CHAPTER - 7

7.0 SOIL QUALITY OF THE STUDY AREA

7.1 Introduction

Soil may be defined as a thin layer of earths crust which serves as a natural medium for the growth of plants. It is unconsolidated mineral matter that has been subjected to and influenced by genetic and environmental factors, parent material, climate, organisms and topography all acting over a period of time. Soils differ among themselves in some or all the properties, depending upon the difference in the genetic and enviornemntal factors.

7.2 Soil Characteristics

Soil of the study area are mostly laterite in nature and are acidic. To assess the soil quality of the study area ten soil samples were collected from various villages as shown in Fig. 7.1 and Table 7.1 and were analysed for physical and chemical characteristics by M/s Micro Metal (India).

7.2.1 Physical Characteristics of Soils

Table 7.2 shows physical characteristics of soils as follows :

Texture

The varying proportions of particles of different size groups in a soil constitutes as the textural class. The principal textural classes are: clay, sandy clay, silt clay, clay loam, sandy clay loam, silty loam, loam, sandy loam, silt loam, sand, loamy. Sand and silt depending upon the ratio of sand and clay.

It is seen from Table 7.2 that the soils of study area vary from sandy to sandy clay but majority of them are sandy clay. Table 7.3 gives the idea of textural classes of soils in detail for different study area villages.

Colour

Colour gives a ready clue to soil conditions and some important properties. It is due either to mineral matter or organic matter or mostly due to both. The colour of soils in the study area is mostly brownish and reddish.

Moisture retention Capacity/water holding capacity

The moisture retention capacity in soils varied upon texture of soils. Clay soil can retain more water than that of sandy or gravels. The moisture retention capacity of soils varied from minimum 10% to 17.95% in the study area which can be considered low from the point of view of plant growth as it needs frequent irrigation and nutrients supplied to plants are also not fully available to them because of leaching compared to fine soils having WRC/WHC of 50-60%.

Organic Matter

Organic matter, though forming a small part of minerals in soils, plays a vital role in the productivity of soils. The content of organic matter in soil varied inbetween 0.27% and 2.1%. It serves as source of food for soil bacteria and fungi which are responsible for converting organic materials into simple substances readily used by the plants.

Bulk Density

The bulk density of soils varied from 1.0 gm/cc to 1.5 gm/cc in study area.

Infiltration Rate of Soils

Infiltration (the movement of water in soils) are governed by its texture and structure along with porosity and permeability of soils and can give idea in regard to water retention capacity of soils. Texturally fine soils have low infiltration rate compared to coarse textured soils. Infiltration rate of soils of few villages are as follows :

S.N.	Name of village	Infiltration rate, cm/hr	
		Field I	Field II
1.	Baikampady	6.8	7.2
2.	Kunjettebail	7.2	6.5
3.	Kenjar	6.1	7.0
4.	Project site	5.8	5.8
5.	Jogatte	12.5	11.8
6.	Kalavar	10.8	11.5
7.	Hosabettu	15.5	15.0

It is seen from above that infiltration rate of soils in the study area are varying from 5.8 cm/hr to 15.5 cm/hr.

7.2.2 Chemical Characteristics of Soils

Chemical characteristics of soils are given in Table 7.4 from which following observations are made:

pH

The soils are slightly acidic with pH range between 4.95 and 5.80.

Minerals Content

Soil samples were analysed for various constituents like potassium, phosphates, iron, zinc, lead, chromium, cadmium, nitrates and sulphates etc. Phosphates are in the range of 0.009 - 0.12% and nitrates from 0.12 to 0.23%. The zinc content showed a wide range of 0.32 and 1.64%. Lead, chromium, cadmium and fluorides were absent in all soil samples. Most of the soil samples are deficient in Iron as it is found below detection limit in about 70% of samples. The highest percent of sulphate content was observed 3.45 while lowest was 0.2%.

Cation exchange capacity of soils are given separately for each ion i.e. calcium, magnesium, sodium, potassium, hydroxide and chloride. Calcium and magnesium range between 1-20 and 0.9-26 milli equivalents per 100 gm of soil respectively. The sodium content ranged from 0.3 to 19%.

7.2.3 Conclusions

(a) All soil samples are slightly acid in nature and contain low organic matter. N, P & K content of soils is also quite low.

(b) Water Holding Capacity of soil is very low and have high percolation rates. The soils at site are unsuitable for disposal of solid wastes and storage of liquid effluents. However in selective areas where clay content is high can be used for said purposes after soil investigations.

TABLE 7.1 : LOCATION OF SOIL SAMPLES COLLECTED FROM DIFFERENT VILLAGES

S.No.	Sampling Location	Approximate distance in km from plant site	Sample No.
1.	Project site	-	S-1
2.	Kunjathabailu	2	S-2
3.	Jagatte	2.5	S-3
4.	Mudushedde	6	S-4
5.	Hosabettu	3.5	S-5
6.	Baikampady	2	S-6
7.	Surinje	6.5	S-7
8.	Kalavar	3	S-8
9.	Kenjar	2.5	S-9
10.	Bajpe	6	S-10

TABLE 7.2 : PHYSICAL CHARACTERISTICS OF SOIL OF STUDY AREA

S.No.	Sampling Location	Texture	Colour	Moisture retention capacity (%)	Organic matter (%)
1.	Project site	Sandy Loam	Brownish	14.6	0.32
2.	Kunjathabailu	Sandy	"	15.0	0.31
3.	Jogatte	Sandy Clay	"	15.0	1.06
4.	Mudushedde	Sandy Clay	"	17.95	0.48
5.	Hosabettu	Sandy Clay	"	13.15	1.96
6.	Baikampady	Sandy Clay	"	12.0	1.73
7.	Surinje	Sandy Loam	"	17.15	0.38
8.	Kalavar	Sandy Soil	"	10.0	1.30
9.	Kenjar	Sandy Loam	"	15.05	2.1
10.	Bajpe	Sandy Clay	"	14.0	0.27

TABLE 7.3 : TEXTURAL CLASSIFICATION OF SOILS OF SOME VILLAGES IN THE STUDY AREA

Sr.No.	Name of Village	Profile and soil depth (CM)	% primary sand	Soil silt	Particles clay	Textural classification
1.	Baikampady	0-20	57.78	18.35	21.45	SCL
		20-40	63.16	14.79	18.05	SL
		40-68	62.80	15.92	16.62	SL
2.	Baikampady	0-20	59.05	16.04	18.13	SL
		22-45	63.60	16.30	15.75	SL
		45-72	68.30	10.25	17.15	SL
3.	Kunjatibattu	0-18	64.17	11.00	21.23	SL
		18-45	64.30	18.73	15.90	SL
4.	Kunjatibattu	0-22	59.70	14.54	20.90	SCL
		22-48	62.40	16.15	17.45	SCL
5.	Kenjar I	0-20	58.69	13.60	25.40	SCL
		20-45	65.40	15.40	16.34	SL
6.	Kenjar II	0-25	56.40	11.80	18.02	SL
		25-60	69.30	17.35	11.50	LS
7.	Project site I	0-20	48.59	22.55	26.15	L
		20-50	56.70	19.31	20.93	SCL
8.	Project site II	0-22	53.35	20.12	22.15	SCL
		22-40	58.16	23.60	15.37	SL
9.	Jogatte I	0-22	73.47	10.81	10.15	LS
		22-60	72.31	8.78	11.60	LS
10.	Jogatte II	0-18	78.53	8.97	10.70	LS
		20-65	76.42	10.31	10.80	LS

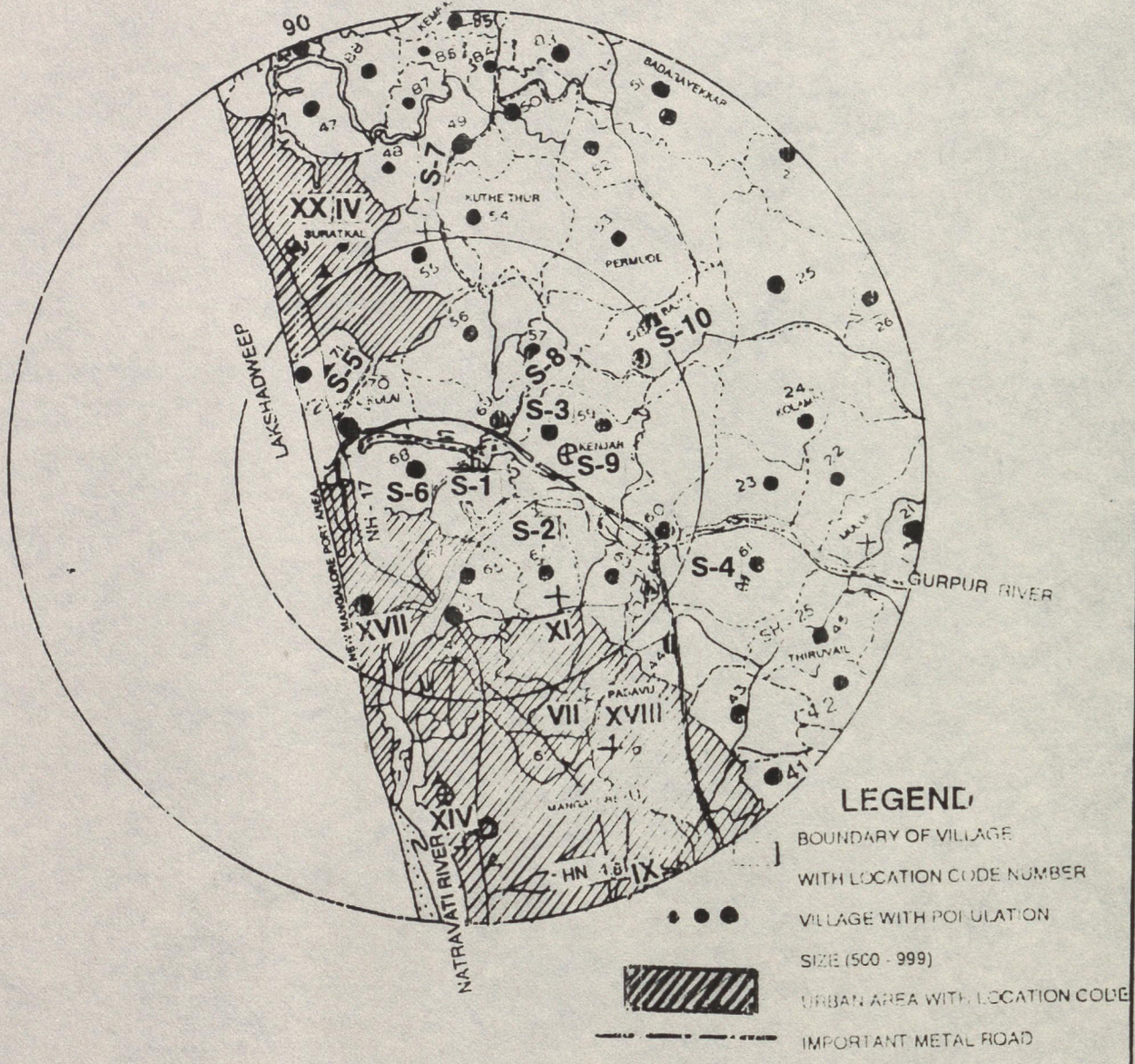
11.	Kalavaru I	0-22	70.12	12.28	13.60	LS
		25-60	74.63	13.40	9.63	LS
12.	Kalavaru II	0-20	60.05	17.15	18.60	LS
		20-55	64.30	16.50	15.83	AL
13.	Hossebettu I	0-20	80.53	8.25	9.75	LS
		20-60	82.12	4.10	10.86	LS
14.	Hossebettu II	0-20	78.69	6.77	10.12	SL
		20-54	78.43	6.98	10.68	LS

L - Loam
SL - Sandy Loam
SCL - Sandy Clay Loam
LS - Loamy Sand

TABLE 7.4 : CHEMICAL CHARACTERISTICS OF SOIL OF STUDY AREA

S.No.	Sampling Location	pH	Electrical conductivity (ug/m)	% by weight Phosphates	Potassium	Copper	Iron	Zinc	Lead	Chromium	Cadmium
1.	Project site	5.0	560	0.009	0.68	0.72	Nil	0.68	Nil	Nil	Nil
2.	Kunjathbailu	5.61	850	0.10	0.68	0.90	Nil	1.33	Nil	Nil	Nil
3.	Jogatte	5.15	410	0.12	1.45	0.52	0.01	0.62	Nil	Nil	Nil
4.	Mudushedde	5.30	670	0.05	0.63	0.3	Nil	1.20	Nil	Nil	Nil
5.	Hosabettu	5.80	540	0.10	0.81	0.50	0.15	0.68	Nil	Nil	Nil
6.	Baikampady	5.05	410	0.1	0.72	0.38	Nil	0.32	Nil	Nil	Nil
7.	Surinje	5.80	620	0.02	Nil	0.22	Nil	1.04	Nil	Nil	Nil
8.	Kalavar	5.0	1.95	0.10	0.14	0.04	0.09	1.04	Nil	Nil	Nil
9.	Kenjar	4.95	5.3	0.02	Nil	0.11	Nil	1.2	Nil	Nil	Nil
10.	Bajpe	5.76	700	0.009	0.95	1.6	Nil	1.64	Nil	Nil	Nil

S.No.	Sampling Location	% by weight Fluoride	Sulphates	Nitrates	Nickel	Cation Exchange Capacity (meq/100 grams) Calcium	Magnesium	Sodium	Potassium	Hydroxide	Chloride
1.	Project site	Nil	1.45	0.16	0.04	12.0	26.0	19.0	22.0	17.0	0.03
2.	Kunjathbailu	Nil	1.20	0.16	0.04	1.0	0.90	0.1	0.01	Nil	3.1
3.	Jogatte	Nil	0.45	Nil	0.04	3.15	1.9	1.36	0.1	1.05	2.86
4.	Mudushedde	Nil	0.20	0.12	0.08	2.30	0.9	0.3	Nil	Nil	1.95
5.	Hosabettu	Nil	0.55	Nil	0.26	2.45	1.2	1.45	0.1	3.12	1.45
6.	Baikampady	Nil	3.45	0.15	0.32	20.0	17.0	12.0	18.0	4.45	0.32
7.	Surinje	Nil	0.7	0.15	0.20	5.02	1.22	1.02	0.01	3.55	2.56
8.	Kalavar	Nil	3.45	0.23	0.04	2.7	1.40	1.62	2.90	4.45	1.86
9.	Kenjar	Nil	0.25	0.12	Nil	6.50	2.10	4.95	8.0	Nil	Nil
10.	Bajpe	Nil	0.48	0.21	0.38	4.12	1.62	1.84	0.02	2.04	5.26



JAIPRAKASH ENGG. & STEEL CO. LTD.

TITLE
SOIL SAMPLING LOCATION

EST Consultants (P) Ltd.

SCALE: 0.7 cm = 1 Km | FIG. NO. **7.1**

CHAPTER - 8

8.0 LAND ENVIRONMENT OF THE STUDY AREA

8.1 LAND USE PATTERN

8.1.1 Land Use Classification

Land use pattern or the various manners in which different parts of the land in an area is being utilized (or not utilized) is an important indicator of environmental health, of the human activity and of the various degrees of inter plays between these two. Thus while the soil quality, water availability, agricultural practices and climate may dictate atleast partly in the state of agricultural use, human activity may have significantly altered the natural environment to make it fit for a certain use or by forcibly resorting it to an unsuitable land use and triggering off rapid environmental degradation. The term implies as if all the land (and other natural resources) are for use.

To get an idea about the land use in the area Census data for 1981 was used as also information was collected from revenue department for 1990-91. Since census data was in better detail and data for all the villages falling in the study area was available uniformally it was used in this report. The recent land use data cover details of few villages only and thus has been used for comparison of ten years from 1981 to 1990-91. The data on land use are given in Table 8.1 and 8.2 for rural and urban area respectively for 1981 while Table 8.3 gives the land use data for 1990-91. Following inferences can be drawn from the data.

1) Total geographical area of the study area is 28562 hectares both for rural and urban area.

2) Forest area is a meagre 0.7%.

3) The culturable land, which include irrigated and unirrigated area, occupied 41% showing highest percentage of 43.6% in villages of group 'B' i.e. 5-10 km radius compared to 36% of group 'A'.

4) The land use categroy 'culturable waste' which includes pastures and grazing land, land under miscellaneous trees, crops, groves and culturable waste, has contributed 13% for the study area and 17.4% for group 'B' villages and 2.9% for group 'A'.

5) The land under the category of 'Area not available for cultivation' which includes land put to non-agricultural uses, barren (deserts, ravines, saline and eroded lands) and uncultivable lands, is about 45%. Villages falling in the group 'A' have shown higher percentage of 61.1% while villages of group B have 38% of the area belonging to this category.

8.1.2 Decadal Changes in Land Use

Tables 8.1, 8.2 and 8.4 give an idea of the changes in land use during the period 1981 to 1990-91. Following points are noted from the data.

1) Culturable land increased from 41.3% in 1981 to 54.1% in 1990-91.

2) The "Area not available for cultivation" declined from 1981 to 1990-91 from 45% to 34.0%.

3) The land under the category of "culturable waste" has decreased slightly during the recent years.

Culturable land has increased in the area indicating conversion of waste land into culturable land and

intensive use of land by the farmers for agriculture. It is likely to be because of tree plantation on hillocks.

8.1.3 Land Use of the proposed Site

Land use of the proposed site is important from the point of view of land use conversion particularly from prime agricultural land into industrial land as well as degradation of forest land (if any) out of total land required for the steel plant. The land for the plant belongs to villages Baikampady, Kulai, Thokur, Kenjar and Panambur. The detail of land use of the site is as follows :

S.N.	Category of Land	Area (acres)
	Total land to be acquired by JESCO	1600
1.	Forest land	Nil
2.	Grazing land	Nil
3.	Marshy land	480 (30%)
4.	Land under hillocks or waste land (not available for cultivation)	550 (34.4%)
5.	Agricultural land	570 (35.6%)
	a. Irrigated	200 (35% of agricultural land)
	b. Unirrigated	370
6.	Double cropped area (included in agricultural land)	200 (Out of 570 acres agricultural land)

Out of total land i.e. 1600 acres, the land owned by Government is 265 acres, 160 acres by KIADB and remaining 1175 acres are private land owned by farmers.

The above figures suggest that out of total, waste land is about 64.4% (including 30% marshy land). Double cropped area and irrigated land is about 35% of the

total agricultural land. There is no forest land at site.

8.2 Cropping Pattern

8.2.1 Cropping activity go on throughout the year. Study area around proposed site for the steel plant falls in the coastal zone of the Karnataka state which is a humid region and receives rain from both South West and North East Monsoons. Climate of the area is suited to mainly paddy and other horticultural plants and some crops like Coconut, Arecanut, pepper, Cashewnut etc. Thus paddy is the main cereal crop which is cultivated twice or thrice a year. Pulses and vegetables are also grown in study area. Urad and moong are main pulse crops. Coconut plantation is prominent feature of most of the villages and are grown on embankments, hillocks, and outer periphery of the farms. Mango and Cashewnut trees are also grown on a large scale. Arecanut is cultivated in small patches of land mostly around the houses. It is grown both as a single crop as well mixed crop. The main mixed crops are arecanut mixed with coconut, banana, mango or jackfruit. Banana, pineapple, chiku and citrus are prominent fruit crops.

8.2.2 To get an idea of the area under various crops it was attempted to collect recent data from agriculture department available for some villages as given in Table 8.5. Following points observed from the data presented are :

1) Study area is mainly paddy growing. The main cropping season for paddy is May - August, September - December and January - April respectively. First season paddy (May - August) covered largest area of 1542 hectares or 54.1% of the total cropped area.

2) Coconut can be considered as prominent crop while arecanut and cashewnut ranks second and third

among plantation crops. The percentage of cropped area of the total area under planation for these crops are 41.9, 22.0 and 21.6 respectively.

3) Pepper is a most important spice crop which is mostly cultivated as a mixed crop with coconut and arecanut plantation.

4) None of the village have area under oilseeds.

5) The area occupied by other crops which include sugarcane, bajra, ragi etc. is also high as total cropped area under this group occupies position next to only paddy.

On the basis of above, it can be concluded that paddy is the main crop of the study area. Coconut, arecanut, cashewnut and pepper are main plantation crops. Pulses and vegetable cover limited area and no oil crop are reported in any village of the study area.

8.2.3 Crop Yields

Crop yield is governed by several factors like farm practices, farm inputs, soil quality, varieties sown and other climatic conditions such as rain, temperature etc. Average yield of various crops as collected from agricultural department are as follows :

S.N.	Crop	Yield (Qtl/ha)
1.	Paddy	24.0
2.	Coconut	6000 nuts/year/ha
3.	Arecanut	12.50
4.	Cashewnut	8.0
5.	Pepper (Dry)	4.0
6.	Cocoa	4.0
7.	Banana	24.0
8.	Mango	100.0

9.	Citrus	930.0
10.	Sapota (Chiku)	170.0
11.	Pineapple	350.0
12.	Jackfruit	240.0

8.2.4 Crop diseases and their Control

Paddy crop has Blast and Gauldmidge as main diseases in the area. Hinosan and Bavestin are used for control of blast in paddy. Gauldmidge is still uncontrolled and farmers have resorted to disease resistant varieties.

8.2.5 Irrigation

Availability of water for irrigation is an important factor which reflects the crop production in an area. Though Mangalore falls in coastal area receiving good rainfall sufficient for cereal and other crops but vegetable crops needs light but frequent irrigation at timely intervals and heavy rainfall over shorter period of time unhelpful. Irrigated area by different sources is given in Table 8.6 as per 1981 Census. From the table it is seen that total irrigated area is only 3.6% of the total agricultural land and wells are the prime source of irrigation. Among other sources river and tanks cover 9.1% and 8% area respectively. Groupwise distribution show that there is negligible irrigated area (0.1%) within 5 kms radius area.

8.3 Natural Vegetation

Vegetation plays a vital role to balance the eco-system of an area.

To identify the vegetation grown in and around the proposed site a site visit was made by the field staff of EST Consultants and the following tree species are identified.

a) Vegetation grown at the proposed site : Most of the land of proposed steel plant is marshy barring a small stretch of cultivated land and small hillocks. Along the boundary of cultivated fields few coconut trees are seen while hillocks portion of the land is covered by small shrubs mixed with scanty coconut trees. No dense tree plantation was observed at the proposed site.

b) Common trees/plant species in the study area: Main species identified by the EST field team are as under -

1.	Delonix regia	- (Gul mohar)
2.	Acacia auriculiformis	- (Akashmani)
3.	Leucaena leucocephala	- (Subabool)
4.	Casuarina equisetifolia	- (Jhau)
5.	Azadirechta indica	- (Neem)
6.	Tamarindus indica	- (Imli)
7.	Polyalthia longifolia	- (Ashok)
8.	Polyalthia pendula	- (Ashok)
9.	Nerium indicum	- (Kaner)
10.	Ficus bengalensis	- (Bargad)
11.	Sweitenia macrophylla	- (Mahazoni)
12.	Jacaranda mimosifolia	- (Jacaranda)
13.	Ficus religiosa	- (Pipal)
14.	Roemia speciosa	- (Queen of flower)
15.	Zizyphus xylopyra	- (Jangle ber)
16.	Tectona grandis	- (Teak)
17.	Borassus flabellifer	- (Palm/Tad)
18.	Albizzia lebbek	- (Siris)
19.	Eucalyptus hybrid	- (Eucalyptus)
20.	Thusa compacta	- (Mayurpankhi)
21.	Rosa sp.	- (Gulab)
22.	Hibiscus sp.	- (Gulhar)
23.	Bougainvillea sp.	- -
24.	May flower	- -

C. Cultivated plants and fruit trees -

1.	Cocos nucifera	- (Coconut)
2.	Anacardium occidentale	- (Cashewnut)
3.	Areca catechu	- (Arecanut)
4.	Mangifera indica	- (Mango)
5.	Psidium guajava	- (Guava)
6.	Carica papaya	- (Papaya)
7.	Musa sepientum	- (Banana)
8.	Artocarpus heterophyllus	- (Kathal/jackfruit)
9.	Oriza sativa	- (Paddy)
10.	Zizyphus mauritiana	- (Ber)
11.	Sesamum indicum	- (Sesamum)

8.4 Wild Flora and Fauna

There is no reserve forest or protected forest in the study area as per information collected from the Forest Department, Mangalore. A small area has been covered by Social Forestry Wing of the Forest Department as given in the Table 8.7. The table shows that Acacia and Casuarina are most common species among the planted species. The average survival rate of plants is about 80%.

On an average 1000 plants are planted in one hectare area with range from 500-2000 plants.

There is no wild life reported in the 10 kms radius of the study area as per the information obtained from Forest Department.

8.5 Plant species identified for green belt development

Tree species identified for green belt are as follows :

Azadirachta indica	(Neem)
Acacia mearnsill	(Wattles/Australian Babool)
Acacia decurrens	(Wattles/Australian Babool)
Albizzia folcataria	-

Albizzia lebbek	(Siris)
Cassia fistula	
Cassia siamia	(Kala siris)
Casuarina equisetifolia	(Jhau)
Delonix regia	(Casuarina)
Ficus religeosa	(Gul mohar)
Calistenum lanceoletus	-
Callindra callothyrus	-
Prosois juliflora	(Vilayati babool)
Eucalyptus globulus	(Eucalyptus)
Pengamia glabra	-
Dalbergia sissoo	(Sisham)
Mangifera indica	(Mango)

8.6 Livestock

8.6.1 Livestock and agriculture go hand in hand in hand in sustaining the rural economy. Cows and buffaloes are main milking animals in the study area. Oxen are used as farm power for tillage operation in agricultural fields and transportation of the materials. He-buffaloes are also used for transport of agricultural produces from village to market and fertilizers from market to village etc. Poultry farming is practiced in the area.

To get an idea about the various kinds of animals in study area information was collected for some representative villages from Animal Husbandry Department for the year 1990-91. The data collected is given in Table 8.8 can provide an overview of the area.

It is seen in the Table 8.8 that number of milking animals is higher compared to other animals. Cows constitute about 60% of the total milking animals including cross bread cows. Oxen and he-buffaloes are almost equal in number at 2054 and 2138 respectively. Pigs are 1190 and sheep only 95. Poultry population is 10090.

8.6.2 Milk Yield

Milk yield of animal depends upon several factors such as animal breed, proper care of animal health, fodder and feeding quality.

Average milk yield of cross breed cows and buffaloe are reported to be 12 litres and 6 litres per day per lacting animal respectively. Indigenous cow yields 2-5 litre milk/day and goat on an average yield one litre milk per day.

A good number of oxen and he-buffaloes in villages show that most of the farmers depend upon animals for field preparation and other field operations.

TABLE 8.1 : LAND UTILIZATION OF RURAL PART OF STUDY AREA AS PER CENSUS RECORDS 1981

S.No.	Name of Village	Total Area of Village in round Figures (Hectares)	Land under various of uses (Hectares)			
			Forest	Agricultural	Culturable waste (Including gauchar & groves)	Area not available for cultivation
A	0-5 Km Radius					
1.	Bangrakulur	Included in Derebail town.				
2.	Padukody	157	-	151	-	6
3.	Katipalla	450	-	31	4	415
4.	Bala	567	-	310	-	257
5.	Kalavar	330	-	166	-	164
6.	Bajpe	723	-	148	-	575
7.	Kenjar	668	-	136	-	532
8.	Malavoor	607	-	107	-	500
9.	Padushedde	146	-	146	-	-
10.	Marakada	379	-	198	-	181
11.	Kunjathbailu	331	-	104	-	227
12.	Panjimogar	181	-	64	-	117
13.	Panambur	Included in New Mangalore Port area				
14.	Baikampady	486	-	10	-	476
15.	Thokur	532	-	382	-	150
16.	Kulai	401	-	200	148	53
17.	Hosabettu	238	-	95	30	113
	Total	6196	-	2248	182	3766
	%age			(36.3)	(2.9)	(60.8)
B	5-10 Km Radius					
18.	Boloor (B)	Included in Mangalore city				
19.	Kadri (B)	- Do -				
20.	Mulur	516	-	297	103	116
21.	Kandavara	537	-	239	126	172
22.	Adyapady	466	-	170	282	14
23.	Kolambe	915	-	266	89	560

24.	Paduperar	823	54	450	249	70
25.	Muduperar	896	-	305	328	263
26.	Kompadavu	842	-	372	1	469
27.	Neenmarga	814	92	318	124	280
28.	Bandanthila	807	-	313	402	92
29.	Kudupu	437	-	105	-	332
30.	Panchanadi	409	-	144	-	265
31.	Thiruvail	517	-	108	343	66
32.	Chellairu	317	-	172	65	80
33.	Madya	200	-	104	32	64
34.	Surinje	344	-	185	-	159
35.	Delanthabettu	320	-	133	12	175
36.	Badagayekkar	1011	-	633	137	241
37.	Tenkayekkar	541	-	167	82	292
38.	Permude	742	-	263	45	434
39.	Kuthethur	696	-	376	4	316
40.	Mudushedde	594	-	242	-	352
41.	Tannirubari	Included in New Mangalore Port area				
42.	Nadugodu	289	-	231	12	46
43.	Kilenjur	137	-	96	18	23
44.	Kemral	375	8	124	8	235
45.	Attur	107	-	67	2	38
46.	Panja	153	-	99	4	50
47.	Koikude	279	-	175	24	80
48.	Haleangady	199	-	112	6	81
Total		14283	154	6266	2498	5365
%age			(1.1)	(43.9)	(17.5)	(37.5)
Grand Total		20479	154	8514	2680	9131
%age			(0.7)	(41.6)	(13.1)	(44.6)

Note: Village Panambur is partly included in new Mangalore port area (i.e 405 ha) and remaining part is as extention. But here complete area of the village, i.e 688 ha) is included in new Mangalore port area in the land use table. Similarly village Baloor (B) and Kadri (B) is partly included in Mangalore city and remaining as an out growth, but here complete area of these villages are included in Mangalore city (urban area). Village Tannirubavi also partly included in new Mangalore port area, but here complete area of the village is included in new Mangalore port area.

TABLE 8.2 : LAND USE OF URBAN PART OF STUDY AREA AS PER CENSUS RECORDS OF 1981

S.No.	Name of Town	Total area (Hectares)	Area under various type of uses (Hectares)			
			Forest	Agricultural	Culturable waste (including gauchar & groves)	Area not available for cultivation
A	0-5 Km Radius					
1.	Kavuru	442	-	122	223	97
2.	New Mangalore Port	1137	Data not available			
	Total	1579	-	122	223	97
B	5-10 Km Radius					
3.	Surat kag	1337	Data not available			
4.	Padavu	847	- Do -			
5.	Mangalore Urban Area	3280*	- Do -			
6.	Kankanadi	253	-	84	25	144
7.	I. Derebail (Portion)	349	-	122	6	221
8.	II. Derebail (Portion)	288	Data not available			
	Total	6354	-	206	31	365
	Grand Total	7933	-	328	254	462

* Complete area of the Mangalore Urban area was not available in the district census Hand book for 1981.

TABLE 8.3 : LAND USE FOR 1990 - 91

S. No.	Name of Village	Total area of village (hectares)	Land under various type of uses (hectares)				
			Forest	Cultivable land		Culturable Waste	Area not available for cultivation
				Irrigated	Un-Irrigated		
A 0-5 Km Radius							
1.	Kalavar	330	-	81	115	20	114
2.	Bajpe	723	-	276	241	50	156
3.	Panjimogar	180	-	25	106	6	43
4.	Baikampady	486	-	39	87	172	188
5.	Thokur	327	-	24	209	52	42
6.	Kulai	401	-	75	113	35	178
Total		2447	-	520	871	335	721
%age				21.2	35.6	13.7	29.5
7.	Kandavara	537	-	80	238	70	149
8.	Adyapady	466	-	94	206	40	126
9.	Panchanadi	409	-	62	57	35	255
10.	Delanthabettu	320	-	106	110	-	104
11.	Kuttathur	696	-	90	276	110	220
12.	Muddeshedde	594	-	80	163	76	275
13.	Attur	107	-	34	20	9	44
14.	Panja	153	-	41	52	5	55
Total		3282	-	587	1122	345	1228
%age				17.9	34.2	10.5	37.4
Grand Total		5729	-	1007	1993	680	1949
%age			-	19.3	34.8	11.9	34.0

Note - Irrigated area is about 48.1% of the total cultivable land.

TABLE 8.4 : LAND USE SHOWING COMPARATIVE TRENDS DURING 1981 AND 1990-91
AS SUMMARISED FROM TABLES 8.1 AND 8.3

S.No.	Category of Land	1981			1990-91		
		Group A	Group B	Total	Group A	Group B	Total
1.	Forest (%)	-	1.1%	0.7%	-	-	-
2.	Cultivable Land (%)	36.3	43.9%	41.6%	56.8%	52.1%	54.1%
	I. Irrigated				21.2	17.9	19.3
	II. Un-irrigated				35.6	34.2	34.8
3.	Culturable - waste (%)	2.9	17.5	13.1	13.7	10.5	11.9
4.	Area not available for cultivation (%)	60.8	37.5	44.6	29.5%	37.4%	34.0

Note - Percentage given for irrigated and un-irrigated area are of total cultivable land.

TABLE 8.5 : CROPPING PATTERN FOR 1990-91

S.No.	Name of Village	Area under various crops (hectares)											
		Paddy			Coco-nut	Areca-nut	Pepper	Cashew-nut	Fruit Plant-ation	Pulses	Veget-able	Oil seeds	Others
		I	II	III									
A 0-5 Km Radius													
1.	Kalavar	100	80	15	15	3	1	-	5	2	3	-	67
2.	Bajpe	356	262	118	81	18	5	11	11	26	26	-	33
3.	Panjimogar	66	20	11	3	1	1	5	3	-	3	-	49
4.	Baikampady	10	5	-	31	-	1	10	1	2	-	-	71
5.	Thokur	85	23	1	18	2	-	10	2	6	2	-	108
6.	Kulai	100	75	25	10	2	1	15	5	2	3	-	50
	Total	717	465	170	158	26	9	51	27	38	37	-	378
B 5-10 Km Radius													
7.	Kandavara	166	75	43	37	40	5	18	6	5	5	-	36
8.	Adyapady	215	87	43	12	2	2	37	6	-	4	-	22
9.	Panchanadi	43	23	5	6	33	2	7	2	1	4	-	21
10.	Delanthabettu	104	81	25	26	28	4	4	8	19	-	-	23
11.	Kuttethur	125	80	20	11	12	4	4	4	8	2	-	196
12.	Muddeshedde	105	80	60	7	2	5	8	10	-	2	-	104
13.	Attur	24	23	3	9	2	-	5	1	-	-	-	13
14.	Panja	43	21	4	12	1	1	1	-	3		-	24
	Total	825	470	203	120	120	23	84	37	35	20	-	439
	Grand Total	1542	935	373	278	146	32	135	64	73	57	-	817

Growing period of paddy I. May - August
II. September - December
III. January - March

Note : Farmers in the study area adopting mixed cropping and inter cropping pattern thus percentage of cropped area for various crops can not be used to compare with total cultivable land. Keeping the above in view percentage of area under crops has not been calculated in Table 8.5.

TABLE 8.6 : IRRIGATION DETAILS AS PER CENSUS RECORDS OF 1981 (RURAL AREA ONLY)

S.No.	Name of Village	Total agricultural land (hectares)	Total irrigated land (hectares)	Irrigated area by different sources (hectares)				
				well with out electricity	well with electricity	River	Tank	Others
A 0-5 Km Radius								
1.	Bangrakulur	Fully incorporated in Derebail Town						
2.	Padukody	151	Nil	-	-	-	-	-
3.	Katipalla	31	1	1				
4.	Bala	310	Nil	-	-	-	-	-
5.	Kalavar	166	Nil	-	-	-	-	-
6.	Bajpe	148	Nil	-	-	-	-	-
7.	Kenjar	136	1	1	-	-	-	-
8.	Malavoor	107	Nil	-	-	-	-	-
9.	Padushedde	146	Nil	-	-	-	-	-
10.	Marakada	198	Nil	-	-	-	-	-
11.	Kunjathbailu	104	Nil	-	-	-	-	-
12.	Panjimogar	64	Nil	-	-	-	-	-
13.	Panmbur		Included in New Mangalore Port area.					
14.	Baikampady	10	Nil	-	-	-	-	-
15.	Thokur	382	Nil	-	-	-	-	-
16.	Kulai	200	Nil	-	-	-	-	-
17.	Hosbettu	95	Nil	-	-	-	-	-
	Total	2248	2	2	-	-	-	-
	%age		0.1	100.0	-	-	-	-
B 5-10 Km Radius								
18.	Boloor (B)		Included in Mangalore City					
19.	Kadri (B)		- Do-					
20.	Mulur	297	Nil	-	-	-	-	-
21	Kandevara	239	Nil	-	-	-	-	-
22.	Adyapady	170	Nil	-	-	-	-	-
23.	Kolambe	266	Nil	-	-	-	-	-
24.	Paduperar	450	Nil	-	-	-	-	-
25.	Muduperar	305	Nil	-	-	-	-	-

26.	Kompadavu	372	3	-	3	-	-	-
27.	Neenmarga	318	24	-	-	-	24	-
28.	Bondanthila	313	Nil	-	-	-	-	-
29.	Kudupu	105	Nil	-	-	-	-	-
30.	Pancholi	144	Nil	-	-	-	-	-
31.	Thiruvail	108	4	4	-	-	-	-
32.	Chellairu	172	Nil	-	-	-	-	-
33.	Madya	104	Nil	-	-	-	-	-
34.	Surinje	185	3	3	-	-	-	-
35.	Delanthabettu	133	25	25	-	-	-	-
36.	Badagayekkar	633	6	1	5	-	-	-
37.	Tenkayekkan	167	Nil	-	-	-	-	-
38.	Permude	263	Nil	-	-	-	-	-
39.	Kuthethur	376	Nil	-	-	-	-	-
40.	Mudushedde	242	1	1	-	-	-	-
41.	Tannirubavi		Included in New Mangalore area.					
42.	Nadugodu	231	96	68	-	28	-	-
43.	Kilenjur	96	32	29	3	-	-	-
44.	Kemrag	124	16	16	-	-	-	-
45.	Attur	67	Nil					
46.	Panja	99	24	20	4	-	-	-
47.	Koikude	175	24	24	-	-	-	-
48.	Haleangady	112	49	48	-	-	-	-
	Total	6266	307	239	15	28	24	-
	%age		4.9	77.9	4.9	9.1	7.8	
	Grand total	8514	309	241	15	28	24	-
	%age		3.6	78.0	4.9	9.1	7.8	-

TABLE 8.7 : PLANTATION UNDER SOCIAL FORESTRY SCHEME IN DIFFERENT VILLAGES/ROAD SIDES DURING 1979-80 TO 1991-92.

