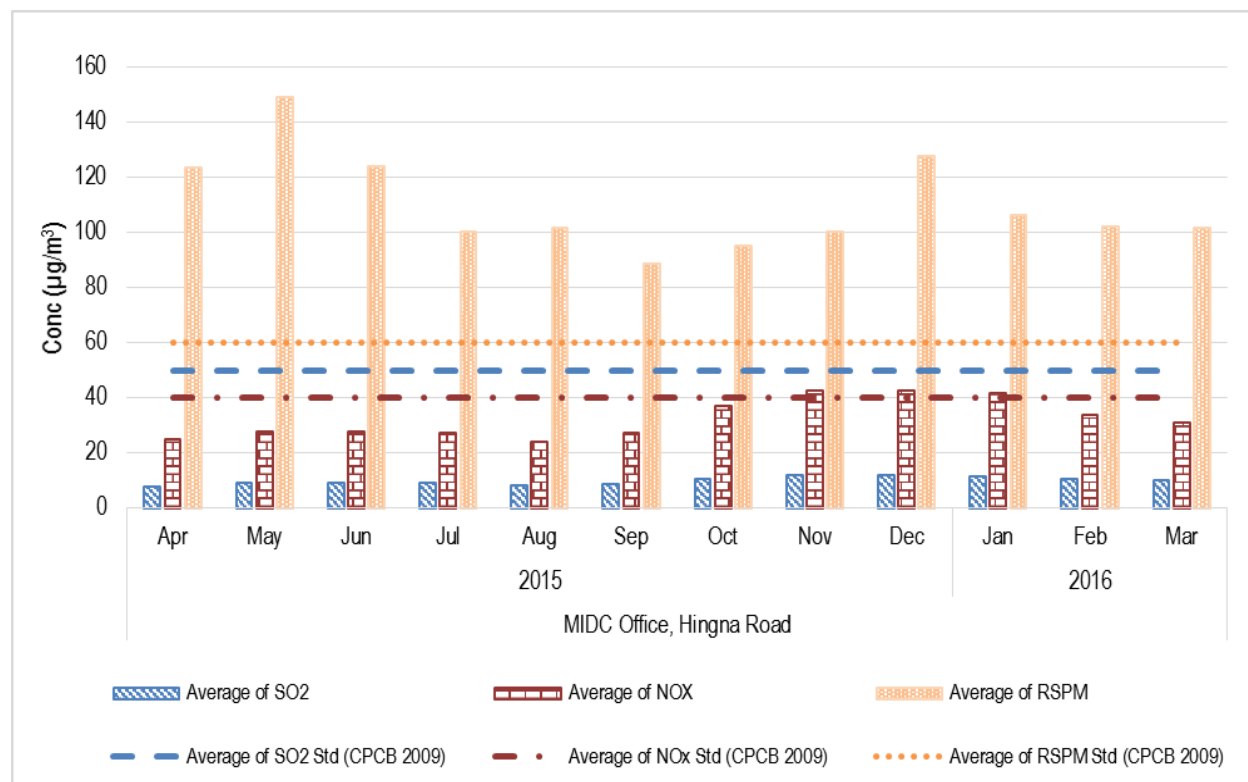


Figure No. 116: Monthly average reading recorded at MIDC Office, Hingna Road

Table No. 103: Data for annual average trend of SO₂, NO_x, and RSPM at MIDC Office, Hingna Road

		Average of SO ₂	Average of NO _x	Average of RSPM
MIDC Office, Hingna Road	09-10	10	38	128
	10-11	10	34	113
	11-12	10	35	105
	12-13	11	41	125
	13-14	10	31	119
	14-15	11	33	129
	15-16	10	32	110

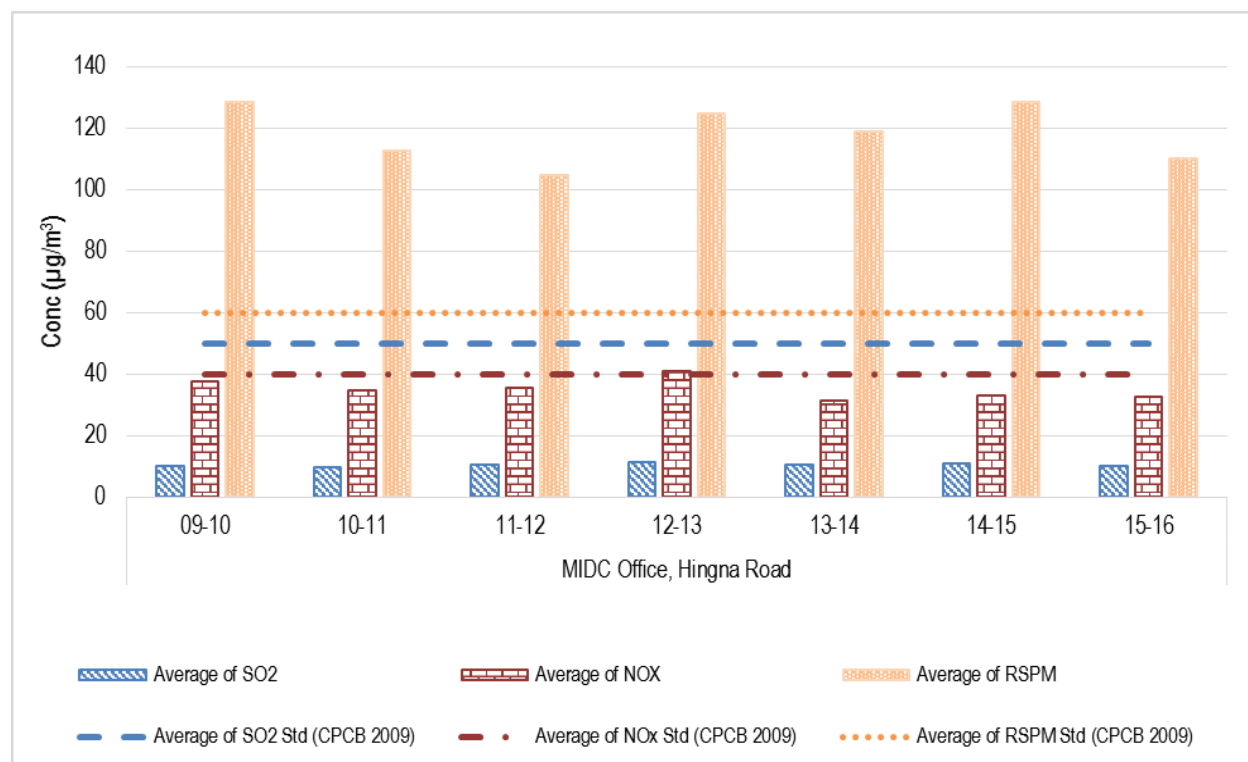


Figure No. 117: Annual average trend of SO₂, NO_x, and RSPM at MIDC Office, Hingna Road

Nagpur – Govt Polytechnic Col, Sadar

Table No. 104: Data for monthly average reading recorded at Govt Polytechnic Col, Sadar

			Average of SO ₂	Average of NO _x	Average of RSPM
Govt Polytechnic Col, Sadar	2015	Apr	9	30	111
		May	8	25	88
		Jun	8	25	103
		Jul	9	30	89
		Aug	10	30	92
		Sep	10	31	87
		Oct	11	36	101
		Nov	13	47	102
		Dec	15	48	93
	2016	Jan	12	41	96
		Feb	10	30	83
		Mar	9	26	69

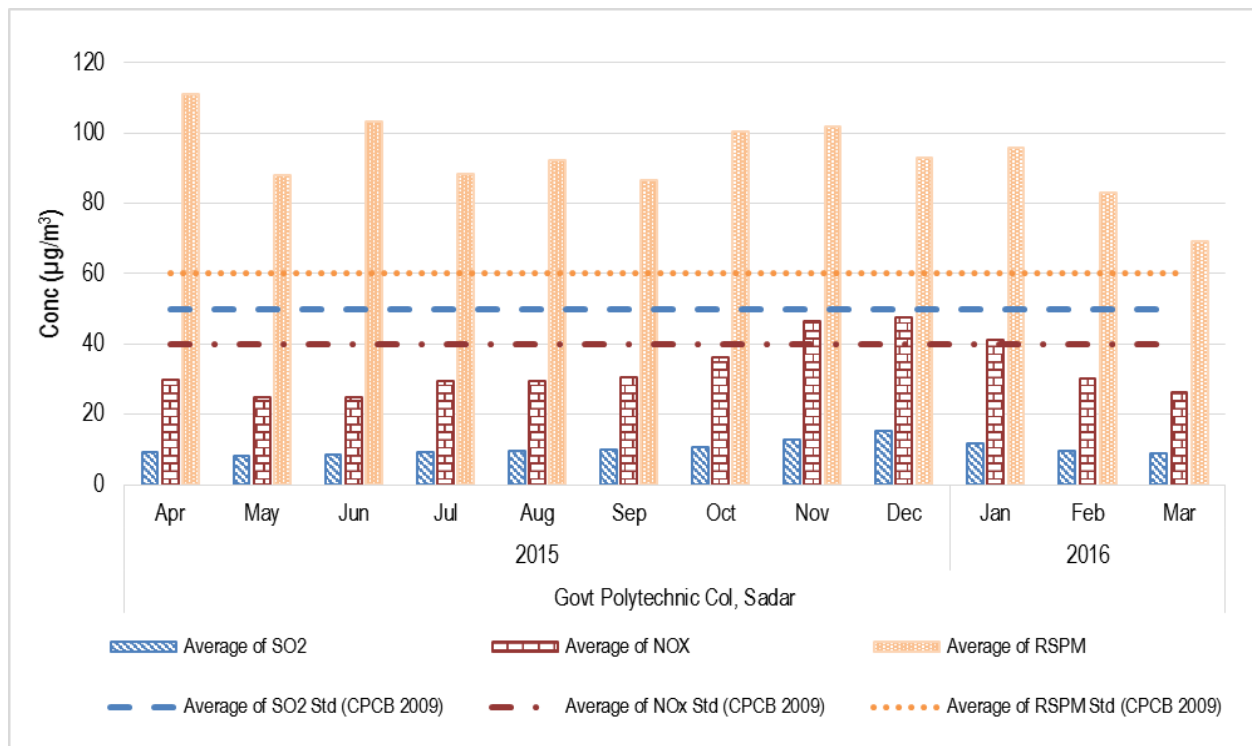


Figure No. 118: Monthly average reading recorded at Govt Polytechnic Col, Sadar

Table No. 105: Data for annual average trend of SO₂, NO_x, and RSPM at Govt Polytechnic Col, Sadar

		Average of SO ₂	Average of NO _x	Average of RSPM
Govt Polytechnic Col, Sadar	09-10	9	31	93
	10-11	9	30	87
	11-12	9	30	80
	12-13	10	35	82
	13-14	9	28	92
	14-15	10	31	103
	15-16	10	33	91

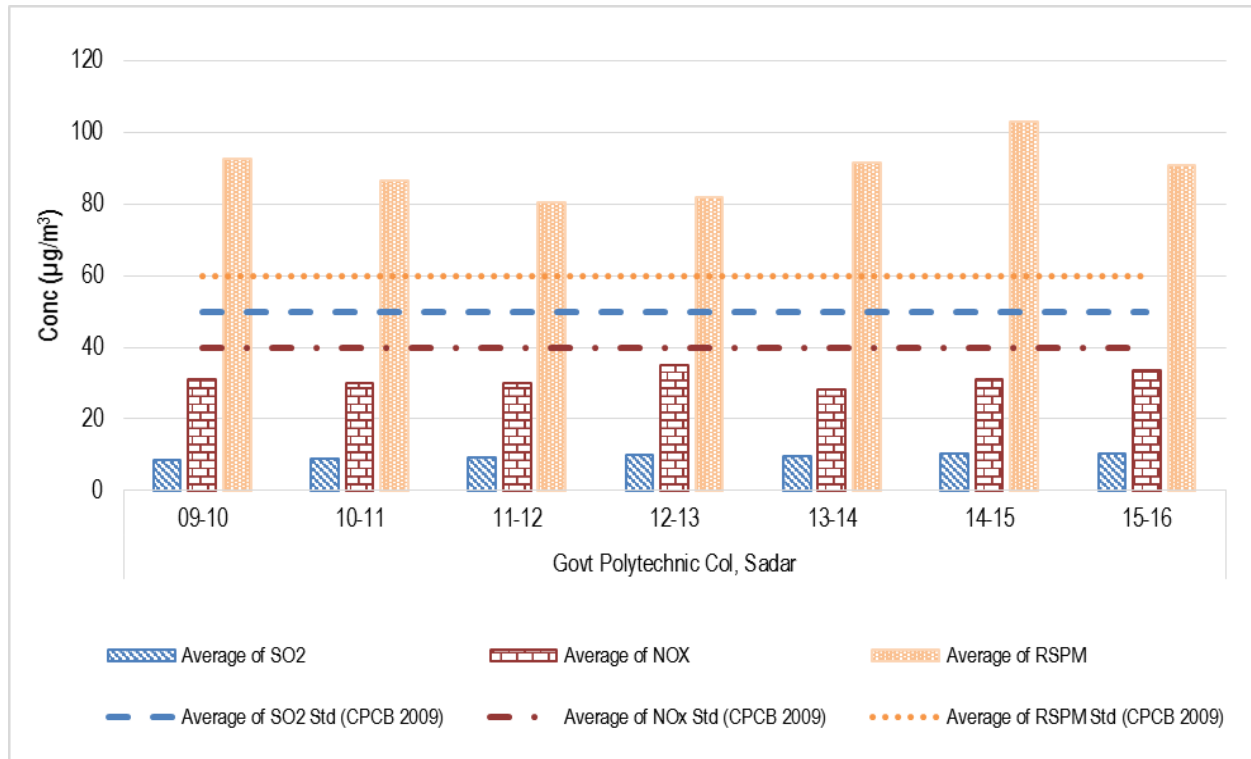


Figure No. 119: Annual average trend of SO₂, NO_x, and RSPM at Govt Polytechnic Col, Sadar

Nagpur – Nagpur Civil Lines

Table No. 106: Data for monthly average reading recorded at Civil Lines Nagpur

		Average of SO ₂	Average of NO _x	Average of RSPM	
Civil lines Nagpur	2015	Apr	8	24	57
		May	8	22	63
		Jun	8	24	61
		Jul	8	25	53
		Aug	8	24	50
		Sep	9	28	49
		Oct	9	29	49
		Nov	11	35	54
		Dec	10	32	58
	2016	Jan	12	41	52
		Feb	10	32	57
		Mar	9	25	47

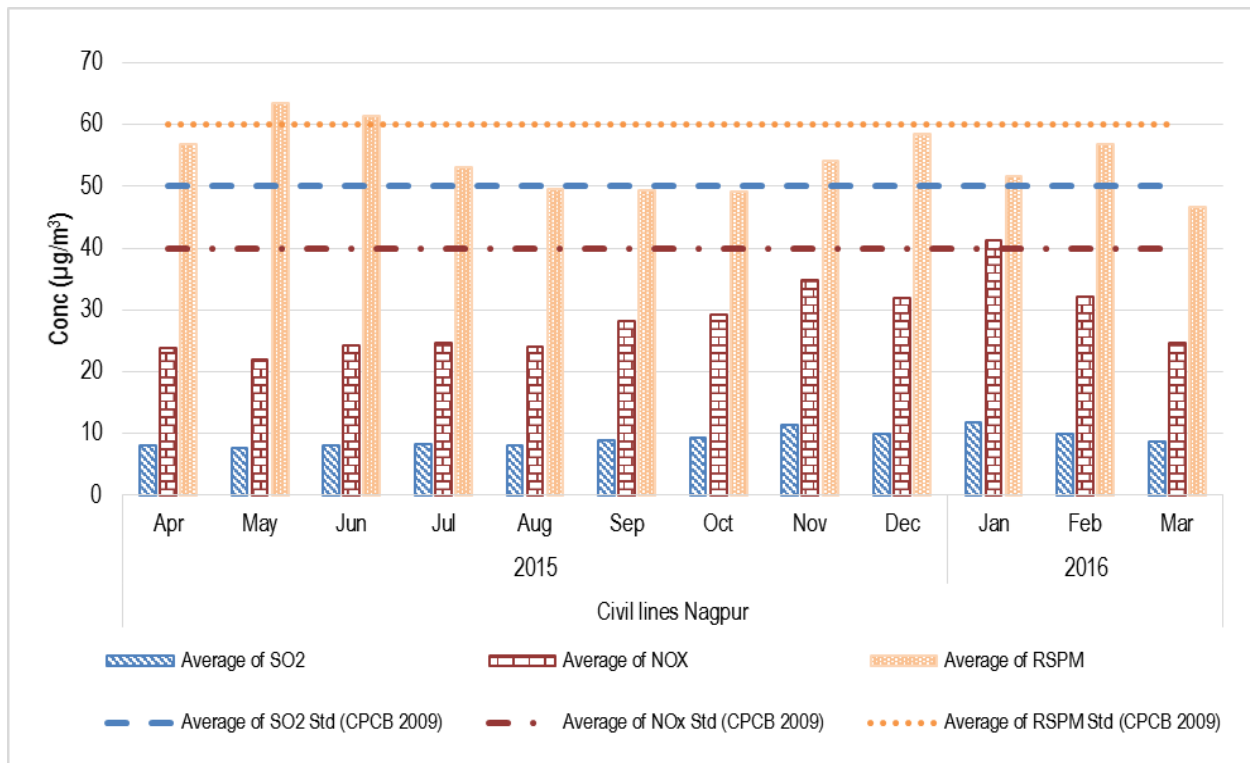


Figure No. 120: Monthly average reading recorded at Civil Lines Nagpur

Table No. 107: Data for annual average trend of SO₂, NO_x, and RSPM at Civil Lines Nagpur

		Average of SO ₂	Average of NO _x	Average of RSPM
Civil lines Nagpur	09-10	13	35	85
	10-11	9	28	66
	11-12	9	26	55
	12-13	9	30	54
	13-14	9	24	61
	14-15	10	28	62
	15-16	9	29	54

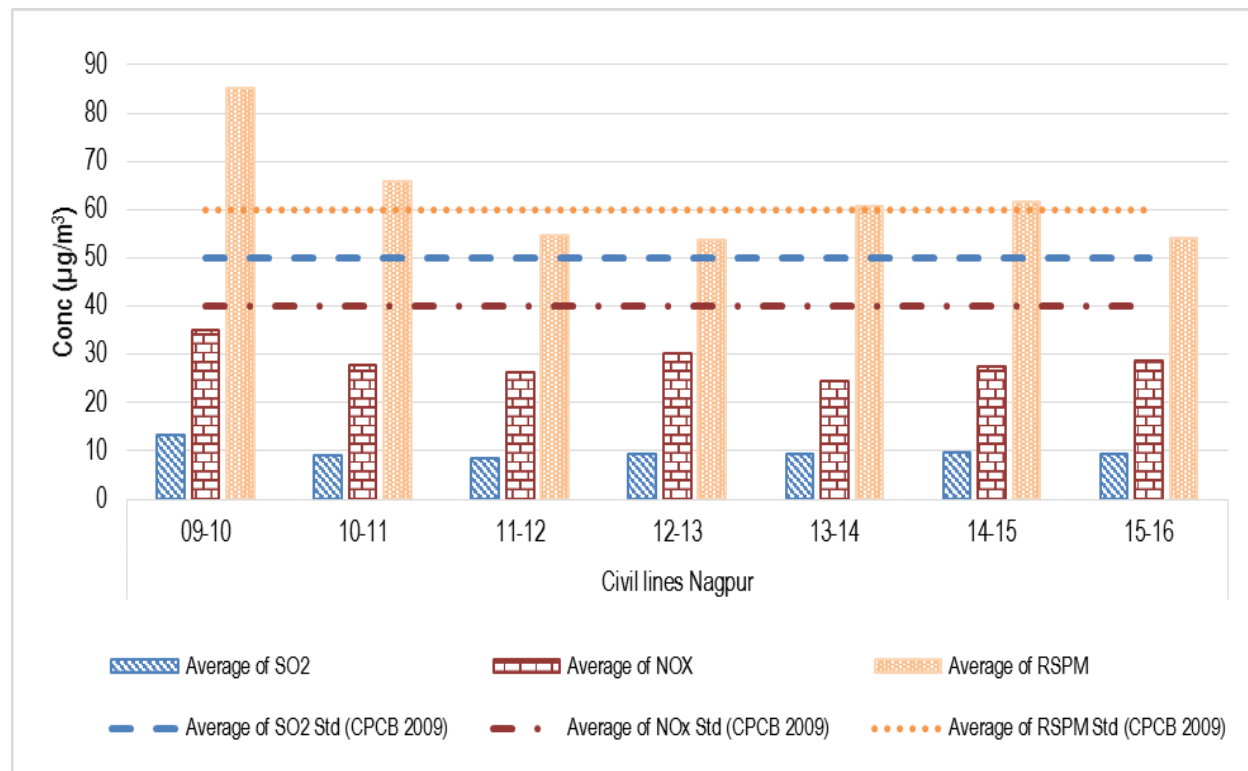


Figure No. 121: Annual average trend of SO₂, NO_x, and RSPM at Civil Lines Nagpur

Table No. 108: % exceedence of pollutants at Nagpur RO

Row Labels	Number of Observations			Percentage Exceedence			
	Total	Exceedence SO	Exceedence NO	Exceedence RSPM	SO	NO	RSPM
Civil lines Nagpur	305	0	0	3	0	0	1
Govt Polytechnic Col, Sadar	123	0	2	39	0	2	32
IOE North Ambazari road	107	0	0	47	0	0	44
MIDC Office, Hingna Road	106	0	0	54	0	0	51

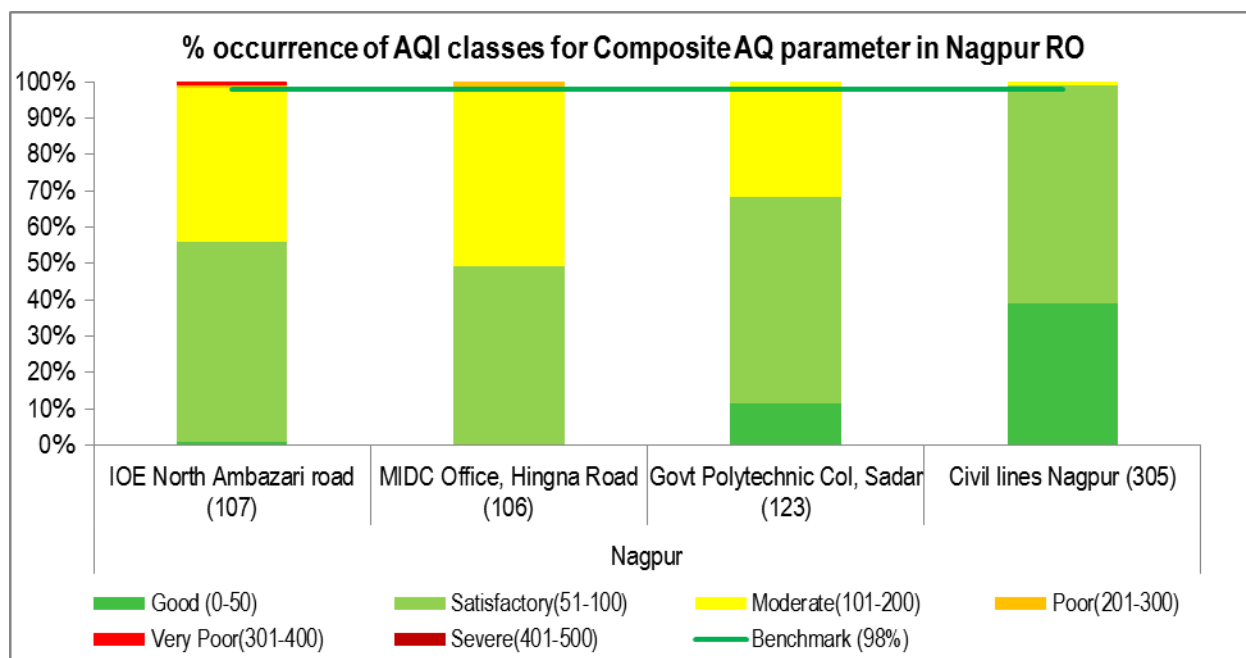
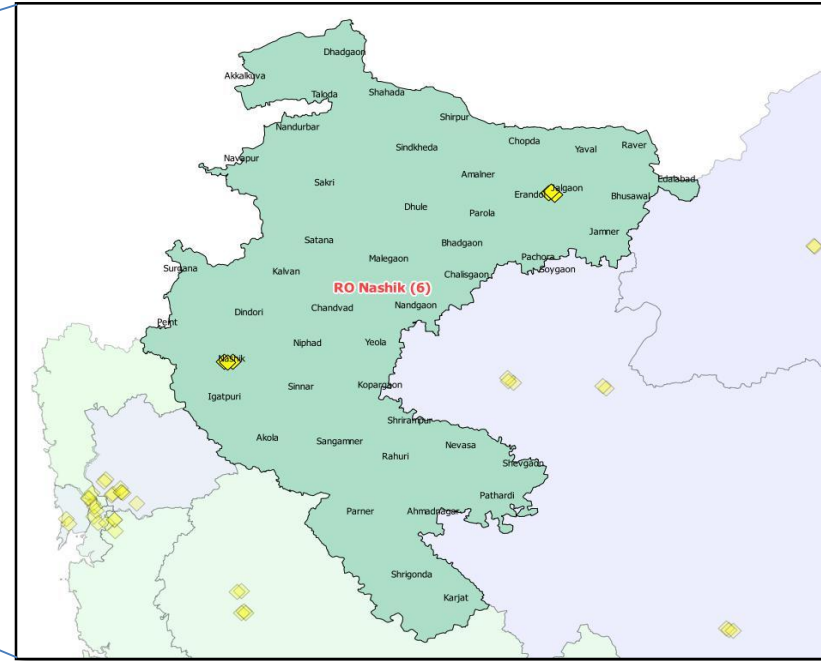
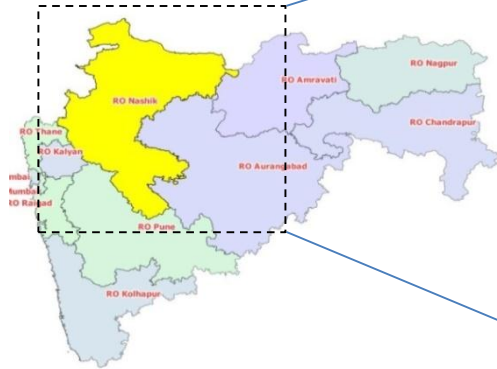


Figure No. 122: % occurrence of AQI classes for Composite AQ parameter in Nagpur RO

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

		Average of SO ₂	Average of NO _x	Average of RSPM	
Old B. J. Market	2015	Apr	19	45	111
		May	19	45	109
		Jun	15	37	97
		Jul	14	34	89
		Aug	14	33	95
		Sep	14	35	108
		Oct	13	36	102
		Nov	14	35	118
		Dec	13	36	111
	2016	Jan	13	38	113
		Feb	14	39	118
		Mar	14	41	119

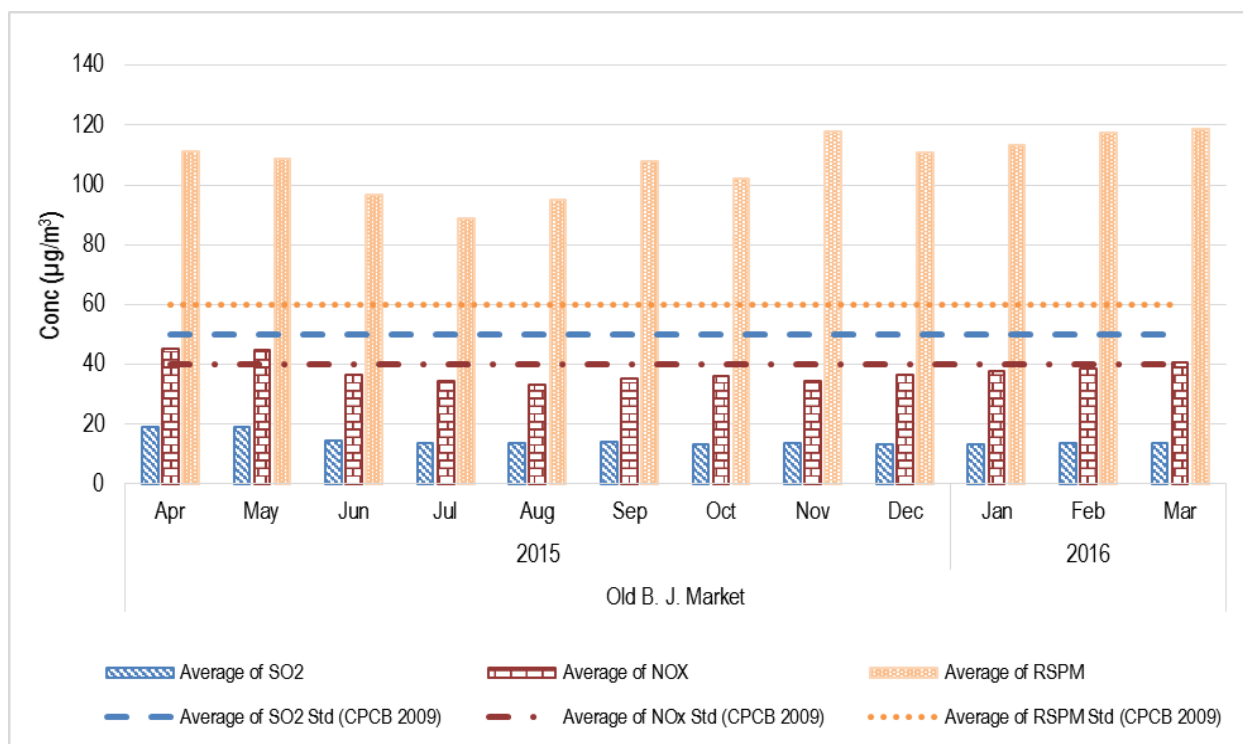


Figure No. 93: Monthly average reading recorded at - Old B. J. Market

Table No. 110: Data for annual average trend of SO₂, NO_x, and RSPM at Old B. J. Market

