

Report on Ambient Noise Levels & Ambient Air Quality during Deepawali Festival - 2020 .



CENTRAL POLLUTION CONTROL BOARD
Ministry of Environment, Forest & Climate Change
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FOREWORD

Noise and Air pollution due to bursting of fire crackers during Deepawali is well known. It is, therefore, necessary to conduct ambient noise and air quality monitoring during the festival to understand level of pollution and to correlate it with the effectiveness of pollution abatement measures. Like every year, Central Pollution Control Board, State Pollution Control Boards, and Pollution Control Committees carried out extensive ambient noise and air quality monitoring across the country during Deepawali festival on November 14, 2020.

This report is a compilation of ambient noise data collected from 251 locations in 93 cities spread over 19 States and 04 UTs in the country. A comparison of noise level data, available for 167 locations of Deepawali 2020 with previous year, it is seen that noise level has decreased at 122 locations, increased at 39 locations and no change is noticed at 6 locations. While such results are encouraging, greater efforts are required for spreading awareness about effects of noise pollution among public in general.

In compliance to the orders of Hon'ble Supreme Court, like 2019 and in 2020 also, CPCB conducted monitoring at eight cities namely Delhi (CPCB Head Quarter), Agra, Bhopal, Bengaluru, Kolkata, Lucknow and Vadodara where its Regional Directorates are situated. CPCB has conducted monitoring for 15 days (7th November to 21st November) i.e. for a period of 7 day prior to Deepawali; (7th November to 13th November – Pre-Deepawali period); Deepawali day (14th November); and for 7 days' period after Deepawali (15th November to 21st November – Post-Deepawali period). In addition to the NAAQS parameters (PM₁₀, PM_{2.5}, SO₂ and NO₂ and metals such as Pb, Ni, As in PM₁₀), elements used in composition of firecrackers (Al, Ba and Fe) are monitored in PM_{2.5} fraction as proposed in short term Ambient Air Quality Criteria Values (AAQCVs).

In this report, year-wise comparison (2017 – 2020) of PM_{2.5} and elements in PM_{2.5} in Delhi city during Deepawali has been highlighted. The gradual betterment in ambient air metal concentrations in PM_{2.5} was observed since 2017 after the implementation of regulatory mechanism as suggested by Hon'ble Courts for either restricting/banning of firecrackers and development of "Green Crakers". This report will help in generation of data on pollution caused by the bursting of firecrackers which have harmful effects on inhalation and would be helpful for regulation and controlling quantity of Pb, Ni, As, Al, Fe and Ba used in manufacturing of firecrackers.

I hope that SPCBs/ PCCs and other concerned agencies will use this document to disseminate information among all sections of society to encourage them to celebrate Deepawali festival in more environment friendly ways.

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(Shiv Das Meena)

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1.0 Introduction

Central Pollution Control Board (CPCB) is monitoring ambient air quality and noise levels during Deepawali day festival from past many years to assess the status of air & noise pollution levels in environment caused by burning of crackers. The main objective of monitoring ambient air quality and noise levels is to ensure compliance of the Hon'ble Supreme Court directions dated October 5, 1999 & September 27, 2001 and also to examine the status & trend of pollution over the years during Deepawali day festival.

Hon'ble Supreme Court in its order dated October 20, 2018 directed as follows:

“CPCB and respective State Pollution Control Boards/Pollution Control Committees (SPCBs/PCCs) of the States and Union Territories shall carry out short –term monitoring in the cities for 15 days (commencing from 7 days prior to Deepawali day and ending 7 days after Deepawali day) for parameters namely Aluminum, Barium, Iron apart from the regulatory parameters against the short term ambient air quality criteria values (AAQCVs) proposed by CPCB with regard to bursting of firecrackers. This will help in generation of data on pollution caused by the bursting of firecrackers and would be helpful for regulation and control quantity of Aluminum, Barium and Iron used in the manufacture of firecrackers”.

In view of above CPCB informed all SPCBs/PCCs and RDs via letters dated September 17, 2020 to carry out noise monitoring on pre-Deepawali day (November 09, 2020) and Deepawali day (November 14, 2020) & ambient air quality monitoring from November 07, 2020 to November 21, 2020 in state capital at least for two locations and to submit the report by December 11, 2020. In addition to the general parameters like PM₁₀, PM_{2.5}, SO₂, NO₂ and metals (Pb, Ni & As in PM₁₀) selected metals/elements like Al, Ba, and Fe in PM_{2.5} are also to be monitored to assess the impact of fire crackers bursting during Deepawali day festival.

Accordingly, CPCB, SPCBs and PCCs has carried out AAQM 15 days continuously for the compliance of Hon'ble supreme court and the final report has been submitted by the respective SPCBs and PCCs individually in the Hon'ble Supreme court of India. Therefore, this year Deepawali 2020 report focused on Ambient Noise during the two year period i.e 2019 and 2020 and Ambient Air data for the year 2020 across the country conducted by CPCB. This report divided in the following two Parts:

Part-I: Ambient Noise Levels -2020, Part-II: Ambient Air Quality during - 2020.

2.0 Executive Summary

In order to assess the impact of bursting of fire crackers during Deepawali festival, Central Pollution Control Board (CPCB) along with all its subordinate offices & SPCBs/UTs had conducted Ambient noise monitoring on Normal and Deepawali Day 2020.

Ambient noise monitoring data from 93 cities for 251 locations have been received in year 2020. **On pre-Deepawali day** (09th November 2020) noise level ranged between 32 and 87 Leq.dB(A) while same on the festival day (14th November 2020) ranged between 33 and 97 Leq.dB(A). On pre-Deepawali Day, the minimum noise level 32 Leq.dB(A) was reported at SVR College, Surat (Gujarat) and the maximum noise level 87 Leq.dB(A) was reported at Christanpatty (R), Nagaon (Assam) while **on Deepawali day** minimum noise level 33 Leq.dB(A) was reported at SVR College, Surat (Gujarat) and the maximum noise level 97 Leq.dB(A) was reported at two locations i.e. Bank More, Dhanbad (Jharkhand) and Birla Visram (C), Madurai, Tamil Nadu. Over all, noise level shows some improvements in this year 2020 as compared to the last year noise level.

In compliance to Hon'ble Supreme Court in the year 2018, like last year (2019), this year also CPCB conducted Ambient air quality monitoring in 2020 at eight cities namely Delhi (CPCB Head Quarter), Agra, Bhopal, Bengaluru, Kolkata, Lucknow, shillong and Vadodara where its Regional Directorates are situated. 15 days monitoring (7th November to 21st November); 7 days prior (7th November to 13th October – Pre-Deepawali period); Deepawali day (14th November) and 7 days after Deepawali (15th November to 21st November – Post-Deepawali period) were conducted.

In addition to the NAAQS parameters (PM₁₀, PM_{2.5}, SO₂ and NO₂ and metals such as Pb, Ni &As in PM₁₀) and elements (Al, Ba, and Fe) used in composition of fire crackers, which may have harmful effects on inhalation, are also included in monitoring plan. Al, Ba, and Fe are monitored in PM_{2.5} fraction as proposed in short term AAQCVs.

City wise increase/decrease in PM₁₀ and PM_{2.5} on Diwali day compared to Pre-Diwali period (in%). Highest increment in PM₁₀ on Deepawali day was reported in Lucknow (114%) followed by Bhopal (86.2%), Delhi (67.1%), Shillong (53.7) and Kolkata (22.6%). PM_{2.5} was increased by 26 – 82.9% compared to Pre-Deepawali period among the various cities monitored. Highest increment was recorded in Delhi (82.9%), followed by Bhopal (81.3%), Lucknow (67.6%), Kolkata (53.6%), Shillong (30.5%) and Vadodara (26%).

The concentrations of criteria gaseous pollutants (SO₂ and NO₂) at all cities have been highlighted. Increase in SO₂ concentration on Deepawali day at cities like Delhi, Lucknow, Bhopal and Vadodara are evident. Increase on Deepawali day may be attributed to oxidation of sulphur due to bursting of cracker. Bengaluru and Shillong reported SO₂ at Below Detection Limit (4 µg/m³). NO₂ was reported within prescribed std limit (80 µg/m³) in all the cities except Delhi during Pre-Deepawali, Deepawali and post Deepawali days. During the Pre-Deepawali period and on

Deepawali day NO₂ was found to above NAAQS in Delhi. Delhi, Bhopal, Lucknow and Bengaluru reported increase in NO₂ on Deepawali day compared to Pre-Deepawali period.

Lead (Pb), Nickel (Ni) and Arsenic (As) in ambient air (PM₁₀) in various cities during the study period has been made. Lead found to remain always within 24 hourly average standard limits during Deepawali days (15 days monitoring period) at all cities except in Bhopal on Deepawali day compared to pre and post Deepawali period may be a matter of further investigation. The concentration of Nickel found higher during pre-Deepawali days in Agra, Delhi, Kolkata, Bhopal and Vadodara may be attributed to general urban sources MSW burning. Arsenic was found to increase and crossed the prescribed annual concentration limit on Deepawali day in Agra, Delhi, Lucknow, Kolkata and Bhopal and it may be attributed to fireworks.

Year-wise comparison (2017 – 2020) of PM_{2.5} and elements in PM_{2.5} in Delhi during Deepawali has been made. Reduction in Aluminium and Barium concentrations were observed in 2020 compared to 2019. Gradual betterment in ambient air metal concentrations in PM_{2.5} was observed every year since 2017 after the implementations of regulatory mechanisms as suggested by Hon'ble Courts for either restricting / banning of firecrackers or development of "Green Crackers" was initiated in 2018. In 2020 Aluminium and Iron found within proposed AAQCVs concentrations. Barium found exceeding proposed AAQCVs concentrations on Deepawali day in Delhi; still a reduction of 38.8% was observed in 2020 compared to 2019.

PART-I

Ambient Noise Levels during Deepawali festival - 2020

[AMBIENT NOISE LEVELS DURING DEEPAWALI FESTIVAL 2020]

2.0 Monitoring Network and Findings:

Ambient Noise Levels:

With the view to maintain the uniformity in monitoring across the country, CPCB prepared protocol for monitoring of ambient noise levels and circulated it to all SPCBs, RDs and PCCs in the country. A total number of 19 locations in 08 different cities covering 06 States and 01 UT across the country were monitored for ambient noise level during Deepawali festival- 2020 by CPCB-Head Office and its 07 Regional Directorates. The monitoring network is given in the table-1(a).