S.No.	Name of village/ Location of road	Year of Plantation	Area	Species
1.	Badagayakkar	1979-80	10 ha.	Casuarina equisetifolia
		1988-89	5 ha.	Casuarina, Acacia
2.	Tenkayekkar	1980-81	12 ha.	Casuarina, Eucalyptus
3.	Mudushedde	1981-82	2 ha.	Casuarina
		1991-92	3 ha.	Casuarina, Acacia, Soapnut, Jackfruit, Mango, Goli, Cashewnut, Mahogony.
4.	Suratkal to Parekja	1981-82	2 ha.	Acacia, Casia, Casuarina
5.	Malavoor	1985-86	5 ha.	Casuarina
6.	Bajpe Bajpe to Kadri, Mangalore road, (From Airport road to Mangalore road upto Kadri-deer Park	1982-83	4 km	Casuarina, Acacia, Cassia
		1986-87	15 km	May flower, Pelto phorum, Mahogony, Neem, Cassia, grandis, Jack fruit, Jacaranda, Casuarina
7.	From Mangalore to Mudushedde (upto T.B. Hospital)	1986-87	22 km	Casuarina
8.	New Mangalore Port Trust (N.M.P.T) Beach side Plantation	1991-92	7 ha	Casuarina, Cassia fistula, Badami

Note - Average number of plants planted in one hectare = 1000 (500-2000)
Average Plant to plant distance = 2 m x 2 m
Average servival rate = Above 80%

TABLE 8.8 : LIVESTOCK FOR 1990-91 AS PER THE ANIMAL HUSBANDARY DEPARTMENT DATA

Name of village	Number of animals								
	Cow		Buffal-oes	Goats	Oxen	He-buffa-loes	Sheeps	Pigs	Poultry
	Cross Breed	Indigen-ious							
A 0-5 Km radius									
1. Kalavar	25	250	45	15	240	100	10	-	800
2. Kenjar	25	775	850	60	800	850	-	12	1200
3. Panjimogar	30	265	18	36	29	280	-	950	-
4. Baikampady	12	68	16	18	116	14	-	-	216
5. Thokur	8	141	16	8	21	122	-	-	569
6. Kulai	50	450	130	50	300	65	-	25	2000
7. Bajpe	88	108	142	-	88	122	-	60	1428
Total	238	2057	1217	187	1594	1553	10	1047	6213
B. 5-10 Km radius									
8. Kandavara	61	266	151	56	76	176	-	16	1176
9. Adyapady	16	109	70	34	42	51	-	6	168
10. Panchanadi	10	180	36	-	36	95	-	74	495
11. Dalanthabettu	23	212	152	-	84	32	-	-	856
12. Kuthethur	-	160	122	10	60	93	5	45	410
13. Mudushedde	-	170	130	120	80	30	80	2	380
14. Attur	-	45	125	-	24	60	-	-	32
15. Panja	-	148	64	-	58	48	-	-	360
Total	110	1290	850	220	460	585	85	143	3877
Grand Total	348	3347	2067	407	2954	2138	95	1190	10090

CHAPTER - 9

9.0 AQUATIC ECOLOGY

9.1 Topography of the Coast line

The probable area where the effluent can be discharged in the Arabian Sea will be within a distance of about 20 km between Old Mangalore Port and Suratkal. Old Mangalore Port area is characterised by the discharge of fresh water from two large rivers viz. Netravati and Gurupur. The influx of fresh water and sediment transport by the rivers have tremendous environmental and ecological significane.

Apart from the barmouth opening the coast line is straight even beyond Suratkal excepting at the New Mangalore Port area where a port has been artificially created to accommodate cargo vessels. The harbour channel is regularly dredged to maintain adequate depth for shipping. The bottom topography also show similar configuration and is gradually sloping towards the continental shelf. The bottom sediment is in general clayish excepting in nearshore area and the barmouth. At the barmouth and its vicinity alluvial sand deposits are noticed, which at the proximity of the barmouth has formed an offshore bar which gets exposed at certain places during low tides.

9.2 Physical features:

Tides and currents at Mangalore :

The tides experienced at the coastal region of Mangalore are of mixed semidiurnal type with unequal amplitudes. The normal tidal range is about 1.3 m, significantly varying during springs and neaps.

Currents :

The flow pattern in the near shore regions of Mangalore were mainly tide induced, slightly modified and influenced by shore geomorphology and river discharge, and closely followed the tidal pattern. The highest current speeds recorded during springs and neaps were 77 cm/sec and 50 cm/sec respectively. The current measurements made at different locations did not indicate any significant variation in speed and direction except for an inshore tendency at the Old Harbour stations. This might be due to the influence of nearby estuary and associated circulation. However, the coastal flows off Mangalore could for all practical purposes be taken as reversing tidal currrents flowing more or less parallel to the coast with a maximum spring velocity of 80 cm/sec with an inshore drift under the influence of the existing wind.

The available wind data indicate a wind pattern with significant seasonal variations. During the fair weather season winds were generally weak, very often less than 20 km/hr. Under the fairly strong and consistent winds blowing shorewards especially during the evenings, an onshore drift to the order of 2 to 4 cm/sec could very well be expected during the fair weather seasons. The onshore drift could be of the order of 15 to 20 cm/sec during the SW monsoon when westerly wind speed as high as 60 km/hr and above are quite common.

9.3 Chemical features:

Chemical features of the water tended to be uniform and typical of coastal waters. Temperature and salinity showed a slight increase away from the shore. Nutrients in general remain low.

Transparency was high and showed the expected increase further offshore. BODs was low and well within the

acceptable limits and so were the suspended solids. Sulphides remained below detectable limit during the period of observation. Biological productivity was in general high as indicated by the pigment concentrations.

9.4 PREVIOUS MARINE ECOLOGY SERVEYS

9.4.1 National Institute of Oceanography carried out surveys on the marine eco-system. Further, College of Fisheries, Mangalore are also collecting sea water samples fortnightly (excepting during monsoon months) at 5 m, 10 m and 15 m distance along the coast line with particuler reference to MCF effluents discharged into Arabian sea. These long term observations do not show any significant adverse effects from the existing discharges of effluents.

9.4.2 Some of the observations on the prevalance of organism are as follows:

9.4.2.1 Zooplankton

From the observations made it appears that between New Mangalore Port and Old Mangalore Port there is high zooplankton concentration. The total biomass being around 400 ml.

The most abundant group of zooplankton recorded was copepods followed by cladocerans. The other groups represented numerically in the descending order were decapods, chaetognaths and ostracods. The commercially important groups like fish eggs and larvae, prawn larvae of penaeids, crab zoea, megalops and sergestids which include Acetus sp. are also present in appreciable numbers.

9.4.2.2 Subtidal Benthic Macrofauna

Benthic community between the nearshore 5 m deep station and the offshore 20 m deep station between Old Mangalore Port and Suratkal tend to show almost similar pattern of organisms. Most abundant forms are the bivalves, gastropods,polychaetes and pteropods. Holothurians, star fishes, amphipods and decapods appeared occasionally in the sampling.

In all these samplings, bivalves recorded the maximum number. The next in abundance is polychaetes. Holothurians though a few in number contributed substantially to the biomass. The bivalves in a few collections recorded a very high number. These were smaller in size and contributed very little to the biomass. Considering the numerical abundance and the size of these bivalves, it is possible to presume that a fresh settlement of bivalves has taken place to the benthic community in this area.

9.4.2.3 Bacteriological Condition

In general, the incidence of indicator organisms was meagre. The only group which showed higher count was total coliforms. Heterotrophic population was very poor, the counts ranging between 10 and 38/ml. This may be due to low organic matter content in the bottom sediments in that area. FC/FS ratio indicated that sewage pollution is insignificant.

9.5 Fisheries in study area :

Unlike other coastal ports on western coast, Mangalore donot support port on a large scale. Fishing activity is moderate to low. The yearwise fish landing data at Mangalore (Table 9.1) show that annual fish landings at Mangalore is around one lakh tonne which is not even 1% of the total export of marine products.

9.6 Conclusions

From the earlier studies carried out it is possible to state that more conducive biological environment is available.

Chemical studies indicate that a general uniformity prevails throughout, BODs and suspended solids remain well within the acceptable limits.

Studies on current velocity, direction etc. did not indicate any significant variation in speed or direction excepting for an inshore tendency at the old harbour station.

Further for ascetaining the effluent discharge point in the sea, the project authorities have approached the National Institute of Oceanography to survey/advise the most suitable point for discharge of the treated effluents into Arabian sea.

TABLE 9.1 : YEARWISE DATA FOR FISH LANDINGS AT MANGALORE

Year	Marine Fish landings (Quantity in Lac tonnes)	Marine product export (Quantity in tonnes)
1984-85	1.29	3035.88
1985-86	1.24	2708.22
1986-87	1.04	3173.84
1987-88	0.86	3559.94
1988-89	0.98	N.A
1991-92	1.34	N.A

Source : Time Research Foundation Study on Management of urban Development.

CHAPTER - 10

DEMOGRAPHIC AND SOCIO-ECONOMIC ENVIRONMENT OF THE STUDY AREA

10.1 DEMOGRAPHIC FEATURES OF THE STUDY AREA

10.1.1 To understand human settlements, population, households and demographic features of the study area, villagewise data from District Census Hand book, 1981 was tabulated and placed in Tables 10.1 to 10.5. To get recent information, door to door sample survey was also conducted for some villages in regard to educational, medical and Drinking water facilities, literacy, transportation, etc. The information is placed in Tables 10.6 to 10.10 and referred to in this chapter at relevant sections. Narrative of these tables is as follows.

10.1.2 Human Settlements

Table 10.1 provides details of human settlements in 10 km radius of the proposed Mangalore Steel plant. Total population of the study area is 3,89,725 consisting 64,913 households with an average of 6 persons per family. The density of population is about 1364 persons/sq. km which is 4.8 times and 7.0 times higher than the district and state figures respectively. The population density within 5 km radius is about 821 persons/sq.km while the area falling under 5-10 km radius has 1570 persons/km sq. which is partly due to outskirts of Mangalore city falling in this region.

10.1.3 Amenities

The use of amenities, in the EIA study, are important from the point of assessment of development in infrastructure of an area. Keeping in view the above village wise amenities data is placed in Table 10.2 as per 1981 census from which following points emerge.

10.1.3.1 Educational Facilities

Various educational institutions are available in the village. There are 171 primary schools, 123 middle schools and 42 high schools in the entire study area. In addition, institutions for higher education and technical college are also in existance there. The personal inventory survey data (Table 10.6) show that primary schools are there in all the villages, while 87% villages have middle school. Nearly one-fourth of the villages have high schools and one village an intermediate college.

10.1.3.2 Medical Facilities

Medical institutes and medical practitioners are common in the area. Registered medical practitioners are found in each village of study area. There are three hospitals, seven dispensaries and six family planning centres in Mangalore urban area. In rural areas about 24% villages have medical institution of one kind or the other in the form of hospital, dispensary, maternity and family welfare centre, primary nursing home, family planning centre and primary health centre etc. The survey data (Table 10.7) show that 40% villages have doctors, in addition to midwives and nurses in 47% villages. Amongst the villages surveyed Bajpe and Suratkal have Primary Health Centre.

To get an idea about the human health status of the area monthwise data was collected on human diseases from the primary health centres and family welfare centre Suratkal for the pevious three years (i.e. from 1990 to 1992) which is given in Table 10.18. It is seen from the table that most of the people suffer from respiratory diseases and their number is large compared to other diseases.

10.1.3.3 Drinking Water Source

Wells are the primary source of drinking water as nearly 58% villages have wells as the only source of drinking water. Tap water connections and hand pumps are in limited number. As also seen from Table 10.8 primary source of drinking water is wells, about 91% families interviewed are dependent on wells though hand pumps and tap water supply is available in some villages.

10.1.3.4 Post & Telegraph offices

Good availability of postal facilities can be seen from the Table 10.2. About 50% villages have post offices while post & telegraph offices and telephones are available in about 20% and 36% villages respectively.

10.1.3.5 Approach and Communication facilities to the study area villages

There is good road network in the study area. About 27% villages are linked with kutcha road and remaining are connected with metalled road having bus service. 80% of surveyed villages (Table 10.9) are connected with pucca roads. Bus services is available to 60% of villages. Auto & Taxi is available at Bajpe and Baikampady.

10.1.3.6 Power Supply

All villages of the study area are electrified.

10.1.4 Literacy

Table 10.3 shows details of literates in study area as per 1981 census and based on subsequent survey is officially declared as a 100% literate district. About 68% of the total population is literate. Literacy in males is higher than females. Of the total population

male literates are 74.2% and female literates are 61.5%. Groupwise distribution show that literacy is higher in group B villages compared to group A. The literacy rate in the district and Karnataka state is as under -

	Literacy %	
Category	Dakshina Kannada district	Karnataka state
Persons	53.47	38.46
Males	62.09	48.81
Females	45.32	27.71

From above it is clear that literacy rate is higher in the study area compared to district and state figures. Table 10.10 show that literates are 90% of total population surveyed. Male and female literates are somewhat similar upto 12th standard but number of females falls in the category of graduates, and professional and technical.

10.1.5 Occupational Pattern in Study Area

With the coming up of an industry in an area several changes are likely to take place in the form of infrastructural development i.e. hospitals, schools, in addition to new avenues of employment. On the other hand there can be considerable changes in the occupation of persons atleast in a certain group who become landless due to aquisition of their land for industrial development.

In order to record the present status of occupation pattern in the study and to superimpose changs which may take place after the steel plant is set up information was compiled from 1981 census and placed in

Table 10.4. Table 10.5 contains summery of Tables 10.3 and 10.4. The following points can be drawn from these tables -

1) The percentage of total male and female main workers is 48.9 and 29.6 of the total male and female population respectively.

2. Among the total main workers, male and female cultivators contribute 7.1% and 6.1% respectively.

3. Of the total female main workers female agricultural labourers are higher (8.8%) compared to males (5.2%).

4. The female workers involved in house hold industry are about nine times more than male workers. Substantial proportion also involved in Beedi manufacture as a Cottage industry.

5. Among the total main workers other workers are about 70%. Other workers are 83.8% of the total male main workers.

6. The percentage of non workers is 50.6 and 68.9 respectively of the total male and female population.

7. Marginal workers are low compared to category 'others'.

10.2 Socio-Economic Environment of the Study Area

10.2.1 Introduction

Setting up of an industry are likely to some extent improve the economic conditions of the villages around through additional employment opportunities and economic multiflier factors such as transport of material, setting up of small business like repair

shops, grocery shops etc. However, on the other hand some families presently at project site shall be required to be relocated elsewhere. A preliminary approach to rehabilitation plan is given subsequently in this chapter.

A door to door personal inventory to assess socio-economic conditions by way of a questionnaire was conducted in some villages around the proposed plant. The information collected is tabulated and presented in Tables 10.11 to 10.17. Salient featuers are :

10.2.2 Family Size

Table 10.11 gives break up of male and female population of the interviewed families into age groups of 1 - 4 years, 5-9 years, 10-19 years, 20-39 years and over 40 years. The survey showed that number of family members per family remains same as obtained from Census Records. The data shows the following break up in different age groups and suggest that % of children is low and maximum % falls in the age group of 20-39 years and above 40 years both for males & females.

	Male	Female
	(% of total interviewed)	
Upto 4 years	2.8	1.4
5 - 9 years	2.8	8.3
10 - 19 years	19.6	27.8
20 - 39 years	41.1	30.6
>40	33.7	31.9

10.2.3 Public facilities

The public facilities include shops and government offices which can support the basic public needs. Table 10.12 shows that Kirana shops and tea stalls are available in most of the villages of the study area.

10.2.4 Housing and Sanitary Conditions

Table 10.13 gives an idea of housing and sanitary conditions in the study area. About 20% houses are kutcha. In most of the villages (about 80%) houses are clustered comprising generally 5 rooms in each house. Houses are made of lateritic bricks and most of the roofs (78%) are of tiles. About two-third families have sanitary facilities in the form of septic tanks.

10.2.5 Household items in villages and durables with families

It is seen from the Table 10.14 that television, two-wheelers and four-wheelers are available in most of villages. Table 10.15 shows durables available with interviewed families. One-third families have black and white T.V and 22% of the families have coloured T.V. Fans are available with almost every family. Other items such as sewing machine, fridge, etc are owned by only a few.

10.2.6 Sources of Family Income

As seen in Table 10.16 main occupation of villagers is agriculture. Most of the farmers have an additional earning source i.e. milk selling, fish selling, part-time labour and beedi making. A few families are involved in business and fish trade as a single source of earning. About 6% families are dependent upon business and 9.4% are engaged in fishing of the total families interviewed. About 47% of the interviewed families are engaged in more than one source of earning, an uncommon feature compared to some of the northern states.

10.2.7 Land holding

Table 10.17 gives an idea of various sizes of land holdings in the study area. The distribution show that more than 50% farmers own upto 2 hectares, 25% families

have land holding between 1-2 Hectare. There is no land holder above 4 hectares among the families interviewed. About 21.9% families are land less.

10.2.8 General features of the area

Some of other features of the study area observed are as follows.

1. Migration is very common in the area. It has been observed during field survey that about 75% villages fall in this category and a large number of persons have migrated to Bombay and the Gulf.

2. The nearest place where people go for selling their agricultural produce, fish and buying seeds, fertilizers and pesticides, agricultural implements, cloth and other items are Bajpe, Suratkal and Mangalore.

3. Regarding development of the area it is expressed that there is considerable progress because of various government sponsored schemes. They anticipate further development in the area with the industrialisation of the area and coming up of the steel plant.

4. The dominant religion is Hinduism followed by Muslims and Christians. Among Hindus, Brahmins, Bunts, Poojari, Mogaveera, Jain, Shetty and Nair are the prominent casts.

5. Regarding farm machinaries and fishing, pump sets are available with about 60% farming families. None of the farmers in the area has a tractor of other advanced agricultural implements. Only two families have power tillers and one has ordinary boat for fishing.

On the basis of above enumeration it can be expressed that primary schools and middle schools are available in all villages, Literacy percentage is high, Medical facility is also good compared to other states like - U.P. and M.P.

Large number of villages are linked by metalled road and bus service. Above 65% families have septic tanks and houses are made of lateritic bricks with tile roof. Kirana shops and tea stalls are available in all villages of study area. Availability of luxury households items i.e. coloured T.V and two-wheelers etc. with villagers show their general prosperity.

10.2.9 Rehabilitation of the Displaced Families

The site has been selected after scrutinising various alternate sites taking into account many other facilities and to minimise the rehabilitation, in addition to minimising environment impact.

The entire activity of rehabilitation will be handled in association with the State Government authorities as per their statutory norms/guidelines. The area to be utilised is not very densely populated and around 200 families are expected to be relocated from this vast area of land. Agriculture is the main occupation of most (about 90%) of the families and adequate compensation will be paid to the displaced families for their real estate and other structures like wells, houses and horticulture as per State Government norms.

JESCO intends to acquire around 30 acres of land at Chellayru village (adjacent to MRPL rehabilitation camp) for the purpose of rehabilitation. This area is more than the statutory requirement (Karnataka Resettlement of Project Displaced Persons Bill 1987) to be provided to the displaced families.

The rehabilitation site is proposed to be located in an already developed area and hence the facilities have only to be extended to the resettlement area. JESCO with cooperation of State Government authorities will arrange for infrastructure such as supply of water, electricity, religious structures and roads. The present major occupation (agriculture) of the families can be continued by them of their new locations without any duress. Also the resettlement area will be close (10 km) to their old settlement and hence the present life style and culture of the displaced families is not expected to be affected.

The steel plant project will bring some down stream industries nearby and this will offer employment opportunities to the local people besides those who will be directly employed by the steel plant. This is expected to effectively improve the economic conditions of the displaced community.

TABLE 10.1 : HUMAN SETTLEMENT IN THE 10 KM RADIUS AREA
(SOURCE : CENSUS RECORDS OF 1981)

Sr. No.	Name of Village	Census Code No.	Area of village (hectares) *	No.of Occupied residential houses	No.of house holds	Population
A.	0-5 Km radius					
1.	Bangrakulur	4	Fully included in Derebail town as an out growth i.e 228 ha.			
2.	Padukody	5	157	566	575	2836
3	Katipalla	55	450	418	418	2694
4.	Bala	56	567	421	421	2413
5.	Kalavar	57	330	276	281	1663
6.	Bajpe	58	723	894	948	5915
7.	Kenjar	59	668	630	631	4053
8.	Malavoor	60	607	418	420	2580
9.	Padushedde	62	146	298	298	567
10.	Marakada	63	379	655	661	3426
11.	Kunjathbailu	64	381	558	560	2962
12.	Panjimogar	65	181	328	329	1909
13.	Panambur	67	Included in new Mangalore Port area with portion of out growth i.e. 284 ha.			
14.	Baikampady	68	486	506	524	3145
15.	Thokur	69	532	641	663	4484
16.	Kulai	70	401	1310	1328	7777
17.	Hosabettu	71	238	700	710	4109
18.	Kavouoru	XI	442	1137	1145	6747
19.	New Mangalore Port Area	-	1137	1287	1310	6945
	Total		7825	11043	11222	64225

B. 5-10 Kms radius

20.	Boloor (B)	3	Included in Mangalore city with portion of out growth i.e. 165 ha.			
21.	Kadri (B)	6	Included in Mangalore city with portion of out growth i.e. 141 ha.			
22.	Mulur	21	516	645	659	4469
23.	Kandavara	22	537	453	454	2848
24.	Adyapady	23	466	292	302	1934
25.	Kolambe	24	915	596	632	3944
26.	Paduperar	25	823	427	462	2792
27.	Muduperar	26	896	649	689	4185
28.	Kompadavu	27	842	326	326	2023
29.	Neermarga	41	814	619	628	3773
30.	Bondanthila	42	807	566	566	3495
31.	Kudupu	43	437	300	300	1770
32.	Panchanadi	44	409	459	474	2545
33.	Thiruvail	45	517	565	573	3216
34.	Chellairu	47	317	241	284	1756
35.	Madya	48	200	160	160	948
36.	Surinje	49	344	248	257	1822
37.	Delanthabettu	50	320	209	211	1321
38.	Badagayekkar	51	1011	374	380	2083
39.	Tenkayekkar	52	641	378	399	2254
40.	Permude	53	742	433	433	2703
41.	Kuthethur	54	696	397	397	2396
42.	Mudushedde	61	594	452	453	2750
43.	Tannirubavi	66	Included in New Mangalore Port area with portion of out growth i.e. 190 ha.			
44.	Nadugodu	83	289	231	235	1390
45.	Kolenjur	84	137	103	103	631
46.	Kemral	85	375	404	405	2237
47.	Attur	86	107	112	112	625
48.	Panja	87	153	93	95	564
49.	Koikude	88	279	294	295	1792
50.	Haleangady	90	199	496	514	3179
51.	Suratkal	XXIV	1337	3841	3943	25998
52.	Padavu	XVIII	847	3242	3263	18618

53.	Mangalore (Urban area)	XIV	3280**	30120	32018	193699
54.	Kankanadi	IX	253	1858	1895	11520
55.	Derebail	VII	637	1758	1774	10220
	Total		20737	51341	53691	325500
	Grand Total		28562	62384	64913	389725

Note : * Area of villages given are in round figures.

** Area for Mangalore (urban part) is incomplete as actual figure is not available in the district Census book of 1981.

TABLE 10.2 : AMENITIES AVAILABLE AS PER CENSUS RECORDS OF 1981

Sr. No.	Name of Village	Census Code No.	Educational Facility	Medical	Drinking water	Post & Telegraph	Communications (Bus/Railway station water way	Approach to village	Power supply
A.	0-5 km radius								
1.	Bangrakular	4	Fully incorporated in Derebail town						
2.	Padukody	5	P,M	-(-5)	W	-(-5)	BS	PR	EA
3.	Kattipalla	55	P6,M4,H2,C	MCW,D2 Nh,RP2	HP	PTO,Phone	BS	PR	EA
4.	Bala	56	P,M	RP	W	PO	-(-5)	PR	EA
5.	Kalwar	57	P2,M2,H	-(-5)	W	-(10 +)	-(-5)	PR	EA
6.	Bajpe	58	P5,M4,H2,PUC O2	PHU,RP5	W,HP,TK	PTO,Phone	BS,RS	PR	EAJ
7.	Kenjar	59	P2,M2	H	W,TK	PO,Phone	-(-5)	PR	EA
8.	Malavoor	60	P2,M2	RP3	W	PO, Phone	BS	PR	EA
9.	Padushedde	62	P,M	PHU,RP	W	PO	BS	PR	EA
10.	Marakada	63	P,M	RP2	W	-(-5)	BS	PR	EA
11.	Kunjathbailu	64	P,M	D,RP	T,W	PO	BS	PR	EA
12.	Panjimagara	65	P,M	-(-5)	W	PO	BS	PR	EA
13.	Panambur	67	Included in Mangalore port area						
14.	Baikampady	68	P2,M2	RP	W	Po	BS	PR	EA
15.	Thokur	69	P2,M2	-(5-10)	W	-(5-10)	-(-5)	KR	EA
16.	Kulai	70	P2,M,AC	RP	W	PTO,Phone	BS	PR	EA
17.	Hasabettu	71	P2,M,H,AC	RP	W	PO	BS	PR	EA
18.	Kavuru	XI	P2,M3,H	-	W,T	PTO,Phone	BS	PR	EA
19.	New Mangalore port area	XVII	P3,M2,H,AC	HC,FC	W,T	PTO,Phone	BS	PR	EA
B.	5-10 Km radius								
20.	Bolloor (B)	3	Included in Mangalore city						
21.	Kadri (B)	6	"						
22.	Mulur	21	P3,M2,H2O	D,RP2	W	PTO,Phone	BS	PR	EA
23.	Kandavara	22	P2,M2	RP2	W	PO,Phone	-(-5)	KR	EA
24.	Adyapady	23	P,M	-(-5)	W	PO	-(-5)	KR	EA
25.	Kolambe	24	P2,M	-(-5)	W	PO	BS	KR	EA

26.	Paduperar	25	P2,M2	-(-5)	W	PO	BS	KR	EA
27.	Muduperar	26	P3,M2	-(-5)	W	-(-5)	BS	KR	EA
28.	Kompadavu	27	P,M	-(-5)	W	PO	BS	PR	EA
29.	Neenmarga	41	P2,M	RP	W	PO,Phone	BS	PR	EA
30.	Bondanthila	42	P2,M2,H,PUC	-(5-10)	W	PO,Phone	BS	PR	EA
31.	Kudupu	43	P,M	-(-5)	W	PO	BS	PR	EA
32.	Panchanadi	44	P,M,H	RP3	W	Phone	BS	PR	EA
33.	Thiruvail	45	P,M	RP	W	Phone	BS	PR	EA
34.	Chellairu	47	P2,M	-(5-10)	W,TK,R	PO	-(-5)	KR	EA
35.	Madya	48	P	-(-5)	W	PO	-(-5)	KR	EA
36.	Surinje	49	P,M	RP	W,TK,R	PO	BS	KR	EA
37.	Delanthabettu	50	P,M	-(-5)	W,TK,R	-(-5)	-(-5)	KR	EA
38.	Badagayekkar	51	P2,M	RP,PHU	W,TK	PO	BS	PR	EA
39.	Tenkayekkar	52	P,M	RP	W,TK	PO	BS	PR	EA
40.	Permude	53	P2,M2	RP2	TK,W	PO	BS,RS	PR	EA
41.	Kuthethur	54	P2,M	RP2	TK,W,R	PO,Phone	BS	KR	EA
42.	Mudushedde	61	P2,M	TBH	W	PO	BS	PR	EA
43.	Tannirubavi	66	Included in new Mangalore Port area						
44.	Nadugodu	83	P,M	-(-5)	W	PO	-(-5)	PR	EA
45.	Kilenjur	84	P	-(-5)	W	-(-5)	-(-5)	KR	EA
46.	Kemral	85	P,M	RP2	W	PO	BS	KR	EA
47.	Attur	86	P,M	-(-5)	W	-(-5)	BS	KR	EA
48.	Panja	87	P,M	-(-5)	W	-(-5)	BS	KR	EA
49.	Koikude	88	P,M	-(-5)	W	PO,Phone	BS	KR	EA
50.	Haleangady	90	P3,M3,H	RP5,PHU	W	PTO,Phone	BS	PR	EA
51.	Suratkal	XXIV	P11,M10,H3, PUC2,ASC, Short type 2	PHC,FC	W,T	PTO,Phone	BS	PR	EA
52.	Padavu	XVII	P3,M2,H	D	W,T	PTO,Phone	BS	PR	EA
53.	Mangalore (Urban area)	XIV	PUC10,Type 9, P72,M43,H24, ASC4,AC2,A2, Polytechnic 2,04, Short type 4	H3,D7, FC6	W,T,HP	PTO,Phone	BS,RS	PR	EA

54. Kankanadi	IX	P5,M3,H	-	W,T,HP	PTO,Phone	BS	PR	EA
55. Derebail (Portion)	VII	-	-	-	-	BS	PR	EA

Abreviations used -

A (-) sign indicate that facility is not available.

A (-) sign and figure in bracket indicate nearest distance where facility is available.

Educational facilities

P - Primary school

M - Middle school/Junior secondary school

H - High school

PUC - Pre University college/Higher secondary/Inter mediate college

C - College

AC - Adult literacy class/centre

ASC - College of arts, science and commerce combined

Short type - short hand type centre

O - Others (Sanskrit Pathasala, Urdu Madarasa and Makhtaf etc.)

A - College of arts

Medical Facilities

RMP - Registered medical practioner

D - Dispensary

MCW - Maternity and child welfare centre]

NH - Nursing home

HC - Health centre

FC - Family plannig centre

PHU - Primary health unit

TBH - Tuberculosis hospital

Drinking water facilities

W - Well

HP - Hand Pump

T - Tap water supply

TK - Tank, R - River

Post & Telegraph facilities

PO - Post office

PTO - Post & Telegraph office

Communications facilities

BS - Bus stop/Bus stand

RS - Railway station

Approach to village

PR - Pucca road

KR - Kutcha road

Power Supply

EA - Electricity for all purposes

TABLE 10.3 : LITERATES IN STUDY AREA AS PER CENSUS RECORDS OF 1981

Sr. No.	Name of village	Population			Literates	
		Persons	Males	Females	Males	Females
A.	0-5 km radius					
1.	Bangrakular	Included in Derebail Town				
2.	Padukody	2836	1504	1332	1001	616
3.	Katipalla	2694	1316	1378	884	631
4.	Bala	2413	1146	1267	797	711
5.	Kalavar	1663	771	892	425	397
6.	Bajpe	5915	2843	3072	1970	1675
7.	Kenjar	4053	1961	2092	1142	895
8.	Malavoor	2580	1276	1304	668	515
9.	Padushedde	567	299	268	208	135
10.	Marakada	3426	1778	1648	1197	773
11.	Kunjathbailu	2962	1491	1471	954	714
12.	Panjimogar	1909	968	941	653	458
13.	Panambur	Included in new Mangalore port area				
14.	Baikampady	3145	1610	1535	1061	665
15.	Thokur	4484	2223	2261	1408	978
16.	Kulai	7777	3821	3956	2728	2171
17.	Hosabettu	4109	1961	2148	1465	1288
18.	Kavuru (P)	6747	3229	3518	2151	1839
19.	New Mangalore Port area	6945	3730	3215	2464	1636
	Total	64225	31927	32298	21176	16097
	% age		49.7	50.3	66.3	49.8
B.	5-10 km radius					
20.	Baloor (B)	Included in Mangalore city				
21.	Kadri (B)	"				
22.	Mulur	4469	2032	2437	1187	1223
23.	Kandavara	2848	1389	1459	888	658
24.	Adyapady	1934	892	1042	457	409
25.	Kolambe	3944	1860	2084	1238	1068

26.	Paduperar	2792	1327	1465	816	700
27.	Muduperar	4185	1911	2274	1164	1154
28.	Kompadavu	2023	957	1066	550	409
29.	Neermarga	3773	1848	1925	1219	1000
30.	Bondanthila	3495	1657	1838	1021	846
31.	Kudupu	1770	853	917	652	564
32.	Panchanadi	2545	1273	1272	868	681
33.	Thiruvail	3216	1532	1684	912	751
34.	Chellairu	1756	820	936	573	496
35.	Madya	948	431	517	270	260
36.	Surinje	1822	828	994	481	464
37.	Delanthabettu	1321	594	727	375	372
38.	Bodagayekkar	2083	947	1136	548	543
39.	Tenkayekkar	2254	1046	1208	686	597
40.	Permude	2703	1249	1454	764	728
41.	Kuthethur	2396	1127	1269	778	667
42.	Mudushedde	2750	1316	1434	644	520
43.	Tannirubavi	Included in New Mangalore port area				
44.	Nadugodu	1390	612	778	409	411
45.	Kilenjur	631	285	346	208	209
46.	Kemral	2237	1048	1189	648	601
47.	Attur	625	284	341	174	163
48.	Panja	564	247	317	146	151
49.	Koikude	1792	833	959	537	483
50.	Haleangady	3179	1532	1647	1096	911
51.	Suratakal (M)	25998	13370	12628	9766	6740
52.	Padavu	18618	9143	9475	6508	6428
53.	Mangalore	193699	96690	97009	78117	68246
54.	Kankanadi (P)	11520	5433	6087	4117	3824
55.	Derebail	10220	5056	5164	3641	2973
	Total	325500	160422	165078	121458	105250
	% age		49.3	50.7	75.7	63.8
	Grand Total	389725	192349	197376	142634	121347
	% age		49.4	50.6	74.2	61.5

TABLE 10.4 : OCCUPATIONAL PATTERN IN STUDY AREA AS PER CENSUS RECORDS OF 1981

Sr. No.	Name of Village	Total main Workers		Cultivators		Agricultural Labourers		House hold industry		Other workers		Marginal Workers		Non Workers	
		Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
A.	0-5 km radius														
1.	Bangrakular	Fully included in Derebail Town with Portion of out growth													
2.	Padukody	918	562	55	50	20	44	38	355	805	113	-	-	586	770
3.	Katipalla	564	411	01	-	07	15	127	373	429	23	03	26	749	941
4.	Bala	535	532	152	138	88	106	36	193	259	95	02	05	609	730
5.	Kalavar	351	361	74	32	87	101	14	164	176	64	-	06	420	525
6.	Bajpe	1276	969	177	120	250	125	46	494	803	230	-	05	1567	2098
7.	Kenjar	876	319	241	99	268	166	08	06	359	48	50	571	1035	1202
8.	Malavoor	652	485	137	76	197	102	26	195	292	112	02	45	622	774
9.	Padushedde	165	113	55	29	08	09	08	49	94	26	-	-	134	155
10.	Marakada	852	484	64	12	45	45	14	282	729	145	80	18	846	1146
11.	Kunjathbailu	803	472	109	44	58	75	20	298	616	55	-	08	688	991
12.	Panji mogar	504	300	84	22	20	31	30	221	370	26	-	-	464	641
13.	Panambur	Included in New Mangalore port area with portion of out growth													
14.	Baikam pady	797	572	101	43	43	73	11	218	642	238	22	36	791	927
15.	Thokur	960	790	160	103	146	94	36	443	618	150	02	19	1261	1452
16.	Kulai	1831	1158	93	54	88	102	129	542	1521	460	94	257	1896	2541
17.	Hosabettu	918	706	52	24	71	135	42	148	753	399	-	09	1043	1433
18.	Kavuru (P)	1632	1250	82	34	77	106	75	775	1398	335	18	38	1579	2230
19.	New Mangalore port area	2166	933	56	50	32	59	19	195	2059	629	5	4	1559	2278
	Total	15800	10417	1693	930	1505	1388	679	4951	11923	3148	278	1047	15849	20834
	% age	49.5	32.3	10.7	8.9	9.5	13.3	4.3	47.5	75.5	30.3	0.9	3.2	49.6	64.5

B. 5-10 km radius

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20. Baloor (B)	Included in Mangalore city with portion of out growth													
21. Kadri (B)	"													
22. Mulur	949	732	104	37	182	187	39	02	624	506	16	58	1067	1647
23. Kandavara	661	574	133	47	147	120	74	126	307	281	14	50	714	835
24. Adyapady	417	513	158	114	70	106	14	185	175	108	02	05	473	524
25. Kolambe	908	800	246	97	175	125	85	408	403	170	07	19	944	1265
26. Paduperar	619	609	210	72	205	156	46	345	158	36	03	06	705	850
27. Muduperar	813	724	159	94	183	170	64	291	407	169	07	47	1091	1503
28. Kompadavu	422	396	133	47	107	122	34	222	148	05	02	11	533	659
29. Neermarga	976	777	252	128	197	156	69	333	458	160	12	27	860	1121
30. Bondanthila	840	926	243	149	191	190	120	443	286	144	06	06	811	906
31. Kudupu	451	304	69	11	21	34	14	66	347	193	01	04	401	609
32. Pachanadi	648	371	96	01	86	20	41	207	425	143	04	07	621	894
33. Thiruvail	806	672	118	45	126	111	110	378	452	138	-	-	726	1012
34. Chellairu	375	417	146	111	43	107	15	186	171	13	04	08	441	511
35. Madya	208	186	82	50	20	49	11	75	95	12	03	41	220	290
36. Surinje	364	377	111	81	60	61	39	184	154	51	01	02	463	615
37. Delanthabettu	278	346	96	63	40	94	08	71	134	118	-	-	316	381
38. Badagayekkar	452	485	215	213	71	121	21	135	145	16	01	74	494	577
39. Tenkayekkar	455	405	91	27	104	100	45	232	215	46	01	02	590	801
40. Permude	541	554	209	130	77	85	39	294	216	45	-	01	708	899
41. Kuthethur	494	501	172	93	107	140	42	144	173	124	-	04	633	764
42. Mudushedde	654	676	121	27	184	177	35	317	314	155	-	-	662	758
43. Tannirubavi	Included in New Mangalore port area with portion of out growth													
44. Nadugodu	285	388	116	104	71	99	34	174	64	11	01	02	326	388
45. Kilenjur	129	155	67	50	13	36	25	69	24	-	01	07	155	184
46. Kemral	395	488	72	66	48	52	61	343	214	27	34	40	619	661
47. Attur	123	185	36	30	75	42	04	113	08	-	-	-	161	156
48. Panja	129	157	61	52	28	40	07	01	33	64	02	18	116	142
49. Koikude	364	369	119	80	42	74	57	197	146	18	02	33	467	557
50. Haleangady	679	551	69	32	44	94	68	363	498	62	-	01	853	1095
51. Suratakal	5565	3909	439	188	239	401	399	2050	4488	1270	112	415	7693	8304
52. Padavu (M)	4757	3124	115	32	96	45	173	1657	4373	1390	37	65	4349	6286
53. Mangalore	48163	23494	527	227	280	261	1009	6567	46347	16439	421	860	48106	72655

54. Kankanadi (P)	2757	2003	42	46	30	100	83	210	2602	1647	15	20	2661	4064
55. Derebail	2608	1860	158	90	69	86	68	284	2313	1400	30	24	2418	3280
Total	78285	48028	4984	2634	3431	3751	2953	16672	66917	24961	739	1857	81397	115193
% age	48.8	29.1	6.3	5.5	4.4	7.8	3.8	34.7	85.5	52.0	0.5	1.1	50.7	69.8
Grand Total	94085	58445	6677	3564	4936	5139	3632	21623	78840	28109	1017	2904	97246	136027
% age	48.9	29.6	7.1	6.1	5.2	8.8	3.9	37.0	83.8	48.1	0.5	1.5	50.6	68.9

P = Portion

M = Muncipality

H.H. etc. House hold industry, manufacturing processing servicing and repairs

Note : Percentage given for cultivators, agricultural labourers, household industry and other workers is to the total main workers for male and female separately while percentage of total main workers, marginal workers and non workers is to the total male and female population.

