

Ambient Air Quality Monitoring in And around Dolomite and Limestone Mine of Kamalapuram surrounding area, Kurnool District, Andhra Pradesh, India

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Abstract- The study is to focus on ambient quality of air in Kamalapuram Minin surrounding area, viz. Peddamalkapuram ,yerraguntla, and chinnamalkapuram in state of Andhra Pradesh, The a Air Quality was assessed based on New National Ambient Air Quality Standard of Central pollution Board of India Measuring Four air pollutants. The outcome of the study has been presented in the form of air Quality Index. The ambient air quality survey was carried out during the post monsoon for a period of 24 hrs. at four different locations with respect to, SPM, PM₁₀, PM_{2.5}, SO₂, NO_x and CO . According to work results, PM₁₀ concentration varies from 30-40 ug/m³ where PM_{2.5} concentration varies from 15-17 ug/m³ and these are under the clean air and reported healthy

Keywords:Kamalapuram- , ambient air quality, Health disturbances, Air pollutants.

INTRODUCTION

The study area is located at Kamalapuram village of Dhone Mandal, in the southeast part of Kurnool district. The topography of the region comprises mainly a plateau terrain with flat ground. The area fall under survey of India toposheet No 57 E/15. Kamalapuram lies between North Latitude $15^{\circ}21'25''$ to $15^{\circ}21'53''$ and East longitude $77^{\circ}56'53''$ to $77^{\circ}57'31''$. The entire area is flat and is devoid of vegetation.

The report illustrates the description of the existing environmental status of the study area with reference to the prominent environmental attributes. The study area covers 10 Km radius around the existing kamalapuram area. The observations of the baseline data of air, during the study period Post-Monsoon season -2013

