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## **ACTION PLAN FOR CRITICALLY POLLUTED AREA:**

### **BHADRAVATHI, KARNATAKA STATE:**

#### **PREAMBLE:**

Ministry of Environment & Forest (MoEF), Govt. of India in association with Central Pollution Control Board (CPCB), New Delhi and Indian Institute of Technology (IIT), New Delhi have, recently, carried out an environmental assessment of industrial clusters across the country based on comprehensive Environmental Pollution Index (CEPI) with the aim of identifying polluted industrial clusters & prioritizing planning needs for intervention to improve the quality of environment in these industrial clusters and the nation as a whole. The assessment so carried out has been documented in the form of a report entitled 'Comprehensive Environmental Assessment of Industrial Clusters'. In all 88 industrial clusters have been assessed.

The industrial clusters/areas having aggregated CEPI scores of 70 and above should be considered as critically polluted clusters/areas and need further detailed investigations in terms of the extent of damage and formulation of appropriate remedial action plan.

As per Ministry of Environment & Forest, Govt. of India vide office Memorandum No.J-11013/5/2010-1A.II (I) dated. 13.01.2010 Bhadravathi industrial Cluster, in Karnataka State was declared as critically polluted area with CEPI score of 72.33. **Annexure 4** presents the latitude & longitude with boundary mark for Bhadravathi industry cluster. In view of this, Karnataka State Pollution Control Board, Bangalore in co-ordination with the Zonal Office of Central Pollution Control Board and industries located in and around Bhadravathi Industrial Cluster has developed Action plans for the enhancement of pollution control measures to bring down the prevailing pollution loads.

#### **1. INTRODUCTION**

##### **1.1. Area Details including brief history (background information)**

Bhadravathi derives its name from the [Bhadra River](#) which flows through the city. It was earlier known as *Benkipura* (or Venkipura), and earlier *Benki Pattana* which is in English means *city of fire*. Iron ore from the [hill station](#) of

Kemmannugundi and water from the Bhadra River helped the establishment of an iron mill in 1918 and paper mill in 1936.

Bhadravathi Taluk is having an area of 690 Sq Km. The total population of the area is 3,38,989. Bhadravathi is having a town area of about 67 Sq KM and population is 1,60,662. There are 2 major industries located in Bhadravathi of which one is a 17 category.

The average temperature in the summer is between 25 °C (77 °F) and 37 °C (99 °F). The average winter temperature is between 20 °C (68 °F) and 30 °C (86 °F). The annual precipitation in the city is around 950 millimetres (37 in). Bhadravathi is at an altitude of 597 meters (1,959 ft) above sea level.

## 1.2. Location

Shivamogga District is having 7 taluks – Shivamogga, Bhadravathi, Sagar, Shikaripur, Soraba, Hosanagar and Thirthahalli. Bhadravathi lies in the central part of the Karnataka State, in the south-east corner of the Shivamogga district. Bhadravathi city is at a distance of about 20 KM from Shivamogga. **Annexure 1** present the digitized map of identified Industrial cluster with latitude & longitude of the boundaries. To identify the impact on human, eco-geological features & other sensitive receptors an impact zone of 2 kilometers in all directions from the boundary of the industrial cluster is identified and marked in the digitized map presented in the **Annexure 3**. Bhadravathi is one of the big towns in Shivamogga District. Bhadravathi area is surrounded on the West by Shivamogga Taluk, East by Channagiri Taluk of Davangere Dist, South by Tarikere of Chikkamagalur District and North by Honnali Taluk of Davanagere Dist. The major industries located in and around Bhadravathi are paper and steel.

The Bhadravathi is located at 75.42N Latitude and 13.50 E Longitude. The NH206 and SH 65 are passing through Bhadravathi. The Bhadravathi Railway station is located inside the city. The nearest Air ports are Mangalore and Hubli at a distance of about 220 KM.

Categories of working industries in Bhadravathi cluster is as follows:

	Red	Orange	Green
Large	2	--	1
Medium	--	--	--
Small	--	--	1
Total	2	--	2

There is only one 17 Category industry and one Large Red Category industry located in Bhadravathi viz.

1. The Mysore Paper Mills Ltd (MPM), Paper Town, Bhadravathi having latitude and longitude –N13.82760, E-075.70831 respectively.
2. Steel Authority of India, Visvesvaraya Iron and Steel Ltd (VISL), Bhadravathi having latitude and longitude N-13.83788 and E-075.70084 respectively.

### **1.3. Digitized Map with Demarcation of Geographical Boundaries and Impact Zones**

The map showing the geographical boundaries, Latitude & Longitude of boundaries and impact zone is enclosed as **Annexure-1 to 3**.

Latitude & longitude of boundary (East, West, North, South,) of cluster of industries are as follows

North direction	---	Lat	13.8419552
	---	Long	75.7018948
West direction	---	Lat	13.8296208
	---	Long	75.6939724
East direction	---	Lat	13.8249119
	---	Long	75.7170439
South direction	---	Lat	13.8195362
	---	Long	75.7068515

### **1.4. CEPI Score (Air, Water, Land and Total)**

Bhadravathi is declared as critically polluted area and stands at 35<sup>th</sup> position with a CEPI score of 72.33. The sub index score assigned for different environment is indicated below:

No	Industrial area/ cluster	Air	Water	Land	CEPI	
1	Bhadravathi (Karnataka).	62.75	56.50	45.50	72.33	Ac_Ws_Ln
Note : Ac - Air Critical : Ws - Water Severe :Ln –Land normal						

### **1.5. Total population and sensitive receptors (hospitals, educational institutions, courts etc) residing in the area comprising of geographical area of the cluster and its impact zone (minimum 2 km)**

Bhadravathi Taluk is having a total population of 3,38,989. Bhadravathi town is having a population of 1,60,662. The impact zone covers about 70% of the Bhadravathi Town. There are 13 hospitals in the impact zone, out of which two hospitals are having bed strength of 100 and 115. The court complex is located in the impact zone. Education institutions of MPM and VISL and other education institutions are located in the impact zone.

**The following villages/hamlets are located within 2 km of the impact zone.**

Sl.No	Name of the village	Direction in which located	Population
1	Gowrapura	East	1800
2	Sunnadahalli	South East	1716
3	Guninarasipura	East	1632
4	Koralakoppa	East	1313
5	Bhadravathi town	North, West, South	160662

**1.6. Eco-geological features** Impact Zones (the area comprising of geographical area of the cluster and its impact zone (minimum 2km)

**1.6.1. Major Water Bodies (Rivers, Lakes, Ponds, etc.):**

Bhadra river passes through Bhadravathi town. The source of water for Bhadravathi town and industries is from this river. The width of the river is about 120 - 150 meter & depth is about 10 to 15 m meter during flood. Jannapura tank is located in the study area. The tank water is used for irrigation.

**1.6.2. Ecological parks, Sanctuaries, flora and fauna or any eco sensitive Zones-**

No Ecological parks, Sanctuaries are located in the cluster & impact zone; some peacocks are seen in the VISL greenery.

**1.6.3. Buildings or Monuments of Historical/archaeological/religious Importance.**

[Lakshmi Narasimha Temple](#) is located at the Old Town area of Bhadravathi, built during the regime of the [Hoysala Empire](#) in the thirteenth century. This temple is maintained by state archeological department.

**1.7. Industry classification and distribution (no. of industries per 10sq. km area or fraction)**

**1.7.1. Highly Polluting industries (17 categories)**

The Mysore Paper Mills Ltd., is the only 17 category industry in Bhadravathi and engaged in the manufacture of paper and sugar.

### 1.7.2. Red category industries (54 categories)

The Steel Authority of India Ltd, Visvesvaraya Iron and Steel Plant is the only Large red industry located in Bhadravathi and engaged in the manufacture of mild steel and alloys.

### 1.7.3. Orange and Green category industries

The total number of industries operating in the cluster is as indicated the following table

Category	Orange	Green
Large	--	1
Medium	--	--
Small	--	1

### 1.7.4. Grossly Polluting industries: (Industries which discharge BOD load more than 100 Kg/day in to water bodies)

1. The Mysore Paper Mills Ltd

## 2. WATER ENVIRONMENT

### 2.1. Present status of water environment supported with minimum one year analytical data

The quantity of water used and effluent generated from large industries located in the cluster are given below:

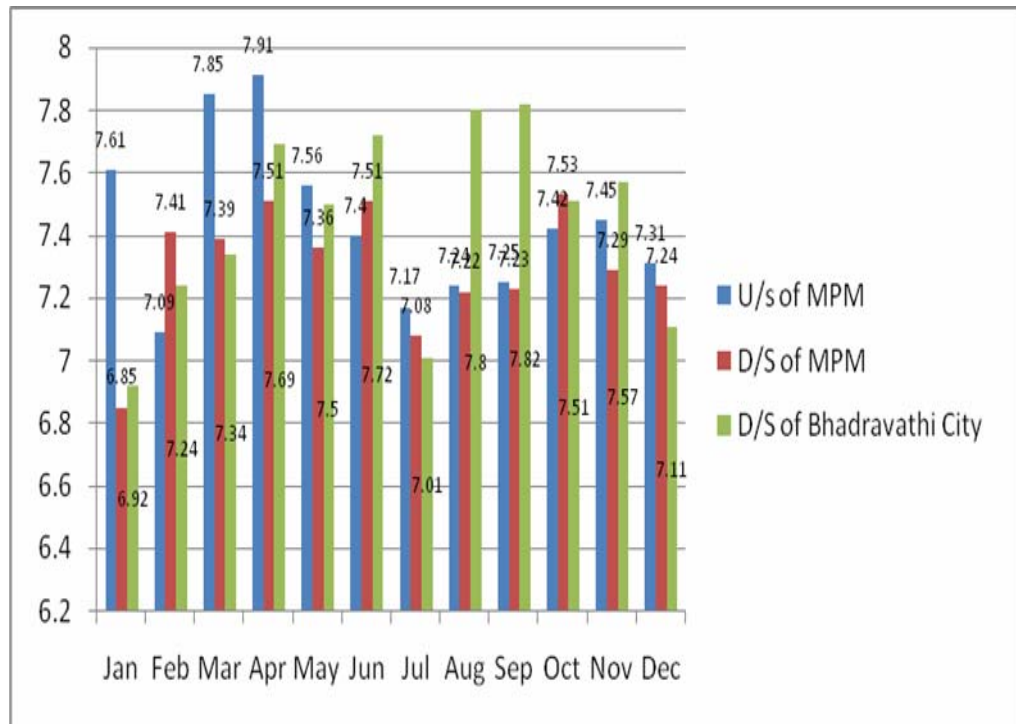
Name of Industries	Activity	Water consumption in KLD		Waste Water Generation in KLD	
		Domestic	Industrial	Sewage	Trade Effluent
MPM	Paper and Sugar	8000	44200	6000	40000
VISL	Steel	4300	4550	3440	4420

The MPM is discharging the treated trade effluent to the Bhadra river. There are domestic outfalls from city which joins the river. The parameters chosen for the analysis though limited, is adequate to asses the water quality. The Board is collecting the Bhadra river water samples at 3 locations every month with in Bhadravathi impact area. The water samples are generally meeting the C class standard.