S. No.	State/UT	City	No. of Locations
1.	Delhi(UT)	Delhi	06
2.	Gujarat	Vadodara	02
3.	Karnataka	Bangaluru	02
4.	Madhya Pradesh	Bhopal	02
5.	Meghalaya	Shillong	01
6.	Uttar Pradesh	Agra	02
		Lucknow	02
7.	West Bengal	Kolkatta	02
Total			19

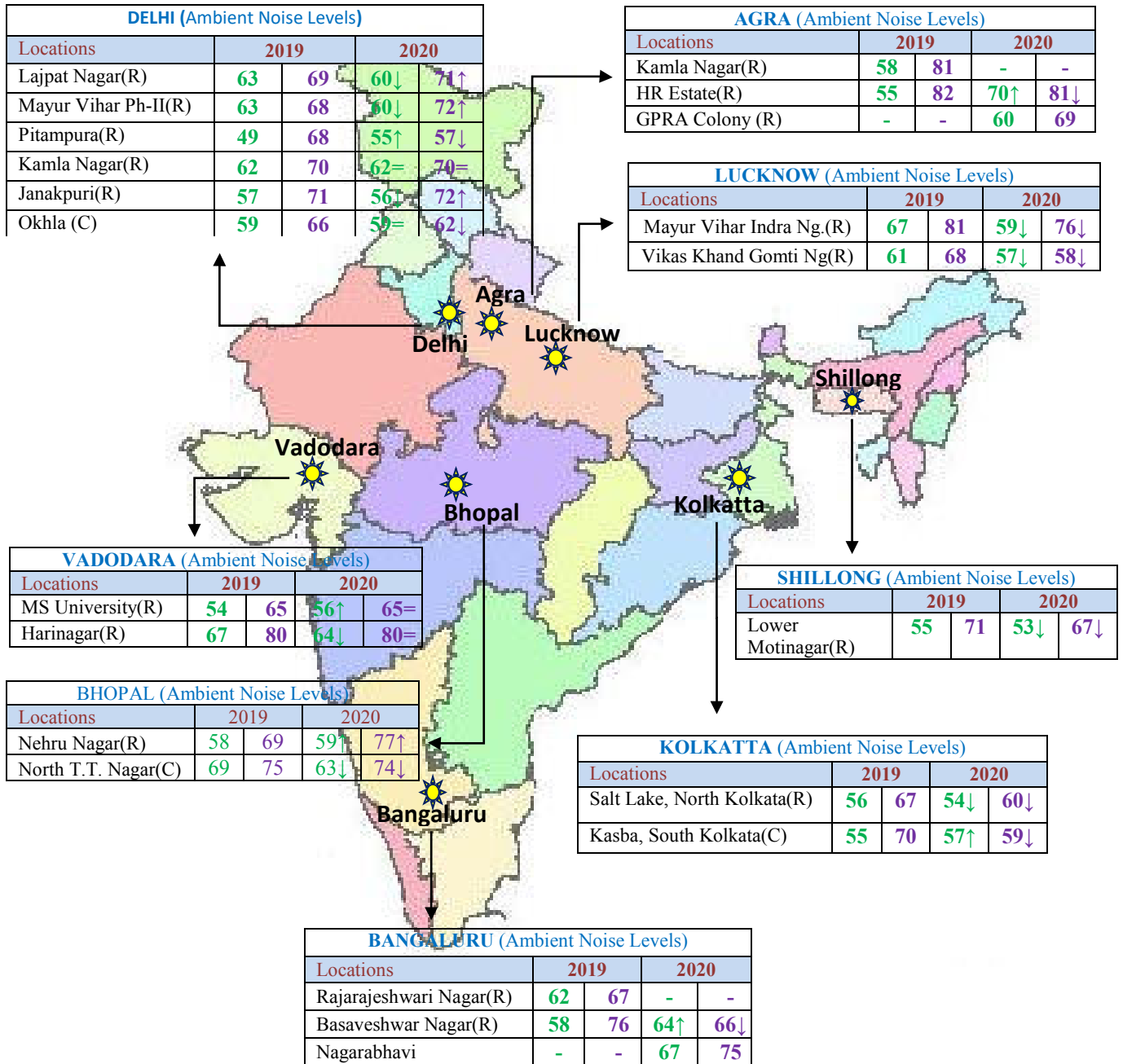
Ambient noise level monitoring to see the impact of bursting of crackers on environment during Deepawali festival, 2020 was conducted by SPCBs/PCCs as per protocol of CPCB. Out of which Ambient noise level monitoring data of pre Deepawali and Deepawali day in the year, 2020 for 232 locations in 85 different cities of 15 states and 3 UTs have been received from respective SPCBs/PCCs. The monitoring network is given in the table-1(b).

S. No.	State	Ambient Noise Monitoring 2020	
		No. of Cities	No. of Locations
1.	Andhra Pradesh	05	15
2.	Assam	08	22
3.	Bihar	01	06
4.	Chandigarh (UT)	01	04
5.	Goa	04	04
6.	Gujarat	05	16
7.	Himachal Pradesh	10	10
8.	Jharkhand	01	03
9.	Jammu (UT)	01	04
10.	Madhya Pradesh	01	03
11.	Meghalaya	01	04
12.	Mizoram	01	04
13.	Odisha	14	53
14.	Puducherry (UT)	01	01
15.	Rajasthan	14	30
16.	Sikkim	01	01
17.	Tamil Nadu	12	25
18.	Tripura	04	27
Total		85	232

[AMBIENT NOISE LEVELS DURING DEEPAWALI FESTIVAL 2020]

3(A) Ambient Noise Monitoring carried out by CPCB:

Comparison of Ambient noise levels during Deepawali festival 2019 & 2020 (Pre-Deepawali & Deepawali day) data received from the Regional Directorates of CPCB is given in the Map. The results are compared with previous year data (2019).



Pre-Deepawali Day Deepawali Day

Map: Ambient Noise Monitoring Data during Pre-Deepawali & Deepawali day 2020 monitored by CPCB

[AMBIENT NOISE LEVELS DURING DEEPAWALI FESTIVAL 2020]

In Delhi, in addition to the manual sampling locations, Real time noise level monitoring also conducted by CPCB at 10 various locations in Delhi for comparison as follows.

(B) Real-time Noise Monitoring Data:

Round the clock (24X7) noise level monitoring at ten locations in Delhi is being conducted by CPCB. The data of selected pre-Deepawali day (2019-2020) is tabulated at Table 2a. The data reveals that day time noise levels have decreased in 2020 as compared to pre-deepawali day of 2019 at seven out of 10 locations. Only NSIT Dwarka, R. K. Puram and ITO stations have recorded slight increase in day time noise. The night time noise found increased at Anand Vihar and ITO only (both traffic area).

Table 2(a): Online Ambient Noise Level data during Pre-Deepawali (2019-2020)					
	Monitoring Stations	Pre-Deepawali Day (All values are in Leq dB(A))			
		21.10.2019		09.11.2020	
		Day Time	Night Time	Day Time	Night Time
1	Anand Vihar (C)	66	63	65↓	78↑
2	Punjabi Bagh (R)	60	50	56↓	50=
3	CPCB HQ (C)	67	59	66↓	54↓
4	Civil Lines (C)	62	58	60↓	57↓
5	DCE, Bawana (S)	60	58	51↓	50↓
6	Dilshad Garden(S)	85	79	74↓	74↓
7	ITO (C)	73	70	74↑	74↑
8	Mandir Marg (S)	70	53	49↓	48↓
9	NSIT, Dwarka (S)	56	55	58↑	54↓
10	R.K. Puram (S)	62	66	69↑	65↓
Area Designation (C) – Commercial, (R) – Residential, (S) – Sensitive					
Prescribed Standards in Leq dB(A): (C) – 65 (Day time) 55 (night time); (R) - 55 (Day time) 45 (night time) and (S) - 50 (Day time) 40 (night time)					
Day Time – 0600 hrs to 2200 hrs and Night time – 2200 hrs to 0600 hours					

[AMBIENT NOISE LEVELS DURING DEEPAWALI FESTIVAL 2020]

The noise level data of both years (2019-2020) recorded at 10 real-time monitoring stations in Delhi on Deepawali days is given at Table 2b. The data shows that 7 out of 10 locations, noise levels have increased on Deepawali day night this year compared to 2019. Only three stations (ITO, Anand Vihar and Dilshad Garden have recorded slight decline in night time noise on Deepawali day, 2020 compared to last year Deepawali day. Day time noise had also similar trend.

Table 2(b): Online Ambient Noise Level data during Deepawali Days (2019-2020)					
S.No.	Monitoring Stations	Deepawali Day (All values are in Leq dB(A))			
		27.10.2019		14.11.2020	
		Day Time	Night Time	Day Time	Night Time
1	Anand Vihar (C)	67	65	64↓	63↓
2	Punjabi Bagh (R)	56	55	61↑	61↑
3	CPCB HQ (C)	65	63	68↑	67↑
4	Civil Lines (C)	60	60	63↑	63↑
5	DCE, Bawana (S)	60	58	63↑	61↑
6	Dilshad Garden(S)	75	76	74↓	74↓
7	ITO (C)	71	69	66↓	65↓
8	Mandir Marg (S)	57	55	62↑	61↑
9	NSIT, Dwarka (S)	56	58	64↑	63↑
10	R.K. Puram (S)	76	60	64↓	63↑
Area Designation (C) – Commercial, (R) – Residential, (S) – Sensitive					
Prescribed Standards in Leq dB(A): (C) – 65 (Day time) 55 (night time); (R) - 55 (Day time) 45 (night time) and (S) - 50 (Day time) 40 (night time)					
Day Time – 0600 hrs to 2200 hrs and Night time – 2200 hrs to 0600 hours					

Observation: It is not wise to compare the manual sampling noise value with Real time noise monitoring value since it is an averaged for day time and night time AAQ standards in respect of Noise. During Deepawali day, 3 out of 6 locations values are increased in manual sampling; and 7 out of 10 locations values are increased in real time sampling also in comparison of 2019. In Delhi, the background noise due to traffic & transport movement noise levels are also attributed along with bursting of fire crackers and Hon'ble court emphasized the importance of green crackers to minimize the air pollution during Deepawali festival.

[AMBIENT NOISE LEVELS DURING DEEPAWALI FESTIVAL 2020]

4. Ambient Noise Monitoring carried out by SPCBs & PCCs:

Andhra Pradesh

Observations: This year 2020, ambient noise monitoring has been carried out at fifteen locations in five cities. On pre-Deepawali-day noise level ranged between 50 and 78 Leq.dB(A), while on the festival day it ranged between 53 and 93 Leq.dB(A). The maximum noise level value of 93 Leq.dB(A) was reported at Laxmi Puram (R), Guntur city on the festival day. Since, the last year (2019) data has not received, the comparison was not made and as such data of this year has given in table-3.

S. No.	Cities	Locations	Pre-Deepawali day 2020		Deepawali day 2020	
1.	Vijaywada	Benz Circle (C)	69		87	
2.		IMAH (C)	62		83	
3.		Yenamalakuduru (R)	61		80	
4.	Nellore	Terrace of Regional Office (R)	62		61	
5.		Chandramouli Nagar (R)	51		54	
6.		Dr. P.V. Ramchandra Reddy Hospital (C/S)	50		53	
7.	Ongole	Terrace of Municipal Corporation (C/R)	67		77	
8.		Terrace of Sri Nilayam, Sambasiva Nagar (R)	78		81	
9.		Terrace of Prakasam Milk Prodcue Company (R)	78		77	
10.	Guntur	Laxmi Puruam (R)	73		93	
11.		Brodipet, Guntur (C)	77		89	
12.		Brundhavan Garden (S)	71		91	
13.	Kurnool	Govt. Hospital (S)	72		78	
14.		Montessori High Schoo (S)	69		71	
15.		Venkatramana Colony (R)	71		74	

Assam

Observations: This year 2020, ambient noise monitoring has been carried out at twenty two locations in eight cities. On pre-Deepawali-day noise level ranged between 47 and 87 Leq.dB(A), while on the festival day it ranged between 50 and 88 Leq.dB(A). The maximum noise level value of 88 Leq.dB(A) was reported at Christanpatty (R) and Haibargaon Bazar(C), Nagaon city on the festival day. The data of this year has compared with previous year and the same has given in table-4.

