Conclave of change makers for clean air and sustainable mobility

Dr. B. Nagappa

Scientific Officer

KSPCB , Bangalore

E-mail :aqmc@kspcb.gov.in

High Air Pollution in Bangalore city

- Growth of vehicular population
- Type of vehicles on road
- Fuel adulteration issues
- Large number of D.G Sets
- Air pollution from SSI units

VEHICLE STRENGTH AND GROWTH IN BANGALORE(YEAR WISE)
(FIGURES AS AT THE END OF MARCH EACH YEAR)
(FIGURES IN LAKHS)

YEAR	TWO WHEELERS	M/CARS	A/R CABS	OTHERS	TOTAL
2001	10.92	2.07	0.62	1.12	14.73
2002	11.83	2.26	0.64	1.23	15.96
2003	13.23	2.53	0.69	1.37	17.82
2004	14.44	2.77	0.76	1.53	19.5
2005	15.7	3.18	0.75	1.67	21.3
2006	18.97	4	0.86	2.38	26.21
2007	21.11	4.69	0.94	2.86	29.6
2008	22.38	5.05	0.92	2.91	31.26
2009	23.34	5.75	0.93	3.03	33.05
2010	24.16	6.34	1.2	3.2	34.9
2011	26.24	7.1	1.21	3.36	37.91
		As on 31.3.2013			~ 46.0

In a decade 257 % of growth is observed in vehicular population,

Out of which 72 % are two wheelers

•Vehicular Pollution

•Diesel driven vehicles & Petrol driven vehicles

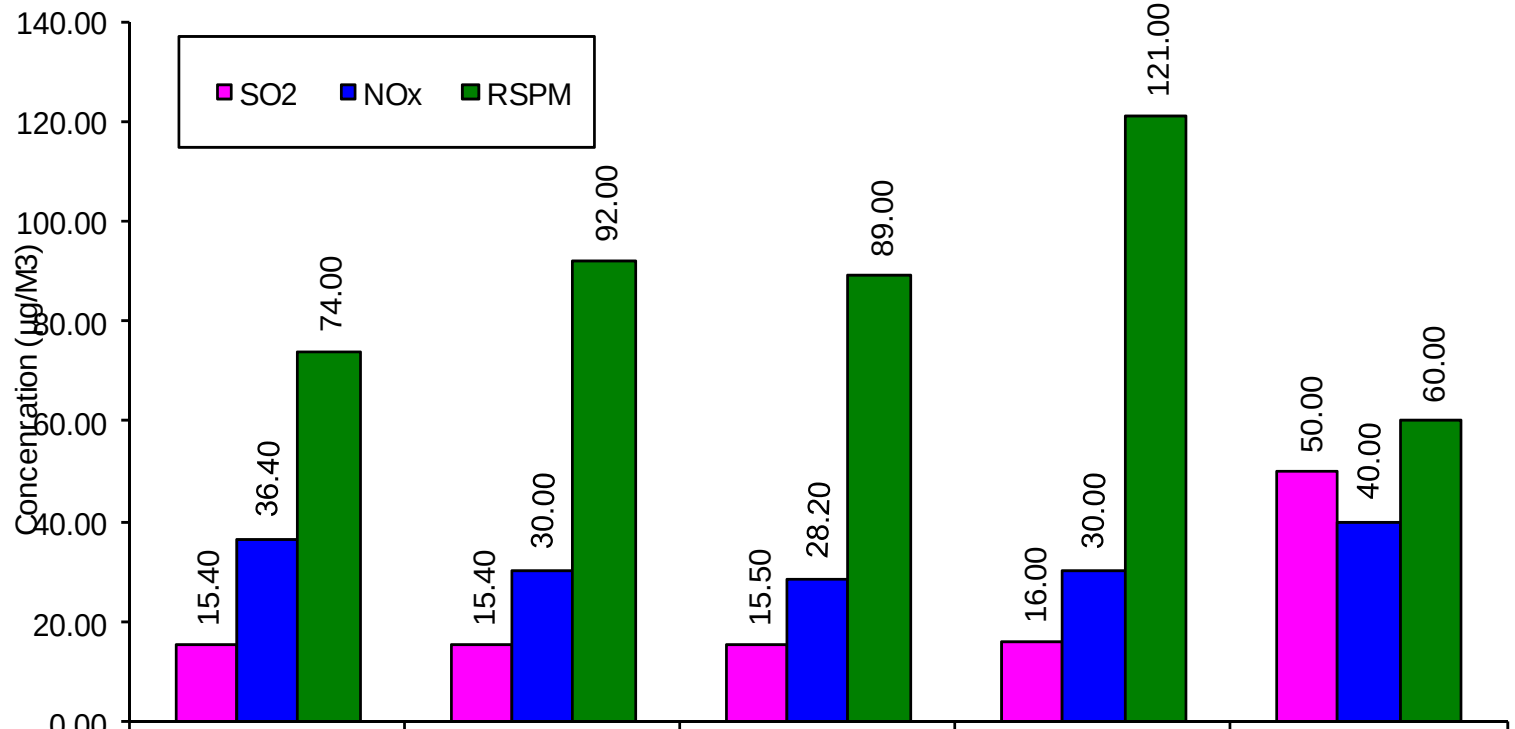
Air quality monitoring in Bangalore

Conventional, Continuous and Mobile Lab

- 12 AAQM stations covering Industrial Area, Residential and other areas and Sensitive Area
- Parameters SO2, NO2 and RSPM
- Frequency : Twice a week , 24 hrs, 365 days

- 2 CAAQMS+ 3CPCB
- Parameters : SO2, NO2 , CO and RSPM

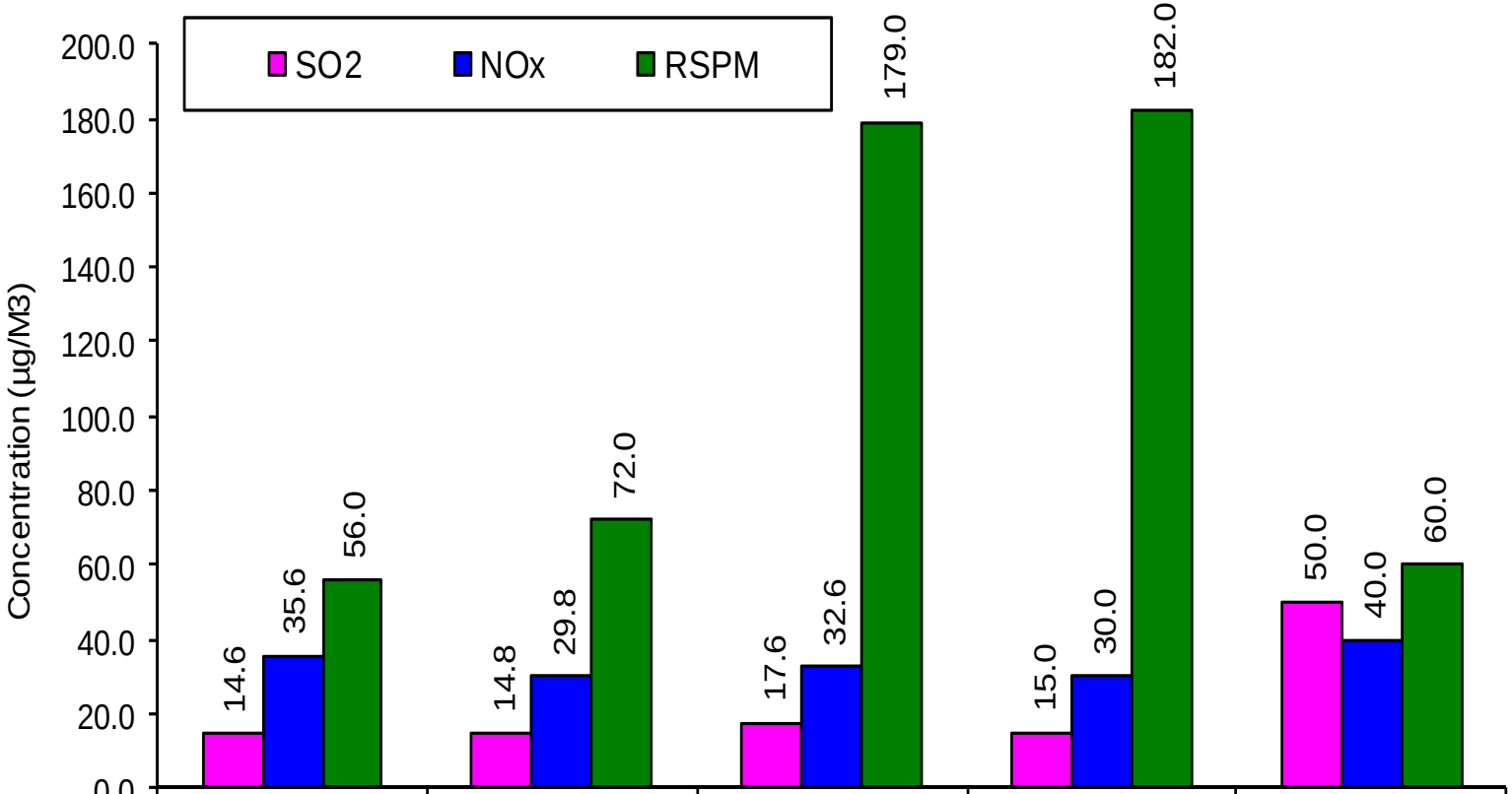
•**Industrial Area :** Three AAQMS have been set up in Bangalore city viz. i) Graphite India Limited ,ii) KHB Industrial Area and iii) Peenya Industrial area



	2009-10	2010-11	2011-12	2012-13	STD
SO2	15.40	15.40	15.50	16.00	50.00
NOx	36.40	30.00	28.20	30.00	40.00
RSPM	74.00	92.00	89.00	121.00	60.00

RSPM values are exceeded the national ambient air quality standard (60.0 µg/M3)

