ENVIRONMENTAL STATUS AND ACTION PLAN FOR CONTROL OF POLLUTION AT CHANDRAPUR

MAHARASHTRA POLLUTION CONTROL BOARD
MUMBAI - 400 022
http://mpcb.mah.nic.in

March 2006

CONTENTS

Environmental status of Chandrapur District

1. BACKGROUND:

Chandrapur district is famous for its sprawling coal mines and Tadoba wildlife sanctuary, which is an important Tiger destination in the country. The mineral based industrial development and rapid urbanization in this district has albeit resulted in pollution and environmental degradation and its effects are being felt on a wide scale. The Parliament and Maharashtra Legislative assembly have deliberated on environmental degradation and social problems associated with this industrial development and recommended the abatement measures. Accordingly, MoEF and MPCB have issued directions to various industries and implementing agencies respectively, directing them to take effective steps to control environmental degradation and the pollution.

The air quality issues at Chandrapur have also been studied under US-Asia Environmental Program by a team of experts from US-EPA in September, 2004. They carried out the institutional analysis and recommended a pilot project to implement the Visible Emission Observations (VEOs) from the stationary sources, as an alternate approach to manage the air quality at Chandrapur.

Considering the multitude of pollution problems at Chandrapur, Member Secretary, MPCB took a review of the current status of the pollution from various sources in December 2005. It was noticed during the review that the industrial and other activities at Chandrapur have extensively contributed to pollution and there is a considerable rise in the associated health problems in the local population. It was perceived that pollution, mainly air pollution, at Chandrapur is a serious threat to environment and public health needing urgent intervention by all concerned. MPCB therefore decided to prepare `**an integrated action plan to control pollution at Chandrapur'** covering various aspects of the environmental degradation and the pollution. The proposed plan stipulates implementation of the time bound actions through an effective and well orchestrated interdepartmental coordination.

2. PHYSIOGRAPHY

Chandrapur is located in the eastern edge of Maharashtra in 'Vidharbha' region. It is located between 19.30' N to 20.45'N Latitude and 78.46'E longitude. The district is bounded by Nagpur, Bhandara and Wardha on the northern side, Yavatmal on the western side, Gadchiroli on the eastern side and Adilibad district of the Andhra Pradesh on the southern side. Physiographically, the district is situated within the Wainganga and Wardha river basins, respectively, flowing on the eastern and western boundries of the district which are the tributaries of Godavari river.

Chandrapur district is abundantly endowed with rich flora and fauna, water resources and mineral wealth. Chandrapur has been famous from ancient times as the capital of Gond dynasty. Anandavan at Varora is famous the world over due to work being done on the rehabilitation of the leprosy patients. India's largest thermal power plant, many coal mines, cement and paper factories, huge lime stone deposits, bauxite, iron, and chromite mines are the sources of wealth for the district. Tadoba-Andhari Tiger Project is a major tourist attraction. Different tribes are the original inhabitants of this district for millennia.

Chandrapur district is spread over about 11,443 square km. There are eleven talukas including 12 towns in this district, out of which six are municipal towns. Population of the district as per 2001 census is about 22,15,000. Total number of villages is 1790. Average size of an urban centre is 41,000 to 45,000 persons. Wardha is the main river flowing through the district. Rivers Erai, Andhari,Wainganga and the .Penganga are its tributaries. Chimur and Mul are the main water sheds between Wardha and Wainganga rivers.

2.1 Climate :

The climate of the district can be classified as tropical hot climate with high range of temperature through out of year. Primarily there are two prominent seasons in the district - the very hot summer and moderate winter. The summer months are very hot and prolonged while winter is short and mild. The monsoon season starts immediately after summer till late September. The southwest monsoon bring lot of rainfall during rainy season and there is no draught prone area in the district.

The temperature starts decreasing from the month of October. December is the coldest month. Mean maximum temperature during December is 28.2º and mean minimum is 11.6º .The southern part is comparatively warmer then the north which ranges between 29.6º to 14.6º. The lowest recorded temperature is in the north is 3º and 8º in the south. The daily mean temperature starts rising from the month of February and May is the peak summer month when mean maximum temperature goes up to 43º and minimum temperature is 28º to 29º. In severe heat condition temperature rises up to 46º. However temperature starts reducing after May due to onset of monsoon, which last from June to September when it is hot and humid.