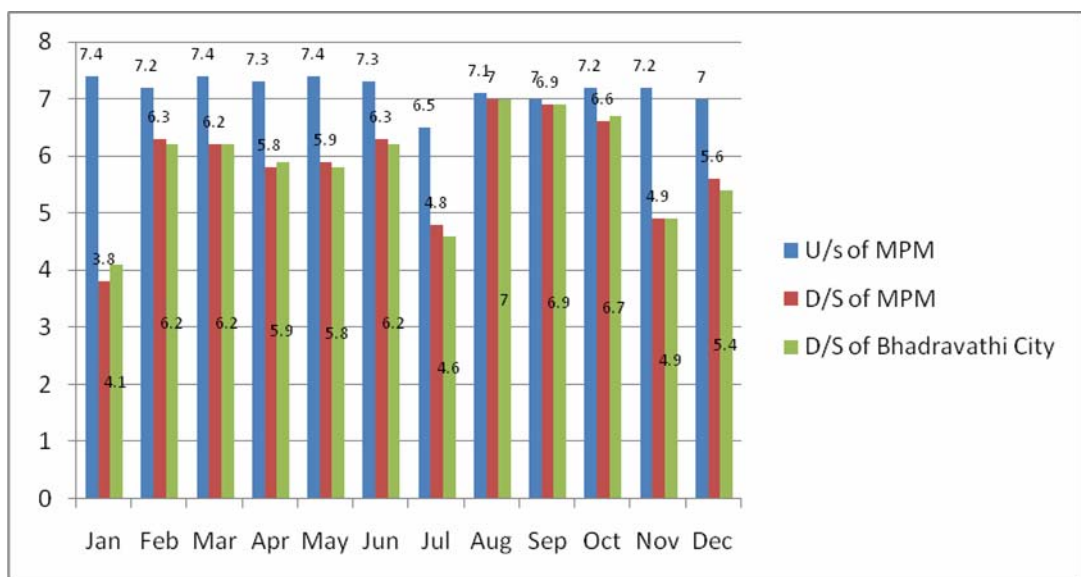
**Report of analysis (trend analysis) of Bhadra River at three locations for the period 2009.**