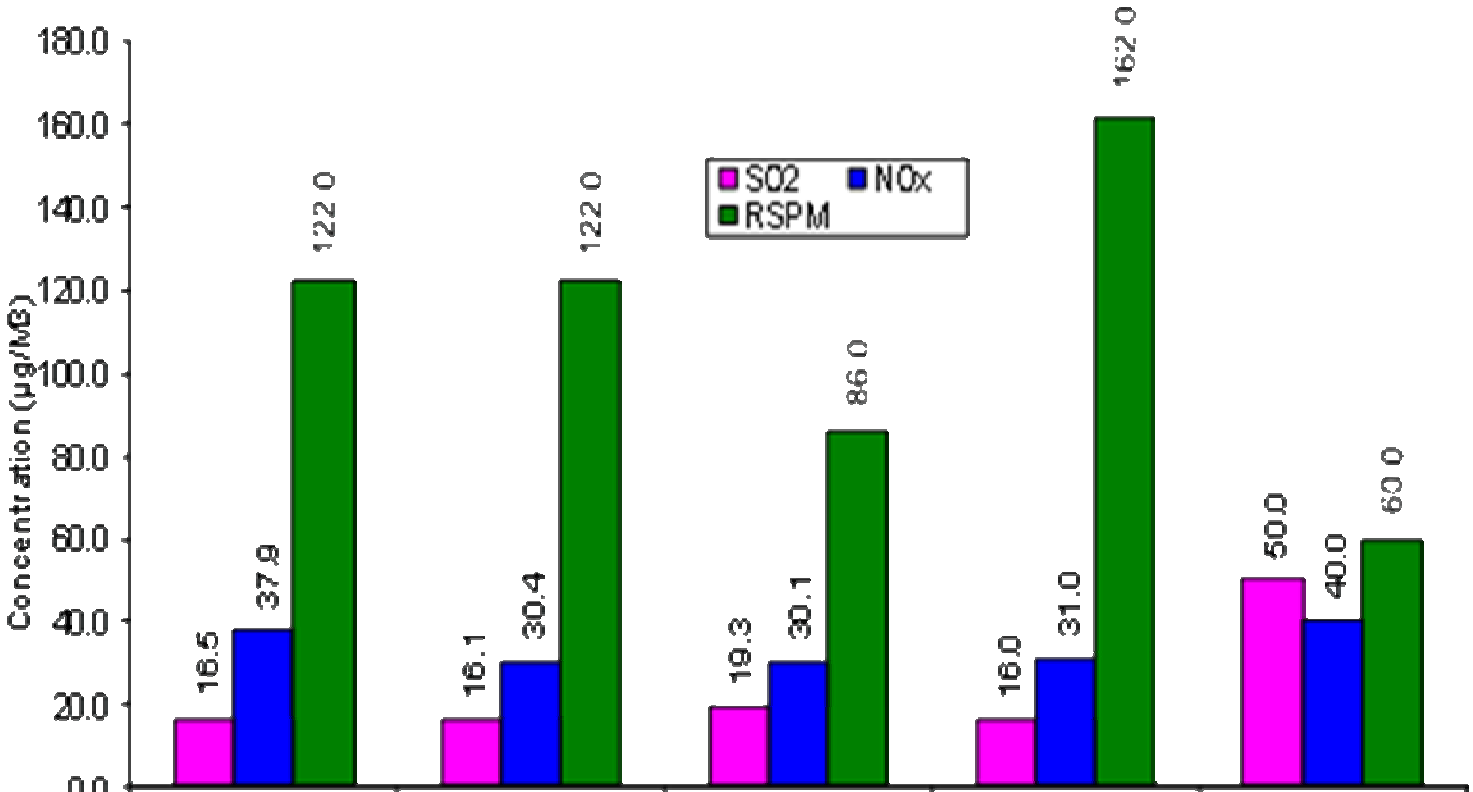
Annual average values of air pollutants at KHB Indl Area, as per revised standards during the years 2009-13



	2009-10	2010-11	2011-12	2012-13	STD
SO2	14.6	14.8	17.6	15.0	50.0
NOx	35.6	29.8	32.6	30.0	40.0
RSPM	56.0	72.0	179.0	182.0	60.0

During 2011-2012 and 2012-2013 RSPM values are around 3 fold higher than national limit, may be due to construction of International Air Port Road ,

Annual avarage values of air pollutants at Graphite India , White Field Road, as per the revised standards during the years 2009-13

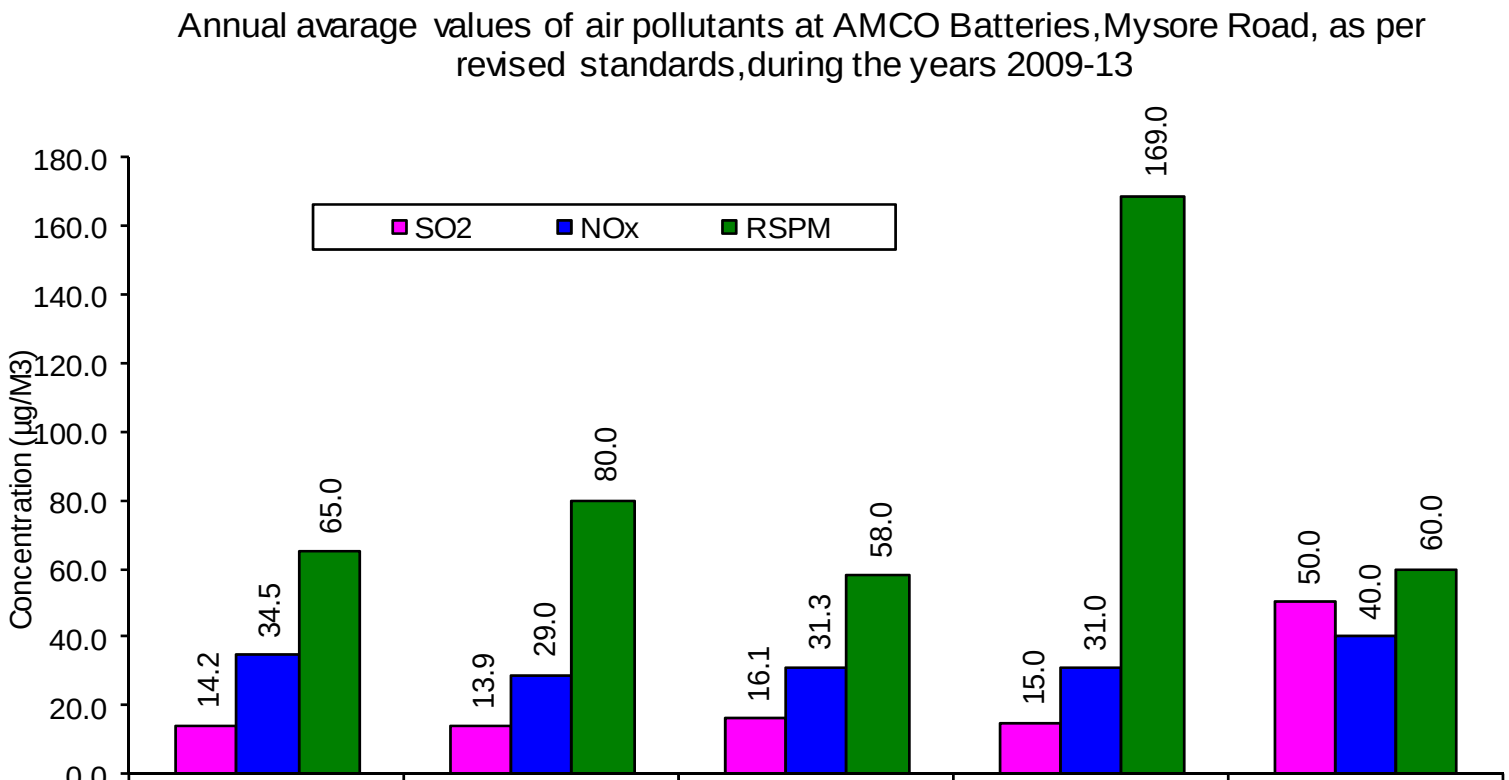


	2009-10	2010-11	2011-12	2012-13	STD
SO2	16.5	16.1	19.3	16.0	50.0
NOx	37.9	30.4	30.1	31.0	40.0
RSPM	122.0	122.0	86.0	162.0	60.0

High levels of RSPM may be due to the construction activities and **vehicular movement and road dust.**

Residential, Rural & Other areas of Bangalore city viz.

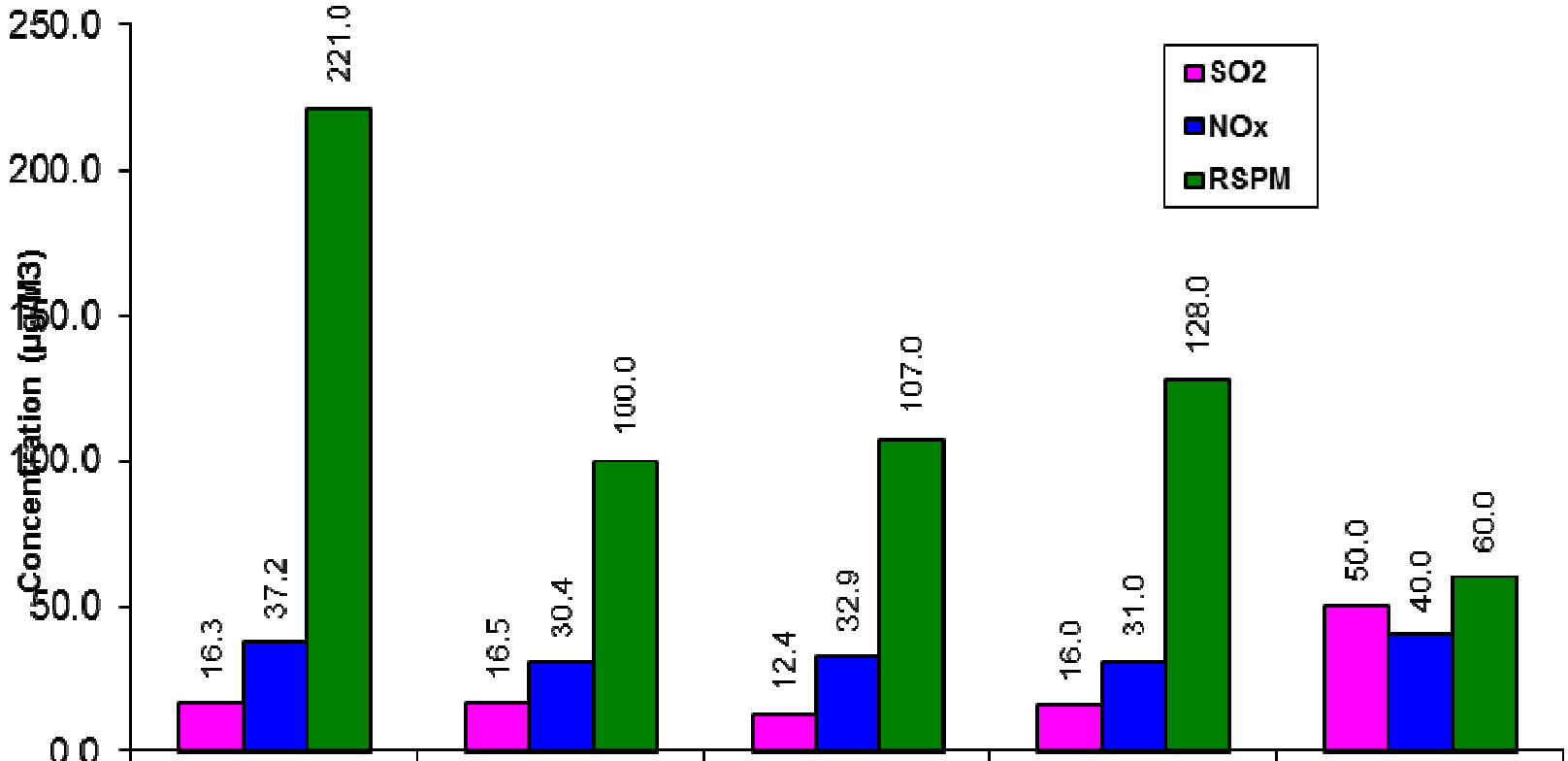
•AMCO batteries Mysore Road. and ii) Yeshwanthpur Police Station, iii) Central Silk Board, iv) DTDC office, Victoria Road, v) Kazisummanahalli white Field. .



