

**Monitoring of total Road Dust and Dust Particles up to 75 micron (aerodynamic particle) on selected main roads of Lucknow City**



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**LUCKNOW**

Duration of Monitoring:  
04-05, September, 2020

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# **Monitoring of Road Dust (up to 75 Micron) on Selected main Roads of Lucknow City**

## **Introduction**

Road Dust has been acknowledged as an important source of urban Air Pollution. A source apportionment study (SAS) conducted by IIT Kanpur for Lucknow City in year 2014 reveals that attribution of road dust in air pollution of Lucknow city, in  $PM_{10}$  is about 87% and in  $PM_{2.5}$  77%. Re-suspended particles from paved roads can considerably enhance atmospheric particulate matter (PM) levels. Particulate emission from paved roads is a complex mixture of various sizes of dust particles derived from different Sources.

The particles deposited on the road surface originate from direct emission from vehicles tail pipe, particles emitted by tyre and break wear process and particles that settle on the road from both nearby and distance sources. Dust deposits on the roads, re-suspended in the atmosphere by plying of vehicles or wind, increase air pollution. To quantifying deposition of total dust and dust particle up to 75 microns on the roads, Central Laboratory, U.P. Pollution Control Board has carried out monitoring of total dust load and dust particles up to 75 micron (Aerodynamic particles size) on certain selected roads of Lucknow city.

## **Scope of Monitoring**

Dust particle less than 75 microns (Aerodynamic particles size) on the road surface has ability to re-suspended in the atmosphere owing to plying of vehicles or wind causing air pollution. The scope of monitoring is as follow-

- To quantify dust load per square meter on selected main roads of Lucknow city.
- To quantify dust particle up to 75 microns (Aerodynamic particles size) per square meter on selected main roads of Lucknow city.
- To quantify total dust load per kilometer on selected main roads of Lucknow city.

## **Monitoring Locations**

Roads selected for dust monitoring are as follows.

1. Front Road of U.P.P.C.B Head office building, Gomti Nagar, Lucknow.
2. Main Road Indira Gandhi Partisthan, Gomti Nagar, Lucknow.
3. Lohia Path, Gomti Nagar, Lucknow.
4. Patrakar Puram, Gomti Nagar, Lucknow.
5. A-Block, Indira Nagar, Lucknow.
6. Shaheed Path, Lucknow.
7. Ring Road, Jagrani Hospital, Lucknow.
8. Husain Ganj, Gurudwara Road, Lucknow.
9. Alambagh Police station to Alambagh Bus station road Lucknow.
10. Near Ravindralay, Station Road, Charbagh, Lucknow.
11. Mahatma Gandhi Marg, Lucknow.

## **Duration of Monitoring**

04 & 05 September, 2020

## **Methodology**

More than 200 grams of road dust samples collected within marked area across width( $M^2$ ) of the roads through sweeping of the roads, using a Vacuum Cleaner fitted with a Brush on the suction end and Nylon Bag on the delivery end to collect the dust. samples. Collected dust put in chain locked sachet. Sachet marked with permanent marker for identification of locations/address of road and area. Samples carried in the laboratory for further analysis. Total weight of the samples recorded. Entire samples dried in the oven at  $105^{\circ}C$  for 12 Hours. Dried Samples reweighed and moisture contents of sample calculated.

200 grams of total dried sample screened properly using 200-mesh standard size sieve using mechanical shaker. Particles up to 75 micron properly segregated and collected in a pan and weighed. Mass (gram/  $m^2$  area of the road) of dust calculated.

- Observed values of total dust and dust particle up to 75 micron depicted in **Table-1** specifying the location/ coordinates of roads selected for monitoring.

- Observed values of total dust load per kilometre of road depicted in **Table-2**.
- Ambient Air Quality of Lucknow City in terms of temperature, humidity, PM<sub>2.5</sub> and PM<sub>10</sub> depicted in **Table-3**.

### **Observations**

On perusal of the data given in Table 1, 2 and 3, following are the observations:

1. Mass of total dust observed in the range between 13.53 to 51.85 g/m<sup>2</sup>. Maximum values observed at Hussainganj-Gurudwara road and minimum at M.G. Marg, Near Awas Vikas, Lucknow. Maximum value of total dust load at Hussainganj-Gurudwara road is owing to construction work of over bridge.
2. Mass of dust contents upto 75 micron size observed in the range between 1.16 to 10.16 g/m<sup>2</sup>. Maximum value observed at Patrakar Puram Road and Minimum at Indira Gandhi Pratisthan, Gomti Nagar, Lucknow.
3. Quantification of mass of total dust load in respect to area of road/ kilometer distance (L X W) reveals that maximum total dust load 892.25 kg/km at road between Alambagh police station to Alambagh Bus station. Minimum 230.0 kg/km at M.G. Marg, Lucknow.
4. Ambient Air Quality Data of Lucknow city obtained during 4 & 5 September, 2020 reveals that, PM<sub>2.5</sub> ranged between 27 to 33 µg/m<sup>3</sup> (Standard-60 µg/m<sup>3</sup>) and PM<sub>10</sub> ranged between 66 to 77 µg/m<sup>3</sup> (Standard -100 µg/m<sup>3</sup>).
5. During above monitoring duration Ambient Temperature was between 30.9 to 31.1<sup>0</sup>C and Relative Humidity between 69.6 to 70% .
6. During monsoon Season, dust particles are trapped in the bottom layers due to rain showers and high relative humidity.

