

# **Report on Ambient Air Quality Data during ODD and EVEN Period, 15<sup>th</sup> to 30<sup>th</sup> April, 2016**

[ In compliance to the order of Hon'ble NGT, Principle Bench, New Delhi in Original Application No. 179 of 2016, Dated April 19, 2016]

By



## **MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE**

Indira Paryavaran Bhavan, Jorbagh Road  
New Delhi - 110 003

&



## **CENTRAL POLLUTION CONTROL BOARD**

PariveshBhawan, East Arjun Nagar, Delhi - 110032

## The Report

The Government of National Capital Territory of Delhi had implemented odd-even scheme from 15<sup>th</sup> to 30<sup>th</sup> April, 2016. As per as Direction of Hon'ble NGT, ambient air quality of Delhi was monitored through a set of Continuous Ambient Air Quality Monitoring Systems (CAAQMS) and manual stations (NAMP) spread across different locations in Delhi [**Annexure-I**].

The independent data analyses report is based on the available data collected for pollutants PM<sub>10</sub>, PM<sub>2.5</sub>, Sulphur Dioxide (SO<sub>2</sub>), Benzene, Ozone (O<sub>3</sub>), Nitrogen Dioxide (NO<sub>2</sub>) and Carbon monoxide (CO) from stations operated by Central Pollution Control Board (Shadipur, Dwarka, Dilshad Garden, DCE and ITO) and 08 manual stations (Pitampura, Sirifort, Janakpuri, Nizamuddin, Shahzada Bagh, Shahdara, BSZ Marg and ITO).

The data as recorded in the CAAQMS systems, operated by Delhi Pollution Control Committee were also collected for 04 stations (Mandir Marg, R. K. Puram, Punjabi Bagh and Anand Vihar).

The available data was also compared with the pre odd-even scheme i.e. April 1-14.

## The Pollutants Profile

The data obtained from these 17 stations for entire period of April, 2016 (covering pre odd even days i.e. April 1-14 and Odd even days i.e. April 15-30) are presented in **Tables-1 to 7** below:

<b>Table-1: PM<sub>2.5</sub> µg/m<sup>3</sup></b>						
<b>Stations</b>	<b>PRE ODD EVEN</b>			<b>DURING ODD EVEN</b>		
	<i>Max</i>	<i>Min</i>	<i>Average</i>	<i>Max</i>	<i>Min</i>	<i>Average</i>
DMS Shadipur	135	111	126	146	103	123
NSIT Dwarka	147	96	121	192	103	137↑
IHBAS Dilshad Garden	182	92	143	157	97	121
ITO	147	46	87	252	76	143↑
DCE	188	49	95	190	78	145↑
Pitampura	82	55	69	NA	NA	NA
Nizamuddin	106	28	63	189	74	112↑
Sirifort	79	33	56	201	49	99↑
Shahzada Bagh	62	33	45	249	57	111↑
Janakpuri	115	49	74	328	124	182↑
Shadhara	NA	NA	NA	85	43	63
Parivesh Bhawan	63	32	45	151	42	87↑
<b>DPCC Stations</b>						
R.K. Puram	137	68	102	175	106	156↑
Mandir Marg	83	39	57	164	44	85↑
Punjabi Bagh	123	38	66	139	56	107↑
Anand Vihar	222	46	130	226	73	174↑
<b>Average</b>	125	54	85	190	75	123↑
Note: NA indicates non availability of Data						

<b>Table-2: PM<sub>10</sub> µg/m<sup>3</sup></b>						
<b>Stations</b>	<b>PRE ODD EVEN</b>			<b>DURING ODD EVEN</b>		
	<i>Max</i>	<i>Min</i>	<i>Average</i>	<i>Max</i>	<i>Min</i>	<i>Average</i>
Pitampura	173	89	132	414	217	271↑
Nizamuddin	236	189	206	421	206	303↑
Sirifort	405	270	316	696	279	434↑
ShahzadaBagh	300	253	276	464	257	361↑
Janakpuri	324	226	255	423	191	304↑
Shadhara	441	246	343	701	235	387↑
Parivesh Bhawan	260	194	226	411	241	311↑
ITO BSZ Marg	199	120	146	389	170	270↑
<b>Average</b>	292	198	238	490	225	330↑

