

**ACTION PLAN FOR CONTROL OF AIR POLLUTION
IN NON-ATTAINMENT CITY OF BIHAR
(PATNA)**



BY

**BIHAR STATE POLLUTION CONTROL BOARD
Parivesh Bhawan, Patliputra Industrial Area,
P.O.-Sadakat Ashram, Patna-800 010**

Action Plan for Control of Air Pollution in Non-Attainment City of Bihar (Patna)

Preamble:

Patna, the capital of Bihar is situated on southern bank of holy river Ganga at 25°30' - 25°40'N latitude & 85°10' - 85°20'E longitude and about 53m above sea level. It is spread over an area of 110 Sq km and has a population of 16.84 Lakh (City)/20.49 Lakh (Urban Agglomerations) as per census 2011. The Patna agglomeration includes Patna Municipal Corporation Area, Patliputra Housing Colony, Phulwarisharif, Danapur Nizamat, Danapur Cantonment, Khagaul etc. Total no. of vehicles registered as on March, 2016 in Patna District with Transport Department is 11,36,075 (Truck: 42037, Bus: 7627, Car: 150078, Taxi: 15236, Jeep: 33630, Three Wheeler: 58647, Two Wheeler: 788069, Tractor: 23047, Toller: 13458 and others: 4246).



The major sources of air pollution in Patna are road dust, vehicular emission, domestic fuel burning, open waste burning, construction activities, industrial emissions etc. Bihar State Pollution Control is regularly monitoring the ambient air quality at Patna through Continuous Ambient Air Quality Monitoring Station (CAAQMS) installed at Indira Gandhi Science Complex; Planetarium premises and Beltron Bhawan, Shastrinagar & Gandhi Maidan, Bankipur Bus Depot under NAMP.

Particulate Matter (PM₁₀ & PM_{2.5}) has been identified as main air pollutant as it is found above the prescribed national standards. This is mainly due to re-suspension of road dust, emission from vehicles, D.G. sets, construction activities, burning of domestic fossil fuels, open burning of solid wastes, transportation of construction materials such as sand, soil etc. without covering and emission from brick kilns located around Patna. NO₂ also has been observed an alarming level. This is mainly due to vehicular emissions. Plying of old vehicles and traffic congestion causes higher level of NO₂. It has been observed that air quality of Patna during winter season becomes very poor & severe due to condensation of fine particulate matter in the lower portions of the atmosphere.

Action Plan for Control of Air Pollution in Non-Attainment city of Bihar

1.	Name of the city	:	Patna				
2.	Air Pollution concerns	:	PM ₁₀ , PM _{2.5} , NO ₂				
3.	Air pollution levels: (provide range of 24-hourly average concentration values; annual average for past five years; No. days in various AQI categories)	:	Annexed as Annexure-1				
4.	Months with high air pollution levels	:	January, February, November & December.				
5.	Action Plan:						
	Source group		Action	Implementation period (Short/Mid/Long-term)	Time target for Implementation	Responsible agency(ies)	Any other information
	Vehicles		1. Restriction on plying and phasing out of 15 years old commercial diesel driven vehicles.	Mid	Dec.18	Transport Department	
			2. Introduction of cleaner fuels (CNG/LPG) for vehicles.	Mid	June,18	Transport Department & Oil companies	
			3. Regular checking of vehicular emission and issue of Pollution under Control Certificate (PUC).	short	March,18	Transport Department & Traffic Police	

