AIR QUALITY MONITORING IN CHIDAMBARAM DURING THE TIME OF DEEPAVALI FESTIVAL

[1] B. Sugumaran and [2] M. Rajendran
[1] M.E scholar and [2] Professor
Department of Civil Engineering, Annamalai University, Annamalai nagar, Chidambaram, Tamil Nadu, India.
Department of Civil Engineering, Annamalai University, Annamalai nagar, Chidambaram, Tamil Nadu, India.

Abstract : Air is one of the vital components of environmental supporting life system of well kinds of living things in the biosphere. Quality of the air is being gradually deteriorated by the anthropogenic activities that poses a serious health hazard and also leads to global warming and climate change. In this thesis, it is proposed to monitor the present ambient air quality parameters in Chidambaram town such as SPM and gaseous pollutants NO_2, SO_2, during time of Deepavali festival at Muthiah Nagar and Pachaiyappan school station. . Air samples to be collected with the help of High Volume Air Sampler with gaseous sampling attachment (Envirotech APM 430). Eight hours sampling was carried out from 7.30 pm to 3.30 am for three days. The concentration value of SPM is 214.32 μg/m^3. The average concentration of Nitrogen Dioxide (NO_2) is 215.17 μg/m^3. The average concentration of Sulphur Dioxide (SO_2) is 23.14 μg/m^3. Heavy burning of fossil fuel for energy production and automobiles are the main sources such air pollutants regularly emitted into atmosphere.

Keywords: High volume sampler, Nitrogen dioxide, Sulphur dioxide, Suspended Particle Matter.

1. INTRODUCTION

Air pollution is one of the most serious thrust in the world. It happens once the aerosols contains gases mud, fumes or odour in harmful amounts, that may be harmful to the health or comfort of humans and animals. For the past 50 years, air pollution was a widely recognized problem that comes with long and short term impact on human health and the environment. In India, pollution has become a great topic of debate at all levels and especially the air pollution because of the enhanced anthropogenic activities such as burning fossil fuels, i.e. natural gas, coal and oil-to power industrial processes and motor vehicles. With high rate of urbanization and increase in motorized transport from the rapid population growth has resulted in increased concentration of various air pollutants sulphur dioxide (SO_2), nitrogen oxide (NOx), carbon monoxide (CO), ozone (O_3), suspended particulate matter(SPM) and Respirable suspended particulate matter (RSPM) . Motorization has brought unprecedented mobility and an extremely convenient form of transport for men and goods, while creating new opportunities for employment. One of the important sources of air pollution is the vehicular exhaust emission. Study of emissions from automobiles, their transport and transformation at the urban scale is a complex task. Air pollution is a serious public health problem in most of the metropolitan areas around the world. Vehicles with poor quality emission and poor maintenance are significant contributors to air pollution in cities.

2. MATERIAL AND METHODS

Chidambaram is a town in Cuddalore District. It is situated in the southern province of Tamil Nadu in India with a populace of around 82,458. Chidambaram Municipality has divided into 33 wards and more than 15,866 houses to which it supplies essential luxuries like water and sewerage. Chidambaram truly implies sky mixed with an air of knowledge and intelligence got from the words 'Chit' and 'Ambaram'. This town is geologically arranged 97° 44' East longitude and 11° 24' North latitude.

Selection of sampling site

After the carefully investigation of traffic volume study the following location are selected namely,
1. Muthaih Nagar
2. Pachaiyappan school junction