The average annual rainfall is about 1420 mm. The eastern part receives more rainfall then west. Average no of rainy days is 60 to 65 through out the district. The relative humidity is very high during monsoon season, which exceeds 70%, but after monsoon season it falls down rapidly and in summer it is only 20%.

The prominent wind direction is from south to north. In summer the wind direction is from east to and south and monsoon from south to east. During

winter, the wind direction changes from north to east. Frequently is characterized by the blowing of wild and violent winds heralding the approach of hot season which last till middle of June.

2.2 Land use pattern:

Chandrapur district can be divided into two regions on the basis of physiographic features.

1. The plain and the fertile region lying in river basins of the Wardha, the Penganga and the Wainganga rivers - The widely spread and flat terrain exhibits mostly rolling topography with residual knolls of the hills in the southern portion while in the northern portion that is in Brahmapuri tahsil, fairly wide flood and alluvial plains covered with fertile loams are observed. The flat terrain of Chandrapur district on the whole lies generally between 200-250 m (MSL). In the Penganga valley, flat terrain covers very little area in the south western portion of the district. The area occupied by the Penganga basin in the south-western parts of the district in Rajura and Chandur tahsils exhibits mostly hilly topography. The hills are known as Gadchandur and Manikgarh hills the altitude in general rises to 500m above MSL.

2. The upland hilly region - The upland hilly region lies between the Wardha and the Wainganga rivers comprising parts of Warora, Chandrapur and major part of Brahmapuri tahsils. It has sandy soil. The hills in Wardha, Gadchiroli and Chandrapur districts are low altitude hills called 'Chimur-Perjagarh-Mul hills'. The altitude of these hills is on average 300 m. above MSL. The present land-use pattern is shown below.

Inhabited area	:	880 .00 Sq. Kms.
Agricultural area	:	4870 .00 Sq. Kms.
Industrial area	:	32.34 Sq. Kms.
Forest cover	:	3810 .00 Sq. Kms
Waste Land	:	550.00 Sq. Kms.
Drought Prone area	:	2890 .00 Sq. Kms

2.3 Soils:

Soil is the most important feature of physiography, the formation of which largely depends upon the topography rock types and drainage. The cropping pattern in the are is governed by the thickness of soil mantle, its texture and constancy. The soils of Chandrapur district are of various types. Each type covering a well-defined tract which displays cropping pattern of totally different level. The soils occurring in the Wardha and the Wainganga valleys are generally most fertile.

The soil of the district is well defined and conductive for growing crops of various kinds. The most fertile soils are found in the Wardha and Wainganga valleys. The numerous varieties of soils known by many local names they are grouped under the following representative classes. The soil conditions along Wardha-Painganga valleys are rich with black regur loams and clay loams along the river bed. These soils locally known as kali soils, are very productive and suitable for rabi crops due to high moisture retention capacity. However water logging is very common during monsoon and is therefore not suitable for khariff crops.

2.4 Vegetation:

The vegetation of the district is characterized as southern Tropical Dry Deciduous Forest where teak is the dominant species. other associated species are Aain, Bamboo, Bijja, Dhada, Haldu, Semal, Tendu etc. depending upon the physiographic features. Jamun, Mango, Arjun are found in moist area. The slopes of the hills have poor and low density vegetation. The plains of the tract have luxuriant forest. The district had about 3651 sq. km. forest cover in 1998-99, which accounted for 33.44% of the total geographical area of the district. However according to forest Dept. the district has an area 5005 sq. km under forest which works out to 46.80 % against state averages 17.45%. The latest available figures (2001) indicate a forest cover of 4531 sq. kms which accounts for 41.5 % of the total land in the district. The major forest area is surrounded by the industrial activity which is also fast urbanizing.

2.5 Socio-Economic, Occupational and Educational Profile:

Physical feature and land use pattern of the district indicate that agriculture is the main activity.. The total agriculture area is 4870 Sq. kms. i.e. 46.05 % of the total area of the district. Paddy, Cotton, Jowar and Soybean are the main crops in the district. 34.33 % of the total area I under forest cover. The percentage of urban & rural population is 28.04 % & 71.96 % respectively. Scheduled Castes and Scheduled Tribes population accounts for 16.78 % and 19.70 %, respectively. The total area under industrial use accounts for 32.34 sq.km.

