

Pattern of Cement Kiln Dust Deposition Around a Cement Factory

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Cement factory is one of main source of particulate air pollutants, emitting large quantities of cement kiln dust into the atmosphere. Generation of dust from cement factory is mainly through rotary kiln, coal mill and cement crusher. Majority of the kiln dust is emitted through the chimney at the top of the sack if there is no proper emission control device. The dispersed dust gets deposited on soil and vegetation around the cement factory. There have been several reports about the damage to the vegetation (Parthasarathy *et al.*, 1975; Oblisamy *et al.*, 1978; Swaminathan *et al.*, 1989 and Prasad *et al.*, 1991). But very little information is available regarding the rate of cement kiln dust deposition in different directions around a factory. The present paper highlights on the rate of cement kiln dust deposition at various distances in six different directions surrounding a cement factory.

Khrew is situated 20 km away in the north east of Srinagar at an altitude of 1870m (a.s.l). In 1982, a large cement factory under the name of Jammu and Kashmir Cements Limited was set up at Khrew. The main raw materials used for the production of cement include limestone, clay, sandstone, bauxite and gypsum. Cement dust, sulphur dioxide (SO₂), oxides of nitrogen (NO_x) and suspended particulate matter (SPM) are the main pollutants of cement industry. The north and north-eastern area is covered by mountain ranges. On the other side its surrounding is flat aerable land of karewas. Due to prevailing topographic and meteorological conditions in the area, pollutants are mainly deposited in the east and south-east of the factory.

The area surrounding the cement factory at Khrew (Pampore) was chosen for the study. Sampling sites were located at five main wind blowing directions such as east, west, north, south and south-east at 0.5, 1.0, 2.1, and 6 km distances from the cement factory. Dust collection jars (25 cm in diameter and 50 cm in height) were kept undisturbed at open places at all the sampling sites. The jars were filled upto 2/3rd of the height of jar with water to avoid the space of collected dust particles and the water level was maintained throughout the period of measurement. The study was carried out on bimonthly basis (May 2004 to April 2005). The measurement of the collected dust was made by evaporating the dust sediment to dryness.

The average cement kiln dust deposition varied from 0 – 142.6 g/m² /month (Table 1). No or negligible dust deposition was observed at the control sites. The maximum dust deposition was observed at 0.5 km distance in south-eastern direction. The mean average cement kiln dust deposition for the five directions decreased in the following order: 403.32, 34.96, 8.88 and 0.4g/m² at distances 0.5, 1.0, 2.0 and 6.0 km respectively. As the

distance from the factory increased, the amount of dust deposition decreased. Earlier studies by Parthasarathy *et al.*, (1975) and Nandi *et al.*, (1987) also revealed the same. The results of the study suggested that the concentration of cement dust in the atmosphere was higher nearer to the factory and it decreased with increasing distance from the factory.

Table 1: Average rate of cement kiln dust fall (g/m²/month) around the cement factory

Distance from the factory (km)	Directions					Mean
	East	West	North	South	Southeast	
0.5	135.5	73.3	28.5	136.7	142.6	183.32
1.0	47.7	25.8	-	50.1	51.2	34.96
2.0	10.5	4.8	-	12.5	16.6	8.88
6.0	0.7	-	-	0.5	0.8	0.4
Median	48.6	25.9	5.7	49.95	52.8	

The mean average dust deposition for the five distances showed the following order with a decreasing trend: south-east, south, east, west and north recording 52.8, 49.95, 48.6, 25.9 and 5.7g/m²/month respectively. Higher deposition in the east and south-eastern directions may be attributed to the higher wind velocities prevailing in these directions as has also been observed by Harsha and Vyas (1990). This study has indicated that there is a substantial quantity of cement kiln dust deposition especially in the east and south-eastern areas of the cement factory.

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