Ambient Air Quality Data of Delhi Stations

For the Month of June, 2018

केन्द्रीय प्रदूषण नियंत्रण बोर्ड

पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय,

भारत सरकार

CENTRAL POLLUTION CONTROL BOARD

Website: http://www.cpcb.nic.in

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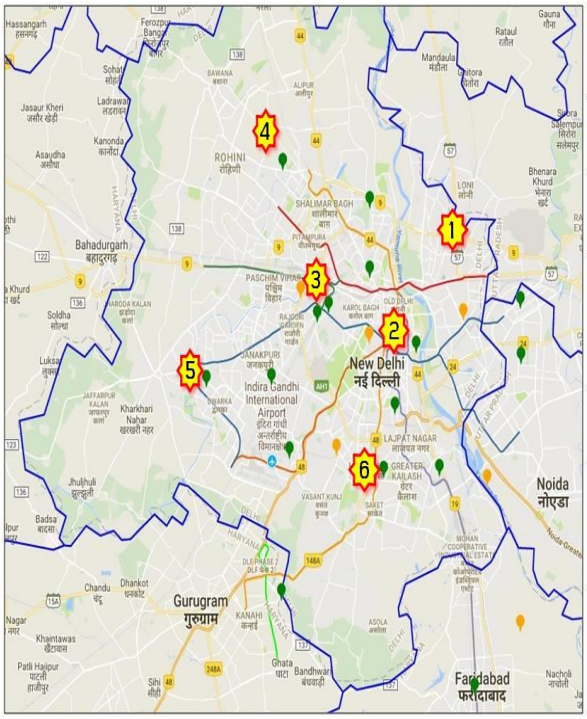
Background: Ambient Air Quality of Delhi

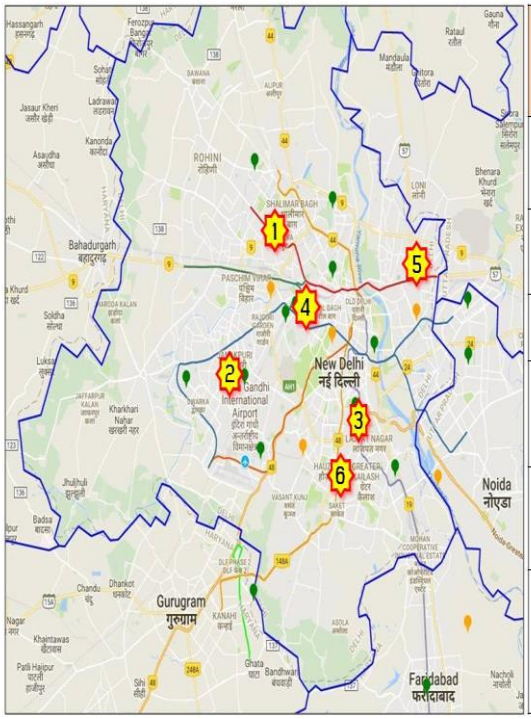
In compliance to the direction of Hon'ble National Green Tribunal, Principal Bench, New Delhi Dated: November 17, 2017 (in the matter of Vardhman Kaushik Vs. Union of India & Others vide **OA No. 44/2018** (Earlier OA No. 21/2014), the ambient air quality data of Continuous Ambient Air Quality Monitoring Stations (CAAQMS) and Manual Stations under NAMP in Delhi (operated by CPCB) for the period June 01, 2018 to June 30, 2018 are compiled and presented in this report.

Site Map of CAAQM & NAMP Stations operated by CPCB in Delhi

1. **CAAQM Stations:** IHBAS ,Income Tax Office, DMS Shadipur, D.T.U., NSIT Dwarka, Sirifort
2. **NAMP Stations:** Pitampura, Janakpuri , Nizamuddin, Shahzada Bagh, Shahdara, Sirifort



CPCB CAAQM Stations	
1	IHBAS
2	I.T.O.
3	DMS Shadipur
4	D.T.U.
5	NSIT Dwarka
6	Sirifort



CPCB NAMP Stations	
1	Pitampura
2	Janakpuri
3	Nizamuddin
4	Shahzada bagh
5	Shahdara
6	Sirifort

Parameter-wise data tables of CAAQM Stations

1. Particulate Matter (in µg/m^3):

i) PM_{10} (100 µg/m^3- 24 Hourly average limit prescribed as per NAAQS 2009)

Date/Stations	ITO	DTU	Sirifort
1-Jun-18	218	216	216
2-Jun-18	180	163	184
3-Jun-18	252	179	161
4-Jun-18	244	220	196
5-Jun-18	NA	189	171
6-Jun-18	105	174	184
7-Jun-18	163	195	205
8-Jun-18	172	194	205
9-Jun-18	215	138	125
10-Jun-18	222	182	187
11-Jun-18	251	278	285
12-Jun-18	839	813	NA
13-Jun-18	923	801	NA
14-Jun-18	679	981	910
15-Jun-18	413	741	620
16-Jun-18	418	568	501
17-Jun-18	181	181	212
18-Jun-18	139	151	192
19-Jun-18	139	187	199
20-Jun-18	191	261	256
21-Jun-18	247	320	348
22-Jun-18	216	258	299
23-Jun-18	202	264	299
24-Jun-18	196	211	242
25-Jun-18	269	319	360
26-Jun-18	165	165	234
27-Jun-18	230	76	73
28-Jun-18	115	71	50
29-Jun-18	121	91	NA
30-Jun-18	121	93	110
Maximum	923	981	910
Minimum	105	71	50
Average	270	289	260

Maximum values are reported in RED for all respective stations & Minimum values are reported in GREEN for all respective stations

