

Impact analysis of air pollution along NH6 through Jalgaon city

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Abstract:- Air pollution is one of the serious problems faced by peoples in developing countries like India. The urban areas in India, which have not only experienced a rapid growth of population but also by growing number of vehicles. The major causes of increased emission of pollutants in urban areas include the use of poor quality fuel, traffic congestion and badly maintained motor vehicles. The impact of vehicular pollution on human health in urban areas is at peak level as vehicle emissions are near the ground level where people live and work. Most of the Indian Cities are also experiencing rapid urbanization and the majority of the country's population is expected to be living in cities within a span of next two decades. This report presents "*Impact analysis of air pollution along NH6 through Jalgaon city*".

Key Words:- hydrocarbon (HC),sulphur oxide(SO₂),Carbon monoxide(CO) and Carbon dioxide(Co₂)

I-Introduction:-

Air pollution is one of the serious environmental concern of the urban Asian cities including India where majority of the population is exposed to poor air quality. The health related problems such as respiratory diseases, risk of developing cancers and other serious ailments etc. due to poor air quality are known and well documented. Besides the health effects, air pollution also contributes to tremendous economic losses, especially in the sense of financial resources that are required for giving medical assistance to the affected people. The poor are often the most affected segment of the population as they do not have adequate measures to protect themselves from air pollution.

Most of the Indian cities are also experiencing rapid urbanization and the majority of the country's population is expected to be living in cities within a span of next two decades. Since poor ambient air quality is largely an urban problem this will directly affect millions of the dwellers in the cities. The rapid urbanization in India has also resulted in a tremendous increase the number of motor vehicles. As the number of vehicles continues to grow and the consequent congestion increases, vehicles are now becoming the main source of air pollution in urban India.

The effect of air pollution includes breathing and respiratory problems, aggravations of existing respiratory and cardiovascular diseases, alterations in the body defense system against foreign materials and damage to lung tissues and carcinogenesis. Air pollution is influenced by four major factors, namely industrialized expansion of the cities, increase in traffic, rapid economic development, and higher level of energy consumption. The growth of, both, an industrial and residential area is unplanned in many developing cities of India, thus, contributing to the air pollution problems. In urban areas, the mobile or vehicular population is predominant and significantly contributes to air quality problems. Automobiles produces volatile organic compounds (VOC), suspended particulate matter (SPM), oxides of sulfur (SO_x), oxides of nitrogen (NO_x) and carbon monoxide (CO), which have adverse effects on surrounding ecosystem.

In order to study the impact of vehicular pollution along the highway (NH-6) passing through Jalgaon city is selected. Jalgaon city is the trade and commercial center of North Maharashtra Region, India. Jalgaon

city is bounded by Satpuda mountain ranges in the north and Ajanta mountain ranges in the south. City Jalgaon is the headquarter of Jalgaon District. Jalgaon City is considered as the agricultural and commercial capital. The Jalgaon railway junction serves routes to Mumbai, Nagpur, Delhi and Surat. The city is well developed with good roads, shopping centers and residential areas with a moderate infrastructure in communication and transport. Modern Jalgaon now boasts of vast industrial areas, educational institutes and good hospitals. Jalgaon is also the hometown of Her Excellency Smt. Pratibha Patil, Honorable President of India. Geographical Setup: Jalgaon city lies between 75° 31' 36.39" to 75° 36' 5.30"E Longitude and 20° 58' 22.40" to 21°01'26.35"N Latitude. The average rainfall of the city is 700-750 mm which categories it as semi-arid region. Temperature extends from 10° to 46° C. City has a total of 5 lakh population during 2008 with a literacy rate 76.06%.

Current population of the city is standing at 4.64 lacks. The population of Jalgaon city had grown up by 23% during 1981 – 91 and by 19% during 1991 – 2001. With the population, vehicular number is also increasing in the city. The data shows that nearly 400 new vehicles are registered every day at Jalgaon Road Transport Office. Vehicle population data of Jalgaon district shows that there is a continuous increase of vehicles since 1998 to 2002. The average vehicular density on highway is 17,000 vehicles/day.

Our first stage on dated 11 Oct. 2017, the project of roadside vehicle exhausts measurements, followed by an analysis of the field data. Valid emissions measurements were obtained from approximately 23 vehicles on Bambhori stop along NH6 through jalgaon. Approximately 89% of the monitored fleet was petrol vehicles and the remaining 3% were gas or dual-fuel (gas and petrol). The average age of the vehicles in the sample fleet is 6.9 years old which is three to four years newer than the average age of all vehicles registered in Jalgaon.