	2009-10	2010-11	2011-12	2012-13	STD
SO2	14.2	13.9	16.1	15.0	50.0
NOx	34.5	29.0	31.3	31.0	40.0
RSPM	65.0	80.0	58.0	169.0	60.0

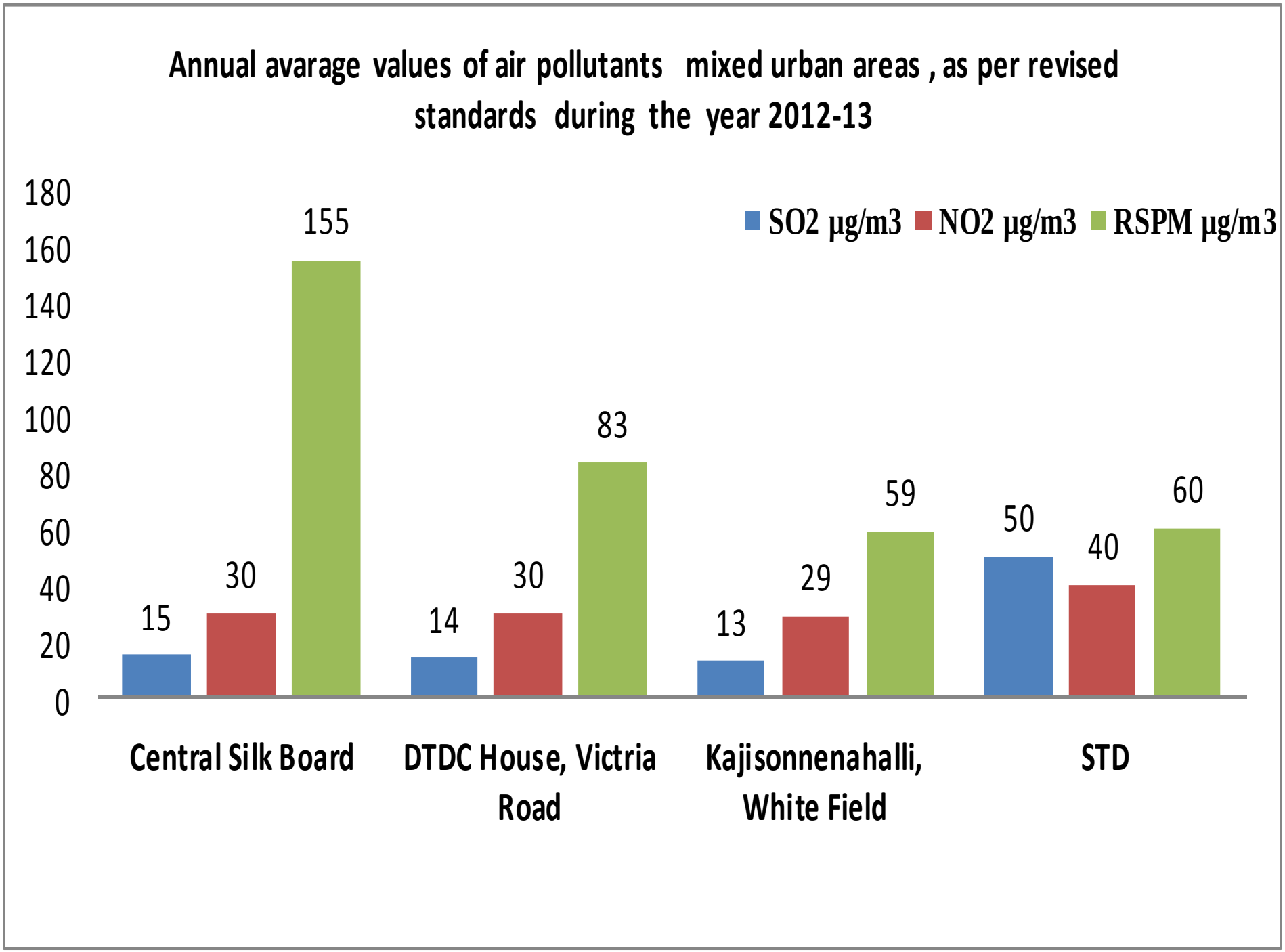
RSPM values have exceeded the national limit (60.0 µg/M3)

Annual average values of air pollutants at Yeshwanthpur Police Station as per revised standards during the year 2009-13



	2009-10	2010-11	2011-12	2012-13	STD
SO2	16.3	16.5	12.4	16.0	50.0
NOx	37.2	30.4	32.9	31.0	40.0
RSPM	221.0	100.0	107.0	128.0	60.0

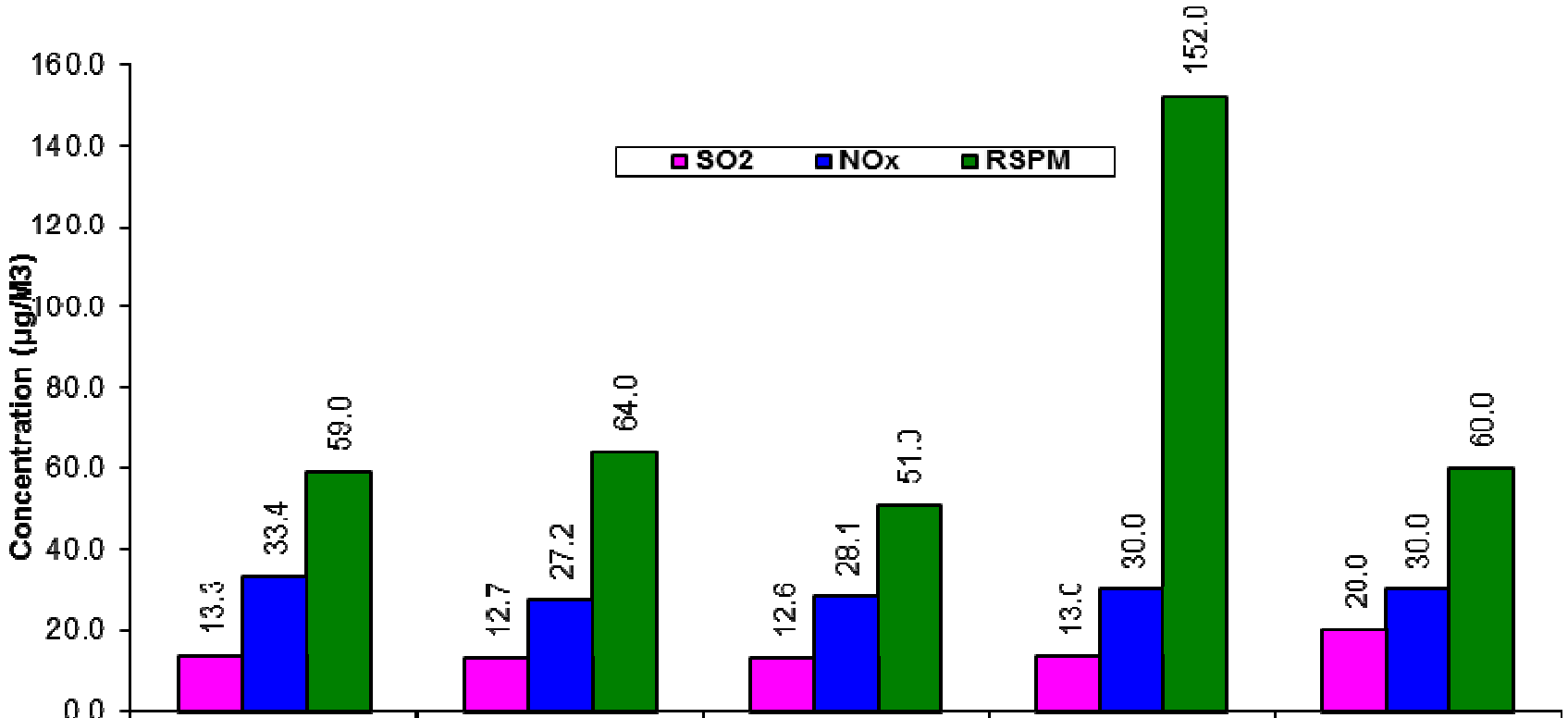
RSPM values have exceeded the national ambient air quality standard (60.0 µg/M3)


Annual avarage values of air pollutants mixed urban areas , as per revised standards during the year 2012-13
180
160
140
120
100
80
60
40
20
0
SO2 µg/m3
NO2 µg/m3
RSPM µg/m3
15
30
155
14
30
83
13
29
59
50
40
60
Central Silk Board
DTDC House, Victria Road
Kajisonnenahalli, White Field
STD

Sensitive zone: Two AAQMS is at sensitive zone of Bangalore city .

