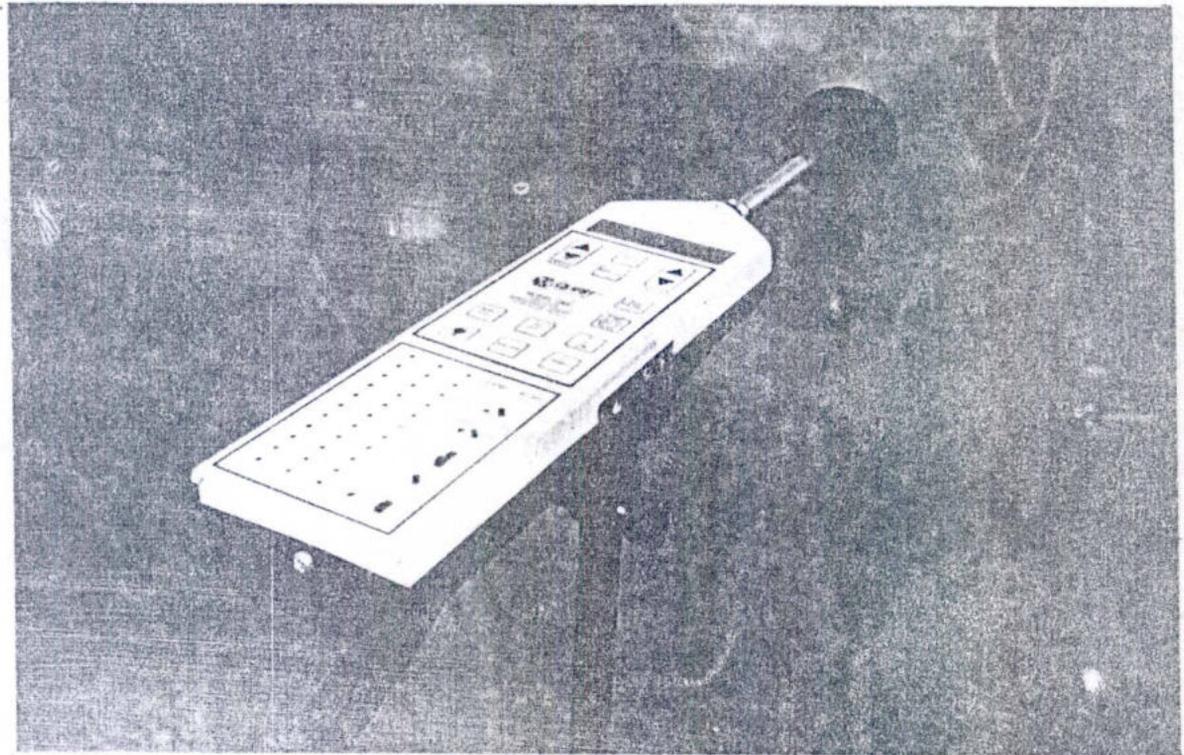


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A REPORT ON 000001

AMBIENT NOISE LEVEL AND AIR POLLUTION  
DURING DIWALI FESTIVAL-2003  
IN JAIPUR



Quest Technology Noise Meter, Model No.1900



CPCB

CENTRAL POLLUTION CONTROL BOARD  
ZONAL OFFICE (CENTRAL)  
2<sup>ND</sup> FLOOR, KRISHNA PALACE  
E-3/15, ARERA COLONY  
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## FOREWORD

Hon'ble Supreme Court, in its interim directions prohibited the bursting of crackers between 10:00 PM to 6:00 AM (next day) w.e.f. September, 2002. To verify the compliance and to find out the noise level and air quality, CPCB has been conducting monitoring in different cities. Jaipur, the next city in the series, has been taken up this year. The city is rich in cultural heritage and celebrates festivals with great fun and fervour. It is most visited city by foreigners after Delhi and Agra. Large number of domestic and foreign tourists come to Jaipur specially to watch Diwali celebrations, mainly the decorated markets, lighted buildings, display of fire works and above all, over joyous people in festive mood. Fire works display including bursting of crackers although give the city a festive look, it generates noise and air pollution at the same time which lead to inconvenience and health hazard to the people.

CPCB, Zonal Office, Bhopal took up the study during October 23-27, 2003. Ambient air quality and noise levels were monitored at various locations across the city. The average noise levels were found exceeding the norms during day as well as night time. Increased concentration of Nitrogen di-oxide and Respirable Particulate Matter, violated the air quality standards during Diwali festival. The findings indicate the need of traffic regulation and decongestion specially with in the walled city and action to create mass awareness on ill-effects of noise and air pollution due to bursting of crackers.

Assistance in the form of staff & instrument support extended by Rajasthan State Pollution Control Board (RSPCB) is acknowledged.

We hope that the report will be useful to all the concerned including the people of Jaipur in general and local authorities in particular.

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## EXECUTIVE SUMMARY

Hon'ble Supreme Court, in its interim directions, prohibited the use of crackers between 10:00 PM to 6:00 AM (next day). To verify the compliance of Supreme Court orders, noise level and air quality monitoring was conducted during Diwali festival in October, 2003.

02. Diwali fell on October 25, 2003. The monitoring was done from October 23-27, 2003 to cover pre & post Diwali period so that the changes in noise level and air quality on Diwali day could be ascertained clearly. Air quality monitoring was done at six locations and noise levels were monitored at sixteen locations in Jaipur.

03. The quality of air in commercial areas in Jaipur city was worse than the air quality even in industrial areas in terms of all the four parameters monitored i.e. Suspended Particulate Matter (SPM), Respirable Particulate Matter (RPM), Sulphur Di-oxide (SO<sub>2</sub>) and Oxides of Nitrogen (NO<sub>x</sub>). The air quality violated all the parameters except SO<sub>2</sub> when compared with the ambient air quality standards for 24 hourly average. Air quality in Jhalana Doongari Institutional Area was, by and large, meeting the National Ambient Air Quality Standards.

04. Barring a few observations, the noise levels exceeded at all the sixteen locations in day time as well as in night time. The commercial areas were found very noisy. The leq noise levels ranged between 75.4 to 106.1 d(B)A in the day time and 70.7 to 103.9 d(B)A in the night time.

05. In spite of the Court order and imposition of prohibition and fine, the bursting of crackers continued after 10:00 PM. In fact, the intensity of firing of crackers increased after 10:00 PM. The business class people were seen bursting crackers in front of their commercial establishments after the business hours.

06. Vehicular movement and blowing of horns contributed considerably to the higher noise levels in the city.

07. Air pollution from firing of crackers reduced visibility in commercial areas and on roads on Diwali day and a day after. Some people reported irritation in throat and eyes especially on Diwali day.

08. The public awareness was poor and it appeared that they have not taken much notice of prohibition on bursting of crackers after 10:00 PM.

09. Efforts should be made to regulate traffic and decongestion especially in commercial areas in the walled city.

## AMBIENT AIR & NOISE LEVEL MONITORING DURING DIWALI IN JAIPUR

### Introduction :

Wide range of fire works are used on Diwali to create a beautiful display of light and colours in the night. A firework basically consists of an oxidizer, fuel, iron, steel, aluminium or other metal powder to produce sparks. Besides, a wide variety of chemicals are also used as colouring agents to impart desired colours. Though the beautiful display of shimmering sparks and colours originating from the fire works have an aesthetic appeal but they also pose many related hazards. Apart from minor and major burn injuries every year due to mishandling of the fire works, the atmosphere is also polluted to a large extent.

Air and noise pollution, the two main problem originating from fire works, cause maximum damage to our environment. The major air pollutants like carbon monoxide, sulphur dioxide, nitrogen oxides, particulates and photochemical oxidants released into environment, have adverse effects on human health.

A team of officials from CPCB, Zonal Office, Bhopal in collaboration with RSPCB, Jaipur officials, monitored the ambient air and noise levels in Jaipur city during Diwali, 2003, for assessing the air pollution and noise levels, if exceeding the standards prescribed by the Pollution Control Boards and likely damage to human being exposed to such excessive pollution. In 2003, main Diwali festival was celebrated on October 25.