	4. Good traffic management including re-direction of traffic movement to avoid congestion.	Mid	July,18	Traffic Police		
	5. Ban on registration of Diesel driven auto-rickshaw /Tempo.	Short	April,18	Transport Department		
	6. Promotion and operationalization of E-rickshaw.	Mid	June,18	Transport Department		
	7. Development of Multi-layer parking.	Long	Dec.19	PMC, UD&HD & District Adm		
	8. Retrofitting of particulate filters in diesel driven vehicle.	Mid	Dec.18	Transport Department		
	9. Checking of fuel adulteration	Short	April, 18	District Adm. & Oil company		
	10. Monitoring on vehicle fitness.	Short	April,18	Transport Department & Traffic Police		
	11. Periodic calibration test of vehicular emission monitoring instrument.	Short	April,18	BSPCB & Transport Department		
	Road Dust	1. Regular cleaning of road dust.	Short	April,18	PMC	
		2. Water spraying on road through tankers.	Short	April,18	PMC	
		3. Construction of pucca pavement along the roads.	Mid	Dec.18	PMC and Road Construction Department	
4. Tree plantation along the roads.		Long	Aug.19	Department of Environment and Forest		
5. Development of green belt in open areas, gardens, parks/ community places, schools & housing societies.		Long	Aug.19	Department of Environment and Forest		
6. Introduction of water fountains at major traffic intersection/ Golambar/circle		Long	Aug.19	PMC		
Construction activities	1. Covering of construction site.	Short	April,18	Building Construction Department and PMC.		
	2. Transportation of construction materials like sand, soil, stone chips etc. in covered system.	Short	April,18	Transport Department, District Adm. & Traffic Police.		
	3. Restriction on storage of construction materials along the road.	Short	April,18	PMC		

Biomass and garbage burning	1. Restriction on open burning of municipal solid waste, Biomass, plastic, horticulture waste etc.	Short	March,18	PMC	
	2. Immediate lifting of solid wastes generated from de-silting and cleaning of municipal drains for its disposal.	Short	April,18	PMC	
	3. Transportation of municipal solid wastes, construction materials and debris in covered system.	Short	April,18	PMC	
	4. Ensuring promotion & use of cleaner fuel for commercial purposes like local Dhaba/eateries	Long	Dec.19	District Adm. & Oil company	
Industries	1. Ensuring installation and operation of air pollution control devices in industries.	Short	April,18	BSPCB	
	2. Ensuring emission standards in industries.	Short	April,18	BSPCB	
	3. Adoption of cleaner technology in brick kilns at five blocks of Patna viz. Patna Sadar, Danapur, Phulwarisharif, Maner and Fatuha by 31.08.2018.	Mid	Aug.18	BSPCB	
	4. Shifting of polluting industries.	Long	Dec.19	BSPCB & Industry Department	
	5. Ban on polluting industries	Short	April,18	BSPCB & Industry Department	
Strengthening of AAQ monitoring	1. Installation of four CAAQMS at Patna a. Two CAAQM stations under CSR funds of CPSU through CPCB at Eco-Park and IGIMS, Patna premises. b. Two CAAQM stations under State Govt. financial assistance.	Mid	Aug.18	BSPCB	
	2. Source apportionment study	Mid	Dec.18	BSPCB	
Public Awareness	1. Issue of advisory to public for prevention and control of air pollution	Short	April, 18	BSPCB& BSDMA	
	2. Involvement of school and other academic institution in awareness program.	Mid	Aug.18	BSPCB	

Others	1. Compliance of guidelines on D.G. sets and action against violation	Short	April,18	BSPCB & PMC	
	2. Help line to oversee non compliances on aforesaid issues.	Short	April,18	BSPCB & PMC	

6. Monitoring mechanism for implementation: The aforesaid action plan shall be implemented by Bihar State Pollution Control Board with co-ordination of Department of Environment and Forest, Govt. of Bihar, Urban Development & Housing Department, Govt. of Bihar, Transport Department, Patna Municipal Corporation, Traffic Police and District Administration. Bihar State Pollution Control Board shall regularly review the implementation of aforesaid action plan.

7. Implementation status: The Chief Secretary, Govt. of Bihar convened meeting with different concerned departments on 23.09.2015, 21.12.2015 and 11.07.2016 and directed for compliance of directions for improvement of air quality of Patna. The Principal Secretary, Environment and Forest, Govt. of Bihar also convened the meeting on 10.12.2017 and 11.01.2018 for follow up of the aforesaid directions. The Hon'ble Deputy Chief Minister also reviewed the issues on 12.12.2017 for improvement of ambient air quality of Patna.

