

## Air quality monitoring of main urban center of Haridwar

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### Abstract

Present study was carried to measure air quality status of main urban center of Haridwar. Parameters such as suspended particulate matter, respiratory suspended particulate matter, oxide of sulphur ( $\text{SO}_x$ ) and nitrogen dioxide ( $\text{NO}_2$ ) were recorded during the study period. Suspended particulate matter and respiratory suspended particulate matter were reported higher than the permissible limit whereas oxide of sulphur and nitrogen dioxide was recorded under the permissible limit prescribed by Central Pollution Control Board (CPCB).

**Keywords:-** Air quality, Particulate matter,  $\text{SO}_x$ ,  $\text{NO}_x$

### Introduction

Air pollution in urban areas due to mobile or vehicular pollution is predominant and significantly contributes to air pollution problems. Automobiles responsible for 60 % of the total air pollution problem. Road traffic produce volatile organic compounds, suspended particulate matter (SMP), respiratory suspended particulate matter (RSPM), oxide of sulphur ( $\text{SO}_x$ ), oxide of nitrogen ( $\text{NO}_x$ ) and carbon monoxide (CO) can cause health problems including burning eyes and nose, itchy irritated throat, and breathing problems (Ingle *et al.*, 2005). Some chemicals found in polluted air can cause cancer, birth defects, brain and nerve damage, and long-term injury to the lungs and breathing passages in certain circumstances. Above certain concentrations and durations, certain air pollutants are extremely dangerous and can cause severe injury or death. Present study has been carried out to assess air quality status of Haridwar city which will help in the prediction of various health problems among local mass caused by air pollution.

### Materials and Method

#### Study area

Present study has been carried out at main urban center of Haridwar city that is Ranipur intersection. This area contains most of the shopping complex, institutes and other important offices which bear extremely high traffic load throughout the year.

#### Air quality monitoring

The ambient air quality was undertaken as per the norms prescribed by the Central Pollution Control Board (CPCB). The sampling was carried out for four days in a week and four weeks in a month, from January to December 2005. Air samples were collected in Respiratory Dust Sampler (RDS) APM-460. During the sampling day sampler was kept at height of 2 m from the ground level and the initial and final rotameter readings were recorded every eight hour and average from 24 hours. Air quality monitoring of gaseous pollutants viz.,  $\text{SO}_x$  and  $\text{NO}_2$  was carried out using the method of West and Gaeke (1956) and Jacob and Hochheiser (1958) respectively.

## Results and Discussion

Monitoring of ambient air quality of main urban center of Haridwar has been carried out during January to December 2005. Table-1 showing the monthly average variation in suspended particulate matter (SPM), respiratory suspended particulate matter (RSPM), oxide of sulphur ( $\text{SO}_x$ ) and nitrogen dioxide ( $\text{NO}_2$ ). Lowest value of suspended particulate matter was recorded  $315.00 \mu\text{gm}^{-3}$  (July) whereas highest value was recorded  $466.00 \mu\text{gm}^{-3}$  (May). Highest concentration of respiratory suspended particulate matter was recorded  $112.50 \mu\text{gm}^{-3}$  (May) and lowest value was found  $95.00 \mu\text{gm}^{-3}$  (August). In case of gaseous pollutants, highest concentration of oxide of sulphur recorded  $10.50 \mu\text{gm}^{-3}$  (Nov) and its lowest value recorded  $7.00 \mu\text{gm}^{-3}$  (March). Concentration of nitrogen dioxide during the study period was recorded between  $12.00 \mu\text{gm}^{-3}$  (September) to  $17.15 \mu\text{gm}^{-3}$  (February).

Varma *et al.* (1993) have reported a higher concentration of S.P.M. in winter and summer seasons in comparison of Monsoon and pre- monsoon seasons at Sindri and Dhanbad. Gupta and Vidya (1994) observed that the atmosphere gets cleaned due to precipitation effect of rain during monsoon season, thereby affecting the S.P.M. Present study reveals that highest valued of SPM and RSPM were also found highest during the pre-monsoon period. Das *et al.*, (2003) monitored the ambient air quality of Tantra-Raikela-Bandhal (TRB) iron ore mines with respect to suspended particulate matter (SPM),  $\text{SO}_2$  and oxides of nitrogen and their level of concentration in different seasons of the year and observed that the concentration of  $\text{SO}_2$  and  $\text{NO}_x$  remained below the prescribed limits except for few places of study area where it exceeded the limit. Jain *et al.* (2006) studied vehicular concentration with regard to RSPM, SPM,  $\text{NO}_2$ ,  $\text{SO}_2$  and found  $\text{SO}_2$  and  $\text{NO}_2$  within the permissible daily standards, RSPM and SPM were also exceeding the prescribed limits.

Present study shows that concentration of gaseous pollutants remained under the limit prescribed by Central Pollution Control Board, however, particulate matter (SPM and RSPM) were higher than the prescribed limits of CPCB.

**Table-1: Average concentration of primary air pollutants recorded at Ranipur Mod during the study period (2005)**

Months	SPM ( $\mu\text{gm}^{-3}$ )	RSPM ( $\mu\text{gm}^{-3}$ )	$\text{SO}_x$ ( $\mu\text{gm}^{-3}$ )	$\text{NO}_2$ ( $\mu\text{gm}^{-3}$ )
January	430.12	111.00	8.00	16.00
February	350.33	109.00	9.50	17.15
March	400.45	100.50	7.00	14.20
April	410.00	105.55	9.00	15.20
May	466.00	112.50	8.50	14.80
June	430.10	118.40	9.00	14.00
July	315.00	110.50	9.00	13.50
August	330.00	95.00	8.00	15.35
September	335.00	98.32	8.00	12.00
October	360.70	105.11	7.30	13.00
November	380.00	109.50	10.50	14.70
December	400.00	109.00	8.50	15.10

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