**Table - 1: Ambient Noise Level Monitoring Stations in Jaipur During Diwali-2003**

S.No.	Location	Type
01.	Ajmeri Gate	Commercial
02.	Chhoti Chopad	Commercial
03.	Badi Chopad	Commercial
04.	Chandpole	Commercial
05.	Janta Colony	Residential
06.	Adarsh Nagar	Residential
07.	Subhash Chowk	Commercial
08.	S.M.S. Hospital	Silence Zone
09.	S.D.M. Hospital	Silence Zone
10.	Tonk Phatak	Commercial
11.	Jhalana Doongri (RSPCB Office)	Institutional
12.	Civil Lines (near Raj Bhavan)	Residential
13.	Mansarovar colony	Residential
14.	Ambabari	Residential
15.	Murlipura	Residential
16.	Rajasthan High Court Building	Silence Zone

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**Table - 2: Ambient air quality monitoring stations in Jaipur during Diwali-2003**

S.No.	Location	Type
01.	Ajmeri Gate	Commercial
02.	Chandpole	Commercial
03.	V.K.I.A. (Viswakarma Industrial Area)	Industrial
04.	Vidhyadhar Nagar	Residential
05.	M.I.A. (Malviya Nagar Industrial Area)	Industrial
06.	Jhalana Doongri	Institutional

**Noise & Ambient Air Quality Monitoring :**

Noise levels were monitored in Jaipur during October 23-27, 2003 (Deepawali on October 25) at sixteen locations spread over the city and representing residential, sensitive and commercial areas. Monitoring sites were selected based on the defined zones. The locations were Ajmeri Gate, Choti Chaupad, Badi Chaupad, Chand Pole, Janta Colony, Adarsh Nagar, Subhash Chowk, SMS Hospital, SDM Hospital, Tonk Phatak, Jhalana Doongari, Civil Lines, Mansarovar Colony, Ambabari, Murlipura and High Court Building. Out of sixteen, six locations were falling under commercial, six residential, three sensitive and one under institutional area. Noise levels were not measured in industrial area. Location of all the monitoring stations have been marked and shown in the attached city map of Jaipur.

Six locations were selected for measurement of ambient air quality in Jaipur city during October 23-27, 2003 representing commercial/residential, industrial and sensitive areas. The locations were Ajmeri Gate, Chand Pole, Viswakarma Industrial (VKI) Area, Vidhyadhar Nagar, Malviya Industrial Area (MIA) and Jhalana Doongari.

**Methodology :**

Five numbers of Quest technology, model 1900 precision integrated logging sound level meters and one number of Cygnet 2001, version 2.1 integrated data logger sound level meter were used for measuring noise levels in decibels. The microphone fitted with windscreen was kept at a height of about 1.5 meter above the ground at all the monitoring locations. Monitoring of noise was done for 30 minutes at different times of the day and night between 4:00 PM to 10:00 PM and 10:00 PM to 12:00 midnight, at all the locations for Leq., L.min., and L.max. during pre-Diwali, Diwali and post-Diwali period of five days from October 23-27, 2003.

Three Respirable Dust Samplers Envirotech APM 460 DX and three RDS Envirotech APM 460 were used which measured suspended particulate matter, Respirable particulate matter, sulfur dioxide and nitrogen dioxide over a period of 24 hours on all days from October 23 (6:00 AM) to October 27 (6:00 AM).

**Result & Discussions :**

Although five days long festival, the main Diwali fell on 25.10.2003. Celebrations and bursting of crackers reached at its peak on Diwali day.

The ambient air quality was monitored continuously from October 23 from 6:00 AM to October 27 upto 6:00 PM at six locations, which were chosen to ensure representative sampling.

Datewise data on the basis of 24 hours monitoring has been prepared for all the four parameters and annexed from table-1 through table-4. Table-5 shows 24 hourly average values of all the four parameters for four days. Figure-1 through figure-4 show the graphic presentation of different parameters. Each figure shows concentration of one parameter at each of the six locations for four days.

Maximum, minimum and equivalent noise levels were monitored at sixteen locations in the city from October 23-27, 2003. Equivalent noise levels are presented in Table-6 whereas maximum and minimum noise levels on all the sixteen locations for all the five days, have been presented in Table-7 & 8 respectively. Figure 5 & 6 show graphic presentation of ambient noise levels from a day before Diwali to a day after. Figure-5 shows noise levels in day time whereas figure-6 shows noise levels at night-time.

The monitoring team observed the following on the basis of the ambient air quality and ambient noise levels monitored during the festival season :

- 01) **Ajmeri Gate** – It is one of the busiest traffic junctions of the city. Leq. Noise levels ranged from 74.9 to 77.5 d(B)A during day time and 61.3 to 77.7 d(B)A in the night time. There was no significant rise in Leq. noise level on Diwali day. However, noise level came down from 76.1 to 61.3 on the second night after Diwali. Peak noise levels ranged from 91.6 to 99.8 during

day time and 93.0 to 98.1 during the night. Minimum noise level ranged from 60.0 to 62.9 in day time and from 58.9 to 65.6 during the night time. Monitored Leq. noise levels during day as well as in the night exceeded the prescribed noise level on all the five days.

Air quality indicated that  $\text{NO}_2$ , RPM & SPM exceeded the prescribed limit from 6:00 AM on 24.10.2003 to 6:00 AM of 27.10.2003. In these days,  $\text{NO}_x$  ranged from 86 to 137, RPM-109 to 165 and the SPM from 297 to 419.  $\text{SO}_2$  concentration remained within the prescribed limit on all the five days ranging from 10 to 27.  $\text{NO}_x$  concentration was  $65 \mu\text{g}/\text{m}^3$  on 23.10.2003. There was no significant change in ambient air quality on Diwali day except for  $\text{SO}_2$  concentration, which increased 100% as compared to the other days before and after Diwali.

- 02) **Choti Chaupad** – It is another busy commercial area within the walled city of Jaipur. Leq. noise level were very high during the day as well as night time. In day time, the noise level ranged from 77.8 to 80.6 and 73.4 to 80.7 in the night time. There was not much change due to Diwali except that Diwali night was noisiest and observed leq. noise level was 80.7. The maximum noise level ranged from 91.6 to 99.8 in day time and 93.0 to 98.1 in the night time. The minimum noise level in day time ranged from 64.9 to 66.5 and during the night, it ranged from 42.7 to 61.8 d(B)A.

- 03) **Badi Chaupad** – It is another commercial location within the walled city, which is over crowded, most of the times. Leq. noise level ranged from 72.9 to 78.8 during day time and 62.7 to 73.5 during night. At Badi Chaupad, the noise level increased from 63.8 to 73.6 in the night time and remained so for three consequent nights. The peak noise levels ranged from 88.0 to 98.4 during the day as well as night time and there was not much change on Diwali day. The minimum noise level ranged from 64.9 to 66.5 in day time and 43.7 to 61.8 in the night time.
- 04) **Chand Pole** – It is another busy commercial area within the walled city. Leq. noise level ranged from 73.5 to 75.1 during day and 71.6 to 75.5 during night time. Although there was a rise in leq. noise level but it was not significant. Maximum noise level ranged from 90.1 to 90.9 in day time and 86.9 to 94.8 during night time. Minimum noise level ranged from 63.5 to 66.8 in day time and 62.5 to 66.5 in the night time. It may be seen that there was not much change in the minimum noise level in day time as well as night time.

The air quality indicated that all the parameters except  $\text{SO}_2$ , exceeded the prescribed limit.  $\text{NO}_x$  ranged from 90 to 129  $\mu\text{g}/\text{m}^3$  whereas RPM ranged from 181 to 312 and SPM from 568 to 782. The  $\text{SO}_2$  concentration, although, remained within the permissible level, there was an increase of 100% in  $\text{SO}_2$  concentration on Diwali day as compared to other days before and after Diwali.