High volume sampler

A short term air quality performing by taking 8 hourly ambient air samples at two locations in Chidambaram town. Ambient air sample were collected by using high volume sampler (APM 430 model, envirotech make) along with gaseous sampler attachment (APM 411 model, envirotech make) at each station as per the guidelines of CPCB for air quality monitoring in the urban area for NAAQS parameters.
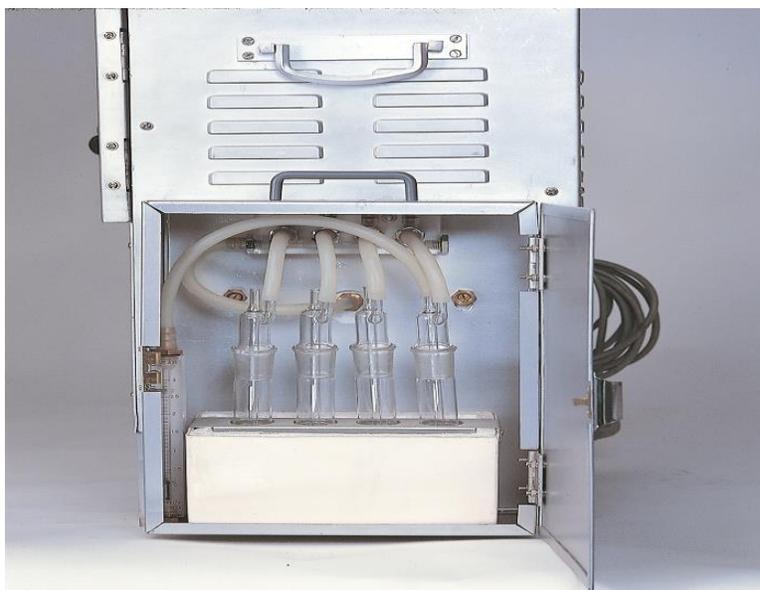

Figure 2.1 High volume air sampler

Principle of Operation

High volume sampler is the basic instrument used to monitor ambient air quality. It is widely used all over the world to measure air pollution, especially, in industrial areas, urban areas, near monuments and others sensitive areas viz., hospitals, schools and research institutions. It is a vital tool for conducting studies on the consequences of air pollution. Envirotech's APM 415 high volume sampler was utilized in the current study to estimate the content of TSPM. It is an internationally accepted standard technique for monitoring the concentration of suspended particulates. In these systems, a large volume (1500 m^3) of atmospheric air is passed through suitable filter medium over a period of 24 h which thus yield measurable dust sample seven from areas with dust levels as low as one microgram per cubic meter of air. However, wherever dirt concentrations area unit high, shorter sampling times could fulfill.

Selection of Filter Medium

For gravimetric determination of content of total suspended particulate, glass microfiber filters selected had low resistance to airflow, low affinity for moisture and 98% collection efficiency for particles of size ≤ 50 micron.

Preparing the Filter

Prior to use, each filter was exposed to a light source in order to inspect for pinholes, particles and other imperfections. A small brush was used to remove stray particles adhering to the surface of new filter papers. The care was taken to handle filter papers from their edges in order to avoid any crease or fold. Both blank and sample containing filters papers were conditioned at temperature of 35° C ± 5° C and relative humidity below 45% for at least 24 h prior to weighing. The identification number and date of sampling were put on each filter paper before weighing.

Impinger

Impinger sometimes known as bubblers, are small bottles used with an air sample pump to collect airborne hazards into designated collection liquids for analysis. For personal exposure measuring the impinger mounts during a holster accent close to the respiratory zone. For space watching the impinger is mounted on the facet of a pump with a holder accent

.

3.   RESULT AND DISCUSSIONS

We are monitored the three pollutants NO_2, SO_2, and SPM in Muthiahnagar and Pachaiyappan school station urban environment at Chidamabaram. Using high volume air sampler during the time of Deepavali festival (5.10.2018) (06.011.2018) (7.10.2018). Eight hour sampling was carried out from 7.30 pm to 3.30 am. During this day wind speed is 1.4 km/hr and the wind direction, calm at morning and its move towards north east direction at evening.

Suspended Particulate Matter (SPM)

The average concentration of SPM was minimum of 160.56 $\mu g/m^3$ at Muthiah Nagar and maximum of 214.32 $\mu g/m^3$ at Pachaiyappan school station. The combustion engines from vehicles and open burning area unit the rationale for increase SPM level (CPCB limit-200 $\mu g/m^3$).

Nitrogen Dioxide (NO₂)

The Average concentration of NO_2 was minimum of 140.12 $\mu g/m^3$ at Muthiah Nagar and maximum of 215.17 $\mu g/m^3$ at Pachaiyappan School junction. The high vehicles movements and bursting of crackers are the main reason and ash from surrounding hotels and homes that also the reason for increasing Nitrogen dioxide (CPCB limit-80 $\mu g/m^3$).