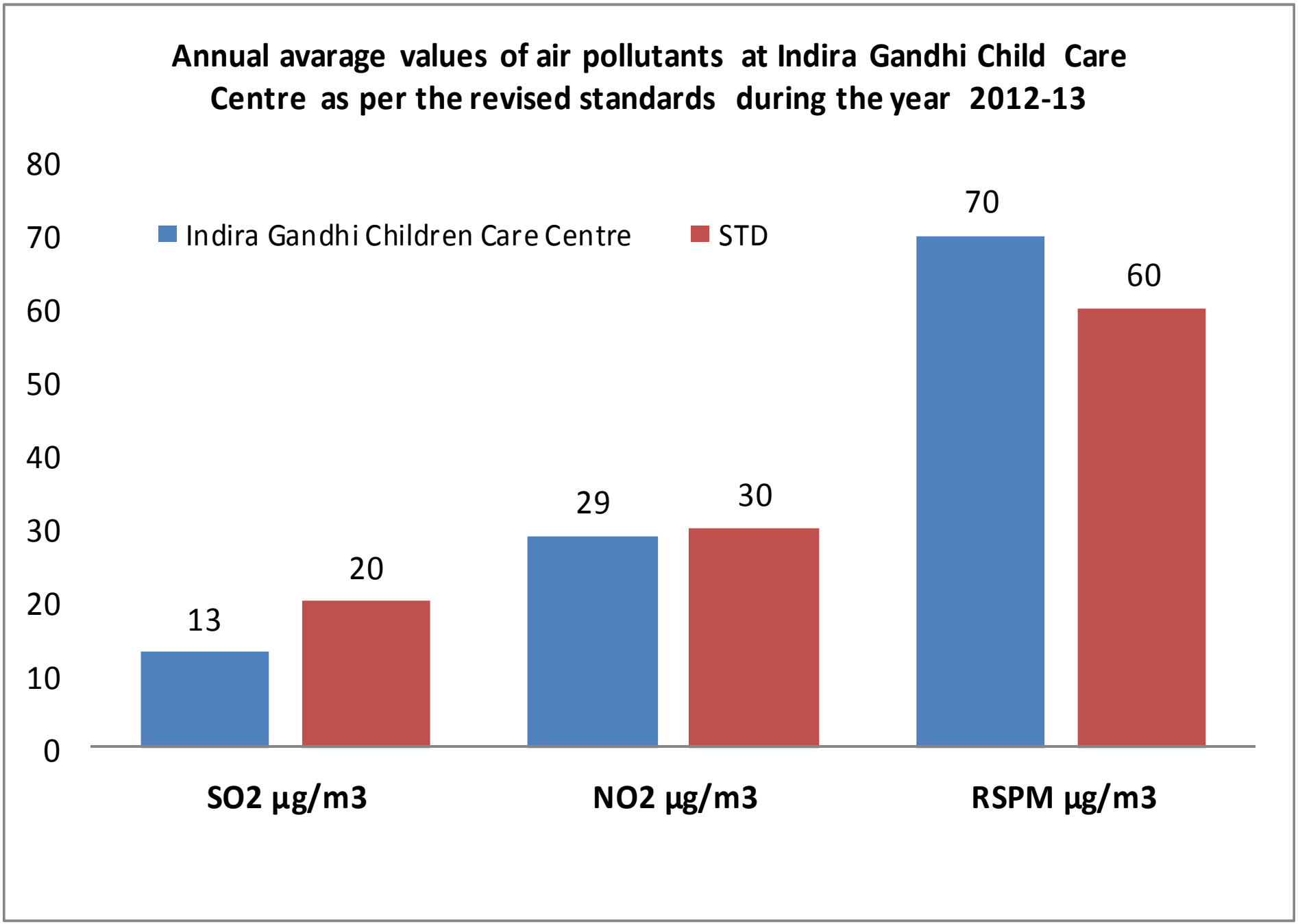
- Victoria Hospital Bangalore
- Indira Gandhi Child Care Centre , NIHMANS

Annual average values of air pollutants at Victoria Hospital as per revised standarda during the years 2009-13



	2009-10	2010-11	2011-12	2012-13	STD
SO2	13.3	12.7	12.6	13.0	20.0
NOx	33.4	27.2	28.1	30.0	30.0
RSPM	59.0	64.0	51.0	152.0	60.0

RSPM values and NO2 have exceeded the national ambient air quality standard (60.0 and 30.0 µg/M3) ,


Annual avarage values of air pollutants at Indira Gandhi Child Care Centre as per the revised standards during the year 2012-13
80
70
60
50
40
30
20
10
0
Indira Gandhi Children Care Centre
STD
13
20
29
30
70
60
SO2 µg/m3
NO2 µg/m3
RSPM µg/m3

PM_{10} filter paper

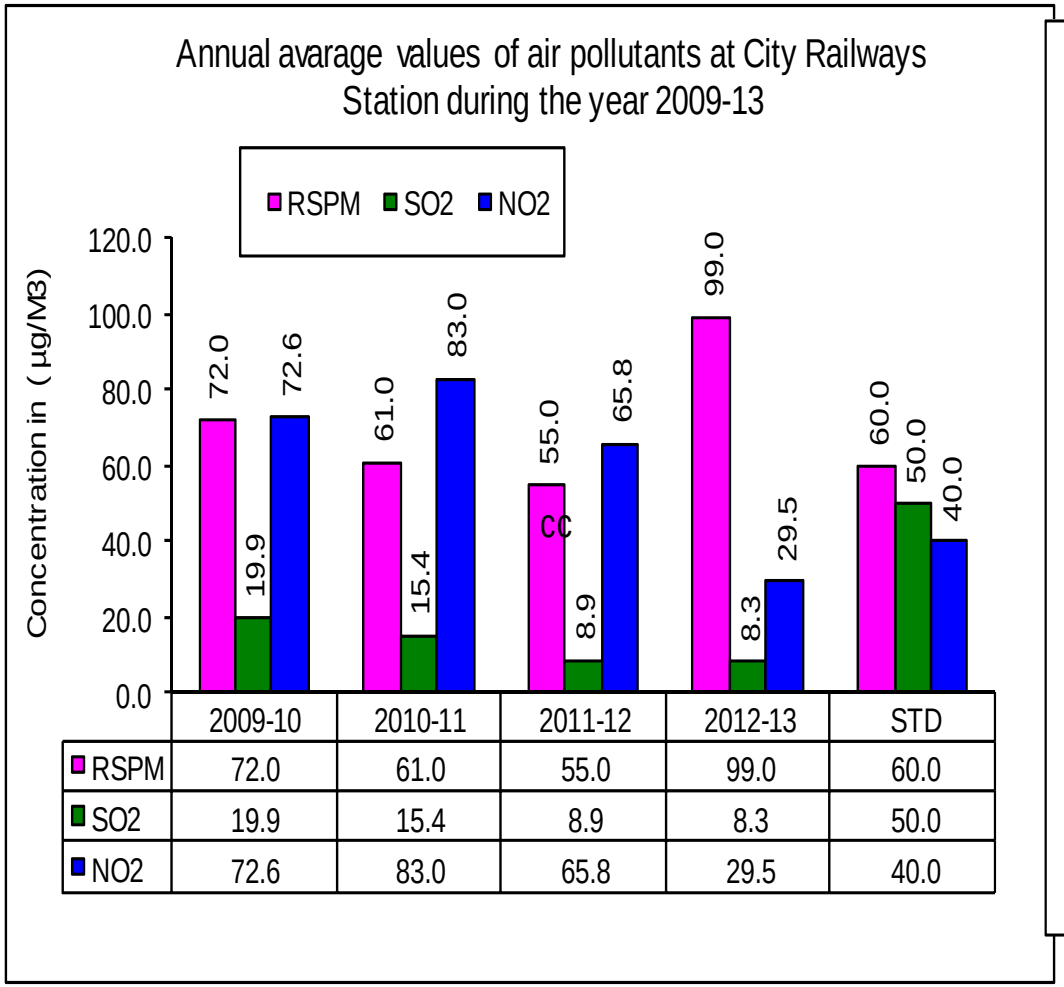
Before Monitoring **After Monitoring**

CAAQMS at City Railway station
Pollutants: SO_2, NO_X, CO and RSPM

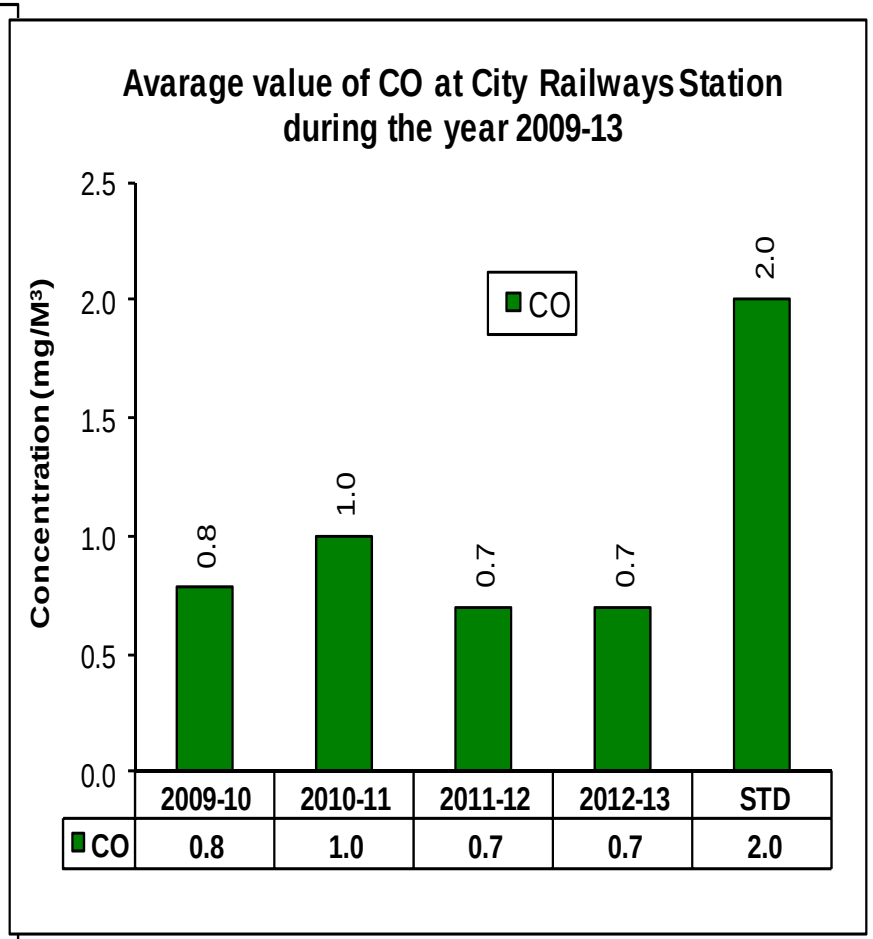
Continuous Ambient Air quality Data at City Railway Station

RSPM and NO2 have exceeded the limit (60 and 40.0 µg/M3) .

SO2 are within the limit (50 µg/M3) in all the years ,



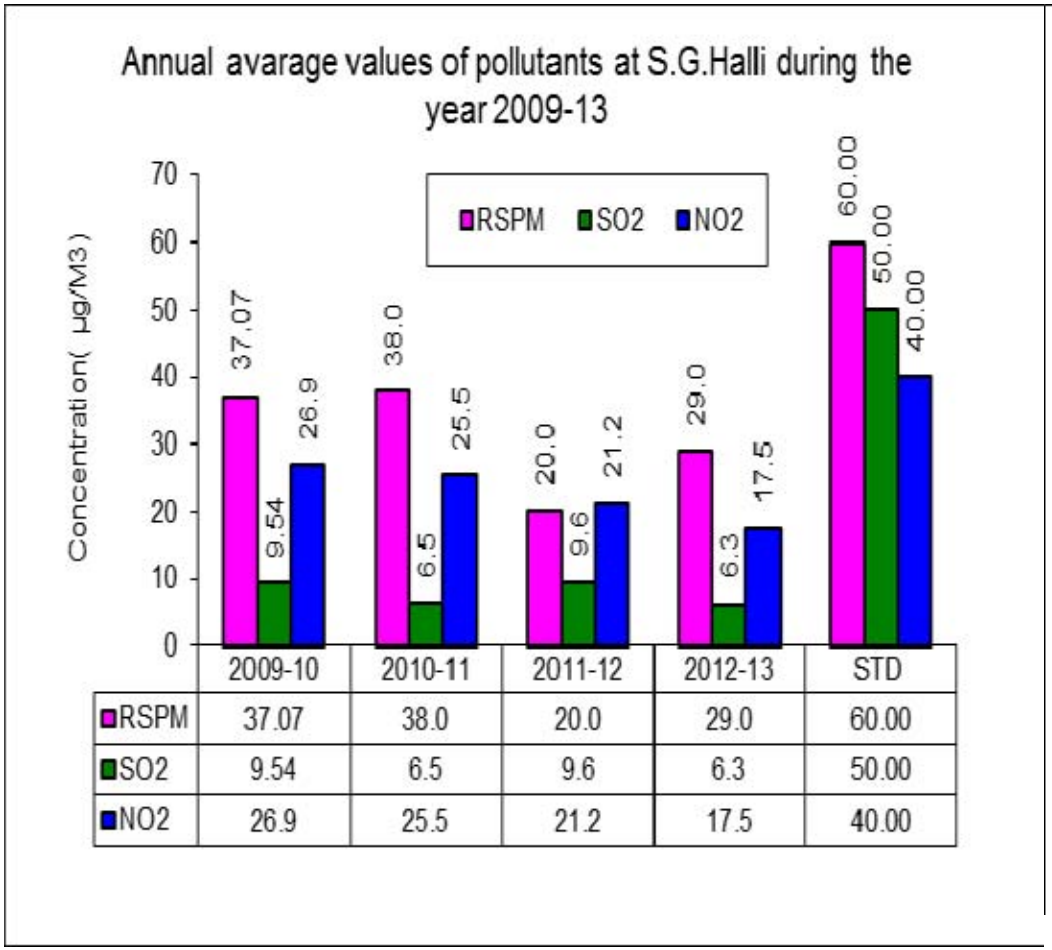
	2009-10	2010-11	2011-12	2012-13	STD
RSPM	72.0	61.0	55.0	99.0	60.0
SO2	19.9	15.4	8.9	8.3	50.0
NO2	72.6	83.0	65.8	29.5	40.0