Table-3: NO <sub>2</sub> µg/m <sup>3</sup>						
Stations	PRE ODD EVEN			DURING ODD EVEN		
	Max	Min	Average	Max	Min	Average
DMS Shadipur	72	36	51	87	38	66↑
NSIT Dwarka	26	12	18	39	13	23↑
IHBAS Dilshad Garden	42	21	33	78	26	52↑
Pitampura	41	31	37	84	21	48↑
Nizamuddin	47	43	45	83	31	55↑
Sirifort	48	47	47	72	31	54↑
ShahzadaBagh	61	51	55	95	46	65↑
Janakpuri	57	47	52	75	42	52
Shadhara	66	56	60	63	31	49
PariveshBhawan	35	23	28	72	28	46↑
ITO BSZ Marg	66	38	57	112	35	74↑
DPCC Stations						
R.K. Puram	109	50	69	138	45	87↑
Mandir Marg	66	25	41	102	27	59↑
Punjabi Bagh	96	56	80	131	59	91↑
Anand Vihar	109	50	82	163	67	109↑
Average	63	39	50	93	36	62↑

Table-4:SO <sub>2</sub> µg/m <sup>3</sup>						
Stations	PRE ODD EVEN			DURING ODD EVEN		
	Max	Min	Average	Max	Min	Average
DMS Shadipur	30	13	22	38	14	23↑
NSIT Dwarka	19	9	13	24	3	11
IHBAS Dilshad Garden	17	8	13	18	9	13
Pitampura	5	4	5	31	4	17↑
Nizamuddin	4	4	4	15	5	8↑
Sirifort	4	4	4	26	5	10↑
ShahzadaBagh	9	6	7	25	9	14↑
Janakpuri	5	4	4	20	7	11↑
Shadhara	12	7	9	30	7	18↑
PariveshBhawan	29	5	16	50	14	31↑
ITO BSZ Marg	17	7	13	37	6	17↑
DPCC Stations						
R.K. Puram	74	21	47	62	28	47
Mandir Marg	29	13	21	81	14	38↑
Punjabi Bagh	58	19	31	62	16	43↑
Anand Vihar	118	18	39	69	11	36
Average	29	9	16	39	10	34↑

Table-5:CO $\mu\text{g}/\text{m}^3$						
Stations	PRE ODD EVEN			DURING ODD EVEN		
	Max	Min	Average	Max	Min	Average
DMS Shadipur	1264	423	776	1801	643	1191↑
NSIT Dwarka	949	371	575	1493	626	942↑
IHBAS Dilshad Garden	740	466	584	991	478	640↑
DPCC Stations						
R.K. Puram	2754	497	1209	4194	818	2308↑
Punjabi Bagh	2645	611	1312	3088	769	1588↑
<b>Average</b>	<b>1670</b>	<b>474</b>	<b>891</b>	<b>2313</b>	<b>667</b>	<b>1334↑</b>

Table-6: O <sub>3</sub> $\mu\text{g}/\text{m}^3$						
Stations	PRE ODD EVEN			DURING ODD EVEN		
	Max	Min	Average	Max	Min	Average
DMS Shadipur	72	38	52	77	23	60↑
NSIT Dwarka	61	35	50	107	21	73↑
DPCC Stations						
R.K. Puram	117	38	89	177	54	114↑
Punjabi Bagh	114	63	79	137	51	100↑
AnandVihar	31	15	24	61	12	45↑
<b>Average</b>	<b>79</b>	<b>38</b>	<b>59</b>	<b>112</b>	<b>32</b>	<b>78↑</b>

Table-7: Benzene $\mu\text{g}/\text{m}^3$						
Stations	PRE ODD EVEN			DURING ODD EVEN		
	Max	Min	Average	Max	Min	Average
DMS Shadipur	4	2	3	5	1	3
NSIT Dwarka	1.1	0.5	1	2	1	1
DPCC Stations						
R.K. Puram	6	2	4	8	2	5↑
Punjabi Bagh	1.3	0.2	1.0	1	0.3	1
AnandVihar	36	9	19	26	2	16
<b>Average</b>	<b>10</b>	<b>3</b>	<b>6</b>	<b>8</b>	<b>1</b>	<b>5</b>

Based on the above data, it may be seen that there was increase in concentration of pollutants at most of the monitoring locations during the period under reference.