Annexure-1

Status of Ambient Air Quality at IGSC-Planetarium Patna

Sl. No	PARAMETERS	Annual Average Concentration							Standards for residential, Rural and other Areas
		2011	2012	2013	2014	2015	2016	2017	
1.	PM ₁₀	186.09 µg/m ³	194.88 µg/m ³	225.78 µg/m ³	211.60 µg/m ³	199.23 µg/m ³	--	--	60 µg/m ³ Annual
2.	PM _{2.5}	----	112.86 µg/m ³	121.90 µg/m ³	-----	203.83 µg/m ³	122.51 µg/m ³	116.15 µg/m ³	40 µg/m ³ Annual
3.	CO	2.35 mg/m ³	2.02 mg/m ³	1.98 mg/m ³	1.87 mg/m ³	1.67 mg/m ³	1.55 mg/m ³	1.49 mg/m ³	02 mg/m ³ 8 hours 04 mg/m ³ 1 hour
4.	O ₃	47.89 µg/m ³	37.07 µg/m ³	27.50 µg/m ³	34.64 µg/m ³	21.86 µg/m ³	34.33 µg/m ³	24.63 µg/m ³	100 µg/m ³ 8 hours 180 µg/m ³ 1 hour
5.	SO ₂	8.66 µg/m ³	14.17 µg/m ³	8.97 µg/m ³	22.65 µg/m ³	13.11 µg/m ³	6.80 µg/m ³	12.08 µg/m ³	50 µg/m ³ Annual
6.	NO ₂	60.10 µg/m ³	71.69 µg/m ³	56.08 µg/m ³	29.00 µg/m ³	57.54 µg/m ³	45.10 µg/m ³	37.01 µg/m ³	40 µg/m ³ Annual
7.	Benzene	4.04 µg/m ³	2.33 µg/m ³	0.99 µg/m ³	0.09 µg/m ³	1.65 µg/m ³	1.24 µg/m ³	0.46 µg/m ³	05 µg/m ³ Annual

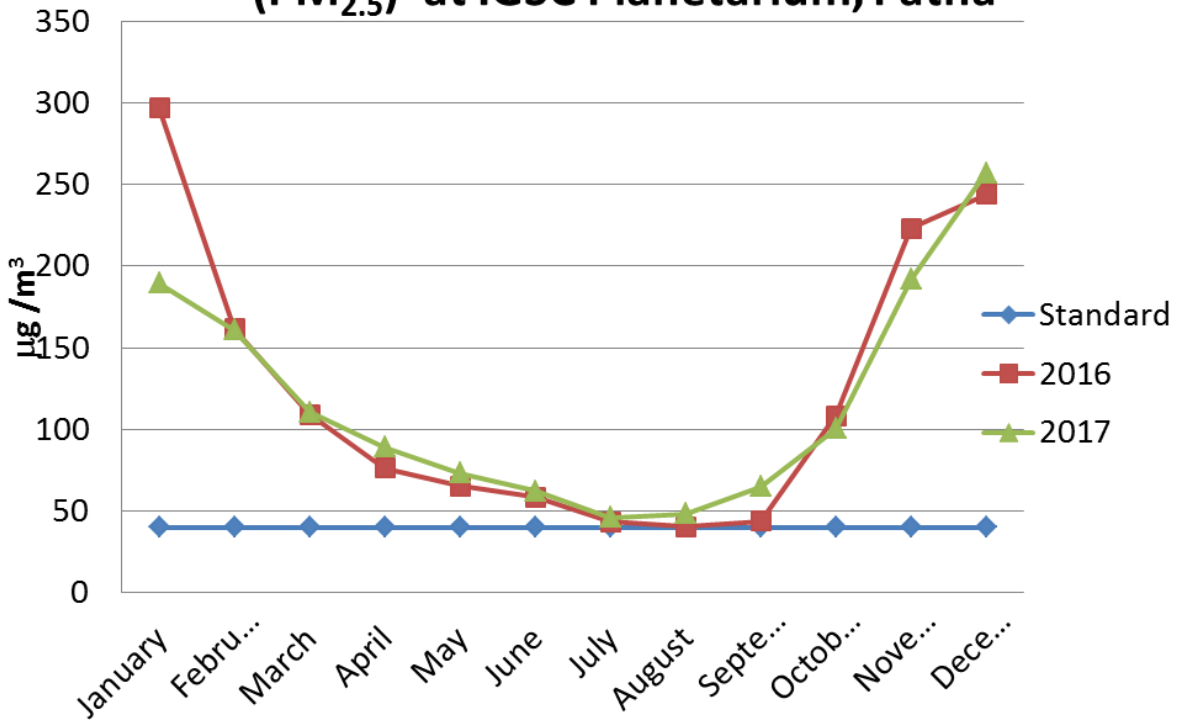
Status of Ambient Air Quality of IGSC Planetarium, Patna