- 05) **Janta Colony** – The residential colony located within the corporation limit of Jaipur, houses mainly mediocre people. Leq. noise level ranged from 65.0 to 75.1 (in day time on five days), highest, being on next day of Diwali. In night time, the leq. level ranged from 66.7 to 82.7, highest being 82.7 during Diwali night. Unlike the commercial area, the effect of bursting of crackers etc. was well reflected in the noise monitoring in residential area. However, the peak noise level ranged from 88.3 to 104.2 in the day time and from 92.4 to 101.4 in the night time. Minimum noise level ranged from 41.6 to 52.9 in day time and from 41.6 to 55.9 in the night time.
- 06) **Adarsh Nagar** – It is a residential area of mixed population. The leq. noise level ranged from 61.5 to 71.2 in day time and 62.7 to 78.9 in night time. The highest of 78.9 was observed on Diwali night. Noise level remained high from Diwali night until the next night. Peak noise levels ranged from 84.8 to 99.0 in the day time and 88.5 to 99.2 in the night time whereas the minimum noise level recorded in the colony ranged from 44.3 to 51.66 in day time, and 42.7 to 67.5 in the night time. The bursting of crackers from Diwali day onward is well reflected in the noise monitoring in the area.
- 07) **Subhash Chowk** – It is another commercial area within the walled city between Badi Chaupad and Choti Chaupad. At Subhash Chowk, the equivalent noise level ranged from 75.2 to

76.5 in day time and 71.3 to 78.3 in the night time. The slight change in leq. noise level was observed from Diwali day until the next night. Peak noise levels during the monitoring ranged from 85.1 to 93.9 in day time and from 84.7 to 97.0 in the night time. Minimum noise level ranged from 66.4 to 67.7 in the day time and from 66.2 to 66.5 in the night time. There was not much change in the minimum level of noise.

- 08) **SMS Hospital** – The hospital is located on the main road from Jaipur to Kota and surrounded by busy roads on all the four sides. However, there were no other activities except traffic movement. Not much difference in equivalent noise level was observed. It touched 67.3 on Diwali night. Normal leq. levels for other four days of noise ranged from 55.1 to 59.7, around SMS Hospital in night. In day time, the leq., noise level ranged from 60.5 to 62.8, with no abnormal change on Diwali day. The peak noise levels ranged from 81.5 to 90.4 in day time and from 78.5 to 95.7 in night time. The maximum noise level of 95.7 was observed on Diwali night.
- 09) **SDM Hospital** – This hospital is located comparatively in a moderately crowded area. The leq. level of noise was observed 76.8 d(B)A on Diwali day. On rest of the four days, it ranged from 57.2 to 66.4. It may be seen that leq. levels are otherwise very high if compared with the prescribed limit for silence zone. Peak noise level was observed as 102.0 in the night of Diwali. In other four days, the peak noise levels ranged

from 78.2 to 91.9. Maximum noise level ranged from 70.7 to 98.2 in the night time. Minimum noise level recorded in the day time ranged from 46.3 to 53.9. It ranged from 40.0 to 52.5 in the night time.

- 10) **Tonk Phatak** – It is another commercial area of Jaipur city but not busy as compared to Badi Choupad & Choti Choupad. The leq. noise level did not show any significant change on Diwali day. The leq. noise level ranged from 66.7 to 75.0 in the day time and 62.6 to 78.2 in the night time. The peak noise level was observed as 109.1 d(B)A on Diwali day. On other four days, the peak levels ranged from 86.5 to 94.4. In night, the peak noise levels ranged from 87.3 to 94.6. Minimum noise level recorded on five days ranged from 49.9 to 56.5 in the day time and from 46.2 to 58.5 in the night time.
- 11) **Jhalana Doongari** – An institutional area located outside the city and housing various offices and institutes. Although there are scattered patches of residential houses, the area has been found quiet not only in the night but also in the day time. There was a small rise in noise level on Diwali day but it was not significant. Leq. level in the day time ranged from 53.4 to 58.6 whereas it ranged from 45.2 to 60.1 in the night time. Peak noise levels recorded in the area ranged from 75.4 to 93.2 in the day time and from 78.5 to 95.4 in the night time. Minimum noise level ranged from 42.1 to 51.6 in the day time and 40.2 to 53.6 in the night time.

The ambient air quality was also monitored and was found within the permissible limit, even  $\text{SO}_2$  concentration did not increase on Diwali day.  $\text{SO}_2$  ranged from 8 to  $12 \mu\text{g}/\text{Nm}^3$ ,  $\text{NO}_2$  from 24 to  $46 \mu\text{g}/\text{Nm}^3$ , RPM – from 70 to 101 and SPM – from 123 to  $206 \mu\text{g}/\text{Nm}^3$ .

- 12) **Civil Lines** – It is one of the posh residential areas of Jaipur. The leq. noise levels ranged from 72.5 to 74.5 in the day time and from 67.8 to 72.8 in the night time except for Diwali night when it touched 75.6 d(B)A. Like any other areas, this area was also noisy as compared to the prescribed noise levels. Peak noise levels in the area ranged from 93.7 to 101.9, in the day time and 89.2 to 97.3 in the night time. Minimum noise level ranged from 53.0 to 56.6 in day time and 47.2 to 57.9 in the night time.
- 13) **Mansarovar Colony** – It is a residential colony where the impact of crackers etc. was very clearly observed on the Diwali day. The leq. noise level on other day, ranged from 60.1 to 69.0, as compared to the leq., the Diwali day which was observed as 72.4. In the night, the average leq. level ranged from 56.0 to 69.4 on other days whereas on Diwali night, it was observed as 73.6. Peak noise level on Diwali day was observed as 99.3 and on Diwali night, 101.0 d(B)A. Minimum noise levels ranged from 47.4 to 55.2 in the day time and 45.1 to 56.6 in the night time.

- 14) **Ambabari** – Amba Bari is a residential area of Jaipur situated outside the walled city. Abnormal high leq. level was observed on Diwali night, on other four nights, the leq. level ranged from 55.3 to 62.0 whereas on Diwali night, it shot upto 74.1. However, in day time, the leq. level was observed between 65.1 to 74.9. Peak noise levels were observed between 89.4 to 112.8 in the day time and between 83.1 to 97.1 in the night. It is the second highest peak noise level monitored in Jaipur during Diwali night. Surprisingly, the minimum noise level remained 51.6 during day as well as in night time.
- 15) **Murlipura** – Being a residential area, the impact of crackers on Diwali day/night was observed. The leq. level in the day time, ranged from 59.9 to 65.6 on all four days except Diwali day when it was observed as 78.1 d(B)A. In the night time, the leq. noise level ranged from 58.8 to 67.4 on all four days except Diwali night when it was observed as 73.9. The highest peak noise levels of 114.3 was observed on Diwali day, as compared to the maximum noise level from 83.3 to 93.7 on other four days. Similarly, in the night time, the peak noise levels ranged from 83.2 to 91.7. Like in Amba Badi, the minimum noise level remained at 51.6 in day time as well as in night time for all the four days.

- 16) **Rajasthan High Court Area** – No impact of Diwali was observed in this area except for Diwali night when the leq. level was observed as 69.3 as compared to other nights when it ranged from 65.3 to 67.3. In the day time, the leq. levels ranged from 69.0 to 72.2. Although it is a sensitive zone, the normal leq. level found during day and night, were much higher than the limit prescribed for such areas.

### **Effect on the Air Quality in Industrial Areas**

There were negligible bursting of crackers / fire works in both the industrial areas in Jaipur city namely, Vishwakarama Industrial (VKI) Area and Malviya Industrial Area (MIA). On the contrary, the industrial activities were reduced due to absence of workers etc. The air quality monitoring showed slight improvement in Air Quality in terms of SO<sub>2</sub> & RPM concentration. The sixth location where the ambient air quality monitored, was Vidhyadhar Nagar. It was a newly coming up residential colony at the outskirts of the city and had not much activities during Diwali. Air quality monitoring stations have been operated by RSPCB in Vidhyadhar Nagar and in the two industrial areas. The data at all these locations indicate no change in the ambient air quality which could be contributed to the bursting of crackers / fire works during Diwali festival.