TABLE 10.5 : SUMMARY OF LITERATES AND WORKERS IN STUDY AREA

Sr. No.	Category	Group A	Group B	Total
1.	Total population (1981)	64225	325500	389725
	Male	31927	160422	192349
	Female	32298	165078	197376
2.	Literates -			
	Male (Percentage of total male population)	66.3	75.7	74.2
	Female (Percentage of total female population)	49.8	63.8	61.5
3.	Total main workers -			
	Male (Percentage of total male population)	49.5	48.8	48.9
	Female (Percentage of total female population)	32.3	29.1	29.6
I.	Cultivators -			
	Male (Percentage of total male main workers)	10.7	6.3	7.1
	Female (Percentage of total female main workers)	8.9	5.5	6.1
II.	Agricultural Labourers -			
	Male (Percentage of total male main workers)	9.5	4.4	5.2
	Female (Percentage of total female main workers)	13.3	7.8	8.8

III. House hold industry etc. -			
Male (Percentage of total male main workers)	4.3	3.8	3.9
Female (Percentage of total female main workers)	47.5	34.7	37.0
IV. Other Workers -			
Male (Percentage of total male main workers)	75.5	85.5	83.8
Female (Percentage of total female main workers)	30.3	52.0	48.1
4. Marginal Workers -			
Male (Percentage of total male population	0.9	0.5	0.5
Female (Percentage of total female population)	3.2	1.1	1.5
5. Non Workers -			
Male (Percentage of total male population)	49.6	50.7	50.6
Female (Percentage of total female population)	64.5	69.8	68.9

TABLE 10.6 : EDUCATIONAL FACILITIES IN STUDY AREA

Sr. No.	Name of village	Primary school	Middle school	High school	Inter-mediate college	Degree college	Profe-ssional Master degree
A.	0-5 km radius						
1.	Kalavar	1	1	-	-	-	-
2.	Kenjar	1	1	-	-	-	-
3.	Panjimogar	1	1	-	-	-	-
4.	Baikampady	1	1	1	-	-	-
5.	Thokur	1	1	-	-	-	-
6.	Kulai	1	1	1	-	-	-
7.	Bajpe	1	1	1	1	-	-
	Total	7	7	3	1	-	-
B.	5-10 km radius						
8.	Kandavara	1	1	-	-	-	-
9.	Adyapady	1	1	-	-	-	-
10.	Panchanadi	1	1	1	-	-	-
11.	Delanthabettu	1	-	-	-	-	-
12.	Kuthethur	1	1	-	-	-	-
13.	Mudushedde	1	1	-	-	-	-
14.	Attur	1	-	-	-	-	-
15.	Panja	1	1	-	-	-	-
	Total	8	6	1	-	-	-
	Grand Total	15	13	4	1	-	-

Note : i. Facilities available are given with their number
ii. - Shows that facilities are not available in the village.
M = Male
F = Female

TABLE 10.7 : MEDICAL FACILITIES

Sr. No.	Name of Village	Mid-wife	Nurse	Doctor	Specialist Doctor	Primary health centre	Private clinic	Hospital	Chemist
A.	0-5 km radius								
1.	Kalavar	-	-	-	-	-	-	-	-
2.	Kenjar	-	-	-	-	-	-	-	-
3.	Panjimogar	1	-	-	-	-	-	-	-
4.	Baikampady	-	-	-	-	-	-	-	-
5.	Thokur	-	-	-	-	-	-	-	-
6.	Kulai	2	2	3 Allo. 4 Ayur.	-	-	-	-	3
7.	Bajpe	2	2	4 Allo. 4 Ayur.	-	1	Y	-	Y
B.	5-10 km radius								
8.	Kandavara	1	1	1 Allo. 1 Ayur.	-	-	-	-	-
9.	Adyapady	-	-	-	-	-	-	-	-
10.	Panchanadi	1	1	1 Allo. 7 Ayur. 1 Unani. 1 Homeo.	-	-	-	-	-
11.	Delanthabettu	-	-	-	-	-	-	-	-
12.	Kuthethur	1	1	1 Allo. 1 Ayur.	-	-	-	-	-
13.	Mudushedde	Y	Y	3 Allo. 3 Ayur.	-	-	-	-	-
14.	Attur	-	-	-	-	-	-	-	-
15.	Panja	-	-	-	-	-	-	-	-

Initials used - Hemeo. - Homeopathic Doctor
Unani. - Unani Doctor
Allo. - Allopathic Doctor
Ayur. - Ayurvedic Doctor

Note : i. Y = yes (facilities are available but their number is not given and remaining facilities are with their numbers).
ii. (-) shows faicilities are not available in the village

TABLE 10.8 : DRINKING WATER FACILITIES

Sr. No.	Name of Village	Number of families having various drinking water sources				
		Well	Well with pump	Hand pump	Village water tank	Tap water connection
A.	0-5 km radius					
1.	Kalavar	2	-	-	-	-
2.	Kenjar	2	-	-	-	-
3.	Panjimogar	1	1	-	-	-
4.	Baikampady	-	2	-	-	-
5.	Thokur	2	-	-	-	-
6.	Kulai	3	-	-	-	1
	Total	10	3	-	-	1
	% age	71.4	21.4			7.2
B.	5-10 km radius					
7.	Kandavara	2	-	-	-	-
8.	Adyapady	2	-	-	-	-
9.	Peduperar	1	-	1	-	-
10.	Panchanadi	1	1	-	-	-
11.	Delanthabettu	2	-	-	-	-
12.	Kuthethur	1	1	-	-	-
13.	Mudushedde	1	1	-	-	-
14.	Attur	1	-	-	-	1
15.	Panja	-	2	-	-	-
	Total	11	5	1	-	1
	% age	61.0	27.8	5.6		5.6
	Grand Total	21	8	1	-	2
	% age	65.6	25.0	5.1		6.3

Note: (i) Percentage shown in the table is on the basis of total families interviewed (i.e in group A-14 and 18 in group B.
(ii) (-) sign shows that facilities are not available in the village.

TABLE 10.9 : TRANSPORTATION AND APPROACH TO VILLAGES

Sr. No.	Name of Village	Bus Stop	Bus Stand	Auto availability	Taxi availability	Railway station	Pucca road
A.	0-5 km radius						
1.	Kalavar	Y	-	-	-	-	Y
2.	Kenjar	-	-	-	-	-	Y
3.	Panjimogar	Y	-	-	-	-	Y
4.	Baikampady	Y	Y	Y	Y	-	Y
5.	Thokur	-	-	-	-	-	Y
6.	Kulai	Y	Y	Y	-	-	Y
7.	Bajpe	Y	Y	Y	Y	Y	Y
B.	5-10 km radius						
8.	Kandavara	Y	-	-	-	-	Y
9.	Adyapady	-	-	-	-	-	-
10.	Panchanadi	-	-	-	-	-	Y
11.	Delanthabettu	-	-	-	-	-	-
12.	Kuthethur	Y	-	Y	-	-	Y
13.	Mudushedde	Y	-	Y	-	-	Y
14.	Attur	Y	-	-	-	-	-
15.	Panja	Y	-	-	-	-	-

Note : Y - Yes (facilities are available)
(-) - Facilities are not available in the village

TABLE 10.10 : LITERACY CLASSIFICATION

Sr. No.	Name of village	Number of literates of Sex											
		Upto 5 Class		6-8 Class		9&10 Class		11&12 Class		Graduates		Professional/ Technicals	
		M	F	M	F	M	F	M	F	M	F	M	F
A.	0-5 km radius												
1.	Kalavar	1	1	-	1	2	1	-	-	-	-	-	-
2.	Kenjar	-	1	-	-	4	5	-	-	1	-	-	-
3.	Panjimogar	3	4	5	2	1	2	1	-	1	-	-	-
4.	Baikampady	-	-	3	2	2	1	-	-	3	2	3	-
5.	Thokur	-	-	-	-	2	3	-	-	1	-	-	-
6.	Kulai	2	2	1	2	1	3	-	1	5	1	-	-
	Total	6	7	9	7	12	14	1	1	11	3	3	-
B.	5-10 kms radius												
7.	Kandavara	-	3	1	2	2	-	-	1	-	-	1	-
8.	Adyapady	-	-	1	-	2	2	-	-	1	-	-	-
9.	Peduperar	2	-	-	1	4	1	-	-	-	-	-	-
10.	Panchanadi	1	1	-	-	-	1	1	1	-	-	-	-
11.	Delanthabettu	-	-	1	1	2	1	1	-	2	-	-	-
12.	Kuthethur	1	1	-	-	4	2	1	-	-	-	5	-
13.	Mudushedde	2	1	-	-	4	3	-	-	-	-	-	-
14.	Attur	3	2	-	1	3	1	1	-	1	-	-	-
15.	Panja	2	1	-	-	4	3	-	-	-	-	-	-
	Total	11	8	3	6	27	11	3	2	4	-	5	-
	Grand Total	17	15	12	13	39	25	4	3	15	3	8	-

TABLE 10.11 : FAMILY SIZE DISTRIBUTION BY SEX AND AGE

Sr. No.	Name of village	Number of families interviewed	Sexwise distribution of family members in various age-groups											
			Upto 4 years		5-9 years		10-19 years		20-39 years		40 years and above		Total	
			M	F	M	F	M	F	M	F	M	F	M	F
A.	0-5 km radius													
1.	Kalavar	2	-	-	-	-	-	1	3	-	3	2	6	3
2.	Kenjar	2	-	-	-	1	1	1	2	3	1	1	4	6
3.	Panjimogar	2	-	-	2	1	3	6	3	3	2	1	10	11
4.	Baikampady	2	-	-	-	-	1	1	2	2	8	2	11	5
5.	Thokur	2	1	1	-	-	-	-	2	2	1	1	4	4
6.	Kulai	4	2	-	-	-	-	3	3	4	5	5	10	12
	Total	14	3	1	2	2	5	12	15	14	20	12	45	41
	% age		6.7	2.4	4.4	4.9	11.1	29.3	33.3	34.1	44.5	59.3		
B.	5-10 kms radius													
7.	Kandavara	2	-	-	-	2	3	2	-	1	3	1	6	6
8.	Adyapady	2	-	-	-	1	2	-	2	1	1	1	5	3
9.	Peduperar	2	-	-	-	-	2	1	1	1	2	1	5	3
10.	Panchanadi	2	-	-	-	-	-	1	4	-	1	1	5	2
11.	Delanthabettu	2	-	-	-	-	1	2	5	-	2	1	8	3
12.	Kuthethur	2	-	-	-	-	2	-	7	-	2	2	11	2
13.	Mudushedde	2	-	-	-	-	-	-	4	3	2	2	6	5
14.	Attur	2	-	-	1	1	2	-	4	2	1	1	8	4
15.	Panja	2	-	-	-	-	4	2	2	-	2	1	8	3
	Total	18	-	-	1	4	16	8	29	8	16	11	62	31
	% age				1.6	12.9	25.8	25.8	46.8	25.8	25.8	35.5		
	Grand Total	32	3	1	3	6	21	20	44	22	36	23	107	72
	% age		2.8	1.4	2.8	8.3	19.6	27.8	41.1	30.6	33.7	31.9		

Note : Percentage is males and females in each group of total male and female population interviewed respectively.

M = Male, F = Female

TABLE 10.12 : PUPLIC SERVICES

Sr. No.	Name of Village	Post office/ Post & Tele-graph	Diesel/ Petrol station	Kirana shop	Restaurant/ Tea stall	Pan shop	Cloth shop	Hardware shop	Wine shop/ Bar	Pump repair	General electrical repair shop	Rice Mill
A.	0-5 km radius											
1.	Kalavar	-	-	2	-	-	-	-	-	-	-	-
2.	Kenjar	-	-	12	5	-	-	-	-	-	-	-
3.	Panjimogar	-	-	-	4	-	-	-	-	-	-	-
4.	Baikampady	Y	Y	Y	19	-	-	-	-	-	-	-
5.	Thokur	-	-	4	3	-	-	-	-	-	-	-
6.	Kulai	Y	Y	25	15	Y	Y	Y	Y	Y	Y	Y
7.	Bajpe	Y	Y	11	14	Y	Y	Y	Y	Y	Y	Y
B.	5-10 km radius											
8.	Kandavara	-	-	7	2	-	-	-	-	-	-	-
9.	Adyapady	-	-	-	-	-	-	-	-	-	-	-
10.	Panchanadi	-	-	125	5	-	-	-	-	-	-	Y
11.	Delanthabettu	-	-	6	2	-	-	-	-	-	-	-
12.	Kuthethur	-	-	-	2	-	-	-	-	-	-	-
13.	Mudushedde	-	-	10	8	-	-	-	-	-	-	-
14.	Attur	-	-	2	-	-	-	-	-	-	-	-
15.	Panja	-	-	2	1	-	-	-	-	-	-	Y

Note : (i) Facilities are given with their number.

(ii)(-) shows that facilities are not available in village.

(iii) Y (Yes) Facilities are available but their number is not given.

Sr. No.	Name of village	Steel ware shop	2 wheeler/ 4 wheeler work shop	Seed & Fertilizer and Pesticide shop	Implement Shop	Cinema hall	Village library/ Reading room	Purchase centre of consumer durables (TV, Fan etc.)	Grain mandi	Police station	Fire brigade	Weekly market
A.	0-5 km radius											
1.	Kalavar	-	-	-	-	-	-	-	-	-	-	-
2.	Kenjar	-	-	-	-	-	-	-	-	-	-	-
3.	Panjimogar	-	-	-	-	-	-	-	-	-	-	-
4.	Baikampady	-	-	-	-	-	-	-	-	-	-	-
5.	Thokur	-	-	-	-	-	-	-	-	-	-	-
6.	Kulai	Y	-	-	-	-	-	-	-	-	-	Y
7.	Bajpe	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
B.	5-10 km radius											
8.	Kandavara	-	-	-	-	-	-	-	-	-	-	-
9.	Adyapady	-	-	-	-	-	-	-	-	-	-	-
10.	Panchanadi	-	-	-	-	-	-	-	-	-	-	-
11.	Delanthabettu	-	-	-	-	-	-	-	-	-	-	-
12.	Kuthethur	-	-	-	-	-	-	-	-	-	-	-
13.	Mudushedde	-	-	-	-	-	-	-	-	-	-	-
14.	Attur	-	-	-	-	-	-	-	-	-	-	-
15.	Panja	-	-	-	-	-	-	-	-	-	-	-

TABLE 10.13 : HOUSING DETAILS (HOUSE STRUCTURE)

Sr. No.	Name of Village	Number of families with houses									Average number of rooms in houses	Housing set-up (clustered/ scattered)	Approximate % age of (Kutcha/ houses) in villages
		Type of roof			Type of Wall			Type of Toilet					
		Thatch	Tile	Slab	Mud	Lateric bricks	Cement	Open	Pit	Septic tank			
A.	0-5 km radius												
1.	Kalavar	2	-	-	-	2	2	2	-	-	6	S	12.4
2.	Kenjar	-	2	-	-	2	2	-	-	2	9	S	10.8
3.	Panjimogar	-	2	-	1	-	1	-	-	2	12	S	3.7
4.	Baikampady	-	2	-	-	2	-	-	-	2	6	C	8.8
5.	Thokur	-	2	-	-	2	-	-	-	2	5	C	21.4
6.	Kulai	-	2	2	-	2	2	-	-	4	6	C	34.5
	Total	2	10	2	1	10	7	2	-	12			
B.	5-10 km radius												
7.	Kundavara	1	1	-	1	1	-	1	-	1	3	C	1.3
8.	Adyapady	-	2	-	1	1	-	2	-	-	2	C	37.2
9.	Peduperar	-	2	-	-	2	2	1	-	1	3	C	-
10.	Panchanadi	-	1	1	-	2	-	-	-	2	7	C	26.4
11.	Delanthabettu	-	2	-	-	2	-	1	-	1	6	C	37.2
12.	Kuthethur	-	2	-	12	1	-	1	-	1	3	C	19.5
13.	Mudushedde	-	1	1	-	2	-	-	-	2	4	C	34.2
14.	Attur	-	2	-	-	2	-	1	-	1	6	C	19.0
15.	Panja	-	2	-	-	2	-	2	-	-	3	C	-
	Total	1	15	2	3	15	2	9	-	9			20.5
	Grand Total	3	25	4	4	25	9	11		21			

C = Clustered, S = Scattered

TABLE 10.14 : HOUSEHOLDS ITEMS IN VILLAGES

Sr. No.	Name of village	T.V	Fridge	VCR	2 wheelers	4 wheelers	Radio and Two-in One	Bicycles
A.	0-5 km radius							
1.	Kalavar	2	-	-	17	6	215	20
2.	Kenjar	26	-	-	11	5	320	96
3.	Panjimogar	6	-	-	16	9	245	45
4.	Baikampady	10	-	-	3	2	180	109
5.	Thokur	10	-	-	3	2	180	109
6.	Kulai	15	-	-	22	13	900	35
7.	Bajpe	12	-	-	68	26	514	112
	Total	81			140	63	2554	526
B.	5-10 km radius							
8.	Kandavara	12	-	-	6	3	1250	192
9.	Adyapady	4	-	-	19	4	181	126
10.	Panchanadi	7	-	-	21	9	341	15
11.	Delanthabettu	21	-	-	10	8	170	156
12.	Kuthethur	5	-	-	4	2	109	40
13.	Mudushedde	20	-	-	13	3	450	20
14.	Attur	-	-	-	2	-	40	10
15.	Panja	-	-	-	5	1	20	5
	Total	69			80	30	2561	564
	Grand Total	150			220	93	5115	1090

Note : i) Items are given with their number.
ii) (-) Shows non availability of items in villages.

TABLE 10.15 : DOMESTIC APPLIANCES AND UTILITIES AVAILABLE WITH FAMILIES

Sr. No.	Name of Village	Number of families having various items									
		Fan	Sewing machine	Mixi	Fridge	B&W T.V	Colour T.V	Cycle	Two wheeler	Four wheeler	VCR
A.	0-5 km radius -										
1.	Kalavar	1	-	-	-	1	-	-	-	-	-
2.	Kenjar	2	1	2	-	-	1	-	-	-	-
3.	Panjimogar	2	-	1	-	-	1	-	-	-	-
4.	Baikampady	2	-	1	-	-	1	-	-	-	-
5.	Thokur	2	1	2	-	1	-	-	-	-	-
6.	Kulai	4	-	2	1	-	3	1	2	-	-
	Total	13	2	8	1	2	6	1	2	-	-
	% age	92.9	14.3	57.1	7.1	14.3	42.9	7.1	14.3		
B.	5-10 km radius -										
7.	Kandavara	1	1	1	-	-	-	1	-	-	-
8.	Adyapady	2	-	1	-	1	-	-	-	-	-
9.	Peduperar	2	-	1	-	1	-	1	-	-	-
10.	Panchanadi	2	1	1	-	1	-	-	1	-	-
11.	Delanthabettu	2	2	-	-	1	-	2	1	-	-
12.	Kuthethur	2	-	1	-	1	-	-	-	-	-
13.	Mudushedde	2	-	1	1	1	1	-	2	-	-
14.	Attur	2	-	1	-	1	-	-	1	-	1
15.	Panja	2	-	1	-	1	-	-	-	-	-
	Total	17	4	8	1	8	1	4	5	-	1
	% age	94.4	22.2	44.4	5.6	44.4	5.6	22.2	27.8		5.6
	Grand Total	30	6	16	2	10	7	5	7	-	1
	% age	93.8	18.8	50.0	6.3	31.3	21.9	15.6	21.9	-	3.1

Note : i) Percentage shown in the table is on the basis of total families interviewed.

ii) Total families interviewed in group A = 14 Nos.
Total families interviewed in group B = 18 Nos.
Total families interviewed = 32 Nos.

TABLE 10.16 : SOURCES OF FAMILY INCOME IN STUDY AREA VILLAGES

Sr. No.	Name of Village	Annual net income through various sources (Rupees)											
		Agriculture		Livestock		Fisheries		Business		Service		Others	
		No.of families involved	Average income	No.of families involved	Average income	No.of families involved	Average income	No.of families involved	Average income	No.of families involved	Average income	No.of families involved	Average income
A.	0-5 km radius												
1.	Kalavar	2	7000	Nil	-	Nil	-	1*	6000	Nil	-	Nil	-
2.	Kenjar	1	10000	Nil	-	Nil	-	Nil	-	2*	25000	Nil	-
3.	Panjimogar	1	25000	1	2000	Nil	-	1*	27000	Nil	-	Nil	-
4.	Baikampady	1	5000	1*	1000	1	8000	Nil	-	Nil	-	Nil	-
5.	Thokur	2	8500	Nil	-	Nil	-	1*	10000	Nil	-	Nil	-
6.	Kulai	Nil	-	Nil	-	2	6500	Nil	-	2	44500		
	Total		7929		1500		4833		14333		17375		
B.	5-10 km radius												
7.	Kandavara	2	8000	Nil	-	Nil	-	Nil	-	Nil	-	1*	1000(B.M)
8.	Adyapady	2	8000	Nil	-	Nil	-	Nil	-	1*	2000	1	3000(B.M)
9.	Peduperar	1	9000	Nil	-	Nil	-	Nil	-	1	40000	1*	4000(B.M)
10.	Panchanadi	2	19500	1	3200	Nil	-	Nil	-	2*	18500	Nil	-
11.	Delanthabettu	1	16000	Nil	-	Nil	-	1	12000	Nil	-	Nil	-
12.	Kuthethur	2	22500	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-
13.	Mudushedde	1	1200	Nil	-	Nil	-	1*	24000	1	48000	Nil	-
14.	Attur	2	15500	Nil	-	Nil	-	Nil	-	1	4000	Nil	
15.	Panja	2	9000	2*	2750	Nil	-	Nil	-	Nil	-	Nil	-
	Average		6913		1983				1800		18750	2667	

* Families depending upon more than one source of earnings.

Families involved in agriculture (as reported in the above table) also included in the number of families involved in more than one source of earning.

B.M = Beedi Making.

TABLE 10.17 : LAND HOLDINGS

Sr. No.	Name of Village	Number of farmers in various groups of land holdings (hectares)						
		Below 0.5	0.5-1.0	1.0-2.0	2.0-4.0	4.0-8.0	Above 8.0	Land less
A.	0-5 km radius -							
1.	Kalavar	-	-	1	1	-	-	-
2.	Kenjar	-	-	-	1	-	-	1
3.	Panjimogar	-	-	-	-	1	-	1
4.	Baikampady	2	-	-	-	-	-	-
5.	Thokur	-	1	1	-	-	-	-
6.	Kulai	1	-	-	-	-	-	3
	Total	3	1	2	2	1	-	5
	% age	21.5	7.1	14.3	14.3	7.1		35.7
B.	5-10 km radius -							
7.	Kandavara	-	-	2	-	-	-	-
8.	Adyapady	-	-	1	1	-	-	-
9.	Peduperar	-	1	-	-	-	-	1
10.	Panchanadi	-	1	1	-	-	-	-
11.	Delanthabettu	-	-	2	-	-	-	-
12.	Kuthethur	-	1	-	1	-	-	-
13.	Mudushedde	1	-	-	-	-	-	1
14.	Attur	-	-	-	2	-	-	-
15.	Panja	1	-	-	1	-	-	-
	Total	2	3	6	5	-	-	2
	% age	11.1	16.7	33.3	27.8			11.1
	Grand Total	5	4	8	7	1	-	7
	% age	15.6	12.5	25.0	21.9	3.1		21.9

Note : Percentage shown in the table is on the basis of total families interviewed (i.e in group 'A' 14 nos.and group 'B' 18 nos.).

10.18

TABLE HUMAN DISEASES AS PER PHC AND FAMILY WELFARE CENTRE SURATKAR DATA

S.No.	Diseases	Number of cases												
		Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Year 1990														
1.	Acute Bronchitis	52	56	56	50	58	62	79	57	68	70	85	71	764
2.	Hypertrophy of tonsils and adenoids	23	11	15	15	16	-	-	2	-	12	26	17	137
3.	Other Respiratory Diseases	78	61	63	63	83	101	129	104	97	105	109	98	1091
4.	Diseases of skin and musculoskeletal system													
	a. Scabies	62	53	60	49	55	73	85	78	77	76	80	61	809
	b. Infections	30	22	26	27	24	36	25	32	30	28	36	25	341
5.	Dysentery	29	27	32	20	19	18	12	11	10	12	13	15	218
6.	Asthma	32	28	28	7	15	23	15	8	11	-	27	28	222
7.	Allergic disorders, Metabolic and blood disease	5	20	6	-	14	11	23	17	-	-	39	21	156
8.	Other Helminthic infections	23	19	-	-	34	24	-	6	4	19	26	17	172
9.	Eye diseases	23	18	25	-	12	-	-	4	3	8	8	11	112
Year 1991														
1.	Acute Bronchitis	85	75	80	79	85	76	87	71	68	47	69	60	882
2.	Hypertrophy of tonsils and adenoides	24	17	17	30	37	32	32	9	48	36	38	32	352
3.	Other Respiratory diseases	103	132	145	124	131	127	141	135	127	117	109	127	1518
4.	Diseases of skin and Musculoskeletal system													
	a) Scabies	86	63	83	92	108	96	67	82	68	84	85	106	1020
	b) Infections	72	36	43	56	55	43	31	40	43	41	35	51	546
5.	Dysentery	14	14	17	14	20	20	27	15	17	20	21	25	224
6.	Asthma	26	27	34	16	33	31	25	44	33	19	35	29	352
7.	Allergic disorders, Metabolic and blood diseases	-	-	14	28	24	3	22	15	27	15	31	25	204

8.	Other Helminthic infections	19	10	25	22	36	40	23	29	30	32	33	37	336
9.	Eye diseases	15	21	18	-	-	4	-	12	-	39	36	13	158

Year 1992

1.	80	81	62	63	30	68	84	34	27	43	63	42	677
2.	53	36	37	35	20	35	51	28	18	33	38	22	406
3.	143	143	117	128	95	101	142	210	126	150	103	89	1547
4.													
a)	123	97	85	77	68	82	117	61	72	62	65	92	1001
b)	56	42	41	37	50	35	59	44	33	22	38	62	519
5.	26	25	19	19	23	22	25	20	19	22	16	18	254
6.	39	46	50	40	32	40	26	37	44	32	62	32	480
7.	16	36	28	41	28	34	15	28	15	28	34	22	325
8.	40	33	-	35	62	39	50	40	31	32	-	28	390
9.	1	4	-	-	-	-	-	-	-	-	-	7	12

CHAPTER - 11

11.0 NOISE ENVIRONMENT

11.1 Basic objective to Noise levels measurement around the proposed power plant is to assess the impact of noise generated in the complex on its workers, and on human settlements in the 10 km radius study area, more particularly to human settlements near the plant boundary. At present there is no activity at the steel plant site and noise survey has been conducted basically to assess the background noise and to identify major noise generating sources of the plant.

Captive Power Plant site is located about 13 kms from Mangalore railway station, National Highway-17 passes 6 kms away from steel plant. Within the study area sources expected to add to noise are Mangalore Port Trust, Mangalore Chemicals and Fertilizers, Kudremukh Iron Ore Co. Ltd, Trucks, Cars and Goods train.

To assess the present noise levels in the study area noise measurements were carried out at locations in the study area as given in Table 11.1 and shown in Fig. 11.1. Table 11.2 gives the OSHA's permissible noise level limits whereas Indian Standards for noise (outside plant premises) are given in Table 11.3. It is seen from the measurements that background noise levels in the rural area are below 50 dB(A). The highest background noise level observed in the Baikampady industrial area was 55-62 dB(A) while it was between 30 to 40 dB(A) in Suratkal. Most of values ranged between 30 to 40 dB(A) in the study area.

The vehicular rush was also higher in Baikampady and N.H.17.

Residual noise level of most of the areas is approximately 44 dBA. It differs in rural and urban areas. Permissible maximum outdoor noise level (Leq)

for residential areas is 55 dBA. Sources of noise generation at the Mangalore steel plant shall be Oxygen plant, blast furnace bustle main and blower etc and at the captive power plant due to high pressure heat generation from boilers, turbogenerators etc. Maximum inplant noise levels due to these sources are likely to vary from 70-110 dBA. Average noise levels within plant area during full operation is expected to be about 50-60 dBA. However, the level of noise may vary depending upon the proximity of different noise sources.

TABLE 11.1 : NOISE LEVELS IN THE 10 KM RADIUS STUDY AREA

Sr.No.	Location	Background Noise Level dB(A)	Vehicles/ hour
A - 0-5 Kms Radius			
1.	Proposed site	35 - 38	10
2.	0-5 Kms of site	33 - 36	10
3.	Kalavar	40 - 50	8
4.	Bajpe	40	20
5.	Kenjar	35 - 40	10
6.	Panjimogar	40	15
7.	Baikampady	55 - 62	25
8.	Thokur	38	6
9.	Kattipalla	40	20
10.	Kulai		
B- 5-10 Kms Radius			
11.	Kandavara	40	2-3
12.	Adyapady	38	5
13.	Delanthabettu	45	6
14.	Panchanadi	50	5
15.	Kuthethur	46	5
16.	Mudushedde	38-40	10
17.	Attur	32	5
18.	Panja	42	3
19.	Suratkag	60	230

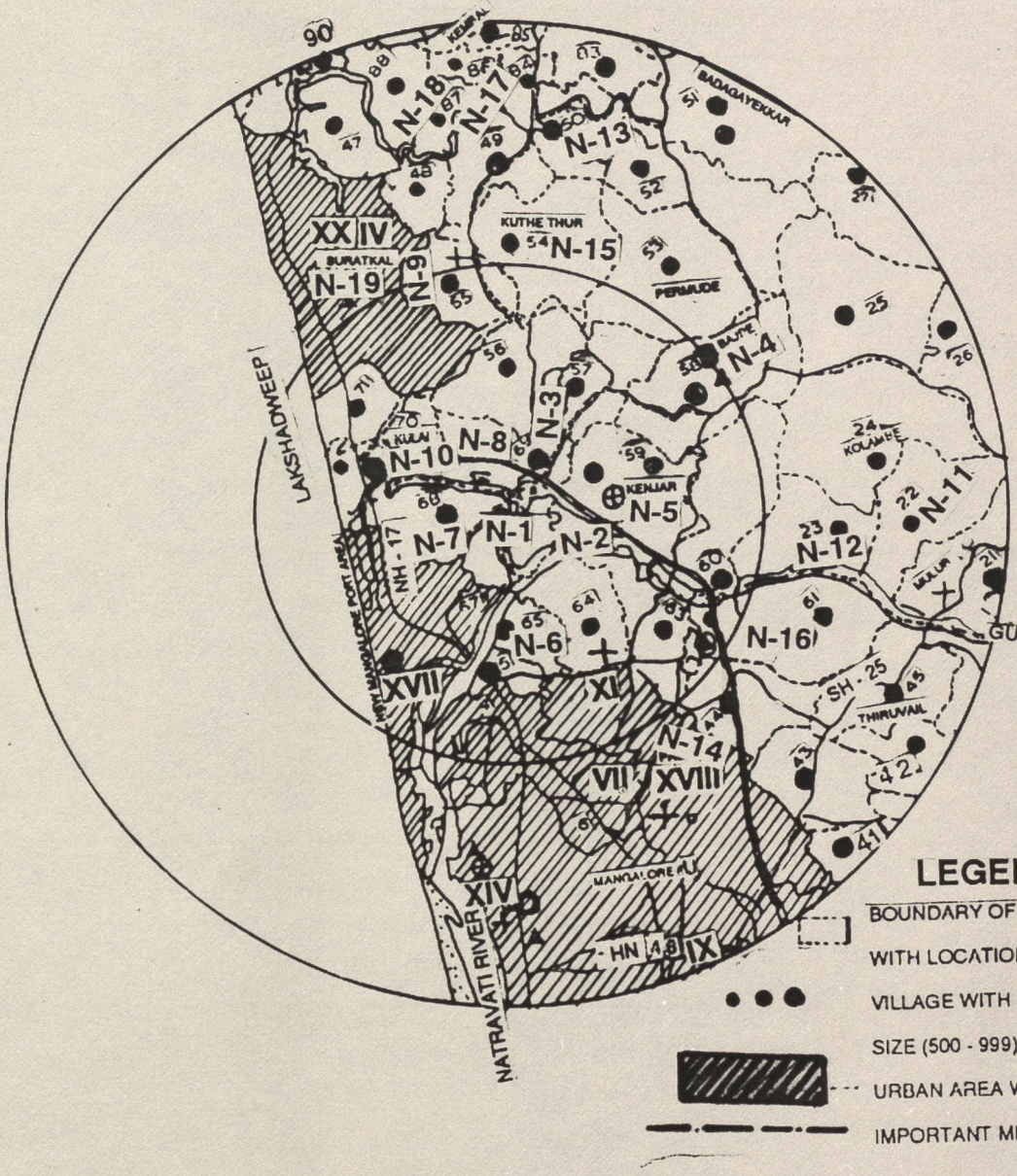
Source : Micro Metal (India)

TABLE 11.2 : OSHA'S PERMISSIBLE NOISE LEVEL

S.No.	Duration hrs./day	Noise Level dB(A)
1.	8	90
2.	6	92
3.	4	95
4.	3	97
5.	2	100
6.	1	105
7.	0.5	110
8.	0.25	115

TABLE 11.3 : INDIAN STANDARDS FOR NOISE (OUTSIDE PLANT PREMISES)

Sr.No.	Area	Leq Noise Level dB(A)	
		DAY (9 AM - 6 PM)	NIGHT (6 PM - 9 AM)
1.	Industrial	75	70
2.	Commercial	65	55
3.	Sensitive	50	45



LEGEND

- BOUNDARY OF VILLAGE WITH LOCATION CODE NUMBER
- VILLAGE WITH POPULATION SIZE (500 - 999)
- URBAN AREA WITH LOCATION CODE
- IMPORTANT METAL ROAD

JAIPRAKASH ENGG. & STEEL CO. LTD.