S. No.	Cities	Locations	Pre-Deepawali day		Deepawali day	
			2019	2020	2019	2020
1.	Guwahati	Panbazar MMC (S)	58	57↓	79	70↓
2.		Ganeshguri(C)	68	65↓	71	68↓
3.		Ulubari, Charial	67	66↓	79	75↓

[AMBIENT NOISE LEVELS DURING DEEPAWALI FESTIVAL 2020]

S. No.	Cities	Locations	Pre-Deepawali day		Deepawali day	
			2019	2020	2019	2020
4.	Silchar	Ambicapatty(R)	58	56↓	69	61↓
5.		Silchar Medical Collage(S)	51	-	59	-
6.		Tarapur(C)	63	-	72	-
7.		Janiganj Bazar (C)	-	58	-	68
8.		Near Court Complex (S)	-	50	-	60
9.	Bongaigaon	Barapara(R)	53	48↓	61	56↓
10.		Paulpara(R)	52	-	65	-
11.		Civil Hospital(S)	49	47↓	60	50↓
12.		Paglasthan(C)	-	69	-	71
13.	Dibrugarh	Maruwipatty(C)	64	-	91	-
14.		Assam Medical Collage & Hospital(S)	51	51=	64	56↓
15.		Milan Nagar (R)	62	62=	79	73↓
16.		H.S. Road (C)	-	64	-	84
17.	Tezpur	Main Bazar (C)	70	73↑	86	79↓
18.		Mazgaon (R)	60	61↑	80	76↓
19.		Civil Hospptial (S)	62	63↑	78	76↓
20.	Nagaon	Civil Hospital (S)	66	73↑	72	73↑
21.		Christanpatty (R)	73	87↑	73	88↑
22.		Haibargaon Bazar(C)	71	85↑	87	88↑
23.	Sivasagar	Melachakar (R)	56	57↑	71	70↓
24.		Central Market(C)	60	63↑	82	81↓
25.		Sivadol Near DC office(S)	51	52↑	66	62↓
26.	Golaghat	Market Area, Golaghatz(C)	67	63↓	71	69↓

Note: (-) indicates data not received.

Bihar

Observations: In this state, this year 2020, ambient noise monitoring has been carried out at six locations in Patna city. On pre-Deepawali day noise level ranged between 56 and 80 Leq.dB(A), while on the festival day it ranged between 67 and 82 Leq.dB(A). The maximum noise level value of 82 Leq.dB(A) was reported at Boring Road Crossing, on the festival day. Since, the last year (2019) data has not received, the comparison was not made and as such data of this year has given in table-5.

Table 5 : Ambient Noise Levels in Leq.dB(A) at different locations during Pre-Deepawali & Deepawali day 2020 in Bihar

S.No.	City	Locations	Pre-Deepawali day 2020	Deepawali day 2020
1.	Patna	Boring Road Crossing	80	82
2.		Parivesh Bhawan, Patliputra, IA	56	78
3.		Betron Bhawan, Shastri Nagar,	61	76
4.		Hindustan Coca Cola Beverage Pvt. Ltd, Patliputra (I)	69	68
5.		Planetarium (IGSC) Adalatganj	62	67
6.		IGIMS, Main Gate, Sheikhpura, Bailey Road	57	68

[AMBIENT NOISE LEVELS DURING DEEPAWALI FESTIVAL 2020]

Chandigarh (UT)

Observations: In this UT, this year 2020, ambient noise monitoring was carried out at four locations in Chandigarh city. On pre-Deepawali day noise level ranged between 51 and 61 Leq.dB(A), while on the festival day it ranged between 54 and 63. The maximum noise value 63 Leq.dB(A) was reported at Sector - 22 on the festival day. The data of this year has compared with previous year and the same has given in table-6.

Table 6 : Ambient Noise Levels in Leq.dB(A) at different locations during Pre-Deepawali & Deepawali day 2019 & 2020 in Chandigarh

S.No.	City	Locations	Pre-Deepawali day		Deepawali day	
			2019	2020	2019	2020
1.	Chandigarh	Sector – 22	58	54↓	77	63↓
2.		Sector – 17	55	51↓	63	54↓
3.		IMTECH	56	55↓	63	61↓
4.		PEC – 12	63	61↓	64	56↓

Goa

Observations: In this state, this year 2020, ambient noise monitoring was carried out at four locations in four cities. On pre-Deepawali day noise level ranged between 58 and 67 Leq.dB(A), while on the festival day, noise level ranged between 61 and 75 Leq.dB(A). The maximum noise level value 75 Leq.dB(A) was reported at Margo Municipality Garden (C), Margo on Deepawali day. The data of this year has compared with previous year and the same has given in table-7.

Table-7 : Ambient Noise Levels in Leq.dB(A) at different locations during Pre-Deepawali & Deepawali day 2019 & 2020 in Goa

S. No.	Cities	Locations	Pre-Deepawali day		Deepawali day	
			2019	2020	2019	2020
1.	Mapusa	Mapusa Municipality(C)	72	64↓	-	67
2.	Panjim	Panjim(C)	32	58↑	67	61↓
3.	Vasco	Fuse Call Office(C)	60	63↑	66.8	71↑
4.	Margao	Margao Municipality Garden(C)	67	67=	67.3	75↑

Note: (-) indicates data not received.

Gujarat

Observations: In this State, this year 2020, ambient noise monitoring carried out at sixteen locations in five cities. On pre-Deepawali day noise level ranged between 32 and 70 Leq.dB(A), while same on the festival day it ranged between 33 and 92 Leq.dB(A). The maximum noise level value 92 Leq.dB(A) was reported at, Recongpeo Satadhar Char Rasta, Ahmedabad city on the festival day. Since, the last year (2019) data has not received, the comparison was not made and as such data of this year has given in table-8.

[AMBIENT NOISE LEVELS DURING DEEPAWALI FESTIVAL 2020]

Table 8 : Ambient Noise Levels in Leq.dB(A) at different locations during Pre-Deepawali & Deepawali day 2020 in Gujarat

S.No.	City	Locations	Pre-Deepawali day 2020	Deepawali day 2020
1.	Ahmedabad	Near Nehru Bridge Char Rasta	69	90
2.		Satadhar Char Rasta	70	92
3.		Umiya mataji mandir, Bhopal	57	81
4.		Vatva Gam, Azad Chok	59	76
5.		Tapan Chowk, Sanand	56	75
6	Gandhinagar	Govt. Staff Quarters, Sector-8	66	84
7		Green Park, Sector 26	65	84
8	Rajkot	Civil Hospital Campus	48	60
9		Shreyas Society, b/h Race Course ring road	53	64
10		Jilla Panchayat Chowk, Nr. Galaxy Cinema	54	66
11	Surat	Delhi Gate	45	51
12		Air India	39	45
13		SVR College	32	33
14	Vadodara	Near Gangotri Appt., Gotri	66	72
15		Near Yash Complex, Gotri	65	70
16		Near GEMRS Hospital, Gotri	57	63

Himachal Pradesh

Observations: In this State, this year 2020, ambient noise monitoring carried out at ten locations in ten cities. On pre-Deepawali day noise level ranged between 37 and 56 Leq.dB(A), while same on the festival day it ranged between 52 and 84 Leq.dB(A). The maximum noise level value 84 Leq.dB(A) was reported at, Recongpeo (C), Kinnaur city on the festival day. The data of this year has compared with previous year and the same has given in table-9.

Table-9 : Ambient Noise Levels in Leq.dB(A) at different locations during Pre-Deepawali & Deepawali day 2019 & 2020 in Himachal Pradesh.

S. No.	Cities	Locations	Pre-Deepawali day		Deepawali day	
			2019	2020	2019	2020
1.	Baddi	Phase-I(R)	60	56↓	72	67↓
2.	Bilaspur	Bilaspur Town(R)	53	53=	61	62↑
3.	Chamba	Near Medical Collage/Distt. Hospital Chamba(S)	39	-	58	-
4.		Chowgan Bazar Chamba, Main Market Chamba(C)	70	-	75	-
5.		Residential Area Hardaspur, Chamba(R)	44	-	51	-
6.	Dharmshala	Dharmshala Building(R)	45	43↓	64	60↓
7.	Kullu	Near Dhalpur Ground(C)	46	47↑	5	65↑

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8.	Kinnaur	Recongpeo(C)	53	54↑	76	84↑
9.	Parwanoo	Sector IV(R)	52	48↓	62	68↑
10.	Paonta Sahib	Himuda Colony, Shubkhera,(R)	50	50=	64	62↓
11.	Rampur	Bhushar (C)	53	55↑	81	81=
12.	Shimla	Rigde (C)	47	47=	79	78↓
13.	Una	Rotary Chowk (R)	71	-	92	-
14.		Rakkar Colony (R)	42	37↓	45	52↑
15.		Govt. Hospital (S)	46	-	66	-

Note: (-) indicates data not received.

Jammu

Observations: In this state, this year 2020, ambient noise monitoring was carried out at four locations in Jammu city. On pre-Deepawali day noise level ranged between 77 and 78 Leq.dB(A), while on the festival day, it ranged between 85 and 94 Leq.dB(A). The maximum noise level value 94 Leq.dB(A) was reported at Gole Market, Gandhi Nagar (C) on the festival day. The data of this year has compared with previous year and the same has given in table-10.

S. No.	City	Locations	Pre-Deepawali day		Deepawali day	
			2019	2020	2019	2020
1.	Jammu	Rehari Chungi(C)	75	77↑	86	90↑
2.		Gole Market Gandhi Nagar(C)	75	78↑	93	94↑
3.		Bakshi Nagar(Govt. Medical College)	77	77=	83	85↑
4.		Kachi Chowini/ Parade(C)	78	77↓	87	91↑

Jharkhand

Observations: In this state, this year 2020, ambient noise monitoring was carried out at three locations in Dhanbad city. On pre-Deepawali day noise level ranged between 65 and 72 Leq.dB(A), while on festival day it ranged between 93 and 97 Leq.dB(A). The maximum noise level value 97 Leq.dB(A) was reported at Bank More, Dhanbad on the festival day. Since, the last year (2019) data has not received, the comparison was not made and as such data of this year has given in table-11.

S. No.	City	Locations	Pre-Deepawali day 2020	Deepawali day 2020
1.	Dhanbad	Bartand	69	93
2.		Hirapur	65	96
3.		Bank More	72	97

[AMBIENT NOISE LEVELS DURING DEEPAWALI FESTIVAL 2020]

Madhya Pradesh

Observations: In this state, this year 2020, ambient noise monitoring was carried out at three locations in Guna city. The pre-Deepawali day noise level ranged between 39 and 47 Leq.dB(A), while on Deepawali day it ranged between 52 and 81 Leq.dB(A). The maximum noise level value 81 Leq.dB(A) was reported at Jai Stambh Chauraha Near Traffic Police Centre (C), Guna on the festival day. Since, the last year (2019) data has not received, the comparison was not made and as such data of this year has given in table-12.

