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IMPACT OF FOUNDRY UNITS ON COIMBATORE ENVIRONMENT

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Abstract

Industrialization and urbanization are the two sources of chemical agents which cause environmental degradation. Industrialization has rapidly developed, which plays both a beneficial and harmful role in the environment. Coimbatore is a major industrial city in Tamilnadu. There are about 450 foundries, 300 motor manufacturing units, 200 wet grinder manufacturing units, about 300 brick clines and 210 textile dyeing and bleaching units in operation. In Coimbatore, as in other Indian cities, there is no separate zone for industrial/commercial activities. Therefore, some industries are located in residential areas. Urbanization, industrialization and associated increases in automobile vehicular activities result in severe pollution problems, which is a major health concern. Hence the study was undertaken to estimate the pollutants released from the foundries and its contribution on the Coimbatore environment.

About 17 foundries were selected randomly and studied for various polluting parameters by adopting CPCB methods. The result of this study showed that there is no wastewater from the process of the unit, the ambient and stack analysis results of SO₂ NO_x, SPM are under the limits as per the CPCB. The released SO₂ depends on the quality of the raw materials and coke. Most of the solid waste is reused, and only slag is the solid waste, which is non-hazardous. Even though all the air pollutant released from foundries are within the limits, the industrial location and increase in number of industries year by year in Coimbatore may be adding up to the load of impact on human health. Hence the study concludes that there should be a separate zone for the industrial sector.

Introduction

The environment has an impact on every aspect of human life and every human activity affects the environment with social, technological and economic development. Abnormal consumption of various natural resources has increased the level of pollutants such as air pollution, chemical pollution, thermal pollution, radioactive pollution etc., which is increasing at an exponential rate, thus endangering our country's rich ecology and environment.

Though the foundry industry dates back to the Harappa period, the most independent era has witnessed a phenomenal growth of foundries. According to published data, there are about 5000 foundries in India with an installed capacity of around 28.16 lakhs tons per annum with the ferrous foundry accounting for 95% of the total units. It is estimated that the cupola based ferrous foundry units numbering around 1000 are operating in and around Coimbatore with an annual output of around 6.00 lakhs tonnes per annum. These foundry units cannot be totally absolved of causing pollution since the foundry process by its nature is more pollution prone than many other activities and the development of modern foundries might have accelerated effluent emissions. This has now engaged the attention of all for its effects on population and environment.

Most of the foundries in and around Coimbatore are in the SSI sector and equipped with cupola furnaces with the melting capacities ranging from 1-6 tons per hour. In cupola furnaces, the coke is employed as the main source of energy to melt down the metal alloys. The air blast, the ash from the coke and dust from the scrap and reaction product results in emissions from the cupola stacks. On the other hand another 5% have resorted to other types of furnaces for melting, such as Induction furnaces. As per the details gathered, the value of various items produced by the foundries amounts to around 45 crores per month generating employment both directly and indirectly to more than about one lakh persons in and around Coimbatore. This population depends on the foundry for their daily bread. This is the social setup existing at present in Coimbatore.

In an attempt to evaluate the impacts of foundry units on Coimbatore's urban environment, air pollution study was carried out at selected foundry units. These units being located in central and suburban zones fairly represent the cross sectional scenario of air pollution status of the city

Materials and Methods

About 17 foundries were selected randomly and studied for its air pollutants such as gaseous (SO_2 and NO_x) and suspended particulate matter (SPM). Both the gaseous index pollutants (SO_2 and NO_x) were continuously monitored on a 24-hour basis. The level of ambient SPM was quantified through a Hi-Volume air sampler operated at a suction rate of $1.2 \text{ m}^3/\text{min}$. The total SPM collected over a period of 24 hours on pre-weighed glass fibre filter paper was reweighed after sampling for gravimetric evaluation of SPM and was reported as mg/m^3 . Atmospheric SO_2 concentrations were determined at the impingement rate of 1 litre/minute for an average period of 4 hrs through West and Gack methods. The method used for ambient NO_x levels was Jacob and Hochhesier, keeping the same impingement rate and averaged over 4 hrs. Stack (cupola) sampling was carried out using Enviro Tech APM 620 Stack Monitoring Unit.

Results and Discussion

The standard value specified by Tamilnadu Pollution Control Board and the average value of atmospheric concentration of SPM, SO_2 and NO_x in various foundry

locations of Coimbatore city are given in Table I & II respectively. Air quality monitoring of SPM in foundry locations reveals that SPM are not exceeding the permissible value at all the monitoring locations. Stack level monitoring of different units infers that the cupola emissions are found to be well within the limits prescribed by the Central Pollution Control Board (CPCB). In almost all the units a spark arrester cum dry dust collector has been used to control the particulate emission of the cupola furnace.