TITLE
NOISE MEASUREMENT POINT

EST Consultants (P) Ltd.

SCALE: 0·7 cm = 1 Km. | FIG. NO. 11-1

CHAPTER - 12

PREDICTIONS OF IMPACTS

12.1 Preamble :

Prediction of environmental impacts is one of the important tools in the entire exercise of Environmental Impact Assessment Studies. Some components of the environment e.g. air and water undergo seasonal changes due to changes in meteorological conditions experienced all over the country. Predictions are, therefore, carried out for these impacts to assess seasonal variations. The results of these predictions are superimposed over the baseline quality to arrive at post project scenario. The predictions thus obtained also help to develop Environmental Management Plan (EMP) so that corrective measures are taken during planning and implementation of the project to minimise adverse impacts on the surrounding environment.

The mathematical modelling are the best tools for quantitative assessment of pollutant concentrations at sensitive targets or other receptor points. There are various techniques based upon proved methodologies to predict the ground level concentrations in the case of air and qualitatively in those cases where models based upon mathematical computations are not yet developed and available to be applied universally. In this chapter, therefore, prediction of impacts based upon mathematical computations on ambient air quality due to proposed captive thermal power power alongwith impact of Mangalore Steel Plant is presented.

12.2 Air Quality Predictions Through Mathematical Modelling

12.2.1 Introduction

Process description and pollutants generation, abatement and control measures proposed to be adopted

at captive thermal power plant of JESCO Steel Plant, quality and quantity of pollutants generated are discussed in detail in Chapter-3 of this report. At JESCO Ltd. imported coal, Blast furnace gas and coke oven gas in captive power plant and other process plants are proposed to be used. The main pollutants expected to be generated are Sulphur dioxide (SO2), Nitrogen oxides (NOx) and Suspended Particulate Matter (SPM). In this context it becomes important to estimate peak incremental concentrations of pollutants caused by various emission sources of captive thermal power plant and steel plant. This chapter is devoted to predict air quality in and around the steel plant at Mangalore due to advent of captive thermal power plant together with steel plant.

12.2.2 Pollutional Loads

Table 12.1 provides stack specifications and expected quantity of emissions from these sources.

12.2.3 Fugitive Emissions due to Material Handling at Port

There is possibility of particulate emission from two operations :

i) during loading/unloading of material,
ii) emission from storage

(A) The quality of emission during unloading/loading is calculated from the empirical formula

$$E = \frac{K\,(0.0009)(S/5)(U/2.2)(H/3.0)}{(M/2)^2} \text{ kg/tonne}$$

where E = emission factor
K = particle size multiplier
S = % of fines

U = Wind speed m/s
H = Drop ht. m for loading & unloading operation
M = Moisture content in percentage.

Considering critical wind speed in the range 20-41 Km/hour, percentage of fines at 15, drop normally 3.5 m, moisture content at 4%, and K value at 0.37 for particle size around 10 micron, the emission factor works out to nearly 0.06 gms/sec (240 gms/hour) for loading/unloading operation involved in 1.44 million tonne of material handling per year at port.

(B) Emission from stock pile is calculated from the following relationship.

$$E = \frac{1.9(S)(365-P)f}{1.5 \quad 235 \quad 15} \text{ kg/day/hecatare}$$

where S = Percentage of dust
p = No.of days of precipitation
f = Percentage of time wind speed exceeds 5.4 m/s.

Considering applicable weather phenomena with p as 147 & f as 93%, emission factor works out to 109 kg/hectare/day.

The area for storrage of material will be maximum 1.2 hectare. As such emission expected is 1.5 gm/sec. Cumulative effect both from loading/unloading operation and storage virtually is only 1.5 gm/sec.

The dust emission will be controlled through installation of water fogging system in conjunction with surfactant.

Since the emission quantities mentioned in (A) & (B) are negligible these have not been included for mathematical modelling.

12.2.4 Mathematical Model for Pollutants Dispersion

Most of the mathematical models for pollutant dispersion in atmosphere are based on Gaussian dispersion. The basic model for computing the pollutant concentrations (ug/m3) for any point with location coordinates x, y and z (m) with respect to the base of a single source of effective height He (m) above base, and strength of emissions Q (g/s) is given by

$$C(X, Y, Z, He) = \frac{10^6 \, Q}{2\sqrt{11}\, 6y\, 6z\, U} \exp\left[-\frac{1}{2}\left(\frac{Y}{6y}\right)^2\right] \left[\exp\left\{-\frac{1}{2}\left(\frac{Z - He}{6z}\right)^2\right\} + \exp\left\{-\frac{1}{2}\left(\frac{Z + He}{6z}\right)^2\right\}\right] \quad \text{---- (12.1)}$$

Where U (m/s) is the average wind velocity in X direction (downwind direction), 6y and 6z are the standard deviations or dispersion coefficients in Y (cross wind or lateral) and Z (vertical) directions (m), respectively, at a distance X in downwind directions from the base of the emission source stack. Validity of Gaussian plume dispersion model has been tested extensively for different atmospheric stability conditions provided reasonable estimates of He, 6y, 6z and U can be made. ISI has also adopted this basic model for plume dispersion and this model forms the basis of dispersion modelling.

The gravitational settling of particulates will be an important consideration in particulate dispersion modelling if the particulates are in the larger

settleable sizes. As evident from Table 12.1 that SPM is being emitted from all the five stacks of JESCO. The dust in blast furnace gas is proposed to be separated by cyclone, venturi scrubber followed by ESP therefore the size of particle at outlet of ESP is assumed less than 20 um. Similarly it has been assumed that dust particle size from coke oven, sinter plant, steel melting shop and power plant stacks shall be less than 20 um in size and their behaviour for atmospheric dispersion will be similar to gaseous pollutants. Hence gravitational settling of particulates is not required to be taken into consideration.

12.2.5 Downwind Ground Level Concentration

Ground level concentrations of pollutants in downwind direction will always be higher in comparison to cross wind direction for any downwind distance X. These concentrations can be obtained by putting Z = O and Y = O in the equations 12.1 to give :

Gaseous Pollutants :

$$C(X, O, O, He) = \frac{10^6 Q}{\pi \sigma_y \sigma_z U} \exp\left[-\frac{1}{2}\left(\frac{He}{\sigma_z}\right)^2\right] \quad (12.2)$$

It may be noted that the dispersion coefficients σ_y and σ_z depend on downwind distance X and atmospheric stability conditions.

12.2.6 Atmospheric Stability Classification

Many alternative models are developed by different authors to relate σ_y and σ_z with downwind distance X under different atmospheric stability conditions. Unfortunately, none of these had been found to be comprehensive enough to be applicable under all types of topographic and meteorological conditions. On the basis of all available information, ISI adopted the

"Pasquill Gifford Stability Classification System" for flat terrains and the "McElroy Stability Classification System" for non-smooth and uneven areas, such as, urban areas and other undulating areas.

The study area is flat and other buildings are also of low to medium height. Therefore, Pasquill-Gifford Stability classification shall be applicable in accordance with ISI recommendations. Pasquill-Gifford Classification divides atmospheric stability into six classes based on wind speed and solar insolation/cloud cover conditions. Details of this classification are given in Table 12.2. This stability classification requires cloud cover data, which has been used for Mangalore IMD observatory.

12.2.7 Atmospheric Dispersion Coefficients

Atmospheric dispersion coefficients vary with downwind distance from emission sources for different atmospheric stability conditions. Table 12.3 gives the variation of crosswind dispersion coefficient, 6y, and vertical dispersion coefficient, 6z, as a function of downwind distance from the source, X, for different stability conditions. These equations used for computations are proposed by Brigg's for open country and are valid upto a distance of 10 km from the emission source.

12.2.8 Effective Stack Height

The effective height of the stack, He, to be used is given by He = Hs + Hpr, where Hs is the actual physical height of stack above ground level and Hpr is the plume rise due to thermal and momentum factors. A very large number of correlations are available to predict plume rise. In this case Plume rise has been determined by Carson and Moses equation given as under :

$$Hpr = \frac{A}{U}\left(-0.029 \times Vs \times d + 5.53\, Qh^{1/2}\right) \quad \text{---- (12.3)}$$

Where Hpr = plume rise, m
Vs = stack gas exit velocity, m/s
d = inside stack diameter, m
U = wind speed at stack level, m/s
Qh = Heat emission rate, kcal/s
A = 2.65 for unstable (Stability Class A to C)
1.08 for neutral (Stability Class D)
0.68 for stable (Stability Class E)

12.2.9 Wind Velocity at Stack Level

Wind velocity at stack level are determined by power law given below :

$$U = Uo\,(Hs/10)^{P} \quad \text{---- (12.4)}$$

Where U = wind speed at stack height, m/s
Uo = wind speed at 10 m height, m/s
Hs = actual stack height, m
p = power law coefficient (0.1, 0.15, 0.20, 0.25, 0.3 and 0.3 for stability classes A, B, C, D, E and F, respectively).

12.2.10 Ambient Air Quality Standards

Ambient air quality standards prescribed by Central Pollution Control Board (CPCB), are as follows :

	Concentration (ug/m3)		
Areas	SPM	SO2	NOx
Industrial and Mixed use	500	120	120
Residential and Rural	200	80	80
Sensitive	100	30	30

12.3 The Plan and Frame Work of Computation

12.3.1 Selection of Locations

The concentrations of pollutants have been computed at an interval of 100 m up to a radial distance of 1000 m, at an interval of 500 m upto a radial distance of 5000 m and at 1000 m interval beyond 5 km upto a radial distance of 10 km.

12.4 Wind Velocities

For computation of long term incremental pollutants concentration during (i) January (ii) May (iii) July and October months representing winter, summer, monsoon and post monsoon seasons average wind velocities in six velocity ranges are required as input data. The average wind velocity in each velocity range gives average wind velocity considered.

Velocity Range (m/s)	January	May	July	October
0-2	1.0	1.0	1.0	1.0
2-3	2.50	2.50	2.50	2.50
3-5	4.00	4.00	4.00	4.00
5-6	5.50	5.50	5.50	5.50
> 6	6.00	6.00	6.00	6.00

12.5 Short Term (one hour) Concentration Equation

The wind velocities taken to compute the concentrations were 2.45, 2.37, 1.96 & 1.61 m/s during January, May, July and October months. These values have been taken based on average wind speed of IMD data of these months. Equation 12.2 has been used for short term concentration computation.

It may be emphasised that these peak concentrations may occur in exceptional situations for a very short period when wind blows continuously in that direction. Thus

these peak concentrations may cause psychological alarms with no physiological or other long term impairments.

12.6 Long Term Concentration Equation

The long term ground level concentrations over a month or more are computed by

$$C(x, o, f) = \frac{360\ f\ Q}{100\ \phi\ (\bar{1}\bar{1})\ 3/2\ \sqrt{2}\ 6z\ U\ x} \exp\left[-\frac{1}{2}\left(\frac{He}{6z}\right)^2\right]$$

--- (12.5)

Where = 22.50 (direction sector width)

f = percentage frequency of wind

12.7 Adequacy of Stack Height

Based on SO2 and SPM loads of various stacks the minimum stack height required has been worked out as per CPCB guide lines. The following table gives proposed heights of various stacks and minimum height required as per CPCB guide lines. It is clear that proposed height is greater than the minimum height hence heights of various stacks are adequate for dispersion of pollutants by natural disperson process.

Stack	Height of stack for SO2 emission rate (m)	Height of stack for SPM emission rate (m)	Height of stack Proposed (m)
1. Power Plant	98.70	30.62	100.00
2. Blast furnace	64.41	20.96	80.00
3. Coke oven	75.38	20.74	100.00
4. Sinter Plant	66.88	49.14	100.00
5. Steel Melting shop	51.97	36.36	60.00

12.8 Plan of Computations

The basic model as also formula for computing plume rise being now available, it was planned to compute the following :

a) One hourly short term concentrations of various pollutants under various stabilities shown graphically in Fig. 12.1 to 12.20 for SO2 concentration.

b) Computation of short term (eight hourly) concentrations of various pollutants for different stabilities given in Tables 12.4 to 12.18.

c) Computation of long term concentrations of pollutants given in Tables 12.19 to 12.54.

d) Computation of effective eight hourly pollutants concentration given in Table 12.55 to 12.57 and computation of effective long term concentration of pollutants given in Tables 12.58 to 12.69. The isopleths of various concentrations have also been prepared and the same are given in Fig. 12.21 to 12.32.

12.9 Computed Incremental Pollutant Concentrations

12.9.1 Short Term Concentration due to Individual Stacks

i) The worst one hourly concentrations of SO2, NOx and SPM from captive thermal power plant stack are 121.31, 4.73 and 7.64 ug/m3 respectively. These worst concentrations occur during winter at a distance of 1000 m under persistance of stability class A. The values of NOx and SPM are very low in comparison to SO2 because of low pollutional loads. The worst concentrations under the persistance of stability class D and E occur at distances between 5-6 km and 8-9 km in all seasons except post monsoon.

ii) In case of blast furnace stack the SO2 concentration is higher in comparison to NOx and SPM because of higher SO2 emission load. The worst one hourly concentration of pollutants in various representative months are as below.

Pollutant	January			May		
	I	II	III	I	II	III
SO2	42.30	43.18	35.41	41.68	43.12	35.52
NOx	6.86	7.00	5.74	6.76	7.00	5.76
SPM	2.07	2.11	1.73	2.04	2.11	1.74
Distance of Occurrance (km)	1.0	4.0	6.0	1.0	4.0	6.0

Pollutant	July			October		
	I	II	III	I	II	III
SO2	36.04	41.92	35.20	34.32	39.59	33.69
NOx	5.85	6.80	5.72	5.57	6.42	5.48
SPM	1.76	2.05	1.72	1.68	1.94	1.65
Distance of Occurrance (km)	1.0	4.5	7.0	1.5	6.0	8.0

The distance of occurrance under persistance of stability class E are higher because of low dispersion potential in this stability.

iii) The coke oven stack being large in diameter and higher exit temperature has higher heat emission rate in comparison to power plant stack. This high heat

emission rate causes higher plume rise which causes higher effective stack height. The worst one hourly concentrations of SO2, NOx, SPM from this stack are as follows:

Pollutant	January			May		
	I	II	III	I	II	III
SO2	21.04	22.24	13.43	20.76	22.03	13.03
NOx	16.89	17.85	10.78	16.66	17.68	10.46
SPM	0.69	0.73	0.44	0.68	0.72	0.43
Distance of Occurrance (km)	2.0	9.0	10.0	2.0	9.0	10.0

Pollutant	July			October		
	I	II	III	I	II	III
SO2	18.19	19.33	8.23	16.02	15.35	4.93
NOx	14.60	15.51	6.61	12.86	12.32	3.96
SPM	0.60	0.64	0.27	0.53	0.50	0.16
Distance of Occurrance (km)	2.5	10.0	10.0	3.0	10.0	10.0

iv) Worst one hourly pollutants concentrations of NOx and SPM from sinter plant stack are 11.73, 20.93 and 14.08 ug/m3 respectively. These worst concentrations occur during January under persistance of neutral weather conditions i.e. under stability class D. This stack as highest heat emission rate among all stacks of steel plant and captive thermal power plant. The distances of occurrance of these concentrations are 2 km under

stability class A and 10 km under persistance of stability D & E respectively.

v) NOx concentration values are higher than SO2 concentration values for this stack because NOx emission load is higher than SO2 emission load. The worst concentration values of various pollutants for this stack are as follows :

Pollutant	January			May		
	I	II	III	I	II	III
SO2	19.05	25.51	26.86	18.55	25.15	26.63
NOx	30.31	40.58	42.73	29.51	40.01	42.37
SPM	17.32	23.19	24.42	16.86	22.86	24.21
Distance of Occurrance (km)	1.0	3.5	4.5	1.0	3.5	4.5

Pollutant	July			October		
	I	II	III	I	II	III
SO2	16.07	12.66	24.85	14.84	20.59	22.25
NOx	25.57	20.14	39.53	23.61	32.76	35.40
SPM	14.61	11.51	22.59	13.49	18.79	20.23
Distance of Occurrance (km)	1.5	3.5	5.0	1.5	6.0	7.0

12.9.2 <u>Short Term Eight Hourly concentrations from Individual Stacks</u>

The eight hourly concentrations have been derived by a multiplying factor therefore variation of the

concentration with distance is the same as that of worst one hourly concentrations. As the variation of worst an hourly concentration values are depicted in Fig. 12.1 to 12.20 their detailed tables have not been given. The detailed tables highlighting eight hourly concentration values are in Tables 12.4 to 12.8.

12.9.3 Effective Eight Hourly Short Term Concentration

Effective concentration implies concentration obtained by combining pollutant concentrations of all emission sources. The Tables 12.55 to 12.58 provide effective concentration values of SO2, NOx and SPM. A review of above tables show that effective NOx concentration is below 25 ug/m3 under all stability conditions in all months. SPM concentration is below 13.0 ug/m3. The peak SO2 concentration goes upto 61.72 ug/m3 in winter season at a distance of 15 km. More than one peak is observed in effective concentrations because maxima of individual stacks occur at different distances.

12.9.4 Long Term Concentration due to Individual Stack

Long term concentrations have been computed for individual stacks. The detailed tables have been given for only for those stacks and months for which concentration is above 1.0 ug/m3.

i) Long term concentration of SO2 from power plant stack is maximum in July. This value is 17.0 ug/m3 in east direction. The concentrations during January, May and October are 11.0, 7.30 and 13.0 ug/m3 respectively. The concentrations occur in West direction during January and October and in SE direction during May. These maximum concentrations occur between 2-3 km in all the seasons. However, concentration of NOx & SPM are below 1.0 ug/m3 in all months and all direction.

ii) The dominant directions towards which wind blows during January, May, July and October as below.

Month	Dominant wind directions
Jaunary	W, SE
May	SE, E, W
July	E, SE
October	W, E

The persistance of these directions are in descending order of persistance.

iii) SO2 concentration from blast furnace stack is more than 1.0 ug/m3 in all the representative months. The maximum SO2 concentration during January, May, July and October is 3.70, 2.80, 6.20 & 4.10 ug/m3 respectively. These concentrations occur at a distance of 2 - 2.5 km. The direction of occurrance of these concentrations are W, SE, E & W during January, May, July and October months. The NOx concentration is below 1.0 ug/m3 in all directions and all months. Concentration of SPM is also below 1.0 ug/m3 during January and May. However SPM concentration goes upto 6.20 ug/m3 in July and 4.10 ug/m3 in October. The directions of occurrance are the same as mentioned above.

iv) The maximum SO2 and NOx concentrations from coke oven stack are below 3.0 ug/m3. The distance of occurrance of maximum concentration ranges between 3-5 km. The directions of occurrance of these concentrations during different months are same as mentioned in para (ii) above. SPM concentration from this stack is almost zero in all the months.

v) Maximum SO2 concentration from sinter plant stack is 1.60 ug/m3 in east direction during July. The maximum concentration value of this pollutant is below 1.0 ug/m3 in the remaining months. The maximum NOx concentration during January, May, July and October are 1.50, 1.40, 2.80 & 1.50 ug/m3 respectively. The directions of occurrance of these concentrations are same as mentioned in para (ii) above. The SPM concentration during July is maximum and it goes upto

1.90 ug/m3 in east direction at a distance of 4 km. The concentration of this pollutant in remaining months is below 1.0 ug/m3.

vi) The maximum concentration of SO2 during January, May, July & October are 1.60, 1.90, 1.40 & 1.80 ug/m3 respectevely. The maximum NOx concentration during above mentioned months is 2.60, 3.00, 5.50 2.80 ug/m3. The direction of occurrance of these concentrations are same as mentioned in para (ii) and is below 4.0 ug/m3 in all directions and months.

12.9.5 Effective Long Term Concentrations:

The maximum effective long term concentrations (Tables 12.58 to 12.69) have been computed in order to depict the combined effect of pollutional sources of steel plant and captive power plant. The maximum effective SO2 concentration during different representative months are 17.77, 13,95, 30.80 & 19.85 ug/m3. These concentrations occur in west direction during January and October months and in east direction during May and July months. The distance of occurrance ranges between 2-3.5 km. The maximum NOx concentration during above months in the same order are 5.54, 6.18, 11.43 and 5.88 ug/m3. The directions and distance of occurrance are same as for SO2. The effective SPM concentration during four representative months of each season are 2.82, 3.19, 11.70 & 6.70 ug/m3 respectively. The directions and distances are same as for SO2 & NOx.

12.10 Overall Conclusions

12.10.1 The worst predicted effective short term (eight hourly) concentrations due to continuous emission sources of steel plant as well as captive power plant for SPM, SO2 and NOx earlier tables are as follows :

Pollutant	Distance (km)	Stability	Maximum Concentration (ug/m3)	
			One Hourly	Eight Hourly
SPM	3	A	42.87	12.86
SO2	1.5	A	205.73	61.72
NOx	3	D	75.50	22.65

The worst short term (eight hourly) concentrations which could possibly be superimposed on the baseline ambient air quality has some limitation. The worst concentrations are computed assuming that during the entire eight hours wind is all the time blowing in that direction under worst stability class. In nature it is virtually impossible to assume that wind will be blowing in the same direction under the worst meteorological conditions. Hence, statistically it is safe to say that realistic concentrations shall be considerably lower than predicted above and the experience show that concentrations are likely to be not more than 1/3rd of predicted above.

12.10.2 The high wind velocities prevailing in the study area will help disperse the pollutants rapidly by natural dispersion process.

12.11 Recommended Management of Ambient Air Quality for JESCO

12.11.1 The worst pollutant concentrations occur at distances upto 3 kms. To minimise the adverse effects of air pollutants, a well-designed green-belt with an absorbing core and a high curtain of selected tree species should be planted between the emission sources and boundary of the JESCO complex. A green belt plan is given in Chpater-13 of this EIA report.

12.11.2 JESCO should maintain an integrated micro-meteorological and air-quality monitoring stations in the plant premises and the surrounding area as recommended in Chapter-13 of this report.

12.12 Since worst effective concentrations occur between 1.5-3 km hence locations at the above mentioned distance shall be affected in east and west directions as these are the dominant directions. Since Arabian Sea lies in west direction w.r.t plant site and during major portion of the year wind blows towards this direction hence sea will be a good flushing tool for dispersion of pollutants. However during winds towards east human habitation is likely to be affected be affected. Increment due to JESCO is such that the post project ambient air quality shall be within the prescribed limits of CPCB applicable for rural and residential category and much below the mixed use category.

Table 12.1 : Stack Input Parameters and Expected Quality of Emission

Sl. No.	Stack	Diameter (m)	Height (m)	Velocity (m/s)	Temperature (deg.k)	Pollutional load (ug/s)			Heat Emission Rate (kcal/s)
						SO2	NOx	SPM	
1.	Power Plant	2.50	100.00	25.0	403.00	1.87×10^{8}	7.22×10^{6}	1.17×10^{7}	2302.78
2.	Blast Furnace	2.70	80.00	12.40	410.00	4.5×10^{7}	7.3×10^{6}	2.2×10^{6}	1719.40
3.	Coke Oven	3.50	100.00	18.90	550.00	7.6×10^{7}	6.10×10^{7}	2.50×10^{6}	7836.33
4.	Sinter Plant	4.50	100.00	31.00	400.00	5.10×10^{7}	9.1×10^{7}	6.1×10^{7}	11146.03
5.	Steel Melting Shop	2.00	60.00	16.00	600.00	2.2×10^{7}	3.5×10^{7}	2.0×10^{7}	2243.00

TABLE 12.2 : PASQUILL GIFFORD STABILITY CLASSIFICATION

Surface Wind speed (at 10 m height) m/s	Day Time Isolation			Night Time Conditions	
	Strong	Moderate	Slight	Thin overcast of >4/8 cloud cover	Upto ⩽ 3/8 cloud cover
Less than 2	A	A-B	B	-	-
2-3	A-B	B	C	E	F
3-5	B	B-C	C	D	E
5-6	C	C-D	D	D	D
More than 6	C	D	D	D	D

where A = Extremely Unstable
B = Moderately Unstable
C = Slightly Unstable
D = Neutral
E = Slightly Stable
F = Moderately Stable
A-B = Use average of A and B
B-C = Use average of B and C
C-D = Use average of C and D

TABLE 12.3 : VARIATION OF DISPERSION COEFFICIENT 6y AND 6z WITH DISTANCE (PROPOSED BY BRIGG'S FOR OPEN COUNTRY)

Stability Class	6y (m)	6z (m)
A	$0.22x/(1 + 0.0001\ x)^{1/2}$	$0.20x$
B	$0.16x/(1 + 0.0001\ x)^{1/2}$	$0.12x$
C	$0.11x/(1 + 0.0001\ x)^{1/2}$	$0.08x/(1 + 0.0002\ x)^{1/2}$
D	$0.08x/(1 + 0.0001\ x)^{1/2}$	$0.06x/(1 + 0.0015\ x)^{1/2}$
E	$0.06x/(1 + 0.0001\ x)^{1/2}$	$0.03x/(1 + 0.0003\ x)$
F	$0.04x/(1 + 0.0001\ x)^{1/2}$	$0.016x/(1 + 0.0003\ x)$

Table 12.4 : Eight Hourly SPM Concentration (ug/m3) From Power Plant Stack

Distance (m)	January			May			July			October		
	I	II	III	I	II	III	I	II	III	I	II	III
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
500	0.17	0.00	0.00	0.13	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
600	0.57	0.00	0.00	0.51	0.00	0.00	0.18	0.00	0.00	0.04	0.00	0.00
700	1.15	0.00	0.00	1.05	0.00	0.00	0.52	0.00	0.00	0.17	0.00	0.00
800	1.68	0.00	0.00	1.57	0.00	0.00	0.96	0.00	0.00	0.43	0.00	0.00
900	2.06	0.00	0.00	1.97	0.00	0.00	1.39	0.00	0.00	0.77	0.00	0.00
1000	2.29	0.00	0.00	2.23	0.00	0.00	1.73	0.00	0.00	1.12	0.00	0.00
1500	2.28	0.19	0.00	2.20	0.17	0.00	2.18	0.08	0.00	2.00	0.02	0.00
2000	1.63	0.66	0.08	1.66	0.62	0.08	1.79	0.38	0.05	1.86	0.18	0.02
2500	1.20	1.17	0.27	1.23	1.12	0.26	1.38	0.80	0.18	1.52	0.48	0.10
3000	0.91	1.57	0.51	0.93	1.52	0.49	1.07	1.21	0.38	1.22	0.83	0.25
3500	0.71	1.84	0.74	0.73	1.80	0.72	0.85	1.54	0.59	0.98	1.16	0.42
4000	0.56	2.00	0.93	0.58	1.97	0.92	0.68	1.77	0.78	0.80	1.43	0.59
4500	0.46	2.08	1.08	0.48	2.07	1.07	0.56	1.93	0.94	0.66	1.64	0.75
5000	0.38	2.11	1.91	0.40	2.11	1.18	0.47	2.02	1.07	0.56	1.79	0.88
6000	0.28	2.08	1.33	0.29	2.09	1.32	0.35	2.09	1.24	0.41	1.96	1.08
7000	0.22	1.99	1.38	0.22	2.01	1.38	0.27	2.07	1.33	0.32	2.02	1.19
8000	0.17	1.88	1.40	0.18	1.91	1.40	0.21	2.00	1.37	0.26	2.01	1.26
9000	0.14	1.77	1.39	0.14	1.79	1.39	0.17	1.92	1.38	0.21	1.97	1.30
10000	0.12	1.66	1.36	0.21	1.69	1.37	0.41	1.77	1.38	0.17	1.91	1.31

I - Unstable Weather Conditions

II - Neutral Weather Conditions

III - Stable Weather Conditions

Table 12.5 : Eight Hourly SO2 Concentration (ug/m3) From Power Plant Stack

Distance (m)	January			May			July			October		
	I	II	III	I	II	III	I	II	III	I	II	III
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400	0.20	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
500	2.61	0.00	0.00	2.09	0.00	0.00	0.44	0.00	0.00	0.04	0.00	0.00
600	9.03	0.00	0.00	8.05	0.00	0.00	2.87	0.00	0.00	0.60	0.00	0.00
700	18.29	0.00	0.00	16.63	0.00	0.00	8.20	0.00	0.00	2.72	0.00	0.00
800	26.62	0.00	0.00	24.94	0.00	0.00	15.18	0.00	0.00	6.83	0.00	0.00
900	32.72	0.00	0.00	31.29	0.02	0.00	22.00	0.00	0.00	12.20	0.00	0.00
1000	36.39	0.11	0.00	35.32	0.08	0.00	27.53	0.02	0.00	17.72	0.00	0.00
1500	36.21	3.04	0.12	34.86	2.71	0.10	34.68	1.22	0.04	31.80	0.38	0.00
2000	25.82	10.48	1.33	26.28	9.79	1.23	28.47	5.96	0.71	29.56	2.84	0.32
2500	19.02	18.56	4.31	19.46	17.76	4.10	21.93	12.76	2.81	24.12	7.60	1.60
3000	14.37	24.90	8.12	14.76	24.20	7.83	16.99	19.24	5.94	19.27	13.19	3.89
3500	11.19	29.15	11.77	11.51	28.62	11.46	13.43	24.39	9.31	15.52	18.38	6.66
4000	8.95	31.71	14.82	9.22	31.36	14.53	10.85	28.09	12.37	12.69	22.66	9.43
4500	7.33	33.03	17.18	7.55	32.85	16.93	8.93	30.56	14.92	10.54	25.96	11.91
5000	6.11	33.52	18.92	6.30	33.48	18.73	7.49	32.06	16.94	8.89	28.36	14.01
6000	4.46	33.03	21.03	4.60	33.20	20.93	5.49	33.18	19.65	6.57	31.11	17.08
7000	3.41	31.59	21.93	3.52	31.89	21.91	4.22	32.83	21.10	5.07	32.06	18.96
8000	2.70	29.84	22.15	2.79	30.22	22.19	3.35	31.79	21.75	4.04	31.97	20.03
9000	2.20	28.03	21.99	2.27	28.46	22.08	2.74	30.44	21.94	3.31	31.31	19.36
10000	1.84	26.30	21.64	1.90	26.75	21.75	2.28	28.99	21.84	2.76	30.36	18.76

I - Unstable Weather Conditions

II - Neutral Weather Conditions

III - Stable Weather Conditions

Table 12.6 : Eight Hourly NOx Concentration (ug/m3) From Power Plant Stack

Distance (m)	January			May			July			October		
	I	II	III	I	II	III	I	II	III	I	II	III
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
500	0.10	0.00	0.00	0.08	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
600	0.35	0.00	0.00	0.32	0.00	0.00	0.11	0.00	0.00	0.02	0.00	0.00
700	0.71	0.00	0.00	0.65	0.00	0.00	0.32	0.00	0.00	0.11	0.00	0.00
800	1.04	0.00	0.00	0.97	0.00	0.00	0.59	0.00	0.00	0.27	0.00	0.00
900	1.28	0.00	0.00	1.22	0.00	0.00	0.86	0.00	0.00	0.48	0.00	0.00
1000	1.42	0.00	0.00	1.38	0.00	0.00	1.07	0.00	0.00	0.69	0.00	0.00
1500	1.41	0.12	0.00	1.36	0.10	0.00	1.35	0.05	0.00	1.24	0.02	0.00
2000	1.01	0.41	0.05	1.03	0.38	0.05	1.11	0.23	0.03	1.15	0.11	0.01
2500	0.74	0.72	0.17	0.76	0.69	0.16	0.86	0.50	0.11	0.94	0.30	0.06
3000	0.56	0.97	0.32	0.58	0.95	0.31	0.66	0.75	0.23	0.75	0.51	0.15
3500	0.44	1.14	0.46	0.45	1.12	0.45	0.53	0.95	0.36	0.61	0.72	0.26
4000	0.35	1.24	0.58	0.36	1.22	0.57	0.42	1.10	0.48	0.50	0.89	0.37
4500	0.29	1.29	0.67	0.29	1.28	0.66	0.35	1.19	0.58	0.41	1.01	0.47
5000	0.24	1.32	0.74	0.25	1.31	0.73	0.29	1.25	0.66	0.35	1.11	0.55
6000	0.17	1.29	0.82	0.18	1.30	0.82	0.21	1.29	0.77	0.26	1.21	0.67
7000	0.13	1.23	0.86	0.14	1.25	0.86	0.17	1.28	0.82	0.20	1.25	0.74
8000	0.11	1.16	0.86	0.11	1.18	0.86	0.13	1.24	0.85	0.16	1.25	0.78
9000	0.09	1.16	0.86	0.09	1.11	0.86	0.11	1.19	0.86	0.13	1.22	0.80
10000	0.07	1.03	0.84	0.08	1.04	0.85	0.09	1.13	0.85	0.11	1.19	0.81

I - Unstable Weather Conditions

II - Neutral Weather Conditions

III - Stable Weather Conditions

Table 12.7 : Eight Hourly SPM Concentration (ug/m3) From Blast Furnace Stack

Distance (m)	January			May			July			October		
	I	II	III	I	II	III	I	II	III	I	II	III
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
500	0.02	0.00	0.00	0.11	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
600	0.13	0.00	0.00	0.27	0.00	0.00	0.13	0.00	0.00	0.04	0.00	0.00
700	0.30	0.00	0.00	0.42	0.00	0.00	0.26	0.00	0.00	0.11	0.00	0.00
800	0.46	0.00	0.00	0.53	0.00	0.00	0.38	0.00	0.00	0.22	0.00	0.00
900	0.56	0.00	0.00	0.59	0.00	0.00	0.47	0.00	0.00	0.32	0.00	0.00
1000	0.61	0.02	0.00	0.61	0.02	0.00	0.53	0.00	0.00	0.40	0.00	0.00
1500	0.62	0.18	0.02	0.49	0.17	0.02	0.51	0.09	0.01	0.50	0.04	0.00
2000	0.49	0.38	0.12	0.35	0.37	0.11	0.38	0.26	0.08	0.41	0.15	0.04
2500	0.34	0.53	0.25	0.25	0.51	0.29	0.29	0.41	0.19	0.32	0.29	0.12
3000	0.24	0.60	0.35	0.19	0.59	0.35	0.22	0.52	0.29	0.25	0.40	0.22
3500	0.18	0.63	0.43	0.14	0.62	0.42	0.17	0.58	0.37	0.20	0.48	0.30
4000	0.14	0.63	0.47	0.11	0.63	0.47	0.14	0.61	0.43	0.16	0.53	0.37
4500	0.11	0.62	0.50	0.09	0.62	0.50	0.11	0.62	0.47	0.13	0.56	0.41
5000	0.09	0.60	0.52	0.08	0.61	0.52	0.09	0.61	0.50	0.11	0.58	0.45
6000	0.08	0.56	0.52	0.06	0.56	0.52	0.07	0.59	0.52	0.08	0.58	0.48
7000	0.05	0.51	0.51	0.04	0.51	0.51	0.05	0.55	0.52	0.06	0.56	0.50
8000	0.03	0.46	0.49	0.03	0.47	0.49	0.04	0.51	0.50	0.05	0.53	0.50
9000	0.03	0.42	0.47	0.03	0.43	0.47	0.03	0.47	0.49	0.04	0.51	0.49
10000	0.02	0.39	0.45	0.02	0.40	0.45	0.03	0.44	0.47	0.03	0.48	0.47