Table-12: Ambient Noise Levels in Leq.dB(A) at different locations during Pre-Deepawali & Deepawali day 2020 in Madhya Pradesh

S. No.	Cities	Locations	Pre-Deepawali day 2020	Deepawali day 2020
1.	Guna	Debu Colony (R)	43	79
2.		Jai Stambh Chauraha Near Traffic Police Centre, (C)	47	81
3.		District Hospital	39	52

Meghalaya

Observations: In this state, this year 2020, ambient noise monitoring carried out at four locations in Shillong city. On pre-Deepawali day noise level ranged between 47 and 51 Leq.dB(A), while on festival day, it ranged between 54 and 64 Leq.dB(A). The maximum noise level value of 64 Leq.dB(A) was reported at Lumpyngngad, (R) and Police Bazar (C) and in Shillong on the festival day. The data of this year has compared with previous year and the same has given in table-13.

Table-13: Ambient Noise Levels in Leq.dB(A) at different locations during Pre-Deepawali & Deepawali day 2019 & 2020 in Meghalaya

S.No.	City	Locations	Pre-Deepawali day		Deepawali day	
			2019	2020	2019	2020
1.	Shillong	Lumpyngngad (R)	52	50↓	64	64=
2.		Police Bazar (C)	63	51↓	73	64↓
3.		Lawmali (S)	55	47↓	68	58↓
4.		EPIT, Byrnihat	-	50	-	54

Note: (-) indicates data not received.

Mizoram

Observations: In this State, this year 2020, ambient noise monitoring was carried out at four locations in Aizawl city. On pre-Deepawali day noise level ranged between 37 and 55 Leq.dB(A), while on festival day, it ranged between 36 and 57 Leq.dB(A). The maximum noise level value of 57 Leq.dB(A) was reported at **Bawngkawn, Aizawl** on Deepawali day. The data of this year has compared with previous year and the same has given in table-14.

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Table-14 : Ambient Noise Levels in Leq.dB(A) at different locations during Pre-Deepawali & Deepawali day 2019 & 2020 in Mizoram

S.No.	City	Locations	Pre-Deepawali day		Deepawali day	
			2019	2020	2019	2020
1.	Aizawl	Laipuitlang	49	44↓	49	41↓
2.		Dawrpui	57	55↓	56	54↓
3.		Khatla	-	37	-	36
4.		Bawngkawn	-	42	-	57

Note: (-) indicates data not received.

Odisha

Observations: In this State, this year 2020, ambient noise monitoring was carried out at fifty three locations in fourteen cities. On pre-Deepawali day noise level ranged between 47 and 80 Leq.dB(A), while same on the festival day it ranged between 46 and 80 Leq.dB(A). The maximum noise level value as 80 Leq.dB(A) was reported at Kalinganagar Industrial Complex, Kalinganagar on pre-Deepawali Day and Nayapalli, Bhubaneswar on festival day. The data of this year has compared with previous year and the same has given in table-15.

Table-15: Ambient Noise Levels in Leq.dB(A) at different locations during Pre-Deepawali & Deepawali day 2019 & 2020 in Odisha State

S.No.	Cities	Locations	Pre-Deepawali day		Deepawali day	
			2019	2020	2019	2020
1.	Angul	Amalpada (R)	63	58↓	73	66↓
2.		Bazar Chhak (C)	74	60↓	82	63↓
3.		District HQ (S)	65	70↑	66	73↓
4.		Hakimpada, East Angul (I)	61	63↑	67	66↓
5.	Balasore	Sahadevkhunta (R)	63	55↓	79	64↓
6.		Motiganj (C)	80	73↓	87	76↓
7.		District HQ Hos. (I)	60	59↓	66	60↓
8.		Balasore Industrial Estate I)	58	60↑	73	64↓
9.	Berhampur	Brahmanagar (R)	55	49↓	73	62↓
10.		Girija Market Square (C)	76	70↓	76	75↓
11.		MKCG Medical College Hospital Campus (S)	64	61↓	67	58↓
12.		Ankuli Industrial Estate (I)	65	67↑	67	60↓
13.	Bhubaneswar	Nayapalli (R)	65	65=	67	80↑
14.		Sahid Nagar (C)	61	74↑	72	79↑
15.		Capital Hospital (S)	55	49↓	63	61↓
16.		Rasulgarh (I)	58	61↑	69	70↑
17.	Cuttack	Suryaihar Link (R)	67	64↓	76	70↓
18.		Badambadi (C)	76	70↓	77	71↓
19.		SCB Medical College & Hospital (S)	67	65↓	69	67↓
20.		Khapuria Industrial Estate(I)	71	66↓	76	65↓

[AMBIENT NOISE LEVELS DURING DEEPAWALI FESTIVAL 2020]

S.No.	Cities	Locations	Pre-Deepawali day		Deepawali day	
			2019	2020	2019	2020
21.	Jharsuguda	Cox Colony(R)	68	50↓	88	68↓
22.		Jhanda Chowk (C)	70	67↓	82	72↓
23.		Near Mangala Bazar(S)	67		86	-
24.		Bombay Chowk (I)	71	72↑	80	66↓
25.	Kalinganagar	Sapagadia (R)	71	70↓	84	65↓
26.		Gopabandhu Chhak (C)	77	77=	83	76↓
27.		CHC Hospital (S)	71	72↑	78	69↓
28.		Duburi Chowk, Kalignagar	68	-	78	-
29.		Kalinganagar Industrial Complex	-	80	-	72
30.	Keonjhar	Baniapat Chowk (R)	72	62↓	75	76↓
31.		Punjabi Chowk (C)	76	68↓	81	72↓
32.		Govt. Hospital (S)	64	60↓	71	66↓
33.		Drupada I/E		70		74
34.	Konark	Madhipur(R)	58	47↓	64	57↓
35.		NAC Market (C)	75	57↓	72	60↓
36.		Public Health Center(I)	60	50↓	60	46↓
37.	Pardeep	PPT colony, Madhuban (R)	64	54↓	72	58↓
38.		Badpadia Market (C)	70	65↓	76	65↓
39.		Biji Memorial Hos., Atharbanki(S)	58	56↓	73	63↓
40.		IFFCO Ltd. (I)	67	59↓	78	64↓
41.	Puri	Kumutisahi, Old Sadar lane(R)	71	72↑	77	64↓
42.		Sri Mandir, Puri(C)	77	78↑	84	75↓
43.		District HQ Hospital (S)	65	65=	74	60↓
44.	Rayagada	Indira Nagar	74	69↓	89	68↓
45.		Main Market	74	68↓	83	72↓
46.		Dist. HQ Hospital	72	64↓	81	64↓
47.		JESCO(I)	68	76↓	80	75↓
48.	Rourkela	Sec- 6(R)	51	48↓	71	66↓
49.		Amabagan(C)	64	60↓	72	64↓
50.		IGH, Steel Township(S)	49	49=	62	55↓
51.		Main Gate of RSP (SAIL)(I)	67	72↑	68	62↓
52.		Sector-4(R)	-	-	-	-
53.		Bisra Chowk(C)	-	-	-	-
54.	Sambalpur	Ainthapall(R)	59	60↑	78	65↓
55.		Goal Bazar Chowk(C)	75	74↓	83	74↓
56.		Dist. HQ Hospital, Modipara(S)	53	54↑	71	60↓
57.		Bareipali (I)	67	59↓	84	70↓

Note: (-) indicates data not received.

[AMBIENT NOISE LEVELS DURING DEEPAWALI FESTIVAL 2020]

Puducherry (UT)

Observations: In this UT, this year 2020, ambient noise monitoring was carried out at only one location i.e. Mudaliarpet R). On pre-Deepawali day, noise level was 69 Leq.dB(A), while on the festival day it was reported 86 Leq.dB(A). The data of this year has compared with previous year and the same has given in table-16.

Table-16: Ambient Noise Levels in Leq.dB(A) at different locations during Pre-Deepawali & Deepawali day 2019 & 2020 in Puducherry

S.No.	City	Location	Pre-Deepawali day		Deepawali day	
			2019	2020	2019	2020
1.	Puducherry	Mudaliarpet (R)	70	69↓	91	86↓

Rajasthan

Observations: In this State, this year 2020, ambient noise was monitoring carried out at thirty locations in fourteen cities. On pre-Deepawali day noise level ranged between 49 and 75 Leq.dB(A), while same on the Deepawali day noise level ranged between 56 and 78 Leq.dB(A). The maximum noise level 78 Leq.dB (A) was reported at two locations i.e. Pole Gate (C), Udaipur and Kala Kuan (R), Alwar on the festival day. The data of this year has compared with previous year and the same has given in table-17.

Table-17: Ambient Noise Levels in Leq.dB(A) at different locations during Pre-Deepawali & Deepawali day 2019 & 2020 in Rajasthan

S. No.	Cities	Locations	Pre-Deepawali day		Deepawali day	
			2019	2020	2019	2020
1.	Jaipur	Gandhi Nagar (R)	57	67↑	93	67↓
2.		Jawahar Nagar (R)	63	55↓	81	60↓
3.		Raja Park (C)	66	61↓	80	67↓
4.		Mansarovar (C)	57	49↓	83	66↓
5.		SDM Hospital (S)	65	62↓	72	60↓
6.		Civil Line (S)	67	65↓	71	68↓
7.	Ajmer	Kutchery Road (R)	73	71↓	74	76↑
8.	Bhilwara	Azad Nagar (R)	70	51↓	91	61↓
9.		Kumbha Circle Azad Ngr (C)	66	70↑	76	75↓
10.	Pali	Maharaja Shree Umed Mills (R)	69	67↓	68	73↑
11.		Surajpol, Townhall (C)	67	67=	68	74↑
12.		Bangur Hospital (S)	65	72↑	68	76↑
13.	Bikaner	Junagarh (C)	71	71=	79	73↓
14.	Jodhpur	Shashtri Ngr P. Station (C)	64	64=	79	67↓
15.		Maha Mandir Police Station(R)	64	63↓	81	62↓
16.	Kota	MBS Hospital(S)	69	66↓	74	74=
17.		Dadawada(R)	56	53↓	67	63↓
18.		Gumanpura(C)	70	69↓	86	77↓

[AMBIENT NOISE LEVELS DURING DEEPAWALI FESTIVAL 2020]

S. No.	Cities	Locations	Pre-Deepawali day		Deepawali day	
			2019	2020	2019	2020
19.	Udaipur	Pole Gate (C)	76	75↓	83	78↓
20.		M.B. Hospital (S)	68	69↑	69	71↑
21.		Amba Mata Scheme (R)	69	70↑	79	73↓
22.	Alwar	Kala Kuan (R)	64	51↓	91	78↓
23.		General Hospital (S)	61	62↑	71	66↓
24.	Bhiwadi	Ashiana Garden Society (R)	62	63↑	78	70↓
25.		Star Hospital (S)	60	57↓	73	60↓
26.	Sikar	Nawalgarh Road	59	52↓	71	56↓
27.	Chitorgarh	Public Park (C)	63	60↓	77	63↓
28.		Guard Ofc. Kumbha	60	65↑	80	70↓
29.	Bharatpur	Iaxmi Mandir Shouwk (C)	61	62↑	71	66↓
30.	Balotra	Maheshwari railway Crossing (C)	59	52↓	76	73↓

Sikkim

Observations: In this State, this year 2020, ambient noise monitoring was carried out at one location, M.G. Marg in Sikkim. On Pre-Deepawali Day it was reported as 61 Leq dB(A) whereas it was reported as 60 Leq DB(A) on Deepawali day. Since, the last year (2019) data has not received, the comparison was not made and as such data of this year has given in table-18.