Tamilnadu Pollution Control Board Air Quality Standards

Table I

Area	SPM $\mu\text{g}/\text{m}^3$	NO _x $\mu\text{g}/\text{m}^3$	SO ₂ $\mu\text{g}/\text{m}^3$
Industrial	500	120	120
Residential	200	80	80
Sensitive	100	30	30

Average value of atmospheric pollutants in and around the foundry units.

Table II

S.No	Name of the units	Pollutant concentration in $\mu\text{g}/\text{m}^3$		
		SPM	SO ₂	NO _x
1	Polammal Foundry	63	4.6	3.7
2	R V Industries	82	3.8	1.1
3	Nandhini Castings	74	7.2	2.4
4	Lakshmi Metal Works	53	3.1	4.8
5	Allied Super Castings	101	3.4	5.7
6	Sri Vetrivel Industries	98	8.1	7.9
7	Mico Industries	76	1.3	4.0
8	S.D Engineering Foundry	87	1.8	1.7
9	Velmurugan Foundry	93	3.6	8.7
10	Sumathi Engineering Foundry	102	9.3	4.4
11	Makesh Metal Works	94	2.3	BDL
12	Babu Engineering	57	6.3	3.5
13	Allied Castings	88	8.6	1.7
14	Sri Murugan Metal Works	59	2.1	3.9
15	Revathi Metals	63	3.5	0.7
16	Bannari Foundry	73	3.5	2.4
17	S.S Engineering	73	8.0	3.1