		Average of SO ₂	Average of NO _x	Average of RSPM
Old B. J. Market	09-10	15	45	109
	10-11	18	45	122
	11-12	16	43	111
	12-13	18	44	123
	13-14	19	41	118
	14-15	18	42	111
	15-16	14	38	108

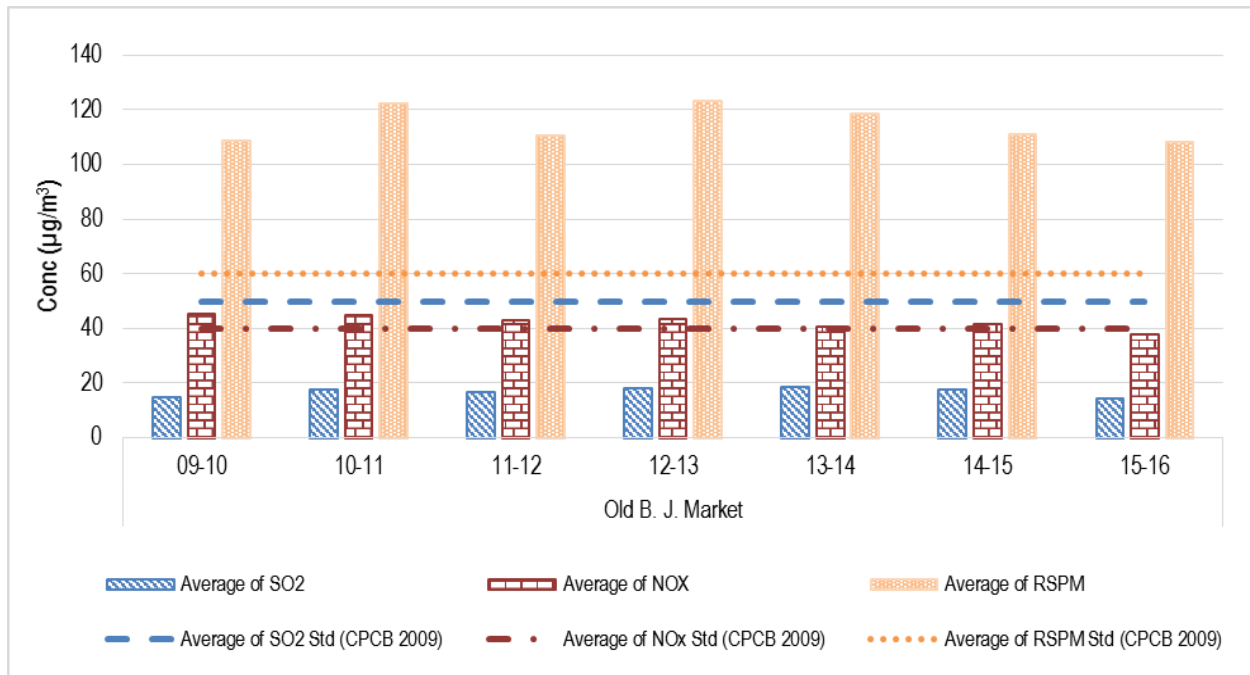


Figure No. 123: Annual average trend of SO₂, NO_x, and RSPM at - Old B. J. Market

Jalgaon – Girna Water Tank

Table No. 111: Data for monthly average reading recorded at Girna Water Tank

			Average of SO ₂	Average of NO _x	Average of RSPM
Girna Water Tank	2015	Apr	18	40	105
		May	16	40	108
		Jun	11	27	78
		Jul	13	32	90
		Aug	12	30	94
		Sep	12	29	100
		Oct	13	31	100
		Nov	13	33	112
		Dec	12	31	104
	2016	Jan	13	32	114
		Feb	13	32	111
		Mar	14	35	112

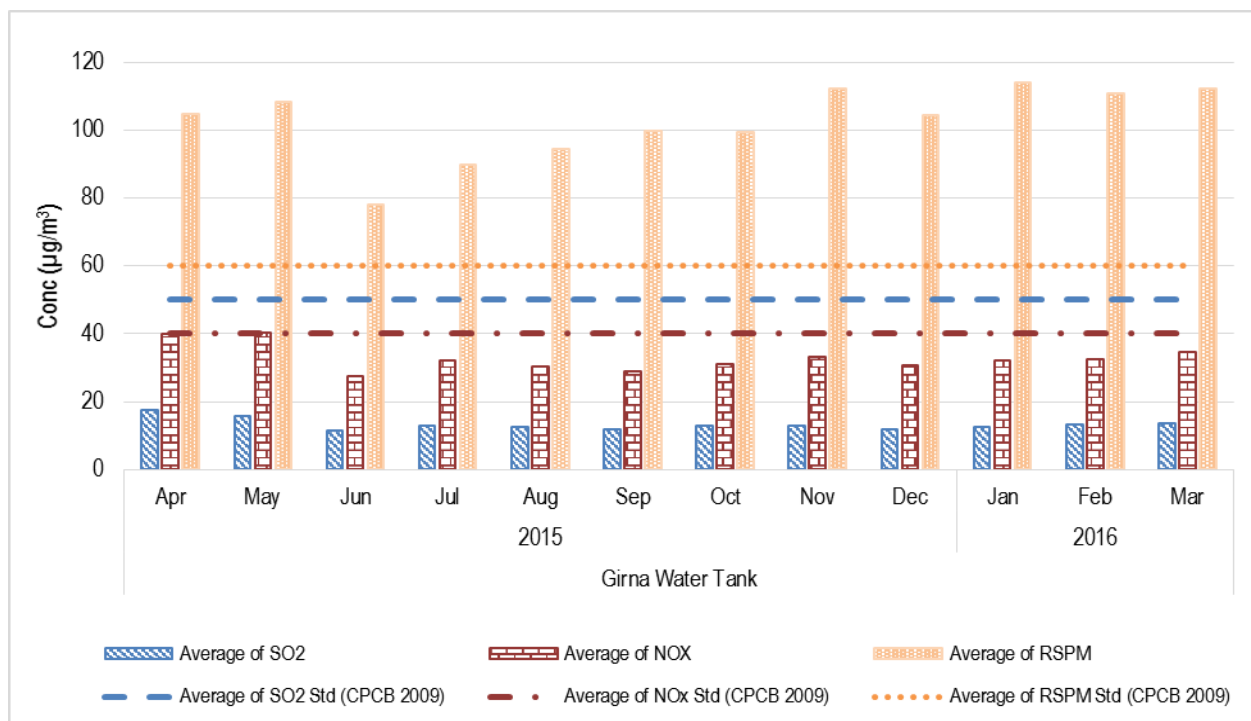


Figure No. 124: Monthly average reading recorded at Girna Water Tank

Table No. 112: Data for annual average trend of SO₂, NO_x, and RSPM at - Girna Water Tank

		Average of SO ₂	Average of NO _x	Average of RSPM
Girna Water Tank	09-10	13	43	110
	10-11	16	42	122
	11-12	13	38	116
	12-13	16	40	124
	13-14	17	37	116
	14-15	16	39	112
	15-16	13	33	103

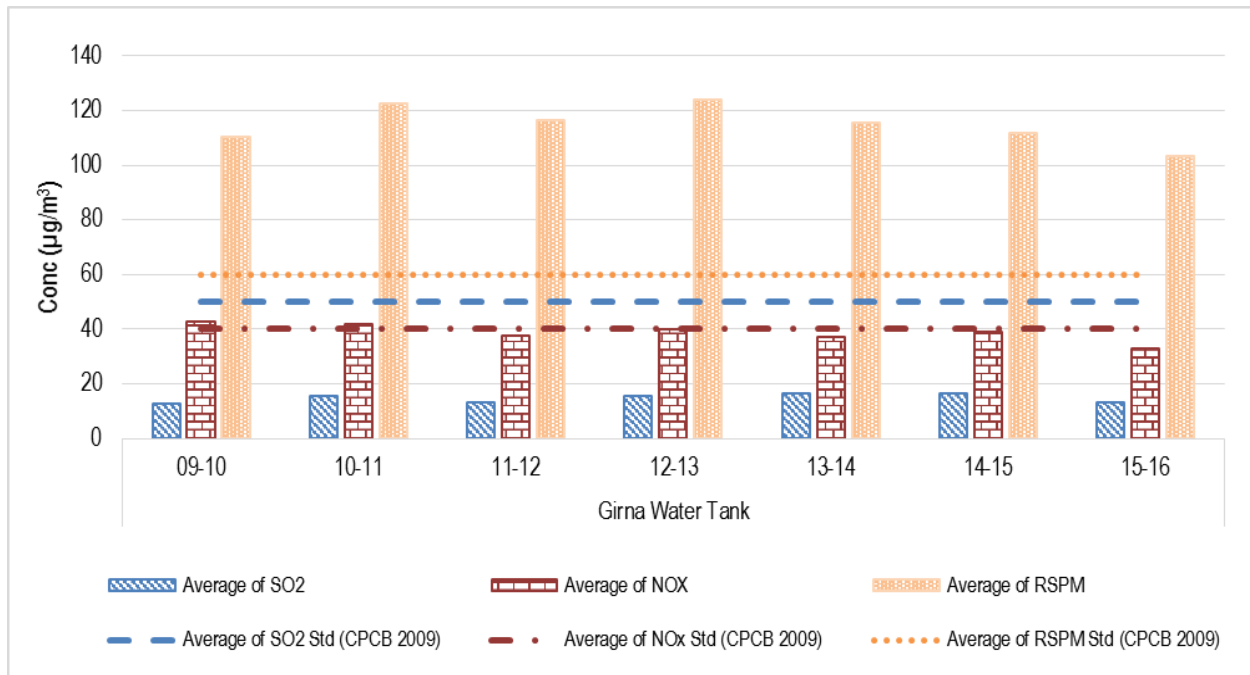


Figure No. 96: Annual average trend of SO₂, NO_x, and RSPM at Girna Water Tank

Jalgaon – MIDC Jalgaon

Table No. 113: Data for monthly average reading recorded at MIDC Jalgaon

			Average of SO ₂	Average of NO _X	Average of RSPM
MIDC Jalgaon	2015	Apr	22	50	119
		May	22	51	121
		Jun	16	40	105
		Jul	14	37	100
		Aug	14	39	104
		Sep	15	38	111
		Oct	15	41	112
		Nov	15	38	110
		Dec	14	38	117
	2016	Jan	15	41	123
		Feb	15	42	121
		Mar	15	42	122



Figure No. 125: Monthly average reading recorded at MIDC Jalgaon

Table No. 114: Annual average trend of SO₂, NO_x and RSPM at MIDC Jalgaon

		Average of SO ₂	Average of NO _x	Average of RSPM
MIDC Jalgaon	09-10	16	49	120
	10-11	22	51	142
	11-12	22	49	137
	12-13	24	51	150
	13-14	23	45	132
	14-15	20	48	125
	15-16	16	41	114

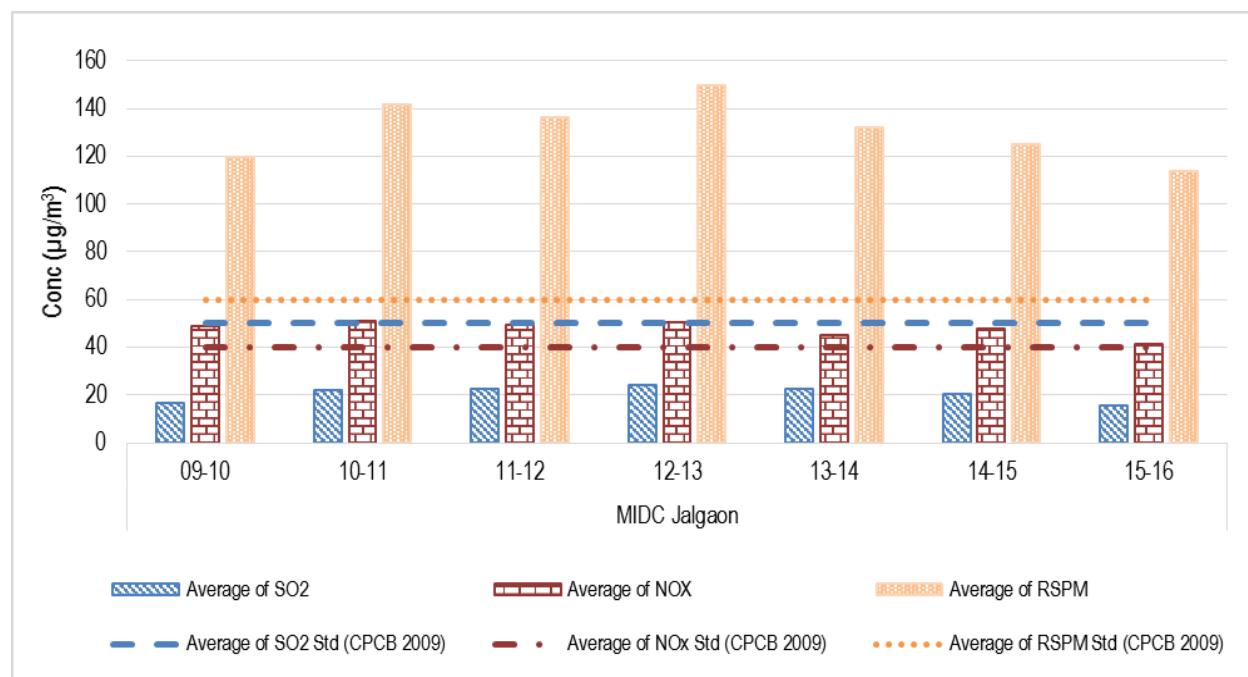


Figure No. 126: Annual average trend of SO₂, NO_x and RSPM at MIDC Jalgaon

Nashik - RTO Colony

Table No. 115: Data for monthly average reading recorded at RTO Colony

			Average of SO ₂	Average of NO _x	Average of RSPM
RTO Colony	2015	Apr	21	22	80
		May	21	21	55
		Jun	12	19	57
		Jul	10	14	55
		Aug	7	10	31
		Sep	4	23	52
		Oct	6	34	80
		Dec	16	24	109
	2016	Jan	24	31	114
		Feb	26	35	100

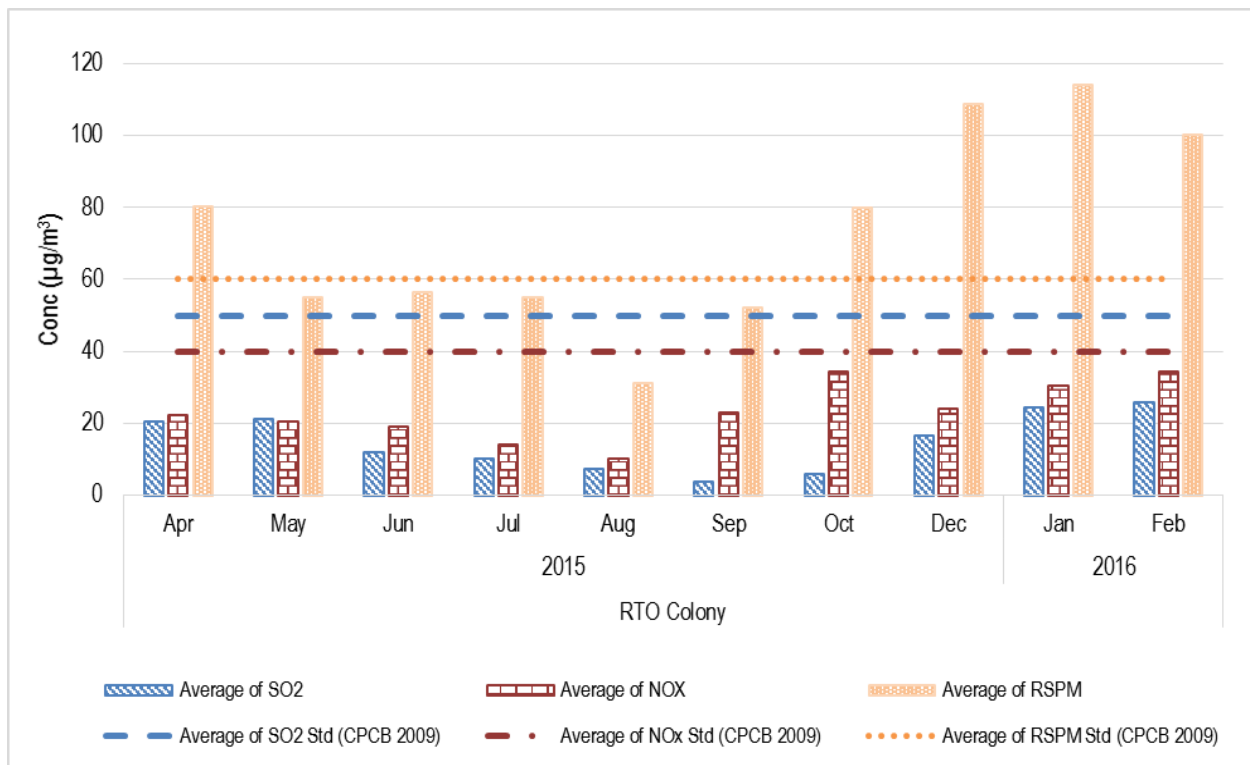


Figure No. 127: Monthly average reading recorded at RTO Colony

Table No. 116: Data for annual average trend of SO₂, NO_x, and RSPM at RTO Colony

		Average of SO ₂	Average of NO _x	Average of RSPM
RTO Colony	09-10	21	29	81
	10-11	21	23	75
	11-12	24	28	98
	12-13	25	27	90
	13-14	28	28	71
	14-15	24	26	77
	15-16	14	23	73

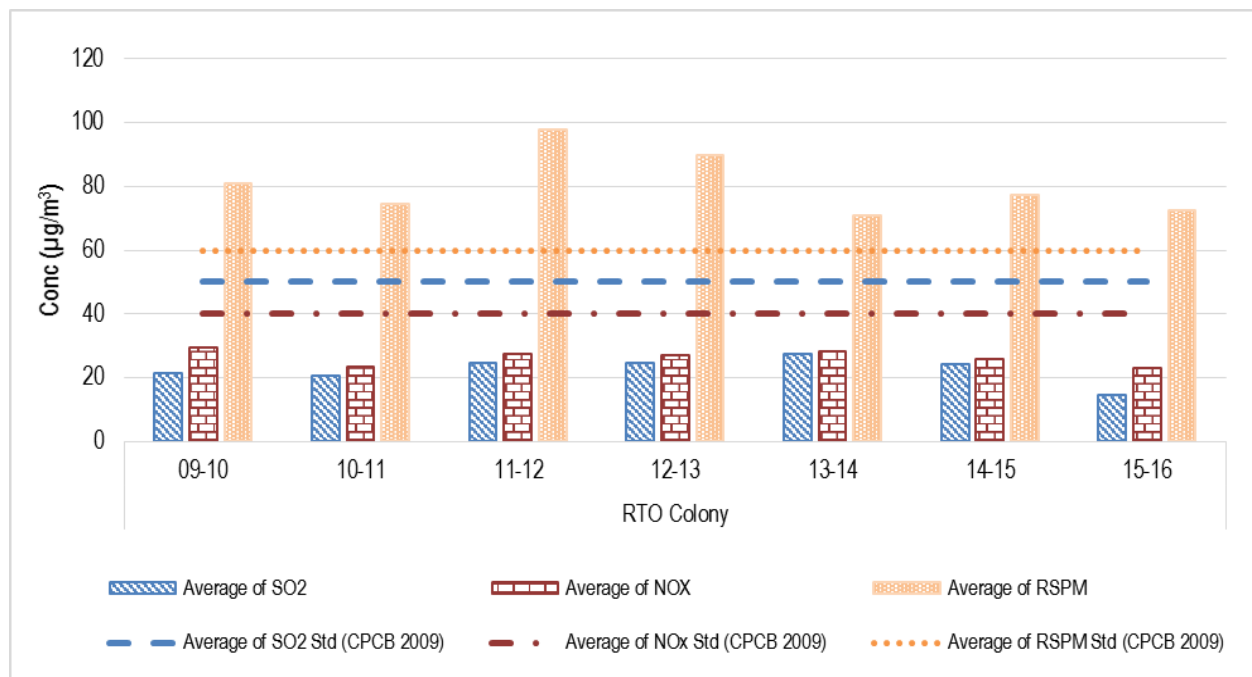


Figure No. 128: Annual average trend of SO₂, NO_x, and RSPM at RTO Colony

Nashik – MIDC Satpur - VIP

Table No. 117: Data for monthly average reading recorded at MIDC Satpur - VIP

			Average of SO ₂	Average of NO _x	Average of RSPM
MIDC Satpur - VIP	2015	Apr	18	22	87
		May	21	22	65
		Jun	14	19	72
		Jul	8	11	36
		Aug	6	11	46
		Sep	4	21	61
		Oct	6	26	81
		Dec	19	26	114
	2016	Jan	23	31	108
		Feb	24	34	105

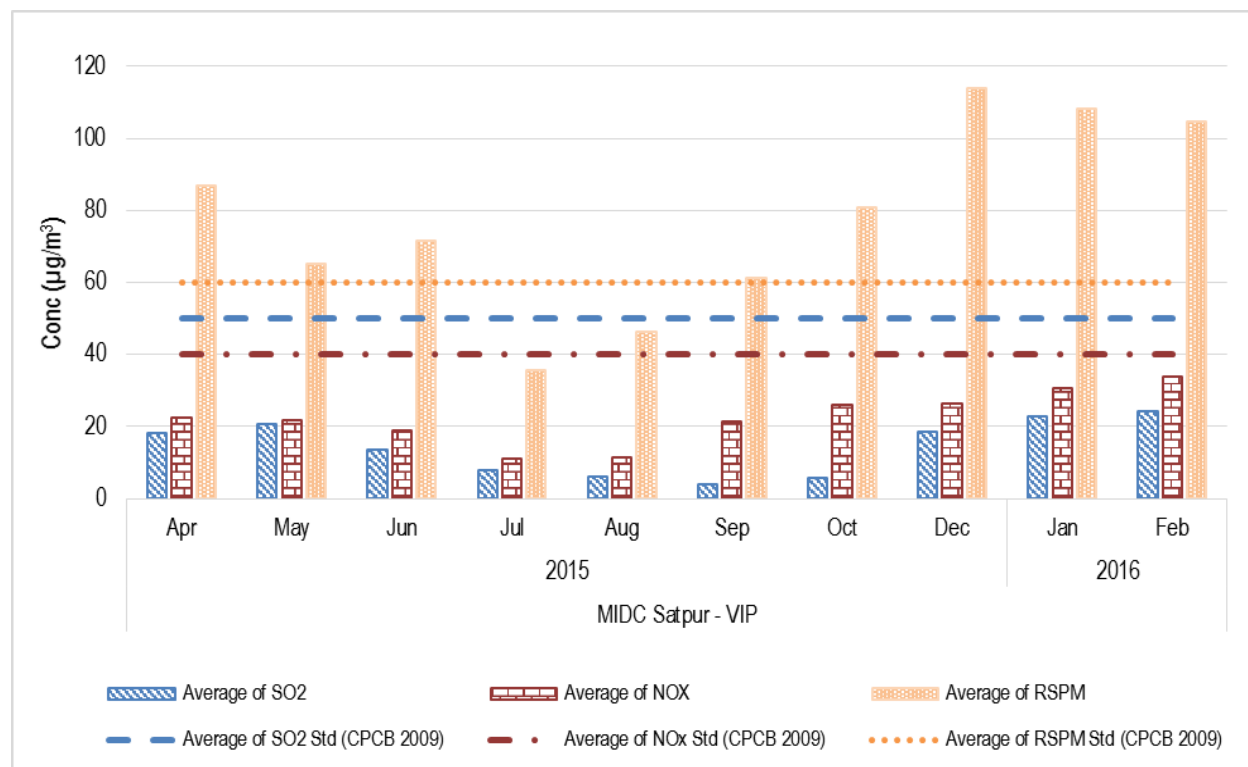


Figure No. 129: Monthly average reading recorded at MIDC Satpur - VIP

Table No. 118: Data for annual average trend of SO₂, NO_x, and RSPM at MIDC Satpur – VIP

		Average of SO ₂	Average of NO _x	Average of RSPM
MIDC Satpur - VIP	09-10	23	29	85
	10-11	23	25	70
	11-12	25	28	98
	12-13	25	27	92
	13-14	27	28	71
	14-15	25	26	80
	15-16	14	22	78

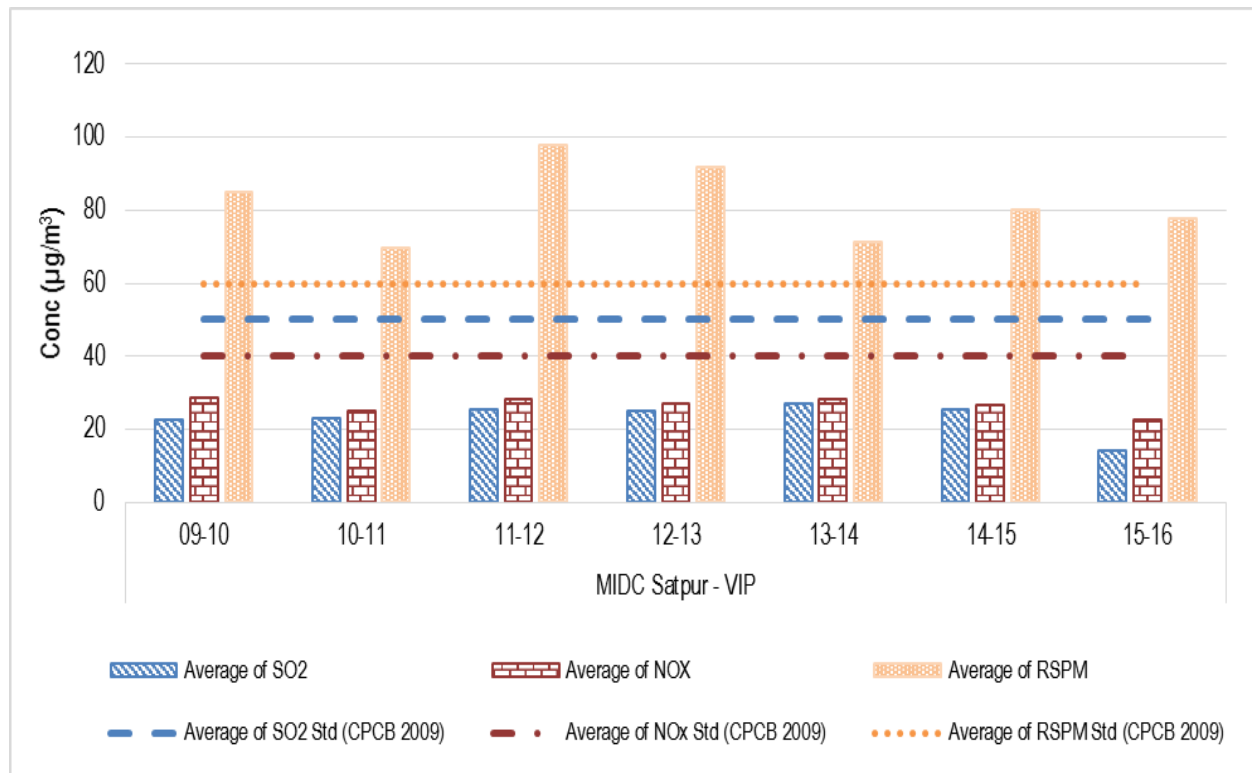


Figure No. 130: Annual average trend of SO₂, NO_x, and RSPM at MIDC Satpur – VIP

Nashik – NMC Nashik

Table No. 119: Data for monthly average reading recorded at NMC Nashik

			Average of SO ₂	Average of NO _X	Average of RSPM
NMC Nashik	2015	Apr	20	22	170
		May	21	23	84
		Jun	11	21	69
		Jul	12	16	57
		Aug	9	18	42
		Sep	4	24	57
		Oct	7	30	93
		Dec	17	25	135
	2016	Jan	24	31	131
		Feb	25	34	109