## **The Meteorological Profile**

The record of meteorological parameters like Mixing Height (m), Wind Speed (m/s), Temperature (°C) and Relative Humidity (%) for the entire period of April 2016 is tabulated at Table-8. In the fortnight before odd even scheme, prominent wind direction was from west, followed by north-west and south-west. During the period of odd even scheme, the wind direction remained same as west, however this got shifted as south-west followed by north-west. From 25<sup>th</sup> to 27<sup>th</sup> wind speed and mixing height was comparatively lower. The charts showing PM2.5 profile with respect to mixing height and wind speed are given at Table-9, Figure-1 and Figure-2 respectively.

The data regarding plying of vehicles were sought from Department of Transport, Govt. of National Capital Territory of Delhi.

## **Conclusion**

The air quality is affected by various meteorological factors like Mixing Height (m), Wind Speed (m/s), Temperature (°C), solar radiation, Relative Humidity (%), conditions in the airshed outside Delhi etc., besides emission from various sources including vehicles. The decrease in vehicular emission was not a dominant enough factor to impact observed data. Further, since meteorological factors as well as emission from various sources outside Delhi in the airshed varies from time to time, data for different periods do not lend themselves to scientifically accurate comparison.

**Table-8: RECORD OF METEOROLOGICAL PARAMETERS**

CENTRAL POLLUTION CONTROL BOARD					
Daily Average of Metereological Parameters in Delhi					
Date	Mixing Height (m)	WIND SPEED (m/sec)	TEMPERATUTE ( °C)	RELATIVE HUMIDITY ( %)	PROMINENT WIND DIRECTION
1/4/2016	732	2.7	30.7	36.3	W, NW
2/4/2016	606	1.98	33.2	35.1	SW, W
3/4/2016	554	1.9	33.3	38.5	SW, SE
4/4/2016	734	2.52	32.8	33.7	NW, SW
5/4/2016	614	3.1	30.7	30.8	NW
6/4/2016	551	2	31	30.2	SE, SW, NE
7/4/2016	803	2.7	28.4	38.4	W, SW, NW
8/4/2016	705	1.5	29.3	30	E, NE
9/4/2016	682	2.5	31.3	26.4	W, NW, N
10/4/2016	681	2.4	30.6	29.6	NW
11/4/2016	753	4.3	28.9	35.3	W, NW
12/4/2016	829	4.1	29.8	31.6	W
13/4/2016	746	4	31.6	28	W
14/4/2016	648	2.8	33.5	25.1	W, SW
15/4/2016	616	2.8	34.5	23.8	W, SW
16/4/2016	NA	NA	NA	NA	NA
17/4/2016	700	3.4	34.9	27.3	SW, S
18/4/2016	676	2.3	34.3	30.8	SW, W
19/4/2016	718	2.2	34.2	29.8	SW
20/4/2016	770	3.9	33.3	27.5	W
21/4/2016	678	3.8	33.9	23.5	W
22/4/2016	755	2.7	32.4	38.9	SW, W
23/4/2016	672	2.72	31.6	19.8	W, NW
24/4/2016	599	2.5	32	16.6	N, NW, W
25/4/2016	506	1.8	33.2	15.3	W, NE
26/4/2016	456	1.6	34.6	18.2	SW, W
27/4/2016	601	1.8	34.7	18.7	SW, W
28/4/2016	673	2.5	34.4	17.4	NW, W, SW
29/4/2016	651	2.4	34.2	18.6	W, SW
30/4/2016	680	2.2	34.2	20.6	SW, W