There are 7 urban centres and 13 major rural centres. About 6.26 % of the population lives in the slums and 13.36 % of the population is below poverty line. Total work-force in 4 existing industrial estates is just 2071 but there are major industries like coal mines. Thermal power station, Cement Factories, Paper mill etc. which are situated outside the industrial area where work force is about 30,000. There is an influx of workers from other states particularly in Coal Mines. Seasonal migration is temporary phenomenon lasting for about two to three months. The workers mostly migrate to Chandrapur district from Madhya Pradesh, Andhra Pradesh, Orissa and Bihar.

There are two historical centers and 16 religious centers where there is influx of tourists in a particular season.

The overall literacy percent age of the district is 59.41 %.

3. WATER RESOURCES

Wardha, Wainganga and Penganga are the important rivers in Chandrapur district. The Wardha river flows into the district from the western boundary and then flows along the boundaries of Varora, Chandrapur, Korapna, Rajura, Ballarpur and Gondpipri Talukas. Penganga and Irai rivers meet the Wardha river. The confluence of the Wardha and Penganga rivers is near Wardha town. The Wainganga flows along the eastern boundary of the district. This river flows from north to south. The confluence of the Wardha and the Wainganga rivers is near Shivani. Andhari and Mul (Uma) are two other rivers in the district.

The larger lakes in the district are Asola mendha, Kasarla, Tadoba, Naleshwar, Gadmousi. There are bunds at Uma, Andhari, Thargaon, Dongargaon. There are only medium size dams at Asolamendha in Savli taluka, Naleshwar in Sindewahi Taluka, Ghodazari in Nagbhid Taluka, Chargaon, Chandainala and Labhan Sarad in Varora Taluka and Amalnalain and Pakadegudum in Korapna Taluka. Canals and other facilities are also used for water supply. Small bunds are built to store water on the farms. These are called bodis. The various schemes implemented for the water supply for irrigation and their total command area as below:

Type of irrigation	**Strength of irrigation**	**Total command area in ha.**
Wells	18039	8000
Tube Well	255	----
Medium Dams	7	92000
Smaller dams	2497	54881
Larger dams	Nil	Nil
Total		154881

The drinking water supply projects in chandrapur district includes 203 pipeline schemes, 171 tube wells, 4078 wells and 4514 Bore well/ Hand pumps in the entire district. Besides, the Municipal councils in Chandrapur district are depending on the following drinking water sources:

Chandrapur Municipal council	:	Erai Dam
Rajura Municipal council	:	Intake well at Kopangaon Nalla.
Mul Municipal council	:	Wainganga river
Bramhapuri Municipal council	:	Borewell
Bhadrawati Municipal council	:	Wardha river
Warora Municipal council	:	Wardha river

3.1 Ground Water Resources:

About 85% of the state is covered by Deccan basalts whereas the rest of the state is covered by Quaternary alluvium. The total replenishable Ground water Resource is of the order of 37.82 BCM/Yr Provision for Domestic, Industrial & Other uses 12.40 BCM/Yr Available Ground Water Resources for irrigation 25.47 BCM/Yr Net Draft 38 BCM Chandrapur districts shows ground water levels declining trend (more than 20 cm per year) Pre-Monsoon (1995-2004) Fluoride is a common contaminant in Chandrapur district while high nitrate levels are also found in some of the areas in the district as per CGWB reports.

Endemic fluorosis, dental caries, mottling of teeth, pain in joints have been observed in Chandrapur district by various investigating agencies. The district is underlain by various geological formations of Archaean to recent age. The Achaeans comprises hard and fissured gneisses, quartzite. The Vindhagan metasediments are represented by flaggy and massive shale, limestone, sandstones and ferruginous quartzite, covering on area of 1670 sq. Km. Ground water in Achaean crystallites and vidhayan rocks occurs under table to semi-confined conditions in weathered and fractured zones. Aquifers in archaeans are characterized by degree of weathering, secondary porosity and effective inter-granular space, whereas in Vindhyans, joint planes and fracture porosity developed during cooling and compression of sediments and in limestone the solution cavities play a major role in aquifer nature.

The water samples from open wells and the bore wells in the fluoride contaminated areas viz. Rajura, Korpana, Sindewahi, Mul, Warora, Bhadravati and Chimur talukas, show that fluoride concentration in the 27 villages is in the range of 1.0-3.0 ppm and in villages viz. Bamni, Ladbori, Chargaon Badge and Dhoptala it is 3.9 ppm, 7.3 ppm, 3.85 ppm and 4.6 ppm, respectively, which is much beyond the drinking water standards. Water samples in shales, limestones of Rajura, Korpana and Warora talukas are also show a high concentration of fluoride both in phreatic as well as deeper aquifers as compared to aquifers of granite gneisses of Sindewahi, Mul and Chimur Talukas.