1. U/s of MPM
2. D/s of MPM
3. D/s of Bhadravathi City

**pH**

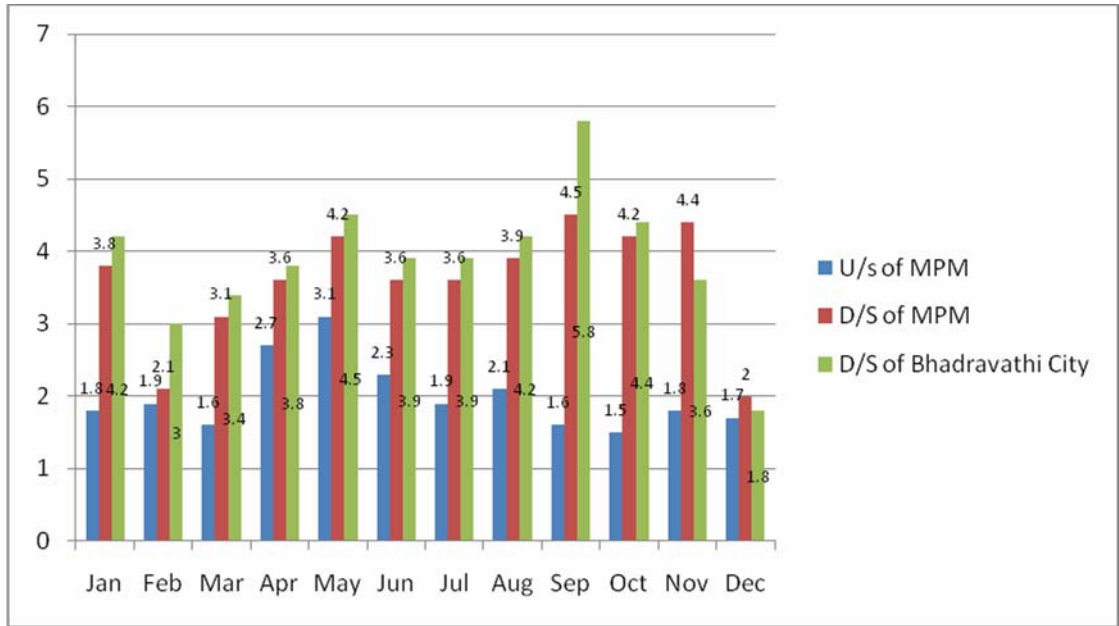


**DO in mg/l**

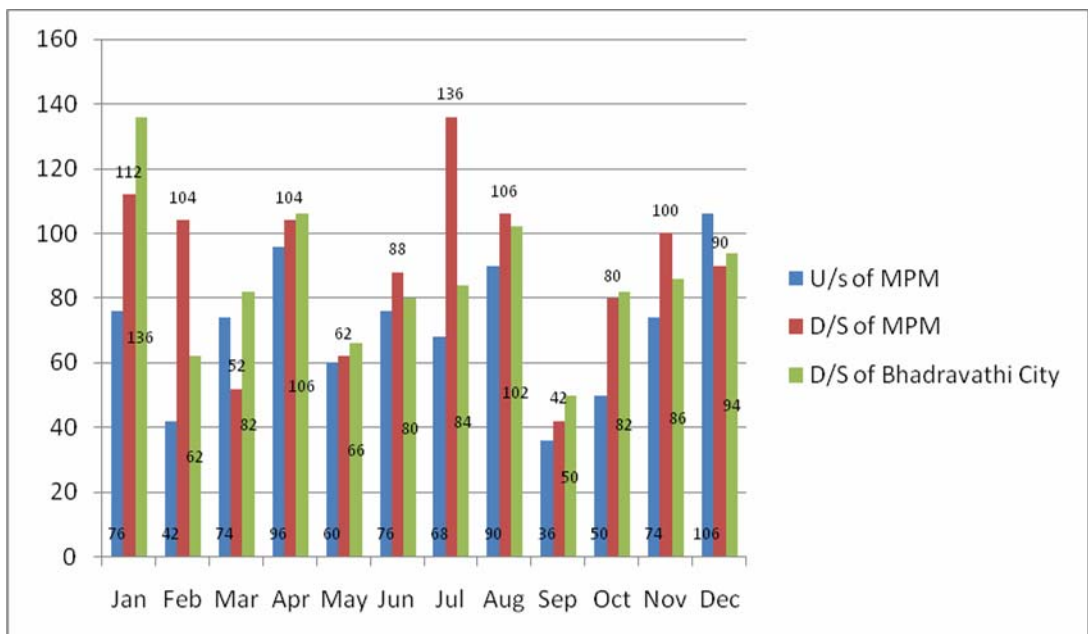




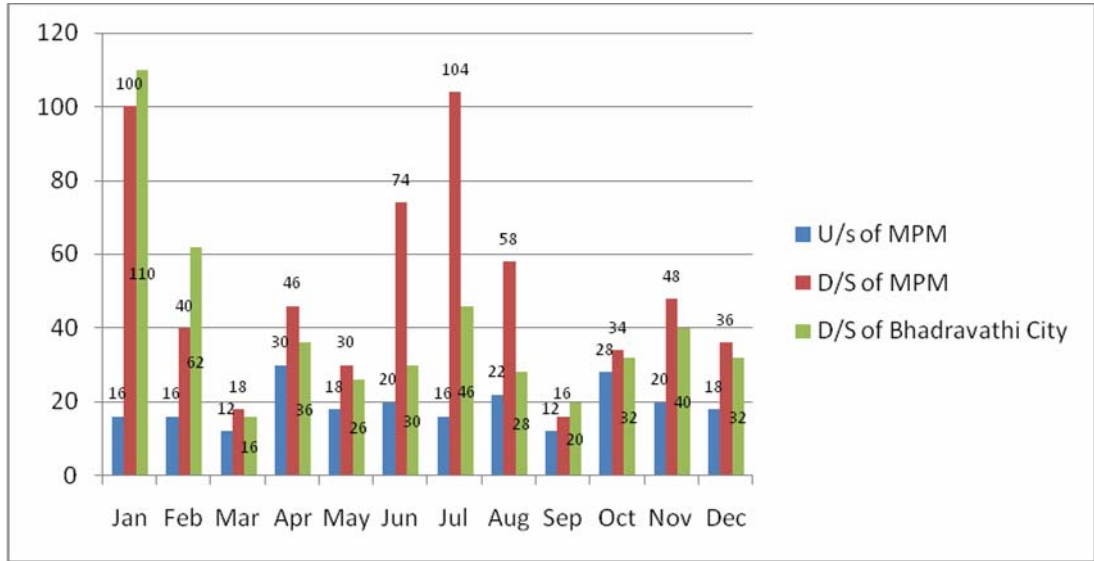
## BOD mg/l



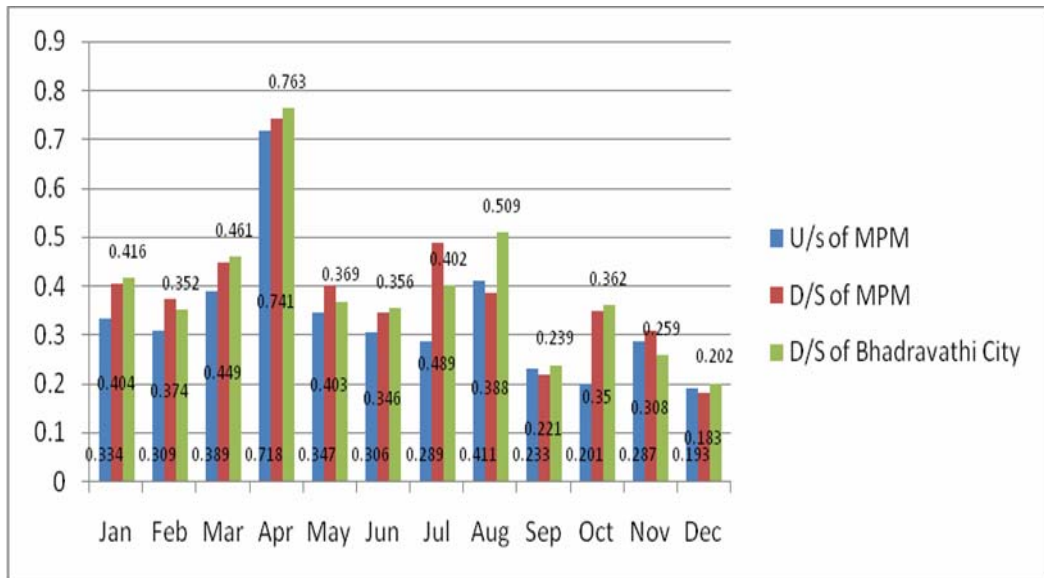
## Total Hardness as CaCO<sub>3</sub>



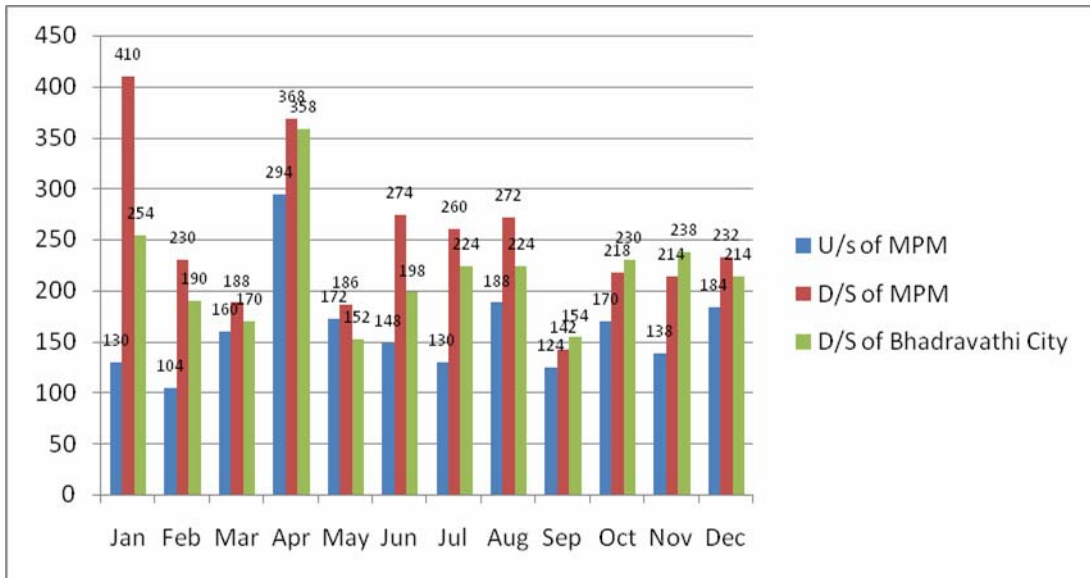
### Chloride in mg/l



### Nitrate (NO<sub>3</sub>) mg/l



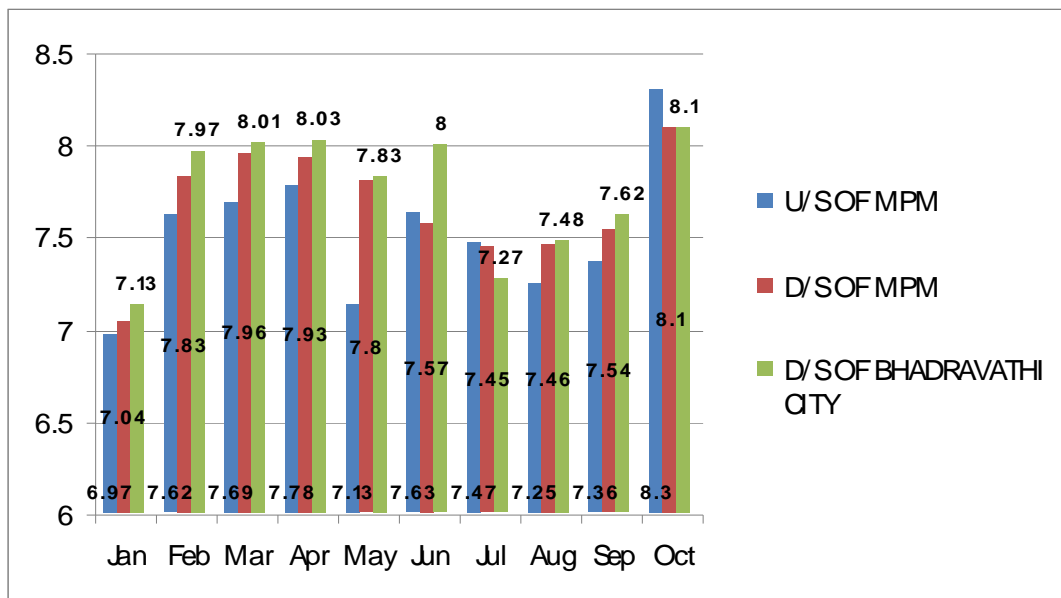
### TDS mg/l



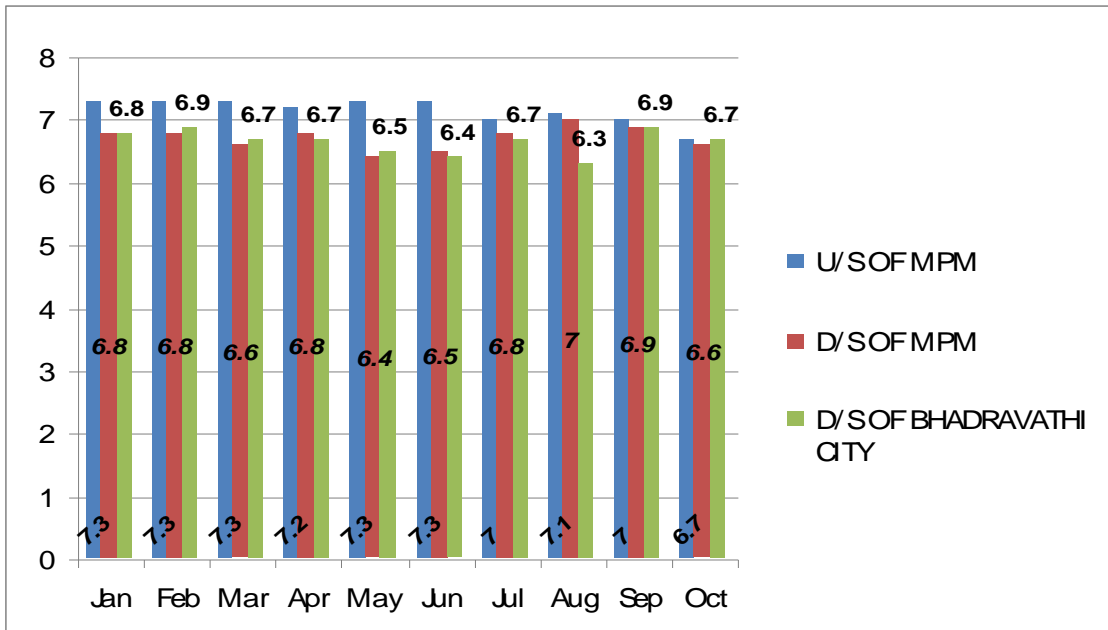
### Report of analysis (trend analysis) of Bhadra River at three locations for the period 2010:

1. U/s of MPM
2. D/s of MPM
3. D/s of Bhadravathi City

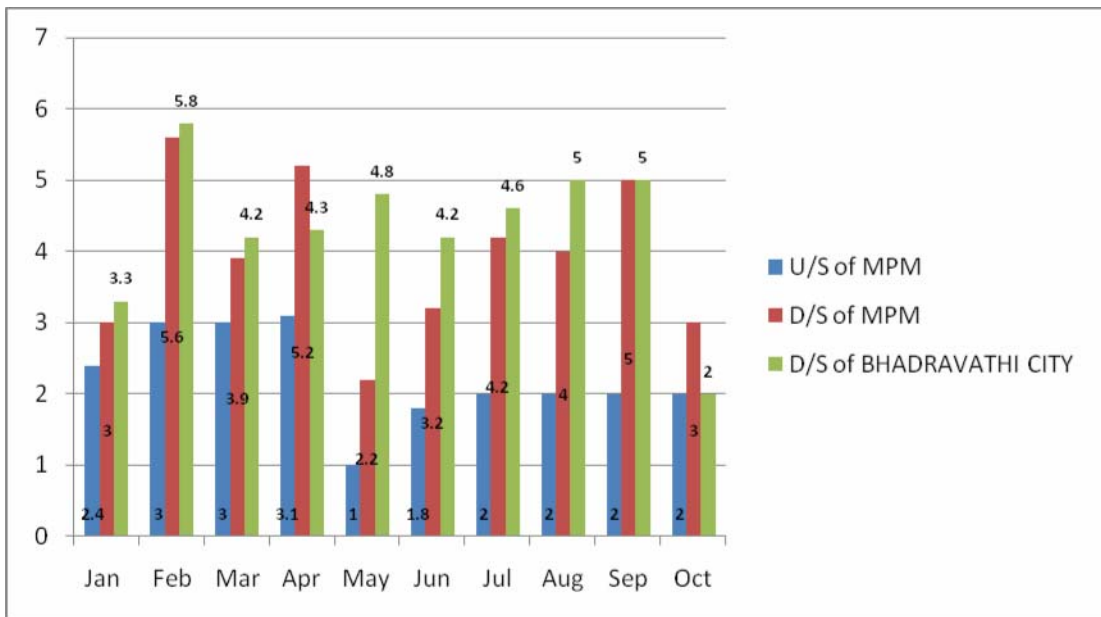
### pH



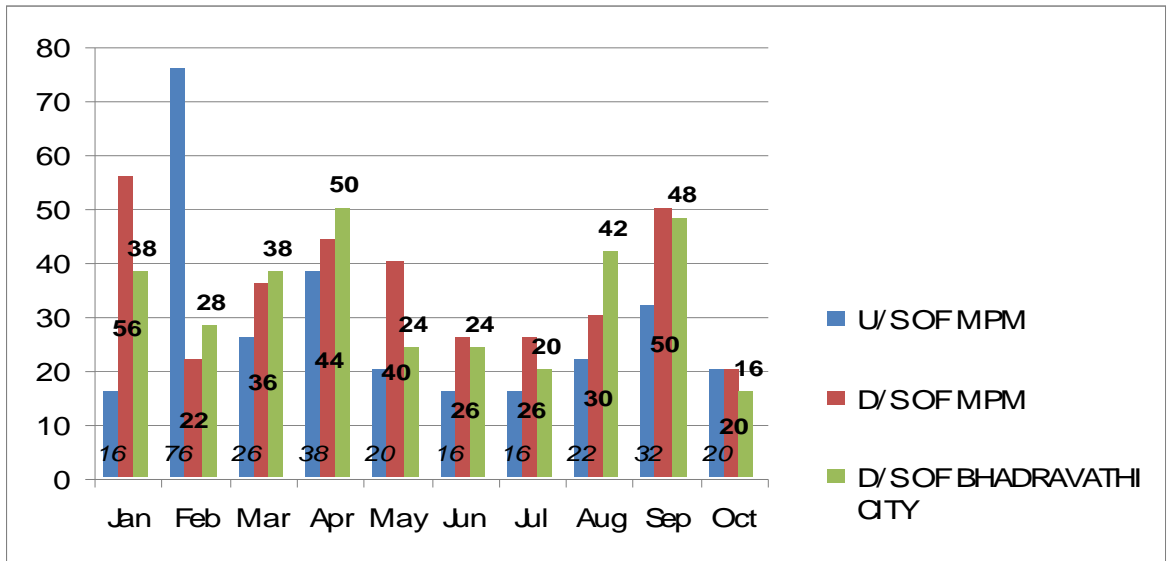
### DO in mg/l



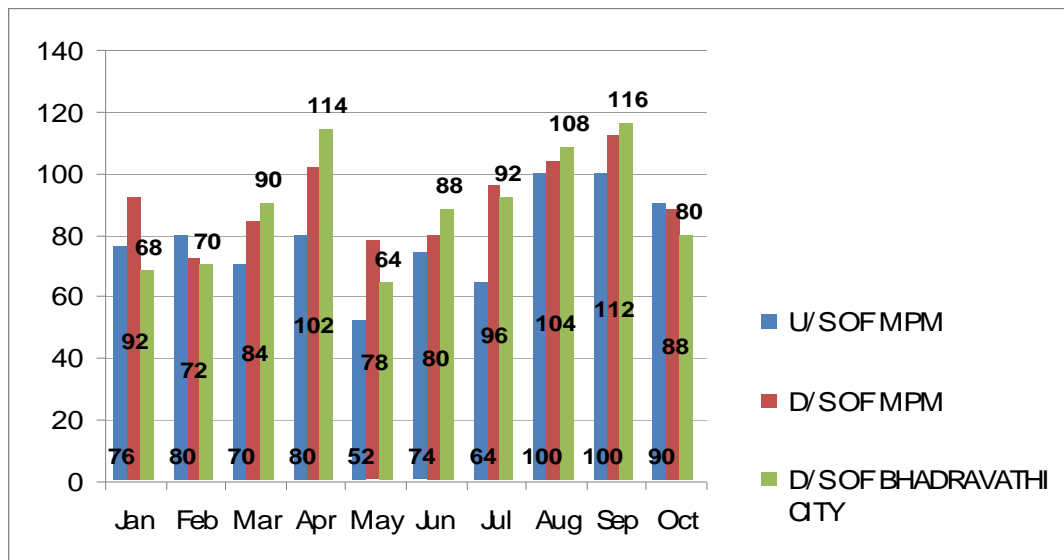
### BOD mg/l



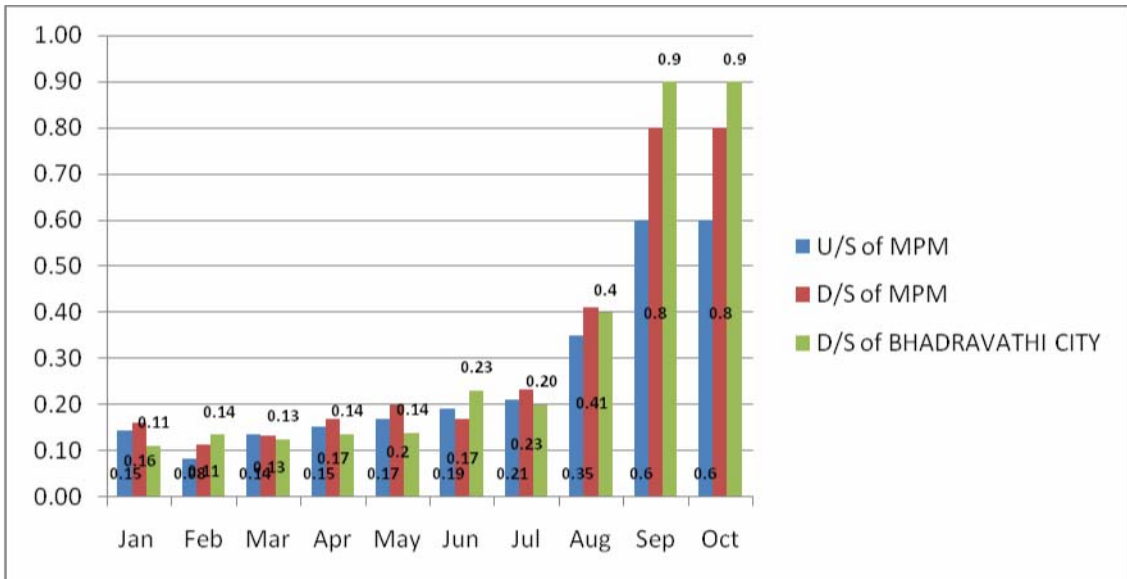
### Chloride in mg/l



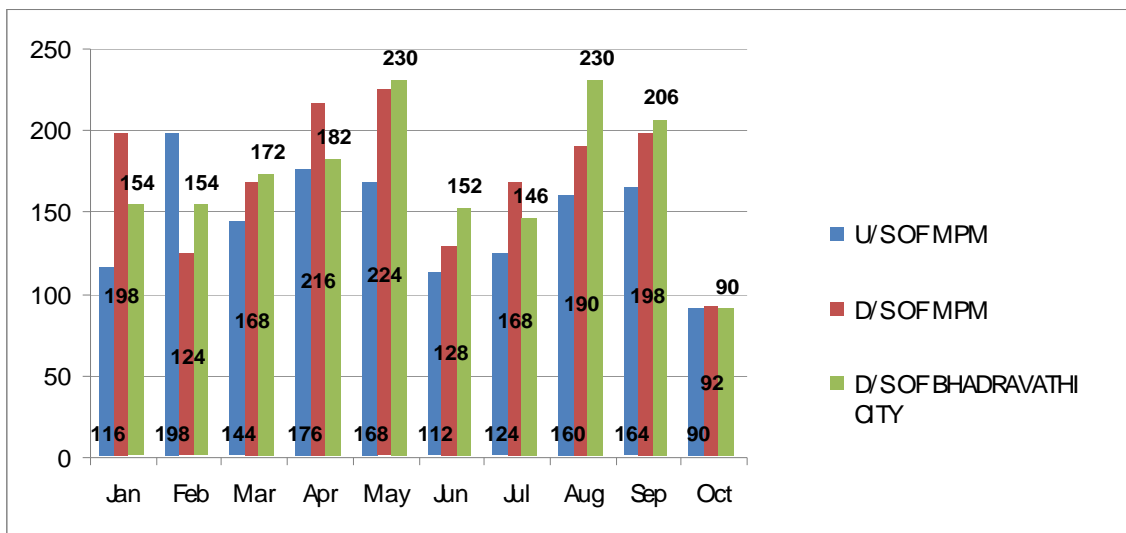
### Total Hardness as CaCO3 mg/l



### Nitrate (NO<sub>3</sub>) mg/l



### TDS mg/l



#### 2.1.1. Water bodies/effluent receiving drains in the area important for water quality monitoring

Bhadra River passes through the Bhadravathi town. The topography of the town is in such a way that the sewage generated from the town is joining the river at different locations. The treated trade effluent from MPM is discharged to Bhadra river.