Sulphur Dioxide (SO₂)

The Average concentration of SO_2 was minimum of 11.12 $\mu g/m^3$ at Muthiah Nagar and maximum of 23.14 $\mu g/m^3$ at Pachaiyappan School junction (CPCB limit-80 $\mu g/m^3$).
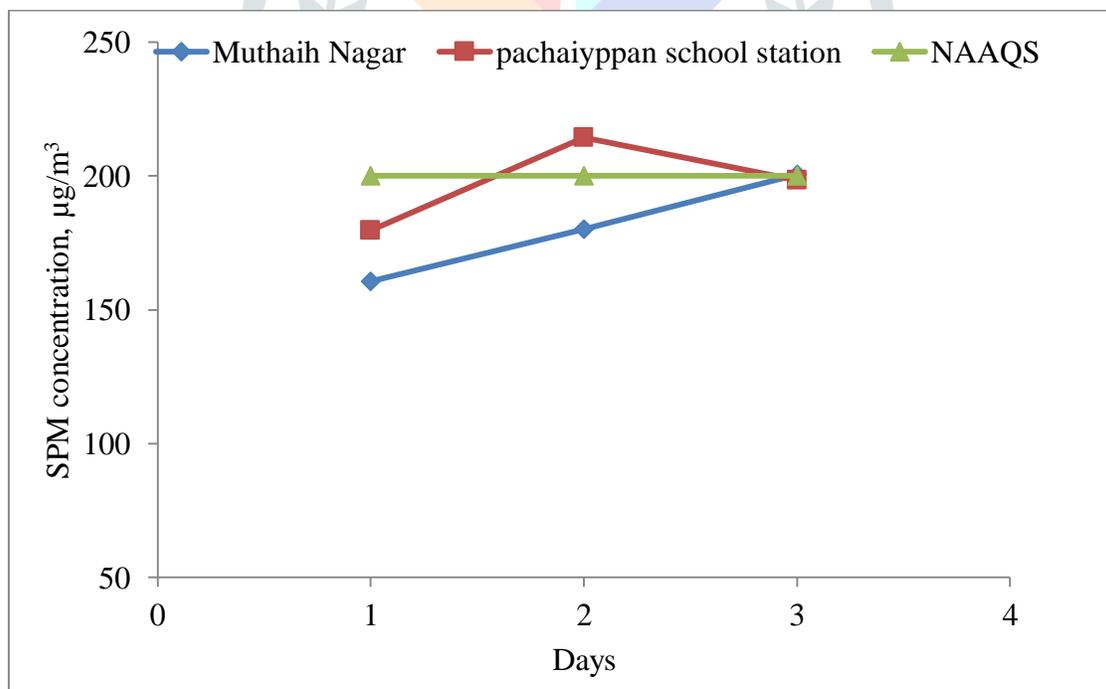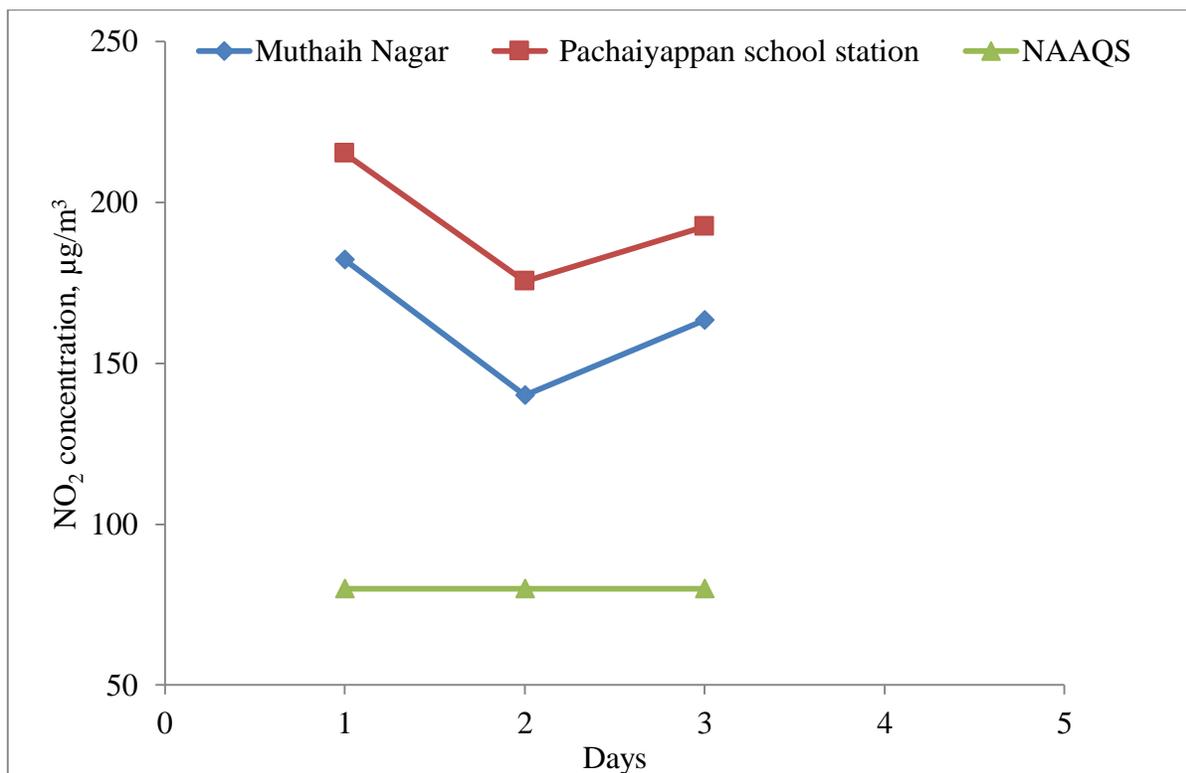