- (i) Diwali or no Diwali, Jaipur city, specially within the walls was very noisy. Sensitive and residential areas were also found noisy as compared to the prescribed standards. Only industrial area complied with the prescribed noise levels. Higher leq. levels of noise in walled city could be attributed mainly to vehicle and people movement. It is confirmed from the another set of noise monitoring done by CPCB during December, 2003 when the Leq. noise levels were observed between 73-92 d(B)A as against the prescribed limits of 65 and 55 d(B)A in day and night time respectively. Being highly crowded specially during festivals, the markets in Jaipur had much higher noise levels.
- (ii) Inspite of the orders of the Hon'ble Court and imposition of fine by local authorities, the bursting of crackers during Diwali festivals, continued after 10:00 PM. Infact, the intensity of firing of crackers increased after 10:00 PM even though it started in the evening with lower intensity. The business class people were bursting maximum crackers in front of their shops after the business hours.
- (iii) Vehicular movement and blowing of horns contributed considerable noise in the city of Jaipur.

- (iv) Air pollution from firing of crackers reduced visibility on roads on Diwali day and a-day-after. Some people reported irritation in throat and in eyes specially on Diwali day.
- (v) Air quality in industrial areas remained unaffected during Diwali. Infact, the air quality improved marginally in the industrial area due to the lower industrial activities and as a result of thin attendance during Diwali festival.
- (vi) It was observed that the public awareness was poor in this regard. It appeared that the public had not taken much notice of ban on bursting of crackers.

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Table - 3: Ambient Air Quality at Jaipur city before Diwali (23.10.2003)

Duration: 23.10.2003 (6.00AM) to 24.10.2003 (6.00AM)

Duration	Chand Pole (Commercial Area)				Ajmeri Gate (Commercial Area)				VKIA (Industrial Area)				Vidhyadhar Nagar (Residential Area)				RSPCB Office, Jhalana Deongri (Institutional Area)				MIA (Industrial Area)			
	SO <sub>2</sub>	NO <sub>2</sub>	RPM	SPM	SO <sub>2</sub>	NO <sub>2</sub>	RPM	SPM	SO <sub>2</sub>	NO <sub>2</sub>	RPM	SPM	SO <sub>2</sub>	NO <sub>2</sub>	RPM	SPM	SO <sub>2</sub>	NO <sub>2</sub>	RPM	SPM	SO <sub>2</sub>	NO <sub>2</sub>	RPM	SPM
06AM to 10 AM	28	136			13	90			21	99			11	19			14	34			12	21		
10AM to 02 PM	19	79	295	931	8	84	205	414	14	65	264	545	8	14	165	401	9	44	94	172	6	23	115	310
02PM to 06 PM	15	70			6	88			25	56			12	23			12	25			16	52		
06AM to 10 AM	16	65	269	813	12	66	161	370	66	149	194	555	19	96	153	386	4	66	57	100	6	21	293	363
10AM to 02 PM	7	113			10	29			33	66			19	42			5	56			6	13		
02PM to 06 PM	6	59	180	578	12	30	135	261	57	51	267	402	5	30	159	268	4	49	92	98	5	BDL	100	163
Average	15	90	248	774	10	85	167	348	36	81	238	501	12	37	159	352	8	46	81	123	9	23	169	275

All values are given in  $\mu\text{g}/\text{m}^3$   
BDL - Below detectable limit

Table - 4: Ambient Air Quality at Jaipur city before Diwali (24.10.2003)

Duration: 24.10.2003 (6.00AM) to 25.10.2003 (6.00AM)

Duration	Chand Pole (Commercial Area)				Ajmeri Gate (Commercial Area)				VKIA (Industrial Area)				Vedhyadhar Nagar (Residential Area)				RSPCB Office, Jhalana Doongri (Institutional Area)				MIA (Industrial Area)			
	SO <sub>2</sub>	NO <sub>2</sub>	RPm	SPM	SO <sub>2</sub>	NO <sub>2</sub>	RPm	SPM	SO <sub>2</sub>	NO <sub>2</sub>	RPm	SPM	SO <sub>2</sub>	NO <sub>2</sub>	RPm	SPM	SO <sub>2</sub>	NO <sub>2</sub>	RPm	SPM	SO <sub>2</sub>	NO <sub>2</sub>	RPm	SPM
05AM to 10 AM	33	136			13	76			21	36			15	85			16	30			17	56		
10AM to 02 PM	22	118	297	826	14	73	197	366	35	51	284	646	7	60	206	405	7	18	141	229	12	34	153	232
02PM to 06 PM	15	92			11	59			15	116			6	61			14	27			22	52		
05AM to 10 AM	13	154	262	696	13	269	186	281	23	71	206	371	20	56	166	368	7	32	99	196	21	31	258	392
10AM to 02 PM	22	130			13	197			18	66			13	28			10	21			13	25		
02PM to 06 PM	6	98	145	544	14	148	95	214	15	56	148	189	12	24	108	219	9	21	64	193	21	26	89	180
Average	19	121	235	689	13	137	159	287	21	66	213	402	12	52	160	331	11	25	101	206	18	38	167	266

All values are given in  $\mu\text{g}/\text{m}^3$ Note: NO<sub>2</sub> values at Ajmeri Gate and Chandpole Gate due to large number of vehicular movement on the occasion of Dhanthera

Table - 5: Ambient Air Quality at Jaipur city on Diwali (25.10.2003)

Duration: 25.10.2003 (6.00 AM) to 26.10.2003 (6.00AM)

Duration	Chand Pole (Commercial Area)				Ajmeri Gate (Commercial Area)				VKIA (Industrial Area)				Vidhyadhar Nagar (Residential Area)				RSPCB Office, Jhalana Doongri (Institutional Area)				MIA (Industrial Area)				
	SO <sub>2</sub>	NO <sub>2</sub>	RPM	SPM	SO <sub>2</sub>	NO <sub>2</sub>	RPM	SPM	SO <sub>2</sub>	NO <sub>2</sub>	RPM	SPM	SO <sub>2</sub>	NO <sub>2</sub>	RPM	SPM	SO <sub>2</sub>	NO <sub>2</sub>	RPM	SPM	SO <sub>2</sub>	NO <sub>2</sub>	RPM	SPM	
06AM to 10 AM	15	184			7	200			10	46			7	26			9	15			9	29			
10AM to 02 PM	PF	PF	237	846	11	89	101	262	14	66	143	364	11	49	114	314	16	21	62	157	21	23	74	279	
02PM to 06 PM	23	142			16	96			11	46			12	30			13	24			28	28			
06AM to 10 AM	48	160	282	727	44	151	190	306	21	50	88	247	28	55	197	458	14	34	79	266	15	28	103	390	
10AM to 02 PM	69	95			64	154			19	43			20	61			10	29			13	22			
02PM to 06 PM	29	65	418	773	18	81	203	571	18	34	87	220	16	32	185	334	9	21	69	171	8	16	43	123	
Average	37	129	312	782	27	129	165	380	16	48	106	277	16	42	165	369	12	24	70	188	16	24	73	244	

All values are given in  $\mu\text{g}/\text{m}^3$ 

PF: Power Failure

Note: Large number of vehicular movement was also observed on the morning hours of Diwali at Ajmeri Gate and Chand Pole Gate Area.

Table - 6: Ambient Air Quality at Jaipur city after Diwali (26.10.2003)

Duration : 26.10.2003 (6.00 AM) to 27.10.2003 (6.00AM)

Duration	Chand Pole (Commercial Area)					Almeri Gate (Commercial Area)					VKIA (Industrial Area)					Vidhyadhar Nagar (Residential Area)					RSPCB Office, Jhalana Doongri (Institutional Area)					M/A (Industrial Area)				
	SO <sub>2</sub>	NO <sub>2</sub>	RPM	SPM	SO <sub>2</sub>	NO <sub>2</sub>	RPM	SPM	SO <sub>2</sub>	NO <sub>2</sub>	RPM	SPM	SO <sub>2</sub>	NO <sub>2</sub>	RPM	SPM	SO <sub>2</sub>	NO <sub>2</sub>	RPM	SPM	SO <sub>2</sub>	NO <sub>2</sub>	RPM	SPM	SO <sub>2</sub>	NO <sub>2</sub>	RPM	SPM		
06 AM to 10 AM	12	80			18	68			7	36			13	40			21	15			15	44			15	44				
10 AM to 02 PM	11	54	115	554	BDL	69	63	171	9	40	99	292	10	26	62	336	6	13			46	119	BDL	BDL	13					
02 PM to 06 PM	11	83			11	85			9	45			8	32			15	33			21	37			21	37				
06 AM to 10 AM	18	121	292	738	23	168	189	673	6	29	95	300	11	38	113	267	7	53			85	206	BDL	BDL	23					
10 AM to 02 PM	8	92			23	89			8	30			7	30			6	24			20	28			20	28				
02 PM to 06 PM	6	40	137	411	5	35	74	412	6	16	73	251	6	33	61	150	5	20			85	151	BDL	BDL	11					
Average	11	78	181	568	14	86	109	419	8	33	89	281	9	33	79	251	10	26			72	159	11	11	26					