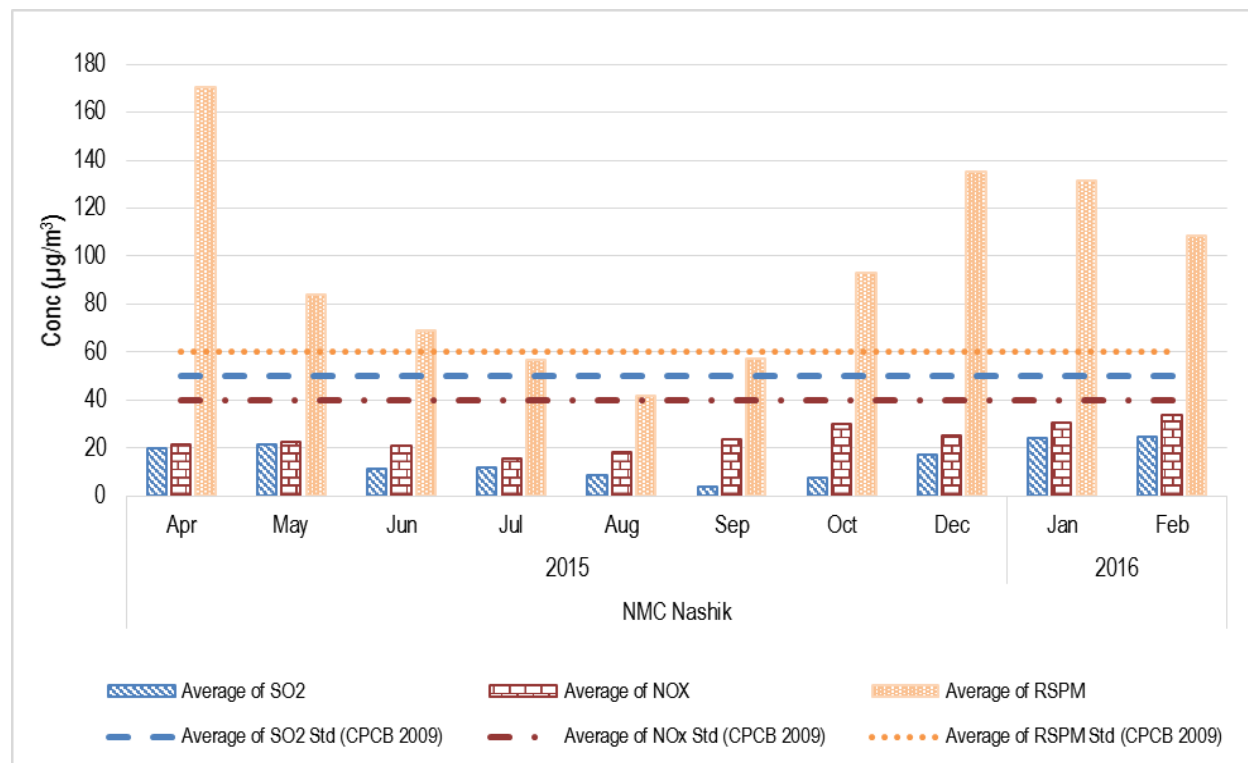


Figure No. 131: Monthly average reading recorded at NMC Nashik

Table No. 120: Data for annual average trend of SO₂, NO_x, and RSPM at NMC Nashik

		Average of SO ₂	Average of NO _x	Average of RSPM
NMC Nashik	13-14	28	28	70
	14-15	25	26	78
	15-16	15	24	94

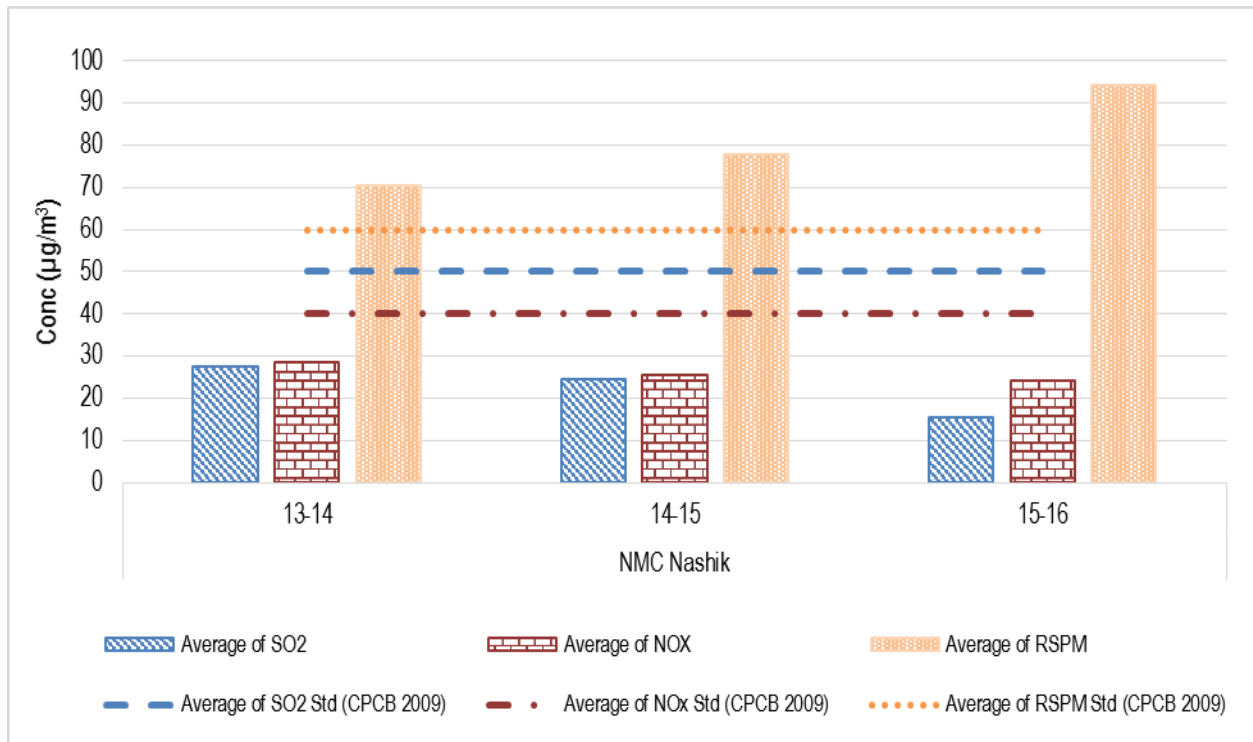


Figure No. 132: Annual average trend of SO₂, NO_x, and RSPM at NMC Nashik

Nashik - SRO Office Nashik

Table No. 121: Monthly average reading recorded at SRO Office Nashik

			Average of SO ₂	Average of NO _x	Average of RSPM
SRO Office Nashik	2015	Apr	20	23	96
		May	23	23	86
		Jun	11	16	50
		Jul	8	16	36
		Aug	8	15	32
		Sep	6	21	79
		Oct	6	30	105
		Dec	18	25	67
	2016	Jan	22	27	76
		Feb	25	36	106

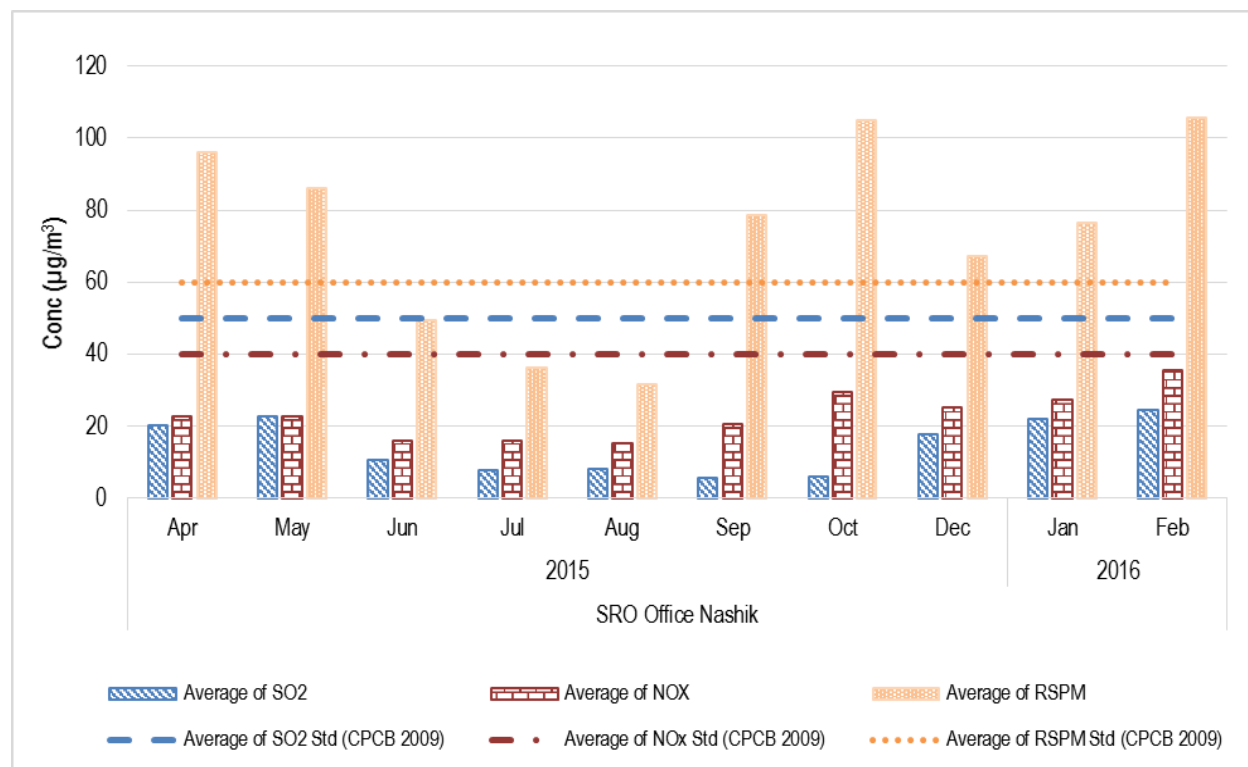


Figure No. 133: Monthly average reading recorded at SRO Office Nashik

Table No. 122: Data for annual average trend of SO₂, NO_x, and RSPM at SRO Office Nashik

		Average of SO ₂	Average of NO _x	Average of RSPM
SRO Office Nashik	09-10	21	27	86
	10-11	20	23	85
	11-12	24	28	114
	12-13	24	27	90
	13-14	28	28	78
	14-15	26	26	73
	15-16	15	24	76

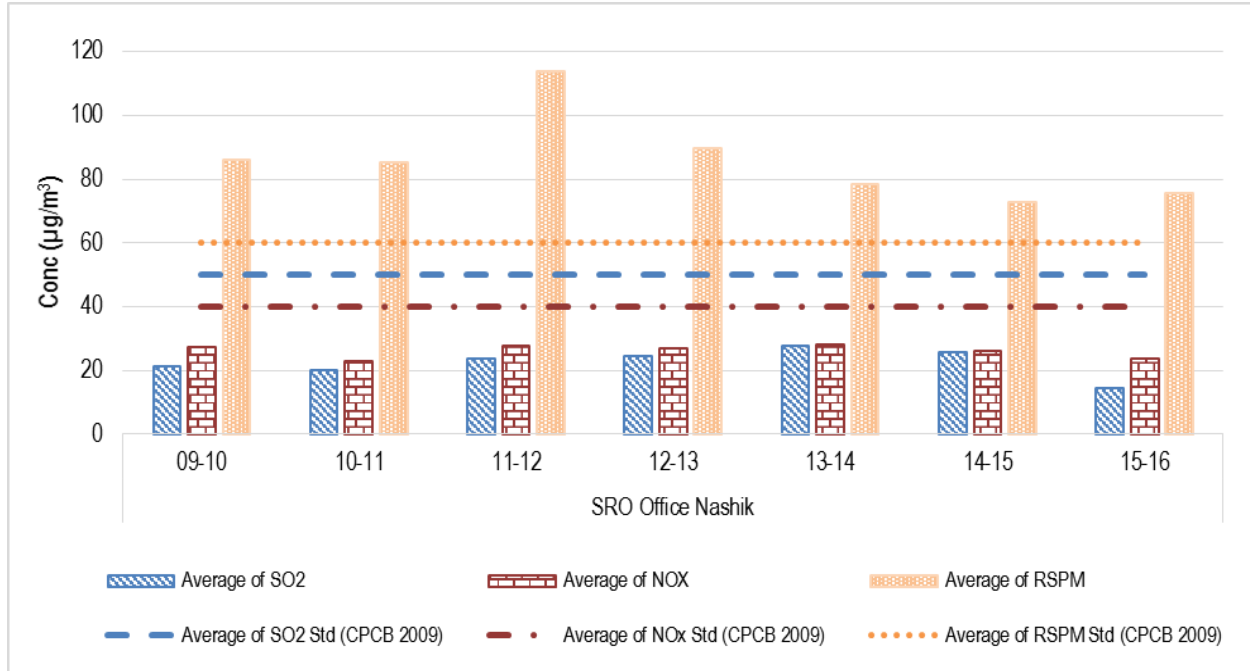


Figure No. 134: Annual average trend of SO₂, NO_x, and RSPM at SRO Office Nashik

Table No. 123: % exceedence of pollutants at Nashik RO

Row Labels	Number of Observations			Percentage Exceedence			
	Total	Exceedence SO	Exceedence NO	Exceedence RSPM	SO	NO	RSPM
Girna Water Tank	102	0	0	64	0	0	63
MIDC Jalgaon	104	0	0	91	0	0	88
MIDC Satpur - VIP	87	0	0	18	0	0	21
NMC Nashik	93	0	0	40	0	0	43
Old B. J. Market	104	0	0	81	0	0	78
RTO Colony	87	0	0	22	0	0	25
SRO Office Nashik	234	0	0	57	0	0	24

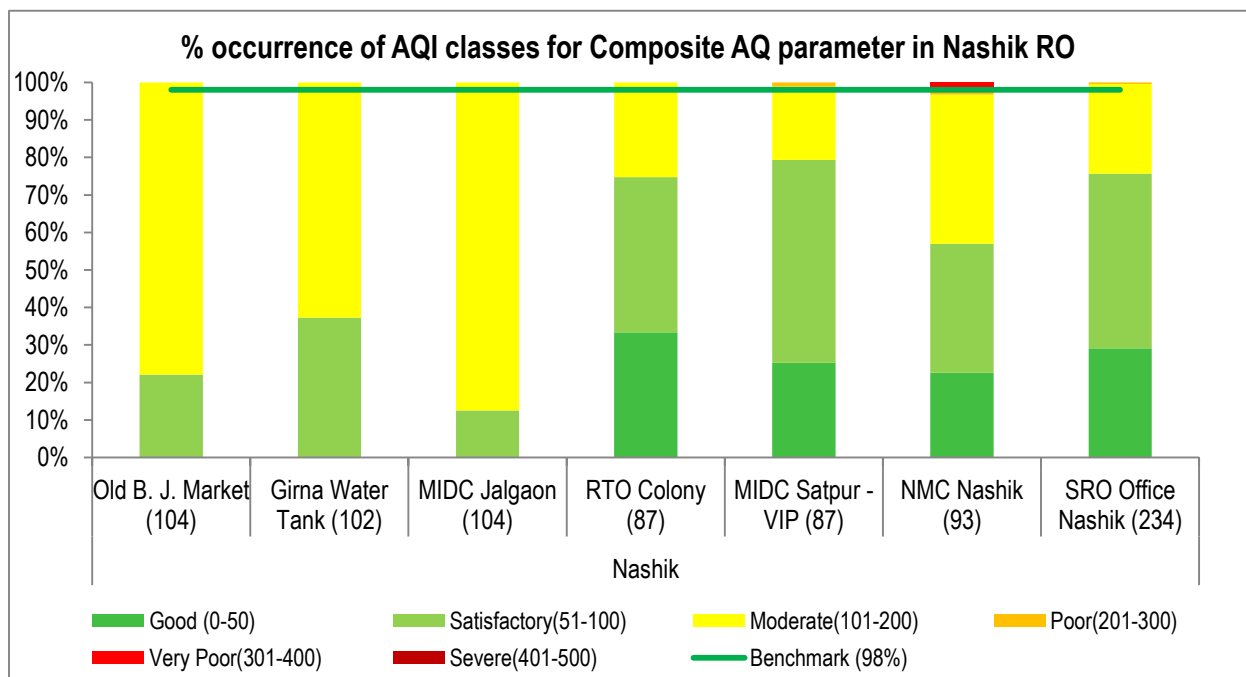
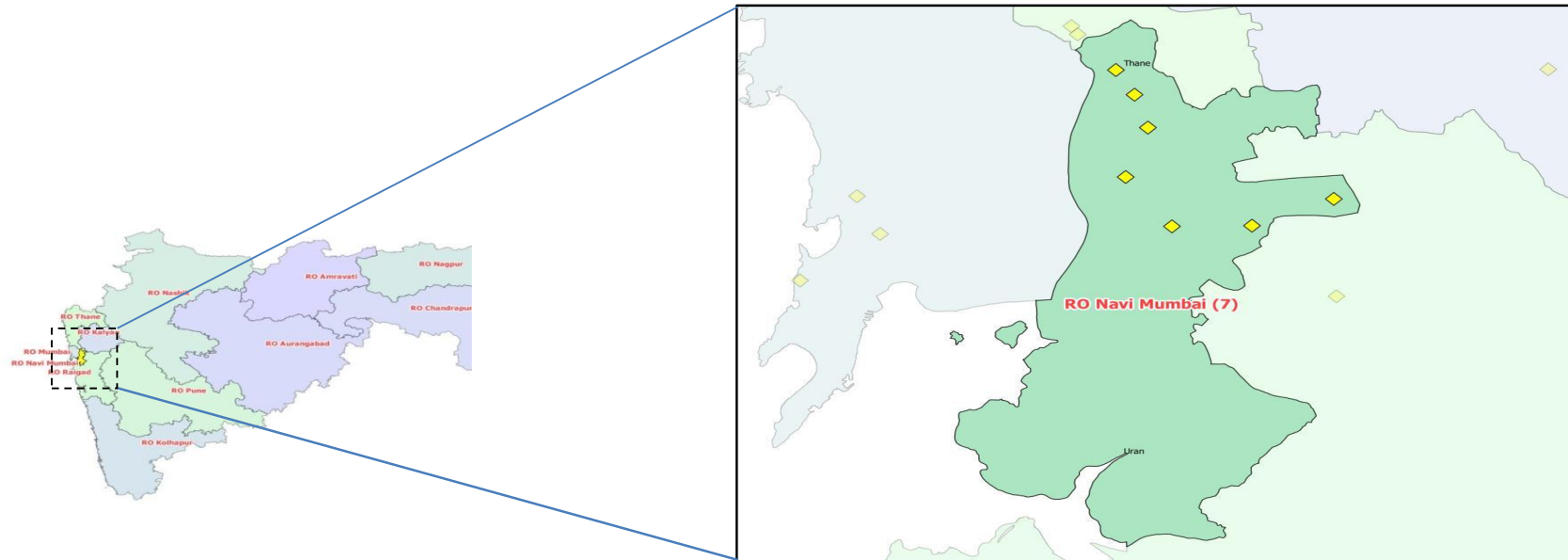


Figure No. 135: % occurrence of AQI classes for Composite AQ parameter in Nashik RO

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-NirmalBhavan	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. 124: Data for monthly average reading recorded at Rabale

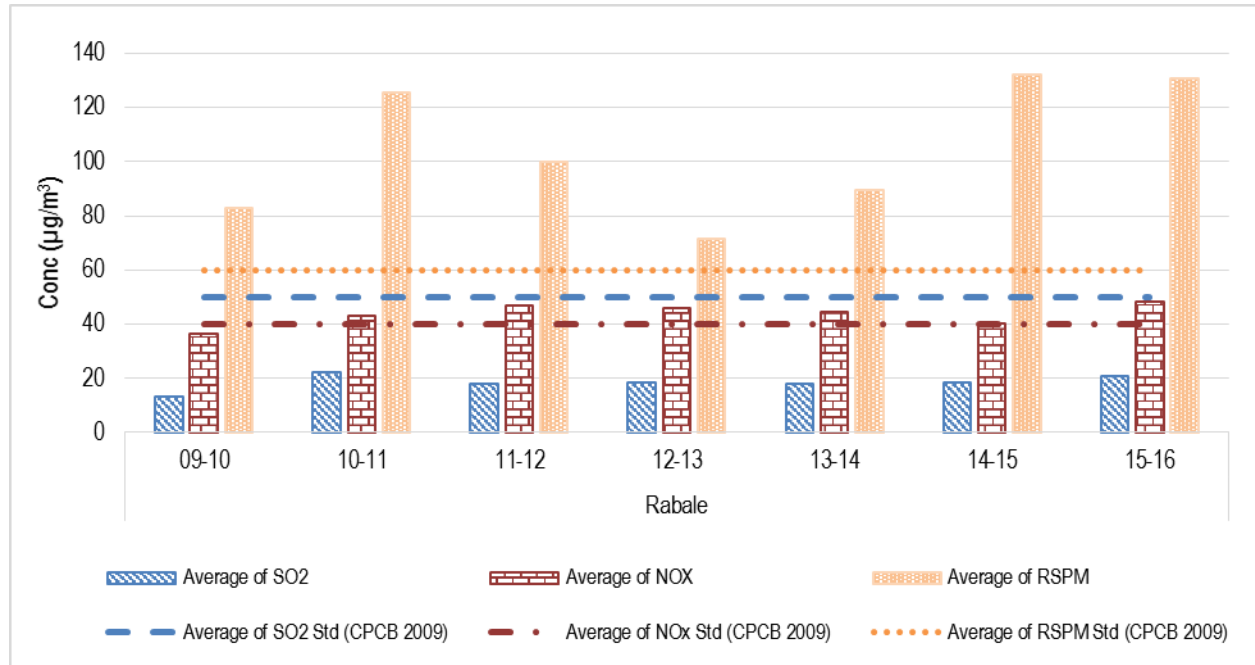
			Average of SO ₂	Average of NO _X	Average of RSPM
Rabale	2015	Apr	19	49	148
		Aug	20	32	87
		Sep	19	32	116
		Oct	19	47	84
		Nov	19	43	100
		Dec	22	51	150
	2016	Jan	23	51	136
		Feb	21	74	206
		Mar	24	51	153



Figure No. 136: Monthly average reading recorded at Rabale

Table No. 125: Data for annual average trend of SO₂, NO_x, and RSPM at Rabale

		Average of SO ₂	Average of NO _x	Average of RSPM
Rabale	09-10	13	36	83
	10-11	22	43	125
	11-12	18	47	100
	12-13	18	46	71
	13-14	18	44	90
	14-15	18	40	132
	15-16	21	48	131

Figure No. 137: Annual average trend of SO₂, NO_x, and RSPM at Rabale

Navi Mumbai – Nerul – DY Patil

Table No. 126: Data for monthly average reading recorded at Nerul – DY Patil

		Average of SO ₂	Average of NO _x	Average of RSPM	
Nerul - DY Patil	2015	Apr	18	47	161
		May	19	52	149
		Jun	14	45	128
		Jul	15	29	77
		Aug	12	20	74
		Sep	16	35	103
		Oct	17	40	114
		Nov	19	45	150
		Dec	18	43	167
	2016	Jan	16	45	156
		Feb	19	45	169
		Mar	19	45	177

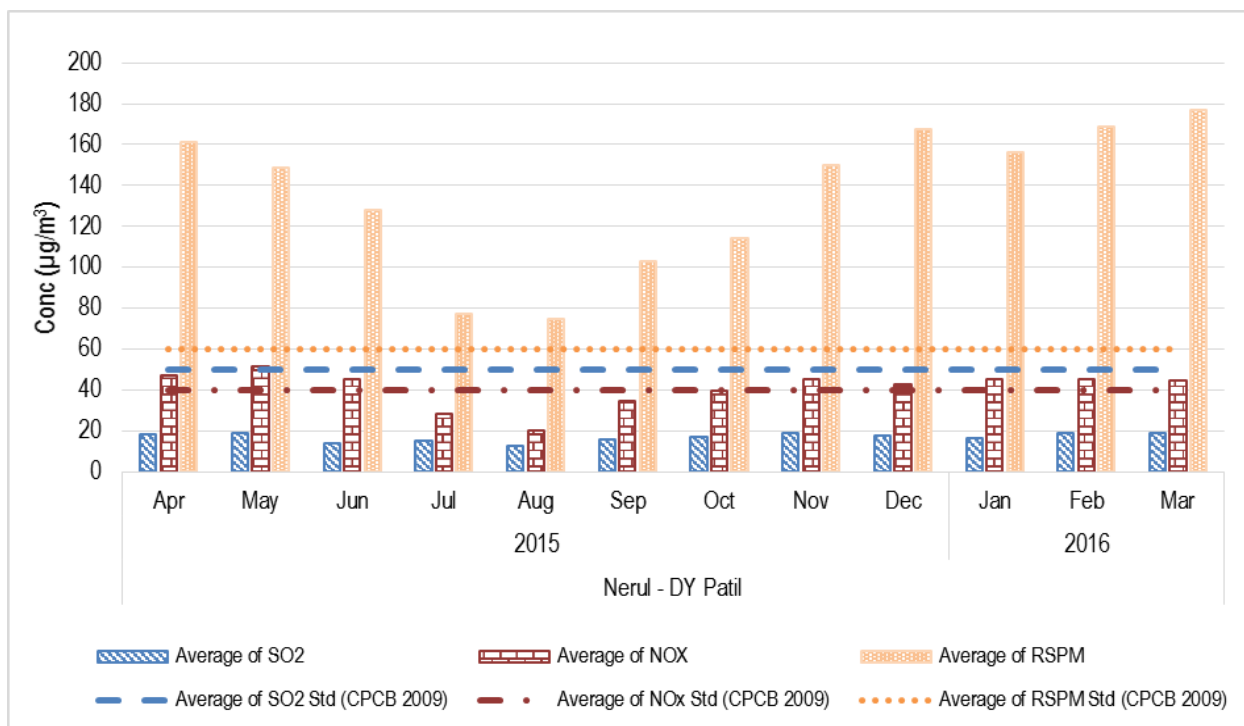
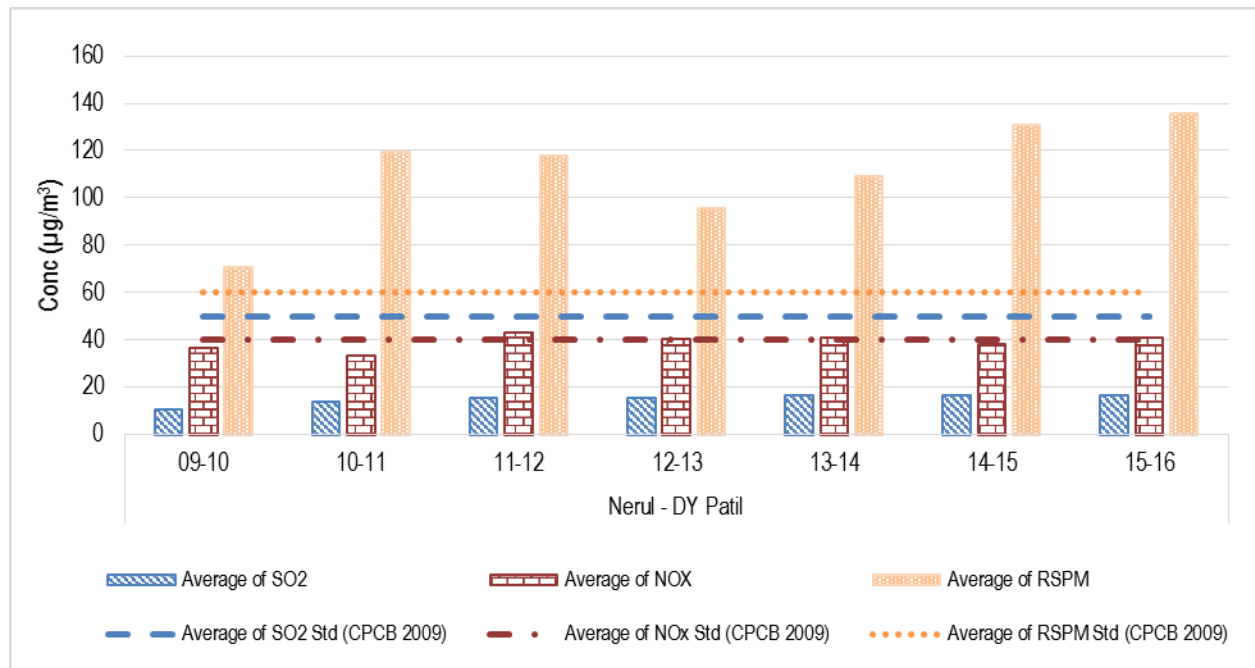


Figure No. 138: Monthly average reading recorded at Nerul – DY Patil

Table No. 127: Data for annual average trend of SO₂, NO_x, and RSPM at Nerul – DY Patil

		Average of SO ₂	Average of NO _x	Average of RSPM
Nerul - DY Patil	09-10	10	37	71
	10-11	14	33	119
	11-12	15	43	118
	12-13	15	40	95
	13-14	17	41	109
	14-15	17	38	131
	15-16	17	41	136

Figure No. 139: Annual average trend of SO₂, NO_x, and RSPM at Nerul – DY Patil

Navi Mumbai – Mahape, MPCB – NirmalBhavan

Table No. 128: Data for Monthly average reading recorded at Mahape, MPCB – NirmalBhavan

		Average of SO ₂	Average of NO _X	Average of RSPM	
Mahape, MPCB-NirmalBhavan	2015	Apr	20	51	138
		May	22	45	79
		Jun	18	35	73
		Jul	14	28	59
		Aug	16	25	36
		Oct	22	42	64
		Nov	21	49	99
		Dec	19	51	81
	2016	Jan	24	52	97
		Feb	20	50	124
		Mar	22	51	88