**Note:** NA indicates non availability of Data

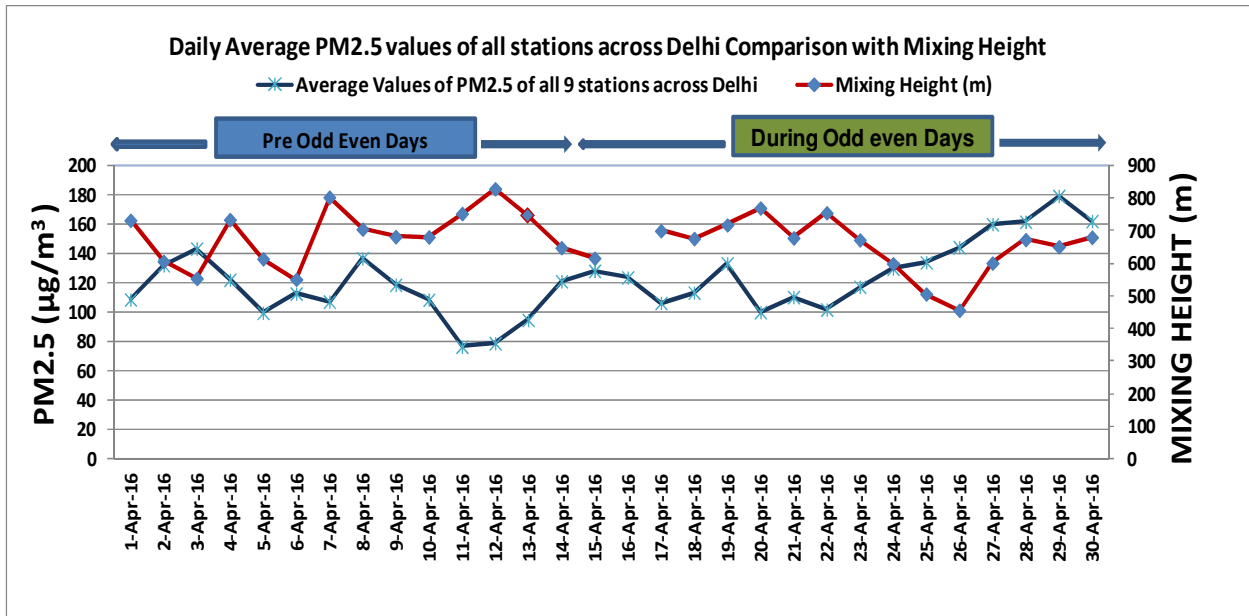
**Table-9: PROFILE OF PM<sub>2.5</sub> WITH RESPECT TO METEOROLOGICAL PARAMETERS**

CENTRAL POLLUTION CONTROL BOARD					
Daily Average Comparison of Wind Speed, Mixing Height, Temperature & Relative Humidity with PM <sub>2.5</sub> in Delhi					
DATES	Mixing Height (m)	WIND SPEED (m/sec)	TEMPERATUTE (°C)	RELATIVE HUMIDITY (%)	Average Values of PM <sub>2.5</sub> of all 9 stations
1-Apr-16	732	2.7	30.7	36.3	109
2-Apr-16	606	1.98	33.2	35.1	132
3-Apr-16	554	1.9	33.3	38.5	143
4-Apr-16	734	2.52	32.8	33.7	122
5-Apr-16	614	3.1	30.7	30.8	100
6-Apr-16	551	2	31	30.2	113
7-Apr-16	803	2.7	28.4	38.4	107
8-Apr-16	705	1.5	29.3	30	137
9-Apr-16	682	2.5	31.3	26.4	119
10-Apr-16	681	2.4	30.6	29.6	108
11-Apr-16	753	4.3	28.9	35.3	76
12-Apr-16	829	4.1	29.8	31.6	79
13-Apr-16	746	4	31.6	28	95
14-Apr-16	648	2.8	33.5	25.1	121
15-Apr-16	616	2.8	34.5	23.8	128
16-Apr-16	NA	NA	NA	NA	124
17-Apr-16	700	3.4	34.9	27.3	106
18-Apr-16	676	2.3	34.3	30.8	113
19-Apr-16	718	2.2	34.2	29.8	133
20-Apr-16	770	3.9	33.3	27.5	100
21-Apr-16	678	3.8	33.9	23.5	110
22-Apr-16	755	2.7	32.4	38.9	102
23-Apr-16	672	2.72	31.6	19.8	117
24-Apr-16	599	2.5	32	16.6	130
25-Apr-16	506	1.8	33.2	15.3	134
26-Apr-16	456	1.6	34.6	18.2	144
27-Apr-16	601	1.8	34.7	18.7	160
28-Apr-16	673	2.5	34.4	17.4	162
29-Apr-16	651	2.4	34.2	18.6	179
30-Apr-16	680	2.2	34.2	20.6	162