Note: NA denotes Data is not available for the day

ii) $PM_{2.5}$ (60 µg/m^3- 24 hourly average limit prescribed as per NAAQS 2009)

Date/Stations	IHBAS	ITO	DMS	DTU	Sirifort	NSIT
1-Jun-18	83	135	84	47	48	107
2-Jun-18	53	129	47	41	47	81
3-Jun-18	51	195	40	57	46	62
4-Jun-18	81	188	40	55	48	65
5-Jun-18	58	NA	46	52	43	70
6-Jun-18	56	71	44	56	50	63
7-Jun-18	66	115	45	73	61	69
8-Jun-18	60	121	50	56	54	62
9-Jun-18	66	176	42	47	46	71
10-Jun-18	83	173	71	72	55	81
11-Jun-18	91	167	66	69	62	97
12-Jun-18	298	362	308	157	133	299
13-Jun-18	551	510	460	285	221	464
14-Jun-18	334	330	253	157	131	293
15-Jun-18	270	254	166	116	94	198
16-Jun-18	192	127	126	108	89	160
17-Jun-18	75	112	63	49	57	89
18-Jun-18	84	70	69	46	48	67
19-Jun-18	59	70	62	53	49	76
20-Jun-18	72	88	102	58	61	86
21-Jun-18	94	92	114	65	67	110
22-Jun-18	110	116	84	85	72	89
23-Jun-18	79	108	79	71	66	112
24-Jun-18	64	100	64	52	55	80
25-Jun-18	87	129	68	50	54	103
26-Jun-18	68	81	66	45	52	71
27-Jun-18	52	157	50	37	32	50
28-Jun-18	45	57	43	30	18	41
29-Jun-18	47	58	55	43	38	41
30-Jun-18	50	53	71	42	33	49
Maximum	551	510	460	285	221	464
Minimum	45	53	40	30	18	41
Average	113	150	96	72	64	110

Maximum values are reported in RED for all respective stations & Minimum values are reported in GREEN for all respective stations

Note: NA denotes Data is not available for the day

2. SO_2 (80 µg/m^3- 24 hourly average limit prescribed as per NAAQS 2009)

Date/Stations	IHBAS	DMS	NSIT
1-Jun-18	5	6	5
2-Jun-18	8	7	12
3-Jun-18	6	5	7
4-Jun-18	5	6	5
5-Jun-18	5	5	4
6-Jun-18	8	7	3
7-Jun-18	17	8	3
8-Jun-18	9	6	4
9-Jun-18	14	6	6
10-Jun-18	11	7	3
11-Jun-18	14	7	2
12-Jun-18	21	8	2
13-Jun-18	17	8	3
14-Jun-18	22	8	10
15-Jun-18	15	8	12
16-Jun-18	9	8	10
17-Jun-18	8	4	8
18-Jun-18	10	8	7
19-Jun-18	9	8	6
20-Jun-18	12	8	6
21-Jun-18	11	13	7
22-Jun-18	21	12	7
23-Jun-18	19	9	5
24-Jun-18	16	10	6
25-Jun-18	15	8	5
26-Jun-18	14	10	5
27-Jun-18	11	7	5
28-Jun-18	12	8	7
29-Jun-18	6	7	8
30-Jun-18	8	11	5
Maximum	22	13	12
Minimum	5	4	2
Average	12	8	6

Maximum values are reported in RED for all respective stations & Minimum values are reported in GREEN for all respective stations

Note: NA denotes Data is not available for the day

3. NO_2 (80 µg/m^3- 24 hourly average limit prescribed as per NAAQS 2009)

Date/Stations	DMS	NSIT	ITO	IHBAS	DTU	Sirifort
1-Jun-18	33	25	108	22	52	NA
2-Jun-18	33	35	106	24	40	NA
3-Jun-18	34	26	95	21	31	NA
4-Jun-18	29	25	105	21	31	NA
5-Jun-18	32	26	91	21	31	43
6-Jun-18	40	31	NA	22	31	24
7-Jun-18	50	30	NA	24	31	28
8-Jun-18	42	57	98	19	31	21
9-Jun-18	60	26	78	13	30	22
10-Jun-18	70	24	81	18	29	21
11-Jun-18	62	25	79	34	29	20
12-Jun-18	54	23	71	37	28	12
13-Jun-18	45	33	59	25	26	18
14-Jun-18	48	20	49	28	27	24
15-Jun-18	51	22	56	30	27	25
16-Jun-18	38	20	60	31	27	24
17-Jun-18	20	19	53	24	26	NA
18-Jun-18	38	20	55	36	26	31
19-Jun-18	51	20	66	31	28	32
20-Jun-18	55	20	91	42	27	31
21-Jun-18	68	23	96	48	28	30
22-Jun-18	80	27	126	62	29	33
23-Jun-18	64	22	86	54	27	29
24-Jun-18	65	22	81	41	27	25
25-Jun-18	42	20	64	37	26	19
26-Jun-18	52	20	75	38	27	23
27-Jun-18	43	17	71	28	27	21
28-Jun-18	41	18	62	29	27	21
29-Jun-18	45	19	71	22	28	19
30-Jun-18	60	18	74	24	26	23
Maximum	**80**	**57**	**126**	**62**	**52**	**43**
Minimum	**20**	**17**	**49**	**13**	**26**	**12**
Average	**48**	**24**	**79**	**30**	**29**	**25**

Maximum values are reported in RED for all respective stations & Minimum values are reported in GREEN for all respective stations