The population growth and industrial development in Chandrapur Ballarshah region have made an adverse effect on the quality of ground-water of

Visapur Nala Basin. The ground-water of Visapur Nala Basin in general is not very bad for irrigation but the dug well waters Nandgaon and some from Visapur village are found unfit for drinking purpose owing to characteristically high concentration of nitrate in them.

4. MINERAL RESOURCES

Natural deposits of the high -grade iron ore in Sindewahi taluka are estimated to be 22, 000, 00 tonnes; limestone in Rajura & Korpana talukas (54,70,00,000 tonnes). Coal in Chandrapur taluka alone is estimated to be 1,22,70,00,000 tonnes. Fish production in the district is about 3945 tonnes/year. Chandrapur district is known for its forest cover. Forest area is 1,19,124.27 ha and social forestry area is 543.68 ha.

Availability of coal has led to opening of increasing number coal mines and the power plant. Limestone has prompted cement industries particularly in Rajura Tahsil. Paper mills have been established because of availability of wood/bamboo. They are located on banks of river or nallahs. Paddy is the main crop of this district and has led to a number of rice processing mills.

Decadal growth rate of the district is about 25 per cent .Chandrapur taluka has experienced 47 per cent growth rate and is closely followed by the Rajura taluka. This growth is mainly due to the abundance of the minerals and industries based on them. However, this has also led to emergence of the environmental problems. Unless effective strategy is evolved to control the environmental pollution in a time bound manner the situation may worsen in a few years.

5. INDUSTRIAL DEVELOPMENT IN CHANDRAPUR

The industrial sector occupies a prominent position in the economy of Maharashtra, which still retains the numero uno status in the country though states like Gujarat, Karnataka and Andhra Pradesh are surging forward with massive investments. Addl.Chandrapur Indl.Area is one of the best Industrial Area in Nagpur region. This Industrial Area is the best Black Gold city of Maharashtra in the region.

MIDC has been set-up with the main objective to promote industrial growth and attract foreign direct investment in Maharashtra. MIDC has made efforts to promote the resource based industrial growth of this region and many corporates have set up industries in this backward district. Addl. Chandrapur Industrial Area spans a total area of 70.23 hectares. Besides, MIDC has acquired 214.40 ha of lands and developed 46 plots at Padolee and 154.62 ha of lands at Korpan, Bhoyegaon, Nandgaon, Ekodi and Kawthala villages to promote the industrial growth in Chandrapur district. It is planned to utilize these areas for setting up of cement manufacture, power plant and lime mining activities. Tadali has been identified as a growth center for sponge iron manufacturing industries considering the ample availability of the iron ore and coal in this region. MPCB has decided a policy on the size of such plants and the development of this industry shall be accordingly governed. This is necessary to ensure techno economic feasibility of compliance of environmental standards. There are other four main growth centers coming up however, they are in the initial stages of development and may take some more time to become active industrial areas. The industrial estate set up in 1961 houses 86 industrial units which include chemical, auxiliary and engineering/ service industries.

Besides, the existing major industries in Chandrapur district include Coal mines of WCL, Cement plants, paper industry, lime mining and kilns, steel and Super Thermal Power Plant of MSEB.

6. ACTIVITIES IMPACTING THE ENVIRONMENT

Chandrapur is a mineral rich district with a dense forest spread over 41.5 % of total land. Based on available minerals and abundant water, industries have been set up within and in the surrounding of Chandrapur City. The details of industries are given in this report. Western Coal Ltd. operates 26 coal mines in Chandrapur city and the surrounding areas. The mined coal is supplied to Super Thermal Power station at Chandrapur having a generation capacity of 2340 MW capacity and also having coal linkage to Durgapur open cast coal mine. Coal is transported to STPS by rail and aerial ropeway. WCL also supplies coal to the other industries like paper mills, sponge iron plants, cement industries etc. All WCL mines generally produce coal of E/F grade. Due to heavy demand of coal, WCL has increased their stipping ratio and coal production. WCL has been given

conditional environmental clearances by MoEF, Government of India. They have obtained consents to operate those mines for the enhanced coal production. Since the coal mined at WCL has high ash content, the industries are preferring washed coal and therefore 9 coal washeries are set up in this district to meet the cleaner coal demand. Currently only 8 coal washeries are in operation. Government of India has allotted two captive coal blocks to the industries for which public hearing were conducted by MPCB. In addition MPCB has also conducted public hearings for two new coal blocks and two cement plant and captive Lime stone mine.