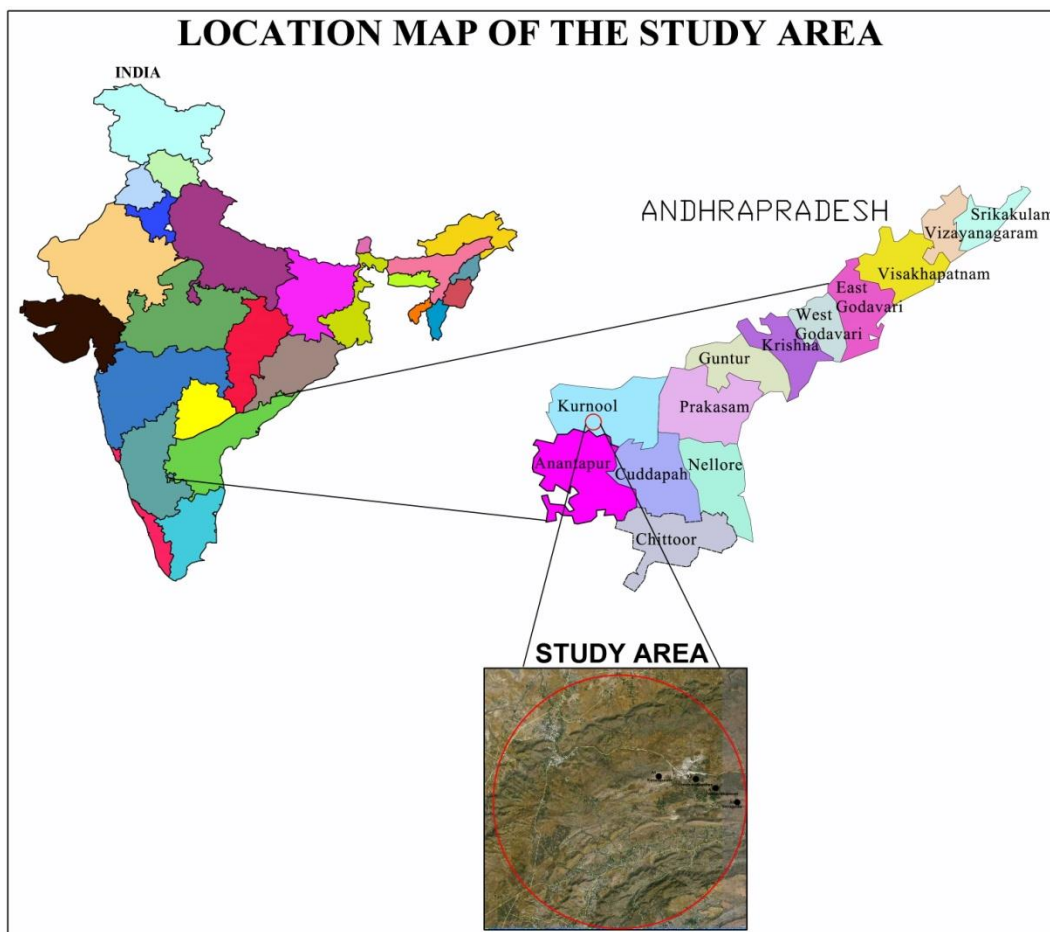


Figure a: Location map of Kamalapuram

Materials and Methods:

Guidelines for Sampling and Measurement of notified Ambient Air Quality Parameters (NAAQS 2009): Under the provisions of the Air (Prevention & Control of Pollution) Act, 1981, the CPCB has notified fourth version of National Ambient Air Quality Standards (NAAQS) in 2009 (Figure b). This revised national standard aims to provide uniform air quality for all, irrespective of land use pattern, across the country. There are four identified health based parameters, which are to measure at the national level and with a view to have data comparison, need

for uniform guidelines for monitoring, sampling, analyses, sample flow chart, data sheet based on standard method has been felt.

Study Area:

The Manual air Quality monitoring stations were set up at four sites, the places as follows:

Station 1: Pedda Malkapuram

Station 2: Chinna Malkapuram

Station 3: Kamalapuram

Station 4: Yerraguntla

Selection of Instruments for air Quality Sampling:

Pre calibrated Respirable dust sampler's model No. Envirotech APM 560 instruments are used for monitoring Suspended Particulate Matter (SPM), Particulate Matter less than 10 microns (PM_{10}) and gaseous pollutants like SO_2 and NO_x . Gas Chromatography techniques have been used for the estimation of CO.

Sampling and Analytical Techniques

Suspended Particulate Matter and PM_{10} present in the ambient air is sucked through the cyclone. Coarse and non-respirable dust is separated from the air stream by centrifugal forces acting on the solid particles. These separated particulates fall through the cyclone's conical hopper and collect in the sampling cap placed at the bottom. The fine dust ($<10 \mu$) forming the respirable fraction of the SPM passes the cyclone and is retained by the glass-fibre filter, which is numbered, pre-weighed, installed in a position of rough side up [IS:1582 (part-IV)-1973]. A tapping is provided on the suction side of the blower to provide suction for sampling air through a set of impingers. Gaseous samples are drawn at a flow rate of 1 – 1.5 liters per minute (Lpm)

SPM and PM_{10} are estimated by gravimetric method. Improved Modified West and Geake Method (IS: 5182 Part-II, 1969) has been adopted for estimation of SO_2 and Arsenite Modified Jacob-Hochheiser Method (IS: 5182 Part-VI, 1975) for the estimation of NO_x .

Carbon Nonoxide: Tedlar bags have been used to collect the grab samples of CO. The CO levels were analyzed through NDIR techniques.

Calibration: Calibration charts are prepared for all gaseous pollutants. The calibration is carried out whenever new absorbing solutions are prepared.