Next step of project work from 23 Oct.2017, at Gujaral petrol pump stop by doing survey of 100 vehicle using auto exhaust or multigas analyzer. By continuing further work as per predecided project working spots, we surveyed 100 vehicle on the Shiv colony stop and Prabhat chawk on 10 Nov.2017 and 22 Nov.2017 respectively.

Road Linkages

Jalgaon city is well connected by road linkages to important places of the State. The National Highway No. 6 from Mumbai – Nagpur passes through the length of the city and is the central axis of the city of Jalgaon. Further, the State Highways are Jalgaon – Ajantha and Jalgaon – Pachora that pass through the South side of the City and the Jalgaon – Mamurabad State Highway that passes through the North of the city. Major district roads are Pimprale – Avhane towards the North – West, Jalgaon – Saokhede on South - West, Pimprala – Mamurabad on North and Jalgaon – Pimprala towards the West.



Fig.No-01 Road Map of Jalgaon City

II-Objectives:-

- To collect emission samples from sample 2/3 wheeler and 4 wheelers petrol vehicle using exhaust gas analyzer.
- To simultaneously collect information about vehicular conditions through questionnaire.
- To study the harmful gases such as, hydrocarbon (HC), sulphur oxide (SO₂), Carbon monoxide (CO) and Carbon dioxide (CO₂).
- To study of age, servicing, period, manufacturer, loading, speed and to correlate these parameters with exhaust emissions.
- To correlate the vehicular emission with the condition of vehicles.
- To collect information about patients reposting in hospitals due to air born diseases in Jalgaon city through data survey of Hospitals.
- To correlate the disease susceptibility with the age, health conditions and exposure levels due to type of work being done by the sample person.

III. Literature Review

This paper reviews the Air Quality Analysis at following locations in India:

1-Gwalior. Gwalior is surrounded by industrial and commercial zones and rapid increase in urbanization results in increase gaseous pollutants SO₂, NO₂, SPM and RSPM. Concentration of SO₂ was monitored at 4 locations of Gwalior by using high volume air sampler (Envirotech APM 415 and 411). The average ambient air concentration of SO₂ was found below the permissible limits of NAAQS at all the sites. Comparatively somewhat higher concentration of SO₂ was observed during these months. A health survey was also carried out which showed the symptoms were developed such as sore throat, shortness of breath, skin irritation, wheezing, sneezing, chest tightness, nausea etc. An assessment for people (aged 10 to 60 years) was carried out to find health problems due to vehicular pollution between the months of November-2013 to May-2014 (winter). Average concentration of SO₂ at residential area Kampoo was found 11.800 µg/m³ which is less as compared to other sites and also the health effects are minimum because this area is not so congested and traffic is less.

2- Bangalore. Kamath and Lokeshappa (2014) investigated air pollutant concentrations at Residential, Industrial & Sensitive Areas of Bangalore. SO₂, NO_x and RSPM were collected over six sites in Bangalore. The sampling stations are located at Victoria Hospital, Graphite Industrial Area, Amco Apartments, Peenya Industrial Area, Yeshwantapur Residential Area and K.H.B Industrial Area. Meteorological parameters like Temperature, Relative humidity, Wind speed, Wind direction & Rain fall data were also recorded during the sampling period. Monthly and seasonal variation of these pollutants have been analysed and noted. It has been observed that the concentrations of the pollutants are high in summer in comparison to the Pre-monsoon and post-monsoon seasons. In the present study, it was noticed that the RSPM levels at all selected sites exceeds the prescribed limits. Apart from this the SO₂ and NO₂ levels in industrial areas remain under prescribed limits. In this study, air quality data of different Areas of Bangalore were collected and also to assessed the air quality and finally following conclusions have been drawn.