Table 12.8 : Eight Hourly SO2 Concentration (ug/m3) From Blast Furnace Stack

Distance (m)	January			May			July			October		
	I	II	III	I	II	III	I	II	III	I	II	III
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400	0.44	0.00	0.00	0.34	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00
500	2.59	0.00	0.00	2.21	0.00	0.00	0.70	0.00	0.00	0.12	0.00	0.00
600	6.18	0.00	0.00	5.45	0.00	0.00	5.22	0.00	0.00	0.81	0.00	0.00
700	9.31	0.00	0.00	8.61	0.00	0.00	7.73	0.00	0.00	2.36	0.00	0.00
800	11.40	0.05	0.00	10.84	0.04	0.00	9.62	0.00	0.00	4.41	0.00	0.00
900	12.45	0.16	0.00	12.07	0.14	0.00	10.81	0.04	0.00	6.43	0.00	0.00
1000	12.69	0.41	0.00	12.50	0.34	0.00	10.81	0.11	0.00	8.08	0.02	0.00
1500	12.69	3.69	0.50	10.08	3.40	0.45	10.50	1.91	0.23	10.30	0.80	0.09
2000	6.93	7.87	2.46	7.08	7.52	2.33	7.88	5.33	1.58	8.49	3.11	0.89
2500	4.95	10.75	5.03	5.08	10.46	4.86	5.82	8.44	3.77	6.55	5.87	2.54
3000	3.68	12.27	7.20	3.78	12.09	7.05	4.40	10.55	5.93	5.08	8.19	4.44
3500	2.84	12.89	8.74	2.92	12.79	8.62	3.42	11.78	7.64	4.02	9.86	6.13
4000	2.25	12.95	9.91	2.32	12.94	9.63	2.75	12.39	8.68	3.25	10.93	7.49
4500	1.83	12.72	10.27	1.89	12.76	10.23	2.25	12.58	9.67	2.67	11.55	8.45
5000	1.52	12.32	10.55	1.57	12.40	10.55	1.88	12.51	10.17	2.24	11.86	9.14
6000	1.11	11.35	10.62	1.14	11.48	10.66	1.37	11.97	10.58	1.64	11.88	9.89
7000	0.84	10.36	10.36	0.87	10.52	10.43	1.05	11.22	10.56	1.26	11.49	10.13
8000	0.67	9.46	9.98	0.69	9.62	10.07	0.83	10.44	10.34	1.00	10.94	10.11
9000	0.54	8.66	9.56	0.56	8.82	9.66	0.68	9.70	10.03	0.82	10.35	9.94
10000	0.45	7.96	9.15	0.47	8.12	9.26	0.56	9.02	9.68	0.68	9.76	9.71

I - Unstable Weather Conditions

II - Neutral Weather Conditions

III - Stable Weather Conditions

Table 12.9 : Eight Hourly NOx Concentration (ug/m3) From Blast Furnace Stack

Distance (m)	January			May			July			October		
	I	II	III	I	II	III	I	II	III	I	II	III
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400	0.07	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
500	0.42	0.00	0.00	0.36	0.00	0.00	0.11	0.00	0.00	0.02	0.00	0.00
600	1.00	0.00	0.00	0.89	0.00	0.00	0.42	0.00	0.00	0.13	0.00	0.00
700	1.51	0.00	0.00	1.40	0.00	0.00	0.85	0.00	0.00	0.38	0.00	0.00
800	1.85	0.00	0.00	1.76	0.00	0.00	1.25	0.00	0.00	0.71	0.00	0.00
900	2.02	0.03	0.00	1.96	0.02	0.00	1.56	0.00	0.00	1.04	0.00	0.00
1000	2.06	0.07	0.00	2.03	0.05	0.00	1.76	0.02	0.00	1.31	0.00	0.00
1500	1.62	0.60	0.08	1.64	0.55	0.07	1.55	0.31	0.05	1.67	0.13	0.00
2000	1.13	1.28	0.40	1.15	1.22	0.38	1.28	0.86	0.26	1.38	0.50	0.14
2500	0.80	1.74	0.82	0.82	1.70	0.79	0.95	1.37	0.61	1.06	0.95	0.41
3000	0.60	1.99	1.17	0.61	1.96	1.14	0.71	1.71	0.96	0.83	1.33	0.72
3500	0.46	2.09	1.42	0.47	2.08	1.40	0.56	1.91	1.24	0.65	1.60	1.00
4000	0.37	2.10	1.58	0.38	2.10	1.56	0.45	2.01	1.44	0.53	1.77	1.21
4500	0.30	2.06	1.67	0.31	2.07	1.66	0.37	2.04	1.57	0.36	1.82	1.37
5000	0.25	2.00	1.71	0.26	2.01	1.71	0.31	2.03	1.65	0.36	1.92	1.48
6000	0.18	1.84	1.72	0.19	1.86	1.73	0.22	1.94	1.72	0.27	1.93	1.61
7000	0.14	1.68	1.68	0.14	1.71	1.69	0.17	1.82	1.71	0.20	1.86	1.64
8000	0.11	1.53	1.62	0.11	1.56	1.63	0.14	1.70	1.68	0.16	1.78	1.64
9000	0.09	1.40	1.55	0.09	1.43	1.57	0.11	1.57	1.63	0.13	1.68	1.61
10000	0.07	1.29	1.49	0.08	1.32	1.50	0.09	1.46	1.57	0.11	1.58	1.58

Table 12.10 : Eight Hourly SPM Concentration (ug/m3) From Coke Oven Stack

Distance (m)	January			May			July			October		
	I	II	III	I	II	III	I	II	III	I	II	III
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
600	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
700	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
800	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
900	0.04	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1000	0.06	0.00	0.00	0.05	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
1500	0.19	0.00	0.00	0.18	0.00	0.00	0.11	0.00	0.00	0.06	0.00	0.00
2000	0.21	0.02	0.00	0.20	0.00	0.00	0.17	0.00	0.00	0.13	0.00	0.00
2500	0.18	0.03	0.00	0.18	0.02	0.00	0.18	0.00	0.00	0.16	0.00	0.00
3000	0.15	0.05	0.02	0.16	0.05	0.02	0.16	0.02	0.00	0.16	0.00	0.00
3500	0.13	0.08	0.03	0.13	0.08	0.03	0.14	0.03	0.00	0.15	0.00	0.00
4000	0.11	0.11	0.05	0.11	0.11	0.04	0.12	0.05	0.01	0.13	0.02	0.00
4500	0.09	0.14	0.06	0.09	0.13	0.06	0.11	0.07	0.02	0.11	0.03	0.00
5000	0.08	0.16	0.08	0.08	0.15	0.07	0.09	0.09	0.03	0.10	0.05	0.01
6000	0.06	0.19	0.10	0.06	0.19	0.09	0.07	0.12	0.05	0.08	0.07	0.02
7000	0.05	0.21	0.11	0.05	0.20	0.11	0.05	0.15	0.06	0.06	0.10	0.03
8000	0.04	0.22	0.12	0.04	0.21	0.11	0.04	0.17	0.07	0.05	0.12	0.04
9000	0.03	0.22	0.13	0.03	0.22	0.11	0.04	0.18	0.08	0.04	0.14	0.05
10000	0.02	0.22	0.13	0.02	0.22	0.13	0.03	0.19	0.08	0.04	0.15	0.05

Table 12.11 : Eight Hourly SO2 Concentration (ug/m3) From Coke Oven Stack

Distance (m)	January			May			July			October		
	I	II	III	I	II	III	I	II	III	I	II	III
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
600	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
700	0.09	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
800	0.45	0.00	0.00	0.35	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00
900	1.08	0.00	0.00	0.89	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00
1000	1.94	0.00	0.00	1.66	0.00	0.00	0.47	0.00	0.00	0.08	0.00	0.00
1500	5.71	0.02	0.00	5.43	0.01	0.00	3.48	0.00	0.00	1.70	0.00	0.00
2000	6.31	2.17	0.01	6.23	0.17	0.02	5.32	0.02	0.00	3.89	0.00	0.00
2500	5.58	0.79	0.16	5.60	0.67	0.14	5.46	0.14	0.02	4.80	0.02	0.00
3000	4.66	1.64	0.47	4.72	1.45	0.41	4.94	0.45	0.08	4.81	0.11	0.02
3500	3.85	2.60	0.90	3.92	2.36	0.81	4.29	0.92	0.21	4.43	0.29	0.06
4000	3.20	3.50	1.38	3.27	3.24	1.26	3.68	1.49	0.40	3.96	0.56	0.13
4500	2.69	4.30	1.85	2.76	4.03	1.71	3.16	2.11	0.63	3.49	0.92	0.23
5000	2.29	4.95	2.27	2.35	4.70	2.13	2.73	2.72	0.87	3.08	1.33	0.35
6000	1.71	5.87	2.95	1.76	5.66	2.80	2.08	3.78	1.34	2.40	2.19	0.62
7000	1.33	6.38	3.42	1.37	6.22	3.27	1.64	4.60	1.74	1.92	2.99	0.89
8000	1.06	6.62	3.73	1.10	6.50	3.59	1.32	5.18	2.05	1.56	3.66	1.12
9000	0.87	6.67	3.92	0.90	6.61	3.79	1.09	5.56	2.29	1.30	4.20	1.40
10000	0.73	6.64	4.03	0.75	6.59	3.91	0.92	5.80	2.47	1.10	4.61	1.48

I - Unstable Weather Conditions

II - Neutral Weather Conditions

III - Stable Weather Conditions

Table 12.12 : Eight Hourly NOx Concentration (ug/m3) From Coke Oven Stack

Distance (m)	January			May			July			October		
	I	II	III	I	II	III	I	II	III	I	II	III
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
600	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
700	0.07	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
800	0.36	0.00	0.00	0.28	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
900	0.87	0.00	0.00	0.71	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.00
1000	1.55	0.00	0.00	1.34	0.00	0.00	0.38	0.00	0.00	0.06	0.00	0.00
1500	4.58	0.01	0.00	4.36	0.00	0.00	2.80	0.00	0.00	1.37	0.00	0.00
2000	5.07	1.74	0.02	5.00	0.14	0.02	4.27	0.02	0.00	3.12	0.00	0.00
2500	4.48	0.63	0.13	4.50	0.54	0.11	4.38	0.12	0.01	3.85	0.02	0.00
3000	3.74	1.32	0.37	3.79	1.16	0.33	3.97	0.36	0.07	3.86	0.08	0.00
3500	3.09	2.08	0.72	3.15	1.89	0.65	3.44	0.74	0.17	3.56	0.23	0.05
4000	2.57	2.81	1.10	2.63	2.60	1.01	2.96	1.20	0.32	3.18	0.45	0.10
4500	2.16	3.45	1.48	2.21	3.24	1.37	2.54	1.69	0.50	2.80	0.74	0.18
5000	1.84	3.97	1.82	1.88	3.77	1.71	2.19	2.18	0.70	2.47	1.07	0.28
6000	1.37	4.71	2.37	1.41	4.04	2.25	1.67	3.04	1.07	1.93	1.76	0.50
7000	1.07	5.12	2.75	1.10	4.99	2.63	1.31	3.69	1.40	1.54	2.40	0.71
8000	0.85	5.32	2.99	0.88	5.22	2.88	1.06	4.16	1.65	1.25	2.94	0.90
9000	0.70	5.36	3.14	0.72	5.30	3.04	0.87	4.46	1.84	1.04	3.37	1.13
10000	0.59	5.33	3.23	0.60	5.29	3.14	0.74	4.65	1.98	0.88	3.70	1.19

Table 12.13 : Eight Hourly SPM Concentration (ug/m3) From Sinter Plant Stack

Distance (m)	January			April			May			October		
	I	II	III	I	II	III	I	II	III	I	II	III
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
600	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
700	0.01	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
800	0.07	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
900	0.22	0.00	0.00	0.41	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
1000	0.52	0.00	0.00	0.78	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00
1500	2.81	0.00	0.00	2.60	0.00	0.00	1.41	0.00	0.00	0.52	0.00	0.00
2000	3.86	0.04	0.00	3.74	0.03	0.00	2.88	0.00	0.00	1.80	0.00	0.00
2500	3.77	0.20	0.04	3.74	0.17	0.03	3.39	0.04	0.00	2.69	0.00	0.00
3000	3.32	0.54	0.16	3.34	0.45	0.13	3.30	0.14	0.02	8.99	0.02	0.00
3500	2.84	0.98	0.33	2.87	0.86	0.29	2.99	0.32	0.08	2.93	0.08	0.02
4000	2.41	1.48	0.56	2.45	1.33	0.49	2.65	0.59	0.16	2.72	0.17	0.04
4500	2.05	1.97	0.80	2.09	1.79	0.72	2.32	0.90	0.26	2.47	0.32	0.08
5000	1.76	2.42	1.03	1.80	2.23	0.94	2.03	1.24	0.38	2.22	0.50	0.13
6000	1.34	3.34	1.44	1.37	2.96	1.34	1.58	1.90	0.62	1.78	0.94	0.25
7000	1.04	0.36	1.76	1.08	3.48	1.65	1.25	2.46	0.85	1.44	1.39	0.38
8000	0.84	0.40	1.99	0.87	3.82	1.88	1.02	2.91	1.03	1.19	1.82	0.49
9000	0.70	0.41	2.15	0.72	4.03	2.03	0.85	3.24	1.19	0.99	2.20	0.60
10000	0.58	0.42	2.25	0.60	4.14	2.14	0.71	3.47	1.30	0.85	2.51	0.70

Table 12.14 : Eight Hourly SO2 Concentration (ug/m3) From Sinter Plant Stack

Distance (m)	January			May			July			October		
	I	II	III	I	II	III	I	II	III	I	II	III
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
600	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
700	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
800	0.05	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
900	0.18	0.00	0.00	0.35	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
1000	0.43	0.00	0.00	0.65	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00
1500	2.34	0.00	0.00	2.16	0.00	0.00	1.17	0.00	0.00	0.44	0.00	0.00
2000	3.21	0.03	0.00	3.12	0.02	0.00	2.40	0.00	0.00	1.50	0.00	0.00
2500	3.14	0.17	0.03	3.11	0.14	0.03	2.82	0.03	0.00	2.24	0.00	0.00
3000	2.77	0.45	0.13	2.78	0.38	0.11	2.75	0.11	0.02	2.49	0.02	0.00
3500	2.36	0.82	0.28	2.39	0.72	0.24	2.50	0.27	0.06	2.45	0.06	0.01
4000	2.00	1.23	0.46	2.04	1.10	0.41	2.21	0.49	0.13	2.27	0.14	0.03
4500	1.71	1.64	0.66	1.75	1.49	0.60	1.93	0.75	0.22	2.06	0.26	0.06
5000	1.47	2.01	0.86	1.50	1.86	0.78	1.69	1.04	0.31	1.85	0.42	0.11
6000	1.11	2.62	1.20	1.14	2.47	1.12	1.31	1.58	0.52	1.49	0.78	0.20
7000	0.87	3.03	1.47	0.90	2.90	1.37	1.04	2.05	0.71	1.20	1.16	0.31
8000	0.70	3.29	1.66	0.72	3.18	1.56	0.85	2.42	0.86	0.99	1.52	0.41
9000	0.58	3.45	1.79	0.60	3.36	1.70	0.71	2.70	0.99	0.83	1.8	0.50
10000	0.49	3.52	1.88	0.50	3.45	1.79	0.59	2.90	0.71	0.79	2.09	0.50

I - Unstable Weather Conditions

II - Neutral Weather Conditions

III - Stable Weather Conditions

Table 12.15 : Eight Hourly NOx Concentration (ug/m3) From Sinter Plant Stack

Distance (m)	January			May			July			October		
	I	II	III	I	II	III	I	II	III	I	II	III
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
600	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
700	0.02	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
800	0.10	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
900	0.33	0.00	0.00	0.62	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
1000	0.77	0.00	0.00	1.16	0.00	0.00	0.12	0.00	0.00	0.01	0.00	0.00
1500	4.18	0.00	0.00	3.86	0.00	0.00	2.09	0.00	0.00	0.78	0.00	0.00
2000	5.73	0.00	0.00	5.56	0.04	0.00	4.29	0.00	0.00	2.67	0.00	0.00
2500	5.60	0.30	0.06	5.56	0.25	0.05	5.04	0.05	0.05	4.00	0.00	0.00
3000	4.94	0.80	0.23	4.96	0.68	0.19	4.91	0.20	0.19	4.44	0.03	0.00
3500	4.22	1.46	0.49	4.27	1.28	0.43	4.46	0.48	0.43	4.36	0.11	0.02
4000	3.58	2.20	0.83	3.65	1.97	0.73	3.93	0.88	0.73	4.05	0.26	0.06
4500	3.05	2.93	1.18	3.11	2.66	1.07	3.45	1.34	1.07	3.68	0.47	0.16
5000	2.62	3.59	1.54	2.68	3.32	1.40	3.02	1.85	1.34	3.30	0.74	0.19
6000	1.99	4.67	2.15	2.04	4.40	1.99	2.35	2.83	1.99	2.65	1.39	0.36
7000	1.55	5.41	2.62	1.60	5.17	2.45	1.86	3.66	2.45	2.15	2.07	0.56
8000	1.25	5.88	2.96	1.29	5.68	2.79	1.52	4.33	2.79	1.77	2.72	0.73
9000	1.03	6.15	3.19	1.07	5.99	3.02	1.26	4.81	3.02	1.48	3.27	0.89
10000	0.85	6.28	3.35	0.89	6.16	3.18	1.06	5.17	3.19	1.26	3.74	1.02

Table 12.16 : Eight Hourly SPM Concentration (ug/m3) From Steel Melting Shop Stack

Distance (m)	January			May			July			October		
	I	II	III	I	II	III	I	II	III	I	II	III
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400	0.10	0.00	0.00	0.07	0.00	0.00	0.67	0.00	0.00	0.00	0.00	0.00
500	0.76	0.00	0.00	0.62	0.00	0.00	0.14	0.00	0.00	0.02	0.00	0.00
600	2.02	0.00	0.00	1.77	0.00	0.00	0.67	0.00	0.00	0.14	0.00	0.00
700	3.34	0.01	0.00	3.06	0.00	0.00	1.57	0.00	0.00	0.54	0.00	0.00
800	3.34	0.05	0.00	4.09	0.00	0.00	2.57	0.00	0.00	1.19	0.00	0.00
900	4.94	0.16	0.00	4.74	0.12	0.00	3.41	0.00	0.00	1.93	0.00	0.00
1000	5.20	0.35	0.00	5.06	0.29	0.02	4.02	0.02	0.00	2.63	0.00	0.00
1500	4.34	2.50	0.89	4.37	2.26	0.80	4.38	0.61	0.37	4.05	0.36	0.12
2000	3.08	4.78	2.93	3.14	4.50	2.75	3.42	1.92	1.72	3.56	1.43	0.84
2500	2.22	6.17	4.85	2.28	5.94	4.66	2.57	2.91	3.39	2.84	3.83	2.06
3000	1.66	6.79	6.14	1.71	6.63	5.97	1.97	3.36	4.77	2.24	4.62	3.29
3500	1.28	6.96	6.87	1.32	6.86	6.74	1.55	3.45	5.72	1.79	4.62	4.28
4000	1.02	6.87	7.22	1.05	6.83	7.13	1.24	3.36	6.30	1.46	5.13	5.00
4500	0.83	6.66	7.33	0.86	6.65	7.26	1.02	3.18	6.63	1.20	5.44	5.48
5000	0.70	6.39	7.29	0.72	6.40	7.26	0.85	2.98	6.78	1.01	5.59	5.79
6000	0.50	5.80	7.02	0.52	5.84	7.02	0.62	2.57	6.78	0.74	6.62	6.06
7000	0.38	5.24	6.65	0.40	5.30	6.67	0.48	2.23	6.59	0.57	5.44	6.07
8000	0.34	4.74	6.26	0.32	4.81	6.30	0.38	1.94	6.32	0.46	5.19	5.96
9000	0.25	4.32	5.90	0.26	4.39	5.95	0.31	1.71	6.04	0.38	4.91	5.79
10000	0.21	3.95	5.50	0.21	4.02	5.63	0.26	1.52	5.77	0.31	4.64	5.60

Table 12.17 : Eight Hourly SO2 Concentration (ug/m3) From Steel Melting Shop Stack

Distance (m)	January			May			July			October		
	I	II	III	I	II	III	I	II	III	I	II	III
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400	0.11	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
500	0.84	0.00	0.00	0.68	0.00	0.00	0.15	0.00	0.00	0.02	0.00	0.00
600	2.22	0.00	0.00	1.95	0.00	0.00	0.73	0.00	0.00	0.16	0.00	0.00
700	3.68	0.01	0.00	3.37	0.00	0.00	1.73	0.00	0.00	0.59	0.00	0.00
800	4.78	0.05	0.00	4.50	0.04	0.00	2.82	0.00	0.00	1.30	0.00	0.00
900	5.43	0.17	0.00	5.22	0.14	0.00	3.76	0.00	0.00	2.12	0.00	0.00
1000	5.72	0.39	0.00	5.57	0.32	0.02	4.42	0.02	0.00	2.90	0.00	0.00
1500	4.77	2.75	0.98	4.80	2.48	0.87	4.82	0.67	0.40	4.45	0.40	0.13
2000	3.39	5.26	3.22	3.46	4.95	3.02	3.76	2.11	1.89	3.92	1.57	0.93
2500	2.45	6.78	5.34	2.51	6.53	5.12	2.83	3.20	3.73	3.12	3.00	2.27
3000	1.83	7.47	6.76	1.88	7.30	6.57	2.17	3.70	5.25	2.46	4.21	3.62
3500	1.41	7.65	7.56	1.45	7.55	7.41	1.70	3.80	6.29	1.97	5.08	4.71
4000	1.13	7.65	7.56	1.45	7.55	7.41	1.70	3.80	6.29	1.97	5.08	4.71
4500	0.92	7.33	8.06	0.95	7.31	7.99	1.12	3.50	7.29	1.32	5.98	6.03
5000	0.77	7.03	8.02	0.79	7.04	7.98	0.94	3.28	7.46	1.11	6.15	6.37
6000	0.56	6.38	7.72	0.57	6.42	7.72	0.68	2.83	7.46	0.82	6.18	6.66
7000	0.42	5.76	7.31	0.44	5.83	7.33	0.53	2.45	7.25	0.65	5.99	6.68
8000	0.38	5.22	6.89	0.35	5.29	6.93	0.42	2.14	6.95	0.50	5.71	6.55
9000	0.27	4.75	6.50	0.28	4.83	6.54	0.34	1.88	6.65	0.41	5.40	6.37
10000	0.23	4.34	6.14	0.23	4.43	6.19	0.28	1.67	6.35	0.34	5.10	6.16

I - Unstable Weather Conditions

II - Neutral Weather Conditions

III - Stable Weather Conditions

Table 12.18 : Eight Hourly NOx Concentration (ug/m3) From Steel Melting Shop Stack

Distance (m)	January			May			July			October		
	I	II	III	I	II	III	I	II	III	I	II	III
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400	0.18	0.00	0.00	0.12	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
500	1.33	0.00	0.00	1.08	0.00	0.00	0.24	0.00	0.00	0.02	0.00	0.00
600	3.54	0.00	0.00	3.10	0.00	0.00	1.16	0.00	0.00	0.25	0.00	0.00
700	5.85	0.02	0.00	5.36	0.02	0.00	2.75	0.00	0.00	0.95	0.00	0.00
800	7.63	0.09	0.00	7.16	0.07	0.00	4.49	0.00	0.00	2.07	0.00	0.00
900	8.64	0.27	0.00	8.30	0.22	0.01	5.98	0.00	0.00	3.38	0.00	0.00
1000	9.09	0.62	0.00	8.85	0.51	0.03	7.04	0.02	0.00	4.61	0.02	0.00
1500	7.59	4.37	1.55	7.37	3.95	1.39	7.67	1.06	0.64	7.08	0.64	0.20
2000	5.40	8.37	5.73	5.50	7.88	4.81	5.99	3.36	3.00	6.24	2.50	1.48
2500	3.89	10.79	8.49	3.98	10.39	8.33	4.51	5.09	5.94	4.97	4.77	3.61
3000	2.91	11.88	10.75	2.99	11.61	10.45	3.45	5.88	8.35	3.92	6.69	5.76
3500	2.25	12.17	12.03	2.31	12.00	11.79	2.70	6.04	10.00	3.13	8.08	7.49
4000	1.79	12.03	12.63	1.84	11.94	12.47	2.17	5.88	11.03	2.54	8.78	8.75
4500	1.46	11.66	12.82	1.50	11.63	12.71	1.78	5.57	11.60	2.11	9.52	9.59
5000	1.22	11.18	12.76	1.25	11.20	12.70	1.49	5.21	11.86	1.77	9.78	10.13
6000	0.88	10.14	12.29	0.91	10.22	12.28	1.09	4.51	11.86	1.30	9.83	10.60
7000	0.67	9.17	11.63	0.70	9.27	11.66	0.83	3.89	11.52	1.00	9.52	10.62
8000	0.60	8.30	10.96	0.56	8.42	11.02	0.66	3.40	11.06	0.80	9.08	10.41
9000	0.44	7.55	10.33	0.45	7.68	10.41	0.54	2.99	10.57	0.65	8.59	10.13
10000	0.36	6.91	9.77	0.37	7.04	9.85	0.45	2.66	10.10	0.54	8.12	9.80

Table 12.19 : Long Term SO2 Concentration (ug/m3) from Power Plant Stack for the month of January

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.07	0.00	0.00	0.00	0.00	0.00	0.17	0.07	0.27	0.10	0.06	0.00	0.00	0.00	0.04	0.09
1000	2.00	0.01	0.20	0.01	0.01	0.01	4.30	2.10	4.80	2.00	1.00	0.01	0.01	0.01	0.54	1.70
1500	7.10	0.07	1.20	0.07	0.07	0.07	6.80	2.80	7.00	2.90	1.50	0.07	0.07	0.07	0.82	3.60
2000	10.00	0.11	1.90	0.11	0.11	0.11	7.10	2.70	6.80	2.80	1.40	0.11	0.11	0.11	0.80	4.50
2500	11.00	0.12	2.10	0.12	0.12	0.12	6.60	2.40	5.90	2.40	1.30	0.12	0.12	0.12	0.70	4.50
3000	11.00	0.12	2.10	0.12	0.12	0.12	6.00	2.10	5.10	2.10	1.10	0.12	0.12	0.12	0.58	4.20
3500	9.80	0.11	1.90	0.11	0.11	0.11	5.40	1.90	4.40	1.80	0.95	0.11	0.11	0.11	0.49	3.70
4000	8.60	0.10	1.70	0.10	0.10	0.10	4.90	1.70	3.80	1.60	0.84	0.10	0.10	0.10	0.41	3.30
4500	7.50	0.08	1.40	0.08	0.08	0.08	4.40	1.60	3.40	1.40	0.74	0.08	0.08	0.08	0.35	2.90
5000	6.60	0.07	1.30	0.07	0.07	0.07	4.00	1.50	3.00	1.30	0.66	0.07	0.07	0.07	0.30	2.50
6000	5.10	0.06	0.96	0.06	0.06	0.06	3.40	1.30	2.40	1.00	0.54	0.06	0.06	0.06	0.23	1.90
7000	4.00	0.04	0.75	0.04	0.04	0.04	2.90	1.10	2.00	0.87	0.45	0.04	0.04	0.04	0.18	1.50
8000	3.20	0.04	0.60	0.04	0.04	0.04	2.50	0.99	1.70	0.75	0.39	0.04	0.04	0.04	0.14	1.30
9000	2.60	0.03	0.49	0.03	0.03	0.03	2.20	0.88	1.50	0.65	0.34	0.03	0.03	0.03	0.12	1.00
10000	2.20	0.02	0.40	0.02	0.02	0.02	1.90	0.80	1.30	0.57	0.30	0.02	0.02	0.02	0.10	0.89

Table 12.20 : Long Term SO2 Concentration (ug/m3) from Power Plant Stack for the month of May

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.11	0.16	0.05	0.07	0.00	0.00	0.00	0.07	0.00
1000	0.53	0.00	0.26	0.00	0.09	0.00	4.00	2.60	4.50	0.66	1.60	0.00	0.00	0.20	1.10	0.00
1500	3.10	0.00	1.50	0.00	0.52	0.00	6.70	4.30	7.00	1.00	2.20	0.00	0.00	0.64	2.50	0.00
2000	5.10	0.00	2.40	0.00	0.86	0.00	7.30	4.50	7.20	1.00	2.20	0.00	0.00	0.91	3.20	0.00
2500	5.80	0.00	2.80	0.00	0.98	0.00	7.10	4.40	6.80	0.98	2.00	0.00	0.00	1.00	3.40	0.00
3000	5.80	0.00	2.80	0.00	0.97	0.00	6.70	4.10	6.64	0.90	1.90	0.00	0.00	1.00	3.30	0.00
3500	5.40	0.00	2.60	0.00	0.91	0.00	6.20	3.80	5.90	0.84	1.70	0.00	0.00	0.95	3.10	0.00
4000	4.90	0.00	2.40	0.00	0.83	0.00	5.80	3.50	5.50	0.78	1.60	0.00	0.00	0.89	2.80	0.00
4500	4.50	0.00	2.20	0.00	0.76	0.00	5.40	3.30	5.10	0.73	1.50	0.00	0.00	0.83	2.60	0.00
5000	4.10	0.00	2.00	0.00	0.70	0.00	5.00	3.10	4.70	0.69	1.40	0.00	0.00	0.77	2.40	0.00
6000	3.60	0.00	1.70	0.00	0.60	0.00	4.40	2.70	4.10	0.61	1.20	0.00	0.00	0.65	2.10	0.00
7000	3.10	0.00	1.50	0.00	0.53	0.00	3.80	2.30	3.60	0.54	1.10	0.00	0.00	0.56	1.80	0.00
8000	2.80	0.00	1.30	0.00	0.47	0.00	3.40	2.10	3.20	0.49	0.96	0.00	0.00	0.49	1.70	0.00
9000	2.50	0.00	1.20	0.00	0.42	0.00	3.10	1.90	2.90	0.44	0.86	0.00	0.00	0.43	1.50	0.00
10000	2.30	0.00	1.10	0.00	0.39	0.00	2.80	1.70	2.60	0.41	0.79	0.00	0.00	0.38	1.40	0.00

Table 12.21 : Long Term SO2 Concentration (ug/m3) from Power Plant Stack for the month of July

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.33	0.07	0.08	0.00	0.00	0.00	0.03	0.00
1000	0.27	0.00	0.00	0.00	0.16	0.00	2.70	0.11	7.10	1.70	1.50	0.00	0.00	0.00	0.78	0.00
1500	1.60	0.00	0.00	0.00	0.94	0.00	5.10	0.63	14.00	3.00	2.70	0.00	0.00	0.00	2.50	0.00
2000	2.60	0.00	0.00	0.00	1.50	0.00	6.10	1.00	16.00	3.40	3.10	0.00	0.00	0.00	3.70	0.00
2500	2.90	0.00	0.00	0.00	1.80	0.00	6.20	1.20	17.00	3.40	3.10	0.00	0.00	0.00	4.10	0.00
3000	2.90	0.00	0.00	0.00	1.70	0.00	5.90	1.20	16.00	3.20	2.90	0.00	0.00	0.00	4.00	0.00
3500	2.70	0.00	0.00	0.00	1.60	0.00	5.50	1.10	15.00	3.00	2.80	0.00	0.00	0.00	3.80	0.00
4000	2.50	0.00	0.00	0.00	1.50	0.00	5.00	1.00	14.00	2.80	2.60	0.00	0.00	0.00	3.50	0.00
4500	2.30	0.00	0.00	0.00	1.40	0.00	4.60	0.92	13.00	2.50	2.40	0.00	0.00	0.00	3.20	0.00
5000	2.10	0.00	0.00	0.00	1.30	0.00	4.20	0.85	12.00	2.30	2.20	0.00	0.00	0.00	3.00	0.00
6000	1.80	0.00	0.00	0.00	1.10	0.00	3.60	0.73	10.00	2.00	1.90	0.00	0.00	0.00	2.60	0.00
7000	1.60	0.00	0.00	0.00	0.97	0.00	3.10	0.65	8.90	1.80	1.70	0.00	0.00	0.00	2.30	0.00
8000	1.50	0.00	0.00	0.00	0.87	0.00	2.70	0.58	7.90	1.50	1.50	0.00	0.00	0.00	2.10	0.00
9000	1.30	0.00	0.00	0.00	0.79	0.00	2.40	0.53	7.10	1.40	1.30	0.00	0.00	0.00	1.90	0.00
10000	1.20	0.00	0.00	0.00	0.73	0.00	2.20	0.49	6.40	1.20	1.20	0.00	0.00	0.00	1.70	0.00

Table 12.22 : Long Term SO2 Concentration (ug/m3) from Power Plant Stack for the month of October

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.06	0.23	0.00	0.10	0.05	0.00	0.05	0.04	0.00
1000	1.20	0.00	0.10	0.00	0.00	0.00	1.30	1.20	4.70	0.00	1.60	0.75	0.35	0.75	0.65	0.00
1500	6.80	0.00	0.60	0.00	0.00	0.00	2.50	1.90	8.00	0.00	3.50	1.20	1.40	1.20	1.30	0.00
2000	11.00	0.00	0.99	0.00	0.00	0.00	2.90	2.10	8.80	0.00	4.50	1.20	2.10	1.20	1.70	0.00
2500	13.00	0.00	1.10	0.00	0.00	0.00	2.90	1.90	8.50	0.00	4.60	1.00	2.40	1.00	1.70	0.00
3000	12.00	0.00	1.10	0.00	0.00	0.00	2.60	1.80	7.80	0.00	4.30	0.89	2.30	0.89	1.50	0.00
3500	11.00	0.00	1.00	0.00	0.00	0.00	2.30	1.60	7.00	0.00	3.80	0.76	2.20	0.76	1.40	0.00
4000	10.00	0.00	0.91	0.00	0.00	0.00	2.00	1.40	6.20	0.00	3.40	0.65	2.00	0.65	1.20	0.00
4500	9.10	0.00	0.81	0.00	0.00	0.00	1.80	1.20	5.60	0.00	2.90	0.56	1.80	0.56	1.00	0.00
5000	8.00	0.00	0.71	0.00	0.00	0.00	1.50	1.10	5.00	0.00	2.60	0.49	1.60	0.49	0.92	0.00
6000	6.30	0.00	0.56	0.00	0.00	0.00	1.20	0.91	4.10	0.00	2.00	0.38	1.30	0.38	0.72	0.00
7000	5.00	0.00	0.45	0.00	0.00	0.00	0.96	0.76	3.40	0.00	1.60	0.30	1.10	0.30	0.58	0.00
8000	4.10	0.00	0.37	0.00	0.00	0.00	0.79	0.65	2.80	0.00	1.30	0.25	0.88	0.25	0.47	0.00
9000	3.40	0.00	0.30	0.00	0.00	0.00	0.66	0.56	2.40	0.00	1.10	0.21	0.75	0.21	0.39	0.00
10000	2.90	0.00	0.26	0.00	0.00	0.00	0.56	0.49	2.10	0.00	0.93	0.18	0.65	0.18	0.33	0.00

Table 12.23 : Long Term SPM Concentration (ug/m3) from Blast Furnace Stack for the month of July

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.32	0.08	0.07	0.00	0.00	0.00	0.03	0.00
1000	0.19	0.00	0.00	0.00	0.11	0.00	1.40	0.07	3.40	0.79	0.76	0.00	0.00	0.00	0.41	0.00
1500	0.66	0.00	0.00	0.00	0.40	0.00	2.20	0.26	5.60	1.20	1.20	0.00	0.00	0.00	1.00	0.00
2000	0.91	0.00	0.00	0.00	0.55	0.00	2.40	0.36	6.20	1.30	1.20	0.00	0.00	0.00	1.30	0.00
2500	0.96	0.00	0.00	0.00	0.58	0.00	2.30	0.38	6.00	1.20	1.20	0.00	0.00	0.00	1.40	0.00
3000	0.93	0.00	0.00	0.00	0.56	0.00	2.10	0.37	5.60	1.10	1.10	0.00	0.00	0.00	1.30	0.00
3500	0.88	0.00	0.00	0.00	0.53	0.00	1.90	0.35	5.20	1.00	1.00	0.00	0.00	0.00	1.30	0.00
4000	0.82	0.00	0.00	0.00	0.49	0.00	1.70	0.33	4.80	0.95	0.93	0.00	0.00	0.00	1.20	0.00
4500	0.77	0.00	0.00	0.00	0.47	0.00	1.50	0.31	4.40	0.87	0.85	0.00	0.00	0.00	1.10	0.00
5000	0.73	0.00	0.00	0.00	0.44	0.00	1.40	0.29	4.10	0.79	0.78	0.00	0.00	0.00	1.00	0.00
6000	0.66	0.00	0.00	0.00	0.40	0.00	1.20	0.26	3.50	0.68	0.67	0.00	0.00	0.00	0.94	0.00
7000	0.60	0.00	0.00	0.00	0.36	0.00	1.00	0.24	3.10	0.58	0.57	0.00	0.00	0.00	0.85	0.00
8000	0.55	0.00	0.00	0.00	0.33	0.00	0.89	0.22	2.70	0.51	0.50	0.00	0.00	0.00	0.77	0.00
9000	0.51	0.00	0.00	0.00	0.30	0.00	0.79	0.20	2.40	0.46	0.44	0.00	0.00	0.00	0.71	0.00
10000	0.47	0.00	0.00	0.00	0.28	0.00	0.70	0.19	2.20	0.41	0.40	0.00	0.00	0.00	0.66	0.00

Table 12.24 : Long Term SPM Concentration (ug/m3) from Blast Furnace Stack for the month of October