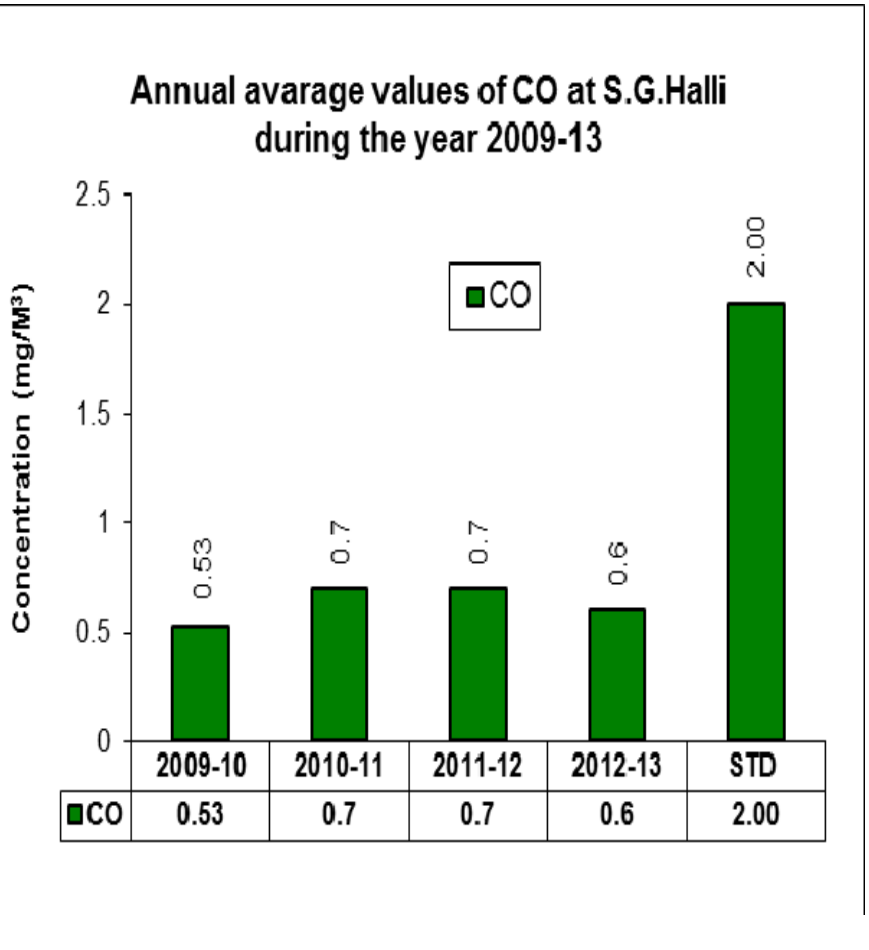
	2009-10	2010-11	2011-12	2012-13	STD
CO	0.8	1.0	0.7	0.7	2.0

Continuous Ambient Air quality data at S.G.Halli

All measured values are within the limit



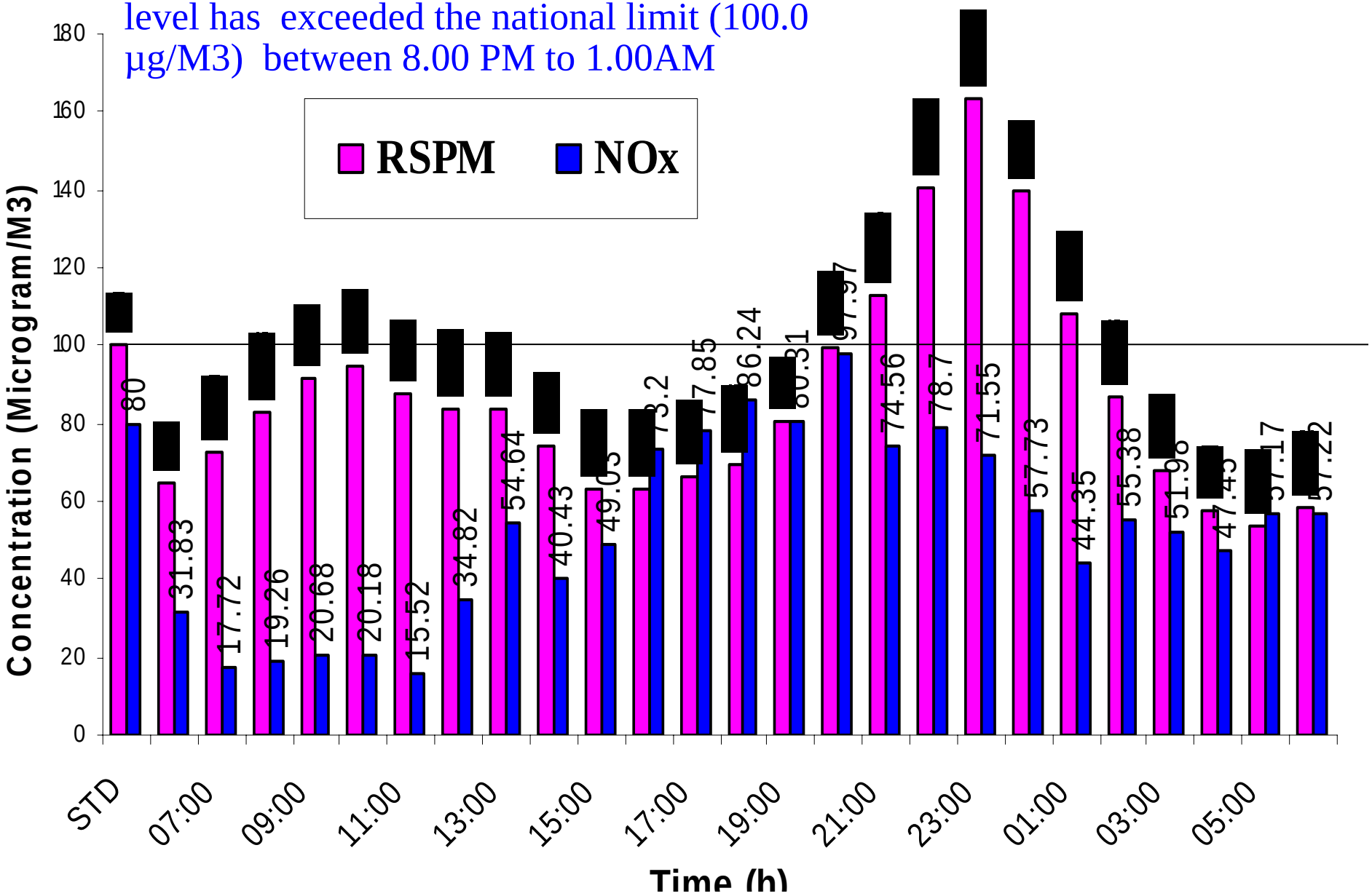
	2009-10	2010-11	2011-12	2012-13	STD
RSPM	37.07	38.0	20.0	29.0	60.00
SO2	9.54	6.5	9.6	6.3	50.00
NO2	26.9	25.5	21.2	17.5	40.00



	2009-10	2010-11	2011-12	2012-13	STD
CO	0.53	0.7	0.7	0.6	2.00

24 Hours CAAQMS data at City Railways Station

24 h. data indicates that the measured RSPM level has exceeded the national limit (100.0 µg/M3) between 8.00 PM to 1.00AM



Mobile Laboratory

Ambient Air Quality Monitoring by Using Mobile Laboratory

Place of Monitoring	Parameters	NAMP Standards	Observed values		
			Min	Max	Avg
Vidhana Soudha Near Gopala Gowda Circle	RSPM µg/M3	**100**	110	131	**115**
	SO2 µg/M3	**80**	6.6	9.6	9.2
	NOx µg/M3	**80**	29.3	68.2	59.6
	Ozone µg/M3	**-**	13.1	14.7	13.9
M. G. Road, Near Cauvery Emporium	RSPM µg/M3	**100**	73	184	**122**
	SO2 µg/M3	**80**	5.8	7.6	6.8
	NOx µg/M3	**80**	20.9	74.1	36.6
	Ozone µg/M3	**-**	13.0	15.5	13.0
K.R.Market	RSPM µg/M3	**100**	67	216	**154**
	SO2 µg/M3	**80**	5.9	13.5	9.3
	NOx µg/M3	**80**	23.4	128.9	69.9
	Ozone µg/M3	**-**	13.9	15.1	14.3
Jayanagar 4th Block	RSPM µg/M3	**100**	44	639	**239**
	SO2 µg/M3	**80**	5.8	10.9	8.2
	NOx µg/M3	**80**	28.8	107.5	60.7
	Ozone µg/M3	**-**	11.7	15.1	12.9