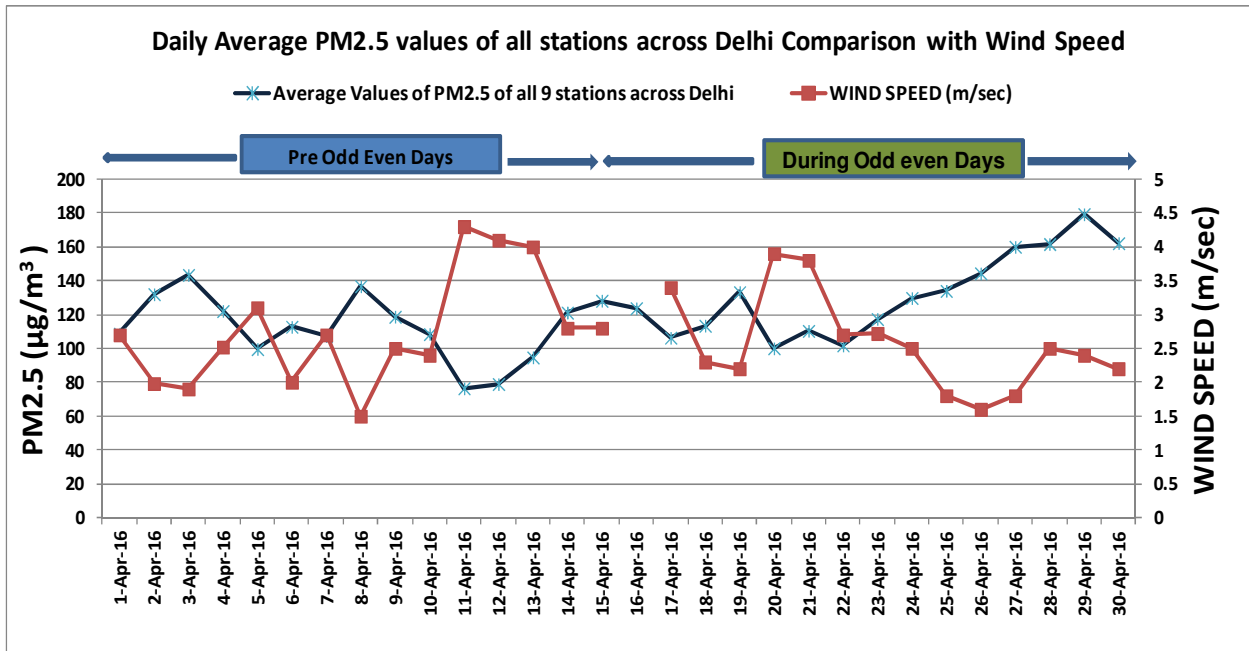
**Note:** NA indicates non availability of Data