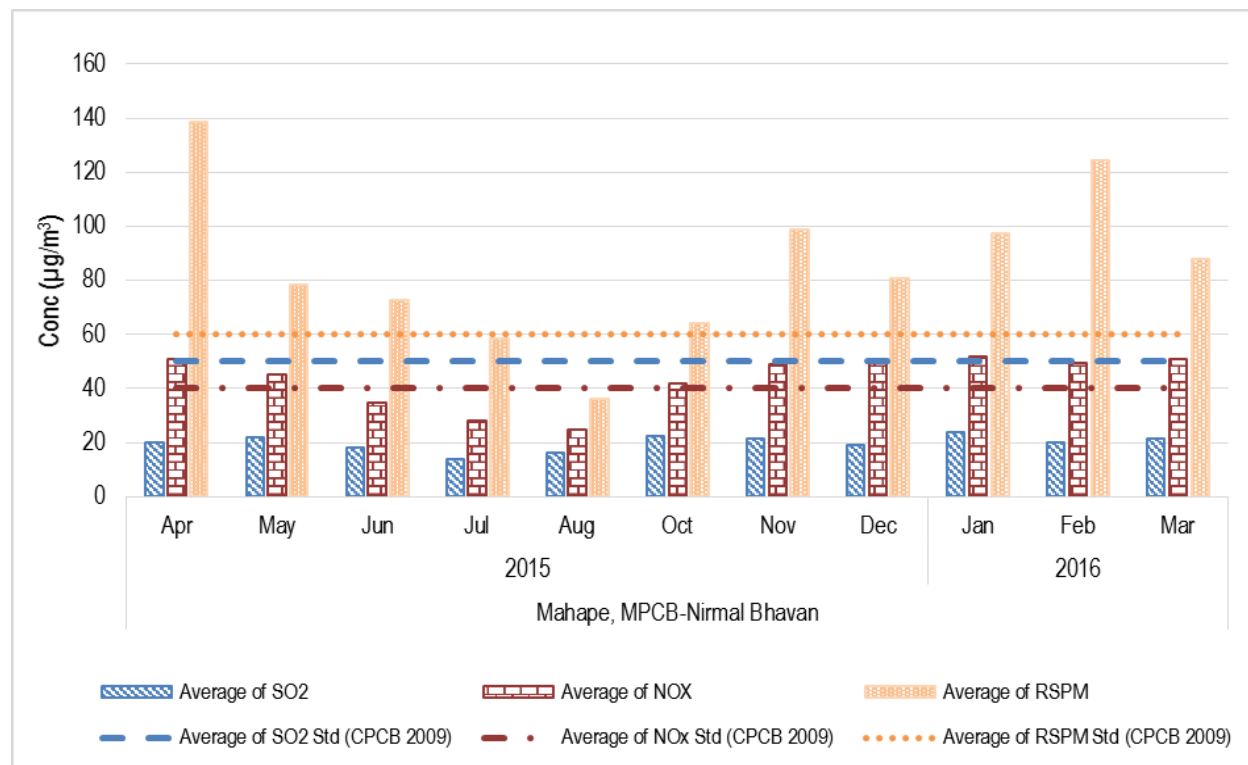


Figure No. 140: Monthly average reading recorded at Mahape, MPCB – NirmalBhavan

Table No. 129: Data for annual average trend of SO₂, NO_x, and RSPM at Mahape, MPCB – NirmalBhavan

		Average of SO ₂	Average of NO _x	Average of RSPM
Mahape, MPCB-NirmalBhavan	09-10	15	42	95
	10-11	22	41	101
	11-12	17	44	133
	12-13	18	45	121
	13-14	18	45	182
	14-15	18	40	131
	15-16	20	43	85

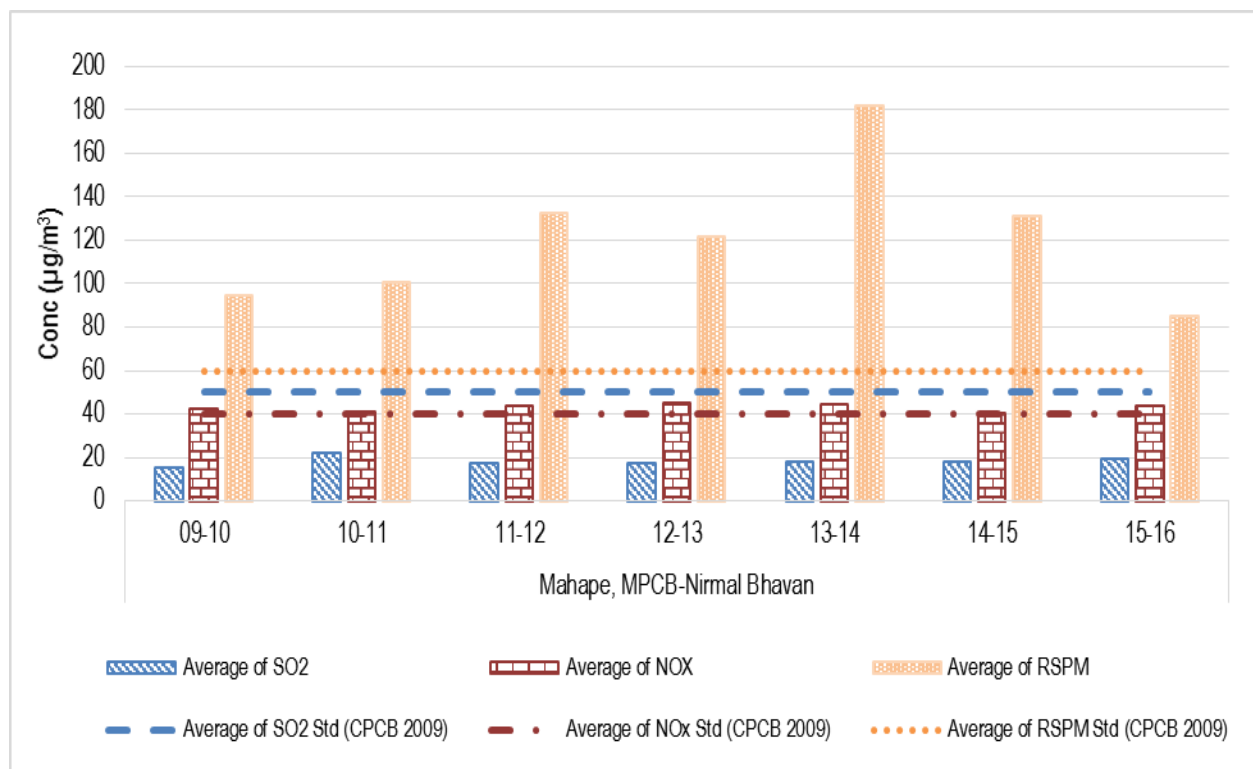


Figure No. 141: Annual average trend of SO₂, NO_x, and RSPM at Mahape, MPCB – NirmalBhavan

Navi Mumbai - Airoli

Table No. 130: Data for monthly average reading recorded at Airoli

			Average of SO ₂	Average of NO _X	Average of RSPM
Airoli	2015	Apr	21	28	33
		May	22	28	23
		Jun	25	29	28
		Jul	15	28	33
		Aug	14	24	35
		Sep	30	39	27
		Oct	32	39	54
		Nov	25	33	34
		Dec	20	60	39
	2016	Jan	33	63	38
		Feb	41	54	49
		Mar	36	59	40

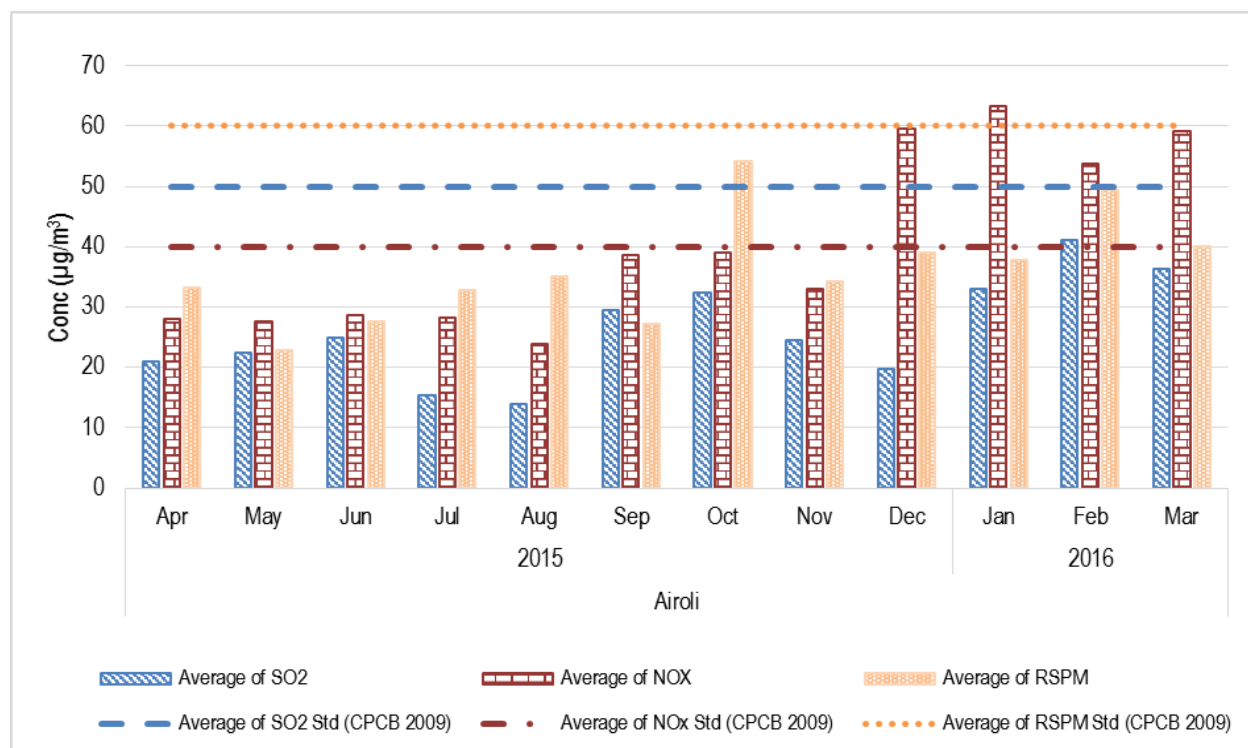
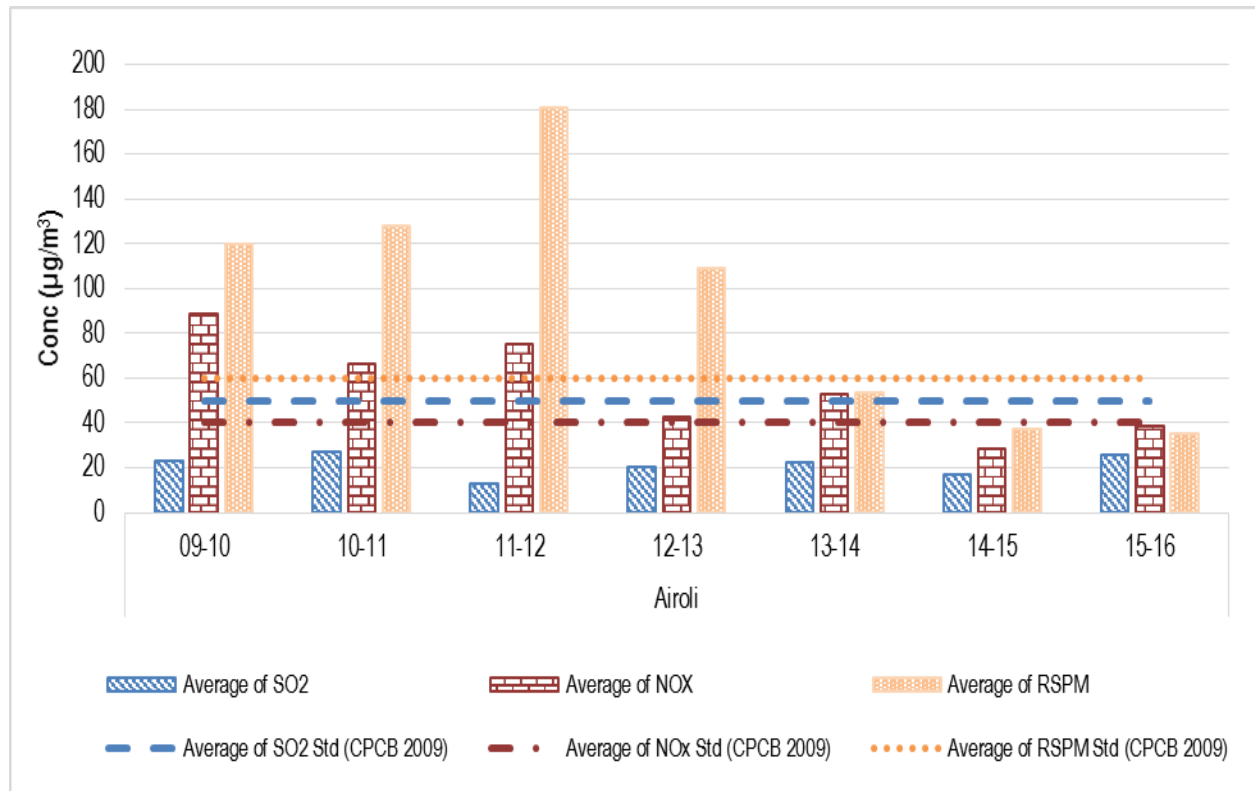


Figure No. 142: Monthly average reading recorded at Airoli

Table No. 131: Data for annual average trend of SO₂, NO_x, and RSPM at Airoli

		Average of SO ₂	Average of NO _x	Average of RSPM
Airoli	09-10	23	89	120
	10-11	27	67	128
	11-12	13	75	181
	12-13	21	43	109
	13-14	22	53	53
	14-15	17	28	38
	15-16	26	39	36

Figure No. 143: Annual average trend of SO₂, NO_x, and RSPM at Airoli

Taloja – Kharghar – CIDCO Nodal Office

Table No. 132: Data for monthly average reading recorded at Kharghar – CIDCO Nodal Office

		Average of SO ₂	Average of NO _x	Average of RSPM	
Kharghar - CIDCO Nodal Office	2015	Apr	19	49	131
		May	20	46	142
		Jun	17	44	107
		Jul	14	22	60
		Aug	18	42	43
		Sep	12	30	53
		Oct	17	40	96
		Nov	17	41	119
		Dec	18	44	146
	2016	Jan	18	45	164
		Feb	19	47	175
		Mar	21	49	158

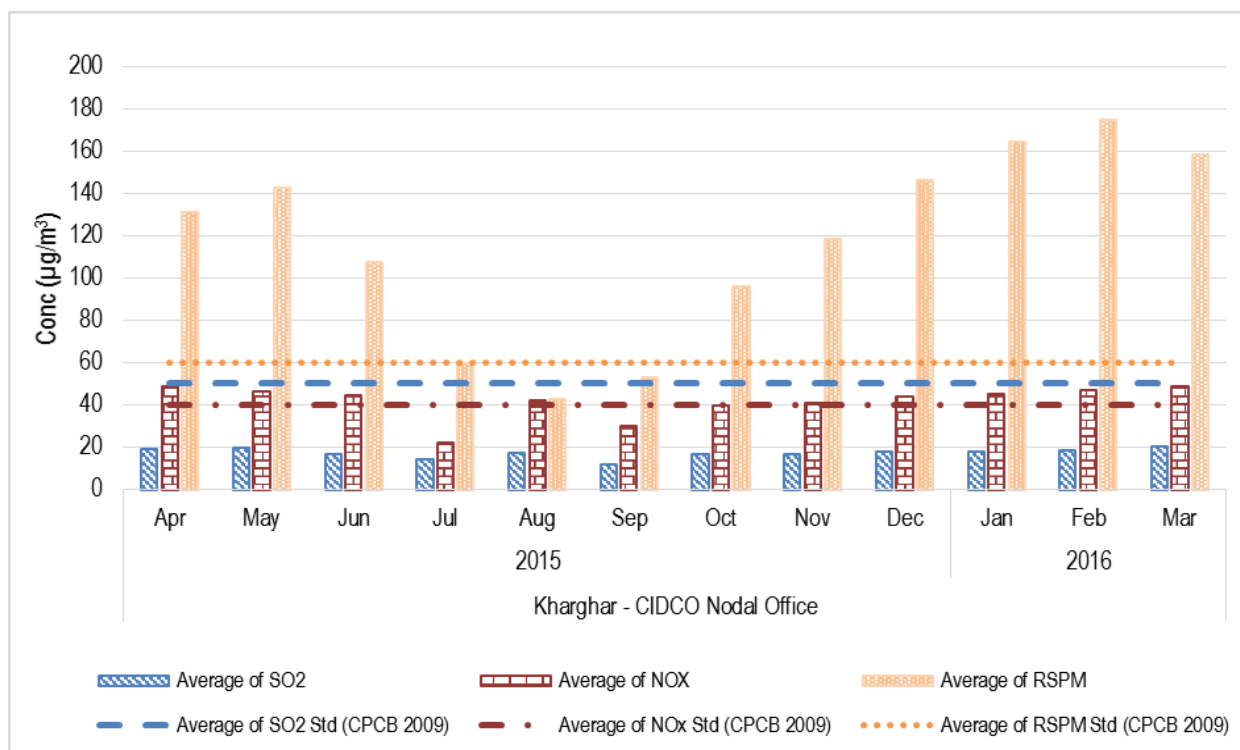


Figure No. 144: Monthly average reading recorded at Kharghar – CIDCO Nodal Office

Table No. 133: Data for annual average trend of SO₂, NO_x, and RSPM at Kharghar – CIDCO Nodal Office

		Average of SO ₂	Average of NO _x	Average of RSPM
Kharghar - CIDCO Nodal Office	09-10	10	35	75
	10-11	17	37	122
	11-12	16	43	122
	12-13	16	41	122
	13-14	17	42	125
	14-15	17	38	127
	15-16	17	41	116

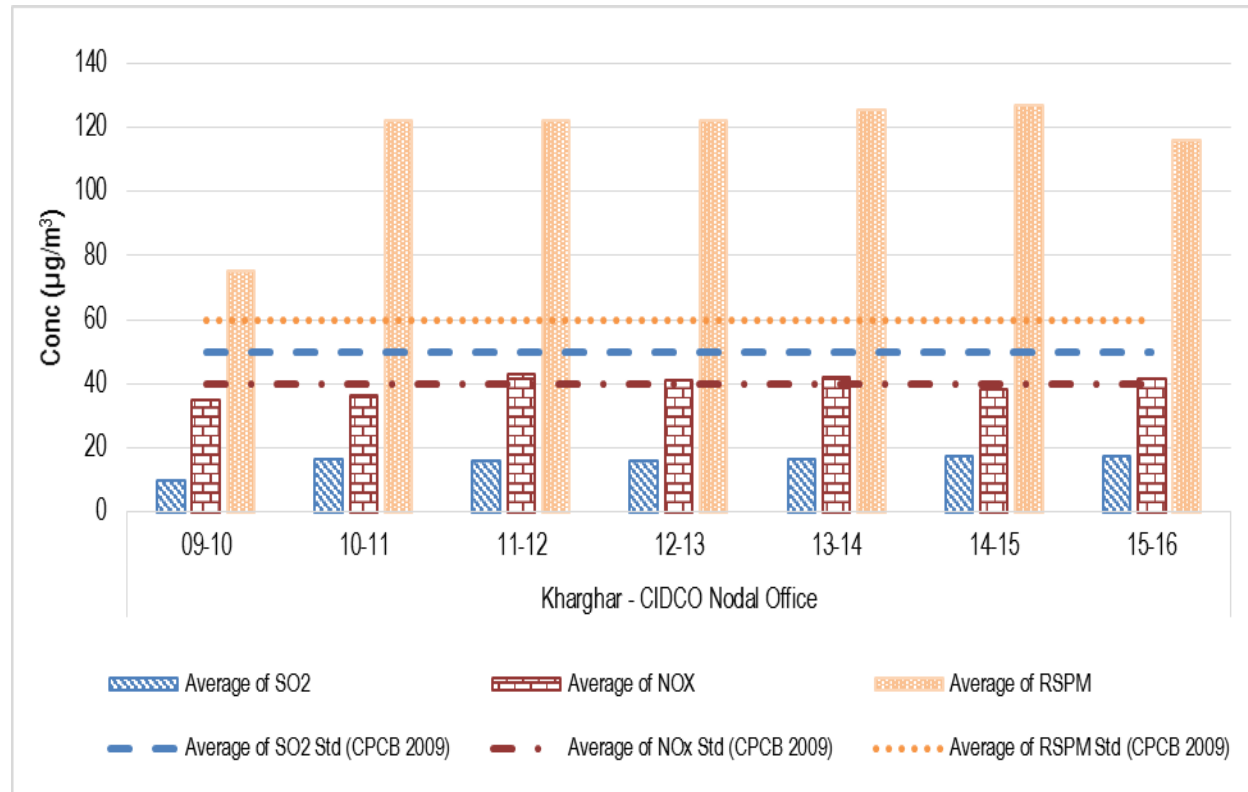


Figure No. 145: Annual average trend of SO₂, NO_x, and RSPM at Kharghar – CIDCO Nodal Office

Taloja – MIDC Building

Table No. 134: Data for monthly average reading recorded at Taloja - MIDC Building

		Average of SO ₂	Average of NO _x	Average of RSPM	
Taloja - MIDC Building	2015	Apr	19	52	162
		May	26	59	168
		Jul	16	33	123
		Aug	25	35	144
		Sep	16	41	124
		Oct	18	40	135
		Nov	23	51	156
		Dec	19	46	163
	2016	Jan	22	51	174
		Feb	22	54	142
		Mar	28	58	146



Figure No. 146: Monthly average reading recorded at Taloja - MIDC Building

Table No. 135: Data for annual average trend of SO₂, NO_x, and RSPM at Taloja - MIDC Building

		Average of SO ₂	Average of NO _x	Average of RSPM
Taloja - MIDC Building	09-10	23	55	200
	10-11	27	48	194
	11-12	20	51	148
	12-13	18	45	129
	13-14	19	47	187
	14-15	18	41	142
	15-16	21	47	148

Figure No. 147: Annual average trend of SO₂, NO_x, and RSPM at Taloja - MIDC Building

Table No. 136: % exceedence of pollutants at Navi Mumbai RO

	Number of Observations				Percentage Exceedence		
	Total	Exceedence SO	Exceedence NO	Exceedence RSPM	SO	NO	RSPM
Airoli	232	0	4	2	0	2	1
Kharghar - CIDCO Nodal Office	104	0	0	67	0	0	64
Mahape, MPCB-NirmalBhavan	108	0	1	41	0	1	38
Nerul - DY Patil	105	0	0	78	0	0	74
Rabale	60	0	1	45	0	2	75
Taloja - MIDC Building	95	0	0	86	0	0	91
Bhosari	101	3	14	44	3	14	44

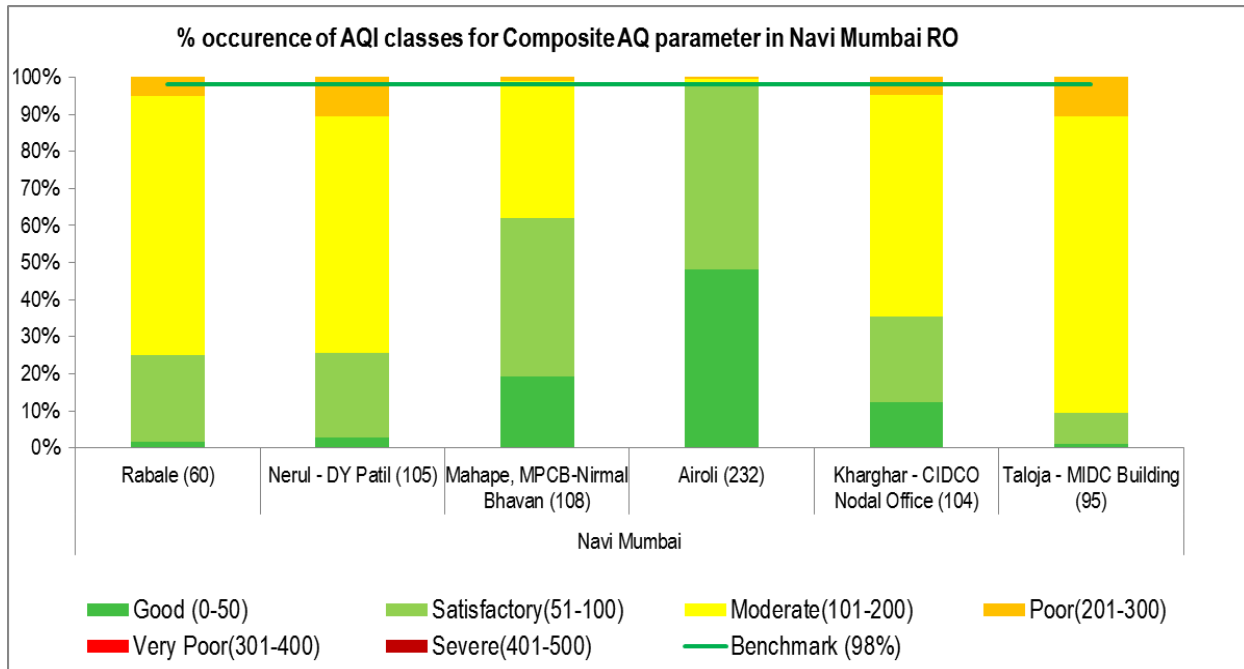
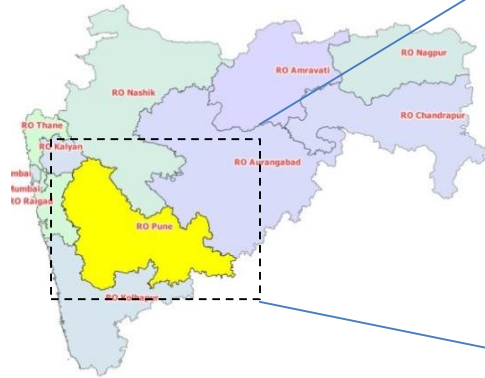


Figure No. 148: % occurrence of AQI classes for RSPM AQ parameter in Navi Mumbai RO

RO – Pune



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

Pune - Bhosari

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

			Average of SO ₂	Average of NO _x	Average of RSPM
Bhosari	2015	Apr	15	45	111
		May	20	41	89
		Jun	14	29	51
		Jul	18	37	46
		Aug	19	46	44
		Sep	19	39	48
		Oct	28	39	81
		Nov	36	52	104
		Dec	61	77	151
	2016	Jan	52	76	172
		Feb	53	69	142
		Mar	41	57	124

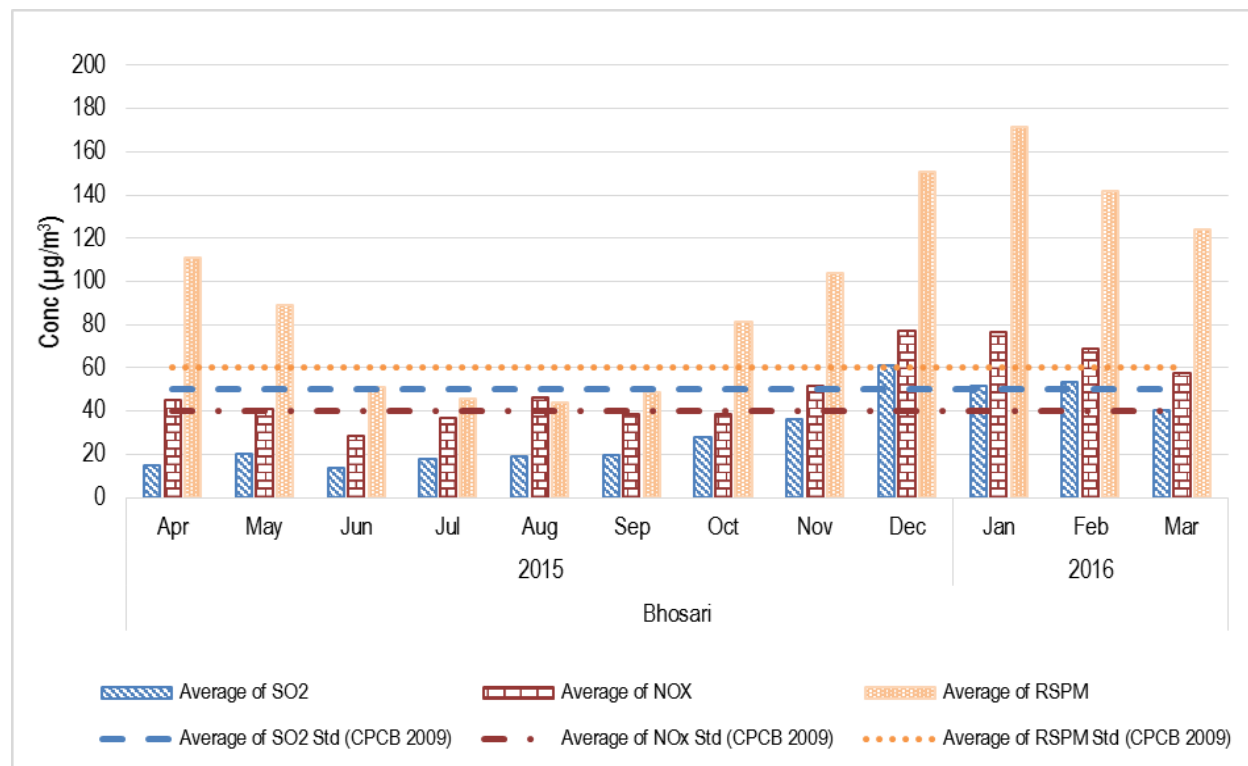
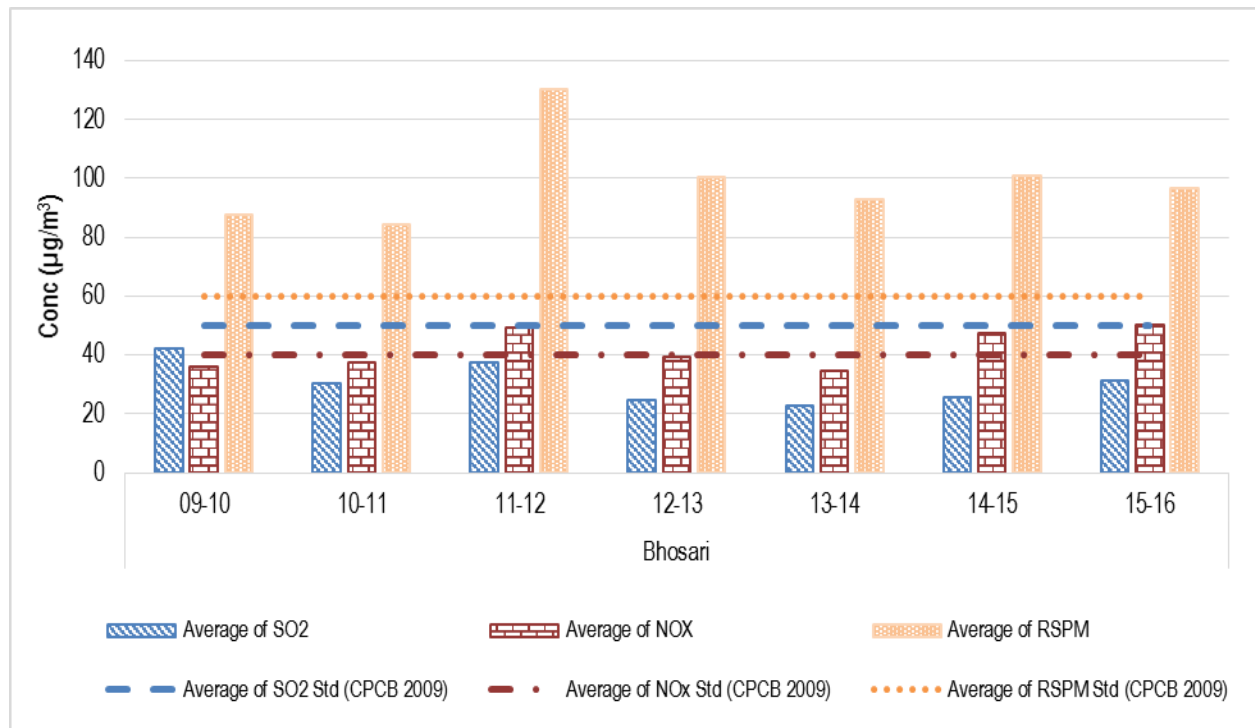