All values are given in µg/m<sup>3</sup>  
 BDL - Below detectable limit  
 VKIA - Vishwakarma Industrial Area  
 SO<sub>2</sub> - Sulphur Dioxide  
 NO<sub>2</sub> - Nitrogen Dioxide  
 RPM - Respirable particulate matter  
 SPM - Suspended particulate matter

MIA - Malviya Industrial Area  
 RSPCB - Rajasthan State Pollution Control Board  
 SPM includes RPM and Non-RPM

Table - 7: Average values of Ambient Air Quality in Jaipur city during Diwali

Duration	Chand Pole (Commercial Area)			Ajmeri Gate (Commercial Area)			VKIA (Industrial Area)			Vidhyadhar Nagar (Residential Area)			RSPCB Office, Jhalana Doongri (Institutional Area)			MIA (Industrial Area)				
	SO <sub>2</sub>	NO <sub>2</sub>	RPM	SO <sub>2</sub>	NO <sub>2</sub>	RPM	SO <sub>2</sub>	NO <sub>2</sub>	RPM	SO <sub>2</sub>	NO <sub>2</sub>	RPM	SO <sub>2</sub>	NO <sub>2</sub>	RPM	SO <sub>2</sub>	NO <sub>2</sub>	RPM	SPM	
23.10.2003	15	90	248	10	65	167	36	81	238	12	37	159	8	46	81	123	9	23	169	275
24.10.2003	19	121	235	13	137	159	21	66	213	12	52	160	11	25	101	206	18	38	167	268
25.10.2003	37	129	312	27	129	165	16	48	106	16	42	165	12	24	70	198	16	24	73	244
26.10.2003	11	78	181	14	86	109	8	33	89	9	33	79	10	26	72	159	11	26	50	178

24 Hours Average Values

All values are given µg/m<sup>3</sup>

- SO<sub>2</sub> - Sulphur Dioxide  
VKIA - Vishwakarma Industrial Area
- NO<sub>2</sub> - Nitrogen Dioxide  
MIA - Malviya Industrial Area
- RPM - Respirable Particulate Matter  
RSPCB - Rajasthan State Pollution Control Board
- SPM - Suspended Particulate matter  
- SPM includes RPM and Non-RPM