3-Ahmedabad - During monsoon (June 2012 to August 2012), the minimum concentration of pollutants were found due to increased vertical dispersion, washout by monsoon rains and suppressed wind erosion. During winter (November 2012 to February 2013) there was a maximum concentration range of all parameters. The minimum and maximum average concentration of SPM was recorded from 185 µg/m³ to 362 µg/m³. Maximum concentrations were recorded during January. During winter season mixing height was very less with respect to the other seasons. High concentration of Pollutants were observed on October due to festival. Minimum concentration of particulates and gases pollutants were found during summer season (April 2012 to June 2012). Lesser concentration levels of pollutants were recorded due to maximum mixing height, high temperature, high wind erosion and moderate stability. As compared with NAAQS, annual average SO₂ and NO₂ concentrations were found well below the prescribed limits. RSPM levels were slightly increasing order at station Panjarapol Char Rasta while SPM showed increasing trend. The minimum and maximum average concentration of RSPM

was recorded from 74 $\mu\text{g}/\text{m}^3$ to 135 $\mu\text{g}/\text{m}^3$. Monitoring station nearby city area were found maximum NO₂ concentration levels and monitoring station nearby industrial area were found maximum SO₂ concentration levels due to industrial influence.

Contribusion of various sectors to ambient air quality in major cities

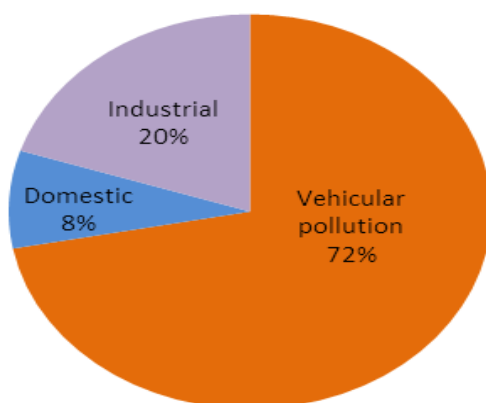


Fig.No-02 Causes of Air Pollution in Various Sectors

Jalgaon City-Air pollution in India is mainly caused from three sources namely vehicles, industrial and domestic sources. The air pollution is mainly concentrated in following three areas vehicular and domestic sources of pollution to the ambient air in Jalgaon as follows (Source: MoEF, 1997).

Source	1980-81	1990-91	2000-01	2001-11
Industrial	56%	40%	29%	20%
Vehicular	23%	42%	64%	72%
Domestic	21%	18%	7%	8%

Table.No-01 Contribution of air pollution from various sources in Jalgaon (Source: MoEF, 1997).

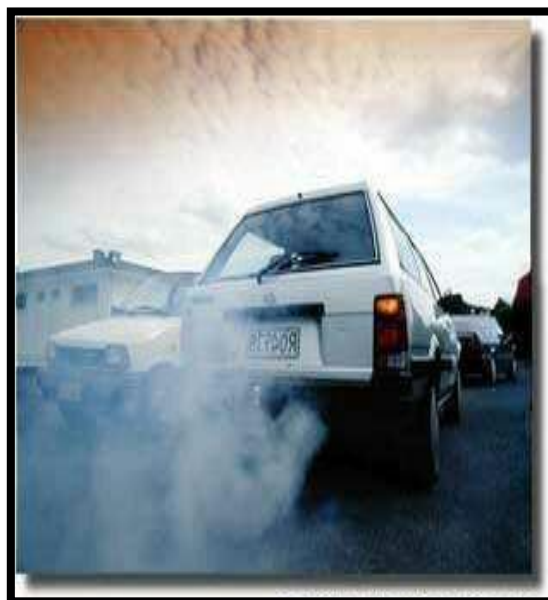


Fig.No-03 Immersion of Smoke from vehicles

IV- Health effect associated with Air pollutant:-

Sr. Num.	Pollutant	Effect on Human Health
01	Sulphur Dioxide	Affect lung function adversely.
02	Particulate Matter and Respirable Particulate Matter (SPM and RPM)	Fine particulate matter may be toxic in itself or may carry toxic (including carcinogenic) trace substance, and can alter the immune system. Fine particulates penetrate deep into the respiratory system irritating lung tissue and causing long-term disorders.
03	Lead	Impairs liver and kidney, causes brain damage in children resulting in lower I.Q., hyperactivity and reduced ability to concentrate.
04	Benzene	Both toxic and carcinogenic. Excessive incidence of leukemia (blood cancer) in high exposure areas.
05	Hydrocarbons	Potential to cause cancer

06	Nitrogen Oxides	Increased susceptibility to infections, pulmonary diseases, impairment of lung function and eye, nose and throat irritations.
07	Carbon Monoxide	Affects the cardio vascular system, exacerbating cardiovascular disease symptoms, particularly angina; may also particularly affect fetuses, sick, anemic and young children, affects nervous system impairing physical coordination, vision and judgments, creating nausea and headaches, reducing productivity and increasing personal discomfort.