Near cantonment Railway Station	RSPM µg/M3	**100**	43	175	**108**
	SO2 µg/M3	**80**	5.3	11.2	9.3
	NOx µg/M3	**80**	18.9	102.1	46.5
	Ozone µg/M3	**-**	12.7	14.2	13.4
Indiranagar BDA Complex Near RTO.	RSPM µg/M3	**100**	61	164	**120**
	SO2 µg/M3	**80**	5.9	14.9	8.7
	NOx µg/M3	**80**	27.3	140.9	66.8
	Ozone µg/M3	**-**	13.2	14.9	13.6
Near C.M.Home Office Opp. BTC Race Course Road	RSPM µg/M3	**100**	37	215	**125**
	SO2 µg/M3	**80**	6.2	12.8	8.4
	NOx µg/M3	**80**	30.5	120.5	65.7
	Ozone µg/M3	**-**	12.7	14.9	13.7
KPSC Office	RSPM µg/M3	**100**	72	608	**330**
	SO2 µg/M3	**80**	5.5	9.7	6.7
	NOx µg/M3	**80**	26.2	88.9	47.2
	Ozone µg/M3	**-**	13.2	13.9	13.6
Near Chalukya Hotel Opp RC College	RSPM µg/M3	**100**	60	222	**159**
	SO2 µg/M3	**80**	5.5	8.5	6.5
	NOx µg/M3	**80**	25.1	67.4	38.5
	Ozone µg/M3	**-**	12.9	14.0	13.6

PM10 and PM 2.5 at Traffic intersection: in **BANGALORE CITY**

- City Railway station, Bangalore
- Central Silk Board (BTM circle)
- Badami House (Corporation Circle)
- 11^{th} Cross Malleshwaram
- Pollutants : SO_2, NOx, PM10, PM2.5 and ambient noise were measured as per the CPCB guidelines.
- Chemical composition of PM: Characterization of $PM_{2.5}$ and PM_{10} particulate matter for metals ,anions and cations were measured

Sampling locations : 4 different traffic intersections

City Railway station, Bangalore

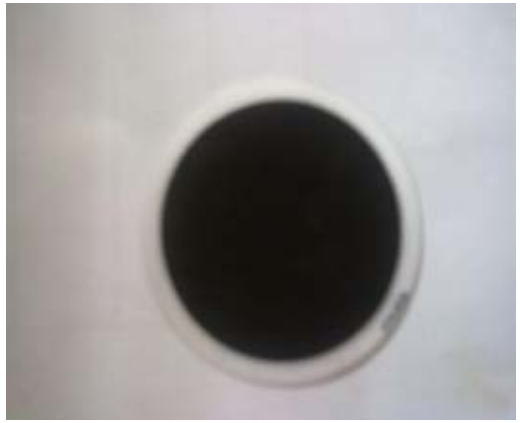
Central silk Board (BTM circle)

Badami House (Corporation Circle)

11th Cross Malleshwaram

PM_{10} filter paper

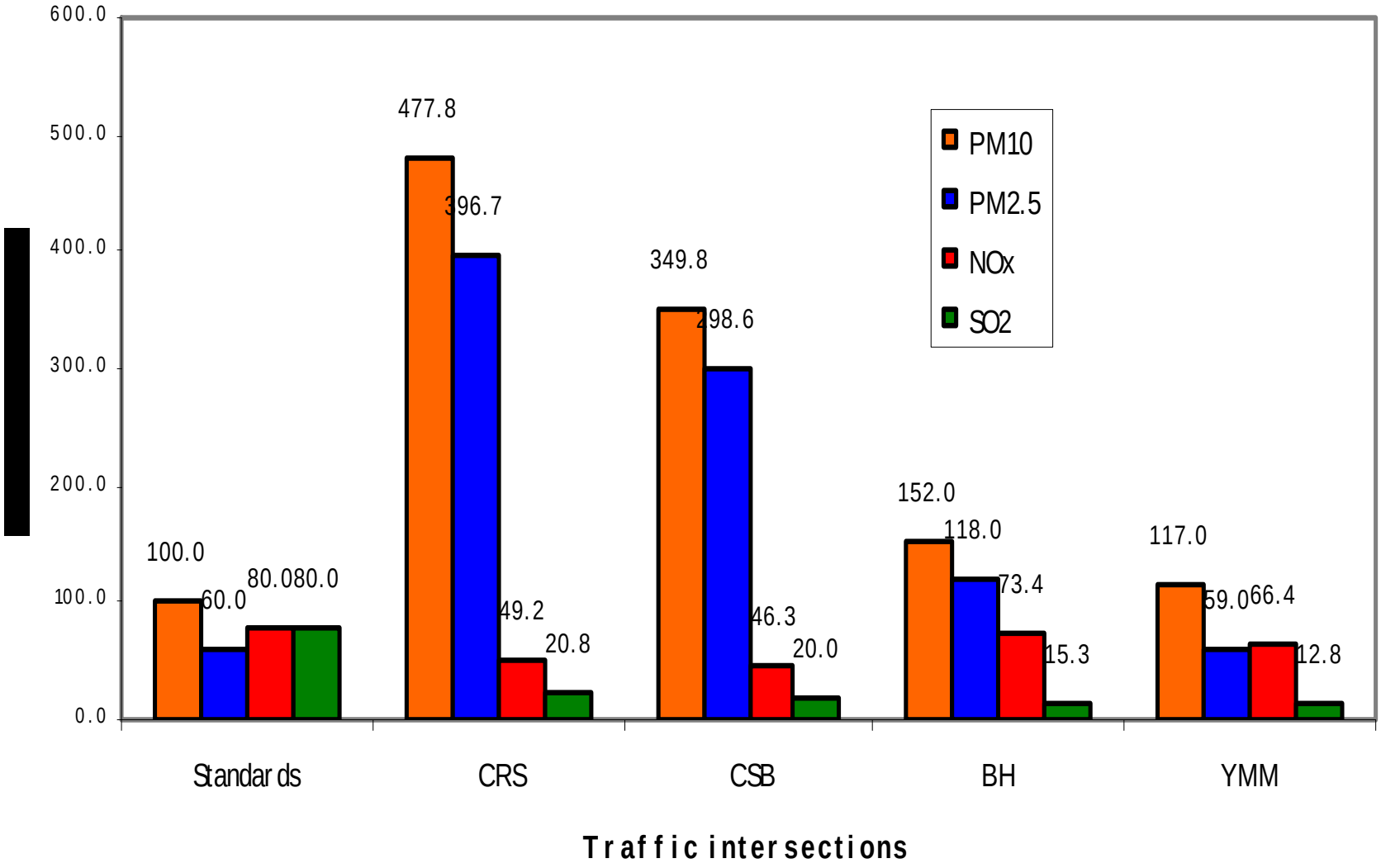
Before Monitoring **After Monitoring**



$PM_{2.5}$ Filter Paper

Before Monitoring **After Monitoring**

Ambient Air Quality at Breathing level in Bangalore City



Chemical composition of $PM_{2.5}$ and PM_{10}

- **EDXRF used to characterize the fine particulate matter (PM2.5 and PM10)**
- **Elements : 42 elements were quantified**

Site 1. City Railway Station (CRS) :

PM2.5 contains 18 elements namely Na, Mg, Al, Si, S, Cl, K, Ca, Ti,V, Cr, Mn, Fe, Ni, Cu, Zn, Br and Pb.

PM10 contains 22 elements : Na, Mg, Si, S,Cl, K, Ca, Ti,V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Se, Br, Rb, Sr and Pb

- **Site :2: Central Silk Board (CSB):**
- **PM 2.5 contains 23 elements namely Na, Mg, Al, Si, S, Cl, K, Ca, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, As, Se, Br, Rb, Ag and Pb,**
- **PM10 contains 25 elements Na, Mg, Al , Si, S, Cl, K, Ca, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, As , Br, Rb, Sr, Ag ,I, Ba and Pb,**
- **Site 3. Badami House (Corpan circle) :**
- **PM 2.5 contains 21 elements namely Na, Mg, Al, Si, S, Cl, K, Ca, Ti, V, Cr, Mn, Fe, Ni, Cu, Zn, As, Se, Br, Rb, and Pb,**
- **PM10 contains 23 elements namely : Na, Mg, Si, S, Cl, K, Ca, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Br, Rb, Sr, Ag ,Cd Ba and Pb,**
- **Site 4. 11th cross , Malleshwaram :**
- **PM 2.5 contains 21 elements namely Na, Mg, Al, Si, S, Cl, K, Ca, Ti, V, Cr, Mn, Fe, Ni, Cu, Zn, As, Br, Rb, Y and Pb.**
- **PM10 contains 23 elements namely : Na, Mg, Si, S, Cl, K, Ca, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, As , Br, Rb, Sr, Y, Ba and Pb.**

Elemental carbon , Organic carbon (not analysed due non availability of equipment)

Name of the element	PM 2.5 (µg/M3)				PM 10 (µg/M3)			
	CRS	CSB	BH	YMM	CRS	CSB	BH	YMM
Sodium	7.5037	14.7088	17.4895	10.567	21.0329	16.6821	16.046	19.8145
Magnesium	6.1149	8.0077	6.6536	3.4666	53.7408	92.8109	42.605	31.6287
Aluminum	5.7183	5.5134	6.9302	3.4241	6.0739	5.7095	6.3591	3.5268
Silicon	1.8738	3.0154	1.6323	1.3467	0.0000	0.7363	0.0000	0.0000
Phosphorus	1.2081	2.4050	1.1579	1.0363	2.9987	5.1903	2.4084	2.1857
Sulphur	1.1672	0.9729	1.5817	0.2421	5.1001	3.8853	4.2106	4.0323
Chlorine	0.5007	0.6892	0.3802	0.2746	4.7011	8.1727	4.2616	3.1985
Potassium	0.4369	0.4876	0.2820	0.2850	4.9528	6.5914	4.2193	5.2150
Calcium	0.3465	1.0872	0.1304	0.1949	1.3323	1.4766	0.5175	0.5832
Scandium	0.1145	0.1405	0.1025	0.0854	0.2305	0.2762	0.2149	0.1437
Titanium	0.0470	0.0626	0.0315	0.0227	0.4195	0.7277	0.4062	0.3067
Vanadium	0.0418	0.1428	0.0846	0.4229	0.0700	0.2303	0.1179	0.4654
Chromium	0.0197	0.0201	0.0153	0.0127	0.1007	0.1421	0.0901	0.0886
Manganese	0.0097	0.0208	0.0133	0.0060	0.0199	0.0206	0.0139	0.0097
Iron	0.0086	0.0131	0.0132	0.0067	0.0349	0.0486	0.0336	0.0197
Cobalt	0.0027	0.0035	0.0024	0.0017	0.0137	0.0201	0.0131	0.0107
Nickel	0.0024	0.0072	0.0059	0.0017	0.0126	0.0240	0.0154	0.0116
Copper	0.0014	0.0042	0.0054	0.0032	0.0068	0.0126	0.0089	0.0075
Zinc	0.0000	0.0138	0.0000	0.0000	0.0118	0.0096	0.0091	0.0000
Gallium	0.0000	0.0029	0.0000	0.0000	0.0101	0.0174	0.0095	0.0054
Germanium	0.0000	0.0028	0.0012	0.0018	0.0103	0.0219	0.0093	0.0063

Name of the element	PM 2.5 (µg/M3)				PM 10 (µg/M3)			
	CRS	CSB	BH	YMM	CRS	CSB	BH	YMM
Bromine	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Rubidium	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Strontium	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Yttrium	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Molybdenum	0.0000	0.0000	0.0000	0.0000	0.0160	0.0432	0.0129	0.0098
Rhodium	0.0000	0.0000	0.0000	0.0049	0.0000	0.0000	0.0000	0.0066
Palladium	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Silver	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cadmium	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tin	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0137	0.0000
Antimony	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tellurium	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Iodine	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cesium	0.0000	0.0000	0.0000	0.0000	0.0000	0.0235	0.0000	0.0000
Barium	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Lanthanum	0.0000	0.0000	0.0000	0.0000	0.0000	0.2461	0.1514	0.0971
Tungsten	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Gold	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Lead	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total weight of all elements	25.1179	37.3248	36.5176	21.4140	100.8933	143. 124	81.7482	71.3844
Total weight PM (µg/M3)	396.7	298.6	118.0	59.0	477.8	349.9	152.0	117.0
% of M and I content	6.3317	12.499	30.947	36.296	21.116	40.904	53.781	61.012
% of Organic content	93.6683	87.501	69.053	63.704	78.884	59.094	46.219	38.988
	Not carried out due to non availability of equipment							

Ambient Air Quality measured during "BUS DAY" observed by BMTC Bangalore during – 2010.