Figure - 1 : SPM levels in Jaipur city during Diwali

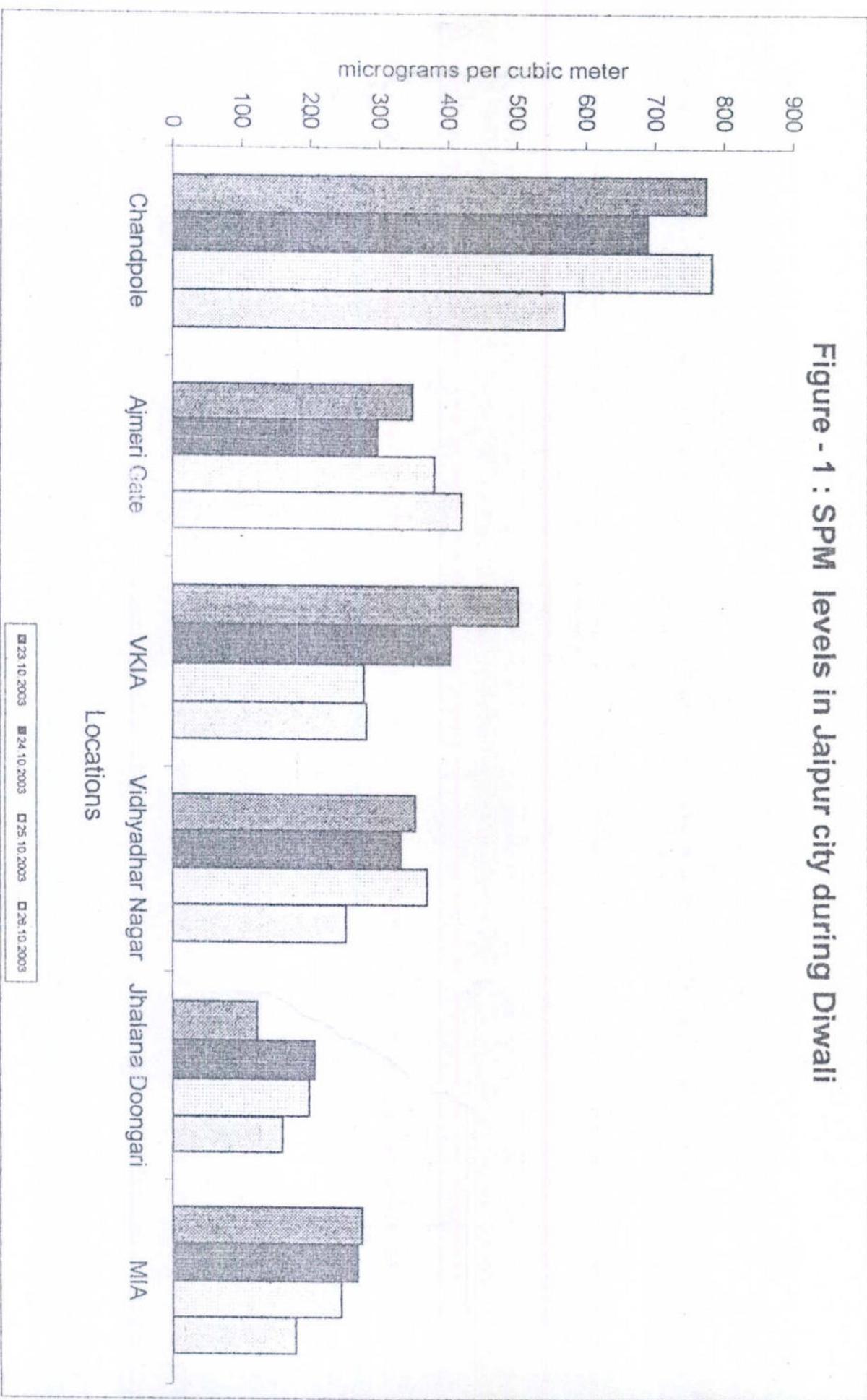


Figure - 2 : RPM levels in Jaipur city during Diwali

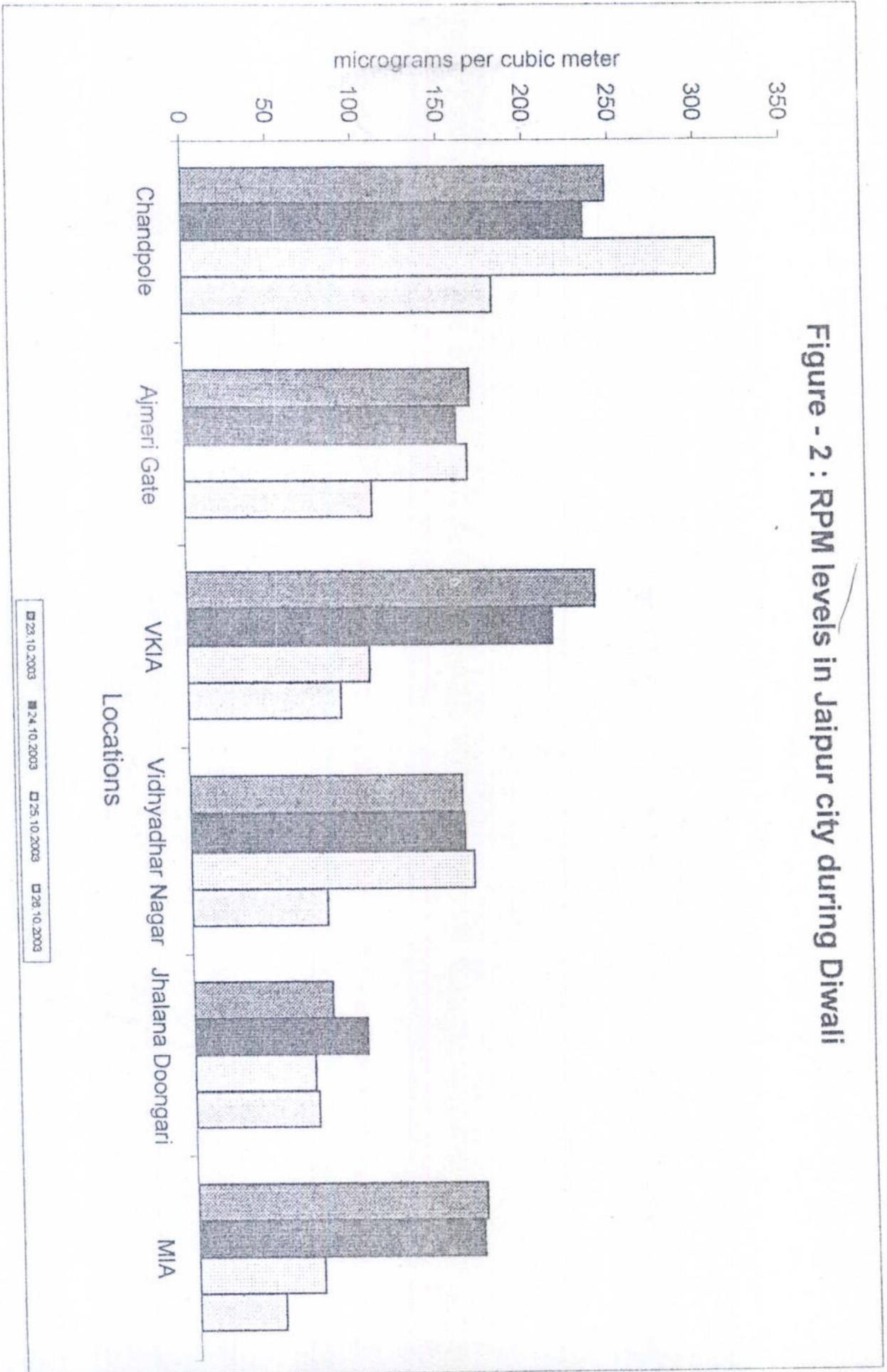


Figure - 3 : Sulphur dioxide levels in Jaipur city during Diwali

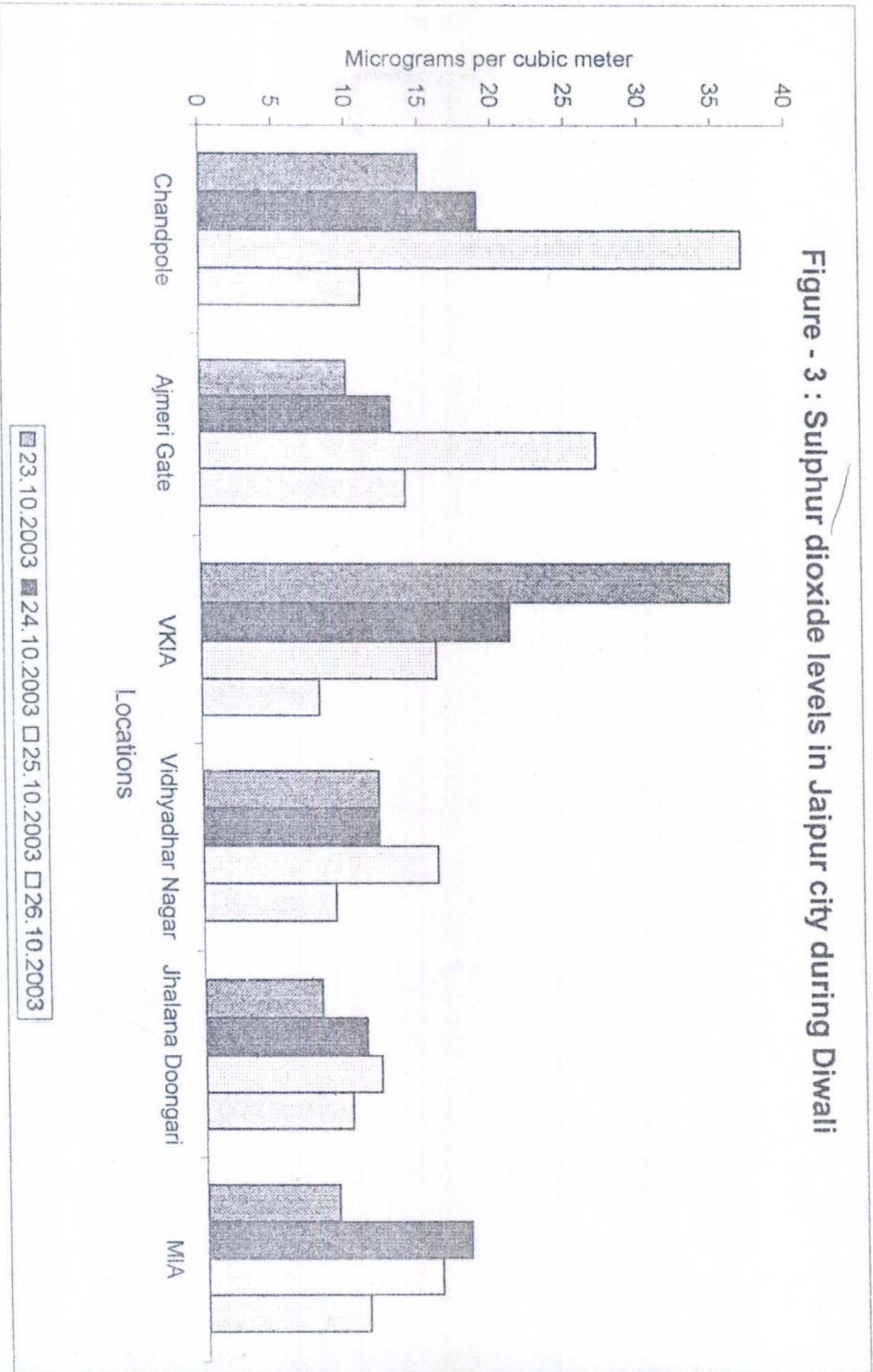
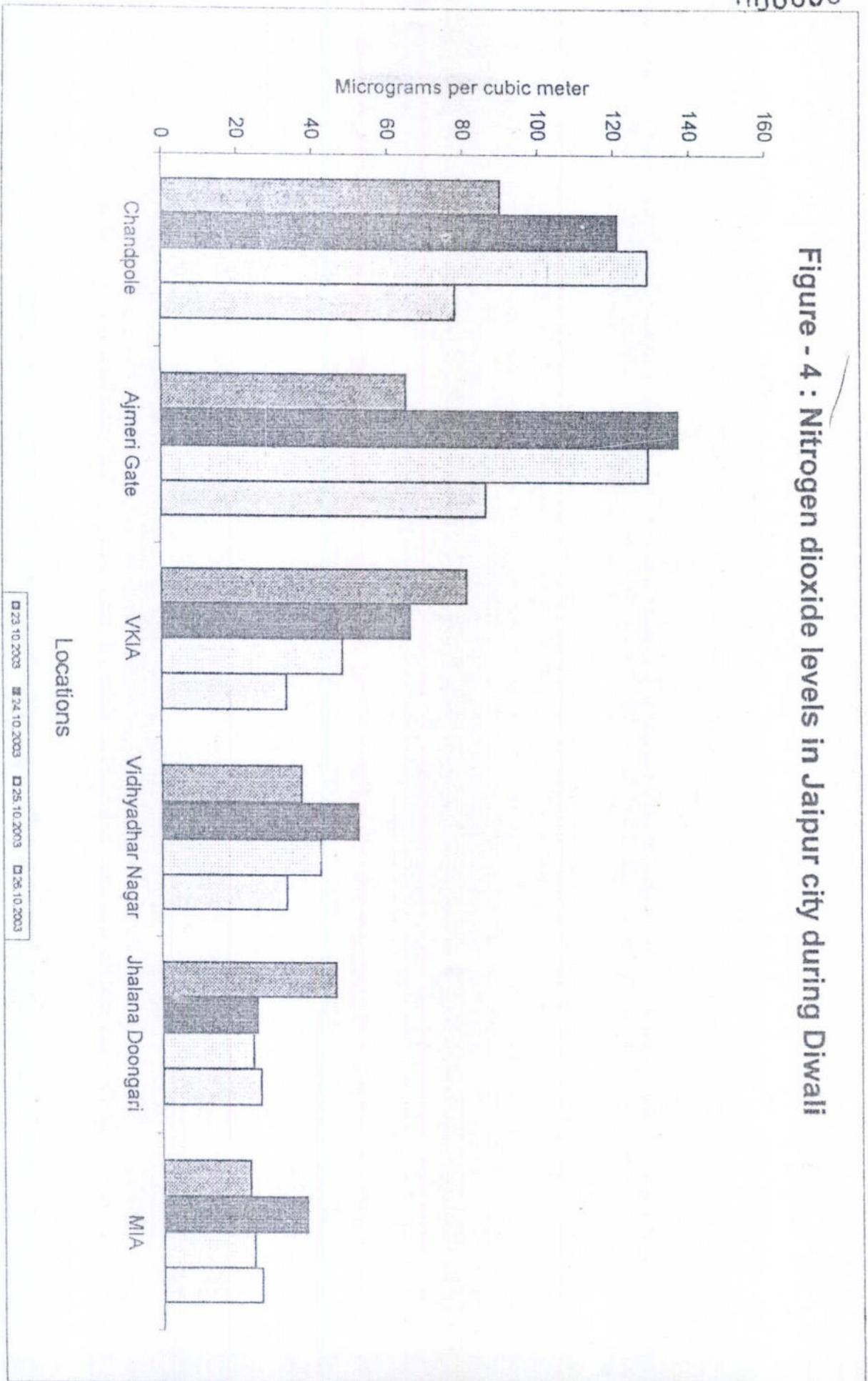