### **2.1.2. Present levels of pollutants in water bodies/effluent receiving drains/ground water (routine parameters, special parameters and water topics relevant to the area in three categories-known carcinogens, probable carcinogens and other toxics)**

Central Pollution Control Board & Ministry of Environment & Forest has not specified any carcinogenic and toxin parameters in water/ effluent. The Board is monitoring only parameters mentioned as per consent conditions arrived on basis of the chemicals handled, process & technology used and other technical inputs specific to the industry.

The MPM and VISL are the major industries located in the cluster. The MPM is the major industry contributing for water pollution. The domestic effluent form the Bhadravathi town is also contributing for water pollution.

The Board is monitoring the river quality at the following locations: Location map showing the industry and the sampling points is enclosed as **Annexure 5**

<b>Sl no</b>	<b>Station name</b>	<b>Programme</b>	<b>Frequency</b>
1	Up Stream of MPM	MINARS	Once in a month
2	Down stream of MPM	Board Programme	Once in a month
3	Down stream of Bhadravathi city	MINARS	Once in a month
4	Holehonnur Bridge	MINARS	Once in a month
5	Kudli confluence point	MINARS	Once in 3 month

The stations cited at Sl no 1 to 3 falls under impact zone.

The bore well samples are collected at the following locations on monthly basis:

1. Hand pump at Ujjanipura
2. Hand pump at MPM Lay out.

The Hardness is more in the samples and this may be due to the natural phenomenon in the area.

### **2.1.3. Predominant sources contributing to various pollutants**

The MPM and CMC, Bhadravathi are the two major water polluting sources.

## **2.2. Sources of water pollution**

### **2.2.1. Industrial**

The MPM discharges treated trade effluent to Bhadra river

### **2.2.2. Domestic:**

- a) The domestic effluent from Bhadravati town limits joins Bhadra river at different locations.
- b) The treated sewage effluent generated from MPM is used for gardening/Irrigation.
- c) The VISL is having sewage treatment system at two locations. At present STP (190 KL/Hr) is not in working condition and have taken up the renovation work. The part of sewage effluent generated from VISL colony and industry is being treated in STP and discharged on land for irrigation. During the rainy season the sewage effluent applied on land finally joins Bhadra River.

### **2.2.3 Others:**

Non point sources from agriculture fields, human activities etc.

### **2.2.4. Impact on surrounding area (outside the CEPI area) on the water courses/ drainage system of the area under consideration.**

As stated above, the treated effluent from the MPM and sewage from the CMC, Bhadravathi is discharged in to the Bhadra river. Therefore there is impact due to sewage pollution. The treated effluent from MPM is having colour due to presence of lignin and only small stretch below the out fall is having colour. The Board has directed the industry to explore the possibility of diverting the treated effluent for agriculture however the river water quality is meeting the class C standards except total coliform and colour.

### **2.3. Details of Water Polluting Industries in the area/cluster**

The major water polluting industries are The Mysore Paper Mills Ltd and Steel Authority of India, VISL and the details are as follows:

#### **The Mysore Paper Mills Ltd, Bhadravathi**

**Introduction:** M/s. The Mysore Paper Mills Limited was founded in 1937 with a modest capacity to produce 6,000 TPA of paper. During last Seven decades the mill has stepped up its production to 1,05,000 TPA of paper including Newsprint, Writing & Printing paper. Due to shortage of cellulose raw materials, MPM has also established a Sugar mill with a crushing capacity of 2500 TCD in the year 1984, which provides bagasse as raw material to meet expanded paper mill capacity. The mill is located at Bhadravati, Shimoga district, on the left bank of river Bhadra in Karnataka State.



1. **Name of the Industry:** THE MYSORE PAPER MILL LIMITED,  
Paper Town, BHADRAVATI-577302,  
Shimoga (DT), KARNATAKA (ST)
2. **Type of Unit** : 17 category Industry.
3. **Products** : News Print -75000 MT/year  
Writing & Printing -30000MT/year  
Sugar -10,000–50,000 MT/year
4. **Raw materials** : Wood - 2,50,000 MT/year  
Captive Bagasse - 50,000 MT/year  
Sugar Cane -1,00,000-5,00,000MT/year  
(Seasonal)

**Steel Authority of India , VISL, Bhadravathi**

Sl No.	Particulars	Details			
1	Name of the Industry	Steel Authority of India Limited Visvesvaraya Iron and Steel Plant , Bhadravati Karnataka State			
2	Type of Unit	Red Category			
3	Products Ton/Year	<b>Intermediate Product</b>		<b>Tonne/Annum</b>	
		Hot Metal	2,04.000		
		Special Steel Blooms	99000		
		Refractories	10800		
		<b>Final Product</b>			
		Mild Steel	32000		
		Mild steel Ingot	4800		
		Alloy and Special steel	77000		
		Pig Castings	5400		
4	Raw Materials Ton/Year	Iron Ore	216432	HC Fe-Chrome	708
		LC Fe-Chrome	348	Coke	129300
		HC Fe-Manganese	624	Si-Manganese	864
		Fe-Silicon	912	Aluminium	24
		Lime Stone	5132	Dolomite	1572
		Burnt Lime	3608	Dunite	2568

## 2.4. Effluent Disposal Methods –Recipient water bodies etc.

Sl No	Name of Industries	Type	Effluent generation in KLD		Treatment system Provided	Disposal Methods/ Recipient water body
			Sewage	Trade Effluent		
1	Mysore Paper Mills Ltd., Bhadravathi	Paper and Sugar	6000	40000	Physical, chemical and Biological treatment	Trade effluent discharged to River Bhadra

## 2.5. Quantification of wastewater pollution load and relative contribution by different sources viz industrial/domestic

Board calculated based on quality of treated effluent discharged.

Sl. No.	Name of industry	Year	BOD in Kgs/day	COD in Kgs/day	TDS in Kgs/day
1	MPM	2009	778	6100	42428

The requirement of water for different purposes and the Quantity of waste water generated from the industries in critically polluted area is as under

### a) M/s Mysore Paper Mill

Purpose	Consumption m3/d	Waste water generation
a. Domestic use	7000-8000(mill & Township)	5000-6000
b. Industrial purpose		
1. Process	Pulp & Paper-30000-38000 Sugar-1000-1200	28000-36000(not easily biodegradable) 800-1000(easily biodegradable)
2. Boiler feed	1500-2500	1000-1500
3. Cooling	2000-2500	1000-1500

### b). VISL, Bhadravathi.

Purpose	Consumption m3/d	Waste water generation
a. Domestic use	4300 KLD	3440 KLD
b. Industrial purpose		
1. Boiler feed	50 KLD	20KLD
2. Cooling	4500 KLD	4400KLD (Recycled)

## 2.6. Action Plan for compliance and control of pollution

### 2.6.1. Existing infrastructure facilities-water quality monitoring network, ETPs, CETPs, Sewerage Treatment Plant of industry(STPs), surface drainage system, effluent conveyance channel/out falls

In the cluster area as part of consent requirements industries are monitoring the quality of treated trade effluent and water quality at the outfall / receiving end. The Board also monitors the effluent quality at the industry and as well as water quality of the Bhadra river at the upstream and down stream of the industrial clusters under different programmes. The parameters chosen for monitoring is limited to understand the impact of discharges at the micro level without monitoring the specific carcinogens and toxins. The STPs and ETPs are monitored by the industry themselves, and the performance details are submitted to the Board. There is no proper surface drainage system and there is no systematic monitoring of storm water quality.

### 2.6.2. Pollution control measures installed by Industries:

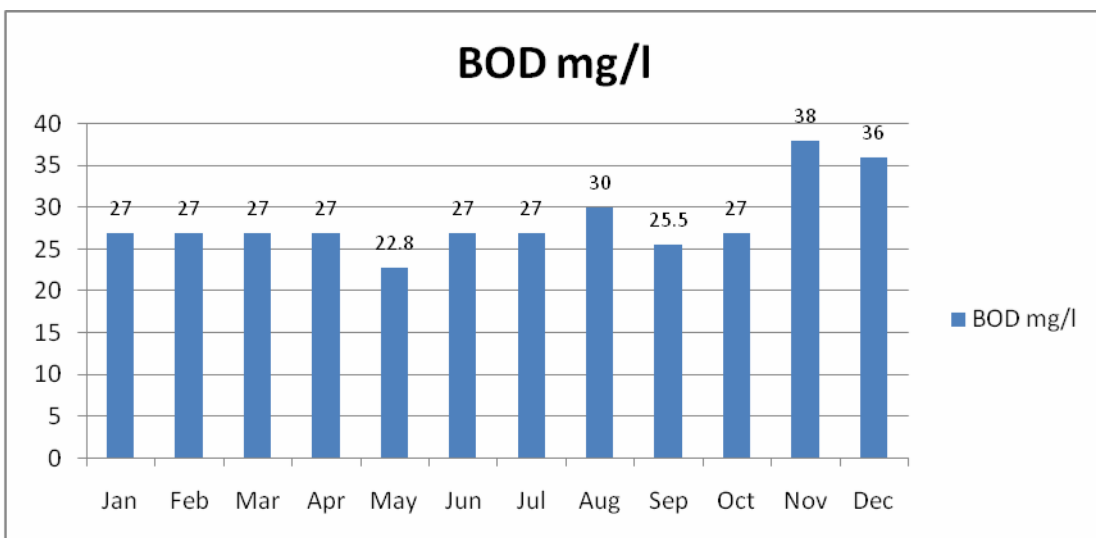
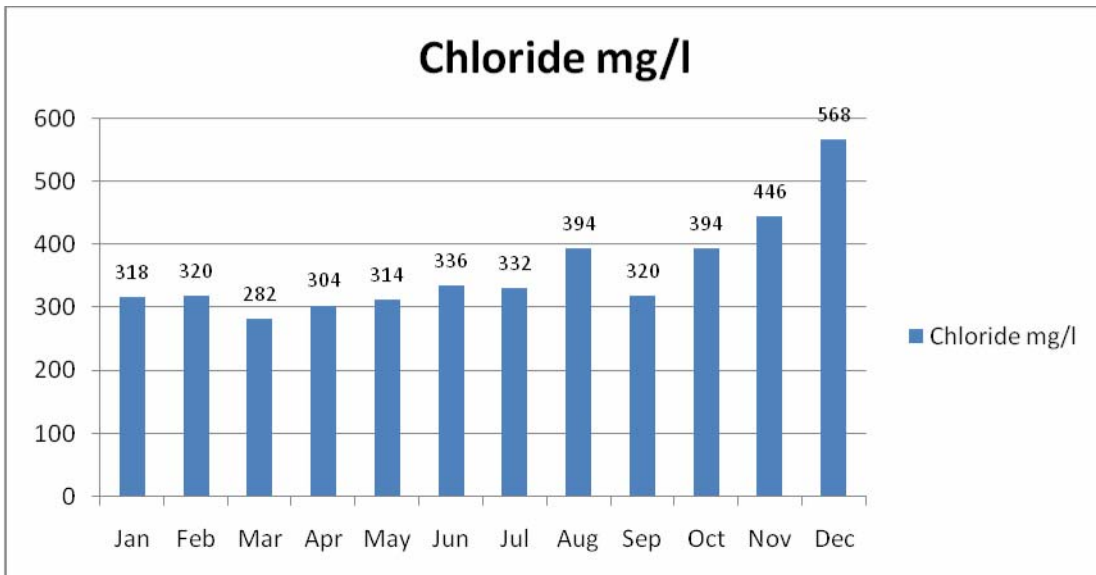
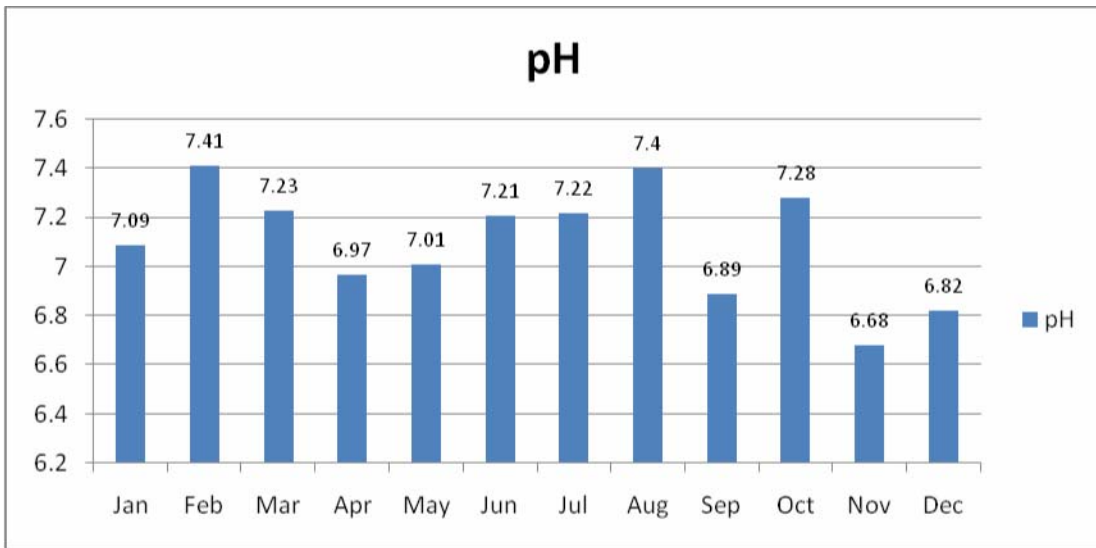
The MPM is having separate ETP and STP for treatment of trade effluent and sewage effluent. The treated effluent is discharged to Bhadra river. The treated sewage is used for gardening/irrigation. The VISL is not generating any trade effluent. The waste water generated from the gas cleaning plant (blast furnace) is treated and recycled back. The waste water from BOF –De-Dusting Plant (DDP) is recycled back. There are two sewage treatment plants with the capacity of 130 M3/hr & 190 M3/hr. The treated water is used in the Farm Plantation leased to the farmers. The 190 Cu-m/hr STP is under renovation.