Figure 3.1 Trend of SPM
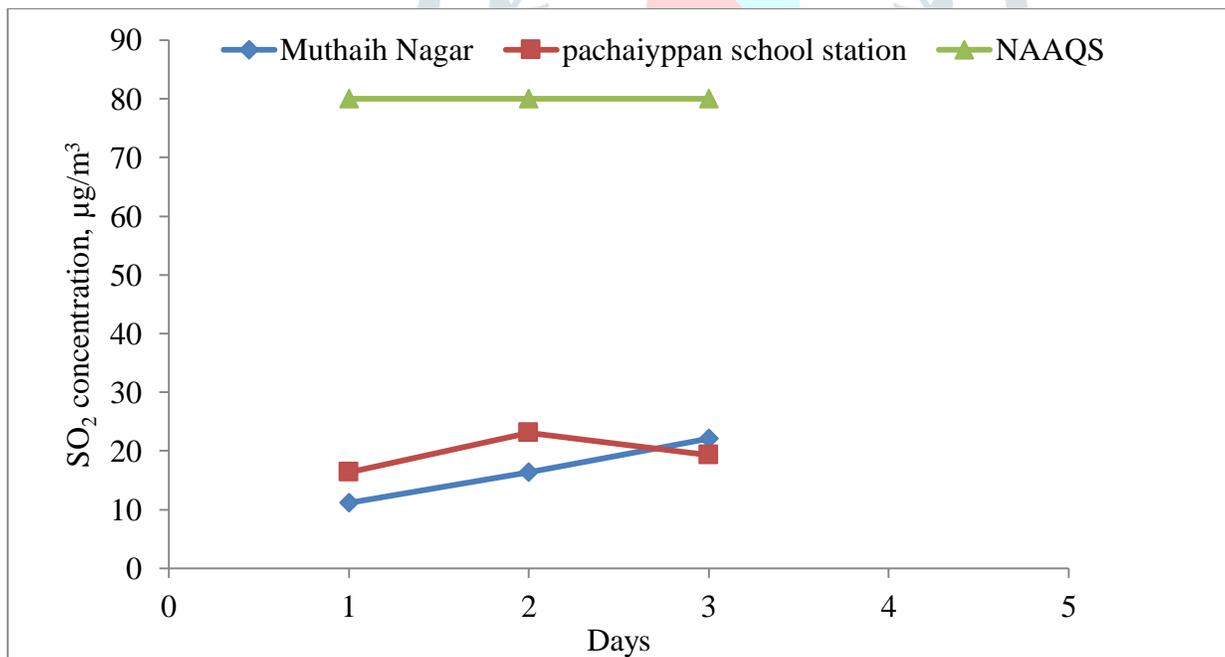
Figure 3.2 Trend of NO₂

Figure 3.3 Trend of SO₂

4. CONCLUSION

This chapter presents the air quality monitoring study was conducted in Chidambaram. The air pollutants such as SPM, NO_2, SO_2, were monitored the ambient air quality. In addition traffic volume is also observed in all the sampling sites for correlating the pollutant concentration work it.