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.06	0.23	0.00	0.08	0.04	0.00	0.04	0.03	0.00
1000	0.80	0.00	0.07	0.00	0.00	0.00	0.58	0.56	2.20	0.00	0.74	0.31	0.26	0.31	0.30	0.00
1500	2.80	0.00	0.25	0.00	0.00	0.00	0.92	0.76	3.10	0.00	1.30	0.40	0.66	0.40	0.51	0.00
2000	3.90	0.00	0.35	0.00	0.00	0.00	0.97	0.75	3.20	0.00	1.50	0.37	0.83	0.37	0.56	0.00
2500	4.10	0.00	0.36	0.00	0.00	0.00	0.89	0.66	2.90	0.00	1.40	0.32	0.83	0.32	0.52	0.00
3000	3.80	0.00	0.34	0.00	0.00	0.00	0.78	0.58	2.50	0.00	1.30	0.26	0.76	0.26	0.46	0.00
3500	3.30	0.00	0.30	0.00	0.00	0.00	0.67	0.50	2.20	0.00	1.10	0.22	0.68	0.22	0.40	0.00
4000	2.90	0.00	0.26	0.00	0.00	0.00	0.57	0.44	1.90	0.00	0.96	0.18	0.60	0.18	0.34	0.00
4500	2.50	0.00	0.23	0.00	0.00	0.00	0.49	0.38	1.70	0.00	0.82	0.16	0.53	0.16	0.29	0.00
5000	2.20	0.00	0.20	0.00	0.00	0.00	0.43	0.34	1.50	0.00	0.72	0.14	0.46	0.14	0.25	0.00
6000	1.70	0.00	0.15	0.00	0.00	0.00	0.33	0.27	1.20	0.00	0.55	0.10	0.37	0.10	0.20	0.00
7000	1.40	0.00	0.12	0.00	0.00	0.00	0.26	0.22	0.96	0.00	0.44	0.08	0.32	0.08	0.16	0.00
8000	1.10	0.00	0.10	0.00	0.00	0.00	0.21	0.18	0.80	0.00	0.35	0.07	0.25	0.07	0.13	0.00
9000	0.90	0.00	0.08	0.00	0.00	0.00	0.18	0.16	0.68	0.00	0.29	0.06	0.21	0.06	0.10	0.00
10000	0.76	0.00	0.07	0.00	0.00	0.00	0.15	0.14	0.59	0.00	0.25	0.05	0.18	0.05	0.09	0.00

Table 12.25 : Long Term SO2 Concentration (ug/m3) from Blast Furnace Stack for the month of January

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.05	0.00	0.00	0.00	0.00	0.00	0.19	0.09	0.25	0.10	0.05	0.00	0.00	0.00	0.03	0.08
1000	1.10	0.00	0.14	0.00	0.00	0.00	2.10	0.88	2.00	0.84	0.44	0.00	0.00	0.00	0.23	0.79
1500	2.90	0.03	0.49	0.03	0.03	0.03	2.60	1.00	2.40	1.00	0.52	0.03	0.03	0.03	0.28	1.40
2000	3.70	0.04	0.66	0.04	0.04	0.04	2.60	0.94	2.20	0.91	0.48	0.04	0.04	0.04	0.25	1.50
2500	3.60	0.04	0.67	0.04	0.04	0.04	2.30	0.86	1.90	0.79	0.42	0.04	0.04	0.04	0.21	1.40
3000	3.30	0.04	0.61	0.04	0.04	0.04	2.10	0.78	1.60	0.69	0.36	0.04	0.04	0.04	0.17	1.30
3500	2.80	0.04	0.54	0.03	0.03	0.03	1.90	0.71	1.40	0.60	0.21	0.03	0.03	0.03	0.14	1.10
4000	2.40	0.03	0.46	0.03	0.03	0.03	1.70	0.65	1.20	0.52	0.27	0.03	0.03	0.03	0.11	0.95
4500	2.10	0.02	0.39	0.02	0.02	0.02	1.50	0.59	1.10	0.46	0.24	0.02	0.02	0.02	0.10	0.82
5000	1.80	0.02	0.34	0.02	0.02	0.02	1.30	0.54	0.94	0.41	0.22	0.02	0.02	0.02	0.08	0.71
6000	1.40	0.02	0.25	0.02	0.02	0.02	1.10	0.46	0.76	0.34	0.18	0.02	0.02	0.02	0.06	0.54
7000	1.10	0.01	0.20	0.01	0.01	0.01	0.93	0.40	0.63	0.28	0.15	0.01	0.01	0.01	0.05	0.43
8000	0.84	0.00	0.15	0.00	0.00	0.00	0.80	0.35	0.53	0.24	0.13	0.00	0.00	0.00	0.04	0.35
9000	0.68	0.00	0.12	0.00	0.00	0.00	0.70	0.31	0.46	0.21	0.11	0.00	0.00	0.00	0.03	0.29
10000	0.57	0.00	0.10	0.00	0.00	0.00	0.61	0.28	0.40	0.18	0.10	0.00	0.00	0.00	0.03	0.25

Table 12.26 : Long Term SO2 Concentration (ug/m3) from Blast Furnace Stack for the month of May

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.12	0.20	0.04	0.07	0.00	0.00	0.00	0.05	0.00
1000	0.37	0.00	0.18	0.00	0.06	0.00	0.19	0.13	0.21	0.28	0.66	0.00	0.00	0.18	0.51	0.00
1500	1.30	0.00	0.63	0.00	0.22	0.00	2.60	1.70	2.70	0.37	0.81	0.00	0.00	0.37	0.96	0.00
2000	1.80	0.00	0.87	0.00	0.30	0.00	2.80	1.80	2.80	0.37	0.80	0.00	0.00	0.43	1.10	0.00
2500	1.90	0.00	0.91	0.00	0.32	0.00	2.70	1.70	2.60	0.36	0.75	0.00	0.00	0.41	1.20	0.00
3000	1.80	0.00	0.88	0.00	0.31	0.00	2.50	1.50	2.40	0.34	0.70	0.00	0.00	0.38	1.10	0.00
3500	1.70	0.00	0.83	0.00	0.29	0.00	2.30	1.40	2.20	0.32	0.65	0.00	0.00	0.34	1.00	0.00
4000	1.60	0.00	0.77	0.00	0.27	0.00	2.10	1.30	2.00	0.30	0.61	0.00	0.00	0.31	0.98	0.00
4500	1.50	0.00	0.72	0.00	0.25	0.00	2.00	1.20	1.90	0.28	0.56	0.00	0.00	0.27	0.92	0.00
5000	1.40	0.00	0.68	0.00	0.24	0.00	1.80	1.10	1.70	0.26	0.52	0.00	0.00	0.25	0.86	0.00
6000	1.30	0.00	0.64	0.00	0.23	0.00	1.70	1.00	1.60	0.25	0.48	0.00	0.00	0.22	0.81	0.00
7000	1.10	0.00	0.55	0.00	0.19	0.00	1.40	0.81	1.30	0.20	0.39	0.00	0.00	0.17	0.68	0.00
8000	1.00	0.00	0.50	0.00	0.18	0.00	1.20	0.71	1.10	0.18	0.35	0.00	0.00	0.15	0.62	0.00
9000	0.96	0.00	0.46	0.00	0.16	0.00	1.10	0.63	0.97	0.16	0.31	0.00	0.00	0.13	0.56	0.00
10000	0.89	0.00	0.43	0.00	0.15	0.00	0.97	0.56	0.87	0.15	0.28	0.00	0.00	0.11	0.52	0.00

Table 12.27 : Long Term SO_2 Concentration (ug/m^3) from Blast Furnace Stack for the month of July

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.32	0.08	0.07	0.00	0.00	0.00	0.03	0.00
1000	0.19	0.00	0.00	0.00	0.11	0.00	1.40	0.07	3.40	0.79	0.76	0.00	0.00	0.00	0.41	0.00
1500	0.66	0.00	0.00	0.00	0.40	0.00	2.20	0.26	5.60	1.20	1.20	0.00	0.00	0.00	1.00	0.00
2000	0.91	0.00	0.00	0.00	0.55	0.00	2.40	0.36	6.20	1.30	1.20	0.00	0.00	0.00	1.30	0.00
2500	0.96	0.00	0.00	0.00	0.58	0.00	2.30	0.38	6.00	1.20	1.20	0.00	0.00	0.00	1.40	0.00
3000	0.93	0.00	0.00	0.00	0.56	0.00	2.10	0.37	5.60	1.10	1.10	0.00	0.00	0.00	1.30	0.00
3500	0.88	0.00	0.00	0.00	0.53	0.00	1.90	0.35	5.20	1.00	1.00	0.00	0.00	0.00	1.30	0.00
4000	0.82	0.00	0.00	0.00	0.49	0.00	1.70	0.33	4.80	0.95	0.93	0.00	0.00	0.00	1.20	0.00
4500	0.77	0.00	0.00	0.00	0.47	0.00	1.50	0.31	4.40	0.87	0.85	0.00	0.00	0.00	1.10	0.00
5000	0.73	0.00	0.00	0.00	0.44	0.00	1.40	0.29	4.10	0.79	0.78	0.00	0.00	0.00	1.00	0.00
6000	0.66	0.00	0.00	0.00	0.40	0.00	1.20	0.26	3.50	0.68	0.67	0.00	0.00	0.00	0.94	0.00
7000	0.60	0.00	0.00	0.00	0.36	0.00	1.00	0.24	3.10	0.58	0.57	0.00	0.00	0.00	0.85	0.00
8000	0.60	0.00	0.00	0.00	0.33	0.00	0.89	0.22	2.70	0.51	0.50	0.00	0.00	0.00	0.77	0.00
9000	0.51	0.00	0.00	0.00	0.30	0.00	0.79	0.20	2.40	0.46	0.44	0.00	0.00	0.00	0.71	0.00
10000	0.47	0.00	0.00	0.00	0.28	0.00	0.70	0.19	2.20	0.41	0.40	0.00	0.00	0.00	0.66	0.00

Table 12.28 : Long Term SO2 Concentration (ug/m3) from Blast Furnace Stack for the month of October

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.06	0.23	0.00	0.08	0.04	0.00	0.04	0.03	0.00
1000	0.80	0.00	0.07	0.00	0.00	0.00	0.58	0.56	2.20	0.00	0.74	0.31	0.26	0.31	0.30	0.00
1500	2.80	0.00	0.25	0.00	0.00	0.00	0.92	0.76	3.10	0.00	1.30	0.40	0.66	0.40	0.51	0.00
2000	3.90	0.00	0.35	0.00	0.00	0.00	0.97	0.75	3.20	0.00	1.50	0.37	0.83	0.37	0.56	0.00
2500	4.10	0.00	0.36	0.00	0.00	0.00	0.89	0.66	2.90	0.00	1.40	0.32	0.83	0.32	0.52	0.00
3000	3.80	0.00	0.34	0.00	0.00	0.00	0.78	0.58	2.50	0.00	1.30	0.26	0.76	0.26	0.46	0.00
3500	3.30	0.00	0.30	0.00	0.00	0.00	0.67	0.50	2.20	0.00	1.10	0.22	0.68	0.22	0.40	0.00
4000	2.90	0.00	0.26	0.00	0.00	0.00	0.57	0.44	1.90	0.00	0.96	0.18	0.60	0.18	0.34	0.00
4500	2.50	0.00	0.23	0.00	0.00	0.00	0.49	0.38	1.70	0.00	0.82	0.16	0.53	0.16	0.29	0.00
5000	2.20	0.00	0.20	0.00	0.00	0.00	0.43	0.34	1.50	0.00	0.72	0.14	0.46	0.14	0.25	0.00
6000	1.70	0.00	0.15	0.00	0.00	0.00	0.33	0.27	1.20	0.00	0.55	0.10	0.37	0.10	0.20	0.00
7000	1.40	0.00	0.12	0.00	0.00	0.00	0.26	0.22	0.96	0.00	0.44	0.08	0.30	0.08	0.16	0.00
8000	1.10	0.00	0.10	0.00	0.00	0.00	0.21	0.18	0.80	0.00	0.35	0.07	0.25	0.07	0.13	0.00
9000	0.90	0.00	0.08	0.00	0.00	0.00	0.18	0.16	0.68	0.00	0.29	0.06	0.21	0.06	0.10	0.00
10000	0.76	0.00	0.07	0.00	0.00	0.00	0.15	0.14	0.59	0.00	0.25	0.05	0.18	0.05	0.09	0.00

Table 12.29 : Long Term SO2 Concentration (ug/m3) from Coke Oven Stack for the month of January

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1000	0.05	0.00	0.00	0.00	0.00	0.00	0.26	0.14	0.26	0.11	0.06	0.00	0.00	0.00	0.03	0.08
1500	0.25	0.00	0.00	0.00	0.00	0.00	0.89	0.42	0.85	0.36	0.19	0.00	0.00	0.00	0.09	0.27
2000	0.65	0.00	0.07	0.00	0.00	0.00	1.30	0.54	1.20	0.49	0.26	0.00	0.00	0.00	0.13	0.44
2500	1.10	0.00	0.15	0.00	0.00	0.00	1.40	0.56	1.30	0.52	0.27	0.00	0.00	0.00	0.14	0.58
3000	1.40	0.01	0.23	0.01	0.01	0.00	1.40	0.54	1.20	0.51	0.27	0.01	0.01	0.01	0.13	0.66
3500	1.60	0.02	0.27	0.02	0.02	0.02	1.40	0.51	1.10	0.48	0.25	0.02	0.02	0.02	0.12	0.69
4000	1.70	0.02	0.30	0.02	0.02	0.02	1.30	0.48	1.10	0.44	0.23	0.02	0.02	0.02	0.11	0.69
4500	1.70	0.02	0.30	0.02	0.02	0.02	1.20	0.45	0.96	0.40	0.21	0.02	0.02	0.02	0.10	0.67
5000	1.60	0.02	0.29	0.02	0.02	0.02	1.20	0.42	0.88	0.37	0.19	0.02	0.02	0.02	0.09	0.64
6000	1.40	0.02	0.26	0.02	0.02	0.02	1.00	0.37	0.74	0.32	0.17	0.02	0.02	0.02	0.07	0.56
7000	1.20	0.01	0.23	0.01	0.01	0.01	0.89	0.33	0.63	0.27	0.14	0.01	0.01	0.01	0.06	0.47
8000	1.00	0.01	0.19	0.01	0.01	0.01	0.79	0.30	0.56	0.24	0.12	0.01	0.01	0.01	0.05	0.41
9000	0.89	0.00	0.16	0.00	0.00	0.00	0.70	0.27	0.48	0.21	0.11	0.00	0.00	0.00	0.04	0.35
10000	0.76	0.00	0.14	0.00	0.00	0.00	0.63	0.25	0.42	0.19	0.10	0.00	0.00	0.00	0.04	0.30

Table 12.30 : Long Term SO2 Concentration (ug/m3) from Coke Oven Stack for the month of May

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1000	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.15	0.28	0.03	0.09	0.00	0.00	0.00	0.04	0.00
1500	0.03	0.00	0.01	0.00	0.00	0.00	0.78	0.56	0.96	0.11	0.29	0.00	0.00	0.08	0.15	0.00
2000	0.18	0.00	0.09	0.00	0.03	0.00	1.20	0.83	1.40	0.16	0.40	0.00	0.00	0.17	0.28	0.00
2500	0.41	0.00	0.20	0.00	0.07	0.00	1.40	0.95	1.50	0.18	0.43	0.00	0.00	0.22	0.39	0.00
3000	0.61	0.00	0.29	0.00	0.10	0.00	1.40	0.98	1.50	0.18	0.43	0.00	0.00	0.25	0.46	0.00
3500	0.74	0.00	0.35	0.00	0.12	0.00	1.40	0.96	1.50	0.18	0.42	0.00	0.00	0.26	0.50	0.00
4000	0.80	0.00	0.39	0.00	0.14	0.00	1.40	0.93	1.50	0.17	0.40	0.00	0.00	0.26	0.52	0.00
4500	0.82	0.00	0.39	0.00	0.14	0.00	1.40	0.89	1.40	0.16	0.38	0.00	0.00	0.25	0.51	0.00
5000	0.80	0.00	0.39	0.00	0.14	0.00	1.30	0.85	1.30	0.16	0.36	0.00	0.00	0.24	0.50	0.00
6000	0.73	0.00	0.35	0.00	0.12	0.00	1.20	0.76	1.20	0.14	0.33	0.00	0.00	0.21	0.46	0.00
7000	0.64	0.00	0.31	0.00	0.11	0.00	1.10	0.68	1.10	0.13	0.30	0.00	0.00	0.19	0.41	0.00
8000	0.56	0.00	0.27	0.00	0.10	0.00	0.95	0.62	0.98	0.12	0.27	0.00	0.00	0.17	0.36	0.00
9000	0.49	0.00	0.24	0.00	0.08	0.00	0.86	0.56	0.89	0.11	0.25	0.00	0.00	0.15	0.33	0.00
10000	0.44	0.00	0.21	0.00	0.07	0.00	0.79	0.51	0.81	0.10	0.23	0.00	0.00	0.14	0.30	0.00

Table 12.31 : Long Term SO2 Concentration (ug/m3) from Coke Oven Stack for the month of July

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1000	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.36	0.09	0.06	0.00	0.00	0.00	0.02	0.00
1500	0.01	0.00	0.00	0.00	0.00	0.00	0.57	0.00	1.30	0.32	0.31	0.00	0.00	0.00	0.09	0.00
2000	0.09	0.00	0.00	0.00	0.06	0.00	0.90	0.04	2.10	0.49	0.52	0.00	0.00	0.00	0.22	0.00
2500	0.21	0.00	0.00	0.00	0.12	0.00	1.10	0.08	2.60	0.59	0.62	0.00	0.00	0.00	0.37	0.00
3000	0.31	0.00	0.00	0.00	0.18	0.00	1.20	0.12	2.90	0.64	0.66	0.00	0.00	0.00	0.48	0.00
3500	0.37	0.00	0.00	0.00	0.22	0.00	1.20	0.15	3.00	0.65	0.66	0.00	0.00	0.00	0.56	0.00
4000	0.40	0.00	0.00	0.00	0.24	0.00	1.20	0.16	3.00	0.64	0.65	0.00	0.00	0.00	0.59	0.00
4500	0.41	0.00	0.00	0.00	0.25	0.00	1.20	0.16	2.90	0.62	0.63	0.00	0.00	0.00	0.60	0.00
5000	0.40	0.00	0.00	0.00	0.24	0.00	1.10	0.16	2.80	0.59	0.60	0.00	0.00	0.00	0.58	0.00
6000	0.37	0.00	0.00	0.00	0.22	0.00	1.00	0.15	2.60	0.53	0.54	0.00	0.00	0.00	0.53	0.00
7000	0.33	0.00	0.00	0.00	0.20	0.00	0.89	0.13	2.30	0.48	0.49	0.00	0.00	0.00	0.47	0.00
8000	0.29	0.00	0.00	0.00	0.17	0.00	0.79	0.11	2.00	0.42	0.44	0.00	0.00	0.00	0.42	0.00
9000	0.25	0.00	0.00	0.00	0.15	0.00	0.71	0.10	1.80	0.38	0.40	0.00	0.00	0.00	0.37	0.00
10000	0.22	0.00	0.00	0.00	0.13	0.00	0.64	0.09	1.70	0.34	0.36	0.00	0.00	0.00	0.34	0.00

Table 12.32 : Long Term SO2 Concentration (ug/m3) from Coke Oven Stack for the month of October

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1000	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.07	0.25	0.00	0.06	0.04	0.00	0.04	0.03	0.00
1500	0.06	0.00	0.00	0.00	0.00	0.00	0.20	0.23	0.87	0.00	0.23	0.12	0.08	0.12	0.10	0.00
2000	0.40	0.00	0.04	0.00	0.00	0.00	0.32	0.34	1.30	0.00	0.40	0.18	0.19	0.18	0.16	0.00
2500	0.89	0.00	0.08	0.00	0.00	0.00	0.40	0.39	1.50	0.00	0.55	0.20	0.30	0.20	0.21	0.00
3000	1.30	0.00	0.12	0.00	0.00	0.00	0.44	0.40	1.60	0.00	0.63	0.19	0.37	0.19	0.24	0.00
3500	1.60	0.00	0.14	0.00	0.00	0.00	0.45	0.39	1.60	0.00	0.67	0.18	0.41	0.18	0.25	0.00
4000	1.80	0.00	0.16	0.00	0.00	0.00	0.44	0.37	1.60	0.00	0.68	0.17	0.42	0.17	0.25	0.00
4500	1.80	0.00	0.16	0.00	0.00	0.00	0.42	0.35	1.50	0.00	0.66	0.15	0.42	0.15	0.24	0.00
5000	1.80	0.00	0.16	0.00	0.00	0.00	0.39	0.32	1.40	0.00	0.63	0.14	0.40	0.14	0.23	0.00
6000	1.60	0.00	0.14	0.00	0.00	0.00	0.33	0.28	1.20	0.00	0.55	0.11	0.36	0.11	0.20	0.00
7000	1.40	0.00	0.12	0.00	0.00	0.00	0.28	0.24	1.00	0.00	0.47	0.10	0.32	0.10	0.17	0.00
8000	1.20	0.00	0.11	0.00	0.00	0.00	0.24	0.21	0.91	0.00	0.40	0.08	0.28	0.08	0.14	0.00
9000	1.00	0.00	0.09	0.00	0.00	0.00	0.21	0.19	0.80	0.00	0.35	0.07	0.24	0.07	0.12	0.00
10000	0.89	0.00	0.08	0.00	0.00	0.00	0.18	0.17	0.71	0.00	0.30	0.06	0.21	0.06	0.11	0.00

Table 12.33 : Long Term NOx Concentration (ug/m3) from Coke Oven Stack for the month of January

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1000	0.04	0.00	0.00	0.00	0.00	0.00	0.21	0.11	0.21	0.09	0.05	0.00	0.00	0.00	0.02	0.06
1500	0.20	0.00	0.00	0.00	0.00	0.00	0.71	0.34	0.69	0.29	0.15	0.00	0.00	0.00	0.07	0.21
2000	0.52	0.00	0.06	0.00	0.00	0.00	1.00	0.43	0.95	0.40	0.21	0.00	0.00	0.00	0.10	0.36
2500	0.87	0.00	0.12	0.00	0.00	0.00	1.10	0.45	1.00	0.42	0.22	0.00	0.00	0.00	0.11	0.46
3000	1.10	0.01	0.18	0.01	0.01	0.01	1.10	0.46	0.98	0.41	0.21	0.01	0.01	0.01	0.11	0.53
3500	1.30	0.01	0.22	0.01	0.01	0.01	1.10	0.41	0.92	0.38	0.20	0.01	0.01	0.01	0.10	0.56
4000	1.30	0.01	0.24	0.01	0.01	0.01	1.10	0.38	0.84	0.35	0.18	0.01	0.01	0.01	0.09	0.56
4500	1.30	0.01	0.24	0.01	0.01	0.01	1.00	0.36	0.77	0.32	0.17	0.01	0.01	0.01	0.08	0.54
5000	1.30	0.01	0.24	0.01	0.01	0.01	0.94	0.34	0.71	0.30	0.16	0.01	0.01	0.01	0.07	0.51
6000	1.10	0.01	0.21	0.01	0.01	0.01	0.82	0.30	0.59	0.25	0.13	0.01	0.01	0.01	0.06	0.45
7000	0.98	0.01	0.18	0.01	0.01	0.01	0.72	0.27	0.51	0.22	0.11	0.01	0.01	0.01	0.05	0.38
8000	0.84	0.00	0.15	0.00	0.00	0.00	0.63	0.24	0.44	0.19	0.10	0.00	0.00	0.00	0.04	0.33
9000	0.71	0.00	0.13	0.00	0.00	0.00	0.56	0.22	0.38	0.17	0.09	0.00	0.00	0.00	0.03	0.28
10000	0.61	0.00	0.11	0.00	0.00	0.00	0.51	0.20	0.34	0.15	0.08	0.00	0.00	0.00	0.03	0.24

Table 12.34 : Long Term NOx Concentration (ug/m3) from Coke Oven Stack for the month of May

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1000	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.12	0.23	0.02	0.07	0.00	0.00	0.00	0.03	0.00
1500	0.02	0.00	0.01	0.00	0.00	0.00	0.62	0.45	0.77	0.08	0.24	0.00	0.00	0.07	0.12	0.00
2000	0.15	0.00	0.07	0.00	0.03	0.00	0.95	0.67	1.10	0.13	0.32	0.00	0.00	0.13	0.23	0.00
2500	0.33	0.00	0.16	0.00	0.06	0.00	1.10	0.76	1.20	0.14	0.35	0.00	0.00	0.18	0.31	0.00
3000	0.49	0.00	0.23	0.00	0.08	0.00	1.20	0.78	1.20	0.14	0.34	0.00	0.00	0.20	0.37	0.00
3500	0.59	0.00	0.28	0.00	0.10	0.00	1.20	0.77	1.20	0.14	0.33	0.00	0.00	0.21	0.40	0.00
4000	0.64	0.00	0.31	0.00	0.11	0.00	1.10	0.75	1.20	0.14	0.32	0.00	0.00	0.21	0.42	0.00
4500	0.66	0.00	0.32	0.00	0.11	0.00	1.10	0.72	1.10	0.13	0.30	0.00	0.00	0.20	0.41	0.00
5000	0.65	0.00	0.31	0.00	0.11	0.00	1.00	0.68	1.10	0.13	0.29	0.00	0.00	0.19	0.40	0.00
6000	0.59	0.00	0.28	0.00	0.10	0.00	0.94	0.61	0.96	0.12	0.26	0.00	0.00	0.17	0.37	0.00
7000	0.52	0.00	0.25	0.00	0.09	0.00	0.84	0.55	0.87	0.11	0.24	0.00	0.00	0.15	0.33	0.00
8000	0.45	0.00	0.22	0.00	0.08	0.00	0.76	0.50	0.78	0.10	0.22	0.00	0.00	0.14	0.29	0.00
9000	0.40	0.00	0.19	0.00	0.07	0.00	0.69	0.45	0.71	0.09	0.20	0.00	0.00	0.12	0.26	0.00
10000	0.35	0.00	0.17	0.00	0.06	0.00	0.63	0.41	0.65	0.08	0.18	0.00	0.00	0.11	0.24	0.00

Table 12.35 : Long Term NOx Concentration (ug/m3) from Coke Oven Stack for the month of July

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1000	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.29	0.08	0.06	0.00	0.00	0.00	0.02	0.00
1500	0.01	0.00	0.00	0.00	0.00	0.00	0.46	0.00	1.00	0.26	0.25	0.00	0.00	0.00	0.07	0.00
2000	0.08	0.00	0.00	0.00	0.05	0.00	0.72	0.03	1.70	0.39	0.41	0.00	0.00	0.00	0.18	0.00
2500	0.17	0.00	0.00	0.00	0.10	0.00	0.88	0.07	2.10	0.47	0.50	0.00	0.00	0.00	0.29	0.00
3000	0.25	0.00	0.00	0.00	0.15	0.00	0.96	0.10	2.30	0.51	0.53	0.00	0.00	0.00	0.39	0.00
3500	0.30	0.00	0.00	0.00	0.18	0.00	0.98	0.12	2.40	0.52	0.53	0.00	0.00	0.00	0.45	0.00
4000	0.32	0.00	0.00	0.00	0.19	0.00	0.97	0.13	2.40	0.51	0.52	0.00	0.00	0.00	0.47	0.00
4500	0.33	0.00	0.00	0.00	0.20	0.00	0.94	0.13	2.40	0.50	0.50	0.00	0.00	0.00	0.48	0.00
5000	0.32	0.00	0.00	0.00	0.19	0.00	0.90	0.13	2.30	0.48	0.48	0.00	0.00	0.00	0.47	0.00
6000	0.30	0.00	0.00	0.00	0.18	0.00	0.80	0.12	2.10	0.43	0.43	0.00	0.00	0.00	0.43	0.00
7000	0.26	0.00	0.00	0.00	0.16	0.00	0.71	0.10	1.80	0.38	0.39	0.00	0.00	0.00	0.38	0.00
8000	0.23	0.00	0.00	0.00	0.14	0.00	0.63	0.09	1.60	0.34	0.35	0.00	0.00	0.00	0.34	0.00
9000	0.20	0.00	0.00	0.00	0.12	0.00	0.57	0.08	1.50	0.31	0.32	0.00	0.00	0.00	0.30	0.00
10000	0.18	0.00	0.00	0.00	0.11	0.00	0.51	0.07	1.30	0.28	0.29	0.00	0.00	0.00	0.27	0.00

Table 12.36 : Long Term NOx Concentration (ug/m3) from Coke Oven Stack for the month of October

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1000	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.06	0.20	0.00	0.05	0.03	0.00	0.03	0.02	0.00
1500	0.05	0.00	0.00	0.00	0.00	0.00	0.16	0.19	0.70	0.00	0.18	0.10	0.07	0.10	0.08	0.00
2000	0.32	0.00	0.03	0.00	0.00	0.00	0.26	0.27	1.10	0.00	0.32	0.14	0.16	0.14	0.13	0.00
2500	0.72	0.00	0.06	0.00	0.00	0.00	0.32	0.31	1.20	0.00	0.44	0.16	0.24	0.16	0.17	0.00
3000	1.10	0.00	0.10	0.00	0.00	0.00	0.35	0.32	1.30	0.00	0.51	0.16	0.30	0.16	0.19	0.00
3500	1.30	0.00	0.11	0.00	0.00	0.00	0.36	0.31	1.30	0.00	0.54	0.15	0.33	0.15	0.20	0.00
4000	1.40	0.00	0.13	0.00	0.00	0.00	0.35	0.30	1.20	0.00	0.54	0.13	0.34	0.13	0.20	0.00
4500	1.40	0.00	0.13	0.00	0.00	0.00	0.33	0.28	1.20	0.00	0.53	0.12	0.33	0.12	0.19	0.00
5000	1.40	0.00	0.13	0.00	0.00	0.00	0.31	0.26	1.10	0.00	0.50	0.11	0.32	0.11	0.18	0.00
6000	1.30	0.00	0.11	0.00	0.00	0.00	0.27	0.22	0.97	0.00	0.44	0.09	0.29	0.09	0.16	0.00
7000	1.10	0.00	0.10	0.00	0.00	0.00	0.23	0.19	0.84	0.00	0.38	0.08	0.25	0.08	0.13	0.00
8000	0.96	0.00	0.09	0.00	0.00	0.00	0.20	0.17	0.73	0.00	0.32	0.07	0.22	0.07	0.12	0.00
9000	0.82	0.00	0.07	0.00	0.00	0.00	0.17	0.15	0.64	0.00	0.28	0.06	0.20	0.06	0.10	0.00
10000	0.71	0.00	0.06	0.00	0.00	0.00	0.15	0.13	0.57	0.00	0.24	0.05	0.17	0.05	0.09	0.00

Table 12.37 : Long Term SPM Concentration (ug/m3) from Sinter Plant Stack for the month of July

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1000	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.12	0.03	0.02	0.00	0.00	0.00	0.00	0.00
1500	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.61	0.15	0.14	0.00	0.00	0.00	0.03	0.00
2000	0.02	0.00	0.00	0.00	0.01	0.00	0.49	0.00	1.10	0.26	0.28	0.00	0.00	0.00	0.08	0.00
2500	0.07	0.00	0.00	0.00	0.04	0.00	0.63	0.03	1.50	0.33	0.37	0.00	0.00	0.00	0.16	0.00
3000	0.13	0.00	0.00	0.00	0.08	0.00	0.72	0.05	1.70	0.38	0.41	0.00	0.00	0.00	0.23	0.00
3500	0.18	0.00	0.00	0.00	0.11	0.00	0.76	0.07	1.80	0.40	0.43	0.00	0.00	0.00	0.28	0.00
4000	0.21	0.00	0.00	0.00	0.13	0.00	0.78	0.08	1.90	0.40	0.43	0.00	0.00	0.00	0.32	0.00
4500	0.23	0.00	0.00	0.00	0.14	0.00	0.77	0.09	1.90	0.40	0.42	0.00	0.00	0.00	0.34	0.00
5000	0.24	0.00	0.00	0.00	0.14	0.00	0.75	0.10	1.80	0.39	0.41	0.00	0.00	0.00	0.35	0.00
6000	0.23	0.00	0.00	0.00	0.14	0.00	0.69	0.09	1.70	0.36	0.37	0.00	0.00	0.00	0.34	0.00
7000	0.21	0.00	0.00	0.00	0.13	0.00	0.62	0.09	1.60	0.33	0.34	0.00	0.00	0.00	0.31	0.00
8000	0.19	0.00	0.00	0.00	0.12	0.00	0.56	0.08	1.40	0.30	0.31	0.00	0.00	0.00	0.28	0.00
9000	0.17	0.00	0.00	0.00	0.10	0.00	0.51	0.07	1.30	0.27	0.28	0.00	0.00	0.00	0.25	0.00
10000	0.15	0.00	0.00	0.00	0.09	0.00	0.46	0.06	1.20	0.24	0.26	0.00	0.00	0.00	0.23	0.00

Table 12.38 : Long Term SO2 Concentration (ug/m3) from Sinter Plant Stack for the month of July

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1000	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.10	0.02	0.02	0.00	0.00	0.00	0.00	0.00
1500	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.51	0.13	0.12	0.00	0.00	0.00	0.03	0.00
2000	0.02	0.00	0.00	0.00	0.01	0.00	0.41	0.00	0.92	0.22	0.23	0.00	0.00	0.00	0.07	0.00
2500	0.06	0.00	0.00	0.00	0.04	0.00	0.53	0.02	1.20	0.28	0.31	0.00	0.00	0.00	0.13	0.00
3000	0.11	0.00	0.00	0.00	0.07	0.00	0.60	0.04	1.40	0.32	0.34	0.00	0.00	0.00	0.19	0.00
3500	0.15	0.00	0.00	0.00	0.09	0.00	0.64	0.06	1.50	0.33	0.36	0.00	0.00	0.00	0.24	0.00
4000	0.18	0.00	0.00	0.00	0.11	0.00	0.65	0.07	1.60	0.34	0.36	0.00	0.00	0.00	0.27	0.00
4500	0.19	0.00	0.00	0.00	0.12	0.00	0.64	0.08	1.60	0.34	0.35	0.00	0.00	0.00	0.29	0.00
5000	0.20	0.00	0.00	0.00	0.12	0.00	0.63	0.08	1.50	0.33	0.34	0.00	0.00	0.00	0.29	0.00
6000	0.20	0.00	0.00	0.00	0.12	0.00	0.58	0.08	1.40	0.30	0.31	0.00	0.00	0.00	0.28	0.00
7000	0.18	0.00	0.00	0.00	0.11	0.00	0.52	0.07	1.30	0.27	0.28	0.00	0.00	0.00	0.26	0.00
8000	0.16	0.00	0.00	0.00	0.10	0.00	0.47	0.06	1.20	0.25	0.26	0.00	0.00	0.00	0.23	0.00
9000	0.14	0.00	0.00	0.00	0.09	0.00	0.42	0.06	1.10	0.23	0.24	0.00	0.00	0.00	0.21	0.00
10000	0.13	0.00	0.00	0.00	0.08	0.00	0.38	0.05	0.98	0.20	0.22	0.00	0.00	0.00	0.19	0.00

Table 12.39 : Long Term NOx Concentration (ug/m3) from Sinter Plant Stack for the month of January .

