


## ANNEXURE 4

### Status of Ambient Air Quality of Davangere City, Karnataka



**CENTRAL POLLUTION CONTROL BOARD**  
**Zonal Office (South)**  
Nisarga Bhavan, Thimmaiah Road  
Shivnagar, Bengaluru - 560 079

## 1. ABOUT DAVANGERE CITY

<b>State</b>	Karnataka
<b>Location</b>	14.4666°00"N 75.9242°00" E
<b>Area</b>	77Sq.km
<b>Elevation</b>	602.5 m (1977 ft)
<b>Population</b>	435,128 according to 2011 Census
<b>Climate</b>	Average annual rainfall is 644 mm
<b>Geography</b>	Davangere lies in the Maidan region on the Deccan Plateau. The district is bounded by Shimoga, Haveri, Chitradurga, Chikmagalur and Bellary districts. The southern and western parts of the district are irrigated by the waters of Bhadra reservoir. The city nestles in the midst of the lush green paddy fields giving it a charming green appearance from around the city.
<b>Industries/Companies</b>	Major trading center in central Karnataka, many cotton mills and cloth business establishments, Shamanur sugar mills etc.
<b>Air Quality Stations</b>	02 stations, one residential (SC673) and one commercial (SC-674)
<b>Location of Davangere City</b>	

## **2. DETAILS OF NAMP STATIONS**

The Davangere city has two NAMP stations and they are maintained and regularly monitored Karnataka SPCB. The stations are located at

- 1) KSPCB Regional Office building, (SC-673) – Residential area
- 2) Mothi Theatre, Gandhi Circle, (SC-674) – Commercial area

The monitoring of these stations is carried out by Davangere Regional Office, Karnataka SPCB, the monitoring of pollutants is carried out for 24 hours (4 hourly sampling for gaseous pollutants and 8 hourly sampling for particulate matter) with a frequency of twice a week. The parameters monitored are Sulphur dioxide (SO<sub>2</sub>), Nitrogen dioxide (NO<sub>2</sub>), Particulate Matter (PM<sub>10</sub>), Ammonia (NH<sub>3</sub>) and Lead (Pb).

## **3. DATA FOR AQI CALCULATION**

The KSPCB on request has sent the NAMP stations data for the month of December, 2015 for both the stations. This data has been used in preparing the AQI for those stations. The parameters monitored at these stations are Sulphur dioxide (SO<sub>2</sub>), Nitrogen dioxide (NO<sub>2</sub>), Particulate Matter (PM<sub>10</sub>), Ammonia (NH<sub>3</sub>) and Lead (Pb). However to start with only three parameters such as Sulphur dioxide (SO<sub>2</sub>), Nitrogen dioxide (NO<sub>2</sub>) and Particulate Matter (PM<sub>10</sub>) are considered for calculation of AQI.

## **4. CALCULATION OF AQI**

The AQI is calculated as following:

- The data received from the KSPCB was in 4 hourly concentration for SO<sub>2</sub> and NO<sub>2</sub> and 8 hourly for PM<sub>10</sub> parameters. It was converted into 24 hourly average concentrations.
- The Sub-indices for individual pollutants were calculated using its 24 hourly average concentration value and health breakpoint concentration range.
- The formula used for calculation of Sub-indices is:

$$I_p = \left\{ \frac{(I_{HI} - I_{LO})}{(B_{HI} - B_{LO})} \right\} * (C_p - B_{LO}) + I_{LO}$$

Where

B<sub>HI</sub> = Breakpoint concentration greater or equal to given concentration

B<sub>LO</sub> = Breakpoint concentration smaller or equal to given concentration

I<sub>HI</sub> = AQI value corresponding to B<sub>HI</sub>

I<sub>LO</sub> = AQI value corresponding to B<sub>LO</sub>; subtract one from I<sub>LO</sub>, if I<sub>LO</sub> is greater than 50

AQI = Max (I<sub>p</sub>) (where; p= 1,2,...,n); denotes n pollutants

- The NAMP data received from the KSPCB was fed into the AQI calculator prepared in the Microsoft Excel sheet and the value of Sub-indices and AQI was calculated.

## 5. RESULT

Since manual stations measure PM<sub>10</sub>, it is suggested that for manual station AQI for monitoring days can be calculated as long as PM<sub>10</sub> or PM<sub>2.5</sub> is measured. It is suggested that for manual station, AQI is reported for at least three parameters and one of them should be PM<sub>10</sub> or PM<sub>2.5</sub> possibly on weekly basis.

AQI has been calculated for the month of December, 2015 for two monitoring stations.

### Regional Office Building, KSPCB (SC- 673), December, 2015

<b>AIR QUALITY INDEX (AQI)</b>					
<b>SUB INDEX</b>				<b>AQI</b>	
<b>Date/Month</b>	<b>NO<sub>2</sub></b>	<b>SO<sub>2</sub></b>	<b>PM<sub>10</sub></b>		
03-12-15	11	5	43	43	GOOD
07-12-15	11	5	51	51	GOOD
10-12-15	11	5	43	43	GOOD
14-12-15	11	5	76	76	SATISFACTORY
17-12-15	11	5	61	61	SATISFACTORY
21-12-15	11	5	62	62	SATISFACTORY
23-12-15	11	5	58	58	SATISFACTORY

28-12-15	11	5	49	49	GOOD
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**Mothi Theatre, Gandhi Circle, (SC-674), December, 2015**

<b>AIR QUALITY INDEX (AQI)</b>					
<b>SUB INDEX</b>			<b>PM<sub>10</sub></b>	<b>AQI</b>	
<b>Date/Month</b>	<b>NO<sub>2</sub></b>	<b>SO<sub>2</sub></b>			
01-12-15	12	6	218	218	POOR
04-12-15	12	6	340	340	VERY-POOR
08-12-15	11	5	365	365	VERY-POOR
11-12-15	12	9	282	282	POOR
15-12-15	13	6	243	243	POOR
18-12-15	11	6	174	174	MODERATELY POLLUTED
22-12-15	13	6	212	212	POOR
26-12-15	13	9	251	251	POOR
28-11-15	13	8	256	256	POOR

From the above interpretation of AQI for Davangere city, the responsible parameter for pollution is PM<sub>10</sub>. It can be seen from the above tables that for SO<sub>2</sub> and NO<sub>2</sub>, air quality is good; however it is PM<sub>10</sub> which is in very poor category at Mothi Theatre, Gandhi Circle. It is due to vehicular movement in the vicinity.