Note: NA denotes Data is not available for the day

4. Benzene (05 µg/m^3- Annual Mean limit prescribed as per NAAQS 2009)

Date/Stations	DMS	NSIT
1-Jun-18	1.6	1.1
2-Jun-18	1.6	2.2
3-Jun-18	2.0	0.8
4-Jun-18	1.9	0.7
5-Jun-18	2.7	0.8
6-Jun-18	3.4	2.0
7-Jun-18	3.2	1.3
8-Jun-18	1.8	0.9
9-Jun-18	3.5	1.0
10-Jun-18	2.8	1.3
11-Jun-18	2.2	1.1
12-Jun-18	2.1	1.1
13-Jun-18	1.3	1.4
14-Jun-18	1.5	0.9
15-Jun-18	2.6	0.8
16-Jun-18	1.9	0.7
17-Jun-18	1.0	0.6
18-Jun-18	2.0	1.0
19-Jun-18	1.6	1.3
20-Jun-18	1.8	1.3
21-Jun-18	2.4	2.1
22-Jun-18	2.7	1.2
23-Jun-18	2.1	1.8
24-Jun-18	1.7	1.6
25-Jun-18	1.1	0.9
26-Jun-18	1.9	0.9
27-Jun-18	1.2	0.7
28-Jun-18	1.8	0.9
29-Jun-18	1.2	1.4
30-Jun-18	2.8	1.5
Maximum	3.5	2.2
Minimum	1.0	0.6
Average	2.0	1.2

Maximum values are reported in RED for all respective stations & Minimum values are reported in GREEN for all respective stations

Note: NA denotes Data is not available for the day

5. Ozone (100 µg/m^3- 8 hourly average limit prescribed as per NAAQS 2009)

Date/Stations	DMS			NSIT		
Time Interval	06-14 hr	14-22 hr	22-06 hr	06-14 hr	14-22 hr	22-06 hr
1-Jun-18	23	53	29	33	50	29
2-Jun-18	27	58	22	54	76	12
3-Jun-18	16	55	20	26	55	22
4-Jun-18	27	61	24	32	44	23
5-Jun-18	29	60	20	24	37	25
6-Jun-18	33	45	7	31	39	6
7-Jun-18	25	85	27	40	55	16
8-Jun-18	40	58	30	34	21	12
9-Jun-18	34	54	3	19	43	11
10-Jun-18	25	72	6	31	56	12
11-Jun-18	19	58	18	23	54	11
12-Jun-18	13	27	4	13	26	9
13-Jun-18	10	27	9	18	34	*
14-Jun-18	19	33	8	26	36	17
15-Jun-18	22	37	8	30	41	15
16-Jun-18	14	46	11	27	51	23
17-Jun-18	16	44	18	44	59	29
18-Jun-18	16	64	27	37	68	19
19-Jun-18	34	63	19	51	91	24
20-Jun-18	48	65	27	72	89	61
21-Jun-18	47	95	8	82	101	20
22-Jun-18	62	93	23	60	95	29
23-Jun-18	59	100	25	64	95	33
24-Jun-18	60	72	7	62	78	22
25-Jun-18	24	55	14	39	63	35
26-Jun-18	39	29	14	51	44	28
27-Jun-18	33	53	17	46	66	29
28-Jun-18	22	40	24	29	27	16
29-Jun-18	38	41	19	34	44	16
30-Jun-18	38	38	9	34	45	13
Maximum	62	100	30	82	101	61
Minimum	10	27	3	13	21	6
Average	30	56	17	39	56	21

Maximum values are reported in RED for all respective stations & Minimum values are reported in GREEN for all respective stations

Note: NA denotes Data is not available for the day

5. CO (02 mg/m^3- 8 hourly average limit prescribed as per NAAQS 2009)

Date/Stations	IHBAS			NSIT			DMS		
Time Interval	06-14 hr	14-22 hr	22-06 hr	06-14 hr	14-22 hr	22-06 hr	06-14 hr	14-22 hr	22-06 hr
1-Jun-18	0.8	0.7	1.0	0.4	0.5	0.4	0.7	0.7	0.5
2-Jun-18	0.3	0.5	1.0	0.7	0.5	0.8	0.6	0.7	0.7
3-Jun-18	0.7	0.6	0.9	0.5	0.5	0.6	0.8	0.8	0.7
4-Jun-18	1.1	0.8	0.8	0.6	0.5	0.5	0.8	0.7	0.7
5-Jun-18	0.7	0.5	0.7	0.6	0.5	0.5	0.7	0.7	0.7
6-Jun-18	0.7	1.0	1.1	0.5	0.5	0.6	0.7	0.8	1.0
7-Jun-18	0.7	0.5	0.7	0.5	0.5	0.6	0.9	0.9	0.8
8-Jun-18	0.6	0.8	0.6	0.7	0.5	0.6	1.0	0.8	0.6
9-Jun-18	0.8	0.8	0.9	0.3	1.4	0.4	0.8	0.8	0.9
10-Jun-18	1.5	1.2	1.7	0.3	0.4	0.4	0.7	0.5	0.9
11-Jun-18	0.7	1.0	0.9	0.5	0.5	0.4	0.6	0.6	0.7
12-Jun-18	0.9	0.5	0.9	0.5	0.5	0.4	0.5	0.6	0.5
13-Jun-18	0.8	1.2	0.8	0.4	0.3	0.3	0.3	0.5	0.5
14-Jun-18	0.4	0.9	0.6	0.3	0.2	0.4	0.4	0.5	0.4
15-Jun-18	0.5	0.6	0.3	0.3	0.4	0.5	0.3	0.3	0.5
16-Jun-18	0.4	0.8	0.6	0.4	0.4	0.4	0.5	0.6	0.6
17-Jun-18	0.7	0.8	0.4	0.4	0.3	0.3	0.3	0.5	0.5
18-Jun-18	0.4	0.9	0.4	0.4	0.4	0.4	0.7	0.6	0.6
19-Jun-18	0.7	0.9	0.5	0.4	0.4	0.4	0.8	0.7	0.7
20-Jun-18	0.8	1.0	0.5	0.4	0.4	0.3	0.6	0.6	0.9
21-Jun-18	0.7	0.9	0.9	0.3	0.4	0.5	0.7	1.0	1.0
22-Jun-18	1.0	1.0	1.5	0.4	0.3	0.3	0.7	0.5	1.1
23-Jun-18	2.1	1.0	0.8	0.2	0.3	0.3	0.9	0.7	1.1
24-Jun-18	0.5	0.7	1.1	0.3	0.3	0.3	0.8	0.8	1.1
25-Jun-18	0.6	0.9	0.5	0.3	0.3	0.2	0.6	0.9	0.9
26-Jun-18	0.5	0.7	0.8	0.3	0.2	0.2	0.8	0.8	0.9
27-Jun-18	1.1	0.7	0.4	0.3	0.2	0.3	0.8	1.2	0.7
28-Jun-18	0.5	0.7	0.5	0.2	0.3	0.3	0.8	0.8	0.7
29-Jun-18	0.5	0.6	0.4	0.3	0.5	0.4	0.7	1.1	0.7
30-Jun-18	0.3	0.5	0.6	0.4	0.4	0.5	0.8	1.6	1.4
Maximum	0.7	1.2	1.7	0.7	1.4	0.8	1.0	0.7	0.7
Minimum	0.3	0.5	0.3	0.2	0.2	0.2	0.3	0.3	0.4
Average	0.7	0.8	0.8	0.4	0.4	0.4	0.7	0.7	0.8