### **Conclusion**






1. It is important to have measurement of road dust during monsoon season characterised by high relative humidity to find out **base line data** of road dust.
2. Rain being one of the most important removal mechanisms of air pollution (particles and gases).




3. Monitoring of road dust proposed to carry out in post monsoon period in month of October/ November as humidity is low and inversion effect is maximum. Winter season is comparatively most suitable to know actual road dust load.

### **Recommendations**

1. Roads should be regularly cleaned using mechanical sweeping machine and collected dust should be dumped at proper place, so, that it could not deposited again on the roads .
2. Main roads should be washed regularly using treated sewage from STPs which is available in plenty in Lucknow.
3. Whenever, road washing is not possible, dense sprinkling through treated sewage mixed with dust suppressant should be done regularly.
4. Continuous operation of fountains at main road crossings and parks.
5. Anti-smog guns should be installed at main hot spot areas.
6. Ensure pothole free roads in the city.
7. Road shoulders (unpaved part) should be covered with interlocking tiles or grass.
8. There should be proper Traffic regulation /Management to avoid congestion of the road. Free flow of traffic should be ensured.

**Table-1****Monitored Values of total dust and dust up to 75 microns (Grams)/M<sup>2</sup>)**

Sl. No	Location and Coordinates	Location Photographs	Total dust In (grams/M <sup>2</sup> )	Dust upto 75 microns (gram/M <sup>2</sup> )
1.	Front Road of U.P.P.C.B Head office building, Gomti Nagar, Lucknow.  26.864787 81.005418		37.14	5.42
2.	Main Road Indira Gandhi Parthisthan, Gomti Nagar, Lucknow.  26.870791 81.007669		16.3	1.16
3.	Lohia Path, Gomti Nagar, Lucknow.  26.857059 80.976947		30.63	5.32
4.	Patrkar Puram, Gomti Nagar, Lucknow  26.852768 81.001576		49.49	10.16
5.	A-Block, Indra Nagar, Lucknow.  26.857059 80.976947		30.36	4.48

Sl. No	Location and Coordinates	Location Photographs	Total dust In (grams/M <sup>2</sup> )	Dust upto 75 microns (gram/M <sup>2</sup> )
6.	Shaheed Path, Lucknow 26.862943 81.001576		49.27	7.71
7.	Ring Road, Jagrani Hospital, Lucknow 26.897585 80.968355		37.5	5.76
8.	Husain Ganj, Gurudwara Road, Lucknow 26.838960 80.932505		51.85	7.81
9.	Alambagh, Lucknow 26.820997 80.908764		35.69	7.55
10.	Near Ravindralay, Station Road, Charbagh, Lucknow. 26.832872 80.928737		19.82	1.4
11.	Mahatma Gandhi Marg, Lucknow 26.835027 80.951026		13.53	5.48



**Table 2- Dust load per kilometre (in Kg)**

Sl. No.	Name of the Road	Average Width of Road in Meters	Total Dust/KM in KG	Total Dust load upto 75 micron/KM in KG
1.	Front Road of U.P.P.C.B Head office building, Gomti Nagar, Lucknow.	17	631.38	92.14
2.	Main Road Indira Gandhi Parthisthan, Gomti Nagar, Lucknow.	17	277.10	19.72
3.	Lohia Path, Gomti Nagar, Lucknow.	35	490.00	87.50
4.	Patrkar Puram, Gomti Nagar, Lucknow	16	791.84	162.56
5.	A-Block, Indra Nagar, Lucknow.	16	485.76	71.68
6.	Shaheed Path, Lucknow	30	739.05	115.65
7.	Ring Road, Jagrani Hospital, Lucknow	17	637.50	97.92
8.	Husain Ganj, Gurudwara Road, Lucknow	14	725.90	109.34
9.	Alambagh, Lucknow	25	892.25	188.75
10.	Station Road, Charbagh, Lucknow.	35	693.70	49.00
11.	Mahatma Gandhi Marg, Lucknow	17	230.01	93.16

**Table 3- Ambient Air Quality of Lucknow City in terms of PM<sub>2.5</sub> and PM<sub>10</sub>.**

Sl. No.	Date	Temperature O <sup>0</sup> C	Relative humidity %	Value of PM <sub>10</sub> µg/M <sup>3</sup>	Value of PM <sub>2.5</sub> µg/M <sup>3</sup>
1.	04-09-2020	30.9	70	77**	33*
2.	05-09-2020	31.1	69.6	66**	27*

Source:\*\* - Manual Monitoring, \* - CAAQMS