BDL – Below detectable level

Emission Standards for Cupola and Induction Furnace

Table III

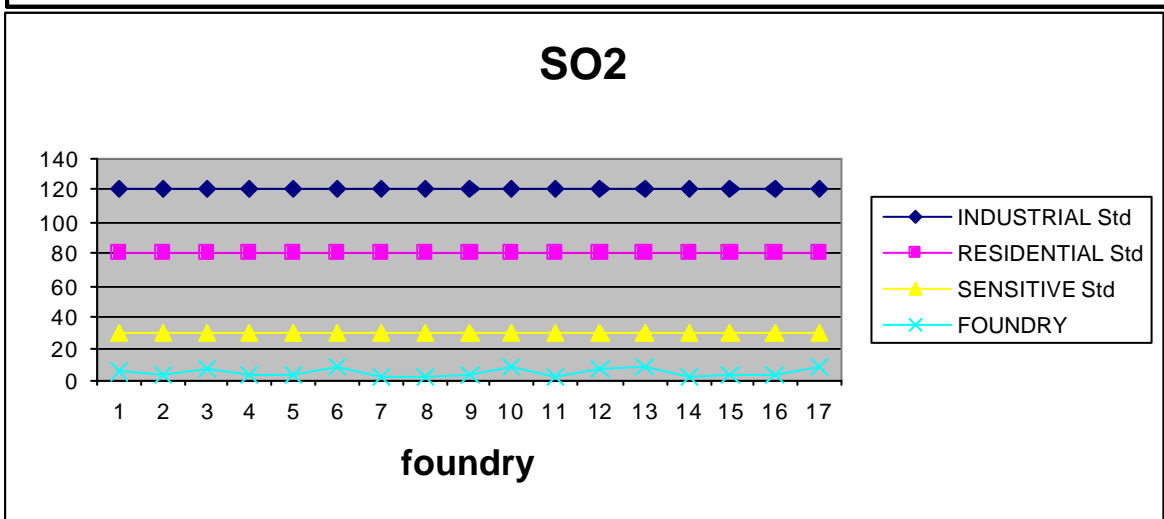
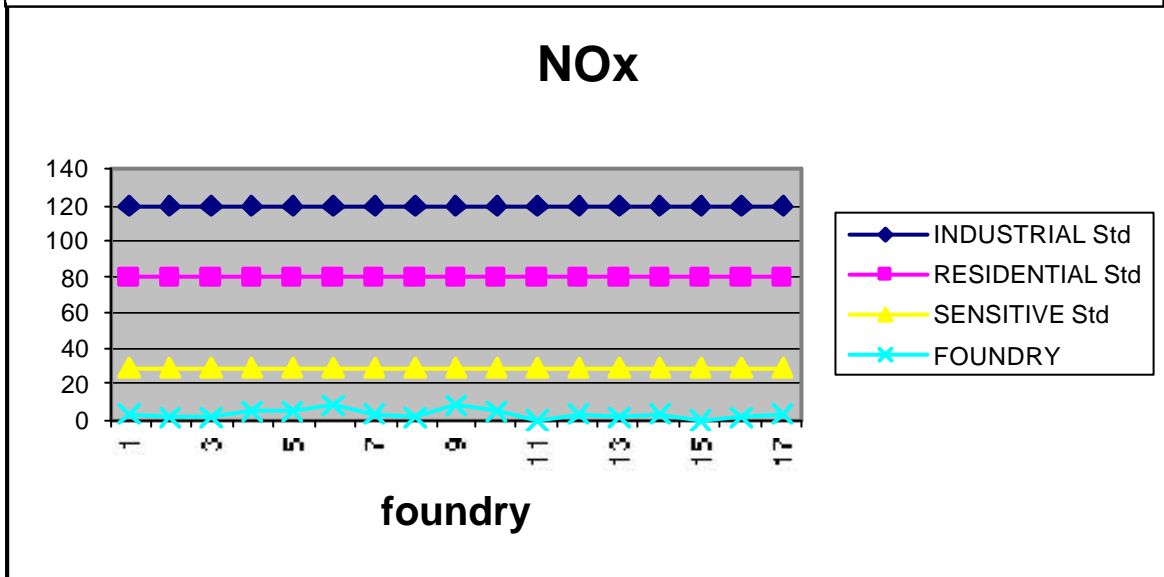
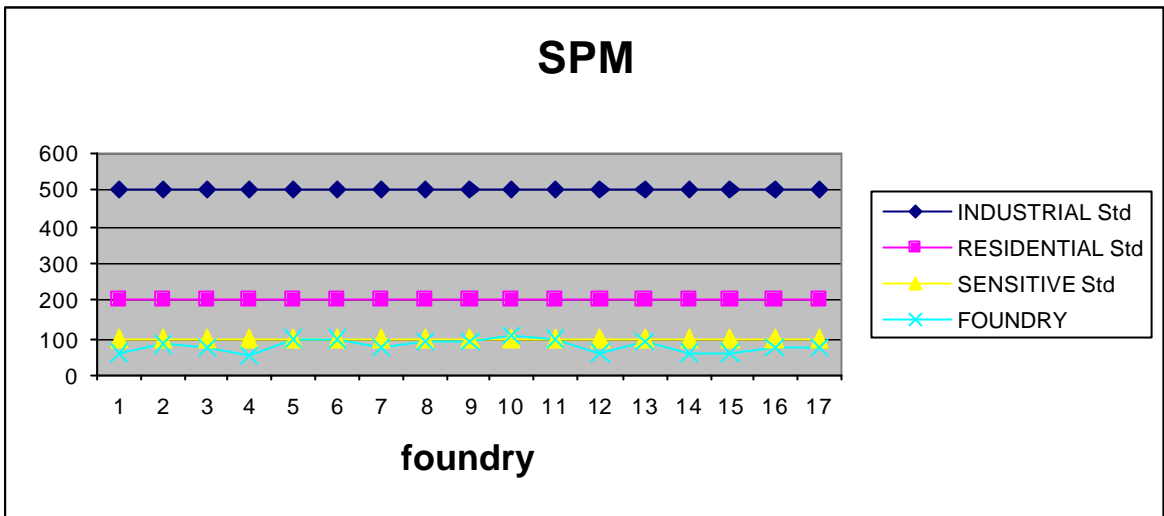
Type	Pollutant	Concentration in mg/Nm ³
Cupola capacity less than 3 MT/hr	Particulate matter	450
3MT/hr and above	-do-	150
Arc foundry capacity	-do-	150
All sinc induction furnace	-do-	150

Atmospheric concentration data of the gaseous pollutants (NO_x and SO₂) are well within the limits prescribed by the CPCB. The units included for the study are cottage industries with small job orders and operates only for a short period of eight hours (First shift) per week.

Further, the study confirms that there is no wastewater from foundry process even though a small quantity of water is used for the processing. The solid waste coming out of the casting process may be reused in the consecutive melting and cupola charging along with pig iron and coke. The only non-recyclable solid waste that comes out from the cupola process is the furnace slag which is small in quantity and non-hazardous in nature.

The present study concludes that even though the air pollutant released from the foundries are within the permissible limits, the industrial location and increase in number of units in Coimbatore may increase the load of pollution to the environment. Hence there is a need for separate zone the industrial sectors.

**Level of Suspended Particulate Matter, Oxides of Nitrogen and Oxides of Sulphur
around foundry premises of Coimbatore City.**



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