Maximum values are reported in RED for all respective stations & Minimum values are reported in GREEN for all respective stations

Note: NA denotes Data is not available for the day

6. NH_3 (400 µg/m^3- 24 hourly average limit prescribed as per NAAQS 2009)

Date/Stations	IHBAS	ITO	DTU	Sirifort
1-Jun-18	33	182	87	NA
2-Jun-18	32	198	60	NA
3-Jun-18	36	155	37	NA
4-Jun-18	31	194	37	NA
5-Jun-18	33	157	25	NA
6-Jun-18	37	NA	13	NA
7-Jun-18	32	NA	14	NA
8-Jun-18	29	196	14	NA
9-Jun-18	10	202	15	NA
10-Jun-18	19	154	17	NA
11-Jun-18	28	105	13	NA
12-Jun-18	64	111	11	22
13-Jun-18	53	89	10	27
14-Jun-18	47	99	7	35
15-Jun-18	50	148	5	35
16-Jun-18	49	115	5	31
17-Jun-18	35	108	4	NA
18-Jun-18	39	121	5	37
19-Jun-18	55	144	5	40
20-Jun-18	46	158	5	39
21-Jun-18	56	229	7	42
22-Jun-18	49	272	7	44
23-Jun-18	49	152	5	41
24-Jun-18	46	164	5	33
25-Jun-18	43	113	4	27
26-Jun-18	47	140	5	32
27-Jun-18	50	113	5	29
28-Jun-18	50	147	5	29
29-Jun-18	32	170	8	30
30-Jun-18	25	180	7	33
Maximum	64	272	87	44
Minimum	10	89	4	22
Average	40	154	15	34

Maximum values are reported in RED for all respective stations & Minimum values are reported in GREEN for all respective stations

Note: NA denotes Data is not available for the day

Parameter-wise data tables of Manual Stations under NAMP

June 2018	Pitampura				Sirifort			Shahdara		
	SO_2	NO_2	PM_{10}	$PM_{2.5}$	SO_2	NO_2	PM_{10}	SO_2	NO_2	PM_{10}
04.06.2018	22	80	373	154	4	45	158	4	69	161
06.06.2018	14	51	303	149	4	31	255	4	33	185
08.06.2018	4	55	224	136	4	21	609	4	49	277
12.06.2018	4	37	915	200	4	30	781	NA	NA	NA
14.06.2018	4	21	791	337	4	29	725	4	34	572
18.06.2018	4	23	504	206	4	24	143	4	28	231
20.06.2018	7	30	373	219	4	24	409	8	26	167
22.06.2018	4	38	413	102	4	28	187	5	39	227
26.06.2018	4	40	141	139	4	30	406	4	31	164
28.06.2018	12	68	104	NA	4	22	62	8	27	72

June 2018	Janakpuri				Nizamuddin				Shahzada Bagh		
	SO_2	NO_2	PM_{10}	$PM_{2.5}$	SO_2	NO_2	PM_{10}	$PM_{2.5}$	SO_2	NO_2	PM_{10}
01.06.2018	4	43	399	35	4	49	253	NA	4	49	290
05.06.2018	11	38	318	40	4	38	297	NA	4	53	304
07.06.2018	7	40	117	54	4	63	233	NA	5	80	163
11.06.2018	4	48	319	36	4	31	147	NA	4	53	183
13.06.2018	4	25	NA	74	4	18	425	NA	4	40	918
15.06.2018	5	33	606	52	4	13	431	NA	5	31	476
19.06.2018	4	19	235	NA	4	28	451	NA	4	54	189
21.06.2018	5	24	282	67	4	38	708	115	7	64	219
25.06.2018	NA	NA	NA	NA	4	32	495	107	4	53	237
27.06.2018	4	44	115	31	6	36	202	112	4	68	93