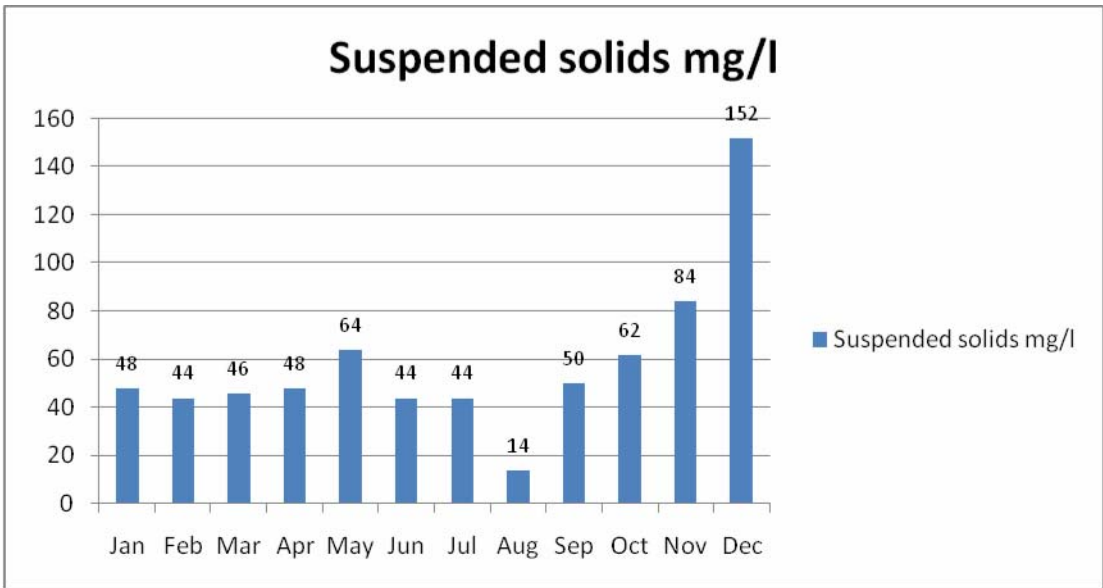
SI No.	Name of Industries	Type	Treatment system Provided
1	MPM	Paper & Sugar	Physical, chemical and Biological treatment
2	VISL	Steel and alloys	Physical and chemical treatment

The details and Flow chart of ETP and STP of MPM and VISL are enclosed in **Annexure 6**.

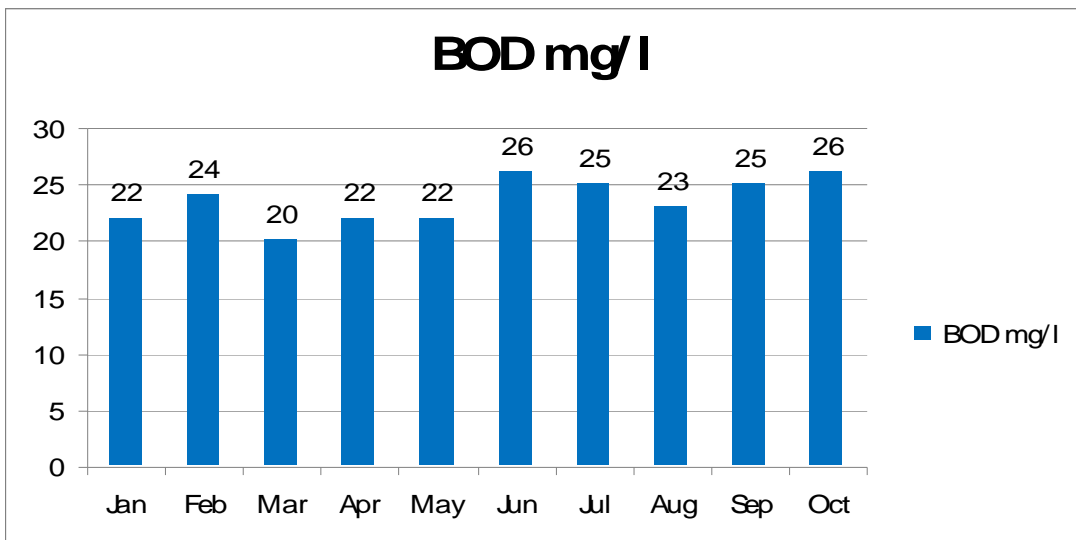
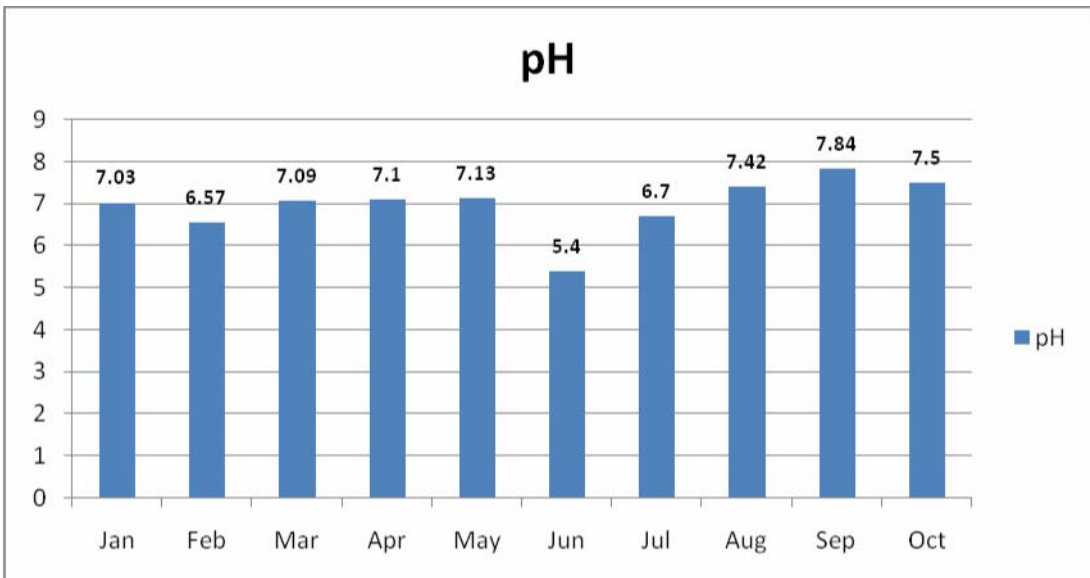
The Board is regularly collecting the samples of treated trade and sewage effluent. The treated trade effluent samples of MPM are generally meeting the standards and on few occasions the SS and chloride are not meeting the standards.

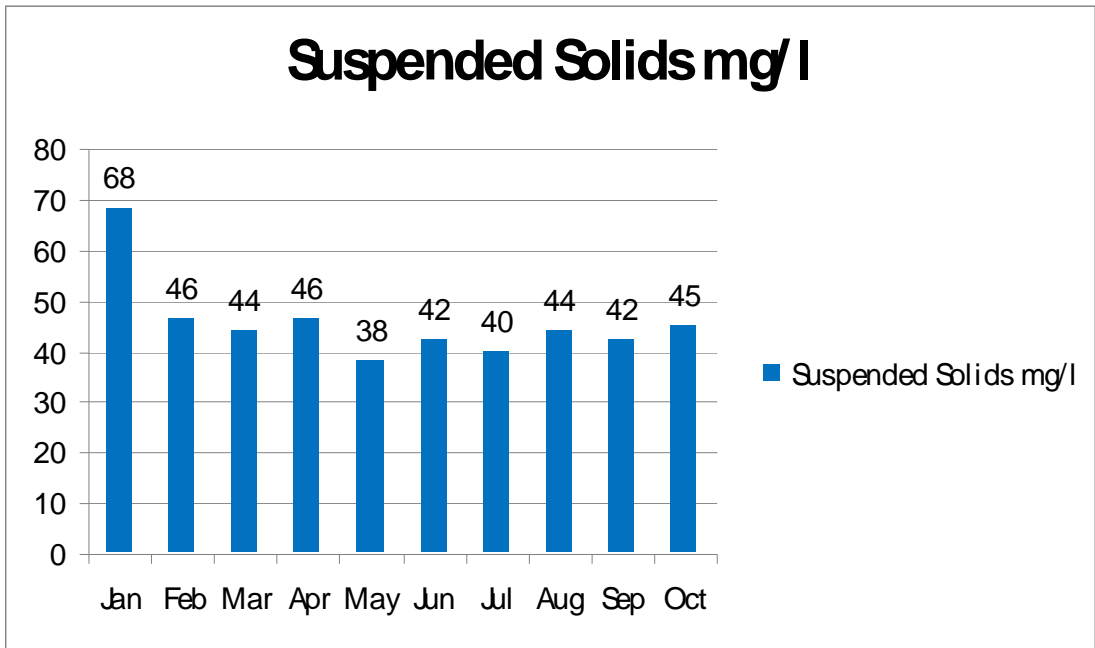
**For the period -2009**





**For the period 2010**





**ETP units of MPM**



**ETP for BF Effluent of VISL**



**Aeration tank of MPM**

### **2.6.3. Technological Intervention**

#### **2.6.3.1. Inventorisation of prominent industries with technological gaps:**

MPM is presently using Chlorine gas as a bleaching agent in chemical pulping sections. The chlorine gas has to be replaced with oxygen and Chlorine dioxide. However detailed study will be undertaken to identify technological interventions needed to ensure better compliance.

#### **2.6.3.2. Identification of low cost and advances cleaner technology for pollution control:**

1) MPM has proposed the following cleaner technology to further improve upon the treatment system.

Installation of Diffused aeration system by replacing surface aerators at aeration tank and Post aeration tank further increases Dissolved Oxygen content in the final treated effluent and also reduces power consumption by 50%.

2) VISL: Industry is having STP at two locations. The STP of capacity 190 Cu-m/hr is not in working condition due to weakening of supporting bunds. The industry has taken up renovation of existing STP. As per the direction of the Board the industry has installed liquid waste treatment plant for their hospital recently.

However detailed study will be undertaken for identification of new areas for adoption of cleaner technology within the cluster.

### **2.6.4. Infrastructure renewal**

#### **2.6.4.1. Details of existing infrastructural facilities**

The Regional Office Shivamogga is not having lab facility. The samples collected are handed over to the Lab located at Davangere. The laboratory at Davangere is having instruments to analyze the parameters as specified in the consent conditions.

The Regional Office is headed by Regional Officer with 1 technical staff and 2 other supporting staff for monitoring & collection of samples, etc.

The Bhadravathi industrial cluster has the following infrastructure such as i) MPM and VISL are using the Water from the river Bhadra and supplying the same to township. ii) The main roads in the industry cluster are asphalted and drains are provided. Apart from these a Post office, Fire station, Police station, Bank, School, Health care units & Canteen are exists in this area.



#### **2.6.4.2. Need of up gradation of existing facilities.**

Shivamogga Office is not having lab facility, hence lab may be established to analyze the basic parameters. Parameters could be analyzed at central lab, Bangalore / recognized labs.

- Existing storm water drains within the cluster to be renovated & de silted by the MPM & VISL.
- Existing service roads are to be repaired and maintained.

#### **2.6.4.3. De silting of water tanks, drains, rivulets, etc.**

Situation does not warrant for de-siltation.

#### **2.6.4.4. Construction of lines drains/connections-**

The CMC, Bhadravathi is not having UGD system. The laying of UGD in CMC limits of Bhadravathi is under progress. The drainage system in Bhadravathi needs improvement.