Sl No.	Month	Main pollutants & BTX Parameters 2016 & 2017											
		CO in mg/m ³		SO ₂ in µg/m ³		NO ₂ in µg/m ³		O ₃ in µg/m ³		PM 2.5 in µg/m ³		Benzene in µg/m ³	
		Avg		Avg		Avg		Avg		Avg		Avg	
		2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
1	January	2.79	2.13	9.7	11.5	76.6	80.6	31.7	18.4	296.7	189.3	2.65	1.09
2	February	1.43	1.96	7.7	9.9	63.6	94.0	28.1	35.8	161.7	160.7	1.88	0.92
3	March	1.37	1.48	8.3	8.5	49.6	13.2	47.8	33.2	109.0	110.6	1.36	0.76
4	April	1.25	1.14	10.4	13.2	21.4	8.0	53.2	32.3	76.1	89.1	1.13	0.41
5	May	1.23	0.99	6.1	15.0	33.4	8.3	54.2	32.7	65.5	73.3	1.04	0.38
6	June	1.18	0.93	5.3	16.5	44.2	8.3	36.7	20.7	58.4	62.4	0.91	0.31
7	July	1.09	0.86	6.3	12.5	41.0	14.5	20.0	10.6	43.5	45.9	0.75	0.26
8	August	1.09	0.93	4.4	12.1	35.1	19.1	20.3	9.5	40.3	48.3	0.76	0.20
9	September	1.16	1.37	6.5	12.2	37.9	47.8	23.4	21.4	43.8	65.1	0.82	0.24
10	October	1.26	1.26	4.8	10.7	48.2	50.4	37.0	26.6	108.3	100.3	0.93	0.25
11	November	2.02	2.01	7.5	8.3	69.8	65.0	42.7	33.9	223.0	191.8	1.26	0.35
12	December	2.70	2.79	4.6	14.6	57.9	34.9	16.8	20.4	243.8	257.0	1.42	0.36
	Avg	1.55	1.49	6.80	12.08	48.23	37.01	34.33	24.63	122.51	116.15	1.24	0.46
Standards		02 mg/m ³ 8hours 04 mg/m ³ 1 hours		50 µg/m ³ Annual		40 µg/m ³ Annual		100 µg/m ³ 8hours 180µg/m ³ 1 hours		40 µg/m ³ Annual		05 µg/m ³ Annual	