Table 1: Techniques used for Ambient air Quality Monitoring

S.NO	PARAMETER	TECHNIQUE	MINIMUM DETECTABLE LIMIT ($\mu g/m^3$)
2	Particulate Matter less than 10 microns (PM_{10})	Respirable Dust Sampler (Gravimetric Method)	1.0
2	Particulate Matter less than 2.5 microns ($PM_{2.5}$)	Fine Particulate Sampler (Gravimetric Method)	1.0

3	Sulphur dioxide	Improved Modified West and Geake Method	4.0
4	Oxides of Nitrogen	Sodium Arsenite Modified Jacob-Hochheiser Method	5.0
5	Carbon Monoxide	NDIR Technique	0.01

Presentation of Primary Data

Various statistical parameters like maximum and minimum values have been computed from the observed raw data for all the AAQ monitoring stations. The summary of these results for each location for the study period (September to November-2013) is presented in Table 2.

These are compared with the standards prescribed by NAAQ, Central Pollution Control Board (CPCB) for rural and residential zone and industrial zone

Table 2: AMBIENT AIR QUALITY RESULTS (POSTMONSOONSEASON - 2013)

S. No	Location	Distance [km]	Direction	SPM ($\mu\text{g}/\text{m}^3$)		PM ₁₀ ($\mu\text{g}/\text{m}^3$)		PM _{2.5} ($\mu\text{g}/\text{m}^3$)		SO ₂ ($\mu\text{g}/\text{m}^3$)		NO _x ($\mu\text{g}/\text{m}^3$)		CO (mg/m ³)	
				MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
1	Peddamlakapuram	1.0	ENE	109	130	40	56	17	24	10.4	11.9	11.4	14.9	0.8	1.3
2	Chinnamalakapuram	2.0	ENE	98	118	38	54	16	22	9.6	12.0	12.8	14.6	0.8	1.5
3	Kamalapuram	1.5	WSW	95	118	39	54	15	21	9.0	11.7	11.3	14.8	0.9	1.5
4	Yerraguntla	3.0	NW	92	114	35	50	15	20	10.0	12.4	12.5	14.5	0.8	1.5
NAAQ Standard for Industrial, Rural and other Area Annual Average/24hr $\mu\text{g}/\text{m}^3$				--		60/100		40/60		50/80		40/80		02(8Hours) 04(1Hours)	

RPM (PM₁₀): The maximum value of PM₁₀ was observed to be 76 $\mu\text{g}/\text{m}^3$ at Mine area minimum value was found 35 $\mu\text{g}/\text{m}^3$ at Yerraguntla village. All the readings were below permissible limit of 100 $\mu\text{g}/\text{m}^3$ for 24hr duration as specified for Industrial, Residential, Rural and other areas.

PM_{2.5}: The maximum value of 35 $\mu\text{g}/\text{m}^3$ was found at Mine area Crushing plant and minimum value was found 15 $\mu\text{g}/\text{m}^3$ at kamalapuram and yerraguntla. All the readings were below the permissible limit of 60 $\mu\text{g}/\text{m}^3$ for 24hr duration as specified for Industrial, Residential, Rural and other areas.

SO₂: The maximum value of SO₂ was found 14.0 µg/m³ at Weigh bridge and minimum was 9.0 µg/m³ at Kamalapuram. All the readings were below the permissible limit of 80 µg/m³ for 24hr duration as specified for Industrials, Residential, Rural and other areas.

NO_x: The maximum value was found 16.5 µg/m³ at Mine office and minimum value of 11.3 µg/m³ were found at kamalapuram. All the readings were below the permissible limit of 80 µg/m³ for 24hr duration as specified for Residential, Rural and other areas.

CO: The maximum value was found 1.6 µg/m³ at Mine office and mine working area and minimum value of 0.8 µg/m³ were found at peddamalkapuram, chinnamalkapuram and Yerraguntla village. All the readings were below the permissible limit of 4 µg/m³ for 1hr duration as specified for Residential, Rural and other areas.

4.0 CONCLUSION

It may be concluded that air quality in and around the kamalapuram surrounding area, is well within the permissible limits as specified for industrial and mixed area by Central Pollution Control Board (CPCB)

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