#### **2.6.4.5. Treatment and management of contaminated surface water bodies**

The MPM is discharging their treated waste water in to Bhadra river. The Board is monitoring the river regularly. The river water is generally meeting the class c standards. However since the area does not have proper UGD system there is an issue with respect to fecal contamination. The CMC Bhadravathi has been informed to install proper collection system for all the sewage generated in the city & install proper treatment system. The STP was constructed under NRCP scheme. The domestic effluent from one wet well is treated in STP. The construction of balance work of wet wells is under progress. The work of UGD is under progress under KMRP.

#### **2.6.4.6. Rejuvenation/Management Plan for important eco-geological features.**

The situation does not warrant for rejuvenation.

#### **2.6.4.7. Carrying of effluent from industrial units located in non-industrial locations to CETP facilities by lines drains/pipelines only and prevention of their disposal into city sewerage/surface drains**

The MPM and VISL are having their own treatment units. There are no other main water based industries in the cluster. Hence there is no necessity of CETP.

#### 2.6.4.8. Installation of Gen sets at CETPs

There are no CETPs in the study area as mentioned above.

#### 2.6.5. Impact on CEPI score after installation of full fledged water pollution control systems:

<b>A1 = 3.00</b>	<b>A2 = 2.50</b>		<b>A = A1 x A2</b> <b>A = 7.50</b>
<b>B1 = 2.00</b>	<b>B2 = 1.50</b>	<b>B3 = 3.00</b>	<b>B = B1+B2+B3</b> <b>B = 6.50</b>
<b>C1 = 5.00</b>	<b>C2 = 3.00</b>	<b>C3 = 5.00</b>	<b>C = C1 x C2+C3</b> <b>C = 20.00</b>
<b>D = 5.00</b>			<b>D = 5.00</b>
			<b>TOTAL = 39.00</b>

#### Justification:

- M/s MPM Ltd has separate ETP and STP for treatment of trade effluent and sewage effluent. The treated effluent is discharged to Bhadra River. The treated sewage is used for gardening/irrigation within the plant.
- M/s VISL does not generate any trade effluent. The waste water generated from the gas cleaning plant (blast furnace) and BOF –De-Dusting Plant (DDP) is treated and recycled for use within the plant.
- There are two sewage treatment plants with the capacity of 130 m<sup>3</sup>/hr & 190 m<sup>3</sup>/hr. The treated water is used in the Farm Plantation leased to the farmers.
- M/s MPM Ltd has proposed the installation of Diffused aeration system by replacing surface aerators at aeration tank, and Post aeration tank further, thereby increasing the Dissolved Oxygen content in the final treated effluent and reducing power consumption by 50%.
- Since there are only TWO large industries; M/s MPM Ltd. and M/s VISL, the scale of operation, as per the parameters mentioned in the report, only accounts for a penalty of **2.5** (factor: A2).
- Owing to a reduction in pollutant dispersal at source and with adequate infrastructure in place, there will be a consequent reduction in the level of exposure (factor: C2).
- CMC, Bhadravathi has constructed STP and remaining balance work of construction of wet wells is under progress. The UGD work for Bhadravathi town is also under progress. This reduces the pollution load on river after commissioning of the said projects.

## **2.6.5. Managerial and Financial aspects**

### **2.6.5.1. Cost and time estimates**

The Shivamogga Office is not having any lab facility. The approximate cost for establishment of basic lab at Shivamogga is Rs 50 lakhs.

### **2.6.5.2. Identified Private/Public sector potential investors and their contribution/obligation**

The MPM is a state public sector, VISL is a Central public sector, KSPCB and CMC, Bhadravathi are Autonomous and local body respectively. Hence contribution is expected from the respective industries and government.

### **2.6.5.3. Government Budgetary support requirement**

Finalized action plan will be submitted seeking financial support.

### **2.6.5.4. Hierarchical and structured managerial system for efficient implementation**

KSPCB will oversee implementation of finalized action plan.

### **2.6.6. Self monitoring system in industries (ETPs etc.)**

M.P.M and VISL are having environmental cell and they are monitoring the samples as per Board norms. Board is also encouraging industries to establish ISO 14001 (EMS). MPM has already been certified.

### **2.6.7. Data linkages to SPCB/CPCB (of monitoring devices)**

At present industries are submitting the reports of analysis regularly at prescribed intervals in hard copy form. The data available with KSPCB is shared with CPCB as and when required. Board has plans to establish data linkages with 17 category industries.

## **3. AIR ENVIRONMENT:**

### **3.1. Present status of Air environment supported with minimum one year analytical data**

The major air pollutants monitored in the industrial cluster are SPM, SO<sub>2</sub>, and NO<sub>x</sub>, as per the earlier norms specified for Ambient Air Quality. All the industries have provided stipulated chimney height and other air pollution control measures to control the emissions from point sources. Karnataka State Pollution Control Board (KSPCB) and industries are also monitoring Ambient

Air Quality in the area of cluster of industries. The parameters are meeting the earlier AAQM standards. RSPM on few occasions is not meeting to the new standards.

### 3.1.1. Critical locations for air quality monitoring

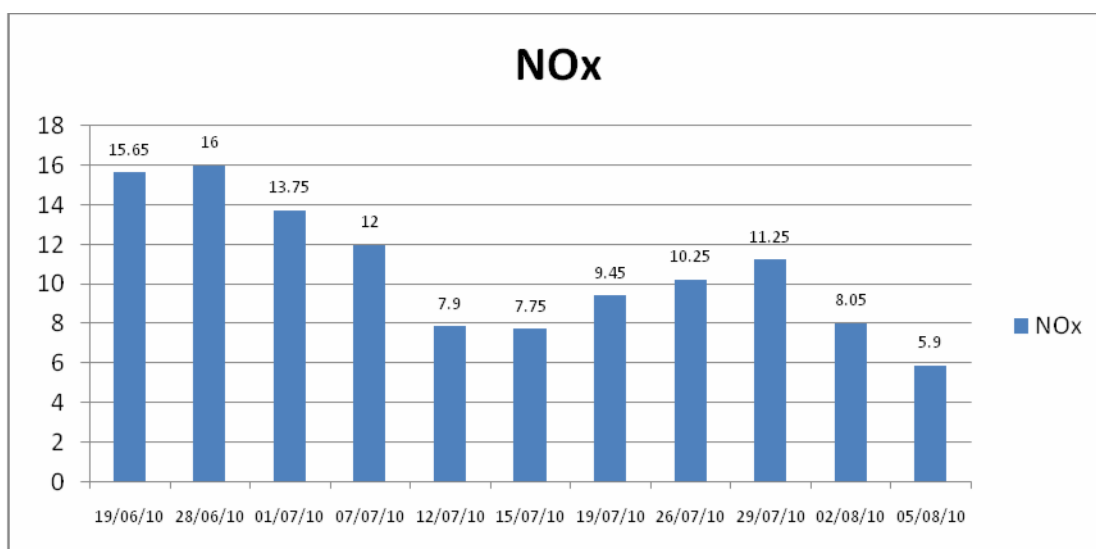
As per the earlier Norms of the Ambient Air Quality monitoring is required to be done for Industrial, Commercial, Residential & sensitive Zones, accordingly air quality monitoring was carried out within the industrial cluster.

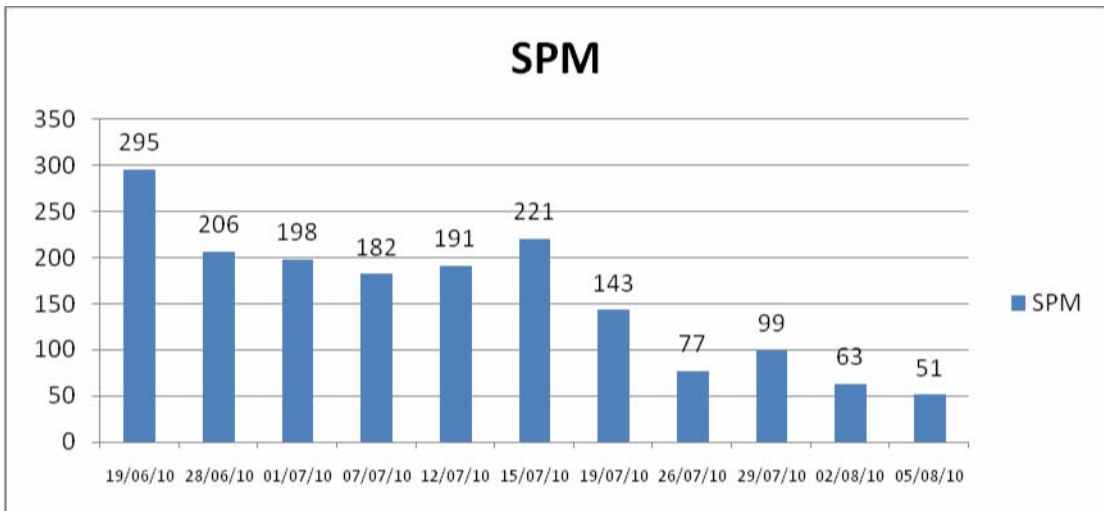
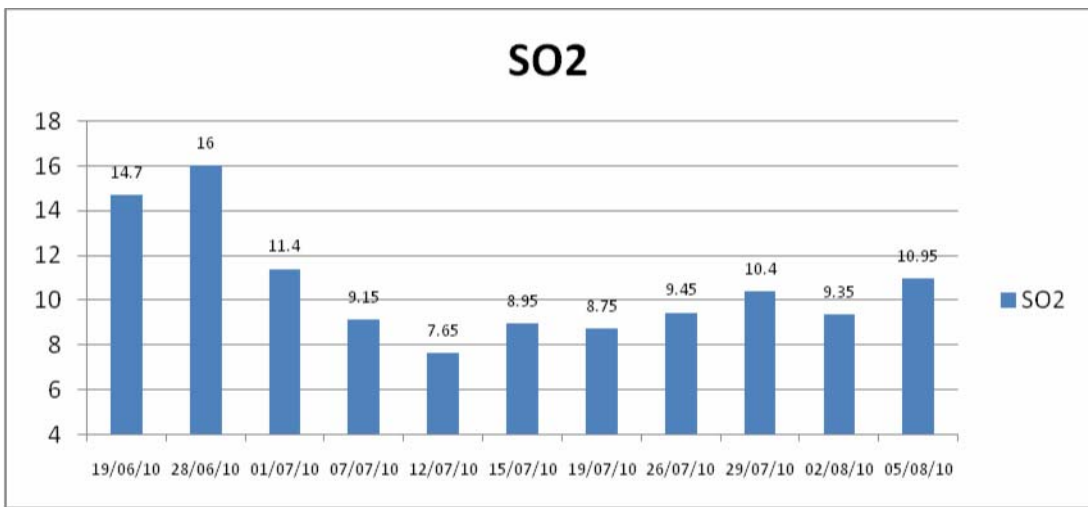
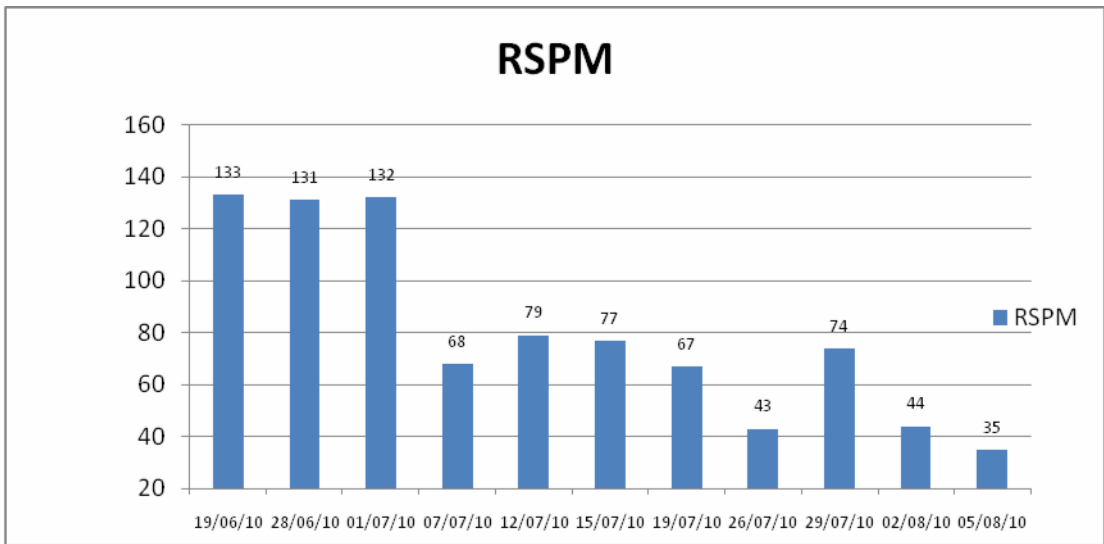
The major industries contributing for air pollution are M/s. MPM and M/s VISL. The critical locations for air quality monitoring are as follows,

1. MPM premises
2. MPM township
3. VISL premises
4. VISL Township
5. Bhadravati old town

### 3.1.2. Present levels of pollutants in air (routine parameters, special parameters and air toxics relevant to the area in three categories known carcinogens, probable carcinogens and other toxic)

#### AMBIENT AIR QUALITY MONITORING AT VISL, BHADRAVATHI





The routine parameters as specified in NAAQM are measured manually in Industrial cluster. Board has initiated necessary steps to train the field and laboratory staff for monitoring new parameter as per the revised NAAQM standards.