Figure - 4 : Nitrogen dioxide levels in Jaipur city during Diwali





9	S.D.M Hospital	Silence zone	Day	73.9	69.7	76.8	70.5	71.4	50
			Night	65.1	66.4	65.3	57.2	62.6	40
10	Tonk Phatak	Commercial	Day	75.0	66.8	72.3	69.0	66.7	65
			Night	78.2	67.4	70.9	63.0	62.06	55
11	Jhalana Doongri	Institutional	Day	57.6	53.4	58.6	57.1	58.4	55
			Night	55.8	50.6	60.1	45.2	58.7	45
12	Civil lines	Residential	Day	73.7	72.5	73.2	73.1	74.5	55
			Night	67.8	70.0	75.6	72.8	72.7	45
13	Mansarovar colony	Residential	Day	60.1	66.1	72.4	69.0	62.7	55
			Night	56.0	63.5	73.6	69.4	63.4	45
14	Ambabari	Residential	Day	71.1	70.8	74.9	65.1	71.7	55
			Night	59.1	55.3	74.1	62.0	59.5	45
15	Muripura	Residential	Day	61.6	61.5	78.1	65.6	59.9	55
			Night	61.3	60.6	73.9	67.4	58.8	45
16	Rajasthan Court Building	Silence Zone	Day	72.0	72.2	70.0	69.0	69.7	50
			Night	67.3	66.6	69.3	65.3	66.5	45

Noise levels are in d(B)A

ND: Not done

Daytime shall mean during 6:00 AM to 10:00 PM

Nighttime shall mean during 10:00 PM to 6:00 AM

Table - 9 : Peak noise levels in Jaipur City during Diwali

S. No.	Location	Type	23.10.03		24.10.03		25.10.03		26.10.03		27.10.23
			Day	Night	Day	Night	Day	Night	Day	Night	
1.	Ajmeri gate	Commercial	95.5	95.5	97.7	98.1	97.2	94.7	91.6	93.0	99.8
			95.5	95.5	98.1	98.1	94.7	94.7	93.0	93.0	96.3
2.	Choti chopad	Commercial	99.2	99.2	95.4	95.4	95.4	95.4	96.4	96.4	98.1
			96.7	96.7	100.4	100.4	99.7	99.7	102.0	102.0	92.7
3	Badi chopad	Commercial	88.0	88.0	96.8	96.8	89.7	89.7	94.6	94.6	100.5
			88.9	88.9	93.1	93.1	98.4	98.4	95.3	95.3	88.5
4	Chandpole gate	Commercial	90.1	90.1	90.9	90.9	90.7	90.7	90.6	90.6	NID
			91.7	91.7	86.9	86.9	94.8	94.8	90.2	90.2	NID
5	Janta colony	Residential	101.0	101.0	89.8	89.8	98.4	98.4	104.2	104.2	88.3
			101.4	101.4	92.4	92.4	101.2	101.2	96.1	96.1	93.8
6.	Adarsh nagar	Residential	84.8	84.8	96.1	96.1	96.2	96.2	99.0	99.0	95.0
			88.9	88.9	91.6	91.6	99.2	99.2	96.2	96.2	88.5
7	Subhash chowk	Commercial	85.1	85.1	92.3	92.3	93.9	93.9	92.8	92.8	ND
			85.6	85.6	84.7	84.7	97.0	97.0	92.4	92.4	ND
8	S.M.S Hospital	Silence zone	87.4	87.4	90.4	90.4	89.9	89.9	87.6	87.6	81.5
			87.5	87.5	91.8	91.8	95.7	95.7	78.5	78.5	80.3

9	Muripura	Residential	Day	83.3	88.1	114.3	93.7	86.5
			Night	83.2	85.9	103.9	84.7	91.7
10	Amba Bari	Residential	Day	106.1	100.6	112.8	89.4	97.6
			Night	91.5	78.8	97.1	83.1	91.0
			Day	84.3	96.9	99.3	98.3	94.6
			Night	87.6	96.5	100.1	96.8	94.6
11	Mansarovar colony	Residential	Day	101.9	93.8	97.0	93.7	99.3
			Night	89.2	93.2	97.3	90.4	92.1
12	Civil Lines	Residential	Day	91.9	89.3	89.6	85.2	85.9
			Night	90.4	87.8	89.8	81.9	85.8
13	High Court Building	Silence zone	Day	91.9	88.1	102.0	78.2	87.3
			Night	91.6	90.0	98.2	70.7	87.3
14	SDM Hospital	Silence zone	Day	82.9	75.4	86.3	80.7	93.2
			Night	80.6	78.5	91.2	80.8	95.4
15	RSPCB, Office	Institutional	Day	91.0	91.1	109.1	94.4	86.5
			Night	91.8	91.9	94.4	94.6	87.3
16	Tonk Phatak	Commercial	Day	91.8	91.9	94.4	94.6	87.3