Ballarpur Paper mill is the major pulp & paper industry located at Ballarpur city, which is about 20 km from Chandrapur City. The raw material of industry is bamboo and hard wood, which is available in the forest area. There are total 4 nos. Cement plants in Chandrapur District located about 70 to 80 kms from Chandrapur City. All Cement industries also carry out captive lime stone mining for raw material. Due to abundant availability of coal, 6 sponge iron plant have also come up in this district, which are within a distance of 10 to 20 kms from Chandrapur city. There are old pottery industries in the city and nearby areas but those are closed since there is no demand for their products. This ETP sludge generated by this industry contains fibers which can be used for paper board making. In Chandrapur district there 19 board mills which are using the ETP sludge of Ballarpur Paper Mills as raw material. There are about 25 plain rice mills and 06 are steam rice mills in the district. These plain rice mills, which are generally located in residential areas, generate rice husk which is responsible for air pollution and nuisance.

Urban environmental concerns in the district are air pollution due to coal burning industries and auto-exhaust, Municipal solid waste, bio-medical waste, untreated domestic sewage and also the urban sanitation are other issues of concern. They contribute significantly to the pollution load.

The category and number of industries located in Chandrapur district are summarized in the table below (as on March 2006).

Sr. No.	Type of Industries	No. of working industries	No. of closed industries	No. of proposed industries	Total
01	WCL Coal Mines	26	04	Private-05 WCL-02	37
02	Lime stone mine (SSI) (other than captive mine of cement industries)	01	--	--	01
03	Fluoride mine	01	--	--	01
04	Thermal Power Plants	01	Nil	02 (Agro Based)	03
05	Pulp & Paper	01	Nil	Nil	01
06	Virgin pulp & waste paper based	01	Nil	Nil	01
07	Cement industries	04	01	01	06
08	Chemicals	04	03	Nil	07
09	Sponge iron	06	Nil	03	09
10	Coal washeries	08	01	Nil	09
11	Edible oil (Soyabeen) refinery	03	Nil	Nil	03
12	Potteries	13	09	Nil	22
13	Lime manufacturers	02	01	Nil	03
14	Used/Waste oil recyclers.	02	Nil	Nil	02
15	Stone crushers	80	04	Nil	84
16	Rice mill plain	251	Nil	Nil	251
17	Rice mill steam	06	Nil	Nil	06
18	Bulk petroleum storage	01	01	Nil	02
19	Tannery	Nil	01	Nil	01
20	Sun-drying paperboard	19	Nil	1	20

The category wise distribution of the industries in Chandrapur District is as below:

Category	Large	Medium	Small	Total
Red	47	18	57	122
Orange	Nil	Nil	178	178
Green	Nil	Nil	402	402
Total	**47**	**18**	**637**	**702**

Proposed industries (as on March 2006)

Red	10	02	04	16

7. INVENTORY OF POLLUTION

An attempt is made in this report to qualify and to quantify pollution arising from above mentioned industrial and human activities in vogue in Chandrapur district. This is based on the information collected by Maharashtra Pollution Control Board (MPCB).

Following table indicates pollution sources located within major industries and habitations in Chandrapur district.

Industry	Pollution						
	Air			Water		Solid	Land
	Stack	Mobile	Fugitive	Point	Non-point	Hazardous	
Coal Mines		*	*		*		*
Cement & Lime Stone mine	*	*	*		*		*
Paper	*			*		*	
Steel	*		*				
Rice			*		*		
Thermal Power	*		*	*	*	*	*
Habitations		*	*		*	*	*