KSPCB has conducted AAQM (Feb 2010 to Dec 2010) at the different locations of Bangalore City using Mobile Laboratory on the occasion of BUS DAY. The reduction in concentration of pollutants is indicated in the table below:

Parameters monitored	Feb2010	Mar 2010	Apr-2010	May-2010	Jun-2010	July-2010	Aug-2010	Oct-2010	Dec-2010	Overall redn
	Marathalli	Bennrghatta Road	Ibbalur Junction	Central Silk Board	Jalahalli Cross	Kadirnahalli	Corporation Circle	Nagarabhavi Circle	Hebbal Jun	
SO2 µg/m3	14.6 %	14.7 %	15.9 %	30.1 %	8.6 %	8.8 %	10.6 %	6.4 %	9.5 %	13.2 %
NOx µg/m3	8.1 %	13.6 %	3.7 %	12.5 %	13.8 %	3.0 %	13.0 %	11.9 %	11.0 %	9.0 %
RSPM µg/m3	20.9 %	13.5 %	10.9 %	12.5 %	13.4 %	15.2 %	9.2 %	4.6 %	4.4 %	13.3 %
CO mg/m3	0.71 %	12.7 %	10.2 %	25.8 %	7.1 %	7.6 %	12.5 %	3.8 %	14.3 %	10.5 %
O3 µg/m3	3.46 %	7.2 %	10.8 %	17.5 %	16.6 %	5.6 %	23.2 %	6.1 %	5.5 %	10.6 %
										11.3 %

Measures to combat Air Pollution in Bangalore city-

Task Force: Departments involved

The Hon'ble Supreme Court has directed that the State shall draw up a plan of action for lowering the rate of RSPM level in Bangalore City to be placed before the Environment Pollution (Prevention and Control) Authority (EPCA – Headed by Dr Bhurelal and team

1. Additional Chief Secretary to Government, Chairman of Task Force	**11. Department of Industries and Commerce**
2. Department of Home	**12. Department of Urban Infrastructure Development (Special Invitee)**
3. Department of Forest, Ecology and Env	**13. Bangalore Metro Rail Corporation Ltd.**
4. Department of Transport	**14. Indian Oil Corporation Ltd.**
5. Department of Food and Civil Supplies	**15. Bangalore Development Authority**
6. Department of Urban Development	**16. Bruhat Bangalore Mahanagara Palike**
7. Bangalore Metropolitan Transport Corporation	**17. Sri. G. Goverdhan, Admin.(Bangalore Environment Trust) a NGO**
8. Department of Police	**18. Karnataka Lorry Owners Association**
9. Department of Excise	**19. Southern State Goods Carrier Owners Association**
10. Department of Commercial Tax	**20. Karnataka Bus Owners Association**

14 Point action plan for improving air quality in Bangalore

Action Plan - 1

Mandatory conversion of in-use 3-wheelers registered after 1.04.1991 onwards to Bi-Fuel Mode (such as LPG and Petrol) in a phased manner from 1.12.2003 onwards with authorized LPG Kits and fixed LPG Cylinders.

3-wheelers registered after 1.04.1991 onwards converted to bi-fuel mode (such as LPG and petrol) in a phased manner from 1-12-2003 onwards with authorized LPG kits and fixed LPG cylinders

Action Plan – 2

Registering new 3 Wheelers having Bi-Fuel Mode only (such as LPG and Petrol) w.e.f. 1-12-2003 & onwards

Register only new 3 wheelers having bi-fuel mode (such as LPG and Petrol) only from 1-12-2003 onwards

Action Plan – 3

To take action for conversion of nearly 35,000 auto rickshaws which are running with unauthorized LPG kits and detachable cylinders by October 2004.

Implemented

Action Plan – 4

Introduction of “No Pollution Under Control Certificate - No Fuel” Scheme in Petrol/Diesel dispensing stations by October 2004.

Fitness certificate / norms will be strictly enforced. If vehicles emitting excess visible smoke, under Section-56(4) of Motor Vehicles Act, 1998 to cancel fitness certificate of such vehicles.

Action Plan – 5

Setting up of Electronic Emission Testing Centers (ETCs) in each petrol bunk to be introduced from 1-12-2003 onwards wherever feasible.

268 emission testing centers in the Bangalore city ,

Out of this, 143 centers are located in petrol bunks and 125 centers are located in other places.

Outside Bangalore City: 180

In Petrol Bunks: 12

In other places: 168

Action Plan – 6

Increase Sales Tax and to impose Entry Tax on white kerosene (Superior Kerosene Oil (SKO) to curb adulteration with Petrol.

Increase sales tax and to impose entry tax on white kerosene to curb adulteration with petrol.

Action Plan – 7

Strengthening strict vigilance and surveillance actions in order to check Adulteration of Fuel.

Strengthen vigilance and surveillance actions - Team

Action Plan – 8

To make mandatory for the whole sellers of kerosene to register themselves and produce end-use certificates before Civil Supplies Department

Kerosene whole sellers to register themselves and produce end use certificates before civil supplies department

The Food & Civil Supplies Dept. informed that all kerosene whole sellers have been registered and they are producing the end-use certificate to the Department. The details of action taken by Dept. are given as indicated below:

Petrol pumps inspected	:	532
Petrol seized (L)	:	41,544
Diesel seized (L)	:	77,539
Kerosene Seized (L)	:	47,632
LPG Cylinders Seized	:	1,682
Lubricant Seized (L)	:	2,04,150.918

Action Plan – 9

To establish 5 Auto LPG Dispensing Stations (ALDS) in Bangalore City by March 2004.

More than 90 auto LPG dispensing Stations established.

Action Plan – 10

To convert 5 roads into One Way by Home Department by March, 2004

This is implemented & in-fact more roads have been converted to one way and it is regularly changed depending on the traffic conditions.

Action Plan – 11

To construct 2 flyovers and one Railway Under Pass by March 2004 as proposed by the concerned Departments.

This is already implemented, many flyovers in different parts of the city are already constructed and many more are planned. The existing flyover connecting the city market & Sirsi circle is proposed to be extended on the Mysore Road to ease the traffic.

Action Plan – 12

To Increase fleet size of BMTC from 3106 buses at present to around 4330 buses by the end of October 2005.

At present, BMTC is having a fleet size of 6200 buses out of which 586 buses are BS-4 and they are adding only BS-4 fleet now onwards.

Action Plan – 13

KSPCB to install one On-line Ambient Air Quality Monitoring Station by June 5, 2004.

- Two CAAQMs have been installed.
  - One at KSPCB Complex, S.G Halli, Bangalore &
  - Second one in City Railway Station, Bangalore.

Both are in good working condition.

Action Plan – 14

KSPCB to take action to promote use of cleaner fuels used by major industries in DG sets and Boilers.

The KSPCB has implemented the Action Plan in the outer ring road.

Other issues -1

Parking policy for the vehicles in the city of Bangalore

The BBMP Commissioner explained that the parking policy for the city of Bangalore has framed and informed that 12 Multi Level Parking facilities are being established in the city.

Due to narrow roads in Bangalore, there is a constraint in creating dedicated bus lanes.

Other issues - 2

Bangalore Metro Rail Project

Only 6 KM stretch (M.G. Road to NGEF) train is running .

Source Apportionment Study: Total Emission Loads (TPD)

	PM10	% Contribution	NOx	% Contribution	SO_2	% Contribution
Transport	22.4	**42**	**146.4**	**67.4**	2.31	**15.8**
Road dust	10.9	**20**	0.0	-	0.0	-
Domestic	1.8	3	2.73	1.2	0.68	4.6
DG Set	3.6	7	**50.96**	**23.3**	3.35	**23.0**
Industry	7.8	**14**	17.19	**7.9**	8.21	**56.2**
Hotel	0.1	-	0.20	0.09	0.02	0.01
Construction	7.7	**14**	0.0	-	0.0	-
Total	**54.4**	**100**	**217.4**	**100**	**14.6**	**100**

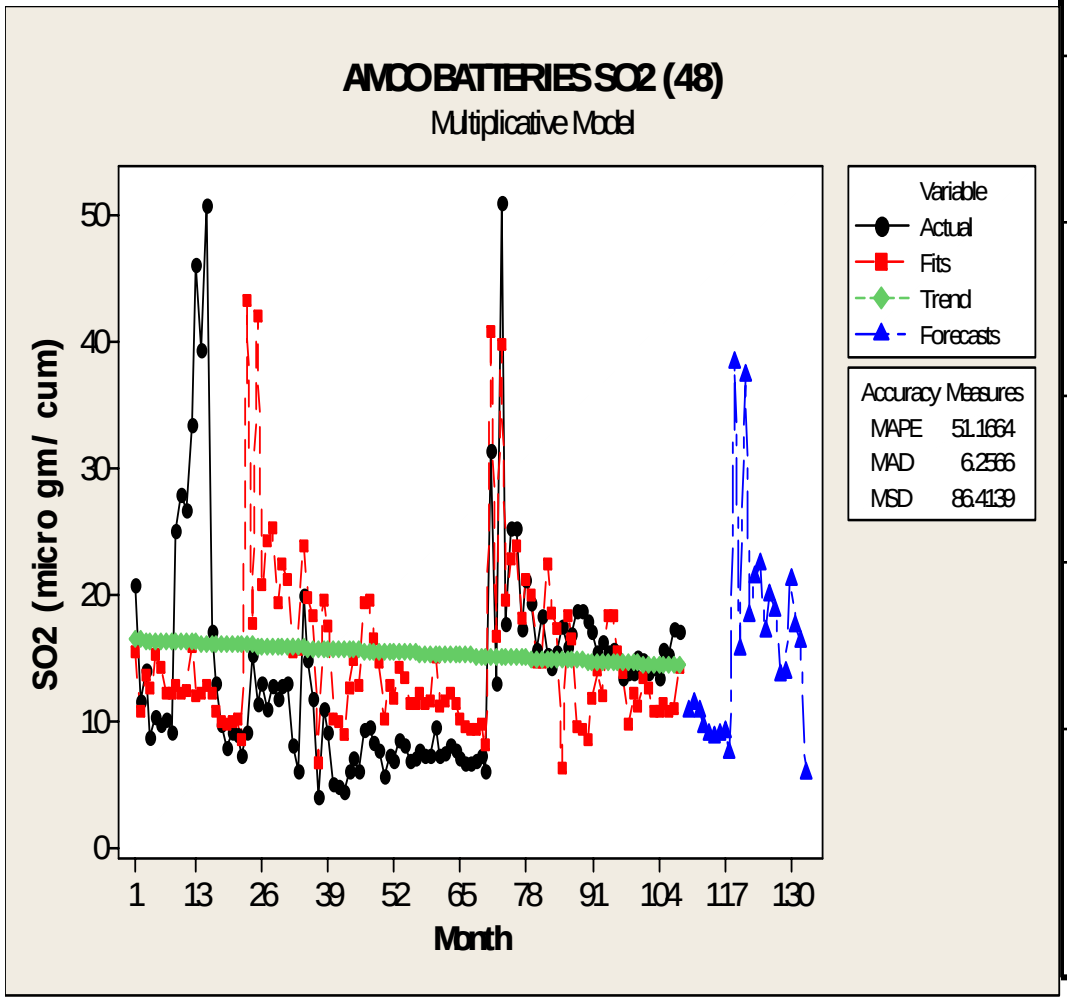
Action taken :