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1000	0.02	0.00	0.00	0.00	0.00	0.00	0.13	0.07	0.13	0.06	0.03	0.00	0.00	0.00	0.01	0.04
1500	0.15	0.00	0.00	0.00	0.00	0.00	0.65	0.32	0.61	0.26	0.14	0.00	0.00	0.00	0.06	0.18
2000	0.38	0.00	0.03	0.00	0.00	0.00	1.10	0.47	0.98	0.41	0.22	0.00	0.00	0.00	0.10	0.32
2500	0.71	0.00	0.08	0.00	0.00	0.00	1.30	0.52	1.10	0.48	0.25	0.00	0.00	0.00	0.12	0.44
3000	1.00	0.00	0.14	0.00	0.00	0.00	1.40	0.52	1.20	0.48	0.25	0.00	0.00	0.00	0.13	0.53
3500	1.30	0.01	0.20	0.01	0.01	0.01	1.40	0.51	1.10	0.47	0.24	0.01	0.01	0.01	0.12	0.59
4000	1.40	0.01	0.23	0.01	0.01	0.01	1.30	0.49	1.10	0.44	0.23	0.01	0.01	0.01	0.11	0.62
4500	1.50	0.02	0.25	0.02	0.02	0.02	1.30	0.46	0.98	0.41	0.22	0.02	0.02	0.02	0.10	0.62
5000	1.50	0.02	0.26	0.02	0.02	0.02	1.20	0.44	0.91	0.38	0.20	0.02	0.02	0.02	0.09	0.61
6000	1.40	0.02	0.25	0.02	0.02	0.02	1.10	0.39	0.78	0.33	0.17	0.02	0.02	0.02	0.08	0.56
7000	1.30	0.01	0.23	0.01	0.01	0.01	0.96	0.35	0.68	0.29	0.15	0.01	0.01	0.01	0.06	0.49
8000	1.10	0.01	0.20	0.01	0.01	0.01	0.85	0.32	0.59	0.25	0.13	0.01	0.01	0.01	0.05	0.43
9000	0.97	0.01	0.18	0.01	0.01	0.01	0.76	0.29	0.52	0.23	0.12	0.01	0.01	0.01	0.05	0.38
10000	0.84	0.00	0.15	0.00	0.00	0.00	0.69	0.26	0.46	0.20	0.11	0.00	0.00	0.00	0.04	0.33

Table 12.40 : Long Term NOx Concentration (ug/m3) from Sinter Plant Stack for the month of May

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1000	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.07	0.14	0.01	0.05	0.00	0.00	0.00	0.02	0.00
1500	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.41	0.71	0.07	0.21	0.00	0.00	0.06	0.10	0.00
2000	0.07	0.00	0.03	0.00	0.01	0.00	0.97	0.70	1.20	0.12	0.34	0.00	0.00	0.14	0.19	0.00
2500	0.21	0.00	0.10	0.00	0.04	0.00	1.20	0.87	1.40	0.15	0.39	0.00	0.00	0.20	0.29	0.00
3000	0.38	0.00	0.18	0.00	0.07	0.00	1.30	0.93	1.50	0.16	0.40	0.00	0.00	0.24	0.36	0.00
3500	0.53	0.00	0.25	0.00	0.09	0.00	1.40	0.95	1.50	0.16	0.40	0.00	0.00	0.26	0.41	0.00
4000	0.63	0.00	0.30	0.00	0.11	0.00	1.40	0.93	1.50	0.16	0.39	0.00	0.00	0.26	0.44	0.00
4500	0.69	0.00	0.33	0.00	0.12	0.00	1.30	0.90	1.40	0.15	0.38	0.00	0.00	0.26	0.46	0.00
5000	0.71	0.00	0.34	0.00	0.12	0.00	1.30	0.87	1.40	0.15	0.36	0.00	0.00	0.25	0.46	0.00
6000	0.69	0.00	0.33	0.00	0.12	0.00	1.20	0.79	1.30	0.14	0.33	0.00	0.00	0.23	0.43	0.00
7000	0.64	0.00	0.31	0.00	0.11	0.00	1.10	0.72	1.10	0.13	0.30	0.00	0.00	0.21	0.40	0.00
8000	0.57	0.00	0.27	0.00	0.10	0.00	0.98	0.65	1.00	0.12	0.28	0.00	0.00	0.19	0.36	0.00
9000	0.50	0.00	0.24	0.00	0.09	0.00	0.90	0.59	0.94	0.11	0.25	0.00	0.00	0.17	0.33	0.00
10000	0.44	0.00	0.21	0.00	0.08	0.00	0.82	0.54	0.87	0.10	0.23	0.00	0.00	0.15	0.30	0.00

Table 12.41 : Long Term NOx Concentration (ug/m3) from Sinter Plant Stack for the month of July

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1000	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.17	0.05	0.04	0.00	0.00	0.00	0.00	0.00
1500	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.00	0.91	0.23	0.21	0.00	0.00	0.00	0.05	0.00
2000	0.03	0.00	0.00	0.00	0.02	0.00	0.72	0.01	1.60	0.39	0.42	0.00	0.00	0.00	0.12	0.00
2500	0.11	0.00	0.00	0.00	0.07	0.00	0.94	0.04	2.20	0.50	0.55	0.00	0.00	0.00	0.23	0.00
3000	0.19	0.00	0.00	0.00	0.12	0.00	1.10	0.08	2.50	0.56	0.62	0.00	0.00	0.00	0.34	0.00
3500	0.27	0.00	0.00	0.00	0.16	0.00	1.10	0.11	2.70	0.59	0.64	0.00	0.00	0.00	0.42	0.00
4000	0.32	0.00	0.00	0.00	0.19	0.00	1.20	0.13	2.80	0.60	0.64	0.00	0.00	0.00	0.48	0.00
4500	0.35	0.00	0.00	0.00	0.21	0.00	1.10	0.14	2.80	0.60	0.62	0.00	0.00	0.00	0.51	0.00
5000	0.36	0.00	0.00	0.00	0.22	0.00	1.10	0.14	2.70	0.58	0.60	0.00	0.00	0.00	0.52	0.00
6000	0.35	0.00	0.00	0.00	0.21	0.00	1.00	0.14	2.60	0.54	0.56	0.00	0.00	0.00	0.51	0.00
7000	0.32	0.00	0.00	0.00	0.19	0.00	0.93	0.13	2.30	0.49	0.51	0.00	0.00	0.00	0.46	0.00
8000	0.29	0.00	0.00	0.00	0.17	0.00	0.84	0.11	2.10	0.44	0.46	0.00	0.00	0.00	0.42	0.00
9000	0.25	0.00	0.00	0.00	0.15	0.00	0.76	0.10	1.90	0.40	0.42	0.00	0.00	0.00	0.37	0.00
10000	0.23	0.00	0.00	0.00	0.14	0.00	0.69	0.09	1.70	0.37	0.38	0.00	0.00	0.00	0.34	0.00

Table 12.42 : Long Term NOx Concentration (ug/m3) from Sinter Plant Shop Stack for the month of October

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1000	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.12	0.00	0.03	0.02	0.00	0.02	0.01	0.00
1500	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.16	0.61	0.00	0.14	0.08	0.05	0.08	0.06	0.00
2000	0.14	0.00	0.01	0.00	0.00	0.00	0.24	0.28	1.00	0.00	0.28	0.14	0.14	0.19	0.12	0.00
2500	0.47	0.00	0.04	0.00	0.00	0.00	0.32	0.34	1.30	0.00	0.41	0.17	0.23	0.17	0.16	0.00
3000	0.84	0.00	0.07	0.00	0.00	0.00	0.36	0.37	1.50	0.00	0.50	0.18	0.30	0.18	0.19	0.00
3500	1.20	0.00	0.10	0.00	0.00	0.00	0.39	0.37	1.50	0.00	0.56	0.17	0.35	0.17	0.21	0.00
4000	1.40	0.00	0.12	0.00	0.00	0.00	0.39	0.36	1.50	0.00	0.59	0.16	0.38	0.16	0.22	0.00
4500	1.50	0.00	0.13	0.00	0.00	0.00	0.39	0.35	1.40	0.00	0.60	0.15	0.39	0.15	0.22	0.00
5000	1.60	0.00	0.14	0.00	0.00	0.00	0.38	0.33	1.40	0.00	0.59	0.14	0.39	0.14	0.22	0.00
6000	1.50	0.00	0.14	0.00	0.00	0.00	0.34	0.29	1.20	0.00	0.54	0.12	0.37	0.12	0.20	0.00
7000	1.40	0.00	0.12	0.00	0.00	0.00	0.30	0.26	1.10	0.00	0.48	0.10	0.33	0.10	0.17	0.00
8000	1.20	0.00	0.11	0.00	0.00	0.00	0.26	0.23	0.98	0.00	0.42	0.09	0.30	0.09	0.15	0.00
9000	1.10	0.00	0.10	0.00	0.00	0.00	0.22	0.20	0.87	0.00	0.37	0.08	0.26	0.08	0.13	0.00
10000	0.95	0.00	0.09	0.00	0.00	0.00	0.20	0.18	0.78	0.00	0.32	0.07	0.24	0.07	0.12	0.00

Table 12.43 : Long Term SPM Concentration (ug/m3) from Steel Melting Shop stack for the month of January

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.02	0.00	0.00	0.00	0.00	0.00	0.08	0.04	0.09	0.04	0.02	0.00	0.00	0.00	0.00	0.03
1000	0.39	0.00	0.03	0.00	0.00	0.00	1.00	0.42	0.87	0.37	0.19	0.00	0.00	0.00	0.09	0.29
1500	1.00	0.00	0.14	0.00	0.00	0.00	1.40	0.55	1.20	0.49	0.25	0.00	0.00	0.00	0.12	0.52
2000	1.40	0.01	0.22	0.01	0.01	0.01	1.50	0.57	1.10	0.48	0.25	0.01	0.01	0.01	0.11	0.62
2500	1.40	0.02	0.25	0.02	0.02	0.02	1.40	0.54	1.00	0.44	0.23	0.02	0.02	0.02	0.09	0.61
3000	1.30	0.01	0.24	0.01	0.01	0.01	1.20	0.50	0.88	0.38	0.20	0.01	0.01	0.01	0.08	0.57
3500	1.20	0.01	0.22	0.01	0.01	0.01	1.10	0.45	0.76	0.34	0.18	0.01	0.01	0.01	0.06	0.50
4000	1.10	0.01	0.19	0.01	0.01	0.01	0.96	0.41	0.67	0.30	0.16	0.01	0.01	0.01	0.05	0.44
4500	0.92	0.00	0.17	0.00	0.00	0.00	0.85	0.37	0.59	0.26	0.14	0.00	0.00	0.00	0.04	0.38
5000	0.80	0.00	0.15	0.00	0.00	0.00	0.77	0.34	0.52	0.23	0.12	0.00	0.00	0.00	0.04	0.34
6000	0.62	0.00	0.11	0.00	0.00	0.00	0.63	0.28	0.42	0.19	0.10	0.00	0.00	0.00	0.03	0.26
7000	0.48	0.00	0.09	0.00	0.00	0.00	0.52	0.24	0.35	0.16	0.08	0.00	0.00	0.00	0.02	0.21
8000	0.39	0.00	0.07	0.00	0.00	0.00	0.45	0.21	0.30	0.14	0.07	0.00	0.00	0.00	0.02	0.17
9000	0.32	0.00	0.06	0.00	0.00	0.00	0.39	0.18	0.25	0.12	0.06	0.00	0.00	0.00	0.02	0.14
10000	0.27	0.00	0.05	0.00	0.00	0.00	0.34	0.16	0.22	0.10	0.05	0.00	0.00	0.00	0.01	0.12

Table 12.44 : Long Term SPM Concentration (ug/m3) from Steel Melting Shop Stack for the month of May

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.05	0.09	0.01	0.03	0.00	0.00	0.00	0.02	0.00
1000	0.07	0.00	0.03	0.00	0.00	0.00	0.95	0.71	1.10	0.11	0.30	0.00	0.00	0.18	0.17	0.00
1500	0.37	0.00	0.18	0.00	0.06	0.00	1.40	1.00	1.60	0.17	0.43	0.00	0.00	0.29	0.36	0.00
2000	0.60	0.00	0.29	0.00	0.10	0.00	1.60	1.10	0.70	0.20	0.47	0.00	0.00	0.29	0.48	0.00
2500	0.70	0.00	0.34	0.00	0.12	0.00	1.60	1.00	1.70	0.20	0.47	0.00	0.00	0.26	0.53	0.00
3000	0.72	0.00	0.35	0.00	0.12	0.00	1.50	0.96	1.50	0.20	0.44	0.00	0.00	0.23	0.53	0.00
3500	0.71	0.00	0.34	0.00	0.12	0.00	1.40	0.87	1.40	0.19	0.41	0.00	0.00	0.20	0.51	0.00
4000	0.69	0.00	0.33	0.00	0.12	0.00	1.20	0.79	1.30	0.18	0.38	0.00	0.00	0.17	0.49	0.00
4500	0.66	0.00	0.32	0.00	0.11	0.00	1.10	0.72	1.10	0.17	0.35	0.00	0.00	0.15	0.46	0.00
5000	0.63	0.00	0.30	0.00	0.11	0.00	1.10	0.65	1.00	0.16	0.32	0.00	0.00	0.14	0.44	0.00
6000	0.58	0.00	0.28	0.00	0.10	0.00	0.90	0.55	0.87	0.14	0.27	0.00	0.00	0.11	0.39	0.00
7000	0.53	0.00	0.26	0.00	0.09	0.00	0.78	0.47	0.74	0.12	0.23	0.00	0.00	0.09	0.35	0.00
8000	0.49	0.00	0.24	0.00	0.08	0.00	0.68	0.41	0.64	0.11	0.20	0.00	0.00	0.08	0.32	0.00
9000	0.46	0.00	0.22	0.00	0.08	0.00	0.60	0.36	0.56	0.09	0.18	0.00	0.00	0.07	0.29	0.00
10000	0.42	0.00	0.20	0.00	0.07	0.00	0.54	0.32	0.50	0.09	0.16	0.00	0.00	0.06	0.27	0.00

Table 12.45 : Long Term SPM Concentration (ug/m3) from Steel Melting Plant Stack for the month of July

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.12	0.03	0.03	0.00	0.00	0.00	0.00	0.00
1000	0.03	0.00	0.00	0.00	0.03	0.00	0.78	0.01	1.70	0.40	0.45	0.00	0.00	0.00	0.12	0.00
1500	0.19	0.00	0.00	0.00	0.11	0.00	1.20	0.08	2.80	0.63	0.69	0.00	0.00	0.00	0.34	0.00
2000	0.30	0.00	0.00	0.00	0.18	0.00	1.30	0.12	3.10	0.68	0.74	0.00	0.00	0.00	0.49	0.00
2500	0.35	0.00	0.00	0.00	0.21	0.00	1.20	0.14	3.10	0.66	0.71	0.00	0.00	0.00	0.56	0.00
3000	0.37	0.00	0.00	0.00	0.22	0.00	1.10	0.15	2.90	0.61	0.65	0.00	0.00	0.00	0.57	0.00
3500	0.36	0.00	0.00	0.00	0.22	0.00	0.99	0.14	2.70	0.55	0.60	0.00	0.00	0.00	0.56	0.00
4000	0.35	0.00	0.00	0.00	0.21	0.00	0.89	0.14	2.50	0.50	0.54	0.00	0.00	0.00	0.54	0.00
4500	0.34	0.00	0.00	0.00	0.20	0.00	0.81	0.14	2.30	0.46	0.49	0.00	0.00	0.00	0.52	0.00
5000	0.33	0.00	0.00	0.00	0.20	0.00	0.73	0.13	2.10	0.42	0.45	0.00	0.00	0.00	0.49	0.00
6000	0.30	0.00	0.00	0.00	0.18	0.00	0.62	0.12	1.80	0.36	0.38	0.00	0.00	0.00	0.45	0.00
7000	0.28	0.00	0.00	0.00	0.17	0.00	0.53	0.11	1.60	0.31	0.32	0.00	0.00	0.00	0.41	0.00
8000	0.26	0.00	0.00	0.00	0.16	0.00	0.46	0.10	1.40	0.27	0.28	0.00	0.00	0.00	0.38	0.00
9000	0.24	0.00	0.00	0.00	0.14	0.00	0.40	0.10	1.30	0.24	0.25	0.00	0.00	0.00	0.35	0.00
10000	0.22	0.00	0.00	0.00	0.13	0.00	0.36	0.09	1.10	0.21	0.22	0.00	0.00	0.00	0.32	0.00

Table 12.46 : Long Term SPM Concentration (ug/m3) from Steel Melting Plant Stack for the month of October

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.09	0.00	0.02	0.01	0.00	0.01	0.01	0.00
1000	0.15	0.00	0.01	0.00	0.00	0.00	0.21	0.27	1.10	0.00	0.25	0.12	0.17	0.12	0.10	0.00
1500	0.81	0.00	0.07	0.00	0.00	0.00	0.35	0.40	1.60	0.00	0.48	0.17	0.33	0.17	0.19	0.00
2000	1.30	0.00	0.12	0.00	0.00	0.00	0.39	0.39	1.60	0.00	0.58	0.17	0.39	0.17	0.22	0.00
2500	1.50	0.00	0.13	0.00	0.00	0.00	0.37	0.35	1.40	0.00	0.58	0.14	0.39	0.14	0.21	0.00
3000	1.50	0.00	0.13	0.00	0.00	0.00	0.33	0.30	1.30	0.00	0.53	0.12	0.36	0.12	0.19	0.00
3500	1.30	0.00	0.12	0.00	0.00	0.00	0.29	0.26	1.10	0.00	0.47	0.10	0.32	0.10	0.17	0.00
4000	1.20	0.00	0.11	0.00	0.00	0.00	0.25	0.22	0.96	0.00	0.41	0.09	0.28	0.09	0.15	0.00
4500	1.10	0.00	0.10	0.00	0.00	0.00	0.22	0.20	0.84	0.00	0.36	0.07	0.25	0.07	0.13	0.00
5000	0.95	0.00	0.08	0.00	0.00	0.00	0.19	0.17	0.74	0.00	0.32	0.06	0.22	0.06	0.11	0.00
6000	0.75	0.00	0.07	0.00	0.00	0.00	0.15	0.14	0.59	0.00	0.25	0.05	0.18	0.05	0.09	0.00
7000	0.60	0.00	0.05	0.00	0.00	0.00	0.12	0.11	0.48	0.00	0.20	0.04	0.14	0.04	0.07	0.00
8000	0.49	0.00	0.04	0.00	0.00	0.00	0.10	0.09	0.40	0.00	0.16	0.03	0.13	0.03	0.06	0.00
9000	0.41	0.00	0.04	0.00	0.00	0.00	0.08	0.08	0.34	0.00	0.14	0.03	0.10	0.03	0.05	0.00
10000	0.34	0.00	0.03	0.00	0.00	0.00	0.07	0.07	0.29	0.00	0.11	0.02	0.09	0.02	0.04	0.00

Table 12.47 : Long Term SO2 Concentration (ug/m3) from Steel Melting Shop Stack for the month of January

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.02	0.00	0.00	0.00	0.00	0.00	0.09	0.05	0.10	0.04	0.02	0.00	0.00	0.00	0.01	0.03
1000	0.43	0.00	0.03	0.00	0.00	0.00	1.10	0.46	0.95	0.40	0.21	0.00	0.00	0.00	0.10	0.32
1500	1.10	0.00	0.15	0.00	0.00	0.00	1.60	0.61	1.30	0.54	0.28	0.00	0.00	0.00	0.13	0.57
2000	1.50	0.01	0.24	0.01	0.01	0.01	1.60	0.63	1.20	0.53	0.28	0.01	0.01	0.01	0.12	0.68
2500	1.60	0.02	0.27	0.02	0.02	0.02	1.50	0.60	1.10	0.48	0.25	0.02	0.02	0.02	0.10	0.68
3000	1.50	0.02	0.27	0.02	0.02	0.02	1.30	0.55	0.97	0.42	0.22	0.02	0.02	0.02	0.08	0.62
3500	1.30	0.01	0.24	0.01	0.01	0.01	1.20	0.50	0.84	0.37	0.19	0.01	0.01	0.01	0.07	0.55
4000	1.20	0.01	0.21	0.01	0.01	0.01	1.10	0.45	0.73	0.33	0.17	0.01	0.01	0.01	0.06	0.48
4500	1.00	0.01	0.19	0.01	0.01	0.01	0.94	0.41	0.65	0.29	0.15	0.01	0.01	0.01	0.05	0.42
5000	0.88	0.00	0.16	0.00	0.00	0.00	0.84	0.37	0.57	0.26	0.13	0.00	0.00	0.00	0.04	0.37
6000	0.68	0.00	0.12	0.00	0.00	0.00	0.69	0.31	0.46	0.21	0.11	0.00	0.00	0.00	0.03	0.29
7000	0.53	0.00	0.10	0.00	0.00	0.00	0.58	0.26	0.38	0.18	0.09	0.00	0.00	0.00	0.02	0.23
8000	0.43	0.00	0.08	0.00	0.00	0.00	0.49	0.23	0.32	0.15	0.08	0.00	0.00	0.00	0.02	0.19
9000	0.35	0.00	0.06	0.00	0.00	0.00	0.43	0.20	0.28	0.13	0.07	0.00	0.00	0.00	0.02	0.16
10000	0.29	0.00	0.05	0.00	0.00	0.00	0.38	0.18	0.25	0.11	0.06	0.00	0.00	0.00	0.01	0.13

Table 12.48 : Long Term SO2 Concentration (ug/m3) from Steel Melting Shop Stack for the month of May

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.06	0.10	0.01	0.03	0.00	0.00	0.00	0.02	0.00
1000	0.07	0.00	0.04	0.00	0.01	0.00	1.10	0.78	1.30	0.12	0.33	0.00	0.00	0.20	0.19	0.00
1500	0.41	0.00	0.20	0.00	0.07	0.00	1.60	1.10	1.80	0.18	0.48	0.00	0.00	0.32	0.40	0.00
2000	0.66	0.00	0.32	0.00	0.11	0.00	1.70	1.20	1.90	0.21	0.52	0.00	0.00	0.32	0.53	0.00
2500	0.77	0.00	0.37	0.00	0.13	0.00	1.70	1.10	1.80	0.22	0.52	0.00	0.00	0.29	0.58	0.00
3000	0.80	0.00	0.38	0.00	0.13	0.00	1.60	1.10	1.70	0.22	0.49	0.00	0.00	0.25	0.58	0.00
3500	0.78	0.00	0.38	0.00	0.13	0.00	1.50	0.96	1.50	0.21	0.45	0.00	0.00	0.22	0.57	0.00
4000	0.76	0.00	0.36	0.00	0.13	0.00	1.40	0.87	1.40	0.20	0.42	0.00	0.00	0.19	0.54	0.00
4500	0.73	0.00	0.35	0.00	0.12	0.00	1.30	0.79	1.30	0.18	0.38	0.00	0.00	0.17	0.51	0.00
5000	0.70	0.00	0.33	0.00	0.12	0.00	1.20	0.72	1.10	0.17	0.35	0.00	0.00	0.15	0.48	0.00
6000	0.64	0.00	0.31	0.00	0.11	0.00	0.99	0.60	0.95	0.15	0.30	0.00	0.00	0.12	0.43	0.00
7000	0.59	0.00	0.28	0.00	0.10	0.00	0.85	0.52	0.81	0.13	0.26	0.00	0.00	0.10	0.39	0.00
8000	0.54	0.00	0.26	0.00	0.09	0.00	0.75	0.45	0.70	0.12	0.23	0.00	0.00	0.08	0.34	0.00
9000	0.50	0.00	0.24	0.00	0.09	0.00	0.66	0.39	0.62	0.10	0.20	0.00	0.00	0.07	0.32	0.00
10000	0.47	0.00	0.22	0.00	0.08	0.00	0.60	0.35	0.55	0.09	0.18	0.00	0.00	0.06	0.29	0.00

Table 12.49 : Long Term SO2 Concentration (ug/m3) from Steel Melting Shop Stack for the month of July

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.14	0.03	0.03	0.00	0.00	0.00	0.00	0.00
1000	0.04	0.00	0.00	0.00	0.02	0.00	0.86	0.02	1.80	0.44	0.50	0.00	0.00	0.00	0.13	0.00
1500	0.21	0.00	0.00	0.00	0.12	0.00	1.30	0.08	3.10	0.69	0.76	0.00	0.00	0.00	0.37	0.00
2000	0.33	0.00	0.00	0.00	0.20	0.00	1.40	0.13	3.50	0.75	0.81	0.00	0.00	0.00	0.54	0.00
2500	0.39	0.00	0.00	0.00	0.23	0.00	1.30	0.16	3.40	0.72	0.78	0.00	0.00	0.00	0.62	0.00
3000	0.40	0.00	0.00	0.00	0.24	0.00	1.20	0.16	3.20	0.67	0.72	0.00	0.00	0.00	0.63	0.00
3500	0.40	0.00	0.00	0.00	0.24	0.00	1.10	0.16	3.00	0.61	0.66	0.00	0.00	0.00	0.62	0.00
4000	0.39	0.00	0.00	0.00	0.23	0.00	0.98	0.15	2.80	0.55	0.60	0.00	0.00	0.00	0.59	0.00
4500	0.37	0.00	0.00	0.00	0.22	0.00	0.89	0.15	2.50	0.50	0.54	0.00	0.00	0.00	0.57	0.00
5000	0.36	0.00	0.00	0.00	0.22	0.00	0.81	0.14	2.30	0.46	0.49	0.00	0.00	0.00	0.54	0.00
6000	0.33	0.00	0.00	0.00	0.20	0.00	0.68	0.13	2.00	0.39	0.41	0.00	0.00	0.00	0.50	0.00
7000	0.31	0.00	0.00	0.00	0.18	0.00	0.58	0.12	1.80	0.34	0.35	0.00	0.00	0.00	0.45	0.00
8000	0.28	0.00	0.00	0.00	0.17	0.00	0.50	0.11	1.60	0.29	0.31	0.00	0.00	0.00	0.42	0.00
9000	0.26	0.00	0.00	0.00	0.16	0.00	0.44	0.11	1.40	0.26	0.27	0.00	0.00	0.00	0.38	0.00
10000	0.25	0.00	0.00	0.00	0.15	0.00	0.39	0.10	1.30	0.23	0.24	0.00	0.00	0.00	0.36	0.00

Table 12.50 : Long Term SO2 Concentration (ug/m3) from Steel Melting Shop Stack for the month of October

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.10	0.00	0.03	0.02	0.00	0.02	0.01	0.00
1000	0.16	0.00	0.01	0.00	0.00	0.00	0.23	0.30	1.10	0.00	0.28	0.13	0.19	0.13	0.11	0.00
1500	0.89	0.00	0.08	0.00	0.00	0.00	0.39	0.44	1.70	0.00	0.53	0.19	0.36	0.19	0.21	0.00
2000	1.40	0.00	0.13	0.00	0.00	0.00	0.43	0.43	1.80	0.00	0.64	0.18	0.43	0.18	0.24	0.00
2500	1.60	0.00	0.15	0.00	0.00	0.00	0.41	0.38	1.60	0.00	0.63	0.16	0.43	0.16	0.23	0.00
3000	1.60	0.00	0.14	0.00	0.00	0.00	0.37	0.33	1.40	0.00	0.58	0.13	0.39	0.13	0.21	0.00
3500	1.50	0.00	0.13	0.00	0.00	0.00	0.32	0.28	1.20	0.00	0.52	0.11	0.35	0.11	0.19	0.00
4000	1.30	0.00	0.12	0.00	0.00	0.00	0.28	0.25	1.10	0.00	0.45	0.10	0.31	0.10	0.16	0.00
4500	1.20	0.00	0.10	0.00	0.00	0.00	0.24	0.22	0.92	0.00	0.40	0.08	0.28	0.08	0.14	0.00
5000	1.00	0.00	0.09	0.00	0.00	0.00	0.21	0.19	0.81	0.00	0.35	0.07	0.24	0.07	0.13	0.00
6000	0.82	0.00	0.07	0.00	0.00	0.00	0.16	0.15	0.64	0.00	0.27	0.05	0.19	0.05	0.10	0.00
7000	0.66	0.00	0.06	0.00	0.00	0.00	0.13	0.12	0.52	0.00	0.22	0.04	0.16	0.04	0.08	0.00
8000	0.54	0.00	0.05	0.00	0.00	0.00	0.11	0.10	0.44	0.00	0.18	0.04	0.13	0.04	0.06	0.00
9000	0.45	0.00	0.04	0.00	0.00	0.00	0.09	0.09	0.37	0.00	0.15	0.03	0.11	0.03	0.05	0.00
10000	0.38	0.00	0.03	0.00	0.00	0.00	0.08	0.08	0.32	0.00	0.13	0.03	0.09	0.03	0.04	0.00

Table 12.51 : Long Term NOx Concentration (ug/m3) from Steel Melting Shop Stack for the month of January

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.03	0.00	0.00	0.00	0.00	0.00	0.15	0.07	0.16	0.07	0.04	0.00	0.00	0.00	0.02	0.05
1000	0.68	0.00	0.05	0.00	0.00	0.00	1.80	0.74	1.50	0.64	0.34	0.00	0.00	0.00	0.15	0.51
1500	1.80	0.01	0.24	0.01	0.01	0.01	2.50	0.97	2.00	0.85	0.45	0.01	0.01	0.01	0.21	0.91
2000	2.40	0.02	0.39	0.02	0.02	0.02	2.60	1.00	2.00	0.84	0.44	0.02	0.02	0.02	0.19	1.10
2500	2.50	0.03	0.44	0.03	0.03	0.03	2.40	0.95	1.80	0.76	0.40	0.03	0.03	0.03	0.16	1.10
3000	2.40	0.03	0.42	0.03	0.03	0.03	2.10	0.87	1.50	0.67	0.35	0.03	0.03	0.03	0.13	0.99
3500	2.10	0.02	0.38	0.02	0.02	0.02	1.90	0.79	1.30	0.59	0.31	0.02	0.02	0.02	0.11	0.88
4000	1.80	0.02	0.34	0.02	0.02	0.02	1.70	0.71	1.20	0.52	0.27	0.02	0.02	0.02	0.09	0.77
4500	1.60	0.02	0.30	0.02	0.02	0.02	1.50	0.65	1.00	0.46	0.24	0.02	0.02	0.02	0.08	0.67
5000	1.40	0.02	0.26	0.02	0.02	0.01	1.30	0.59	0.91	0.41	0.21	0.02	0.02	0.02	0.07	0.59
6000	1.10	0.01	0.20	0.01	0.01	0.01	1.10	0.49	0.73	0.33	0.17	0.01	0.01	0.01	0.05	0.46
7000	0.85	0.00	0.15	0.00	0.00	0.00	0.92	0.42	0.61	0.28	0.15	0.00	0.00	0.00	0.04	0.37
8000	0.68	0.00	0.12	0.00	0.00	0.00	0.78	0.37	0.52	0.24	0.12	0.00	0.00	0.00	0.03	0.30
9000	0.56	0.00	0.10	0.00	0.00	0.00	0.68	0.32	0.45	0.21	0.11	0.00	0.00	0.00	0.03	0.25
10000	0.46	0.00	0.08	0.00	0.00	0.00	0.60	0.29	0.39	0.18	0.10	0.00	0.00	0.00	0.02	0.21

Table 12.52 : Long Term NOx Concentration (ug/m3) from Steel Melting Shop Stack for the month of May

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.09	0.16	0.02	0.05	0.00	0.00	0.00	0.03	0.00
1000	0.12	0.00	0.06	0.00	0.02	0.00	1.70	1.20	2.00	0.19	0.53	0.00	0.00	0.32	0.31	0.00
1500	0.65	0.00	0.31	0.00	0.11	0.00	2.50	1.80	2.90	0.29	0.76	0.00	0.00	0.50	0.63	0.00
2000	1.10	0.00	0.51	0.00	0.18	0.00	2.80	1.90	3.00	0.34	0.83	0.00	0.00	0.50	0.84	0.00
2500	1.20	0.00	0.59	0.00	0.21	0.00	2.70	1.80	2.90	0.36	0.82	0.00	0.00	0.45	0.92	0.00
3000	1.30	0.00	0.61	0.00	0.21	0.00	2.60	1.70	2.70	0.35	0.78	0.00	0.00	0.40	0.93	0.00
3500	1.20	0.00	0.60	0.00	0.21	0.00	2.40	1.50	2.40	0.34	0.72	0.00	0.00	0.35	0.90	0.00
4000	1.20	0.00	0.58	0.00	0.20	0.00	2.20	1.40	2.20	0.32	0.66	0.00	0.00	0.30	0.86	0.00
4500	1.20	0.00	0.56	0.00	0.20	0.00	2.00	1.30	2.00	0.29	0.61	0.00	0.00	0.27	0.81	0.00
5000	1.10	0.00	0.53	0.00	0.19	0.00	1.80	1.10	1.80	0.27	0.56	0.00	0.00	0.24	0.77	0.00
6000	1.00	0.00	0.49	0.00	0.17	0.00	1.60	0.96	1.50	0.24	0.47	0.00	0.00	0.19	0.69	0.00
7000	0.94	0.00	0.45	0.00	0.16	0.00	1.40	0.82	1.30	0.21	0.41	0.00	0.00	0.16	0.62	0.00
8000	0.86	0.00	0.42	0.00	0.15	0.00	1.20	0.71	1.10	0.18	0.36	0.00	0.00	0.13	0.56	0.00
9000	0.80	0.00	0.38	0.00	0.14	0.00	1.10	0.63	0.99	0.16	0.32	0.00	0.00	0.11	0.51	0.00
10000	0.74	0.00	0.36	0.00	0.13	0.00	0.95	0.56	0.88	0.15	0.29	0.00	0.00	0.10	0.47	0.00

Table 12.53 : Long Term NOx Concentration (ug/m3) from Steel Melting Shop Stack for the month of July

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.22	0.05	0.05	0.00	0.00	0.00	0.02	0.00
1000	0.06	0.00	0.00	0.00	0.04	0.00	1.40	0.02	2.90	0.70	0.79	0.00	0.00	0.00	0.20	0.00
1500	0.33	0.00	0.00	0.00	0.20	0.00	2.10	0.13	4.90	1.10	1.20	0.00	0.00	0.00	0.59	0.00
2000	0.53	0.00	0.00	0.00	0.32	0.00	2.30	0.21	5.50	1.20	1.30	0.00	0.00	0.00	0.86	0.00
2500	0.62	0.00	0.00	0.00	0.37	0.00	2.10	0.25	5.40	1.20	1.20	0.00	0.00	0.00	0.98	0.00
3000	0.64	0.00	0.00	0.00	0.38	0.00	1.90	0.26	5.10	1.10	1.10	0.00	0.00	0.00	1.00	0.00
3500	0.63	0.00	0.00	0.00	0.38	0.00	1.70	0.25	4.80	0.97	1.00	0.00	0.00	0.00	0.98	0.00
4000	0.61	0.00	0.00	0.00	0.37	0.00	1.60	0.25	4.40	0.88	0.95	0.00	0.00	0.00	0.95	0.00
4500	0.59	0.00	0.00	0.00	0.36	0.00	1.40	0.24	4.00	0.80	0.86	0.00	0.00	0.00	0.91	0.00
5000	0.57	0.00	0.00	0.00	0.34	0.00	1.30	0.23	3.70	0.73	0.79	0.00	0.00	0.00	0.87	0.00
6000	0.53	0.00	0.00	0.00	0.32	0.00	1.10	0.21	3.20	0.62	0.66	0.00	0.00	0.00	0.79	0.00
7000	0.49	0.00	0.00	0.00	0.29	0.00	0.92	0.20	2.80	0.54	0.56	0.00	0.00	0.00	0.72	0.00
8000	0.45	0.00	0.00	0.00	0.27	0.00	0.80	0.18	2.50	0.47	0.49	0.00	0.00	0.00	0.66	0.00
9000	0.42	0.00	0.00	0.00	0.25	0.00	0.70	0.17	2.20	0.41	0.43	0.00	0.00	0.00	0.61	0.00
10000	0.39	0.00	0.00	0.00	0.24	0.00	0.63	0.16	2.00	0.37	0.38	0.00	0.00	0.00	0.57	0.00

Table 12.54 : Long Term NOx Concentration (ug/m3) from Steel Melting Shop Stack for the month of October

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.04	0.15	0.00	0.04	0.02	0.00	0.02	0.02	0.00
1000	0.26	0.00	0.02	0.00	0.00	0.00	0.37	0.48	1.80	0.00	0.44	0.21	0.29	0.21	0.18	0.00
1500	1.40	0.00	0.13	0.00	0.00	0.00	0.62	0.70	2.70	0.00	0.84	0.30	0.58	0.30	0.33	0.00
2000	2.30	0.00	0.20	0.00	0.00	0.00	0.68	0.69	2.80	0.00	1.00	0.29	0.68	0.29	0.38	0.00
2500	2.60	0.00	0.23	0.00	0.00	0.00	0.65	0.61	2.50	0.00	1.00	0.25	0.68	0.25	0.37	0.00
3000	2.60	0.00	0.23	0.00	0.00	0.00	0.58	0.53	2.20	0.00	0.93	0.21	0.63	0.21	0.34	0.00
3500	2.40	0.00	0.21	0.00	0.00	0.00	0.51	0.45	1.90	0.00	0.82	0.18	0.56	0.18	0.30	0.00
4000	2.10	0.00	0.19	0.00	0.00	0.00	0.44	0.39	1.70	0.00	0.72	0.15	0.50	0.15	0.26	0.00
4500	1.90	0.00	0.17	0.00	0.00	0.00	0.38	0.34	1.50	0.00	0.63	0.13	0.44	0.13	0.23	0.00
5000	1.70	0.00	0.15	0.00	0.00	0.00	0.34	0.30	1.30	0.00	0.56	0.11	0.39	0.11	0.20	0.00
6000	1.30	0.00	0.12	0.00	0.00	0.00	0.26	0.24	1.00	0.00	0.43	0.09	0.31	0.09	0.16	0.00
7000	1.00	0.00	0.09	0.00	0.00	0.00	0.21	0.20	0.83	0.00	0.35	0.07	0.25	0.07	0.12	0.00
8000	0.86	0.00	0.08	0.00	0.00	0.00	0.17	0.16	0.69	0.00	0.28	0.06	0.21	0.06	0.10	0.00
9000	0.71	0.00	0.06	0.00	0.00	0.00	0.14	0.14	0.59	0.00	0.24	0.05	0.18	0.05	0.09	0.00
10000	0.60	0.00	0.05	0.00	0.00	0.00	0.12	0.12	0.51	0.00	0.20	0.04	0.15	0.04	0.07	0.00

Table 12.55 : Effective Eight Hourly SPM Concentration (ug/m3)