Table-18 : Ambient Noise Level in Leq.dB(A) during Pre-Deepawali & Deepawali day, 2020 in Sikkim

S. No.	Cities	Locations	Pre-Deepawali day 2020	Deepawali day 2020
1.	Sikkim	M.G. Marg	61	60

Tamil Nadu

Observations: In this State, this year 2020, ambient noise monitoring was carried out at twenty five locations in twelve cities. On pre-Deepawali day noise level ranged between 50 and 78 Leq.dB(A), while on festival day it ranged between 67 and 97 Leq.dB(A). The maximum noise level as 97 Leq.dB (A) was reported at Birla Visram(C), Madurai on festival day. The data of this year has compared with previous year and the same has given in table-19.

[AMBIENT NOISE LEVELS DURING DEEPAWALI FESTIVAL 2020]

Table-19 : Ambient Noise Levels in Leq.dB(A) at different locations during Pre-Deepawali & Deepawali day 2019 & 2020 in Tamil Nadu						
S. No.	Cities	Locations	Pre-Deepawali day		Deepawali day	
			2019	2020	2019	2020
1.	Chennai	Besant Nagar(R)	55	68↑	76	84↑
2.		Nungambakkam(R)	57	64↑	79	75↓
3.		Sowcarpt(C)	73	55↓	84	78↓
4.		T. Nagar(C)	80	64↓	80	79↓
5.		Triplicane(R)	-	60	-	78
6.	Coimbatore	Kavundampalayam(R)	68	61↓	79	73↓
7.		District Collector Office(M)	62	60↓	66	67↑
8.	Cuddalore	Imperial Road (C)	77	77=	81	82↑
9.		Pudupalayam Village(R)	65	71↑	77	80↑
10.	Dindigul	Nagal Pudhur(R)	55	59↑	64	72↑
11.		Rajagopal(C)	72	72=	79	74↓
12.	Hosur	INEL Transit House(R)	51	54↑	80	81↑
13.		ESI Hospital(S)	50	73↑	79	75↓
14.	Madurai	Thirunagar(R)	65	61↓	88	75↓
15.		Birla Visram(C)	68	64↓	71	97↑
16.	Salem	Sri Saradha Balamandhir(R)	55	57↑	72↓	67↓
17.		Siva Tower(C&I)	58	64↑	71	78↑
18.	Thoothukudi	Raju Nagar, Thoothukudi (R)	59	78↑	75	73↓
19.	Tiruppur	Rayapuram(R)	55	50↓	81	73↓
20.		Kumaran Complex(C)	63	55↓	86	88↑
21.	Trichy	Thillai Nagar(R)	61	64↑	82	85↑
22.		Arulanatha ammal Nagar(R)	59	-	81	-
23.	Tirunelveli	Pettai Nearer to nursing home(S)	56	54↓	60	91↑
24.		Vannarpettai(C)	59	61↑	64	92↑
25.	Vellore	Gandhi Nagar (R)	57	59↑	74	72↓
26.		SIDCO Thiru Nagar (C)	50	58↑	67	68↑

Note: (-) indicates data not received.

[AMBIENT NOISE LEVELS DURING DEEPAWALI FESTIVAL 2020]

Tripura

Observations: In this State, this year 2020, ambient noise monitoring was carried out at twenty seven locations in 04 cities. On pre-Deepawali day noise level ranged between 36 and 69 Leq.dB(A), while on festival day it ranged between 52 and 78 Leq.dB(A). The maximum noise level 78 Leq.dB (A) was reported at Ambassa Bazar (C), Ambassa on festival day. Since, the last year (2019) data has not received, the comparison was not made and as such data of this year has given in table-20.

Table-20 : Ambient Noise Level in Leq.dB(A) during Pre-Deepawali & Deepawali day, 2020 in Tripura

S. No.	Cities	Locations	Pre-Deepawali day 2020	Deepawali day 2020
1.	Dharmanagar	Railway Station (C)	58	68
2.		Dharmanagar circuit house (R)	50	55
3.		SDM and judges quarter (R)	65	65
4.		Dharmanagar Hospital (S)	49	54
5.		D.N. Vidyamandir (S)	66	65
6.	Ambassa	Ambassa District Hospital (S)	44	52
7.		Kulai Class XII School (S)	53	65
8.		Bauli Basti (R)	54	60
9.		Ambassa Bazar (C)	63	78
10.		Dalubari Gate (S)	59	69
11.	Agartala	Ashram chowmuhani (C)	60	72
12.		Capital complex (R)	36	54
13.		Circuit House (R)	59	65
14.		Indranagar (R)	55	63
15.		G.B Hospital (S)	57	57
16.		M.B.B. Collage (S)	42	57
17.		Battala (C)	69	71
18.		Astabal (C)	68	72
19.		Duraga Chowmuhani (C)	64	64
20.		Netaji Chowmuhani (C)	63	67
21.		A. D. Nagar (R)	52	59
22.		I.G.M Hospital (S)	61	59
23.	Udaipur	Brahmabari (C)	63	69
24.		Bridge Chowmuhani (R)	57	69
25.		West Bank of Amar Sagar (R)	63	61
26.		Hospital Area (S)	54	68
27.		Matabari/Tripureswari Temple(S)	55	72

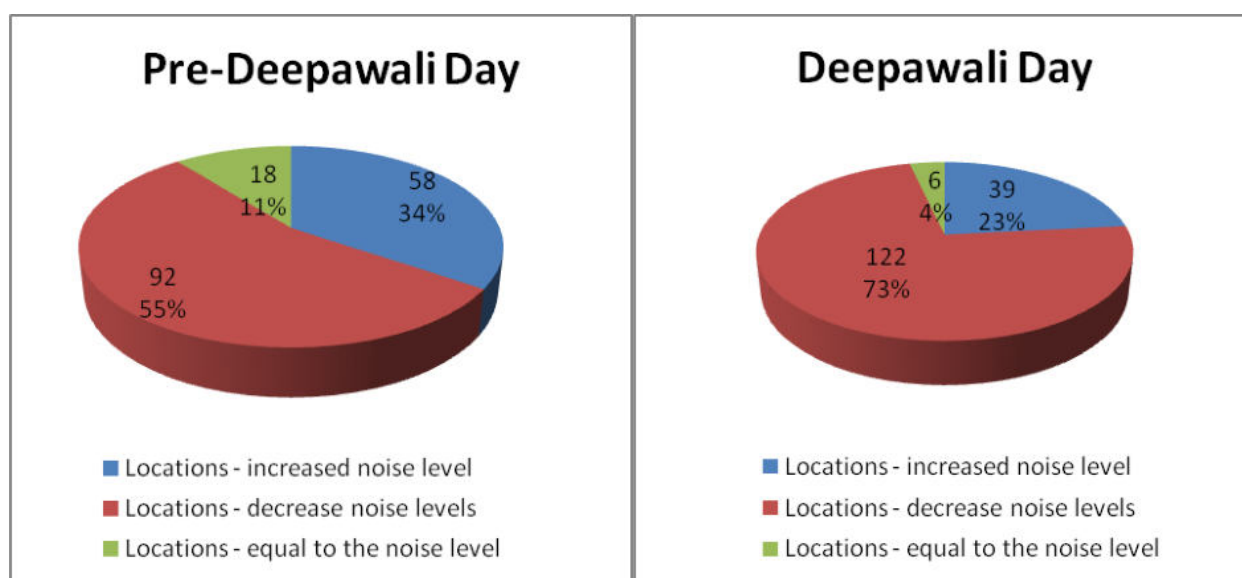
5. Conclusion:

This year 2020, across the country, due to lock down & pandemic (covid-19) situations, no. of noise monitoring locations are decreased significantly comparing with last year-2019. Across the nation, we have received ambient noise monitoring data from 93 cities for 251 locations in this year 2020.

This year 2020, on pre-Deepawali day noise level ranged between 32 and 87 Leq.dB(A) while same on the festival day ranged between 33 and 97 Leq.dB(A). On pre-Deepawali Day, the minimum noise level 32 Leq.dB(A) was reported at SVR College, Surat (Gujarat) and the maximum noise level 87 Leq.dB(A) was reported at Christanpatty (R), Nagaon (Assam) while on Deepawali day minimum noise level 33 Leq.dB(A) was reported at SVR College, Surat (Gujarat) and the maximum noise level 97 Leq.dB(A) was reported at two locations i.e. Bank More, Dhanbad (Jharkhand) and Birla Visram (C), Madurai, Tamil Nadu.

Out of 251 locations, 168 locations monitoring conducted in the same location of last year and it is compared with this year on pre-Deepawali Day and 167 locations are compared on Deepawali day, as these locations are remain same in both the year (2019 & 2020). On pre-Deepawali day, out of 168 locations, noise level increased at 58 locations, decreased at 92 locations and 18 locations are equal to the previous year noise levels. On Deepawali day, out of 167 locations, noise level increased at 39 locations, decreased at 122 locations and 06 locations are equal to the previous year noise levels. In general, a noise levels at same locations (last year & this year) shows some improvements as compared to the last year (2019). Over all, the percentage distributions of noise level in terms of increase, decrease, & equal with respect to the number of locations for the year 2019 & 2020 are depicted in the following in pie charts.

The percentage distribution of Noise level with respect to locations during pre-Deepawali and Deepawali day (2019 & 2020)



6. Recommendations:

1. The Noise standards for fire-crackers were notified by MoEF under the Environment (Protection) (Second Amendment) Rules, 1999 vide G.S.R.682(E), dated the 5th October, 1999 and inserted as serial no. 89 of Schedule I of the Environment (Protection) Rules, 1986. Subsequently these Rules were amended by the Environment (Protection) Second Amendment Rules, 2006 vide G.S.R. 640(E), dated the 16th October, 2006, under the Environment (Protection) Act, 1986 guidelines should be followed by the manufacturer and the Department of Explosives to implement the following standards
 - (i) The manufacture, sale or use of fire-crackers generating noise level exceeding 125 dB(AI) or 145 dB(C)pk at 4 meters distance from the point of bursting should be prohibited.
 - (ii) For individual fire-cracker constituting the series (joined fire-crackers), the above mentioned limit be reduced by $5 \log_{10}(N)$ dB, where N = number of crackers joined together.
2. The State Government shall take measures for abatement of air pollution including noise emanating from various zones during Deepawali day festival and ensure that the existing level do not exceed the Ambient Air Quality Standards and Ambient Noise Standards.
3. All concerned agencies like Electronic, print media, Central & State Governments, Central & State Pollution Control Boards or Pollution Control Committees, Educational institutions & NGOs should create awareness among students & public at large to avoid bursting of fire-crackers to reduce air pollution & noise during festival of Deepawali day.
4. The order of the Hon'ble Supreme Court of India, dated September 27, 2001, prohibiting the use of fireworks between 10.00 p.m. and 06.00 a.m. should be strictly enforced.
5. Enforcement of legal action on un-authorized manufacturing, processing and selling of fireworks should be strictly ensured.
6. Designed places for burning of fire-crackers/fireworks may be identified by the local authority, so that fire-crackers could be played at community level and not at individual houses.
7. Recognition for fire-crackers noise under criteria of cruelty to animals should be incorporated under relevant acts and rules.