Table.No-02 Health effect associated with Air pollutant.

V- Result, Discussion and Observation.

Name of Owner	No. of Vehicle	Last Servicing date	HSU	Nitrogen	Carbon Dioxide	Water Vapour	Carbon Monoxide	Hydrocarbon
Akshay Sonawane	MH-19 BJ-3487	14-Aug	10.8	7.668	1.512	1.188	0.048	0.0324
Sandeep Dheple	MH-10 AA-555	15-Jan	10	7.1	1.4	1.1	0.045	0.03
Amit Klae	MH-19 S-7577	14-Dec	10.3	7.313	1.442	1.13	0.0463	0.0309
Shyam Patil	MP-09 J-2214	13-Nov	11.3	8.023	1.582	1.243	0.05	0.0339
Dhaneshwar Patil	MH-18 BQ-2657	15-Feb	10.4	7.384	1.456	1.144	0.046	0.0312
abhijeet Salunkhe	MH-15 BC-4821	14-May	15.2	10.92	2.138	1.672	0.068	0.0456

Raju Kumar	MH-16 V-2378	14-Aug	16.2	11.502	2.268	1.782	0.0729	0.0486
Shantilal Patel	GJ-02 S-1245	15-Feb	12.4	8.84	1.737	1.364	0.0558	0.0372
Vasnt More	Mh-18 BA-2754	14-Aug	9.85	6.99	1.37	1.085	0.0443	0.0195
Mahesh Sonavane	MH-14 BC-3540	14-Nov	13.5	9.585	1.89	1.485	0.06	0.0405
Pratik Tambat	MH-19 F-7028	14-Nov	13.2	9.372	1.548	1.452	0.059	0.0396
Manilal Chaudhari	MH-15 AA-1768	14-Aug	12.2	8.662	1.708	1.342	0.0512	0.0366
Sagar Chaudhari	MH-18 BS-3390	14-April	11.8	8.378	1.652	1.298	0.053	0.0354
Umesh Koli	MH-04 F-6617	14-Sep	13.8	9.798	1.932	1.518	0.0621	0.0414

Table.No-03 Observation Table.

VI-Conclusion

There is great need to control the air pollution as it is impacting the environment and human health seriously. The concentration of air pollutants like have to be controlled to save the environment. To control air pollution, proper rules and regulations should be implemented by the government, awareness among the people, control the growth of population, number of vehicles, industries and energy consumption. We need to take pollution issue seriously because ignorance is certainly not the proper way to go. The stakes are really high and world needs to wake up and start acting right now because environmental issues are constantly growing in number and size. Poor vehicle design especially 4-stroke four wheelers result in high emission of air pollutants. Uncontrolled growth of vehicle population in all major cities/towns has resulted in high levels

of air pollution. Old process technology is employed in many industries especially in small scale industries resulting in high emission of air pollutants.

VII- Reference

1. Ministry Of Road Transport And Highways Notifications.
(<http://morth.nic.in/index2.asp?slid=32&sublinkid=12&lang=1>).
- 2- Central Pollution Control Board. Minister Of Environment And Forest India.
(<https://app.cpcbcr.com/ccr/#/dashboard-emergency-stats>)
- 3- Jalgaon Municipal Corporation Jalgaon , Jalgaon Sanitation Plan.
(<http://www.jcmc.gov.in/english/projects.html>)
- 4- CPCB(1999) "Auto Emission" Parivesh News Letter 6(1), June New Delhi, Central Pollution Control Board.
- 5- Detailed Discussion with Dr. Makarand Chaudhari , Dr. Mahajan , Dr. Sunil Chaudhari, Dr. Anjali Maheshwari, Dr. Prashant Chaudhari , Dr. Subhash Chaudhari
- 6- World Bank Technical Paper No 381 , Urban Air Quality Management Strategy In Asia Greater Mumbai Report.
- 7- Dohare D and Panday V (2014). Monitoring of Ambient Air Quality in India - A Review submitted to International Journal of Engineering Sciences & Research.
- 8- Pathak CY, Mandalia HC, Roy D and Jadeja RB (2015). Comparative Study of Ambient Air Quality Status of Ahmedabad and Gandhinagar City in Gujarat, India submitted to Chemical Science Transactions, Vol 4(1), pp 89-94.