Distance (m)	January			May			July			October		
	I	II	III	I	II	III	I	II	III	I	II	III
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400	0.11	0.00	0.00	0.09	0.00	0.00	0.67	0.00	0.00	0.00	0.00	0.00
500	0.95	0.00	0.00	0.86	0.00	0.00	0.20	0.00	0.00	0.02	0.00	0.00
600	2.72	0.00	0.00	2.55	0.00	0.00	0.98	0.00	0.00	0.22	0.00	0.00
700	4.80	0.01	0.00	4.57	0.00	0.00	2.35	0.00	0.00	0.82	0.00	0.00
800	5.57	0.05	0.00	6.37	0.00	0.00	3.91	0.00	0.00	1.84	0.00	0.00
900	7.82	0.16	0.00	7.74	0.12	0.00	5.29	0.00	0.00	3.02	0.00	0.00
1000	8.68	0.37	0.00	8.73	0.31	0.02	6.38	0.02	0.00	4.15	0.00	0.00
1500	10.24	2.87	0.91	9.84	2.60	0.82	8.59	0.78	0.38	7.13	0.42	0.12
2000	9.27	5.88	3.13	9.09	5.52	2.94	8.64	2.56	1.85	7.76	1.76	0.90
2500	7.71	8.10	5.41	7.68	7.76	5.24	7.81	4.16	3.76	7.50	4.60	2.28
3000	6.28	9.55	7.18	6.33	9.24	6.96	6.72	5.24	5.46	12.86	5.87	3.76
3500	5.14	10.49	8.40	5.19	10.22	8.20	5.70	5.92	6.76	6.05	6.34	5.02
4000	4.24	11.09	9.23	4.30	10.87	9.05	4.83	6.38	7.68	5.27	7.28	6.00
4500	3.54	11.47	9.77	3.61	11.26	9.61	4.12	6.70	8.32	4.57	7.99	6.72
5000	3.02	11.68	10.83	3.08	11.50	9.97	3.53	6.94	8.76	4.00	8.51	7.26
6000	2.26	11.97	10.41	2.30	11.64	10.29	2.69	7.27	9.21	3.09	10.17	7.89
7000	1.74	8.31	10.41	1.79	11.50	10.32	2.10	7.46	9.35	2.45	9.51	8.17
8000	1.42	7.70	10.26	1.44	11.22	10.18	1.69	7.53	9.29	2.01	9.67	8.25
9000	1.15	7.14	10.04	1.18	10.86	9.95	1.40	7.52	9.18	1.66	9.73	8.22
10000	0.95	6.64	9.69	1.06	10.47	9.72	1.44	7.39	9.00	1.40	9.69	8.13

I - Unstable Weather Conditions

II - Neutral Weather Conditions

III - Stable Weather Conditions

Table 12.56 : Effective Eight Hourly SO2 Concentration (ug/m3)

Distance (m)	January			May			July			October		
	I	II	III	I	II	III	I	II	III	I	II	III
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400	0.75	0.00	0.00	0.56	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00
500	6.04	0.00	0.00	4.98	0.00	0.00	1.29	0.00	0.00	0.18	0.00	0.00
600	17.44	0.00	0.00	15.45	0.00	0.00	8.82	0.00	0.00	1.57	0.00	0.00
700	31.37	0.01	0.00	28.73	0.00	0.00	17.66	0.00	0.00	5.67	0.00	0.00
800	43.30	0.10	0.00	40.77	0.08	0.00	27.66	0.00	0.00	12.54	0.00	0.00
900	51.86	0.33	0.00	49.82	0.30	0.00	36.77	0.04	0.00	20.75	0.00	0.00
1000	57.17	0.91	0.00	55.70	0.74	0.02	43.30	0.15	0.00	28.78	0.02	0.00
1500	61.72	9.50	1.60	57.33	8.60	1.42	54.65	3.80	0.67	48.69	1.58	0.22
2000	45.66	25.81	7.02	46.17	22.45	6.60	47.83	13.42	4.18	47.36	7.52	2.14
2500	35.14	37.05	14.57	35.76	35.56	14.25	38.86	24.57	10.33	40.83	16.49	6.41
3000	27.31	46.73	22.68	27.92	45.42	21.97	21.25	34.05	17.22	34.11	25.72	11.97
3500	21.65	53.11	29.25	22.19	52.04	28.54	25.34	41.16	23.51	28.39	33.67	17.57
4000	16.53	57.04	34.13	18.30	56.19	33.24	21.19	46.26	27.87	24.14	39.37	21.79
4500	14.48	59.02	38.02	14.90	58.44	37.46	17.39	49.50	32.73	20.08	44.67	26.68
5000	12.16	59.83	40.62	12.51	59.48	40.17	14.73	51.61	35.75	17.17	48.12	29.98
6000	8.95	59.25	43.52	9.21	59.23	43.23	10.93	53.34	39.55	12.92	52.14	34.45
7000	6.87	57.12	44.49	7.10	57.36	44.31	8.48	53.15	41.36	10.10	53.69	36.97
8000	5.51	54.43	44.41	5.65	54.81	44.34	6.77	51.97	41.95	8.09	53.80	38.22
9000	4.46	51.56	43.76	4.61	52.08	43.77	5.56	50.28	41.90	6.67	53.06	37.57
10000	3.74	48.76	42.84	3.85	49.34	42.90	4.63	48.38	41.05	6.97	51.92	38.61

I - Unstable Weather Conditions

II - Neutral Weather Conditions

III - Stable Weather Conditions

Table 12.57 : Effective Eight Hourly NOx Concentration (ug/m3)

Distance (m)	January			May			July			October		
	I	II	III	I	II	III	I	II	III	I	II	III
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400	0.25	0.00	0.00	0.17	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
500	1.85	0.00	0.00	1.52	0.00	0.00	0.37	0.00	0.00	0.04	0.00	0.00
600	4.89	0.00	0.00	4.32	0.00	0.00	1.69	0.00	0.00	0.40	0.00	0.00
700	8.16	0.02	0.00	7.54	0.02	0.00	3.92	0.00	0.00	1.44	0.00	0.00
800	10.98	0.09	0.00	10.42	0.07	0.00	6.36	0.00	0.00	3.05	0.00	0.00
900	13.14	0.30	0.00	12.81	0.24	0.01	8.57	0.00	0.00	4.90	0.00	0.00
1000	14.89	0.69	0.00	14.76	0.56	0.03	10.37	0.04	0.00	6.68	0.02	0.00
1500	19.38	5.10	1.63	18.59	4.60	1.46	15.46	1.42	0.69	12.14	0.79	0.20
2000	18.34	11.80	6.20	18.24	9.66	5.26	16.94	4.47	3.29	14.56	3.11	1.63
2500	15.51	14.18	9.67	15.62	13.57	9.44	15.74	7.13	6.72	14.82	6.04	4.08
3000	12.75	16.96	12.84	12.93	16.36	12.42	13.70	8.90	9.80	13.80	8.64	6.63
3500	10.46	18.94	15.12	10.65	18.37	14.72	11.69	10.12	12.20	12.31	10.74	8.82
4000	8.66	20.38	16.72	8.86	19.83	16.34	9.93	11.07	14.00	10.80	12.15	10.49
4500	7.26	21.39	17.82	7.42	20.88	17.47	8.49	11.83	15.32	9.36	13.56	11.77
5000	6.17	22.06	18.57	6.32	21.61	18.25	7.30	12.52	16.21	8.25	14.62	12.63
6000	4.59	22.65	19.34	4.73	21.82	19.07	5.54	13.61	17.41	6.41	16.12	13.74
7000	3.56	22.61	19.54	3.68	22.39	19.29	4.34	14.34	17.90	5.09	17.10	14.27
8000	2.92	22.19	19.39	2.95	22.06	19.18	3.51	14.83	18.03	4.14	17.77	14.46
9000	2.35	21.62	19.07	2.42	21.51	18.90	2.89	15.02	17.92	3.43	18.13	14.56
10000	1.94	20.84	18.68	2.02	20.85	18.52	2.43	15.07	17.69	2.90	18.33	14.40

I - Unstable Weather Conditions

II - Neutral Weather Conditions

III - Stable Weather Conditions

Table 12.58 : Effective Long Term SPM Concentration (ug/m3) for January Month

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.02	0.00	0.00	0.00	0.00	0.00	0.10	0.04	0.12	0.05	0.02	0.00	0.00	0.00	0.00	0.03
1000	0.59	0.00	0.05	0.00	0.00	0.00	1.45	0.64	1.34	0.57	0.20	0.00	0.00	0.00	0.13	0.46
1500	1.68	0.00	0.23	0.00	0.00	0.00	2.40	0.99	2.44	0.89	0.37	0.00	0.00	0.00	0.22	9.08
2000	2.49	0.01	0.39	0.01	0.01	0.01	2.79	1.11	2.29	0.98	0.50	0.01	0.01	0.01	0.24	1.19
2500	2.77	0.02	0.46	0.02	0.02	0.02	2.79	1.68	2.22	0.95	0.50	0.02	0.02	0.02	0.22	1.26
3000	2.82	0.02	0.50	0.01	0.01	0.01	2.59	1.02	2.06	0.86	0.46	0.01	0.01	0.01	0.21	1.25
3500	2.79	0.01	0.50	0.01	0.01	0.01	2.44	0.95	1.85	0.79	0.42	0.01	0.01	0.01	0.18	1.17
4000	2.70	0.01	0.47	0.01	0.01	0.01	2.23	0.88	1.68	0.73	0.38	0.01	0.01	0.01	0.16	1.10
4500	2.48	0.01	0.45	0.01	0.01	0.01	2.05	0.81	1.51	0.65	0.34	0.01	0.01	0.01	0.13	1.02
5000	2.30	0.01	0.43	0.01	0.01	0.01	1.65	0.75	1.37	0.59	0.30	0.01	0.01	0.01	0.12	0.95
6000	1.93	0.00	0.35	0.00	0.00	0.00	1.61	0.64	1.13	0.50	0.26	0.00	0.00	0.00	0.09	0.78
7000	1.62	0.00	0.33	0.00	0.00	0.00	1.38	0.57	6.96	0.41	0.22	0.00	0.00	0.00	0.07	0.66
8000	1.37	0.00	0.26	0.00	0.00	0.00	1.21	0.50	0.83	0.37	0.19	0.00	0.00	0.00	0.06	0.56
9000	1.16	0.00	0.22	0.00	0.00	0.00	1.07	0.45	0.71	0.32	0.17	0.00	0.00	0.00	0.05	0.47
10000	1.01	0.00	0.19	0.00	0.00	0.00	0.95	0.40	0.63	0.29	0.14	0.00	0.00	0.00	0.04	0.40

Table 12.59 : Effective Long Term SPM Concentration (ug/m3) for May Month

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.05	0.09	0.02	0.03	0.00	0.00	0.00	0.02	0.00
1000	0.12	0.00	0.06	0.00	0.00	0.00	1.36	0.98	1.57	0.16	0.46	0.00	0.00	0.20	0.28	0.00
1500	0.62	0.00	0.30	0.00	0.10	0.00	2.37	1.62	2.65	0.30	0.75	0.00	0.00	0.39	0.63	0.00
2000	1.05	0.00	0.50	0.00	0.17	0.00	2.84	1.94	3.06	0.37	0.88	0.00	0.00	0.46	0.87	0.00
2500	1.29	0.00	0.85	0.00	0.22	0.00	2.99	1.93	3.19	0.38	0.85	0.00	0.00	0.48	0.99	0.00
3000	1.19	0.00	0.68	0.00	0.24	0.00	2.93	1.92	2.01	0.39	0.76	0.00	0.00	0.47	1.02	0.00
3500	1.48	0.00	1.61	0.00	0.25	0.00	2.82	1.81	2.88	0.37	0.82	0.00	0.00	0.45	1.03	0.00
4000	1.50	0.00	0.72	0.00	0.25	0.00	2.57	1.69	2.73	0.36	0.77	0.00	0.00	0.42	1.02	0.00
4500	1.47	0.00	0.72	0.00	0.25	0.00	2.43	1.60	2.47	0.33	0.72	0.00	0.00	0.44	0.98	0.00
5000	1.44	0.00	0.68	0.00	0.20	0.00	2.16	1.37	2.30	0.31	0.68	0.00	0.00	0.37	0.98	0.00
6000	1.33	0.00	0.64	0.00	0.23	0.00	2.04	1.30	2.04	0.28	0.59	0.00	0.00	0.31	0.85	0.00
7000	1.21	0.00	0.58	0.00	0.19	0.00	1.81	1.14	1.80	0.24	0.52	0.00	0.00	0.27	0.92	0.00
8000	1.09	0.00	0.53	0.00	0.17	0.00	1.61	1.02	1.50	0.22	0.47	0.00	0.00	0.24	0.69	0.00
9000	1.01	0.00	0.48	0.00	0.17	0.00	1.44	0.91	1.42	0.19	0.42	0.00	0.00	0.20	0.63	0.00
10000	0.90	0.00	0.43	0.00	0.14	0.00	1.31	0.81	1.28	0.19	0.38	0.00	0.00	0.18	0.59	0.00

Table 12.60 : Effective Long Term SPM Concentration (ug/m3) for July Month

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.46	0.11	0.10	0.00	0.00	0.00	0.03	0.00
1000	0.24	0.00	0.00	0.00	0.15	0.00	2.40	0.08	5.66	1.32	1.32	0.00	0.00	0.00	0.50	0.00
1500	0.95	0.00	0.00	0.00	0.57	0.00	3.99	0.38	9.86	2.16	2.20	0.00	0.00	0.00	1.53	0.00
2000	1.39	0.00	0.00	0.00	0.84	0.00	4.57	0.54	11.40	2.45	2.41	0.00	0.00	0.00	2.10	0.00
2500	1.56	0.00	0.00	0.00	0.94	0.00	4.52	0.62	11.70	2.40	2.47	0.00	0.00	0.00	2.38	0.00
3000	1.61	0.00	0.00	0.00	0.97	0.00	4.29	0.64	11.30	2.29	2.34	0.00	0.00	0.00	2.35	0.00
3500	1.59	0.00	0.00	0.00	0.96	0.00	3.99	0.63	10.64	2.14	2.20	0.00	0.00	0.00	2.38	0.00
4000	1.54	0.00	0.00	0.00	0.92	0.00	3.68	0.61	10.06	2.02	2.06	0.00	0.00	0.00	2.28	0.00
4500	1.50	0.00	0.00	0.00	0.90	0.00	3.39	0.57	9.46	1.90	1.92	0.00	0.00	0.00	2.18	0.00
5000	1.33	0.00	0.00	0.00	0.82	0.00	3.15	0.57	8.74	1.75	1.78	0.00	0.00	0.00	2.03	0.00
6000	1.30	0.00	0.00	0.00	0.79	0.00	2.74	0.52	7.64	1.53	1.54	0.00	0.00	0.00	1.89	0.00
7000	1.19	0.00	0.00	0.00	0.72	0.00	2.35	0.48	6.86	1.33	1.34	0.00	0.00	0.00	1.71	0.00
8000	1.09	0.00	0.00	0.00	0.67	0.00	2.08	0.44	5.99	1.17	1.17	0.00	0.00	0.00	1.55	0.00
9000	1.00	0.00	0.00	0.00	0.59	0.00	1.70	0.40	5.00	1.06	1.05	0.00	0.00	0.00	1.43	0.00
10000	0.92	0.00	0.00	0.00	0.55	0.00	1.66	0.37	4.90	0.94	0.99	0.00	0.00	0.00	1.32	0.00

Table 12.61 : Effective Long Term SPM Concentration (ug/m3) for October Month

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.08	0.34	0.00	0.10	0.05	0.00	0.05	0.04	0.00
1000	1.02	0.00	0.08	0.00	0.00	0.00	0.89	0.93	3.67	0.00	1.11	0.49	0.45	0.49	0.44	0.00
1500	4.03	0.00	0.36	0.00	0.00	0.00	1.51	1.39	5.61	0.00	2.10	0.69	1.12	0.76	0.82	0.00
2000	5.99	0.00	0.53	0.00	0.00	0.00	1.70	1.46	6.05	0.00	2.55	0.70	1.44	0.70	0.96	0.00
2500	6.70	0.00	0.51	0.00	0.00	0.00	1.65	1.36	5.72	0.00	2.54	0.64	1.52	0.64	0.94	0.00
3000	6.64	0.00	0.59	0.00	0.00	0.00	1.51	1.24	5.27	0.00	2.43	0.56	1.47	0.56	0.88	0.00
3500	6.09	0.00	0.55	0.00	0.00	0.00	1.36	1.11	4.74	0.00	2.16	0.50	1.37	0.49	0.80	0.00
4000	5.66	0.00	0.47	0.00	0.00	0.00	1.21	0.99	4.25	0.00	1.98	0.42	1.25	0.42	0.72	0.00
4500	5.17	0.00	0.47	0.00	0.00	0.00	1.08	0.79	3.86	0.00	1.76	0.37	1.15	0.37	0.64	0.00
5000	4.65	0.00	0.42	0.00	0.00	0.00	0.97	0.80	3.48	0.00	1.59	0.32	1.04	0.32	0.56	0.00
6000	3.84	0.00	0.35	0.00	0.00	0.00	0.79	0.67	2.88	0.00	1.09	0.25	0.88	0.25	0.47	0.00
7000	3.24	0.00	0.78	0.00	0.00	0.00	0.64	0.55	2.39	0.00	1.06	0.21	0.73	0.21	0.39	0.00
8000	2.67	0.00	0.23	0.00	0.00	0.00	0.63	0.46	2.04	0.00	0.88	0.18	0.63	0.18	0.32	0.00
9000	2.25	0.00	0.20	0.00	0.00	0.00	0.45	0.42	1.71	0.00	0.75	0.15	0.54	0.15	0.27	0.00
10000	1.60	0.00	0.15	0.00	0.00	0.00	0.34	0.32	1.23	0.00	0.55	0.11	0.41	0.11	0.20	0.00

Table 12.62 : Effective Long Term SO2 Concentration (ug/m3) for January Month

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.41	0.00	0.00	0.00	0.00	0.00	0.81	0.21	0.62	0.24	0.13	0.00	0.00	0.00	0.08	0.17
1000	3.51	0.01	0.37	0.01	0.01	0.01	7.83	3.62	8.08	3.38	1.73	0.01	0.01	0.01	0.90	2.91
1500	11.43	0.10	1.84	0.10	0.10	0.10	12.26	5.01	11.89	4.95	2.57	0.10	0.10	0.10	1.35	5.94
2000	16.07	0.16	2.88	0.16	0.16	0.16	13.20	5.07	11.95	4.96	2.54	0.16	0.16	0.16	1.36	7.30
2500	17.70	0.18	3.23	0.18	0.18	0.18	12.82	4.71	10.84	4.46	2.38	0.18	0.18	0.18	1.22	7.41
3000	17.77	0.19	3.29	0.19	0.19	0.19	11.56	4.26	9.52	3.99	2.09	0.19	0.19	0.19	1.03	7.08
3500	16.20	0.18	3.06	0.17	0.17	0.17	10.66	3.90	3.30	3.51	1.84	0.17	0.17	0.17	0.89	6.37
4000	14.69	0.16	2.80	0.16	0.16	0.16	9.74	3.55	7.42	3.14	1.64	0.16	0.16	0.16	0.75	5.77
4500	13.13	0.13	2.42	0.13	0.13	0.13	8.75	3.31	6.66	2.78	1.46	0.13	0.13	0.13	0.66	5.16
5000	11.71	0.11	2.24	0.11	0.11	0.11	8.01	3.07	5.90	2.56	1.31	0.11	0.11	0.11	0.60	4.76
6000	9.57	0.10	1.73	0.10	0.10	0.10	6.79	2.66	4.80	2.06	1.10	0.10	0.10	0.10	0.43	3.60
7000	7.54	0.06	1.41	0.06	0.06	0.06	5.84	2.29	4.23	2.18	0.92	0.07	0.07	0.07	0.36	2.98
8000	6.09	0.05	1.09	0.05	0.05	0.05	5.06	2.05	3.44	1.29	0.72	0.05	0.05	0.05	0.25	2.49
9000	5.06	0.03	0.93	0.03	0.03	0.03	4.46	1.82	3.01	1.37	0.70	0.03	0.03	0.03	0.24	2.01
10000	4.29	0.02	0.71	0.02	0.02	0.02	3.91	1.66	2.63	1.16	0.46	0.02	0.02	0.02	0.20	1.76

Table 12.63 : Effective Long Term SO2 Concentration (ug/m3) for May Month

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.29	0.46	0.10	0.17	0.00	0.00	0.00	0.07	0.00
1000	0.97	0.00	0.48	0.00	0.16	0.00	5.56	3.70	6.37	1.18	2.71	0.00	0.00	0.78	1.85	0.00
1500	4.84	0.00	2.34	0.00	0.81	0.00	11.99	7.89	12.86	1.70	3.90	0.00	0.00	1.44	4.06	0.00
2000	7.78	0.00	3.70	0.00	1.30	0.00	13.54	8.72	13.95	1.81	4.11	0.00	0.00	1.91	5.22	0.00
2500	9.00	0.00	4.34	0.00	1.52	0.00	13.58	8.63	13.48	1.82	3.92	0.00	0.00	2.03	5.73	0.00
3000	9.22	0.00	4.45	0.00	1.55	0.00	12.94	8.20	12.82	1.73	3.75	0.00	0.00	2.01	5.64	0.00
3500	8.92	0.00	4.30	0.00	1.49	0.00	12.17	7.65	11.94	1.64	1.45	0.00	0.00	1.91	5.40	0.00
4000	8.41	0.00	4.09	0.00	1.43	0.00	11.46	7.12	11.22	1.54	3.25	0.00	0.00	1.80	5.19	0.00
4500	1.94	0.00	3.85	0.00	1.33	0.00	10.85	6.64	10.50	1.44	3.03	0.00	0.00	1.66	4.80	0.00
5000	7.40	0.00	3.59	0.00	1.27	0.00	10.02	6.26	9.57	1.36	2.83	0.00	0.00	1.55	4.50	0.00
6000	7.66	0.00	3.19	0.00	1.13	0.00	8.95	5.50	8.55	1.23	2.50	0.00	0.00	1.33	4.04	0.00
7000	5.79	0.00	2.81	0.00	0.99	0.00	7.76	4.71	7.45	1.07	2.22	0.00	0.00	1.14	3.50	0.00
8000	5.22	0.00	2.48	0.00	0.89	0.00	6.85	4.25	6.56	0.98	1.96	0.00	0.00	0.99	3.46	0.00
9000	4.77	0.00	2.28	0.00	0.80	0.00	6.22	3.81	5.41	0.87	1.76	0.00	0.00	0.88	2.03	0.00
10000	4.35	0.00	2.08	0.00	0.62	0.00	5.62	3.42	5.31	0.81	1.61	0.00	0.00	0.78	2.68	0.00

Table 12.64 : Effective Long Term SO2 Concentration (ug/m3) for July Month

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.79	0.18	0.18	0.00	0.00	0.00	0.06	0.00
1000	0.50	0.00	0.00	0.00	0.29	0.00	5.16	0.20	12.76	2.14	2.87	0.00	0.00	0.00	1.34	0.00
1500	2.48	0.00	0.00	0.00	1.46	0.00	9.40	0.97	24.51	5.34	5.09	0.00	0.00	0.00	3.99	0.00
2000	3.95	0.00	0.00	0.00	2.32	0.00	11.21	1.53	28.72	6.16	5.86	0.00	0.00	0.00	5.83	0.00
2500	4.72	0.00	0.00	0.00	2.86	0.00	11.63	1.89	30.80	6.19	6.01	0.00	0.00	0.00	6.62	0.00
3000	4.65	0.00	0.00	0.00	2.75	0.00	11.00	1.89	29.10	5.93	5.72	0.00	0.00	0.00	6.60	0.00
3500	4.50	0.00	0.00	0.00	2.68	0.00	10.34	1.82	27.70	5.59	5.48	0.00	0.00	0.00	6.52	0.00
4000	4.29	0.00	0.00	0.00	2.57	0.00	9.53	1.63	25.20	4.98	4.94	0.00	0.00	0.00	4.05	0.00
4500	4.04	0.00	0.00	0.00	2.46	0.00	8.83	1.62	24.40	4.03	4.77	0.00	0.00	0.00	5.76	0.00
5000	3.79	0.00	0.00	0.00	2.32	0.00	8.04	1.52	22.70	4.47	4.41	0.00	0.00	0.00	6.41	0.00
6000	3.36	0.00	0.00	0.00	2.64	0.00	7.06	1.35	19.50	3.96	3.83	0.00	0.00	0.00	4.85	0.00
7000	3.02	0.00	0.00	0.00	1.82	0.00	6.09	1.21	17.40	3.48	3.39	0.00	0.00	0.00	4.33	0.00
8000	2.83	0.00	0.00	0.00	1.64	0.00	5.35	1.08	15.40	2.97	3.01	0.00	0.00	0.00	3.94	0.00
9000	1.96	0.00	0.00	0.00	1.19	0.00	7.76	1.00	13.80	2.73	2.65	0.00	0.00	0.00	3.62	0.00
10000	2.73	0.00	0.00	0.00	1.15	0.00	4.51	0.96	13.22	2.50	2.52	0.00	0.00	0.00	3.45	0.00

Table 12.65 : Effective Long Term SO2 Concentration (ug/m3) for October Month

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.15	0.56	0.00	0.21	0.11	0.00	0.11	0.08	0.00
1000	2.16	0.00	0.18	0.00	0.00	0.00	2.18	2.15	8.32	0.00	2.70	1.23	0.80	1.23	1.09	0.00
1500	10.55	0.00	0.93	0.00	0.00	0.00	4.08	3.46	13.81	0.00	5.64	12.84	2.53	1.95	2.15	0.00
2000	16.78	0.00	1.51	0.00	0.00	0.00	4.75	3.78	15.69	0.00	6.80	2.01	3.63	2.01	2.73	0.00
2500	19.85	0.00	1.71	0.00	0.00	0.00	4.78	3.52	15.24	0.00	7.41	1.78	4.09	1.78	2.75	0.00
3000	19.17	0.00	1.74	0.00	0.00	0.00	4.39	3.32	14.12	0.00	7.09	1.57	3.99	1.57	2.52	0.00
3500	18.04	0.00	1.65	0.00	0.00	0.00	3.96	2.98	12.84	0.00	6.40	1.37	3.84	1.37	2.36	0.00
4000	16.77	0.00	1.52	0.00	0.00	0.00	3.51	2.66	11.64	0.00	5.82	1.19	3.54	1.19	2.00	0.00
4500	16.04	0.00	1.37	0.00	0.00	0.00	3.17	2.34	10.53	0.00	5.12	1.02	3.25	1.04	1.79	0.00
5000	13.87	0.00	1.24	0.00	0.00	0.00	2.74	2.13	7.99	0.00	4.63	0.92	2.92	0.92	1.65	0.00
6000	11.27	0.00	1.00	0.00	0.00	0.00	2.21	1.77	7.84	0.00	3.67	0.71	2.43	0.71	1.33	0.00
7000	9.25	0.00	0.82	0.00	0.00	0.00	1.80	1.49	6.32	0.00	2.89	0.59	2.00	0.56	1.05	0.00
8000	7.63	0.00	0.69	0.00	0.00	0.00	1.49	1.27	5.50	0.00	2.47	0.49	1.71	0.49	0.86	0.00
9000	6.36	0.00	0.56	0.00	0.00	0.00	1.27	1.11	4.74	0.00	2.10	0.41	1.46	0.41	0.73	0.00
10000	5.46	0.00	0.49	0.00	0.00	0.00	0.99	0.87	4.16	0.00	1.79	0.36	1.26	0.36	0.63	0.00

Table 12.66 : Effective Long Term NOx Concentration (ug/m3) for January Month

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.03	0.00	0.00	0.00	0.00	0.00	0.18	0.08	0.21	0.09	0.04	0.00	0.00	0.00	0.02	0.06
1000	1.01	0.00	0.07	0.00	0.00	0.00	2.63	1.14	2.36	1.01	0.53	0.00	0.00	0.00	0.24	0.81
1500	2.89	0.01	0.37	0.01	0.01	0.01	5.54	1.94	3.97	1.67	0.89	0.01	0.01	0.01	0.42	1.66
2000	4.29	0.02	0.66	0.02	0.02	0.02	5.39	2.25	4.55	1.91	1.01	0.02	0.02	0.02	0.46	2.20
2500	5.11	0.03	0.83	0.03	0.03	0.03	5.44	2.15	4.44	1.88	0.99	0.03	0.03	0.03	0.45	2.41
3000	5.45	0.03	0.92	0.03	0.04	0.04	5.17	2.06	4.14	1.75	0.91	0.04	0.04	0.04	0.42	2.42
3500	5.54	0.04	0.96	0.04	0.04	0.04	4.91	1.89	3.72	1.61	0.84	0.04	0.04	0.04	0.37	2.35
4000	5.22	0.04	0.95	0.04	0.04	0.04	4.56	1.75	3.51	1.47	0.76	0.04	0.04	0.04	0.33	2.23
4500	5.03	0.05	0.91	0.05	0.04	0.04	4.20	1.63	3.05	1.33	0.70	0.05	0.05	0.03	0.29	2.07
5000	4.74	0.05	0.87	0.05	0.05	0.04	3.81	1.52	2.80	1.21	0.64	0.05	0.05	0.05	0.25	1.92
6000	4.02	0.04	0.74	0.04	0.05	0.04	3.33	1.31	2.31	1.01	0.52	0.04	0.04	0.04	0.19	1.64
7000	3.45	0.02	0.62	0.02	0.04	0.02	2.86	1.15	1.98	0.87	0.45	0.02	0.02	0.02	0.15	1.37
8000	2.88	0.01	0.52	0.01	0.02	0.01	2.49	1.03	1.71	0.75	0.39	0.01	0.01	0.01	0.12	1.17
9000	2.45	0.01	0.44	0.01	0.01	0.01	2.19	0.91	1.49	0.67	0.35	0.01	0.01	0.01	0.11	1.00
1000	2.09	0.00	0.38	0.00	0.01	0.00	1.97	0.82	1.31	0.58	0.32	0.00	0.00	0.00	0.09	0.85

Table 12.67 : Effective Long Term NOx Concentration (ug/m3) for May Month

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.11	0.19	0.02	0.06	0.00	0.00	0.00	0.03	0.00
1000	0.20	0.00	0.09	0.00	0.03	0.00	2.42	1.69	2.89	0.30	0.82	0.00	0.00	0.35	0.48	0.00
1500	1.00	0.00	0.48	0.00	0.17	0.00	4.36	3.10	5.10	0.54	1.43	0.00	0.00	0.72	1.11	0.00
2000	1.80	0.00	0.84	0.00	0.30	0.00	5.45	3.72	6.03	0.69	1.71	0.00	0.00	0.88	1.57	0.00
2500	2.27	0.00	1.11	0.00	0.40	0.00	5.70	3.87	6.18	0.77	1.76	0.00	0.00	0.94	1.84	0.00
3000	2.69	0.00	1.27	0.00	0.45	0.00	5.76	3.82	6.04	0.77	1.70	0.00	0.00	0.94	1.97	0.00
3500	2.81	0.00	1.36	0.00	0.49	0.00	5.61	3.60	5.69	0.72	1.63	0.00	0.00	0.92	2.00	0.00
4000	2.92	0.00	1.41	0.00	0.49	0.00	5.26	3.43	5.44	0.70	1.53	0.00	0.00	0.85	1.99	0.00
4500	2.96	0.00	1.41	0.00	0.50	0.00	4.93	3.14	5.00	0.65	1.44	0.00	0.00	0.81	1.93	0.00
5000	2.85	0.00	1.37	0.00	0.49	0.00	4.59	2.95	4.76	0.62	1.35	0.00	0.00	0.75	1.86	0.00
6000	2.63	0.00	1.27	0.00	0.44	0.00	4.16	2.59	4.16	0.56	1.18	0.00	0.00	0.65	1.69	0.00
7000	2.41	0.00	1.16	0.00	0.41	0.00	3.71	2.31	3.61	0.50	1.05	0.00	0.00	0.57	1.53	0.00
8000	2.16	0.00	1.04	0.00	0.38	0.00	3.27	2.05	3.18	0.45	0.86	0.00	0.00	0.50	1.37	0.00
9000	1.96	0.00	0.94	0.00	0.35	0.00	2.98	1.84	2.91	0.41	0.85	0.00	0.00	0.44	1.25	0.00
10000	1.73	0.00	0.80	0.00	0.31	0.00	2.67	1.77	2.64	0.37	0.78	0.00	0.00	0.40	1.14	0.00

Table 12.68 : Effective Long Term NOx Concentration (ug/m3) for July Month

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.34	0.06	0.06	0.00	0.00	0.00	0.02	0.00
1000	0.37	0.00	0.00	0.00	0.06	0.00	1.71	0.03	3.68	1.02	1.07	0.00	0.00	0.00	0.32	0.00
1500	0.51	0.00	0.00	0.00	0.30	0.00	3.52	0.19	8.25	1.9	1.95	0.00	0.00	0.00	0.98	0.00
2000	0.89	0.00	0.00	0.00	0.54	0.00	4.35	0.35	10.43	2.32	2.45	0.00	0.00	0.00	1.51	0.00
2500	1.18	0.00	0.00	0.00	0.70	0.00	4.53	0.47	11.35	2.48	2.56	0.00	0.00	0.00	1.88	0.00
3000	1.34	0.00	0.00	0.00	0.81	0.00	4.53	0.55	11.43	2.48	2.54	0.00	0.00	0.00	2.11	0.00
3500	1.44	0.00	0.00	0.00	0.87	0.00	4.29	0.58	11.32	2.55	2.44	0.00	0.00	0.00	2.20	0.00
4000	1.48	0.00	0.00	0.00	0.89	0.00	4.23	0.60	10.9	2.24	2.36	0.00	0.00	0.00	2.24	0.00
4500	1.49	0.00	0.00	0.00	0.90	0.00	3.87	0.60	10.4	2.12	0.00	0.00	0.00	0.00	2.19	0.00
5000	1.45	0.00	0.00	0.00	0.87	0.00	3.69	0.58	9.82	2.01	2.09	0.00	0.00	0.00	2.14	0.00
6000	1.36	0.00	0.00	0.00	0.81	0.00	3.23	0.54	8.86	1.77	1.84	0.00	0.00	0.00	1.98	0.00
7000	1.23	0.00	0.00	0.00	0.74	0.00	2.85	0.50	7.74	1.58	1.62	0.00	0.00	0.00	1.79	0.00
8000	1.12	0.00	0.00	0.00	0.66	0.00	2.52	0.44	6.94	1.39	1.44	0.00	0.00	0.00	1.63	0.00
9000	1.00	0.00	0.00	0.00	0.60	0.00	2.25	0.41	6.27	1.24	1.29	0.00	0.00	0.00	1.47	0.00
10000	0.93	0.00	0.00	0.00	0.57	0.00	2.02	0.37	5.61	1.14	1.16	0.00	0.00	0.00	1.36	0.00

Table 12.69 : Effective Long Term NOx Concentration (ug/m3) for October Month

Direction / Distance (m)	W	WSW	SW	SSW	S	SSE	SE	ESE	E	ENE	NE	NNE	N	NNW	NW	WNW
500	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.04	0.19	0.00	0.05	0.02	0.00	0.02	0.02	0.00
1000	0.44	0.00	0.03	0.00	0.00	0.00	0.58	0.71	2.65	0.00	0.70	0.34	0.34	0.34	0.29	0.00
1500	2.17	0.00	0.19	0.00	0.00	0.00	1.16	1.25	4.83	0.00	1.52	0.60	0.77	0.60	0.60	0.00
2000	3.83	0.00	0.34	0.00	0.00	0.00	1.45	1.44	5.75	0.00	2.02	0.68	1.19	0.68	0.79	0.00
2500	4.94	9,99	9.43	0.00	0.00	0.00	1.54	1.45	5.80	0.00	2.26	0.67	1.37	0.67	0.84	0.00
3000	5.63	0.00	0.49	0.00	0.00	0.00	1.52	1.38	5.71	0.00	2.31	0.62	1.44	0.62	0.85	0.00
3500	5.88	0.00	0.51	0.00	0.00	0.00	1.46	1.27	5.33	0.00	2.25	0.57	1.43	0.57	0.82	0.00
4000	5.77	0.00	0.52	0.00	0.00	0.00	1.35	1.17	4.95	0.00	2.13	0.50	1.40	0.50	0.79	0.00
4500	5.57	0.00	0.50	0.00	0.00	0.00	1.25	1.08	4.59	0.00	2.00	0.45	1.31	0.45	0.73	0.00
5000	5.37	0.00	0.48	0.00	0.00	0.00	1.16	0.98	4.19	0.00	1.87	0.40	1.24	0.40	0.68	0.00
6000	4.62	0.00	0.42	0.00	0.00	0.00	0.97	0.83	3.52	0.00	1.58	0.34	1.07	0.34	0.58	0.00
7000	3.91	0.00	0.35	0.00	0.00	0.00	0.82	0.72	3.06	0.00	1.34	0.27	0.92	0.27	0.46	0.00
8000	3.36	0.00	0.31	0.00	0.00	0.00	0.69	0.62	2.64	0.00	1.13	0.23	0.80	0.23	0.41	0.00
9000	2.91	0.00	0.25	0.00	0.00	0.00	0.59	0.54	2.30	0.00	0.98	0.19	0.70	0.19	0.36	0.00
10000	2.49	0.00	0.21	0.00	0.00	0.00	0.51	0.47	1.98	0.00	0.84	0.16	0.62	0.16	0.30	0.00