[AMBIENT NOISE LEVELS DURING DEEPAWALI FESTIVAL 2020]

Annexure-I

The Noise Pollution {Regulation and Control} Rules, 2000 SCHEDULE

(see rule 3(1) and 4(1))

Ambient Air Quality Standards in respect of Noise

Area Code	Category of Area / Zone	Limits in dB(A) Leq*	
		Day Time	Night Time
A	Industrial area	75	70
B	Commercial area	65	55
C	Residential area	55	45
D	Silence Zone	50	40

Note:

- (a) Day time shall mean from 6.00 a.m. to 10.00 p.m.
- (b) Night time shall mean from 10.00 p.m. to 6.00 a.m.
- (c) Silence zone is an area comprising not less than 100 meters around hospitals, educational institutions, courts, religious places or any other area which is declared as such by the competent authority.
- (d) Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.

* dB(A) Leq denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

A “decibel” is a unit in which noise is measured.

“A”, in dB (A) Leq, denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear.

Leq: It is an energy mean of the noise level over a specified period

**Protocol for Ambient Noise Monitoring on
Deepawali day**

1.0 Purpose of Monitoring

This protocol presents the method for Ambient Noise monitoring during Deepawali day Festival. The objective is to see the impact of bursting crackers on Environment and whether ambient noise level is within prescribed noise level standard limit.

2.0 Monitoring Locations/Site Selection:

- Site in a city shall be selected such that each category (Residential, Commercial and Silence Zones) should be covered.
- Instrument should be placed considering following points :
 - Instrument must be away from fascades
 - Instrument must be away from obstacles
 - Microphone must be placed 1.2 -1.5 m above the ground level
 - In dry conditions with a wind speed of less than 5 m/s
 - Isolate the instrument from strong vibration and shock
- Close to any domestic premises, Hotel, Hostel, Hospital, Educational institution etc. do not keep the noise level meter and the measurement.

3.0 Monitoring Equipments

Noise measurements will be made with a Type 1 integrating sound level meter with free-field microphone which meets the Accuracy of noise measurement as per IEC 804 (BS 6698) Grade I or ANSI Type I or equivalent IEC 61672-1(2002-05) Class-I.

4.0 Monitoring frequency: Noise Monitoring on Deepawali day Day is to be carried out from 18.00 Hrs to 24.00 Hrs continuously at each location.

5.0 Sampling Frequency/rate: Duration is of 6 hours from 18.00 Hrs to 24.00 Hrs with 1 sec sampling period.

6.0 Monitoring Parameters: Leq, L10, L90, L50, Lmax, Lmin, LAI (with 1sec sampling period at all locations).

7.0 Criteria for monitoring:

The following criteria will be observed when undertaking the noise monitoring:

- a) During Deepawali day sound comes from more than one direction, it is important to choose a microphone and mounting which gives the best possible Omni directional characteristics;
- b) The noise measurement equipment will be supervised continuously during the monitoring period and notes will be made of the date, time and prevailing weather conditions;
- c) Immediately prior to and following each noise measurement session the accuracy of the noise level meter shall be checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Make sure that the instrument is properly

calibrated. The sound level meter and calibrator will hold a current calibration certificate traceable to national standards;

- d) Noise measurements should not be made in fog and rain;
- e) A wind shield will be used at all times to prevent interference with sound levels;
- f) As far as is practicable, the pause facility on the noise measurement equipment will be used to exclude extraneous noise (e.g. low flying aircraft and road traffic passing in front of the microphone) so that the results recorded are representative of the site noise or if possible for road traffic/other source background noise can be eliminated from final reading by using the following formula:

$$L_{\text{pressure}} = 10 \cdot \log [10^{(L_p/10)} - 10^{(L_{p\text{Background}}/10)}]$$

8.0 The following details will be recorded:

- (i) The date, time, location and duration of the measurement;
- (ii) All predominant noise sources will be noted, which may include extraneous noise such as road traffic, aero-planes and other activity;
- (iii) Weather conditions will be recorded including wind speed and approximate direction, cloud cover, rain and ground frost;

9.0 Noise Monitoring Records

The particulars of the measurements recorded by the noise level meter shall be furnished in the monitoring data sheet, which is attached at **Annexure VII**.

[AMBIENT NOISE LEVELS DURING DEEPAWALI FESTIVAL 2020]

Annexure-III

Data sheet for Ambient Noise Monitoring on Deepawali day

Location:		Date:	
Noise Level Meter			
Make	:		
Model	:		
Serial No.	:		
Calibration Result of Noise Level Meter			
Calibration	94 dB at 1000 Hz	114 dB at 1000 Hz	
Initial			
Final			
Sampling rate			
S. No.	Time duration	File No.	L equivalent dB(A)
	18:00 Hrs. to 19:00 Hrs		
	19:00 Hrs. to 20:00 Hrs		
	20:00 Hrs. to 21:00 Hrs		
	21:00 Hrs. to 22:00 Hrs		
	22:00 Hrs. to 23:00 Hrs		
	23:00 Hrs. to 24:00 Hrs		
Average L equivalent dB(A) Between (18:00 to 24:00 Hrs)			
Name & signature of Official on Duty			

L_{max} and L_{min} between (18:00 to 24:00 Hrs).

PART-II

Ambient Air Quality during Deepawali festival 2020

REPORT ON AMBIENT AIR QUALITY DURING DEEPAWALI FESTIVAL 2020

1.0 Background

Hon'ble Supreme Court in its order dated October 23, 2018 in the matter of Arjun Gopal and Others Versus Union of India and Others Writ Petition (Civil) No. 728 of 2015, directed as follows:

“CPCB and respective State Pollution Control Boards/Pollution Control Committees (SPCBs/PCCs) of the States and Union Territories shall carry out short -term monitoring in the cities for 14 days (commencing from 7 days prior to Deepawali and ending 7 days after Deepawali) for parameters namely Aluminium, Barium, Iron apart from the regulatory parameters against the short-term Ambient Air Quality Criteria Values (AAQCVs) proposed by CPCB with regard to bursting of firecrackers. This will help in generation of data on pollution caused by the bursting of firecrackers and would be helpful for regulation and control quantity of Aluminium, Barium and Iron used in the manufacture of firecrackers”.

In compliance of above, like last year (2019) CPCB conducted monitoring in 2020 at eight cities namely Delhi (CPCB Head Quarter) and Agra, Bhopal, Bengaluru, Kolkata, Lucknow, Shillong and Vadodara where its Regional Directorates are situated and Diwali is widely celebrated. 15 days monitoring (07th November to 21st November); 7 days prior (07th November to 13th November - Pre-Diwali period); Diwali day (14th November) and 7 days after Diwali (15th November to 21st November - Post-Diwali period); was conducted by CPCB.

In addition to the NAAQS parameters (PM₁₀, PM_{2.5}, SO₂ and NO₂ and metals such as Pb, Ni & As in PM₁₀) and elements (Al, Ba, and Fe) used in composition of firecrackers, which may have harmful effects on inhalation, are also included in monitoring plan. Al, Ba, and Fe are monitored in PM_{2.5} fraction as proposed in AAQCVs.

2.0 Monitoring locations

City wise locations covered for monitoring is presented in Table 1.

S. No.	States	City	Name of the location	Parameters covered
01	Delhi	Delhi NCT	1) Pitampura 2) Janakpuri, 3) ITO	Regulatory Parameters like PM ₁₀ , PM _{2.5} , SO ₂ , NO ₂ , Metals (Pb, Ni, As in PM ₁₀) and parameters related to AAQCVs (Al, Fe and Ba in PM _{2.5})
02	Gujarat	Vadodara	1) Gotri Water Tank 2) M.S. University Campus	
03	Karnataka	Bengaluru	1) Rajarajeshwari Nagar 2) Basaveshwara Nagar	
04	Madhya Pradesh	Bhopal	1) North T.T.Nagar, 2) Nehru Nagar	
05	Uttar Pradesh	Agra	1) Taj Mahal 2) Nunhi	
		Lucknow	1) Viksh Khand, Gomt Nagar, 2) Mayur Vihar, Indira Nagar	
06	West Bengal	Kolkata	1) Kasba 2) Behala 3) North avenue	
07	Meghalaya	Shillong	1) Lower Motinagar 2) ICI Church Compound, Happy Valley	

3.0 Results and Discussion

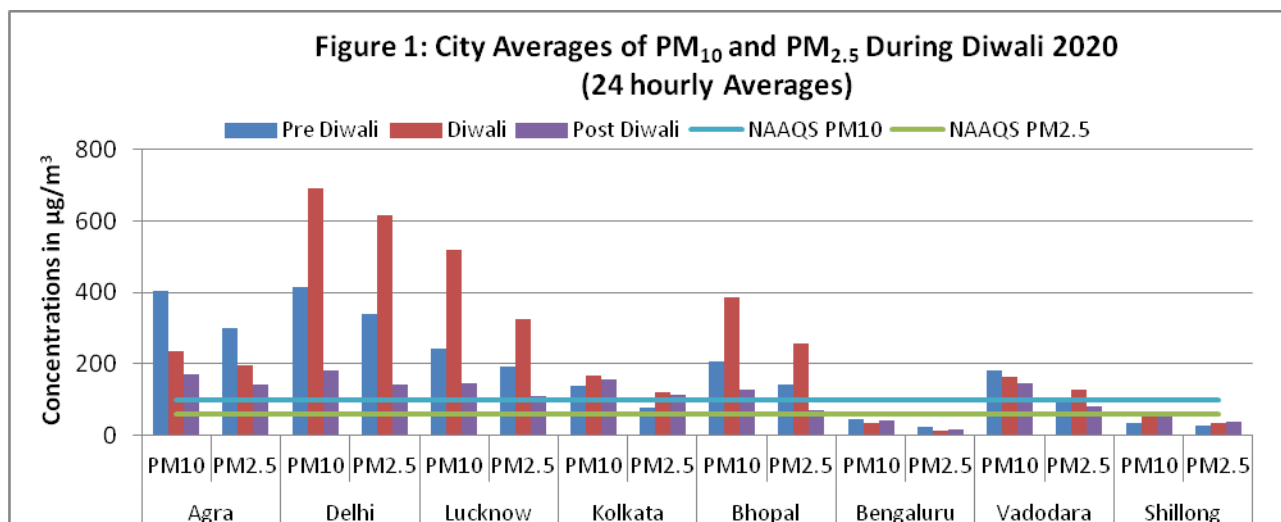
Data were analysed for Pre-Diwali (07th November to 13th November, Diwali (14th November and Post Diwali period (15th November to 21st November). Parameter-wise results are discussed as under:

3.1 NAAQS parameters (PM₁₀, PM_{2.5}, SO₂, NO₂ and metals (Pb, Ni & As) in PM₁₀

a) Particulate Matter (PM₁₀ and PM_{2.5})

PM₁₀ and PM_{2.5} data of representative stations in respective cities are averaged to assess the overall air quality of the city with respect to Particulate matter during pre-Diwali, Diwali day and post Diwali is depicted in Figure 1.