Note: NA denotes Data is not available for the day

Daily Meteorological Data - June 2018

Meteorological Parameters	01-02 Jun	02-03 Jun	03-04 Jun	04-05 Jun	05-06 Jun	06-07 Jun	07-08 Jun	08-09 Jun	09-10 Jun	10-11 Jun
Mixing Height (m)	914	863	816	770	743	692	808	847	804	594
Wind Speed (m/s)	4.1	3.6	3.4	4.2	4.1	3.2	2.6	4.2	3.1	1.9
Temperature (^{O}C)	32.0	31.1	33.0	35.0	35.0	31.2	35.2	33.9	30.2	33.6
Relative Humidity(%)	50.0	51.6	53.2	49.1	50.1	62.1	50.7	57.9	70.1	55.7
Wind Direction	SE	E	SE	E	E	NE,E	SE,E	E,SE	SE,E	NW,N,W

Meteorological Parameters	11-12 Jun	12-13 Jun	13-14 Jun	14-15 Jun	15-16 Jun	16-17 Jun	17-18 Jun	18-19 Jun	19-20 Jun	20-21 Jun
Mixing Height (m)	651	592	599	694	659	833	942	660	816	556
Wind Speed (m/s)	3.3	3.2	4.5	4.2	3.6	3.1	2.9	3.1	2.2	2.3
Temperature (^{O}C)	35.9	37.9	37.9	36.9	35.2	33.7	30.6	32.0	34.2	35.7
Relative Humidity(%)	45.0	41.5	36.1	36.4	41.2	51.1	56.8	51.4	46.9	44.2
Wind Direction	NW,W	W	W	w	W,SW	Varies	NE	NW	NW,NE	NE

Meteorological Parameters	21-22 Jun	22-23 Jun	23-24 Jun	24-25 Jun	25-26 Jun	26-27 Jun	27-28 Jun	28-29 Jun	29-30 Jun	30 Jun-01 July	Average
Mixing Height (m)	600	661	*	*	527	398	555	801	688	720	**785**
Wind Speed (m/s)	2.0	1.7	2.7	2.5	3.5	2.5	3.3	4.3	3.5	2.2	**3.4**
Temperature (^{O}C)	36.5	37.7	37.1	37.1	36.1	32.1	29.3	30.2	30.2	30.8	**33.0**
Relative Humidity(%)	41.8	39.6	38.5	38.0	42.3	54.3	76.6	71.8	69.6	31.9	**55.1**
Wind Direction	N,NE	NE,E,SE	NW,N	NW	NW, SW	E,NW	E	E	E,SE	S,SW,SE	**Varies**

*Inadequate data/Data not available

Daily AQI values of Delhi-NCR (June, 2018)

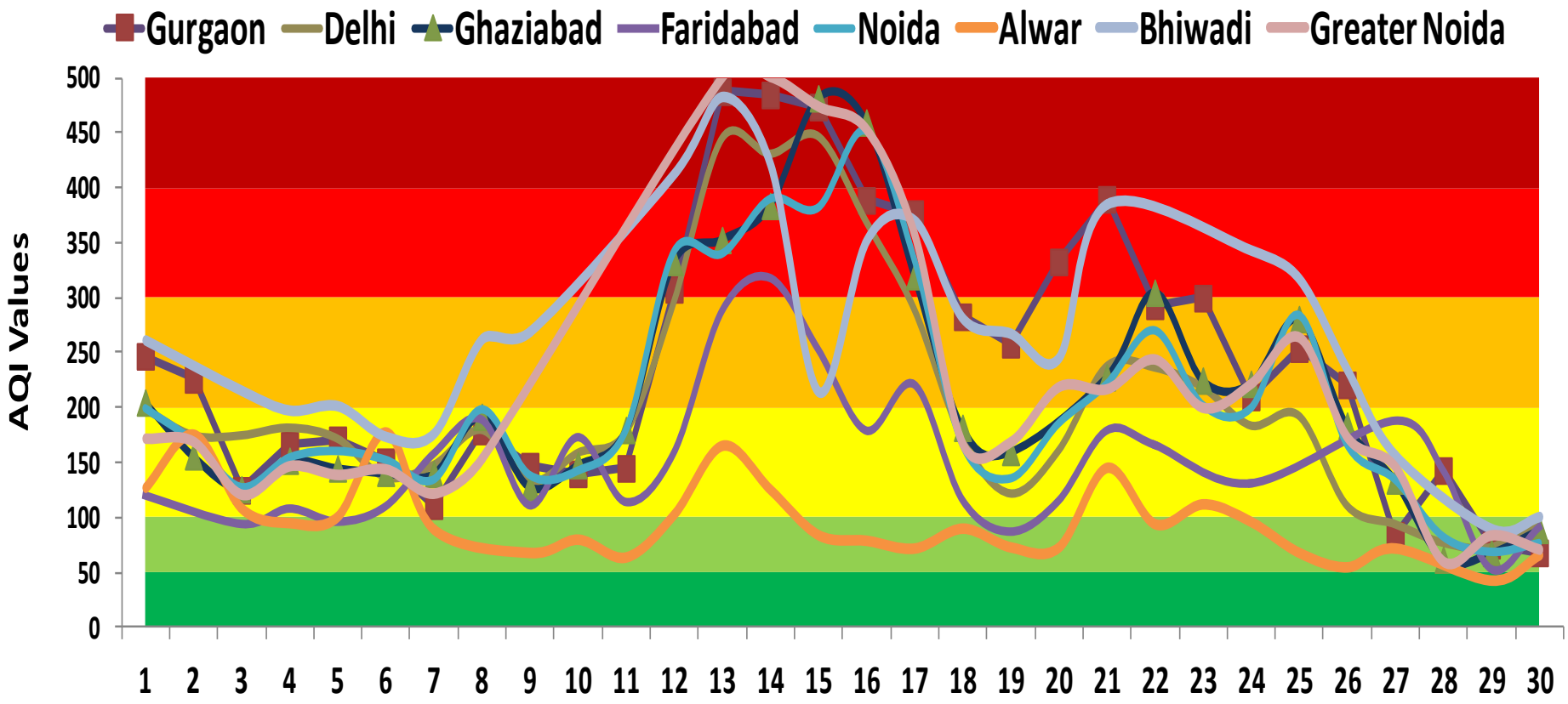
Dates/ Cities	Delhi	Gurgaon	Ghaziabad	Faridabad	Noida	Bhiwadi	Alwar	Greater Noida
1-Jun-18	198	247	205	119	199	171	127	261
2-Jun-18	174	226	156	*	169	168	175	*
3-Jun-18	174	125	126	93	127	120	108	215
4-Jun-18	181	166	152	107	154	146	95	197
5-Jun-18	171	171	145	95	160	138	101	201
6-Jun-18	136	151	141	109	152	143	177	173
7-Jun-18	147	111	140	157	134	121	89	176
8-Jun-18	179	179	192	188	198	153	*	262
9-Jun-18	132	147	128	110	138	*	68	269
10-Jun-18	158	140	148	172	142	*	80	*
11-Jun-18	177	145	180	113	179	*	64	*
12-Jun-18	296	308	333	158	342	*	103	413
13-Jun-18	445	488	353	287	340	500	165	483
14-Jun-18	431	485	384	317	390	500	125	421
15-Jun-18	447	474	482	252	382	473	84	214
16-Jun-18	369	389	460	178	452	452	79	352
17-Jun-18	289	377	320	220	335	356	72	370
18-Jun-18	171	283	182	115	166	166	90	281
19-Jun-18	121	258	160	86	135	168	73	267
20-Jun-18	160	333	*	114	185	218	73	245
21-Jun-18	237	390	228	178	221	216	145	385
22-Jun-18	236	293	305	165	270	243	94	*
23-Jun-18	218	300	225	*	202	199	112	*
24-Jun-18	183	210	222	130	199	221	96	343
25-Jun-18	192	254	281	*	284	263	68	317
26-Jun-18	110	221	184	*	166	172	55	234
27-Jun-18	93	84	134	187	134	145		156
28-Jun-18	76	143	62	142	82	59	*	*
29-Jun-18	72	75	68	52	68	83	43	89
30-Jun-18	96	68	89	90	76	70	66	100
Max	**447**	**488**	**482**	**317**	**452**	**500**	**177**	**483**
Min	**72**	**68**	**62**	**52**	**68**	**59**	**43**	**89**
Average	**202**	**241**	**213**	**151**	**206**	**218**	**97**	**268**