Figure No. 149: Monthly average reading recorded at Bhosari

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

		Average of SO ₂	Average of NO _x	Average of RSPM
Bhosari	09-10	42	36	88
	10-11	30	38	84
	11-12	37	49	130
	12-13	25	39	101
	13-14	23	35	93
	14-15	26	47	101
	15-16	31	50	97

Figure No. 150: Annual average trend of SO₂, NO_x, and RSPM at Bhosari

Pune - Nal Stop

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

			Average of SO ₂	Average of NO _x	Average of RSPM
Nal Stop	2015	Apr	15	61	89
		May	18	50	60
		Jun	15	54	58
		Jul	20	46	56
		Aug	17	45	53
		Sep	20	52	57
		Oct	20	61	78
		Nov	31	62	123
		Dec	28	88	129
	2016	Jan	24	83	114
		Feb	24	91	123
		Mar	24	62	99

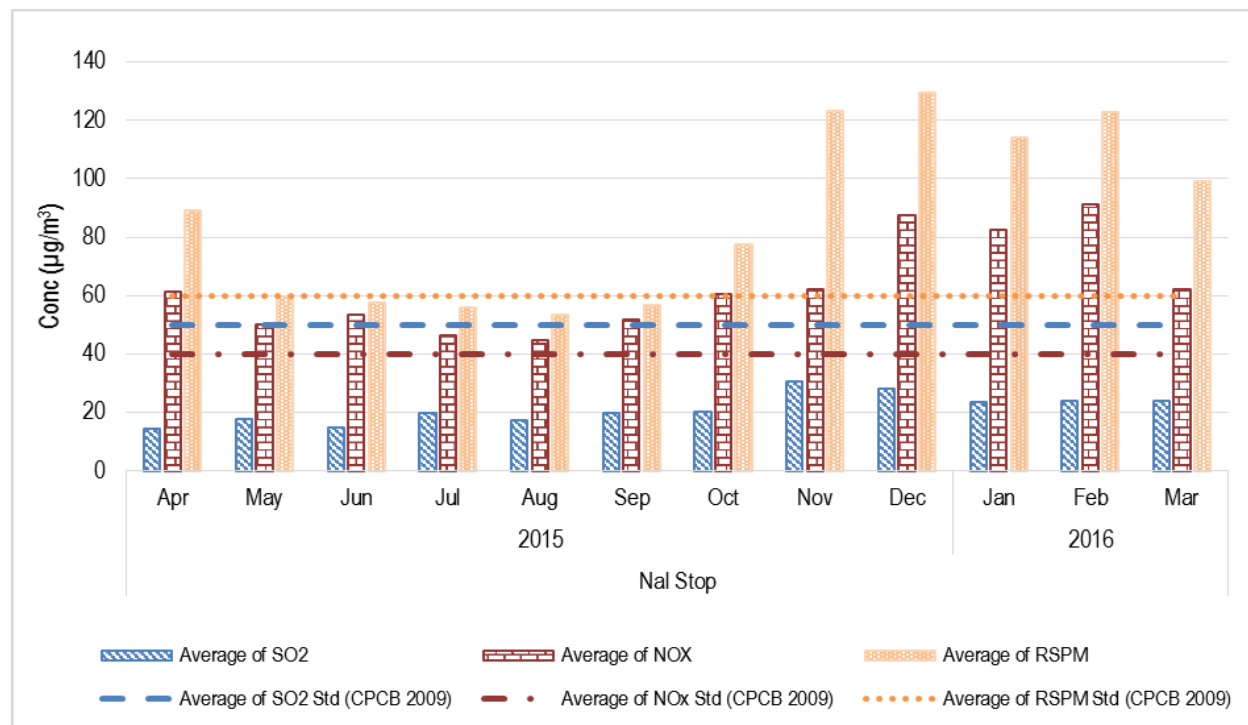
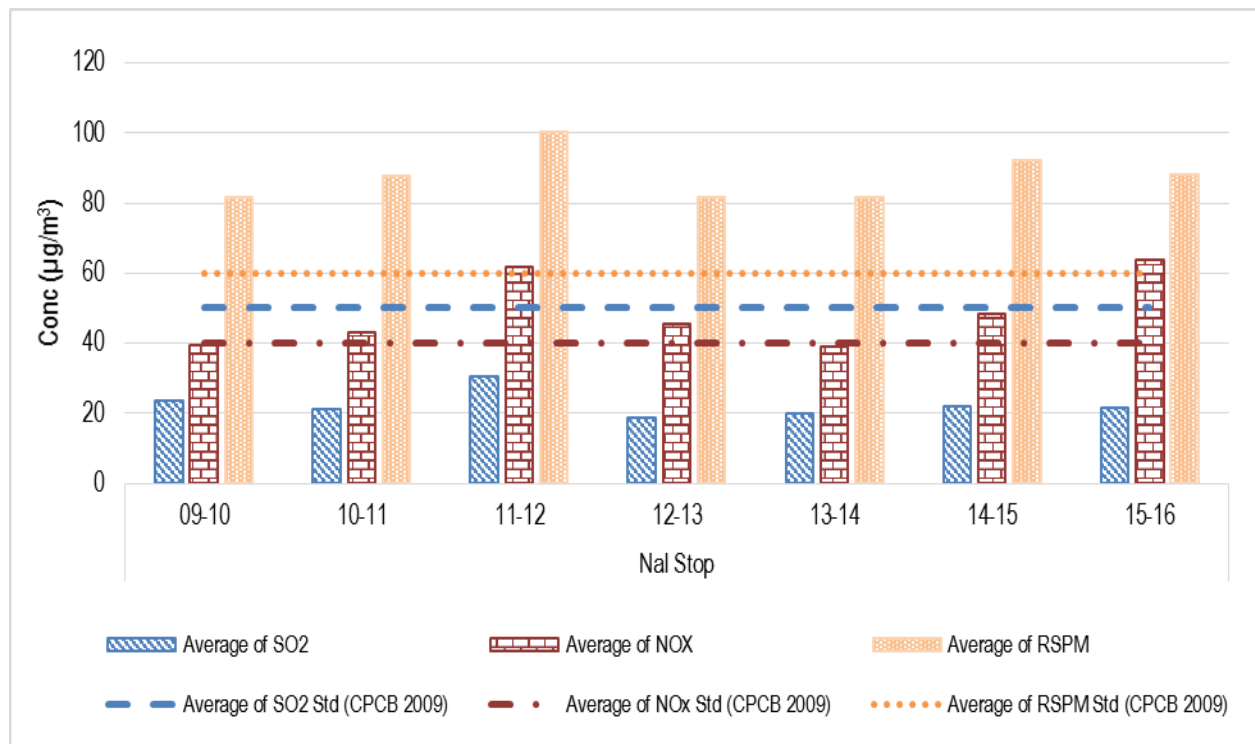


Figure No. 151: Monthly average reading recorded at Nal Stop

Table No. 140: Data for annual average trend of SO₂, NO_x, and RSPM at Nal Stop

		Average of SO ₂	Average of NO _x	Average of RSPM
Nal Stop	09-10	23	39	82
	10-11	21	43	88
	11-12	30	62	100
	12-13	19	45	82
	13-14	20	39	82
	14-15	22	48	92
	15-16	21	64	88

Figure No. 152: Annual average trend of SO₂, NO_x, and RSPM at Nal Stop

Pune – Swargate, pune

Table No. 141: Data for monthly average reading recorded at Swargate, Pune

			Average of SO ₂	Average of NO _x	Average of RSPM
Swargate, Pune	2015	Apr	13	60	100
		May	19	53	100
		Jun	16	32	51
		Jul	12	34	52
		Aug	21	27	36
		Sep	20	47	66
		Oct	24	68	121
		Nov	31	98	177
		Dec	31	110	128
	2016	Jan	19	82	145
		Feb	27	72	112
		Mar	23	74	122

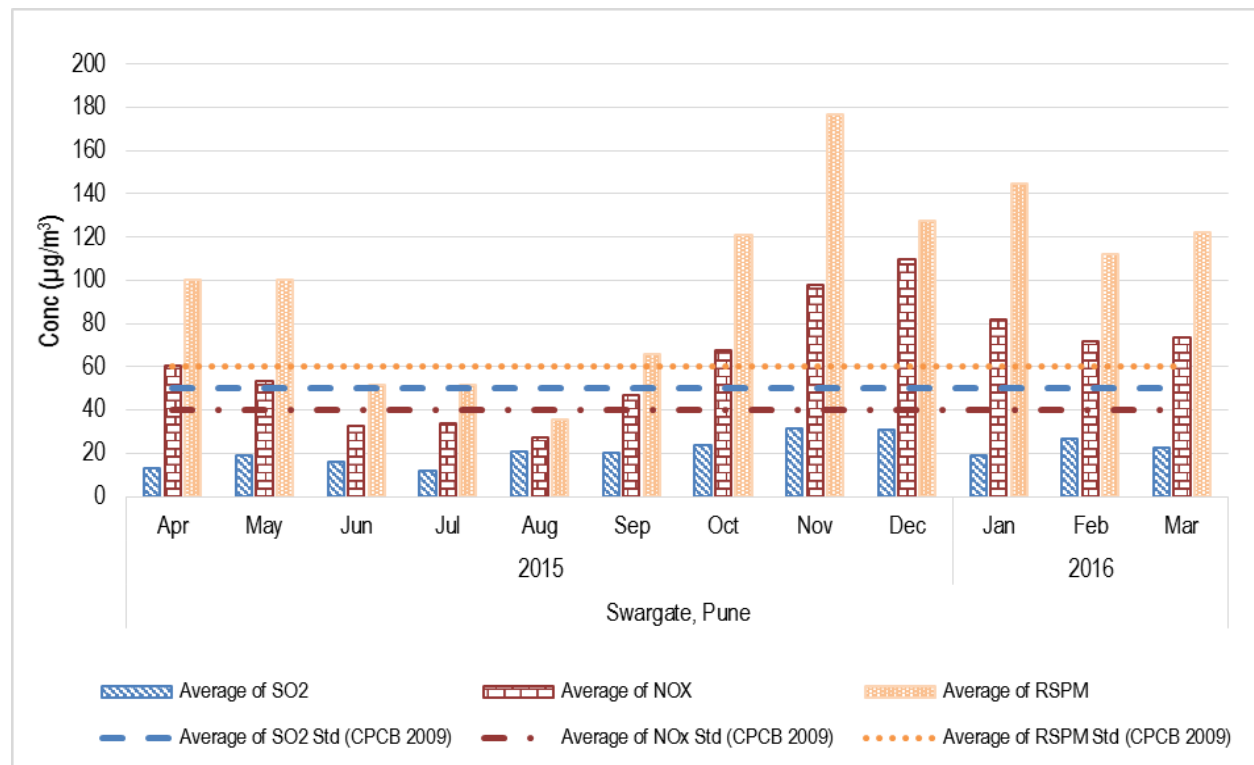
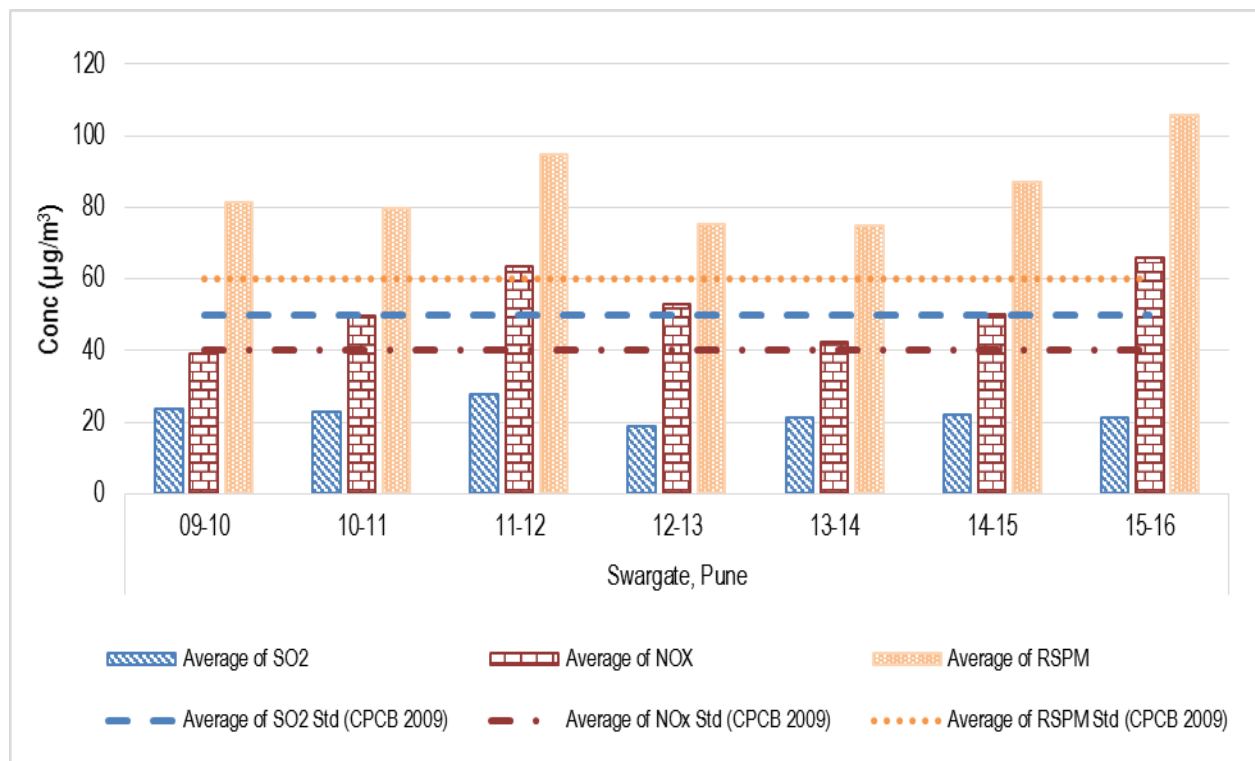


Figure No. 153: Monthly average reading recorded at Swargate, Pune

Table No. 142: Data for annual average trend of SO₂, NO_x, and RSPM at Swargate, Pune

		Average of SO ₂	Average of NO _x	Average of RSPM
Swargate, Pune	09-10	24	39	81
	10-11	23	50	80
	11-12	28	63	95
	12-13	19	53	75
	13-14	21	42	75
	14-15	22	50	87
	15-16	21	66	106

Figure No. 154: Annual average trend of SO₂, NO_x, and RSPM at Swargate, pune

Pune – Pimpri – Chinchwad – BOB Building

Table No. 143: Data for monthly average reading recorded at Pimpri – Chinchwad – BOB Building

		Average of SO ₂	Average of NO _X	Average of RSPM	
Pimpri-Chinchwad - BOB Building	2015	May	16	53	75
		Jun	12	27	43
		Jul	13	30	48
		Aug	16	26	49
		Sep	20	37	64
		Oct	23	45	100
		Nov	32	53	126
		Dec	49	77	157
	2016	Jan	36	84	159
		Feb	41	75	140
		Mar	30	63	130



Figure No. 155: Monthly average reading recorded at Pimpri – Chinchwad – BOB Building

Table No. 144: Data for annual average trend of SO₂, NO_x, and RSPM at Pimpri – Chinchwad – BOB Building

		Average of SO ₂	Average of NO _x	Average of RSPM
Pimpri-Chinchwad - BOB Building	09-10	31	43	89
	10-11	26	49	86
	11-12	33	57	117
	12-13	20	49	84
	13-14	22	39	82
	14-15	22	44	94
	15-16	27	52	101

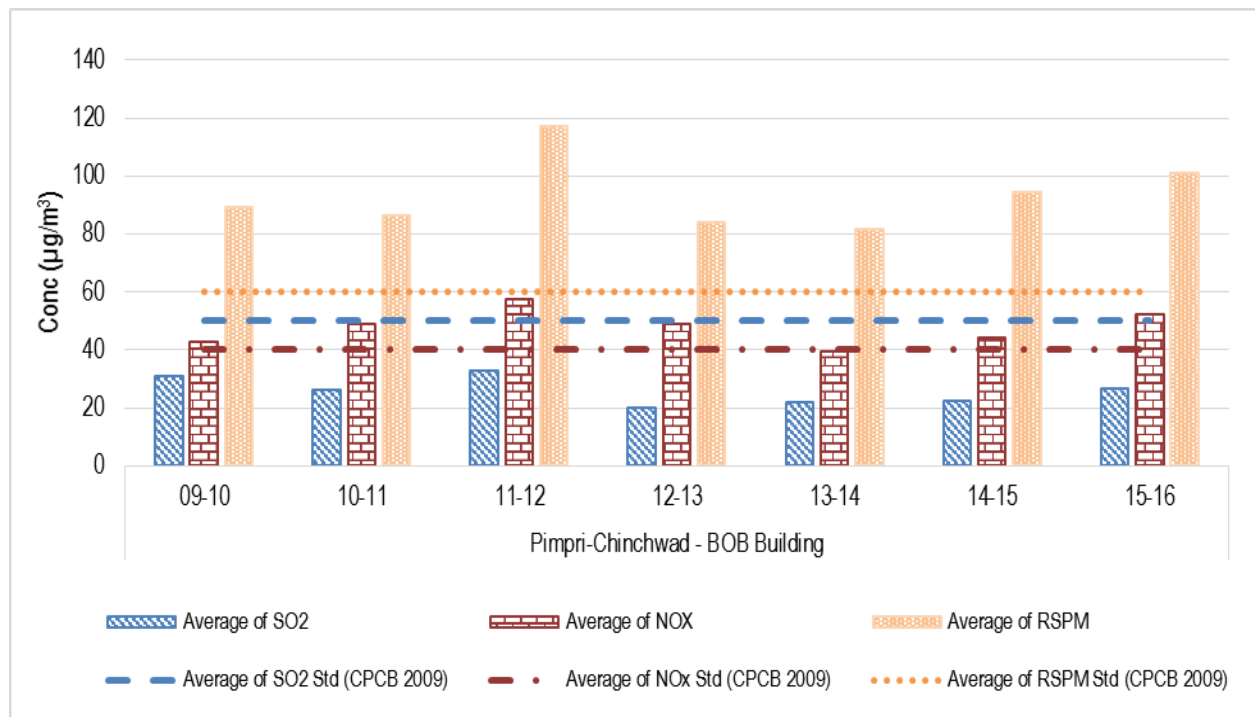


Figure No. 156: Annual average trend of SO₂, NO_x, and RSPM at Pimpri – Chinchwad – BOB Building

Pune - Karve Road - CAAQMS

Table No. 145: Data for monthly average reading recorded at Karve Road - CAAQMS

			Average of SO ₂	Average of NO _x	Average of RSPM
Karve Road - CAAQMS	2015	Apr	12	41	245
		May	15	36	168
		Jun	19	42	91
		Jul	22	46	101
		Aug	26	51	87
		Sep	30	58	109
		Oct	34	65	146
		Nov	39	71	189
		Dec	42	95	171
	2016	Jan	16	46	138
		Feb	19	54	103
		Mar	22	68	96

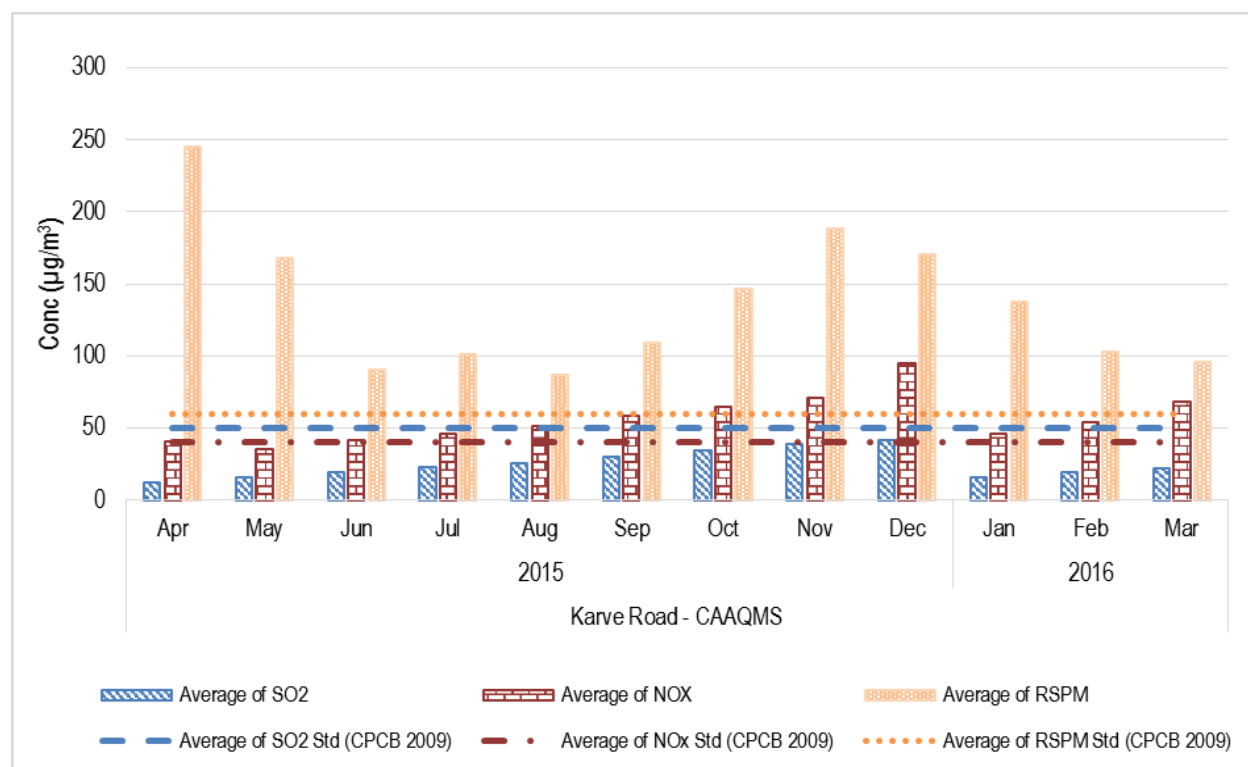


Figure No. 157: Monthly average reading recorded at Karve Road - CAAQMS

Table No. 146: Data for annual average trend of SO₂, NO_x, and RSPM at Karve Road - CAAQMS

		Average of SO ₂	Average of NO _x	Average of RSPM
Karve Road - CAAQMS	09-10	11	35	109
	10-11	12	39	128
	11-12	11	49	131
	12-13	22	66	124
	13-14	27	70	121
	14-15	15	36	123
	15-16	25	57	138

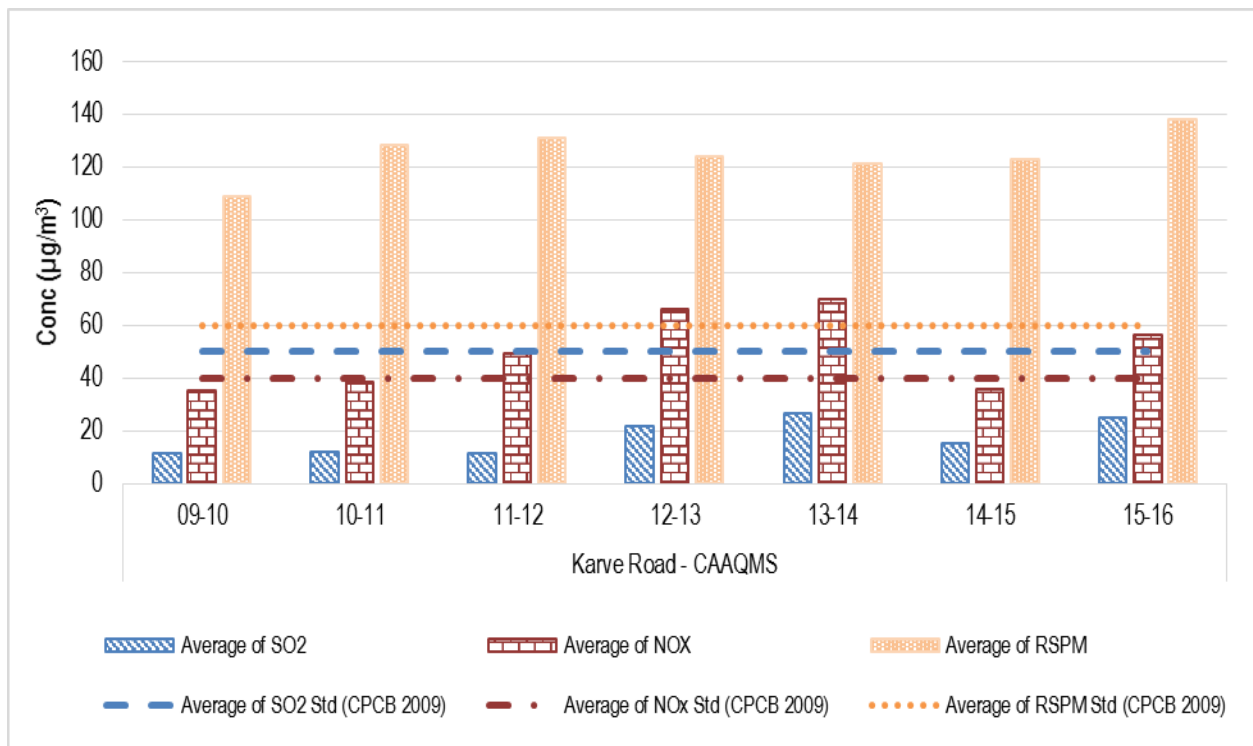


Figure No. 158: Annual average trend of SO₂, NO_x, and RSPM at Karve Road - CAAQMS

Solapur – WIT Campus

Table No. 147: Data for monthly average reading recorded at WIT Campus

			Average of SO ₂	Average of NO _X	Average of RSPM
WIT Campus	2015	Apr	14	34	74
		May	14	34	73
		Jun	13	36	71
		Jul	13	35	76
		Aug	13	35	73
		Sep	13	34	68
		Oct	13	36	75
		Nov	13	36	78
		Dec	12	35	73
	2016	Jan	12	36	80
		Feb	13	36	83
		Mar	12	36	82