[AMBIENT AIR QUALITY DURING DEEPAWALI FESTIVAL 2020]



From Figure 1 it may be seen that during 15 days (07th November to 21st November, 2020) Diwali monitoring period, 24 hourly averages of both PM₁₀ and PM_{2.5} found above the NAAQS (National Ambient Air Quality Standard) i.e 100 µg/m³ (PM₁₀) and 60 µg/m³ (PM_{2.5}) in all cities except Bengaluru and Shillong. These two cities didn't cross NAAQS for PM₁₀ and PM_{2.5} on Diwali day even.

Average PM₁₀ and PM_{2.5} in Agra during Pre-Diwali days were higher than Diwali and Post Diwali days. During pre deepawali days the whole north India was receiving particulates from north-west direction and elevated levels of particulates may be attributed to biomass or stubble burning. Surprisingly on Deepawali day the average wind speed in Agra was increased from 0.8 m/s to 1.9 m/s and that might have caused rapid dispersion. Reduction in PM₁₀ observed in Vadodara may be attributed to restricted vehicular movement and local meteorology.

Substantial addition of Particulates (both PM₁₀ and PM_{2.5}) was observed on Diwali days in Delhi, Lucknow and Bhopal.

Post Diwali Monitoring has revealed that particulates (both PM₁₀ and PM_{2.5}) in all the cities declined in similar pattern.

City-wise increase/decrease in PM₁₀ and PM_{2.5} on Diwali day is presented in Table 2.

	Agra	Delhi	Kolkata	Bengaluru	Bhopal	Lucknow	Vadodara	Shillong
PM ₁₀	-41.5	67.1	22.6	-24.8	86.2	114.0	-10.0	53.7

[AMBIENT AIR QUALITY DURING DEEPAWALI FESTIVAL 2020]

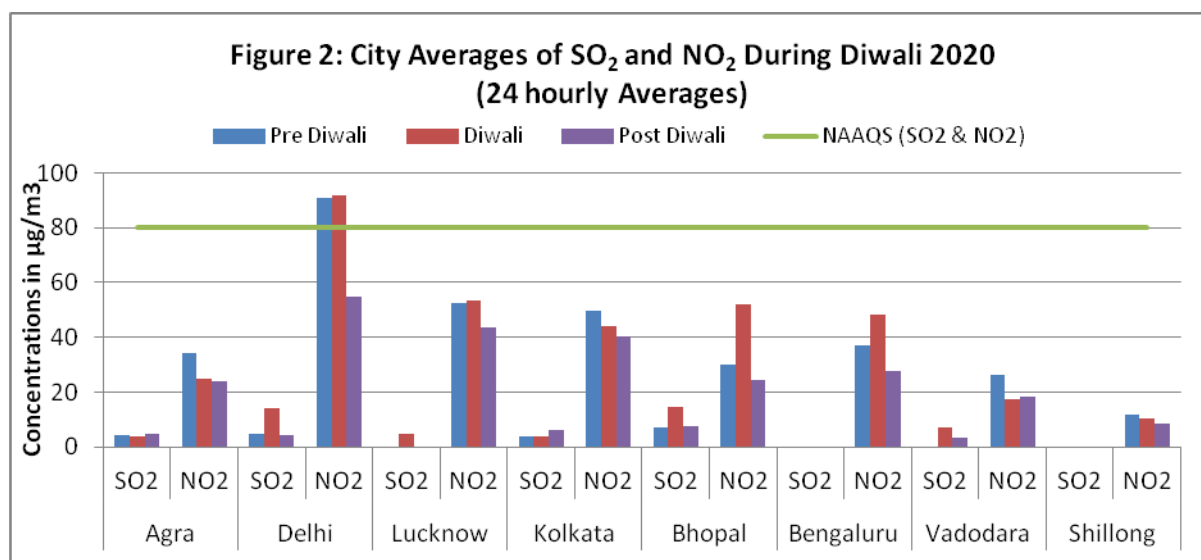
PM_{2.5}	-34.8	82.9	53.6	-41.4	81.3	67.6	26.0	30.5
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Both PM₁₀ and PM_{2.5} were increased in cities like Delhi, Kolkata, Bhopal, Lucknow and Shillong. PM_{2.5} found higher in Vadodara; however, Agra and Bengaluru recorded decline in both PM₁₀ and PM_{2.5}. The increase in PM₁₀ was recorded by 22.6 % to 114% on 14th November, 2020 (Diwali day) compared to Pre-Diwali period among various cities monitored. Highest increment in PM₁₀ on Diwali day was reported in Lucknow (114%) followed by Bhopal (86.2%), Delhi (67.1%), Shillong (53.7%) and Kolkata (22.6%).

On Diwali day, PM_{2.5} was increased by 26 - 82.9% compared to Pre-Diwali period among the various cities monitored. Highest increment was recorded in Delhi (82.9%), followed by Bhopal (81.3%), Lucknow (67.6%), Kolkata (53.6%), Shillong (30.5%) and Vadodara (26%).

b) Sulphur di oxide (SO₂) and Nitrogen di oxide (NO₂)

Fig 2 depicts the concentrations of criteria gaseous pollutants (SO₂ and NO₂) at all cities. SO₂ was found always within the prescribed 24 hourly NAAQS (80µg/m³) throughout the monitoring period including Diwali day. Increase in SO₂ concentration on Diwali day at cities like Delhi, Lucknow, Bhopal and Vadodara are evident. Increase on Diwali day may be attributed to oxidation of sulphur due to bursting of cracker. Bengaluru and Shillong reported SO₂ at Below Detection Limit (4 µg/m³).



NO₂ was reported within prescribed 24 hourly NAAQS (80µg/m³) in all the cities except Delhi during Pre-Diwali, Diwali and post Diwali days. During Pre Diwali period and on Diwali day NO₂ was found to above NAAQS in Delhi. Delhi, Bhopal, Lucknow and Bengaluru reported increase in NO₂ on Diwali day compared to Pre-Diwali period.

3.2 Metals in PM₁₀ (NAAQS Parameters)

Lead Nickel and Arsenic (Pb, Ni and As) concentrations are prescribed in NAAQS 2009. The value of these metals found during Diwali 2020 in Delhi is presented in Table 3.

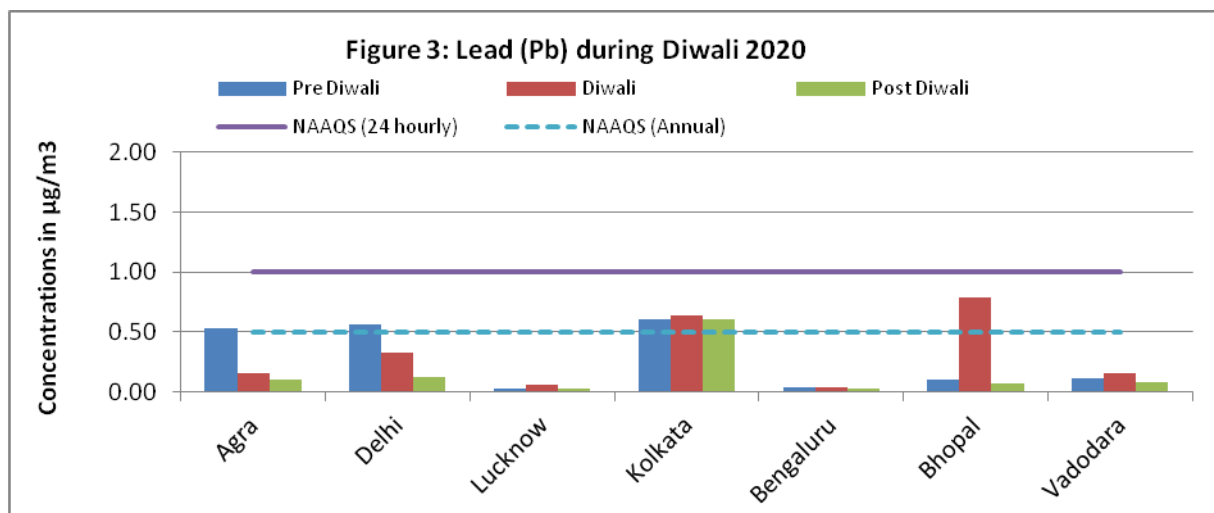
	Nickel (Ni)	Lead (Pb)	Arsenic (As)
Pre Diwali (7 days)	6.57	558	7.52
Diwali	4.67	326	19.67
Post Diwali (7 Days)	4.24	125	3.81
NAAQS	20	1000	6

Notes: (i) All values are in ng/m³; (ii) Nickel and Arsenic has only annual standard and (iii) Pb have both 24 hourly (1000 ng/m³) and annual standards (500 ng/m³)

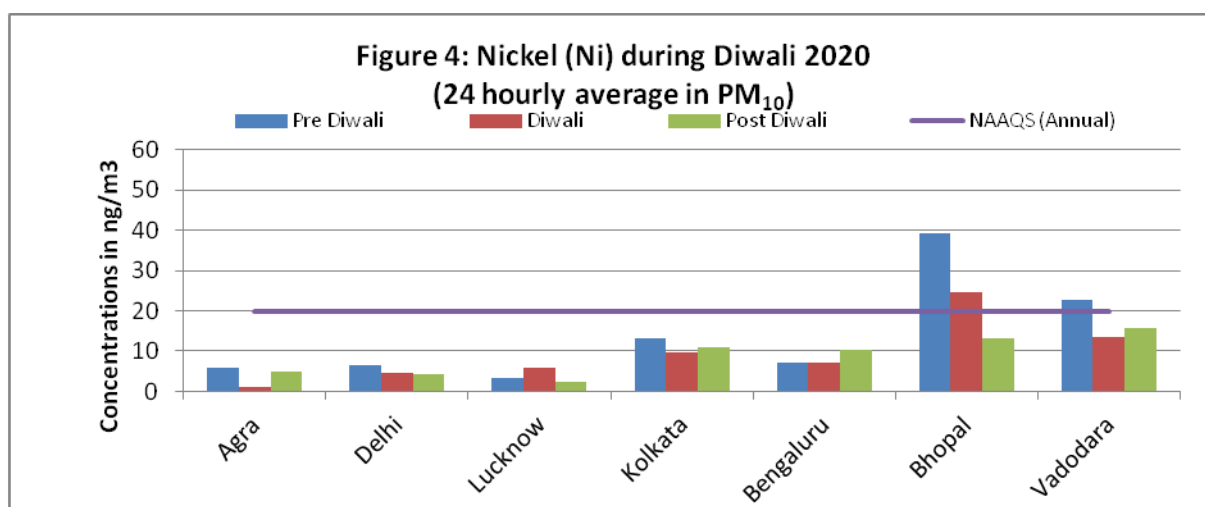
Comparison of 24 hourly average values obtained during 15 days monitoring period may not be logically correct against annual prescribed standards. The increase in Arsenic concentration on Diwali day is a point of concern as major additional activity is fireworks.