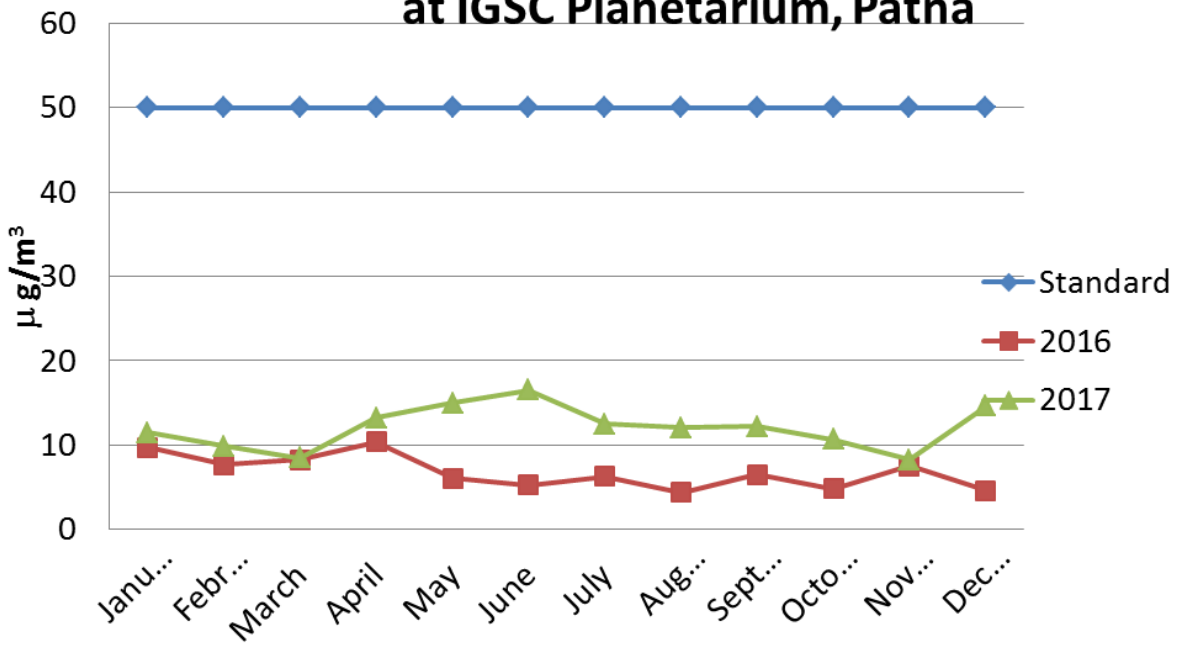
Meteorological Parameters at IGSC Planetarium, Patna during 2016 & 2017															
Sl. No.	Month	WS in m/s		WD in Degree		AT in °C		RH in %		BP in mmHg		SR in w/m ²		VWS in m/s	
		Avg		Avg		Avg		Avg		Avg		Avg		Avg	
		2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
1	January	0.3	0.3	182	195.7	15.6	18.4	73.4	74.9	755.5	755.5	467.7	109.8	-0.05	-0.09
2	February	0.5	0.3	183.2	202.8	21.9	21.0	62.6	66.7	754.6	754.5	397.3	172.2	-0.05	-0.09
3	March	0.4	0.3	196.6	173.6	28.3	24.6	50.6	58.5	753	752.3	450.3	166.5	-0.07	-0.09
4	April	0.4	0.4	196.9	139.1	35.3	30.8	34.4	56.1	749.7	750.4	209	155.5	-0.09	-0.09
5	May	0.4	0.4	126.8	127.2	27.6	32.0	65.4	63.8	749.4	749.5	180.4	95.5	-0.09	-0.09
6	June	0.4	0.4	124.3	132.3	29.5	32.4	70.3	71.5	748.5	747.7	311.4	89.5	-0.09	-0.09
7	July	0.4	0.4	131.7	134.8	26.1	29.5	83.9	83.6	747.8	747.7	353.2	79.7	-0.09	-0.09
8	August	0.4	0.3	132.9	166.8	27.4	28.9	78.9	87.7	748.1	748.3	307.2	103.1	-0.09	-0.12
9	September	0.3	0.3	146.1	158.6	25.2	30.9	86.5	78.9	749.9	750.1	349	97.8	-0.09	-0.15
10	October	0.3	0.3	174.9	157	24.7	28.5	74.3	76	751.7	751.7	201.1	81.5	-0.09	-0.15
11	November	0.3	0.3	186.1	174	18.5	22.7	68.1	66.8	753.9	754.1	438.7	61.5	-0.09	-0.15
12	December	0.3	0.3	195.4	192	15.7	17.3	87.8	75.3	755.2	755.3	483.2	37.6	-0.09	-0.15
	Avg	0.4	0.3	164.7	162.9	24.7	26.4	69.7	71.7	751.4	751.4	345.7	104.2	-0.08	-0.11