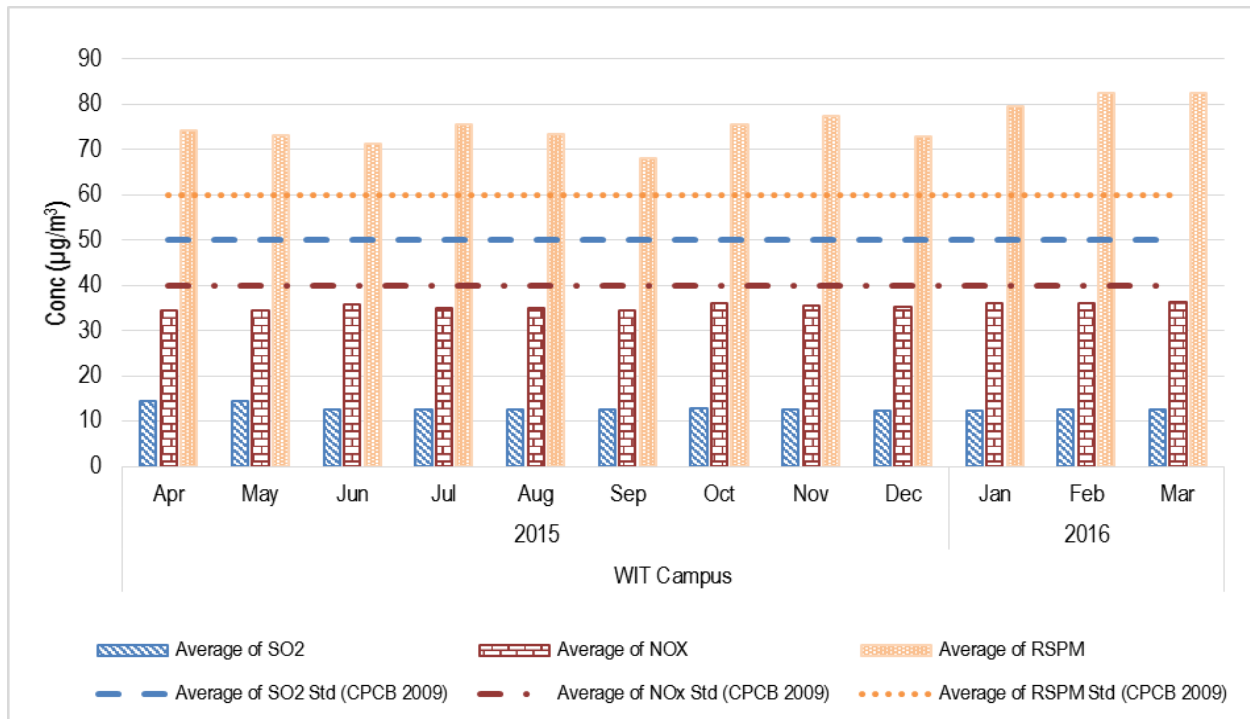
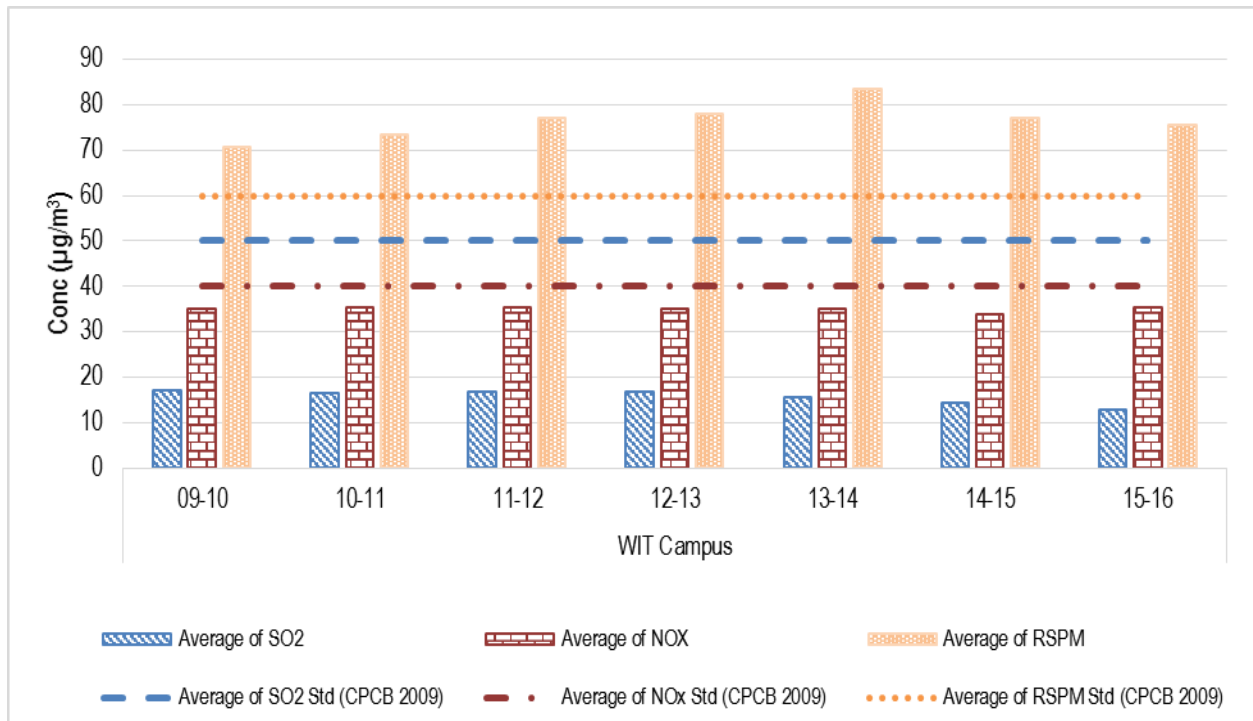


Figure No. 159: Monthly average reading recorded at WIT Campus

Table No. 148: Data for annual average trend of SO₂, NO_x, and RSPM at WIT Campus

		Average of SO ₂	Average of NO _x	Average of RSPM
WIT Campus	09-10	17	35	71
	10-11	17	35	74
	11-12	17	35	77
	12-13	17	35	78
	13-14	15	35	84
	14-15	14	34	77
	15-16	13	35	76

Figure No. 160: Annual average trend of SO₂, NO_x, and RSPM at WIT Campus

Solapur – Saat Rasta – Chithale Clinic

Table No. 149: Data for monthly average reading recorded at Saat Rasta – Chithale Clinic

		Average of SO ₂	Average of NO _x	Average of RSPM	
Saat Rasta- Chithale Clinic	2015	Apr	15	35	78
		May	14	35	74
		Jun	13	36	71
		Jul	13	35	75
		Aug	12	35	72
		Sep	13	35	69
		Oct	12	35	72
		Nov	12	36	76
		Dec	15	51	90
	2016	Jan	12	36	91
		Feb	12	40	93
		Mar	12	37	81

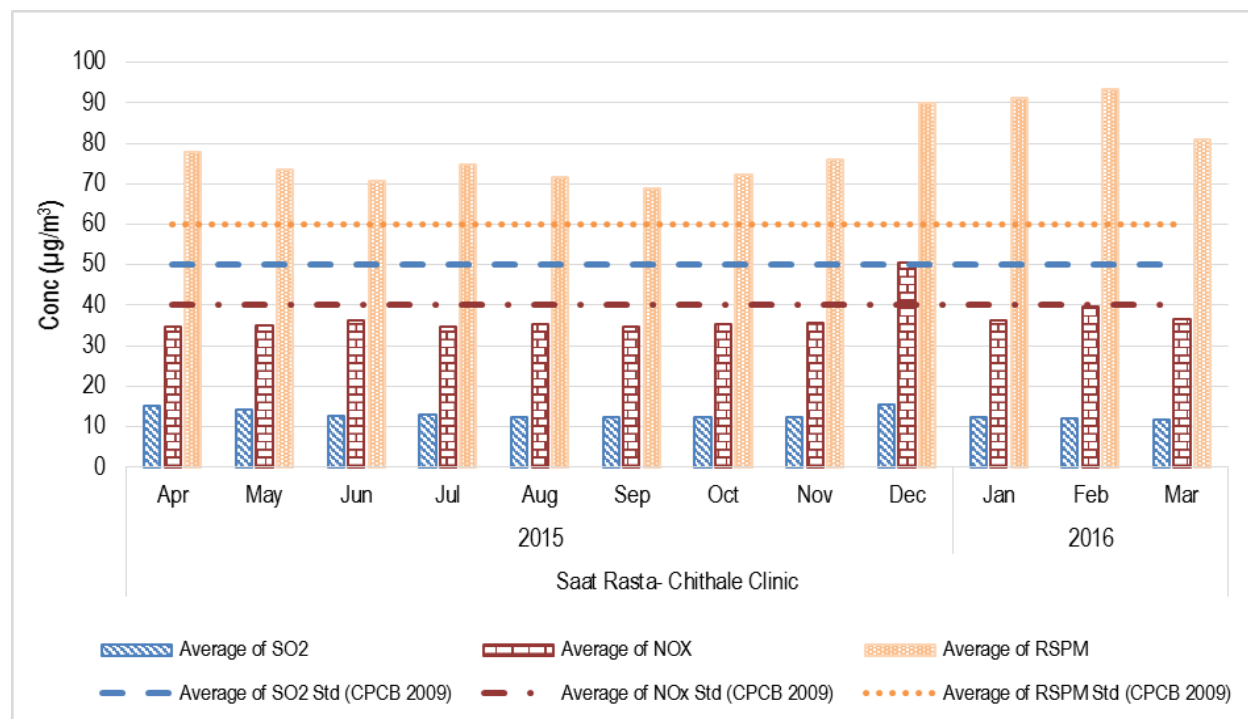


Figure No. 161: Monthly average reading recorded at Saat Rasta – Chithale Clinic

Table No. 150: Data for annual average trend of SO₂, NO_x, and RSPM at Saat Rasta – Chithale Clinic

		Average of SO ₂	Average of NO _x	Average of RSPM
Saat Rasta- Chithale Clinic	09-10	17	36	66
	10-11	17	34	69
	11-12	17	35	77
	12-13	17	35	81
	13-14	16	35	77
	14-15	14	35	78
	15-16	13	37	78

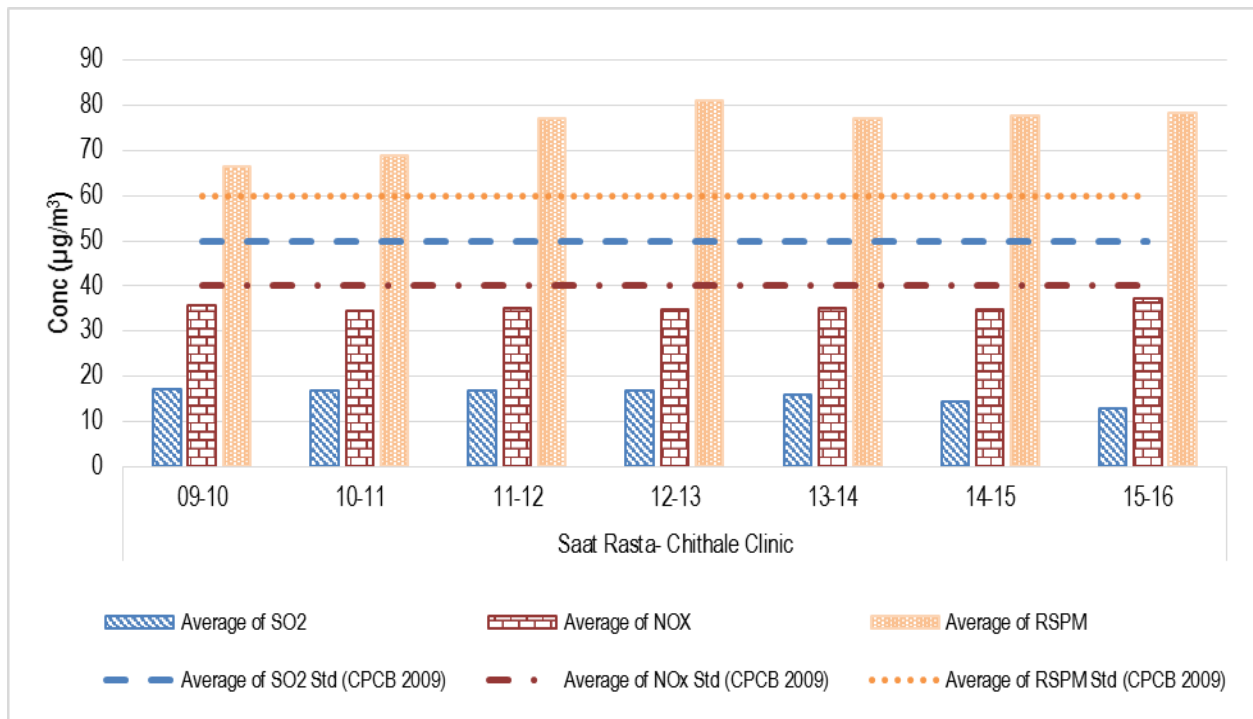


Figure No. 162: Annual average trend of SO₂, NO_x, and RSPM at Saat Rasta – Chithale Clinic

Solapur - Solapur

Table No. 151: Data for monthly average reading recorded at Solapur

		Average of SO ₂	Average of NO _x	Average of RSPM	
Solapur	2015	Apr	8	32	116
		May	10	33	91
		Jun	12	46	60
		Jul	13	51	57
		Aug	14	54	46
		Sep	14	57	59
		Oct	14	53	111
		Nov	16	47	114
		Dec	18	48	125
	2016	Jan	17	53	154
		Feb	12	54	136
		Mar	12	60	121

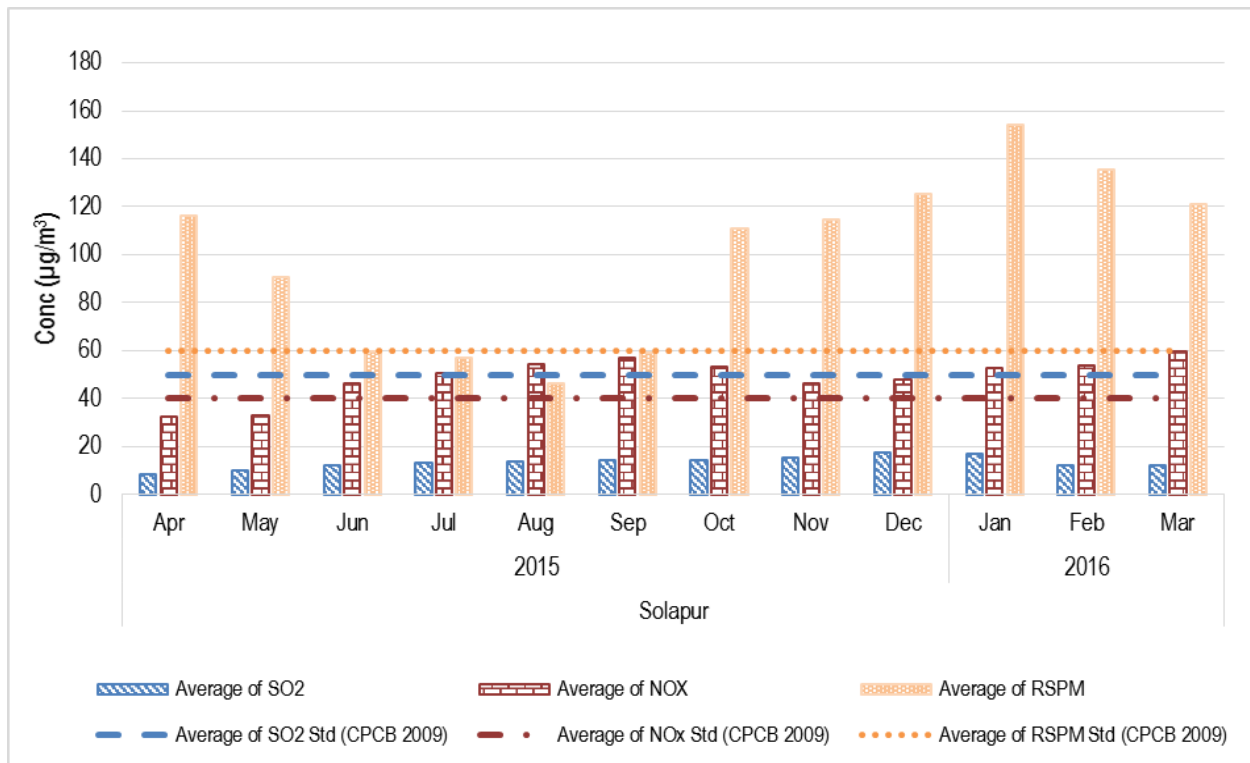


Figure No. 163: Monthly average reading recorded at Solapur

Table No. 152: Data for annual average trend of SO₂, NO_x, and RSPM at Solapur

		Average of SO ₂	Average of NO _x	Average of RSPM
Solapur	10-11	13	37	112
	11-12	12	40	116
	12-13	16	42	106
	13-14	15	42	96
	14-15	9	38	104
	15-16	13	49	100

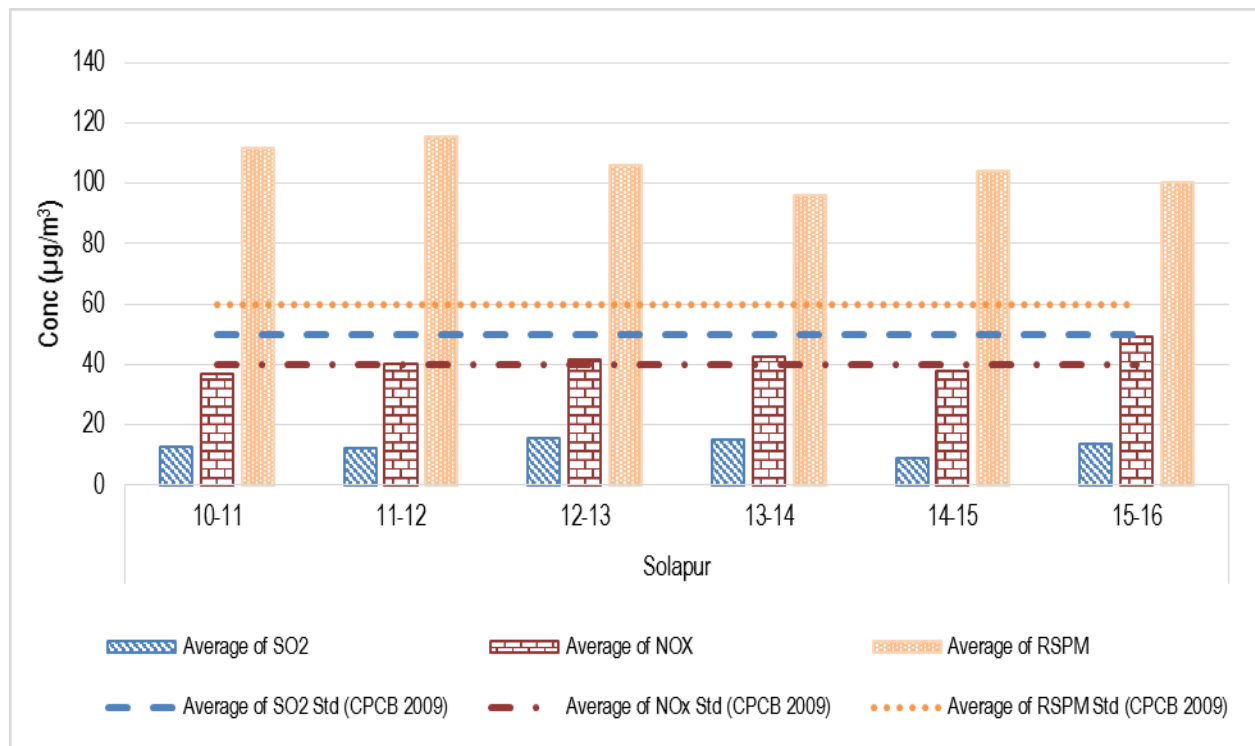
Figure No. 164: Annual average trend of SO₂, NO_x, and RSPM at Solapur

Table No. 153: % exceedence of pollutants at Pune RO

	Number of Observations				Percentage Exceedence		
	Total	Exceedence SO	Exceedence NO	Exceedence RSPM	SO	NO	RSPM
Karve Road - CAAQMS	349	0	26	228	0	7	65
Nal Stop	97	0	18	36	0	19	37
Pimpri-Chinchwad - BOB Building	264	2	38	128	1	14	48
Saat Rasta- Chithale Clinic	103	0	1	5	0	1	5
Solapur	352	0	3	180	0	1	51
Swargate, Pune	103	0	31	50	0	30	49
WIT Campus	103	0	0	0	0	0	0

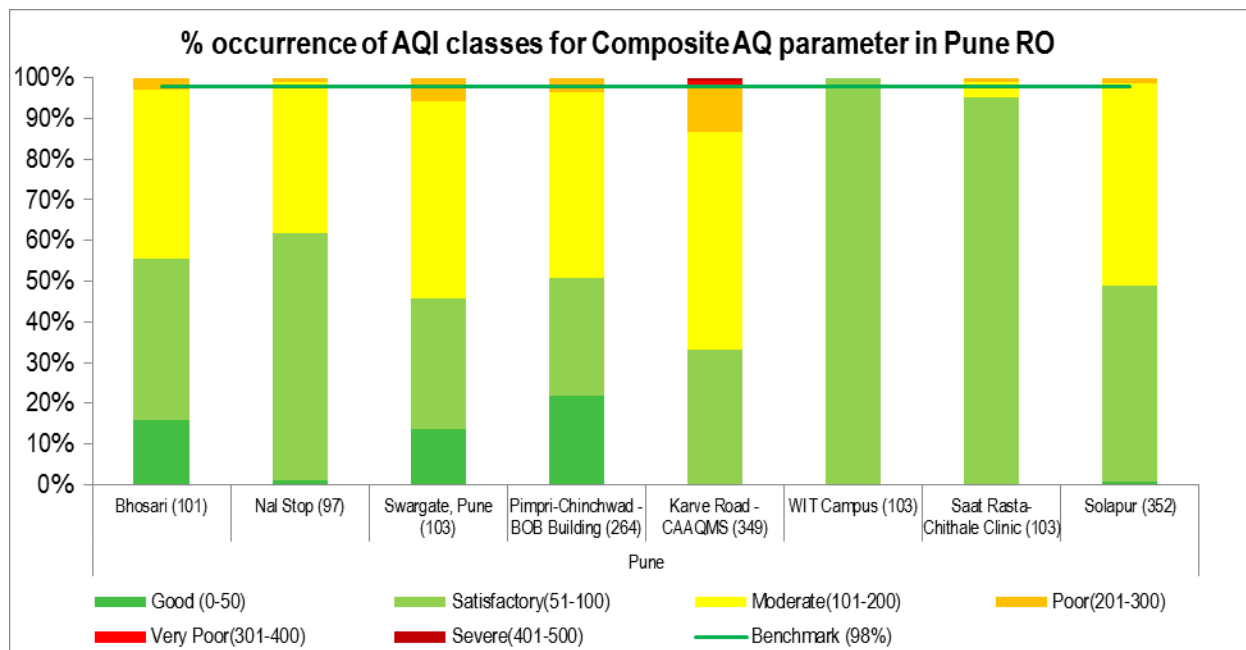
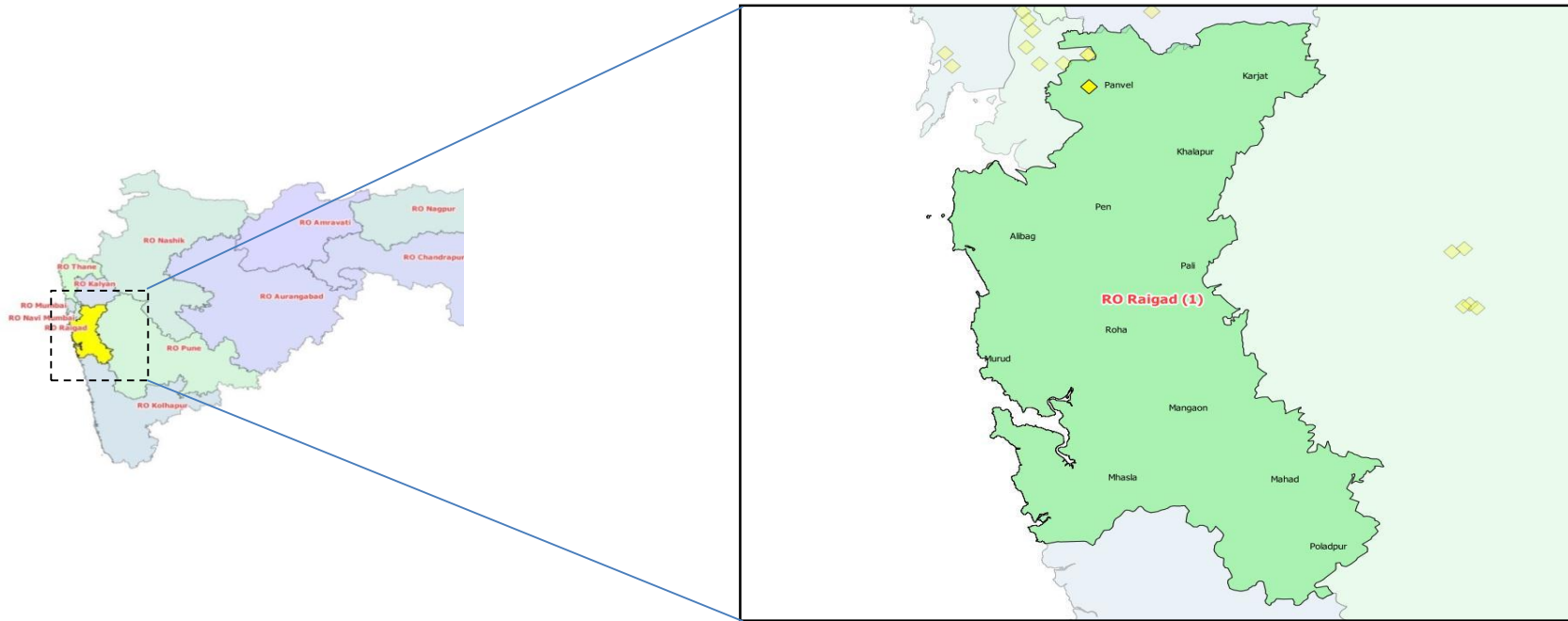


Figure No. 165: % occurrence of AQI classes for Composite AQ parameter in Pune RO

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

		Average of SO ₂	Average of NO _x	Average of RSPM	
Panvel- Water Supply Plant	2015	Apr	19	47	155
		May	18	47	153
		Jun	16	44	158
		Jul	13	26	123
		Aug	19	41	125
		Sep	16	36	117
		Oct	17	42	127
		Nov	19	44	122
		Dec	19	45	141
	2016	Jan	19	45	136
		Feb	18	50	128
		Mar	20	48	144

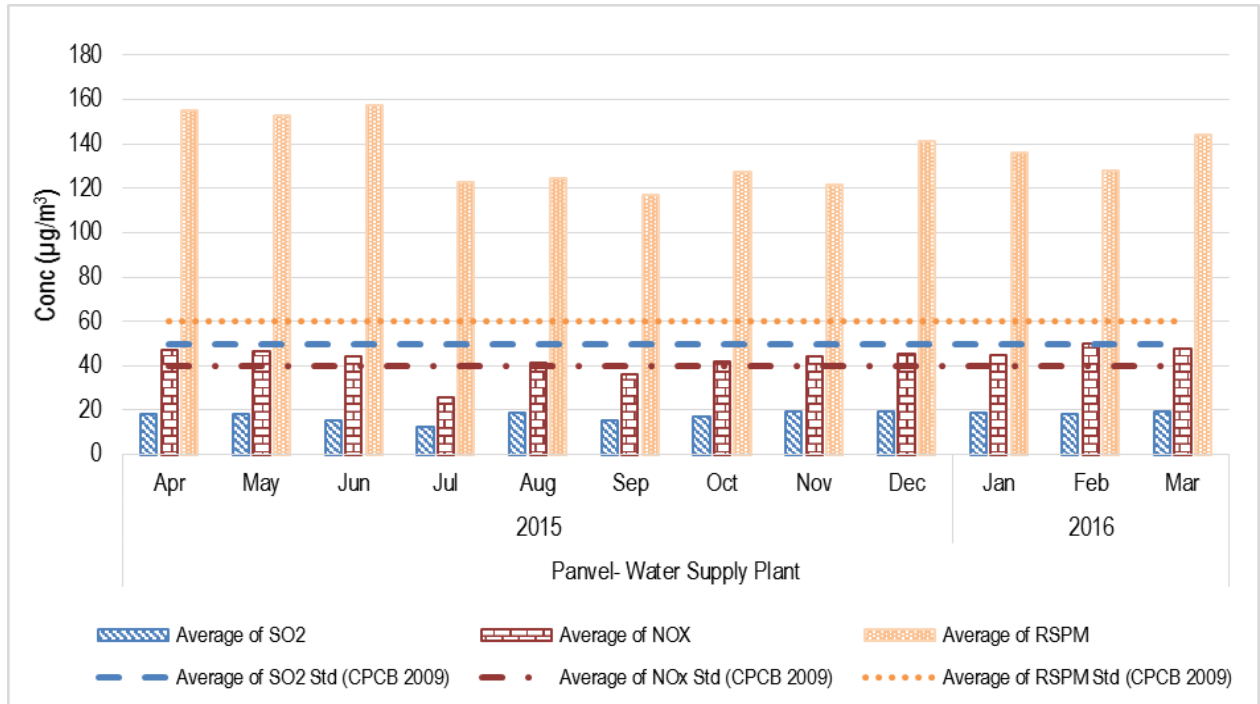


Figure No. 166: Monthly average reading recorded at Panvel – Water Supply Plant

Table No. 155: Data for annual average trend of SO₂, NO_x, and RSPM at Panvel – Water Supply Plant

		Average of SO ₂	Average of NO _x	Average of RSPM
Panvel- Water Supply Plant	09-10	12	42	71
	10-11	15	35	119
	11-12	15	42	140
	12-13	16	42	168
	13-14	16	41	203
	14-15	17	38	136
	15-16	18	43	137