Lead (Pb), Nickel (Ni) and Arsenic in ambient air (PM₁₀) in various cities during the study period are depicted in Figure 3, Figure 4 and Figure 5. Comparison of 24 hourly average values obtained during 15 days monitoring period may not be logically correct against annual prescribed standards.

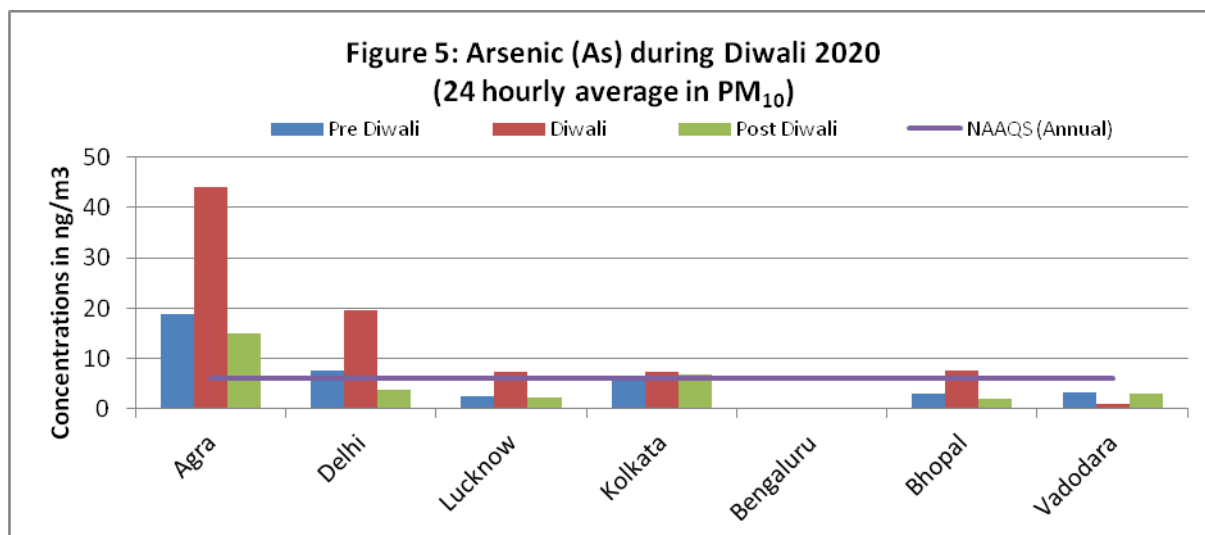
[AMBIENT AIR QUALITY DURING DEEPAWALI FESTIVAL 2020]



Lead (Figure 3) found to remain always within 24 hourly prescribed NAAQS limit during Diwali days (15 days monitoring period) at all cities. Higher lead concentrations in Bhopal on Diwali day compared to pre and post diwali period may be a matter of further investigation and might be due to bursting of spurious crackers.



Nickel (Ni): As depicted in Figure 4 concentration of Nickel found higher during pre-Diwali days in Agra, Delhi, Kolkata, Bhopal and Vadodara may be attributed to general urban sources MSW burning. It remained always within 20 ng/m³ (NAAQS - Annual average value) in all the cities during the period except pre-Diwali averages in Bhopal and Vadodara.



Arsenic was found to increase and crossed the prescribed annual concentration limit on Diwali day in Agra, Delhi, Lucknow, Kolkata and Bhopal. It may not be considered as an exceedance as these are 24 hourly values; however the sharp increase in Arsenic on Diwali day may be correlated to fireworks (contamination in raw material or intrusion of non-approved chemicals in spurious crackers).

3.3 Elements in PM_{2.5}

Three parameters (Aluminium, Barium and Iron) used in manufacturing of firecrackers for which short term Ambient Air Quality Criteria Values (AAQCVs) were proposed due to possible health impact. City-wise summary of 15 days data of prescribed elements in PM_{2.5} for Pre-Diwali period, Diwali day and Post Diwali period is presented in Table 3.

	Agra			Bhopal			Bengaluru			Delhi		
	Al	Ba	Fe	Al	Ba	Fe	Al	Ba	Fe	Al	Ba	Fe
Pre Diwali	1.3	0.1	0.6	1.3	0.2	1.0	0.2	0.02	0.3	2.0	0.1	1.6
Diwali	4.4	2.3	0.2	22.5	23.8	1.5	1.8	1.1	0.3	27.6	11.5	1.6
Post Diwali	1.1	0.4	0.4	1.1	0.5	0.5	0.5	0.3	0.2	1.0	0.2	0.7
	Kolkata			Lucknow			Vadodara			Shillong		
	Al	Ba	Fe	Al	Ba	Fe	Al	Ba	Fe	Al	Ba	Fe
Pre Diwali	0.6	0.03	0.8	0.8	0.1	0.7	1.2	0.3	0.9	0.10	0.10	0.10
Diwali	4.6	3.5	0.9	19.2	17.2	1.0	8.3	5.3	0.6	1.50	0.80	0.10
Post Diwali	1.3	0.6	0.8	2.0	1.3	0.4	1.4	0.6	0.5	0.30	0.10	0.20

Note: (a) All Values are in $\mu\text{g}/\text{m}^3$ in PM_{2.5} (b) Short Term Critical Ambient Air Quality Critical Values (CAAQVs) are: Al - 40 $\mu\text{g}/\text{m}^3$; Ba - 4.0 $\mu\text{g}/\text{m}^3$ and Fe - 40.0 $\mu\text{g}/\text{m}^3$ (All these are given for 24 hourly averages)

[AMBIENT AIR QUALITY DURING DEEPAWALI FESTIVAL 2020]

From the above Table it is evident that Aluminium and Iron in PM_{2.5} fraction are well within the prescribed short term AAQCVs in all cities; however, the violation occurred in Barium in various cities on Diwali day. Barium exceeded AAQCVs (4.0 µg/m³) in Bhopal, Delhi, Lucknow and Vadodara.

Year wise comparison (2017 – 2020) of Diwali day's data of Delhi is presented in Table 4. Reduction in Aluminum and Barium concentrations were observed in 2020 compared to 2019. Gradual betterment in ambient air metal concentrations in PM_{2.5}

Table 4: Comparison of PM _{2.5} and elements in PM _{2.5} in Delhi during Diwali 2017, 2018, 2019 and 2020																
All Concentrations are in µg/m ³																
	PM _{2.5}				Aluminum (Al)				Barium (Ba)				Iron (Fe)			
	2017	2018	2019	2020	2017	2018	2019	2020	2017	2018	2019	2020	2017	2018	2019	2020
Pitampura	677	831	513	865	165	3.1	25.8	48.9	34.5	53.7	16.3	22.6	1.5	1.4	1.0	2.2
Janakpuri	638	988	511	535	177	3.8	39.9	20.4	45.7	56.5	21.2	11.6	1.5	1.5	1.2	1.4
CPCB / ITO (in 2020)	496	990	NM	454	136	4.4	NM	13.4	23.7	52.2	NM	0.3	1.1	1.3		1.3
City Average	604	936	512	618	159	3.8	32.9	27.6	34.7	54.2	18.8	11.5	1.4	1.4	1.1	1.6

Notes: a) NM - Not Measured and b) AAQCVs: Al - 40 µg/m³, Ba - 4.0 µg/m³ and Fe - 40 µg/m³

was observed every year since 2017 after the implementation of regulatory mechanisms as suggested by Hon'ble Courts for either restricting / banning of firecrackers or development of "Green Crackers" was initiated in 2018. In 2020 Aluminum and Iron found within proposed AACQVs concentrations. Barium found exceeding proposed AACQVs concentrations on Diwali day in Delhi; still a reduction of 38.8% was observed in 2020 compared to 2019.

4.0 SUMMARY

- 1) On Diwali day PM_{2.5} concentrations were found to increase in six out of eight cities monitored. Only Agra and Bengaluru reported lesser PM_{2.5} on Diwali day in 2020. Maximum increase was observed in Lucknow (2.14 times) followed by Delhi (1.83 times), Bhopal (1.81 times), Lucknow (1.68 times), Kolkata (1.54 times) Shillong (1.3 times) and Vadodara (1.26 times).

[AMBIENT AIR QUALITY DURING DEEPAWALI FESTIVAL 2020]

Overall the increase in PM_{2.5} level across the cities were lower than last year Diwali (2019)

- 2) SO₂ was found within prescribed NAAQS (80 µg/m³) limits during the entire monitoring period including 27th October, 2019 (Diwali day).
- 3) Similarly NO₂ was also found to be within prescribed NAAQS limit in all the cities during monitoring period.
- 4) During post Diwali period PM₁₀ concentration was reduced by about 1 % to 74% in different cities compared to Diwali day level. Maximum reduction was observed in Delhi (74%) and minimum at Shillong (1%). Lucknow (72%) and Bhopal (67%) recorded similar PM₁₀ reduction as Delhi. About 28% reduction in PM₁₀ was observed in Agra in post diwali period compared to Diwali peak. Kolkata and Vadodara recorded upto 11% reduction during post Diwali compared to Diwali day. Bengaluru has recorded about 16% increase in PM₁₀ during post Diwali period, which may be attributed to local conditions.
- 5) Similarly, PM_{2.5} concentrations were reduced by about 4 % to 77% in different cities during post Diwali period compared to Diwali day level. Maximum reduction was observed in Delhi (77%) and minimum at Kolkata (4.4%). Bhopal (73%), Lucknow (66%), Vadodara (37%) and Agra (26%) reductions were recorded in PM_{2.5} during post Diwali period. Shillong and Bengaluru recorded slight increase in PM_{2.5} during post Diwali period, which may be attributed to local conditions.
- 6) Aluminium (Al) and Iron (Fe) in PM_{2.5} fraction were well within the prescribed short term AAQCVs in all cities in 2020; however, the violation occurred in Barium in various cities on Diwali day. Barium exceeded AAQCVs (4.0 µg/m³) in Bhopal, Delhi, Lucknow and Vadodara in Diwali 2020.
- 7) Reduction in Aluminum and Barium concentrations were observed in 2020 compared to 2019. Gradual betterment in ambient air metal concentrations in PM_{2.5} every year since 2017 after the implementation of regulatory mechanisms as suggested by Hon'ble Courts for either

restricting / banning of firecrackers or development of “Green Crackers” was initiated in 2018.

- 8) Despite banning of firecrackers by Hon’ble NGT and introduction of Green Crackers in selected cities the presence and elevation of Pb, Ni, As invite attention on spurious crackers in market.