Air Quality Index of Patna in days during 2016 & 2017													
Sl.No.	Month	Good		Satisfactory		Moderate		Poor		Very Poor		Severe	
		2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
1.	January	-	-	-	-	-	01	-	02	13	22	18	06
2.	February	-	-	-	-	02	03	07	07	18	15	01	03
3.	March	-	-	02	-	12	09	04	11	13	10	-	-
4.	April	-	-	04	03	20	11	05	13	01	02	-	-
5.	May	-	-	07	08	23	16	01	07	-	-	-	-
6.	June	-	-	14	11	16	19	-	-	-	-	-	-
7.	July	01	02	25	25	05	04	-	-	-	-	-	-
8.	August	01	-	26	14	04	03	-	-	-	-	-	-
9.	September	-	-	23	08	07	16	-	02	-	-	-	-
10.	October	01	-	02	08	10	09	07	02	10	12	-	-
11.	November	-	-	-	-	-	01	03	9	16	11	11	09
12.	December	-	-	-	-	-	-	-	-	21	13	10	18
	Total	3	02	103	77	99	92	27	53	92	85	40	36

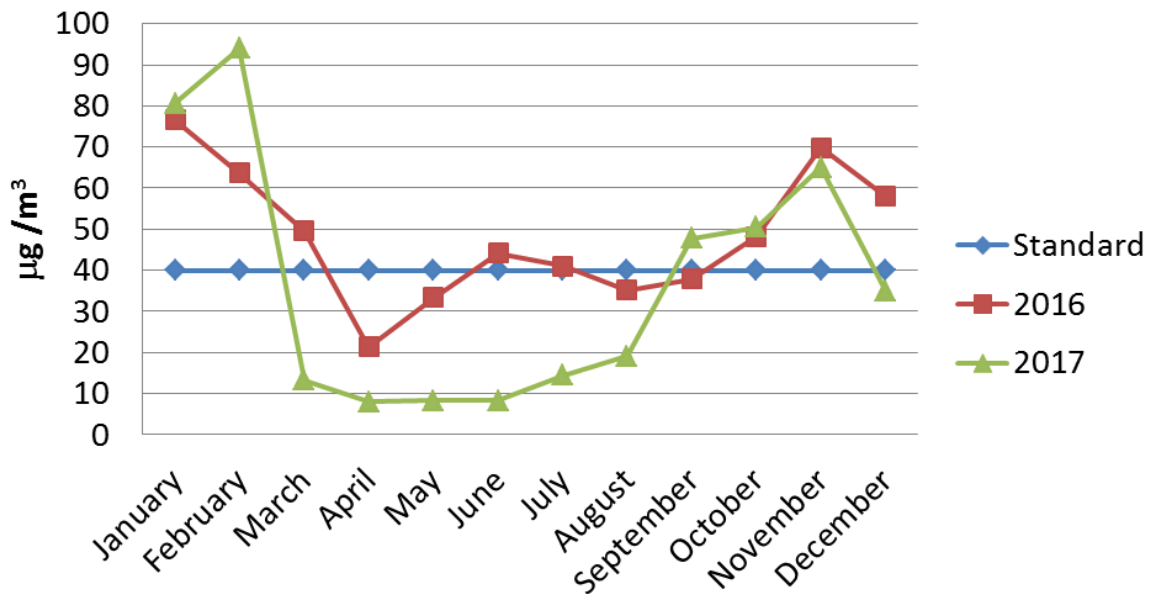
Monthly Variation of Particulate Matter (PM_{2.5}) at IGSC Planetarium, Patna