Good	Satisfactory	Moderate	Poor	Very Poor	Severe
(0–50)	(51–100)	(101–200)	(201–300)	(301–400)	(>401)

Note: Prominent Pollutant is Particulate Matter(PM_{10} & $PM_{2.5}$) in Delhi-NCR

AQI Trend Delhi-NCR, June, 2018

Good	Satisfactory	Moderate	Poor	Very Poor	Severe
(0–50)	(51–100)	(101–200)	(201–300)	(301–400)	(>401)



Data Analysis of Ambient Air Quality:

- **Particulate Matter ($PM_{2.5}$ and PM_{10}):** The values of Particulate Matter exceeded the much beyond the permissible (NAAQS) limits as per during 11th to 17th June in all stations across Delhi .This may be attributed to episodal pollution (Dust Strom) Exceedence in PM_{10} 24 hourly average values is more prominent than $PM_{2.5}$ across Delhi. The stations are categorized based on the maximum daily average value observed in the month and tabulated as under:

PM_{10} (24 hourly average permissible limit as per NAAQS 2009 is 100 µg/m^3)		
Maximum 24 hourly Concentration in µg/m^3 (Category)	**Stations**	
	CAAQM	**Manual (under NAMP)**
Below 101 (Moderate)	None	None
Between 101-350(Moderate to poor)	None	None
Between 351-430 (Very poor)	None	None
Above 430 (Severe)	DTU, Sirifort & ITO	Shahdara,Pitampura, Sirifort,Shahzada Bagh, Janakpuri & Nizamuddin

$PM_{2.5}$ (24 hourly average permissible limit as per NAAQS 2009 is 60 µg/m^3)		
Maximum 24 hourly Concentration in µg/m^3 (Category)	**Stations**	
	CAAQM	**Manual (under NAMP)**
Below 61(Moderate)	None	*None*
Between 61-120(Moderate to poor)	None	Jankpuri & Nizamuddin
Between 121-250 (Very poor)	Sirifort	None
Above 250 (Severe)	IHBAS,DMS,NSIT,ITO & DTU	Pitampura

- **Nitrogen Dioxide (NO_2):** Exceeded the permissible limits at ITO Station only in this month. Maximum exceedence was recorded at ITO for 10 days. The status of NO_2 in all Stations (CAAQM and Manual) is as tabulated below based on their daily concentration in this month:

NO_2 (24 hourly average permissible limit as per NAAQS 2009 is 80 µg/m^3)		
Maximum 24 hourly Concentration in µg/m^3	**Stations**	
	CAAQM	**Manual (under NAMP)**
Below 80	IHBAS,DMS,NSIT, Sirifort & DTU	Shahdara,Pitampura, Sirifort,Shahzada Bagh, Janakpuri & Nizamuddin
Above 80	ITO	None

- Benzene: Standard for this parameter is defined annually in NAAQS 2009, therefore it's exceedence cannot be determined based on 24 hr or monthly data, but slightly high values were recorded at DMS and NSIT for twelve and one day respectively.
- Sulphur Dioxide (SO_2): Recorded within permissible limit in all stations across Delhi as per NAAQS 2009 standards.
- Ammonia: Observed within the permissible limits in all stations across Delhi as per NAAQS 2009 Standard.
- Carbon Monoxide (CO): Observed 8-hourly concentration values within the permissible limits in all stations across Delhi as per NAAQS 2009 Standard.
- Ozone (O_3): As per NAAQS 2009 Standard, Ozone 8-hourly concentration values within the permissible limits in all stations across Delhi except at NSIT Dwarka at time interval 14-22 hr only once in this month .