7.1 Water Resources:

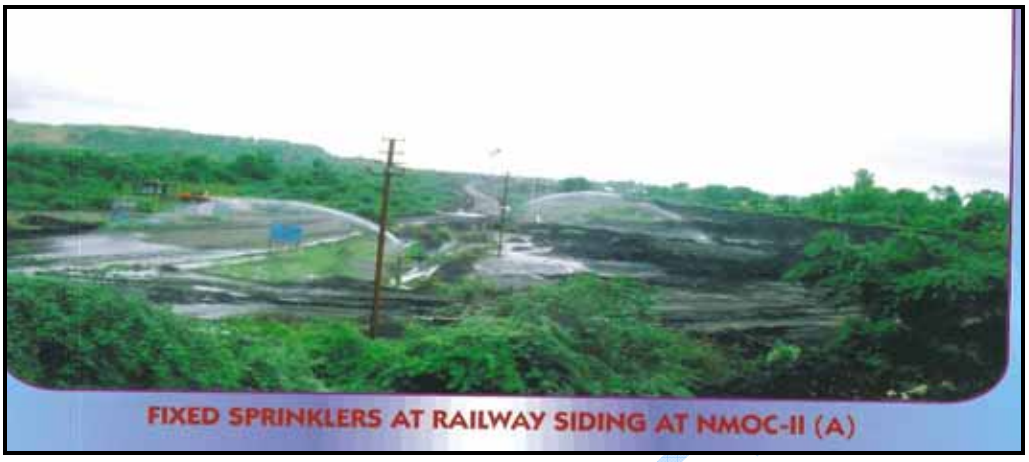
There are several contributing activities to the pollution of water resources and they are discussed in following sections.

7.1.1 Coal mining:

There are 35 working mines in the district with varying capacities. Total capacity is to produce coal @ 1,82,469 tonnes per month(TPM).

Coal Mining in Chandrapur

Average production per mine per day is 1790 tonnes Total wastewater due coal mining activity is estimated to be 1,86,886 m3 day. Hence there is a likelihood of the area in the immediate vicinity of the mine to be deprived of the ground water approximately @ 5340 m3 per day. Wastewater from mine pit contains suspended solids @ 30-40 mg/L, low pH, and sulphates @ 400-500 mg/L and hardness @ 400-500 mg/L as CaCO3. These quantities indicate discharge of about 213 kgs of solids and significant quantity of dissolved solids. It is also true that the entire quantity of the mine water is not discharged in to the environment since this is very valuable resource that can be used fro suppression of the dust and carry out the plantations in the abandoned mine areas. It is also reported that mining disturbs the ground water balance.



7.1.2 Limestone mining:

An impact on ground water regime due to dewatering from the limestone mining is identical as in case of coal mining. The operations do not create sever water quality problems and this water can be used for drinking purposes provided it is containing fluoride within limits or for agriculture after conventional water treatment.

7.1.3 Thermal power generation:

Wastewater generation during coal based power generation is about 50-70 m^3 per MW of power generated. Major pollutants in this waste water are suspended solids in ash slurry, total dissolved solids, traces of oil and hot water with a temperature more than the receiving water bodies. Large quantity of fly ash generation and its disposal is a major issue in TPS since the disposal sites can impair ground water table and the availability of water for agriculture.

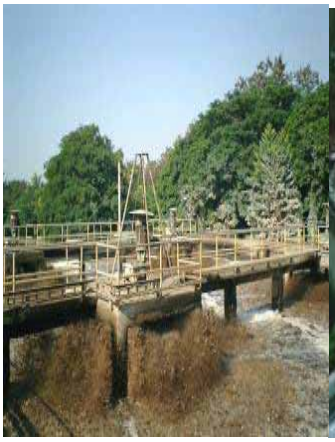
7.1.4 Cement plants & Steel Processing units:

Cement plants and steel processing units are not water intensive industries. Major consumption of water is mainly for cooling and domestic uses.

7.1.5 Paper mills:

Integrated paper mill with a 350 TPD capacity releases wastewater @ 55,000 m3 per day. Pollutants in paper mill are BOD, COD, SS ,colour,

odour etc. Even if BOD of treated effluent is taken as 20 mg/L pollution load would be 1100 kg per day, SS load also would be of the same order.



Aeration Tank **Secondary Clarifier**

Effluent Treatment Plant of M/S Ballarpur Industries Ltd

Assimilative capacity of river at Chandrapur to accept the load, water quality status particularly the DO profile along the river stretch has to be compiled. The same is true for all the tributaries of the Wardha viz. Erai, Penganga and others.