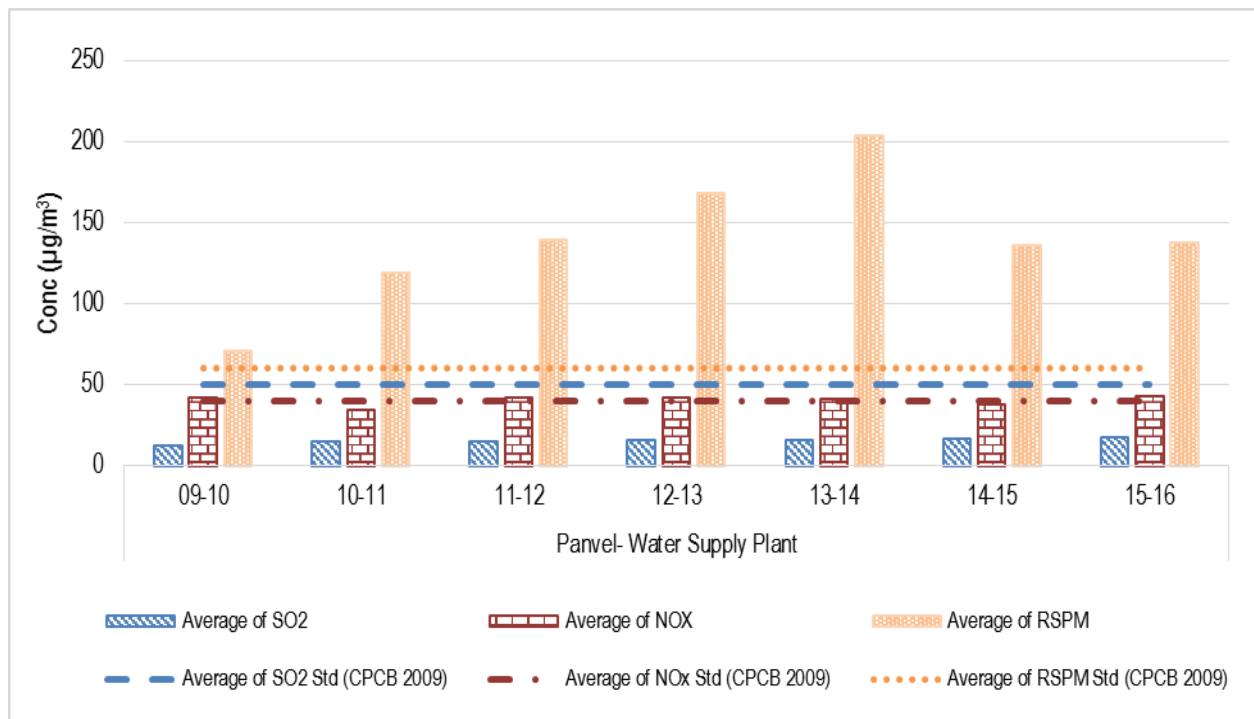
Figure No. 167: Annual average trend of SO₂, NO_x, and RSPM at Panvel – Water Supply Plant

Table No. 156: % exceedence of pollutants at Raigad RO

	Number of Observations				Percentage Exceedence		
	Total	Exceedence SO	Exceedence NO	Exceedence RSPM	SO	NO	RSPM
Panvel- Water Supply Plant	113	0	1	104	0	1	92

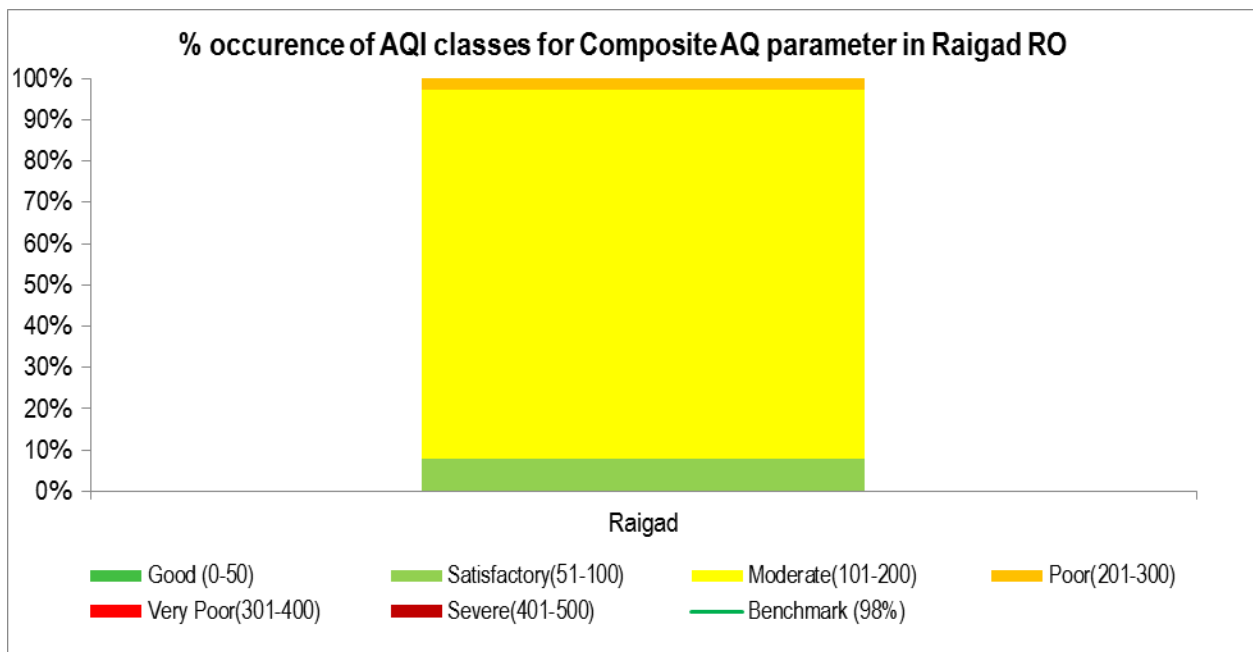
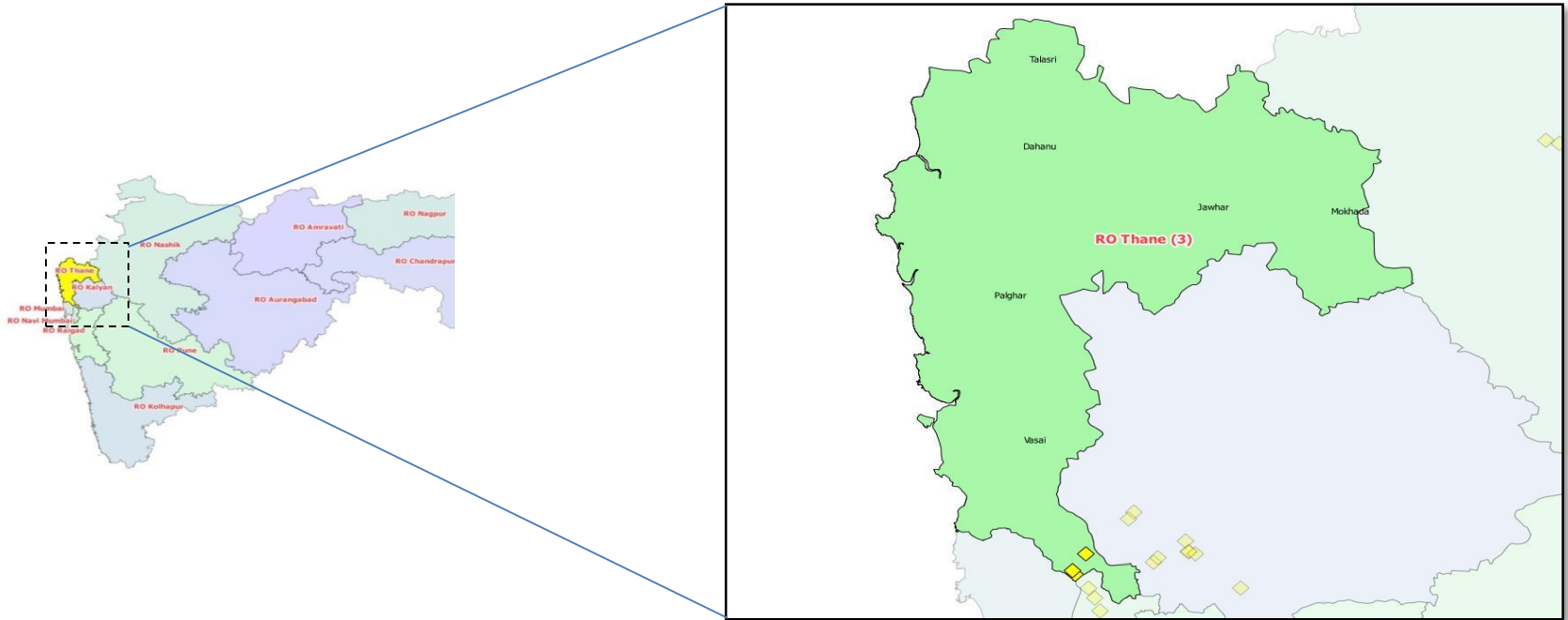


Figure No. 168: % occurrence of AQI classes for Composite AQ parameter in Raigad RO

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: Data for monthly average reading recorded at Kopri

			Average of SO ₂	Average of NO _X	Average of RSPM
Kopri	2015	Apr	28	63	165
		May	32	67	113
		Jun	25	51	94
		Jul	25	51	78
		Aug	28	60	69
		Sep	31	63	71
		Oct	29	64	102
		Nov	28	50	199
		Dec	24	56	203
	2016	Jan	22	70	205
		Feb	24	73	190
		Mar	23	77	138

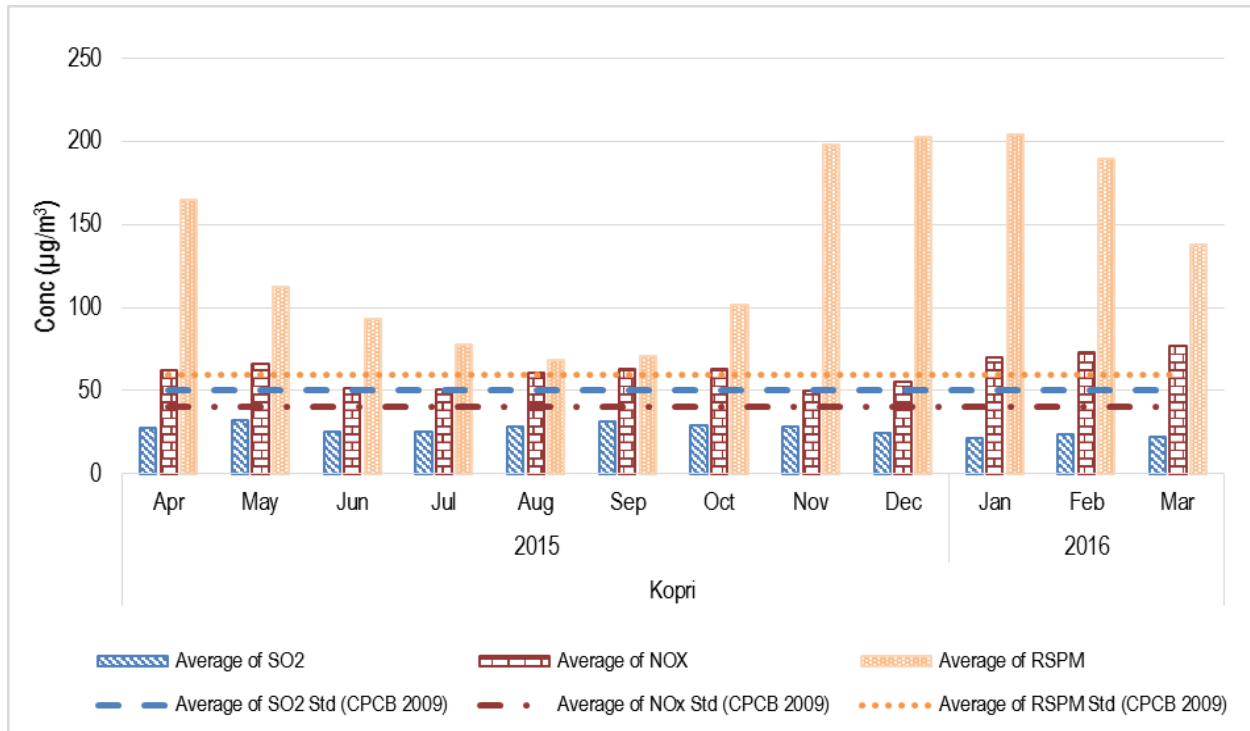


Figure No. 169: Monthly average reading recorded at Kopri

Table No. 158: Data for annual average trend of SO₂, NO_x, and RSPM at Kopri station

		Average of SO ₂	Average of NO _x	Average of RSPM
Kopri	09-10	11	13	50
	10-11	12	11	46
	11-12	12	9	60
	12-13	20	15	86
	13-14	16	41	114
	14-15	21	61	106
	15-16	27	62	136

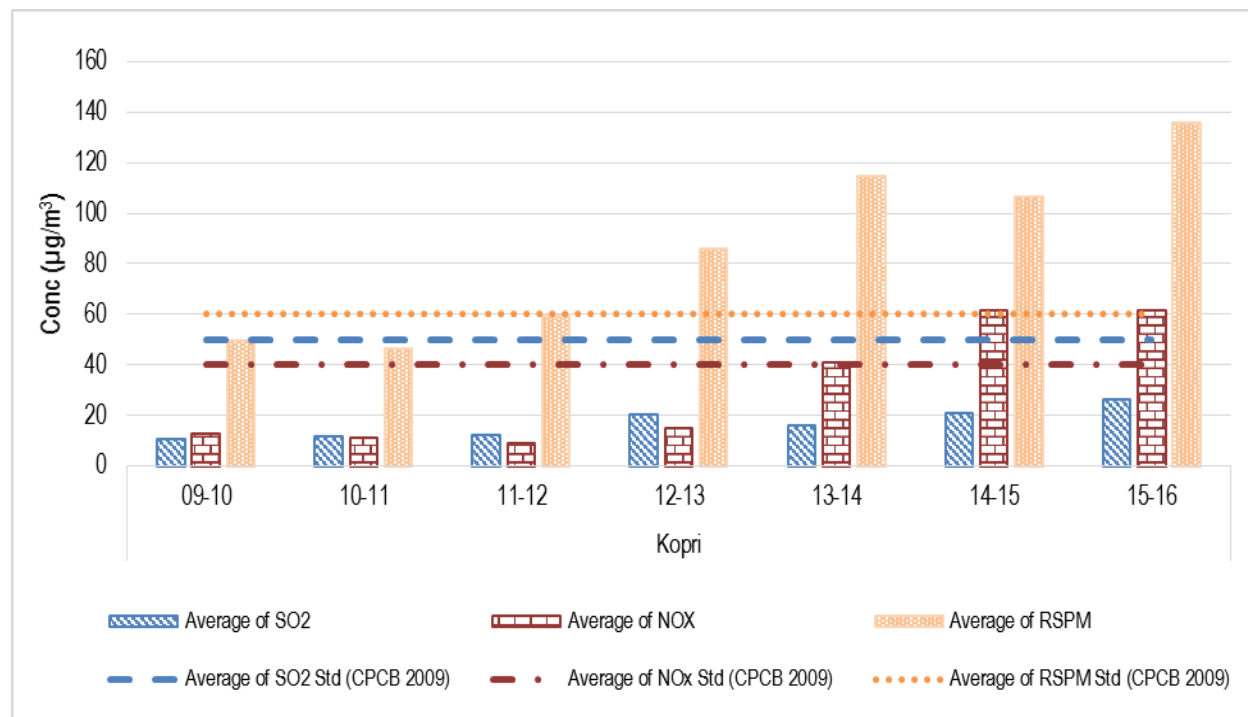


Figure No. 170: Annual average trend of SO₂, NO_x, and RSPM at Kopri station

Thane - Naupada

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

			Average of SO ₂	Average of NO _X	Average of RSPM
Naupada	2015	Apr	29	67	129
		May	33	67	87
		Jun	24	53	68
		Jul	26	54	63
		Aug	28	59	73
		Sep	31	63	77
		Oct	32	65	96
		Nov	26	55	123
		Dec	27	59	117
	2016	Jan	25	70	135
		Feb	25	74	132
		Mar	25	74	125

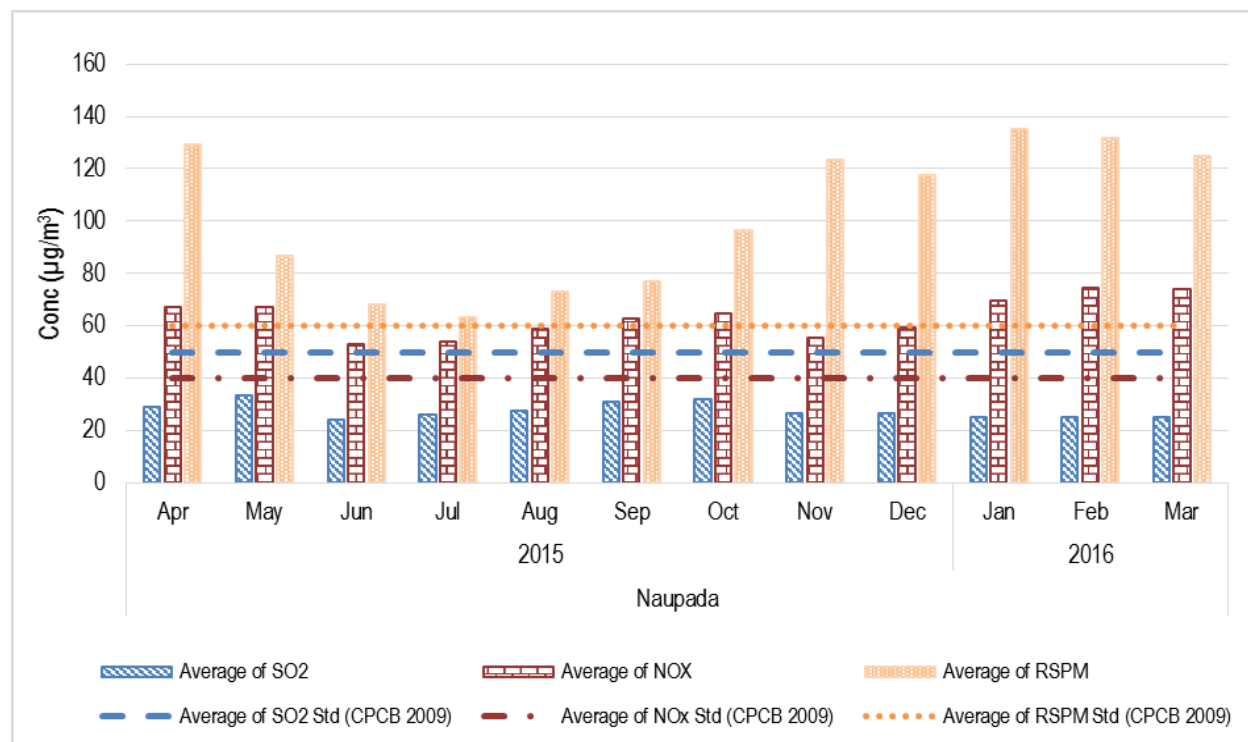
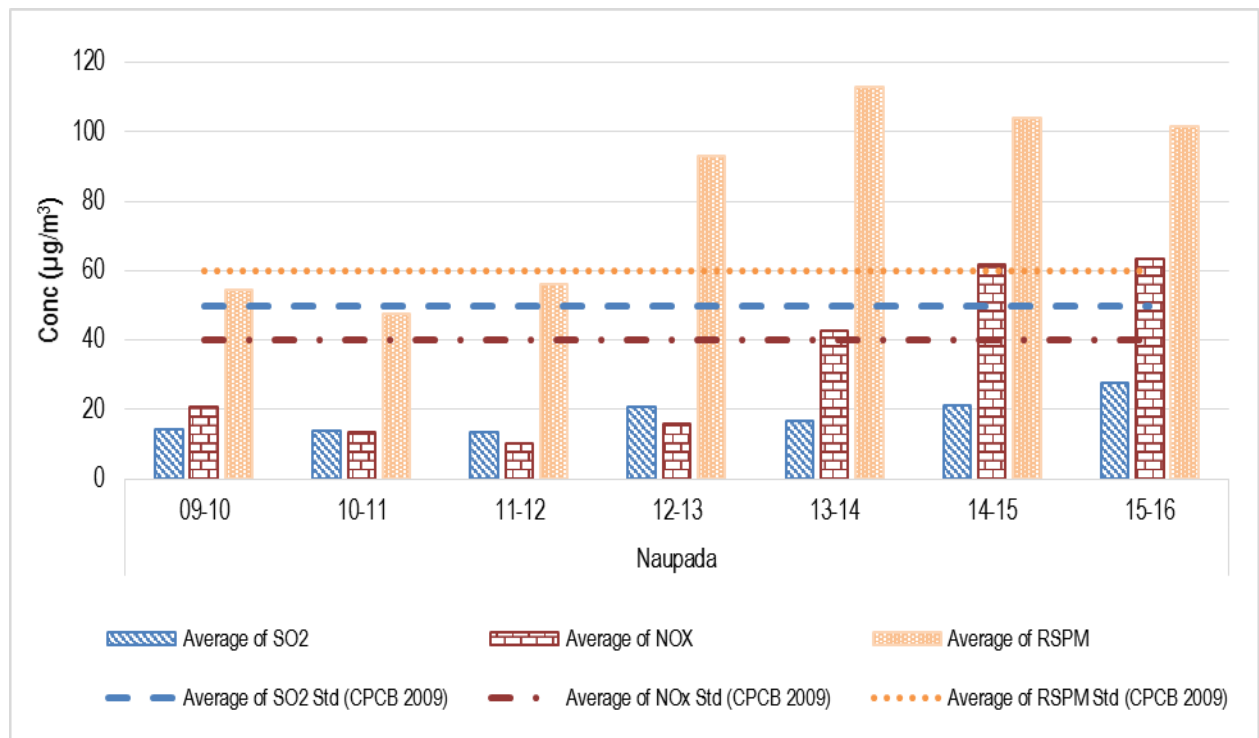


Figure No. 171: Monthly average reading recorded at Naupada

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

		Average of SO ₂	Average of NO _x	Average of RSPM
Naupada	09-10	14	21	55
	10-11	14	13	48
	11-12	13	10	56
	12-13	21	16	93
	13-14	17	43	113
	14-15	21	62	104
	15-16	28	63	102

Figure No. 172: Annual average trend of SO₂, NO_x, and RSPM at Naupada

Thane – BalkumGlaxo

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

			Average of SO ₂	Average of NO _X	Average of RSPM
Balkum/Glaxo	2015	Apr	24	59	157
		May	24	60	108
		Jun	22	50	85
		Jul	25	53	106
		Aug	25	57	69
		Sep	26	59	90
		Oct	26	59	109
		Nov	25	53	147
		Dec	23	50	217
	2016	Jan	20	63	197
		Feb	22	63	169
		Mar	21	64	138

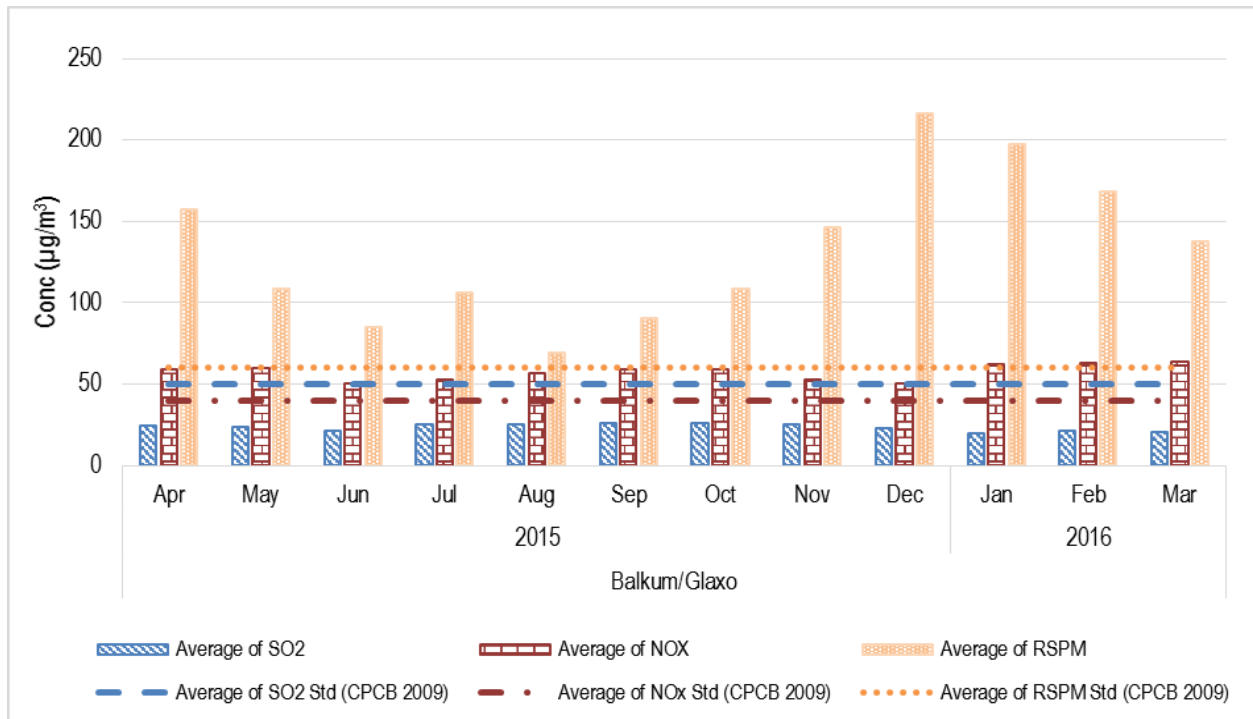


Figure No. 173: Monthly average reading recorded at BalkumGlaxo

Table No. 162: Data for annual average trend of SO₂, NO_x, and RSPM at BalkumGlaxo

		Average of SO ₂	Average of NO _x	Average of RSPM
Balkum/Glaxo	13-14	15	34	107
	14-15	20	60	131
	15-16	24	58	132

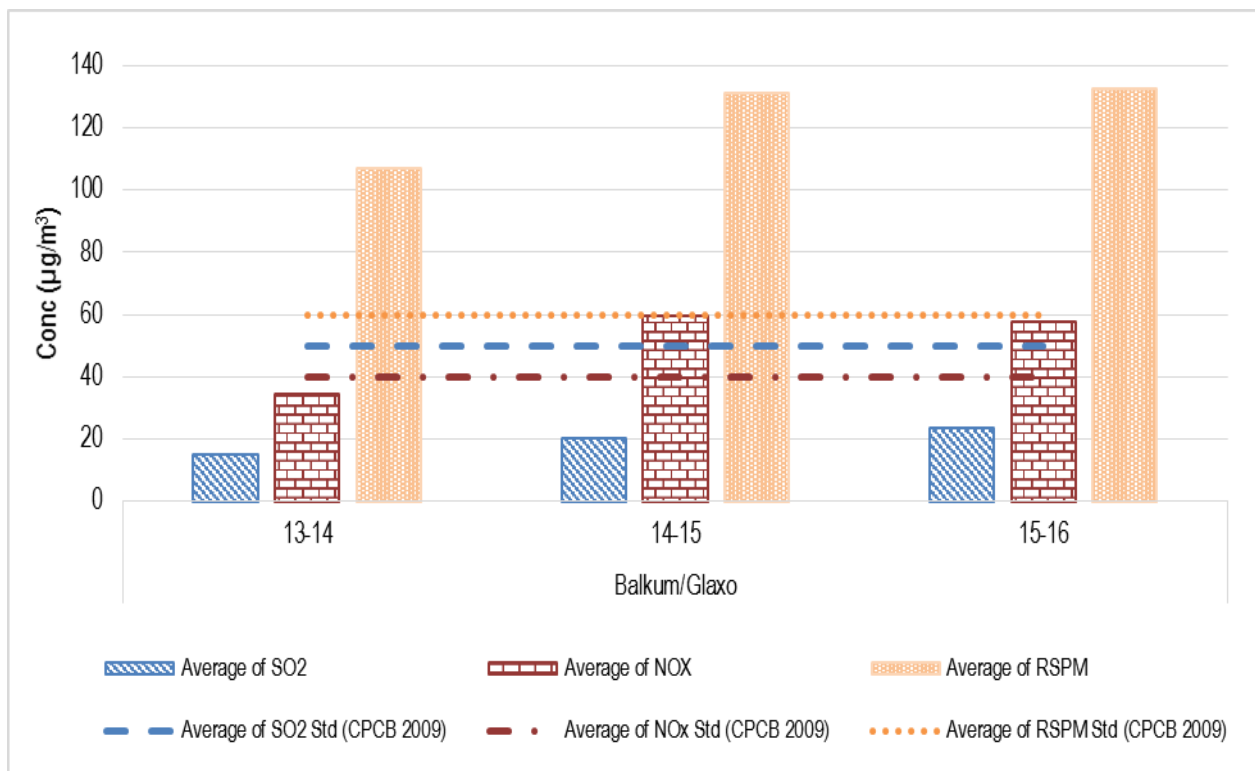


Figure No. 174: Annual average trend of SO₂, NO_x, and RSPM at BalkumGlaxo

Table No. 163: % exceedence of the pollutants at Thane RO

	Number of Observations				Percentage Exceedence		
	Total	Exceedence SO	Exceedence NO	Exceedence RSPM	SO	NO	RSPM
Balkum/Glaxo	101	0	0	69	0	0	68
Kopri	104	0	3	67	0	3	64
Naupada	102	0	1	50	0	1	49

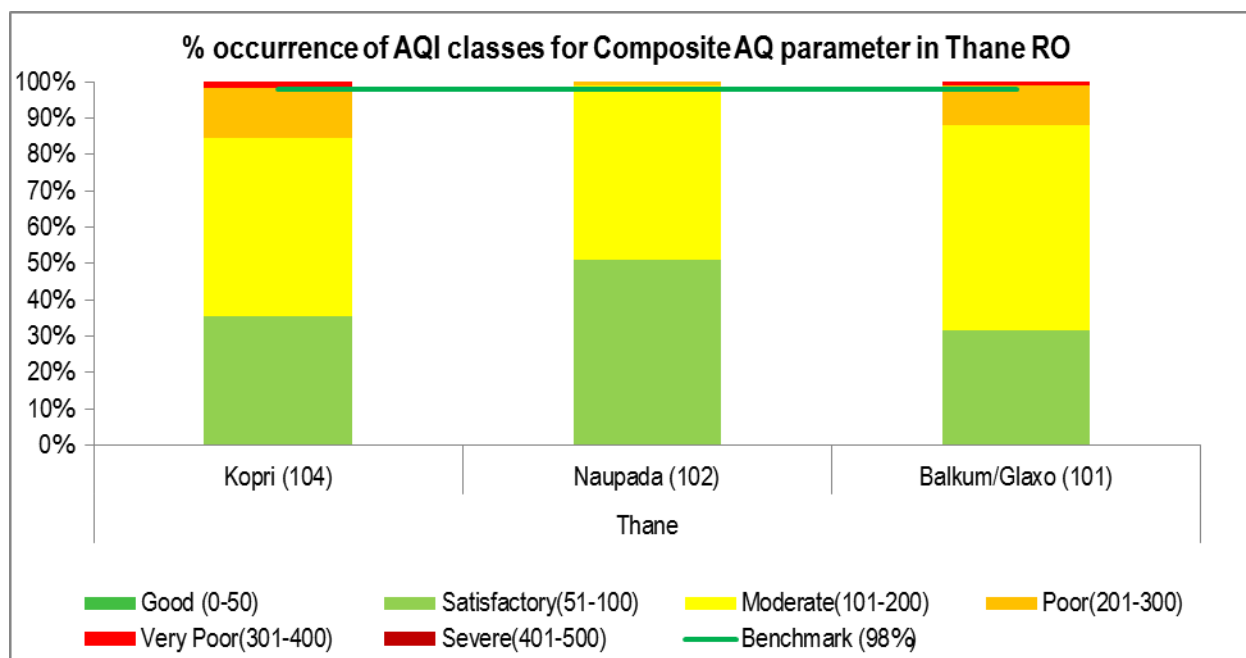


Figure No. 175: % occurrence of AQI classes for Composite AQ parameter in Thane RO