Time Series Trends : Sulphur reduction programme of India:

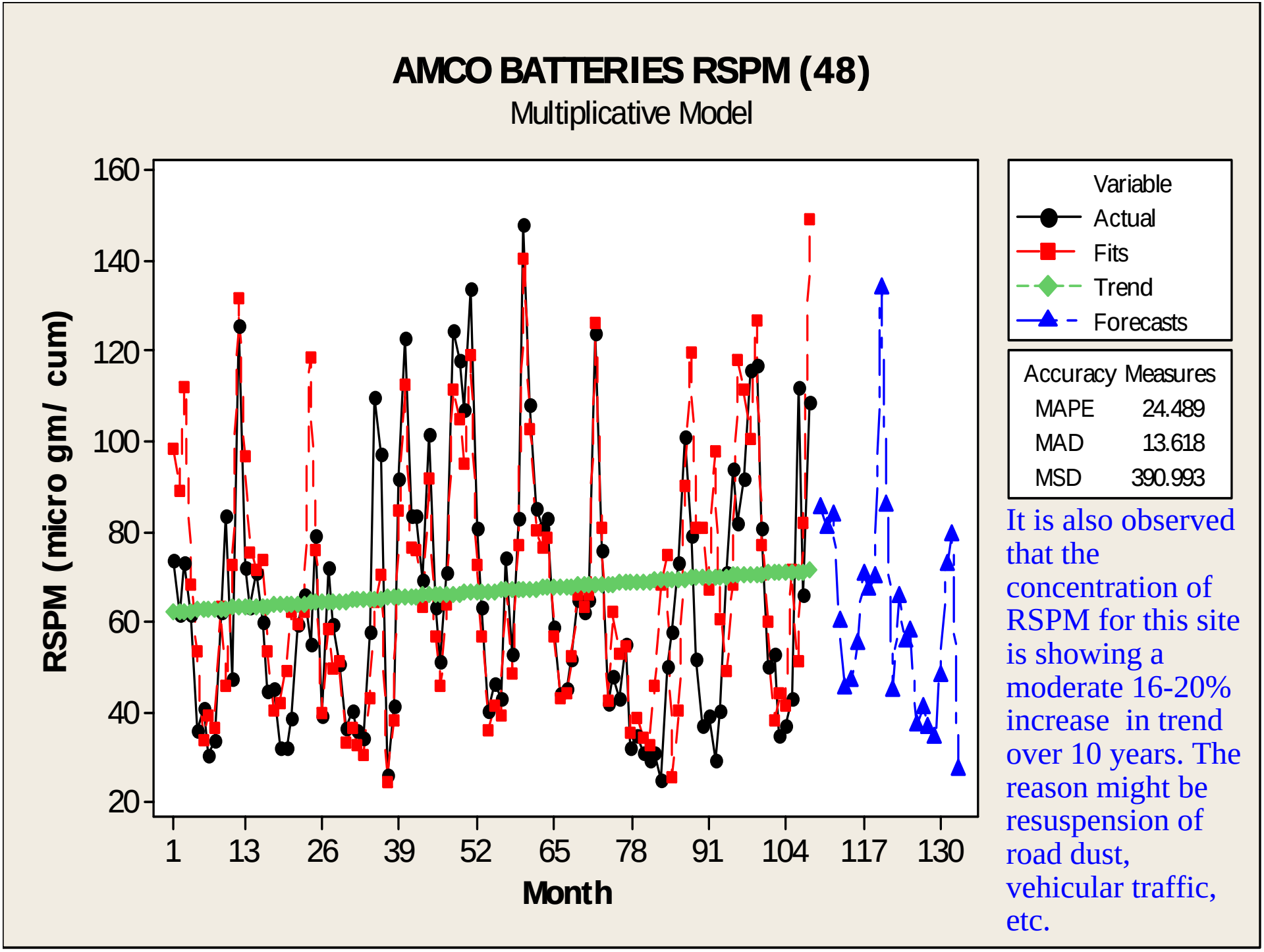
Introduction of Green Fuel: April 2010: 0.005 % in 11 cities and 0.035 % entire country

It is observed that the concentration of SO2 showing an decreasing trend by 15 -20 % over 10 years. The reason is Sulphur reduction programme of Govt of India (Green Fuel concept).

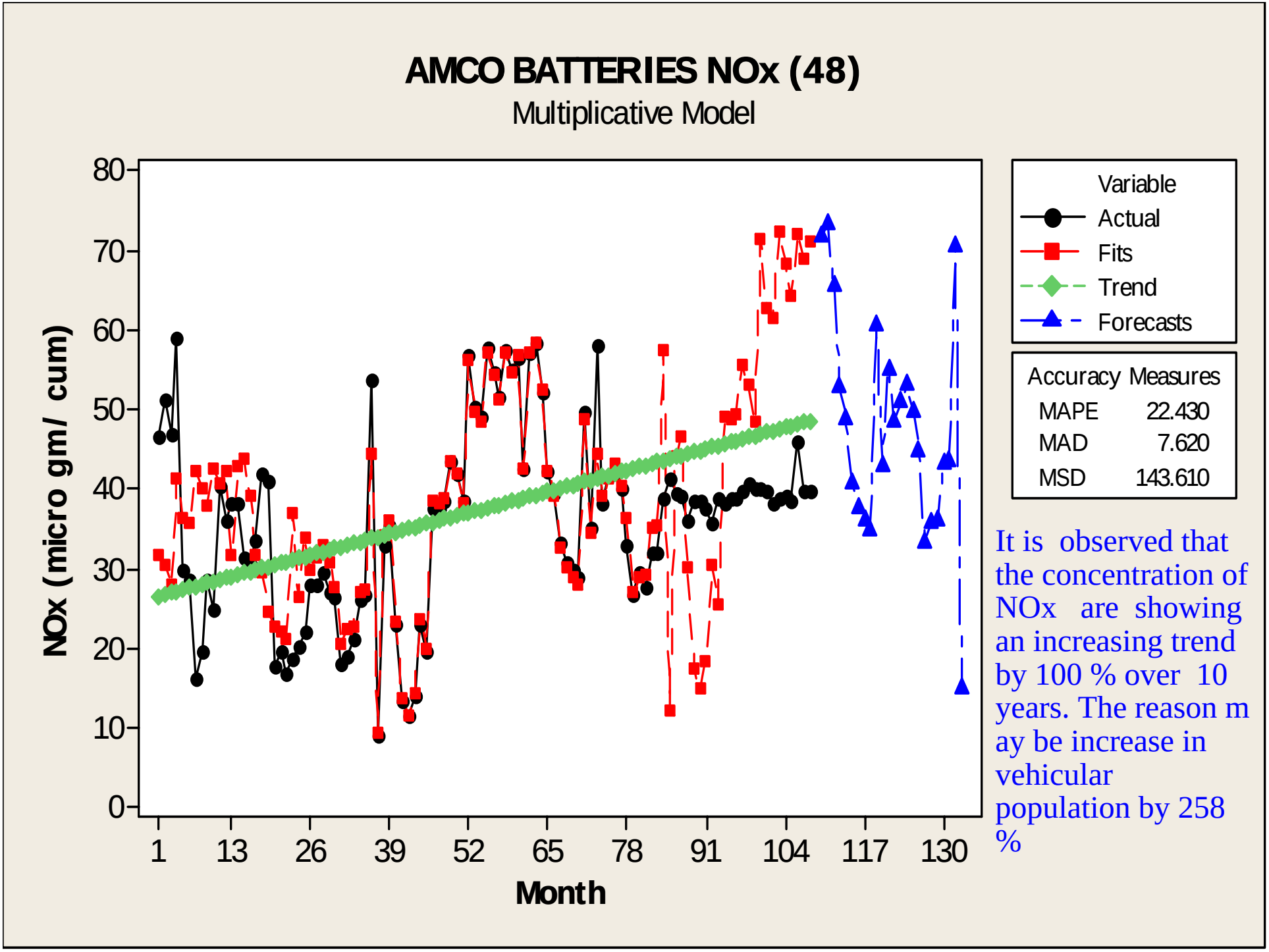
SO2 Concentration in µg/M3 at AMCO Batteries , Mysore Road	
1997-98	28.0
1998-99	38.0
1999-00	32.0
2000-01	26.0
2001-02	27.0
2002-03	16.0
2003-04	16.7
2004-05	17.6
2005-06	21.2
2006-07	15.3
2007-08	15.9
2008-09	14.9
2009-10	14.2
Standards	60



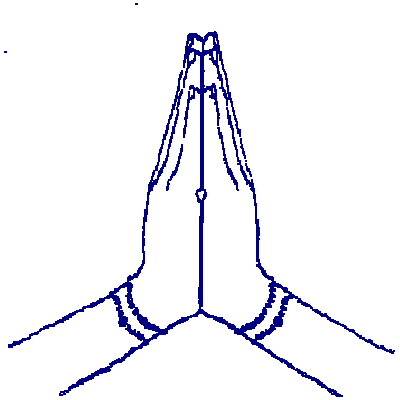
Aug 1997	0.25 %
1998	0.25 in Metro cities
2000	0.25 in Entire country
2000-04	0.05 % in 11 cities
2005	0.035 % in 11 cities
April 2010	0.005 % in 11 cities and 0.035 % entire country



It is also observed that the concentration of RSPM for this site is showing a moderate 16-20% increase in trend over 10 years. The reason might be resuspension of road dust, vehicular traffic, etc.



It is observed that the concentration of NOx are showing an increasing trend by 100 % over 10 years. The reason m ay be increase in vehicular population by 258 %



Thank You