7.1.6 Human habitations:

Water pollution problems from human habitations arise in absence of sewerage. Urban water supply is planned @ 100 lpcd (litres/person/day) while rural @ 55 lpcd. About 80 percent of water supplied emerges as wastewater. It is called sewage if sewerage exists, otherwise such wastewater from habitations is called 'gray water'. There is no sewerage in Chandrapur district. Septic tank and soak pit is the common method of disposal. Bathroom and kitchen washes constitute gray water and flows in open drains in bigger towns. Stagnated gray water in smaller towns breed vectors such as mosquito and are health hazard. These constitute 'non-point' sources since they culminate as run-offs from city limits. Pollution from non-point source has been calculated for Chandrapur. Population is 3,00,000. Water supply @ 100 lpcd would result in 24,000 m^3 gray water every day. BOD of gray water is 75-100 mg/L. Therefore 1800 kg BOD will be released every day within city's environs. It will either be over the land or reach some water body.

Hence it is necessary to quantify pollution load from each major city, town or village and design a narrow-bore sewerage system which is economical and it should be followed by at least stabilization pond which is the most economic method for treatment, disposal and utilization of grey water or sewage in India.

7.2 Air Quality

7.2.1 Industrial area:

An ambient air quality standards have been prescribed for industrial and residential areas under the provisions of Air (P&CP) Act, 1981. In practice, an index called 'pollution standard index' (PSI) is found to be useful to describe the air quality. It combines the ambient air quality (AAQ) levels of the five criteria pollutants into numbers ranging from 0 to 500. If concentration of any one of the five pollutants rises to the level of its air quality standard at any monitoring station then the air quality is deemed to be unhealthy on that day, even if other four are below the standard. 'Good' air quality is when PSI is 50 or less, if it is 50-99 air quality is 'moderate', 100-199 unhealthful and so on. The PSI and associated health impacts are presented below:.

PSI	Descriptor	Effect
0 – 49	Good	--
50 – 99	Moderate	--
100 – 199	Unhealthy	Mild aggravation of symptoms, irritation in healthy persons
200 – 299	Very unhealthy	High aggravation of symptoms and wide spread symptoms amongst healthy people.
300 – 399	Hazardous	Premature onset of some diseases and decreased exercise tolerance in health persons.

MPCB has been monitoring ambient air quality (AAQ) within and around industrial, residential and commercial establishments. The recent air quality data is presented below along with PSIs.

Ambient Air Quality in Chandrapur

Sr. No	Type of Industry	Date of Sample	RSPM	SPM	SO_2	NOx	Pollution Standard Index			
							RSPM %	SPM %	SO2 %	Nox %
1.	Cement	25 Oct 05	226	358	50	30	151	72	42	25
2.	Cement	25 Oct 05	151	260	52	42	101	52	44	36
3.	Coal	8 Nov 05	-	533	122	77	-	107	102	65
4.	Coal Mine	27 Sep 05	-	519	100	59	-	104	84	49
5.	Coal Mine	14 Oct 05	-	519	108	74	-	104	91	62
6.	Comm Area	1 Nov 05	196	331	73	75	131	66	62	63
7.	Commercial	1 Nov 05	309	387	51	59	206	78	43	50
8.	Paper	10 Oct 05	183	381	86	63	122	76	72	73
9.	Paper	22 Dec 05	164	342	136	98	110	68	114	82
10.	Rice Mill	28 Dec 05	-	532	111	79	-	106	93	66
11.	Sponge Iron	13 Oct 05	-	1428	145	86	-	286	121	72
12	Sponge Iron	12 Dec 05	-	486	115	67	-	97	96	56
13.	Thermal Power	17 Dec 05	121	326	100	74	81	65	84	62
14.	Thermal Power	17 Dec 05	135	307	97	70	90	62	81	59
15.	Power Plant	11 Oct 05	132	370	132	65	88	74	111	54
16.	Power Plant	11 Oct 05	162	335	122	73	108	67	102	61

(-) data not available.

Values mentioned in this Table indicate that air quality does not meet the criteria, laid down for industrial area. PSI for coal mines shows **unhealthy** air quality, in cement industry it is **moderate**. In paper mill also it is **unhealthy to moderate**. Air within the plywood factory and in the rice mills is **hazardous**. Sponge iron units also are within the same category. In power plant it appears to be **moderate** as in commercial area of Chandrapur.

Higher PSI or present AAQ within city or in the factory/industrial premises can be due to stationary or mobile or mostly due to fugitive sources. Therefore, there is a reason to believe that SPM values within factory or along the road are due to mobile or fugitive sources. These emissions also disperse as per prevailing micrometeorological conditions to give rise to GLCs (ground level concentrations).