Concentration ranges of Ambient Air Quality Parameters of Delhi Stations

The concentration ranges for pollutants of CAAQM and Manual stations having 24 hourly standard limits are presented in Table-1 and Table-2, respectively based on detailed tabulated data at Page 02—10.

Table-1 Range of 24-hourly Averages for Notified Parameters monitored in June 2018 Delhi

Parameters	IHBAS		ITO		DMS		DTU		SIRIFORT		NSIT	
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
$PM_{2.5}$ (µg/m^3)	45	551	53	510	40	460	30	285	18	221	41	464
PM_{10} (µg/m^3)	*	*	105	923	*	*	71	981	50	910	*	*
SO_2 (µg/m^3)	5	22	*	*	4	13	*	*	*	*	2	12
NO_2 (µg/m^3)	13	62	49	126	20	80	26	52	12	43	17	57
NH_3 (µg/m^3)	10	64	89	272	*	*	4	87	22	44	*	*
Note: '*'indicate Insufficient data or parameter not measured												
CO, Ozone and Benzene not included as there is no 24 hourly permissible limits in NAAQS												

Table-2 Range of 24-hourly Averages for Notified Parameters monitored in June 2018 Delhi

Parameters	Pitampura		Sirifort		Shahdara		Janakpuri		Nizammudin		Shahzada Bagh	
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
$PM_{2.5}$ (µg/m^3)	102	337	*	*	*	*	31	74	107	115	*	*
PM_{10} (µg/m^3)	104	915	62	781	72	572	115	606	147	708	93	918
SO_2 (µg/m^3)	4	22	4	4	4	8	4	11	4	6	4	7
NO_2 (µg/m^3)	21	80	21	45	26	69	19	48	13	63	31	80
Note: '*'indicate Insufficient data or parameter not measured												

Air Quality Index

AQI of Delhi was found largely lying in moderate category at all locations of Delhi-NCR. However, Delhi, Faridabad, Ghaziabad, Gurgaon, Noida & Greater Noida has recorded 5, 3, 5, 8, 4 & 5 poor days respectively. Whereas Bhiwadi station in NCR region falls in poor category for ten days in this month. In June 2018, AQI during 1-11th June were in Moderate category, and reached to Severe Category during June 13th to June 15th , which may be attributed to dust storm episode. Distribution of Air Quality Categories according to the prevailing AQI for Delhi and adjacent NCR cities is presented in Table-3, based on detailed tabulated data and graphical variation at Page 12-13.

Table-3 AQI Values of Delhi-NCR for the month of June 2018

AQI Categories	Range	Delhi	Faridabad	Ghaziabad	Gurgaon	Noida	Greater Noida	Alwar	Bhiwadi
Good	(0–50)	*	*	*	*	*	*	1	*
Satisfactory	(51–100)	4	5	3	3	3	3	17	1
Moderate	(101–200)	17	17	14	10	17	13	10	5
Poor	(201–300)	5	3	5	8	4	5	*	10
Very Poor	(301–400)	1	1	5	6	5	1	*	5
Severe	(>401)	3	*	2	3	1	4	*	3

Meteorological Parameters

Monthly average mixing height was 785 meters. The range for daily average mixing height was observed from 398 meters to 942 meters. Daily average wind speed was observed in the range 1.7 m/s – 4.5 m/s. Monthly average temperature was 33.0 ˚C with minimum daily average as 29.3˚C and maximum as 37.9˚C recorded. Monthly average relative humidity was 55.1% with maximum daily average as 76.6 % and minimum as 31.9 % recorded. Prominent wind direction in June 2018 was from East followed by North & North-West.

Table-4 Monthly Range and Average for Metrological Parameters in Delhi, June 2018

Parameters(Unit)	Average	MAX	MIN
Mixing Height (m)	785	942	398
Wind Speed(m/s)	3.4	4.5	1.7
Temperature(°C)	33.0	37.9	29.3
Relative Humidity (%)	55.1	76.6	31.9

Critical Observations:

- Delhi Air Quality as a whole has recorded slight betterment in June 2018 compared to the month of May 2018. This month, the most of the AQI values reached to moderate category from the poor category in the month of May 2018 except the episoidal periods 11th to 17th June, 2018.
- $PM_{2.5}$ and PM_{10} are the main pollutants for exceedence and elevated AQI in Delhi and NCR.
- Although higher mixing Height and higher wind speed has helped in better dispersion of $PM_{2.5}$. However, few episodes of dust storms have also elevated the PM_{10} level during the month.
- Every year (as studied 2016-2018) the month June experiences at least two spikes in particulate concentrations (1st - 5th June) and (10th to 16th June). This may be attributed to the changing weather condition like increase in temperature, development of low pressure zone over Delhi, which finally allow the air intrusion from West and Southwest direction carrying dry dust resulting into high particulate matter and hazy condition over Delhi.
- This year during 1st to 10th June PM_{10} and $PM_{2.5}$ was ranging between 154 to 220 µg/m^3 and 54 to 89 µg/m^3 respectively. However; the same was increased to 862 and 415 µg/m^3 respectively on 11-17th June. The impact of dust storm episode took four days and the values reached to the previous level from 18th June onwards . The change in wind direction from East to prominently West and Southwest and increased wind speed have helped pushing the dust over Delhi-NCR.
- The baseline average of PM_{10} and $PM_{2.5}$ concentration during June 2018 except the episodal period (11-17th June) were 193 µg/m^3 and 70 µg/m^3 respectively. The average values during episodal days increased by 3 times (PM_{10}) and 2.8 times ($PM_{2.5}$) respectively. The meteorology during episodal event indicated that mixing height was lower, temperature high and the air with low relative humidity might have helped in development of hazy and dusty condition during dust events. It suggests enrichment of PM_{10} during episodal days and the cause of poor air quality may be attributed to coarse particles coming from non combustion sources.