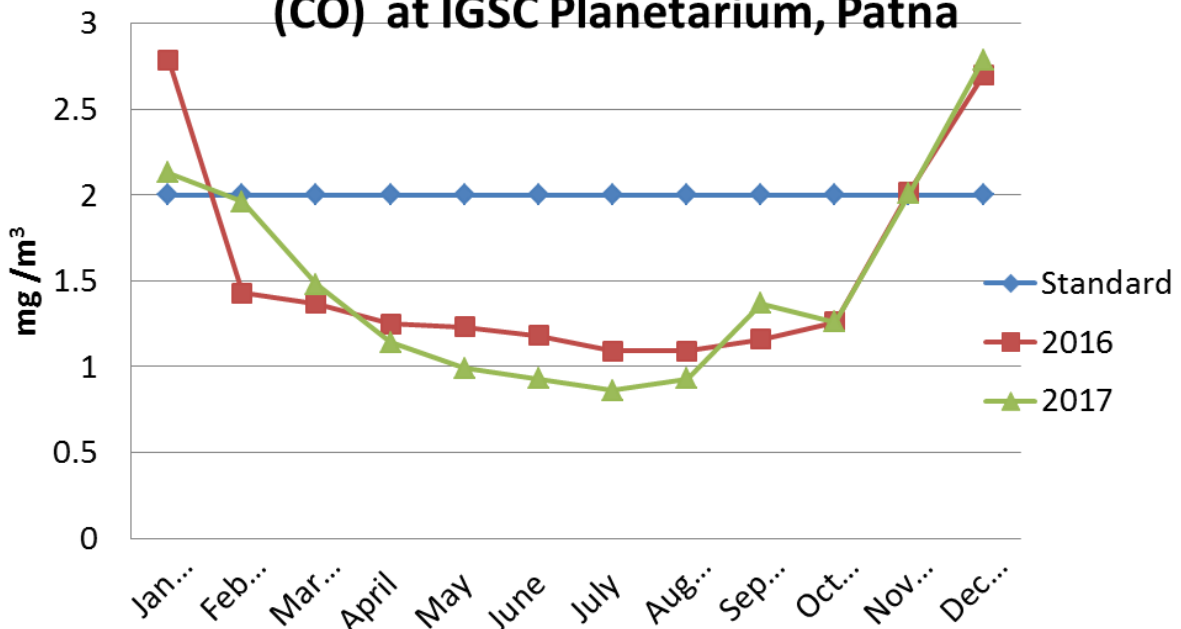
Monthly Variation of Sulphur Di-oxide (SO₂) at IGSC Planetarium, Patna



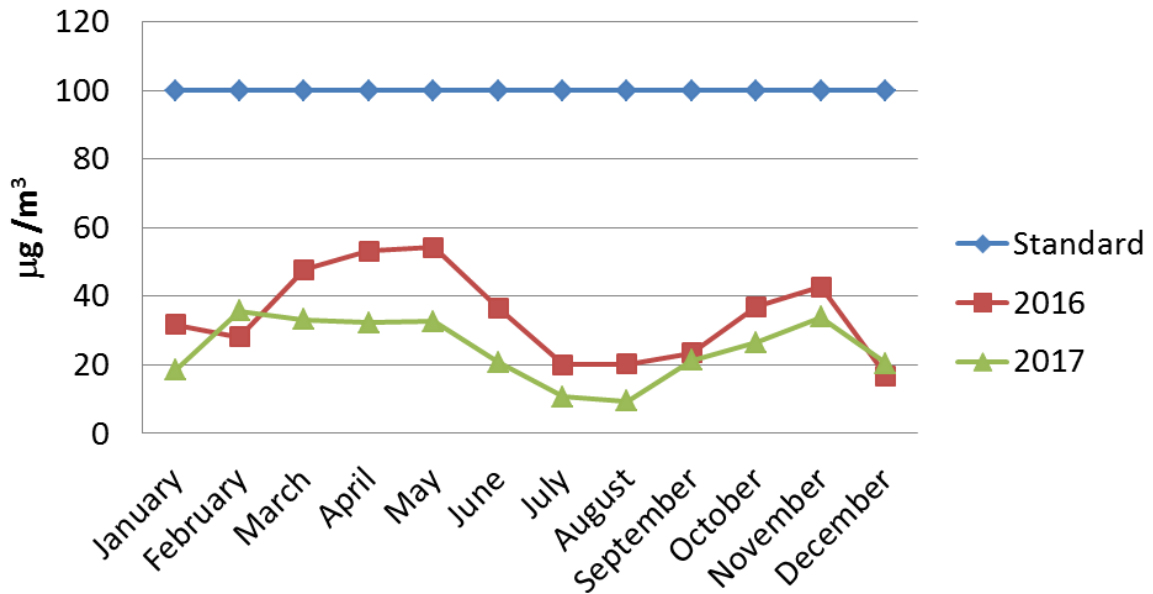
Monthly Variation of Nitrogen Di-oxide (NO₂) at IGSC Planetarium, Patna



Monthly Variation of Carbon Monoxide (CO) at IGSC Planetarium, Patna



Monthly Variation of Ozone (O₃) at IGSC Planetarium, Patna



Monthly Variation of Benzene (C₆H₆) at IGSC Planetarium, Patna