It is observed that mining industries and other units indulging in material handling do not quantify fugitive emission. Material handling includes loading, unloading, crushing stacking of materials. Dust can be

raised during these activities.

Trucks not covered by Tarpaulin

Similarly vehicle movement on paved or unpaved roads also is a source of fugitive emissions. Drilling and blasting in mines cause fugitive emissions. Emission factors for various mining and material handling operations are given below for completeness of the report.

Operation	**Emission factor**	**Unit**
Haul Trucks	4 kg	Vehicle km.
Blasting of coal & over burden	758(A0.8/W1.9D1.8) A = Area blasted, m2 D = Depth of blast, m W = Moisture content, %	Kg/blast
Loading by truck & shovel Over burden Coal	0.01 0.02	Kg/tonne Kg/tonne
Drilling	0.6	Kg/hole
Truck dumping Over burden, Coal	0.02 0.06	kg/tonne kg/tonne
Exposed areas	0.4	kg/hour/ha
Top soil removal	14.0	Kg/scraper hr
Drag line	0.02	kg / m3 material
Haul road - With watering No watering	7.0 14.1	lb/veh.mile lb/veh.mile
Storage pile	1.6 x U U is wind speed	lb/acre-hr m/sec

Fugitive emission at Railway Sidings

7.2.2 Residential areas:

Residential and commercial areas like in Chandrapur,Rajura and other municipal towns are characterized by i) material transport activities ii) traffic iii) use of firewood and coal as domestic fuel, and iv) existence of small roadside coal depots in large numbers.

7.2.3 Vehicular emissions:

The total road length in Chandrapur district is 7059 kms. which are built by PWD and ZP, road length within the municipal areas is about 730 kms. The different types of roads include 2677 kms (tar roads), 3872 kms (stand-stone roads) 53 kms.(cement concrete roads): 960 kms.(roads built by using other materials) and 227kms (other roads). As per latest information given by RTO on different types of vehicles (March, 2004), there are 121566 vehicles in Chandrapur district. Their categorization is given in a table below:

Sr.No.	Details of vehicles	No. of vehicles
1	Scooters	99717
2	Jeep	8245
3	Taxi	394
4	Auto Rickshaws	3690
5	State carriages	417
6	Loading Vehicles(Private)	463
	Loading Vehicles(Public)	1390
7	Ambulance	132
8	School buses	56

9	Private service vehicles	73
10	Joint vehicles	3339
11	Tractors	3491
12	Other	159
	Total	121566

The fuel supply arrangements (i.e. petrol pumps) in the district are inadequate. Fuel is also illegally sold by the road side garages/service centers. There is possibility of adulterated fuel being made available through such outlets.

There is a scope to divert heavy motor traffic from Chandrapur city so as to reduce vehicular movement within the city and the emissions.

MSRTC is running the public transport in the district with a fleet of 298 S.T. buses of which approximately 275 buses are in use on a daily basis. The contribution of these buses in the vehicular emissions in Chandrapur city has not been estimated so far the based on modified emission factors and the conditions of buses. The situations on the vehicular emissions from this source, in the other areas of the district, also requires assessment considering the total number of the buses running and the carrying capacity of the other areas.

The survey conducted by RTO Chandrapur in May 2003 on the traffic load at 105 major nodes in the district is given in table and can be used in future to assess total emission at those locations. A 24 hr. traffic surveys carried out on different roads indicates that about 425-500 vehicles ply on Nagpur-Chandrapur and 27 vehicles ply on Chandrapur-Tadoba roads per hour. About 200-300 vehicles ply in an hour in Chandrapur city main road. The main pollutants from automobile exhausts are SO_2, NOx, particulate matter, hydrocarbons and carbon monoxide.

7.2.4 Coal Handling

There are several coal depots on Nagpur-Chandrapur highway and also on the other roads in the districts due to coal mines in those areas. These depots are responsible for the generation of the large coal dust

emissions leading to deterioration of air quality due to suspended particulate matter in those areas. The contributory factors in the AAQ in Chandrapur district are vehicular emissions, dust due to coal depots and domestic coal burning.

There are also a large number of coal handling plants in and around Chandrapur, Rajura, Ghuggus & other coal mines and industries. All these fugitive emissions affect ambient air quality. However the quantification of the emissions from these sources has not been carried out.