Noise levels are in d(B)A

ND: Not done

Daytime shall mean during 6:00 AM to 10:00 PM

Nighttime shall mean during 10:00 PM to 6:00 AM

Table - 10 : Minimum noise levels in Jaipur City during Diwali

S.No.	Location	Type	23.10.03							24.10.03							25.10.03							26.10.03							27.10.23						
			Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night									
1.	Badi chopad	Commercial	66.2	42.7	66.5	61.8	65.6	52.0	64.9	59.5	65.8	44.1	66.2	42.7	66.5	61.8	65.6	52.0	64.9	59.5	65.8	44.1	66.2	42.7	66.5	61.8	65.6	52.0	64.9	59.5	65.8	44.1					
			61.5	62.5	62.9	65.8	61.0	60.4	60.0	60.7	60.7	60.7	60.7	60.7	60.7	60.7	60.7	60.7	60.7	60.7	60.7	60.7	60.7	60.7	60.7	60.7	60.7	60.7	60.7	60.7	60.7	60.7	60.7				
2.	Ajmeri gate	Commercial	51.6	42.7	46.8	42.7	44.3	67.5	46.7	44.1	49.0	44.1	51.6	42.7	46.8	42.7	44.3	67.5	46.7	44.1	49.0	44.1	51.6	42.7	46.8	42.7	44.3	67.5	46.7	44.1	49.0	44.1					
			62.5	62.5	65.8	65.8	59.4	60.4	60.4	60.4	60.4	60.4	60.4	60.4	60.4	60.4	60.4	60.4	60.4	60.4	60.4	60.4	60.4	60.4	60.4	60.4	60.4	60.4	60.4	60.4	60.4	60.4	60.4	60.4			
3	Adarsh nagar	Residential	51.6	41.6	51.6	41.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	41.6	41.6	51.6	41.6	51.6	41.6	51.6	41.6	51.6	41.6	51.6	41.6	51.6	41.6	51.6	41.6	51.6	41.6	51.6	41.6				
			42.7	41.6	42.7	41.6	49.3	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6			
4	Janta colony	Residential	51.6	51.6	52.9	49.3	41.6	41.6	41.6	41.6	41.6	41.6	51.6	51.6	52.9	49.3	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	51.6	51.6	52.9	49.3	41.6	41.6	41.6	41.6	41.6				
			41.6	41.6	41.6	41.6	55.9	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6			
5	Murlipura	Residential	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6				
			51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6			
6.	Amba Bari	Residential	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6				
			51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6			
7	Mansarovar colony	Residential	51.6	47.4	47.4	55.2	51.6	51.6	51.6	51.6	51.6	51.6	51.6	47.4	47.4	55.2	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6					
			51.6	45.1	45.1	56.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	45.1	45.1	56.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6				
8	Civil Lines	Residential	54.6	53.0	53.0	56.6	56.2	56.2	56.2	56.2	56.2	56.2	56.2	53.0	53.0	56.6	56.2	56.2	56.2	56.2	56.2	56.2	56.2	56.2	56.2	56.2	56.2	56.2	56.2	56.2	56.2	56.2	56.2				
			51.6	47.2	47.2	57.9	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	47.2	47.2	57.9	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6				
9			57.0	57.0	57.0	57.7	54.9	54.9	54.9	54.9	54.9	54.9	57.0	57.0	57.7	54.9	54.9	54.9	54.9	54.9	54.9	54.9	54.9	54.9	54.9	54.9	54.9	54.9	54.9	54.9	54.9	54.9					
			57.0	57.0	57.0	57.7	54.9	54.9	54.9	54.9	54.9	54.9	54.9	54.9	57.0	57.0	57.7	54.9	54.9	54.9	54.9	54.9	54.9	54.9	54.9	54.9	54.9	54.9	54.9	54.9	54.9	54.9	54.9				

	High Court Building	Silence zone	Night		51.6	43.7	54.8	51.6	48.2
			Day	Night					
10	SDM Hospital	Silence zone	Day	46.3	53.9	50.3	51.6	53.9	
			Night	40.0	52.5	51.6	51.6	51.6	
11	RSPCB, Office	Institutional	Day	43.5	42.1	51.6	51.6	51.6	
			Night	40.2	43.7	53.6	50.7	51.6	
12	Tonk Phatak	Commercial	Day	56.5	49.9	54.9	51.8	56.2	
			Night	58.5	49.1	56.8	46.2	51.6	
13	Chandpole gate	Commercial	Day	66.5	66.6	66.8	63.5	NID	
			Night	63.7	63.4	66.5	62.5	NID	
14	Subhash chowk	Commercial	Day	67.7	66.4	67.5	66.9	NID	
			Night	62.2	64.3	66.5	63.1	NID	
15	Choti chopad	Commercial	Day	65.5	69.9	72.1	68.0	70.4	
			Night	64.1	67.4	72.1	65.7	58.5	
16	S.M.S Hospital	Sensitve Zone	Day	52.2	53.0	51.6	52.7	52.7	
			Night	51.6	47.7	54.3	51.6	48.9	

Noise levels are in d(B)A

ND: Not done

Daytime shall mean during 6:00 AM to 10:00 PM

Nighttime shall mean during 10:00 PM to 6:00 AM

Figure - 5 : Ambient Noise level in Jaipur City during Diwali (Day time)

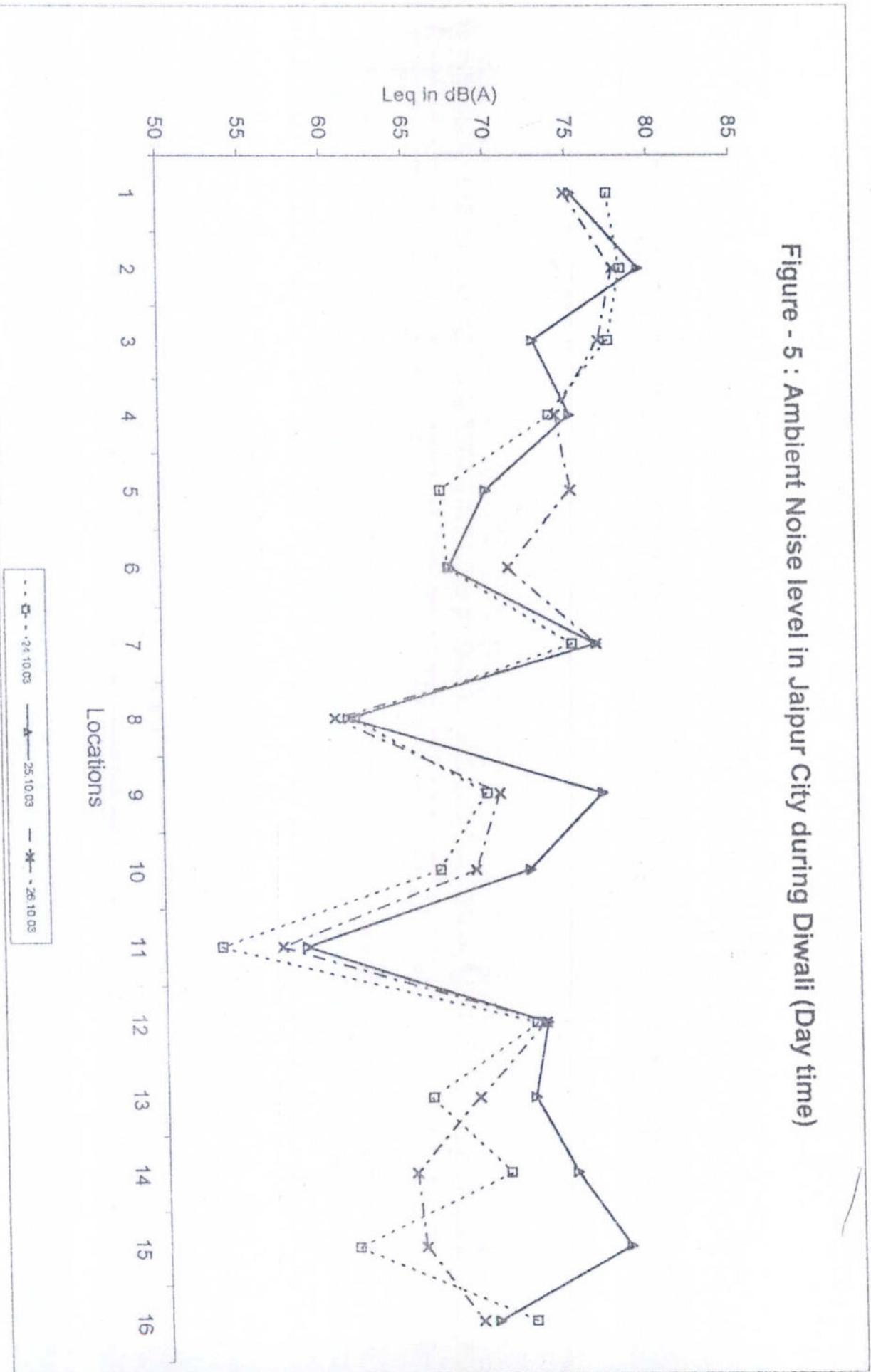


Figure - 6 : Ambient Noise level in Jaipur City during Diwali (Night time)