MPM is monitoring the ambient air quality at 7 different locations for SPM, SO<sub>2</sub> and NO<sub>x</sub> parameters as per Board suggestion. 4 stations are located with in the premises and rest located out side the premises including one station at Hospital in Bhadravati Town Area. The industry was informed to carry out on line monitoring and to transfer the data.

VISL is monitoring the ambient air quality at 7 different locations for SPM, SO<sub>2</sub> and NO<sub>x</sub> parameters. 5 stations are located with in the premises including one at VISL Hospital and rests are located out side the premises.

SL. No.	Name of location	2009-10					
		Concentration of pollutants in µg/m <sup>3</sup>					
		SPM		SO <sub>2</sub>		NO <sub>x</sub>	
		Min	Max	Min	Max	Min	Max
1	MPM- Near ETP	26	48	1	2	1	3
2	MPM- Near STP	23	44	1	3	1	4
3	MPM- Sugar mill	24	48	1	3	2	5
4	MPM- Kalyan mandir	58	120	7	11	7	11
5	VISL- near Oxygen plant	20.78	170.12	0.25	1.57	0.5	17.37
6	VISL – near pump house	30.83	168.71	0.25	1.95	4.07	13.9
7	VISL –near Forge plant	35.42	190.83	0.25	1.7	1.41	15.79
8	VISL –STR shop	8.24	115.58	0.25	1.93	2.68	18.27
9	VISL- near BF ETP	44.9	466.5	0.01	2.35	1.22	25.3

### 3.1.3. Predominant sources contributing to various pollutants

### 3.2. Sources of air pollution viz industrial, domestic (Coal and Biomass burning), natural and Transport & Heavy Earth Movers.

### 3.3. Air Pollution Industries in the area/cluster

There are two major industries in cluster and they are as follows:

Sl.No.	Name & Address of industry	Category
1	MPM	<a href="#">Paper &amp; Sugar</a>
2	VISL	<a href="#">Mild Steel and alloys</a>

a) M.P.M is having Five boilers, out of which Four are Coal fired Boilers and One Chemical Recovery Boiler (45 TPH capacity). Out of four coal fired boilers one is 90TPH CFBC boiler and other three are 60TPH AFBC boilers. All Five boilers are having individual ESPs. All the four coal fired boilers flue gas is discharged through a 105m common chimney. The Soda Recover boiler flue gas is discharged through a 45m chimney. They have provided the control equipment and chimney as per the consent condition.

b) VISL is having following predominant sources of air pollution

1. Basic Oxygen furnace
2. Ladle refinery furnace.

Besides the industry is having 35 air pollution sources. The unit has provided stipulated air pollution control equipment to all the sources except ladle refinery furnace.

c) **Vehicular pollution:** The NH 206 and SH 65 are passing through Bhadravathi. The movement of vehicle to transport raw material and finished products is more. The movement of heavy vehicles and light vehicles on highways and with in city are also contributing to the air pollution.



**ESP and Chimney provided to Chemical Recovery Boiler of MPM**



**ESP and common Chimney provided to Coal fired Boilers of MPM**





### **Air Pollution Control system (Wet Scrubber) for Blast Furnace of VISL**

#### **3.4. Impact of activities of nearby area on the CEPI Area**

The adjacent areas are generally residential in nature and hence their activities do not have any impact on CEPI score of industrial cluster.

#### **3.5. Quantification of the air pollution load and relative contribution by different sources**

Since the industrial source is quantifiable, the other sources are of area/volume source is difficult to quantify. The air pollution load on to the atmosphere from major industries is presented below

<b>Year</b>	<b>Industries</b>	<b>PM Kg/day</b>
2009	MPM	80.11
2009	VISL	39.76

### 3.6. Action Plan for compliance and control of pollution

#### 3.6.1. Existing infrastructure facilities-Ambient air quality monitoring network

All the major industries in the cluster are conducting ambient air quality monitoring every month & submitting reports. The Board is monitoring the parameter as per earlier National Ambient Air Quality standards.

The Regional Office is collecting the sample and handing over the same to Davanagere Lab for analysis since Shivamogga Office is not having lab facility.

#### 3.6.2. Pollution control measures installed by the individual sources of pollution

Sl.No.	Name of industry	Category	Air Pollution Control Measures Provided
1	MPM	<a href="#">Paper &amp; Sugar</a>	<a href="#">ESP</a>
2	VISL	<a href="#">Mild Steel and alloys</a>	<a href="#">Wet Scrubbers</a>

The MPM has provided ESP for all the sources as per the stipulations. The VISL has provided scrubber and chimneys as per stipulations except ladle refinery furnace.

#### 3.6.3. Technological intervention

##### 3.6.3.1. Inventorization of prominent industries with technological gaps

##### 3.6.3.2. Identification of low cost and advanced cleaner technology for air pollution control

The VISL has proposed the following cleaner technology in Steel Making Shop to reduce the air pollution:

- i. Arcing of liquid metal at lower tap
- ii. Addition of Alloying elements and Fluxes in Batches
- iii. Additions of carburising materials only after achieving high temperature.
- iv. Preparation of reducing slag with more addition of Aluminum Shots.
- v. Avoiding vigorous Argon purging.

The VISL has proposed to Increase the speed of Induced Draft Fan of De-Dusting plant of Basic Oxygen Furnace (BOF) to increase the efficiency of the suction, which reduce the dust emission from chimney.

### 3.6.3.3. Introduction and switch over to cleaner fuel

Major industries are going for low sulphur & low ash cleaner fuels. The MPM is using the gas generated from the anaerobic digester along with coal for boiler.

### 3.6.4. Need of infrastructure Renovation

#### 3.6.4.1. Development of roads

The roads in the industry cluster are to be properly asphalted to reduce the emission of dust during vehicular movement.

### 3.6.5. Impact of CEPI score after installation/commissioning of full fledged air pollution control systems

By implementation of the action plan proposed by the industries and the Boards action plans CEPI score is expected to come down substantially.

#### AIR ENVIRONMENT

<b>A1 = 4.00</b>	<b>A2 = 2.50</b>		<b>A= A1 x A2</b> <b>A = 10.00</b>
<b>B1 = 2.00</b>	<b>B2 = 3.00</b>	<b>B3 = 3.00</b>	<b>B= B1+B2+B3</b> <b>B = 8.00</b>
<b>C1 = 5.00</b>	<b>C2 = 1.50</b>	<b>C3 = 0.00</b>	<b>C=C1 xC2 +C3</b> <b>C = 7.50</b>
<b>D = 5.00</b>			<b>D = 5.00</b>
<b>CEPI score after installation/commissioning of full fledged air pollution control systems</b>			<b>TOTAL = 30.50</b>

#### **Justification:**

- The presence of carcinogens does not exceed the critical level, as none of the industries manufacture them as an end-product and if present, will only be in the form of process intermediates (factor: A1).
- Since there are only TWO large industries; M/s MSM Ltd. and M/s VISL, the scale of operation, as per the parameters mentioned in the report, only calls for a penalty of **2.5** (factor: A2).
- M/s MPM has four Coal fired Boilers and one Chemical Recovery Boiler; all of which have been provided with ESPs and the required chimney height to control PM.

- M/s VISL has installed a Wet Scrubber in their Basic Oxygen Furnace unit. This along with adequate chimney height will reduce the PM count leading to a reduction in Ambient Pollutant Concentration (factor: B1).
- Both the major industries have opted for low-sulphur & low-ash containing cleaner fuels. M/s MPM Ltd is using the gas generated from the anaerobic digester along with coal for boiler.
- Owing to a reduction in the pollutant dispersal at source and its presence in the ambient environment, the level of exposure (SNLF) will also reduce (factor: C2).
- The Additional Risk Factor will also reduce, as the industries in the region have adequate pollution control facilities as well as common facilities for the Air Environment (factor: D)
- The VISL has proposed standard operating procedures in steel making shop.
- The VISL has proposed bag filter along with complete ducting system to the ladle furnace to mitigate fugitive emissions.
- The VISL has proposed dust collection system at blast furnace cast house.
- The MPM and VISL are having good green cover. They have proposed plantation program in the industry and township.

### **3.6.6. Managerial and Financial aspects –Cost and time estimates**

#### **3.6.6.1. Cost and time estimates:**

The details are given in the Annexure.

#### **3.6.6.2. Identified Private/Public sector potential investors and their contribution/obligation**

The MPM is a state public sector, VISL is a Central public sector, KSPCB is an autonomous body and CMC, Bhadravathi is a local body. Hence contribution is expected from the respective industries, Government/ Local body.

#### **3.6.6.3. Government Budgetary support requirement**

Finalized action plan will be submitted seeking financial support if needed.

#### **3.6.6.4. Hierarchical and structured managerial system for efficient implementation:**

KSPCB will oversee the implementation of finalized action plan.

### **3.6.7. Self monitoring system in industries (Stacks, APCDs)**

M/s M.P.M and VISL are having environmental cell and they are monitoring the stacks and ambient air quality as per norms.

### **3.6.8. Data linkages to SPCB/CPCB (of monitoring devices)**

At present industries are submitting the reports of analysis regularly at prescribed intervals in hard copy form. The data available with KSPCB is shared with CPCB as & when required. Board has plans to establish data linkages with 17 category industries.

## **4. LAND ENVIRONEMNT (Soil and Ground Water)**

### **4.1. Soil contamination**

#### **4.1.1. Present status of land environment supported with minimum one year analytical data**

The Board is monitoring the under ground water regularly. The Units are not disposing any Hazardous waste on land. The solid waste from the MPM is dumped in the solid waste dump site out side the industry cluster but within the impact area. The solid waste from the VISL is dumped within the premises. No contamination was observed in the industry cluster.

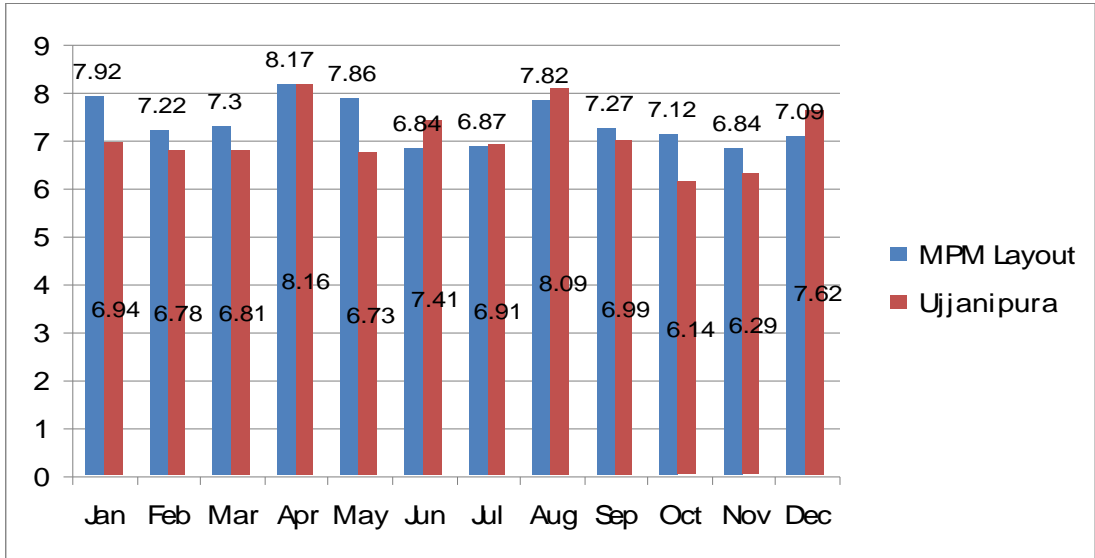
#### **4.1.2. Critical locations for land/soil pollution assessment and ground water monitoring**

At present, based on the data available with KSPCB, there is no contamination in ground water or any issues with the soil contamination. Since the groundwater table is fairly high the industries have been directed not to store any leachable waste without proper lining. The major industries also have got self monitoring protocol of monitoring of groundwater.