- ✓ The SPM levels at all the sampling sites of residential, commercial areas were higher than the NAAQS (200 μg/m^3).
- ✓ The concentration of gaseous pollutant NO_2 were higher than the prescribed NAAQ standard (80 μg/m^3) limit at all the sampling station.
- ✓ The concentration of gaseous pollutant SO_2 were lower than the prescribed NAAQ standard (80 μg/m^3) limit at all the sampling station.

Impact of Air pollution on human health

- ✓ Respiratory diseases.
- ✓ Cardio vascular damage.
- ✓ Fatigue, headaches and anxiety.

REFERENCES

1. Ahmed Haytham A. Air Quality in Egypt August 1999, Air Quality Monthly Report,Monthly report, August 1999.
2. Air Pollution Control in the Transportation Sector. Third Phase Research Report of the Urban Environmental Management Project, 2007.
3. Air pollutants and air quality terms, Air quality monitoring network, 2008.
4. Alias Masitah, HamzahZaini and Kenn Lee See. PM10 and Total suspended particulates (TSP) measurements in various power stations, The Malaysian Journal of Analytical Sciences, Vol 11, No 1, (2007): 255-261.
5. Ambient air quality assessment, CPCB (2002).
6. Ankita P. Dadhich , Rohit Goyal , Pran N. Dadhich, Assessment of spatio-temporal variations in air quality of Jaipur city,Rajasthan, India, The Egyptian Journal of Remote Sensing and Space Sciences 21 (2018) 173–181.
7. Balaceanu C., Stefan S. The assessment of the TSP particulate matter in the urban ambient air, Romanian Reports in Physics, Vol 56 , No 4, (2004): 757-768.
8. Barman S.C., Singh Ramesh, Negi M.P.S., Bhargava S.K. Ambient air quality of LucknowCity (India) during use of fireworks on Diwali Festival, Environ Monit. Asses, No 137, (2008): 495-504.
9. Chan Shin Wai., Li Steven. Air Pollution Business risk or competitive advantage, (2007): 852.
10. Chaulya S.K. Spatial and temporal variations of SPM, RPM, SO_2 and NO_X concentrations in an opencast coal mining area, J. Eviron.Monit., No 6, (2004): 134-142.
11. CPCB standards- national ambient air quality standards (NAAQS) fourth version (2009)
12. Garg A., Shukla P.R., Bhattacharya S., Dadhwal V.K. Sub-region (district) and sector level SO_2 and NO$x$emissions for India: assessment of inventories and mitigation flexibility, Atmospheric Environment, Vol 35, (2001) : 703-713.
13. Ghanem M., Guo Y., Hassard J., Osmond M., and Richards M. Sensor Grids For Air Pollution Monitoring.
14. Goyal P., Sidhartha. Present scenario of air quality in Delhi: a case study of CNG Implementation. Atmospheric Environment, Vol 37, (2003): 5423-5431.
15. Gupta Usha. Valuation of Urban Air Pollution: A Case Study of Kanpur City in India Environ Resource. Econ., (2008).
16. Kumar Rakesh, Joseph Abba Elizabeth. Air Pollution concentrations of $PM_{2.5}$, PM_{10} and NO_2 at ambient and kerbsite and their Correlation in metro city – Mumbai, Environmental Monitoring and Assessment, Vol 119, (2006): 191-199.
17. Lima Ling L., Hughesb Susan J., Hellawellb Emma E.Integrated decision support system for urban air quality assessment, Environmental Modelling & Software, Vol 20, (2005): 947-954.
18. Prof. D.V.S. Murthy and Prof. T. Swaminathan., Improving air quality in Chennai city, India, Asian Regional Research Program on Environmental Technology (ARRPET), (2001-2004).
19. NaikShrikanta. Studies on pollution status of Bondamunda area of Rourkela industrial complex, (2005).
20. National ambient air quality objectives for particulate matter, Science Assessment document. (1998).