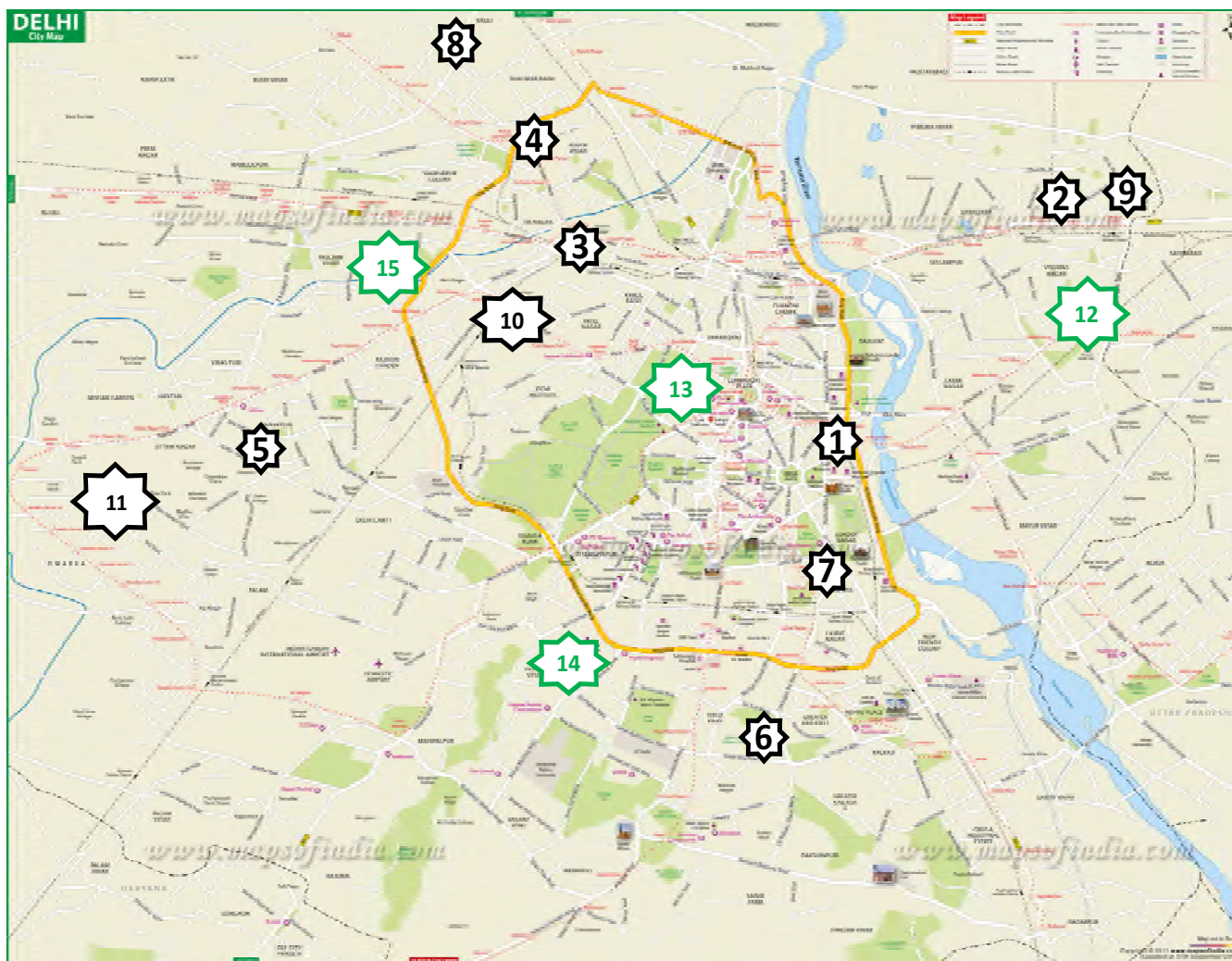
**Figure 1:  $PM_{2.5}$  Profile with Mixing Height (Table-9)**



**Figure 2:  $PM_{2.5}$  Profile with Wind Speed (Table-9)**



## SPATIAL LOCATION OF AMBIENT AIR QUALITY MONITORING STATIONS IN DELHI



Agency: CPCB	
1	ITO**
2	Shahdara*
3	Shahzada bagh *
4	Pitampura*
5	Janakpuri*
6	Sirifort**
7	Nizamuddin*
8	DCE, Bawana
9	Dilshad Garden
10	DMS, Patel Nagar
11	NSIT Dwarka
Agency: DPCC	
12	Anand Vihar
13	Mandir Marg
14	R.K. Puram
15	Punjabi Bagh

Note: Map not to scale and locations are indicative only w.r.t. directions & location \*\*Continuous & Manual; \* Manual