Annex – III: Occurrence of AQI categories for SO_x, NO_x and RSPM across Maharashtra

Table No. 164: AQI for Sox of all AAQMS across Maharashtra

MPCB	Station Name	Observations	Good (0-50)	Satisfactory(51-100)	Moderate(101-200)
Amravati	LRT Commerce College	104	104	0	0
	MIDC Water Works - Akola	206	206	0	0
	Akola- College of Engg & Technology	89	89	0	0
	Raj Kamal Chowk	100	100	0	0
	Govt. College of Engineering	92	92	0	0
	Godhadiwala Private Limited	93	93	0	0
Aurangabad	SBES College	100	100	0	0
	Collector Office, Aurangabad	98	98	0	0
	C.A.D.A. Office	96	96	0	0
	Jalna- Bachat Bhavan	92	92	0	0
	Jalna- Krishnadhan seeds Ltd	93	93	0	0
	Shyam Nagar-Kshewraj Vidyalaya	106	106	0	0
	Ganj Golai - Sidheshwar Bank	106	106	0	0
	Ganeshnagar	96	96	0	0
	Mutha Chowk	95	94	1	0
	Industrial Area CIDCO	104	13	0	91
Chandrapur	Ghuggus	97	97	0	0
	Chandrapur - MIDC	94	94	0	0
	Chandrapur - SRO MPCB	305	305	0	0
	Tadali MIDC	88	88	0	0
	Ballarshah	106	106	0	0
	Rajura	100	100	0	0

MPCB	Station Name	Observations	Good (0-50)	Satisfactory(51-100)	Moderate(101-200)
Kalyan	Ambernath	87	81	6	0
	Badlapur - BIWA House	95	88	6	1
	I.G.M. Hospital	71	66	5	0
	Prematai hall	68	64	4	0
	Dombivali	87	82	5	0
	MIDC Office Dombivali	83	79	4	0
	MPCB RO Kalyan office	71	71	0	0
	Smt. CHM College Campus	87	81	6	0
	Powai Chowk	60	54	6	0
Kolhapur	Chiplun - MIDC Chalkewadi	16	16	0	0
	Chiplun - Water Treatment	16	16	0	0
	Shivaji University Campus	103	103	0	0
	Ruikar Trust	101	101	0	0
	Mahadwar Road	106	106	0	0
	Terrace of SRO-Sangli, Udyog Bhavan	104	104	0	0
	Sangli-Miraj Primary Municipal school	103	103	0	0
	Krishna Valley school	103	103	0	0
Mumbai	Bandra	351	343	8	0
	Sion	284	283	1	0
Nagpur	IOE North Ambazari road	107	107	0	0
	MIDC Office, Hingna Road	106	106	0	0
	Govt Polytechnic Col, Sadar	123	121	2	0
	Civil lines Nagpur	305	304	1	0
Nashik	Old B. J. Market	104	104	0	0
	Girna Water Tank	102	102	0	0
	MIDC Jalgaon	104	104	0	0

MPCB	Station Name	Observations	Good (0-50)	Satisfactory(51-100)	Moderate(101-200)
	RTO Colony	87	87	0	0
	MIDC Satpur - VIP	87	87	0	0
	NMC Nashik	93	93	0	0
	SRO Office Nashik	234	234	0	0
Navi Mumbai	Rabale	60	60	0	0
	Nerul - DY Patil	105	105	0	0
	Mahape, MPCB-Nirmal Bhavan	108	107	1	0
	Airoli	232	195	37	0
	Kharghar - CIDCO Nodal Office	104	104	0	0
	Taloja - MIDC Building	95	94	1	0
Pune	Bhosari	101	73	25	3
	Nal Stop	97	93	4	0
	Swargate, Pune	103	98	5	0
	Pimpri-Chinchwad - BOB Building	264	221	41	2
	Karve Road - CAAQMS	349	328	21	0
	WIT Campus	103	103	0	0
	Saat Rasta- Chithale Clinic	103	102	1	0
	Solapur	352	352	0	0
Raigad	Panvel- Water Supply Plant	113	112	1	0
Thane	Kopri	104	104	0	0
	Naupada	102	102	0	0
	Balkum/Glaxo	101	101	0	0

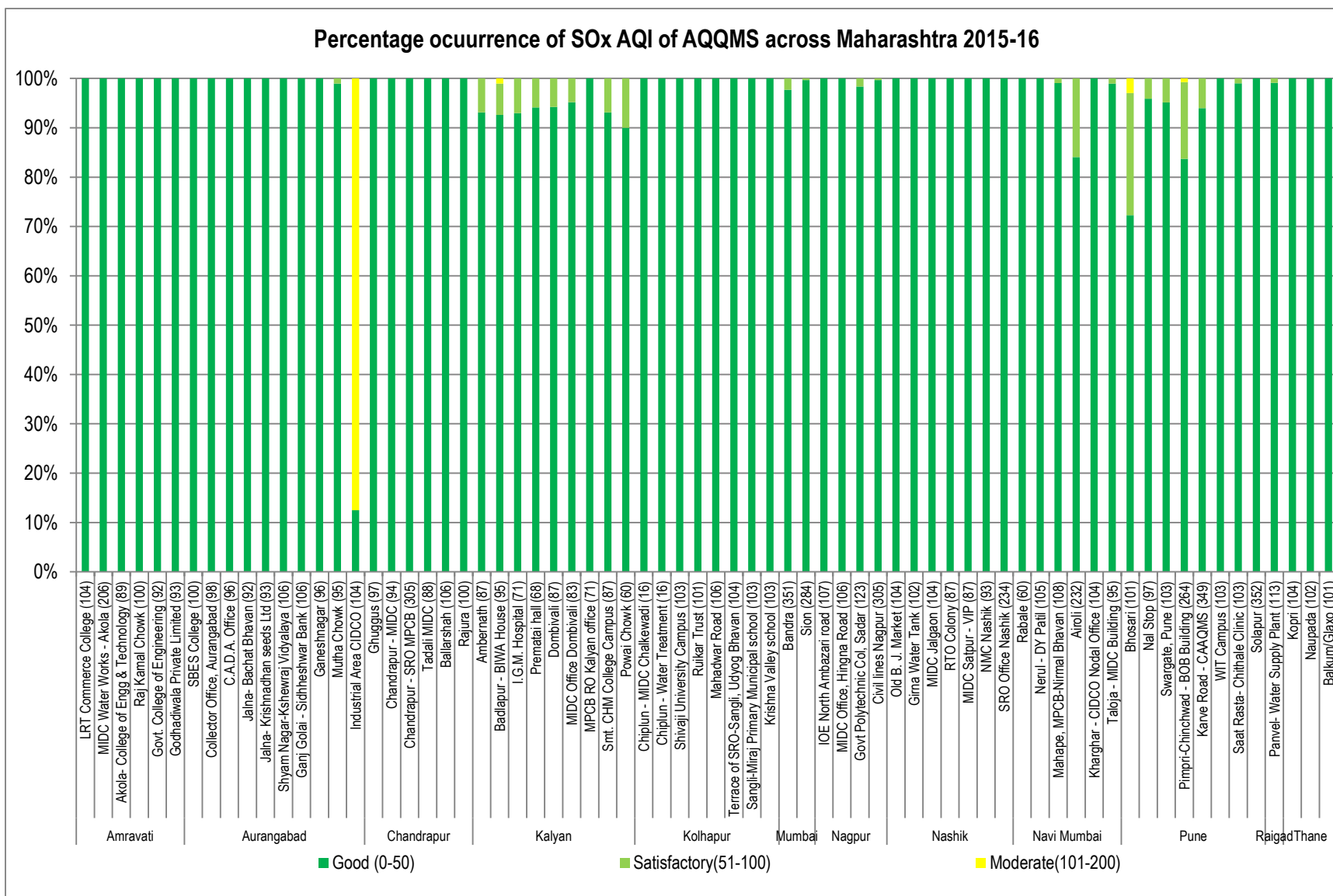


Figure No. 176 : Percentage occurrence of SOx AQI of AAQMS across Maharashtra 2015-16

Table No. 165: AQI of NO_x for all AAQMS across Maharashtra

	Station Name	Observations	Good (0-50)	Satisfactory (51-100)	Moderate(101-200)	Poor(201-300)
Amravati	LRT Commerce College	104	104	0	0	0
	MIDC Water Works - Akola	206	205	1	0	0
	Akola- College of Engg & Technology	89	89	0	0	0
	Raj Kamal Chowk	100	100	0	0	0
	Govt. College of Engineering	92	92	0	0	0
	Godhadiwala Private Limited	93	93	0	0	0
Aurangabad	SBES College	100	47	53	0	0
	Collector Office, Aurangabad	98	75	23	0	0
	C.A.D.A. Office	96	52	44	0	0
	Jalna- Bachat Bhavan	92	92	0	0	0
	Jalna- Krishnadhan seeds Ltd	93	93	0	0	0
	Shyam Nagar- Kshewraj Vidyalaya	106	106	0	0	0
	Ganj Golai - Sidhleshwar Bank	106	104	2	0	0
	Ganeshnagar	96	96	0	0	0
	Mutha Chowk	95	95	0	0	0
	Industrial Area CIDCO	104	12	2	90	0
Chandrapur	Ghuggus	97	95	2	0	0
	Chandrapur - MIDC	94	84	8	2	0
	Chandrapur - SRO MPCB	305	297	8	0	0
	Tadali MIDC	88	84	4	0	0
	Ballarshah	106	95	5	5	1
	Rajura	100	100	0	0	0
Kalyan	Ambarnath	87	7	69	11	0
	Badlapur - BIWA House	95	0	83	11	1

	Station Name	Observations	Good (0-50)	Satisfactory (51-100)	Moderate(101-200)	Poor(201-300)
	I.G.M. Hospital	71	18	53	0	0
	Prematai hall	68	8	60	0	0
	Dombivali	87	2	78	7	0
	MIDC Office Dombivali	83	1	73	9	0
	MPCB RO Kalyan office	71	31	40	0	0
	Smt. CHM College Campus	87	9	70	8	0
	Powai Chowk	60	1	44	15	0
Kolhapur	Chiplun - MIDC Chalkewadi	16	16	0	0	0
	Chiplun - Water Treatment	16	16	0	0	0
	Shivaji University Campus	103	103	0	0	0
	Ruikar Trust	101	28	70	3	0
	Mahadwar Road	106	52	54	0	0
	Terrace of SRO-Sangli, Udyog Bhavan	104	50	53	1	0
	Sangli-Miraj Primary Municipal school	103	48	52	3	0
Krishna Valley school	103	61	42	0	0	
Mumbai	Bandra	351	214	56	77	4
	Sion	284	12	124	148	0
Nagpur	IOE North Ambazari road	107	85	22	0	0
	MIDC Office, Hingna Road	106	81	25	0	0
	Govt Polytechnic Col, Sadar	123	96	25	2	0
	Civil lines Nagpur	305	274	31	0	0
Nashik	Old B. J. Market	104	80	24	0	0
	Girna Water Tank	102	94	8	0	0
	MIDC Jalgaon	104	54	50	0	0
	RTO Colony	87	86	1	0	0

	Station Name	Observations	Good (0-50)	Satisfactory (51-100)	Moderate(101-200)	Poor(201-300)
	MIDC Satpur - VIP	87	87	0	0	0
	NMC Nashik	93	91	2	0	0
	SRO Office Nashik	234	232	2	0	0
Navi Mumbai	Rabale	60	16	43	1	0
	Nerul - DY Patil	105	43	62	0	0
	Mahape, MPCB-Nirmal Bhavan	108	38	69	1	0
	Airoli	232	148	80	4	0
	Kharghar - CIDCO Nodal Office	104	41	63	0	0
	Taloja - MIDC Building	95	26	69	0	0
Pune	Bhosari	101	43	44	14	0
	Nal Stop	97	7	72	18	0
	Swargate, Pune	103	23	49	31	0
	Pimpri-Chinchwad - BOB Building	264	103	123	38	0
	Karve Road - CAAQMS	349	55	268	23	3
	WIT Campus	103	103	0	0	0
	Saat Rasta- Chithale Clinic	103	99	3	0	1
	Solapur	352	61	288	1	2
Raigad	Panvel- Water Supply Plant	113	44	68	1	0
Thane	Kopri	104	1	100	3	0
	Naupada	102	0	101	1	0
	Balkum/Glaxo	101	0	101	0	0

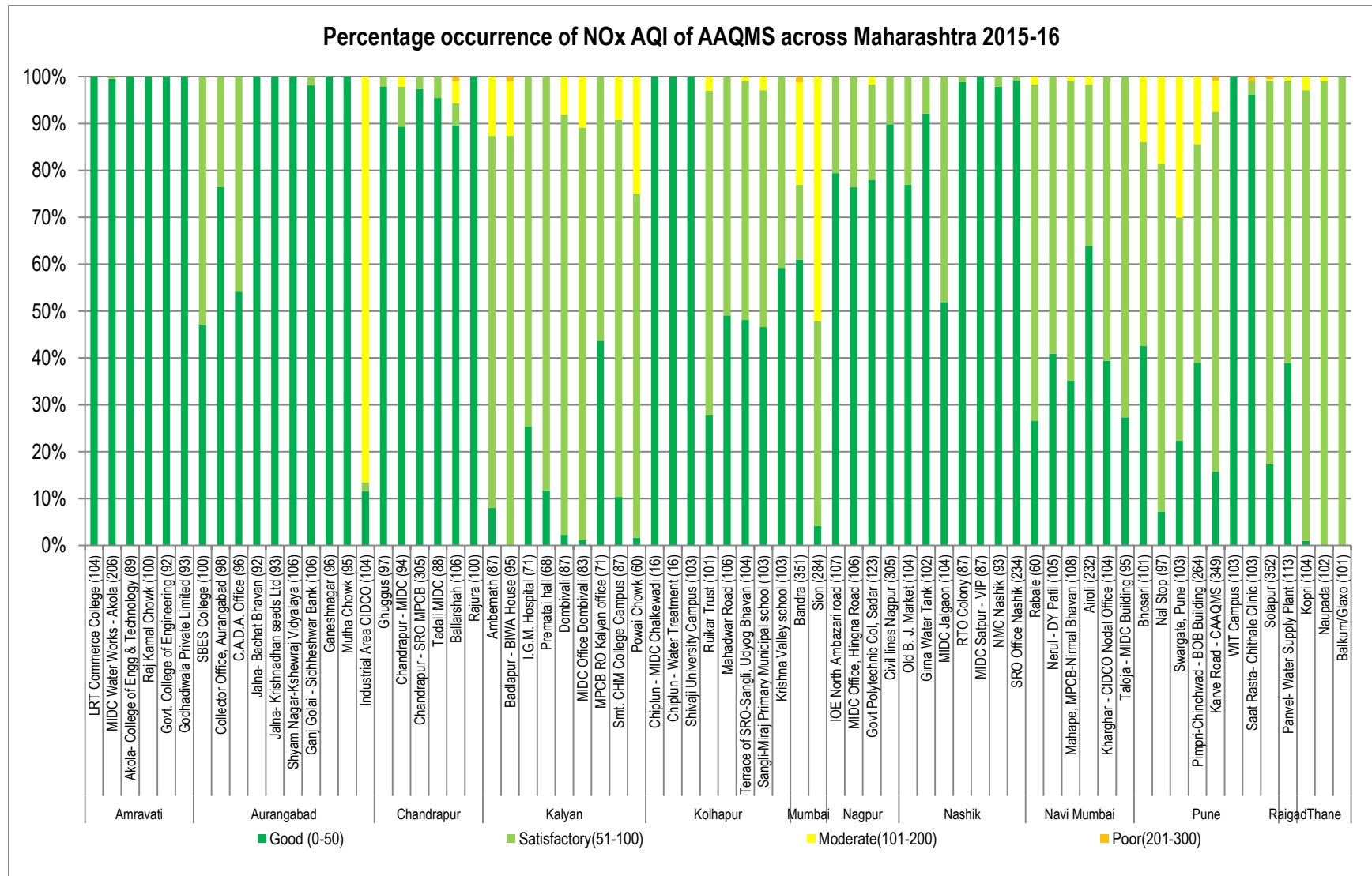


Figure No. 177: Percentage occurrence of NOx AQI of AAQMS across Maharashtra 2015-16

Table No. 166 : AQI of RSPM for all AAQMS across Maharashtra

	Station Name	Observations	Good (0-50)	Satisfactory (51-100)	Moderate (101-200)	Poor (201-300)	Very Poor (301-400)	Severe (401-500)
Amravati	LRT Commerce College	104	0	1	103	0	0	0
	MIDC Water Works - Akola	206	27	37	141	1	0	0
	Akola- College of Engg & Technology	89	1	0	88	0	0	0
	Raj Kamal Chowk	100	0	6	94	0	0	0
	Govt. College of Engineering	92	2	90	0	0	0	0
	Godhadiwala Private Limited	93	0	23	70	0	0	0
Aurangabad	SBES College	100	8	38	53	1	0	0
	Collector Office, Aurangabad	98	23	60	15	0	0	0
	C.A.D.A. Office	96	30	43	23	0	0	0
	Jalna- Bachat Bhavan	92	3	36	51	1	0	1
	Jalna- Krishnadhan seeds Ltd	93	2	55	34	2	0	0
	Shyam Nagar- Kshewraj Vidyalaya	106	20	61	24	1	0	0
	Ganj Golai - Sidhsheshwar Bank	106	28	50	27	1	0	0
	Ganeshnagar	96	0	0	96	0	0	0
	Mutha Chowk	95	0	1	93	0	0	1
	Industrial Area CIDCO	104	0	0	17	87	0	0
Chandrapur	Ghuggus	97	1	14	44	35	3	0
	Chandrapur - MIDC	94	31	37	26	0	0	0
	Chandrapur - SRO MPCB	305	99	151	55	0	0	0

	Station Name	Observations	Good (0-50)	Satisfactory (51-100)	Moderate (101-200)	Poor (201-300)	Very Poor (301-400)	Severe (401-500)
	Tadali MIDC	88	59	18	10	1	0	0
	Ballarshah	106	6	39	48	13	0	0
	Rajura	100	8	33	47	11	1	0
Kalyan	Ambarnath	87	0	36	51	0	0	0
	Badlapur - BIWA House	95	0	34	60	1	0	0
	I.G.M. Hospital	71	0	71	0	0	0	0
	Prematai hall	68	0	68	0	0	0	0
	Dombivali	87	0	32	55	0	0	0
	MIDC Office Dombivali	83	0	34	49	0	0	0
	MPCB RO Kalyan office	71	0	71	0	0	0	0
	Smt. CHM College Campus	87	0	38	48	1	0	0
	Powai Chowk	60	1	12	46	1	0	0
Kolhapur	Chiplun - MIDC Chalkewadi	16	0	0	15	1	0	0
	Chiplun - Water Treatment	16	0	0	14	2	0	0
	Shivaji University Campus	103	11	92	0	0	0	0
	Ruikar Trust	101	1	15	85	0	0	0
	Mahadwar Road	106	0	41	65	0	0	0
	Terrace of SRO-Sangli, Udyog Bhavan	104	41	27	34	2	0	0
	Sangli-Miraj Primary Municipal school	103	43	25	34	1	0	0
	Krishna Valley school	103	13	46	43	1	0	0
Mumbai	Bandra	351	13	219	112	7	0	0
	Sion	284	17	64	142	57	4	0

	Station Name	Observations	Good (0-50)	Satisfactory (51-100)	Moderate (101-200)	Poor (201-300)	Very Poor (301-400)	Severe (401-500)
Nagpur	IOE North Ambazari road	107	1	59	45	1	1	0
	MIDC Office, Hingna Road	106	0	52	51	3	0	0
	Govt Polytechnic Col, Sadar	123	14	70	39	0	0	0
	Civil lines Nagpur	305	124	178	3	0	0	0
Nashik	Old B. J. Market	104	0	23	81	0	0	0
	Girna Water Tank	102	0	38	64	0	0	0
	MIDC Jalgaon	104	0	13	91	0	0	0
	RTO Colony	87	29	36	22	0	0	0
	MIDC Satpur - VIP	87	22	47	17	1	0	0
	NMC Nashik	93	21	32	37	2	1	0
	SRO Office Nashik	234	68	109	56	1	0	0
Navi Mumbai	Rabale	60	1	14	42	3	0	0
	Nerul - DY Patil	105	4	23	67	11	0	0
	Mahape, MPCB-Nirmal Bhavan	108	31	36	40	1	0	0
	Airoli	232	193	37	1	1	0	0
	Kharghar - CIDCO Nodal Office	104	16	21	62	5	0	0
	Taloja - MIDC Building	95	1	8	76	10	0	0
Pune	Bhosari	101	24	33	41	3	0	0
	Nal Stop	97	20	41	35	1	0	0
	Swargate, Pune	103	19	34	44	6	0	0
	Pimpri-Chinchwad - BOB Building	264	65	71	119	9	0	0
	Karve Road - CAAQMS	349	3	118	181	41	4	2

	Station Name	Observations	Good (0-50)	Satisfactory (51-100)	Moderate (101-200)	Poor (201-300)	Very Poor (301-400)	Severe (401-500)
	WIT Campus	103	0	103	0	0	0	0
	Saat Rasta-Chithale Clinic	103	0	98	4	1	0	0
	Solapur	352	56	116	177	3	0	0
Raigad	Panvel- Water Supply Plant	113	0	9	101	3	0	0
Thane	Kopri	104	2	35	51	14	2	0
	Naupada	102	4	48	49	1	0	0
	Balkum/Glaxo	101	4	28	57	11	1	0

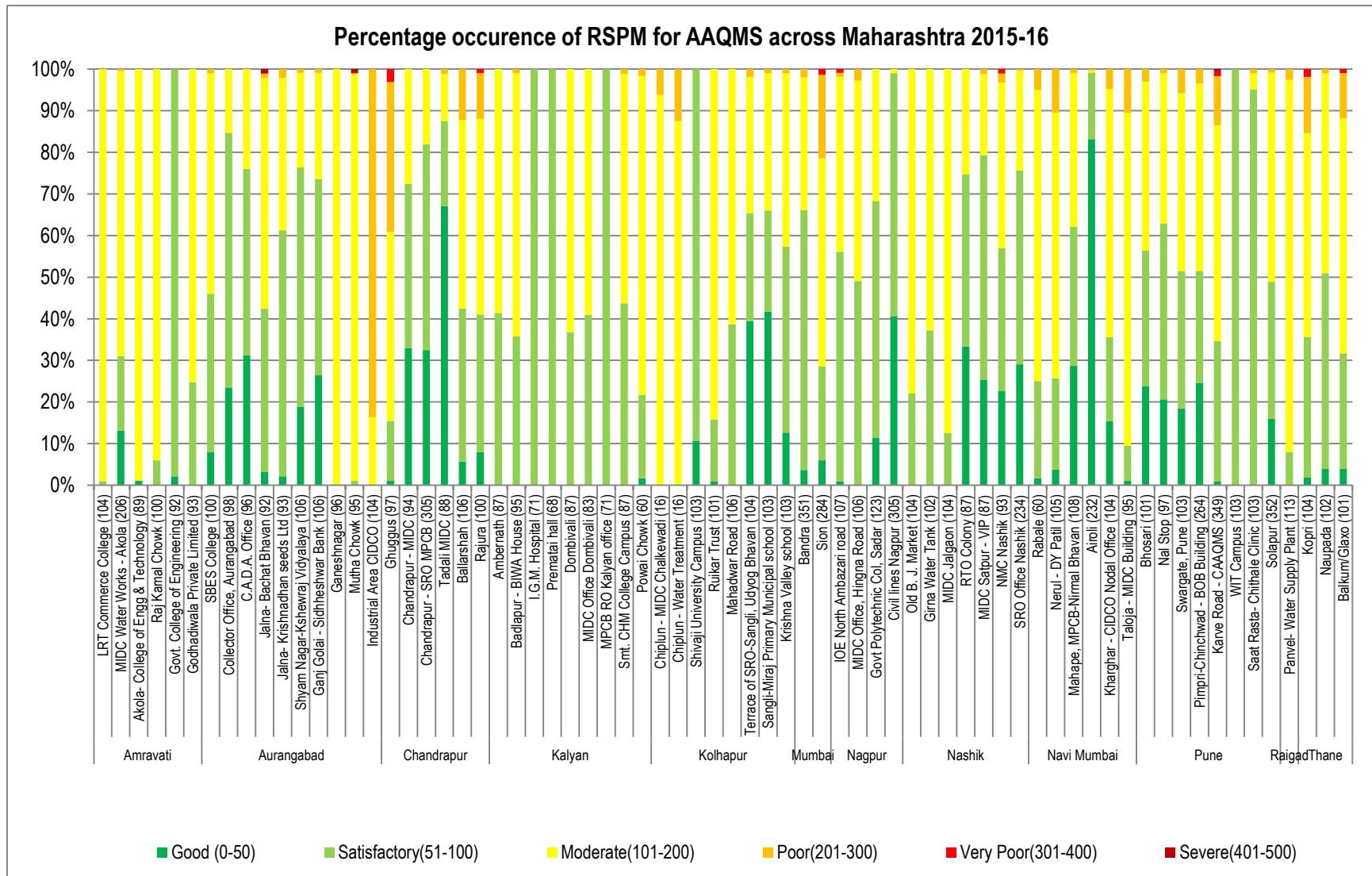


Figure No. 178: Percentage occurrence of RSPM for AAQMS across Maharashtra 2015-16

Appendix – A: Revised NAAQS 2009

चिह्न सं. डी.एल.-33004/99

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

भारत का राजपत्र The Gazette of India

असाधारण
EXTRAORDINARY

भाग III—खण्ड 4

PART III—Section 4

प्राधिकार से प्रकाशित

PUBLISHED BY AUTHORITY

सं. 217]

नई दिल्ली, बुधवार, नवम्बर 18, 2009/कार्तिक 27, 1931

No. 217]

NEW DELHI, WEDNESDAY, NOVEMBER 18, 2009/KARTIKA 27, 1931

राष्ट्रीय परिवेशी वायु गुणवत्ता मानक
केन्द्रीय प्रदूषण नियंत्रण बोर्ड
अधिसूचना

नई दिल्ली, 18 नवम्बर, 2009

सं. सी-29016/20/90/पी.सी.आई.-1.—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, शिपयरी, ग्रामीण और अन्य क्षेत्र	पारिस्थितिकीय संवेदनशील क्षेत्र (केन्द्र सरकार द्वारा अधिसूचित)	प्रबोधन की पद्धति
(1)	(2)	(3)	(4)	(5)	(6)
1	सल्फर डाई आक्साइड (SO ₂), µg/m ³	वार्षिक* 24 घंटे**	50 80	20 80	-उन्नत वेस्ट और गार्ड -परवेगनी परिक्षेप
2	नाइट्रोजन डाई आक्साइड (NO ₂), µg/m ³	वार्षिक* 24 घंटे**	40 80	30 80	-उपतस्थित जेकब और हॉवाइजर (सोडियम-आर्सेनाइट) -रासायनिक संदीप्ति
3	विश्वित पदार्थ (10माइक्रोन से कम आकार)या PM ₁₀ , µg/m ³	वार्षिक* 24 घंटे**	60 100	60 100	-हरात्मक विरक्षण -टोयम -बीटा तनुकरण पद्धति

3187 GI/2009

(1)

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 द्विप्तिकाल -रासायनिक संदीप्ति -रासायनिक पद्धति
6	सीसा (Pb) $\mu g/m^3$	वार्षिक* 24 घंटे**	0.50 1.0	0.50 1.0	ई.पी.एम. 2000 या समरूप फिल्टर पेपर का प्रयोग करके AAS/ICP पद्धति -टेफ्लॉन फिल्टर पेपर का प्रयोग करते हुए ED-XRF
7	कार्बन मोनोक्साइड (CO) mg/m^3	8 घंटे** 1 घंटा**	02 04	02 04	-अविपेक्षी अवरक्त (NDIR) स्पैक्ट्रम मापन
8	अमोनिया (NH_3) $\mu g/m^3$	वार्षिक* 24 घंटे**	100 400	100 400	-रासायनिक संदीप्ति -इण्डोफिनॉल ब्ल्यू पद्धति
9	बैन्जीन (C_6H_6) $\mu g/m^3$	वार्षिक*	05	05	- गैस क्रोमेटोग्राफी आधारित सतत 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 स्पैक्ट्रोमिती 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, उमर 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/असम.]

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 ।

(1)	(2)	(3)	(4)	(5)	(6)
9	Benzene (C ₆ H ₆) µg/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.



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



teri

The Energy and Resources Institute

*...towards global
sustainable development*

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