Action taken under GRAP

Pre-emptive actions were initiated by CPCB convening Task force meeting. The concerned agencies were also called for implementation of dust control measures under GRAP. The Task force has also recommended that the public be advised to avoid unnecessary exposure. Subsequently, a meeting of construction agencies and municipal corporations in Delhi along with neighbouring cities was convened in CPCB on 13.06.2018. The agencies have been asked to take all necessary measures to contain dust, to ensure strict vigil and to check municipal solid waste burning

Recommendations:

- More stringent implementation of construction and demolition, waste handling rule is necessary.
- Ensure Strict action against visibly polluting vehicles
- Undertake greening of open areas, gardens, community places, schools and housing societies
- Take stringent action against open burning of bio-mass/leaves/tyres etc. to control such activities
- Take necessary steps to divert non-destined vehicles towards Eastern Peripheral Expressway.
- Fire at MSW dump site June be controlled by continuous vigil and dousing activities by municipalities and operators.
- Installation of vapors recovery system in fuel dispensing outlets (Petrol Pumps) should be taken up in priority to control volatile emission.

ANNEXURE - I

NATIONAL AMBIENT AIR QUALITY STANDARD (2009)

Pollutant	Time Weighted Average	Concentration in Ambient Air		
		Industrial, Residential, Rural and Other Area	Ecologically Sensitive Area (notified by Central Government)	Methods of Measurement
SO_2, µg/m^3	Annual*	50	20	• Improved West and Gaeke • Ultraviolet fluorescence
	24 hours**	80	80	
NO_2, µg/m^3	Annual*	40	30	• Modified Jacob &Hochheiser (Na-Arsenite) • Chemiluminescence
	24 hours**	80	80	
PM_{10}, µg/m^3	Annual*	60	60	• Gravimetric • TOEM • Beta attenuation
	24 hours**	100	100	
$PM_{2.5}$, µg/m^3	Annual*	40	40	• Gravimetric • TOEM -------- • Beta attenuation
	24 hours**	60	60	
O_3, µg/m^3	8 hours**	100	100	• UV photometric • Chemiluminescence • Chemical Method
	1 hour**	180	180	
Lead (Pb), µg/m^3	Annual*	0.50	0.50	• AAS/ICP method after sampling on EMP 2000 or equivalent filter paper • ED-XRF using Teflon filter
	24 hours**	1	1	
CO, mg/m^3	8 hours**	2	2	• Non Dispersive Infra Red (NDIR) spectrosopy
	1 hour**	4	4	
Ammonia (NH_3) µg/m^3	Annual*	100	100	• Chemiluminescence • Indophenol blue method
	24 hours**	400	400	
Benzene	Annual*	5	5	• Gas chromatography based on continuous analyzer • Adsorption and Desorption followed by GC analysis
Benzopyrene (BaP) - particulate phase only, ng/m^3	Annual*	1	1	• Solvent extraction followed by HPLC/GC analysis
Arsenic (As), ng/m^3	Annual*	6	6	• AAS/ICP method after sampling on EMP 2000 or equivalent filter paper
Nickel (Ni), ng/m^3	Annual*	20	20	• AAS/ICP method after sampling on EMP 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 8 hourly or 1 hourly monitored values, as applicable, shall be compiled with 98% of the time in a year. 2% of the time, theyJune 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.

ANNEXURE -II

CAAQM STATIONS

Sr. No.	Stations	Types of activities around location (Residential/ Commercial/Traffic/ Industrial)	Parameters Monitored
1.	Income Tax Office	Traffic Intersection /Kerb site	NO_2, $PM_{2.5}$, NH_3, PM_{10}
2.	DCE	Residential	NO_2, $PM_{2.5}$, NH_3, PM_{10}
3.	Shadipur	Commercial	SO_2, NO_2, $PM_{2.5}$, CO, O_3, Benzene
4.	IHBAS	Residential	SO_2, NO_2, $PM_{2.5}$, CO, NH_3
5.	NSIT Dwarka	Residential	SO_2, NO_2, $PM_{2.5}$, CO, O_3 , Benzene
6.	Sirifort	Residential cum Commercial	NO_2, $PM_{2.5}$, NH_3, PM_{10}

DETAILS OF MANUAL STATIONS IN DELHI UNDER NAMP

Sr. No.	Monitoring station	Types of activities around location (Residential/ Commercial/Traffic/ Industrial)	Parameters Monitored
01.	Pitampura	Residential	SO_2, NO_2, PM_{10}, $PM_{2.5}$
02.	Sirifort	Residential	SO_2, NO_2, PM_{10}, $PM_{2.5}$
03.	Janakpuri	Residential	SO_2, NO_2, PM_{10}, $PM_{2.5}$
04.	Nizamuddin	Residential	SO_2, NO_2, PM_{10}, $PM_{2.5}$
05.	Shahzada Bagh	Industrial	SO_2, NO_2, PM_{10}, $PM_{2.5}$
06.	Shahdara	Industrial	SO_2, NO_2, PM_{10}, $PM_{2.5}$