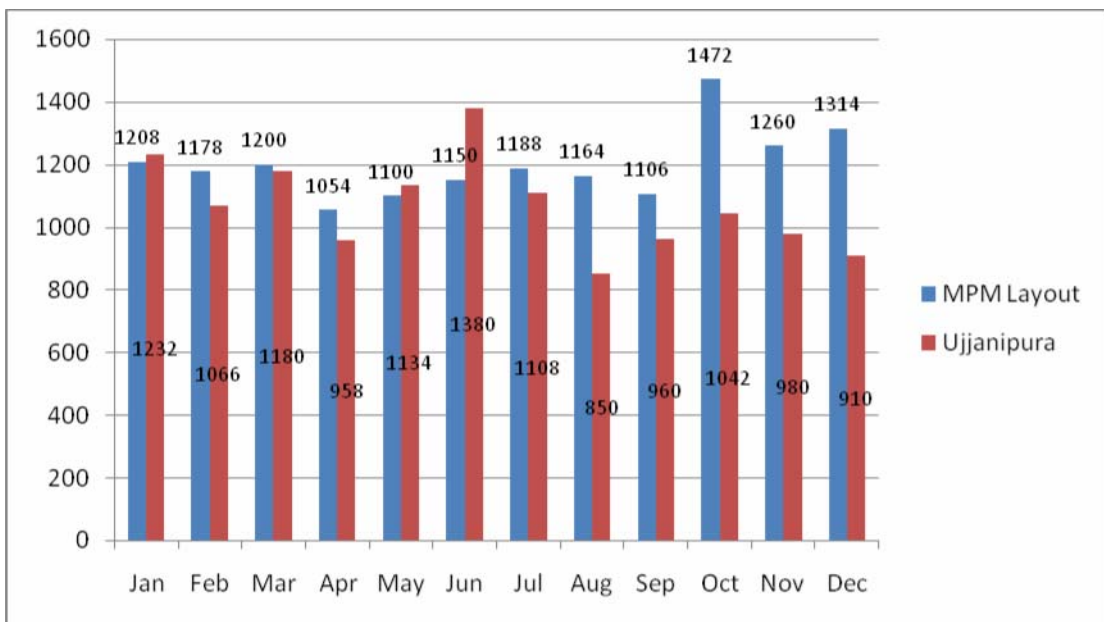
#### **4.1.3. Present levels of pollutants in land/soil and ground water (routine parameters, special parameters and water toxics relevant to the area in three categories known carcinogens, probable carcinogens and other toxics)**

Report of analysis (trend analysis) of water samples collected from Bore wells for the period 2009

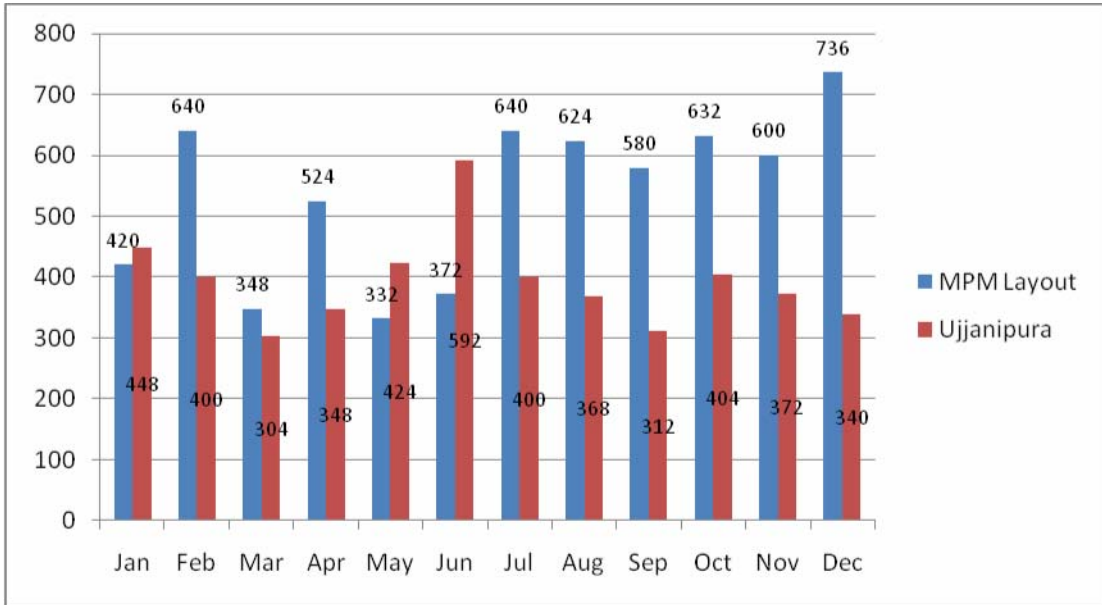
### pH



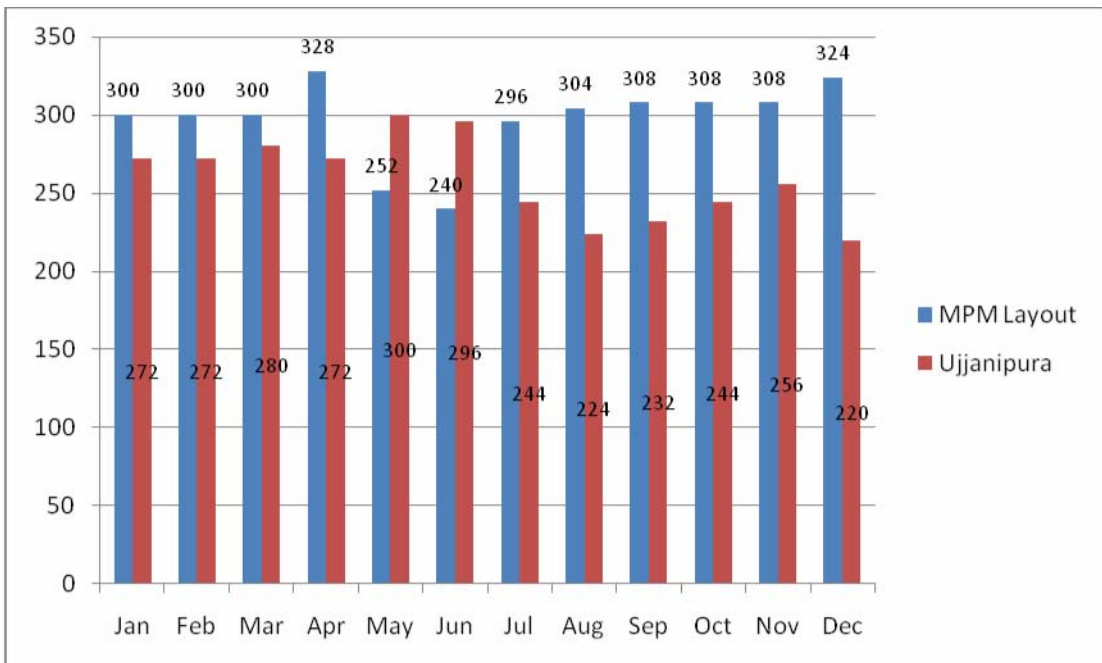
### TDS in mg/l



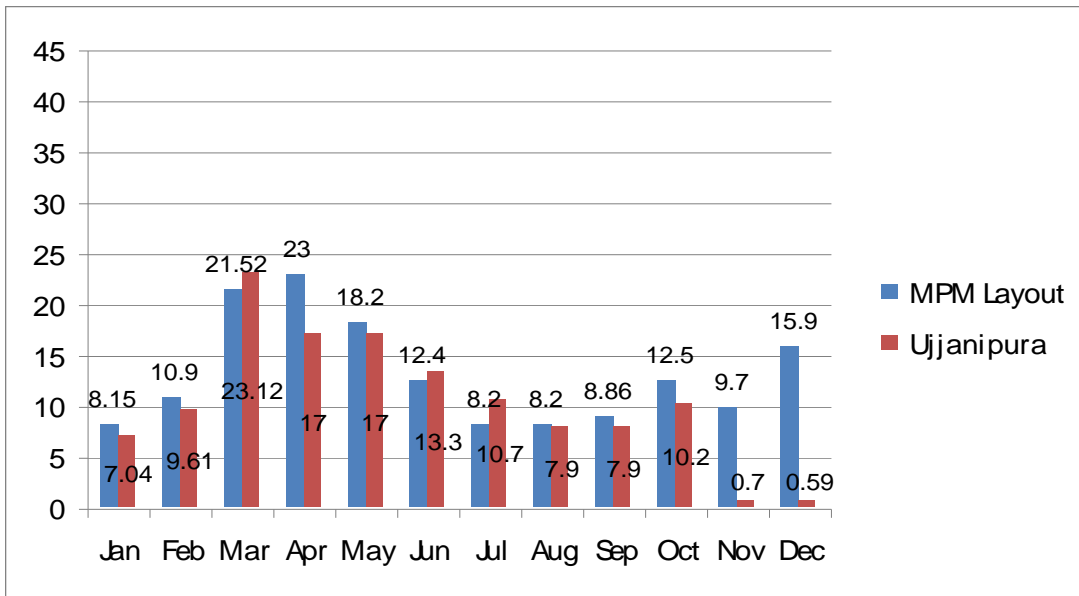
### Total Hardness as CaCo3 in mg/l



### Chloride in mg/l

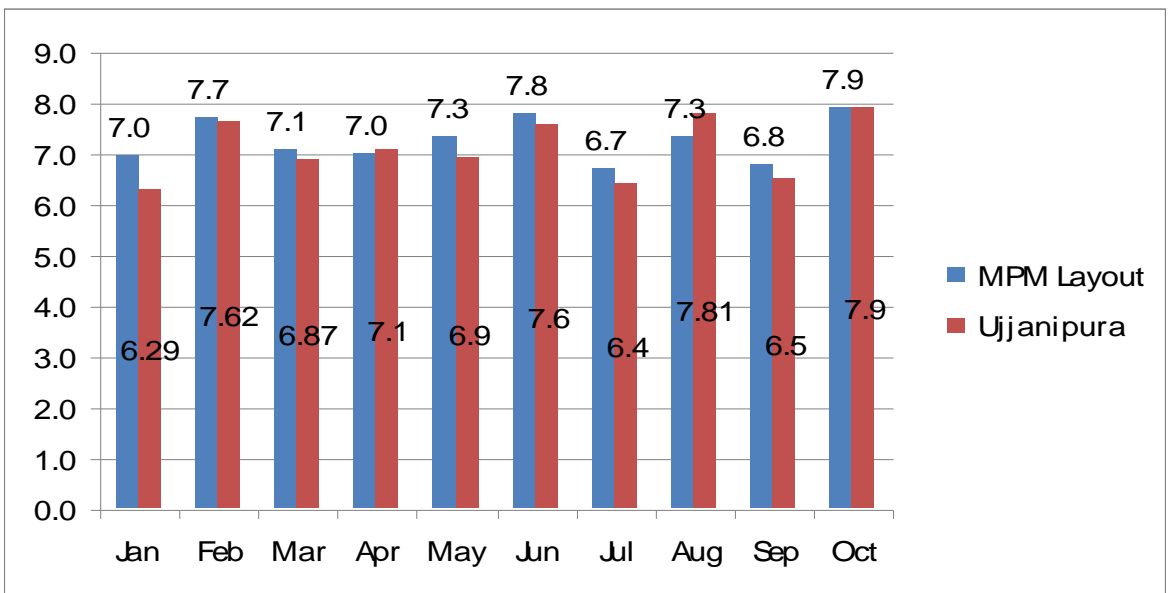


### Nitrite as NO3 in mg/l



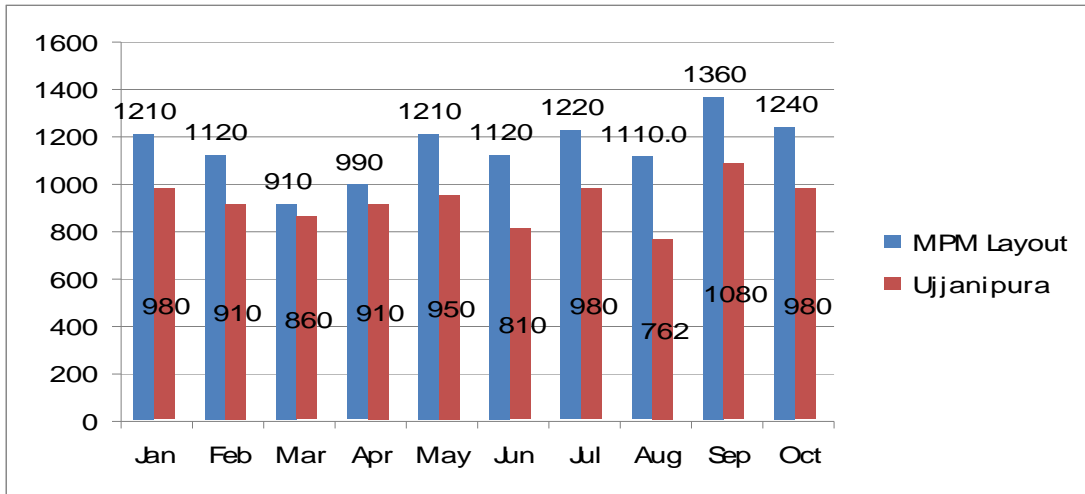
### FOR THE PERIOD 2010

### pH

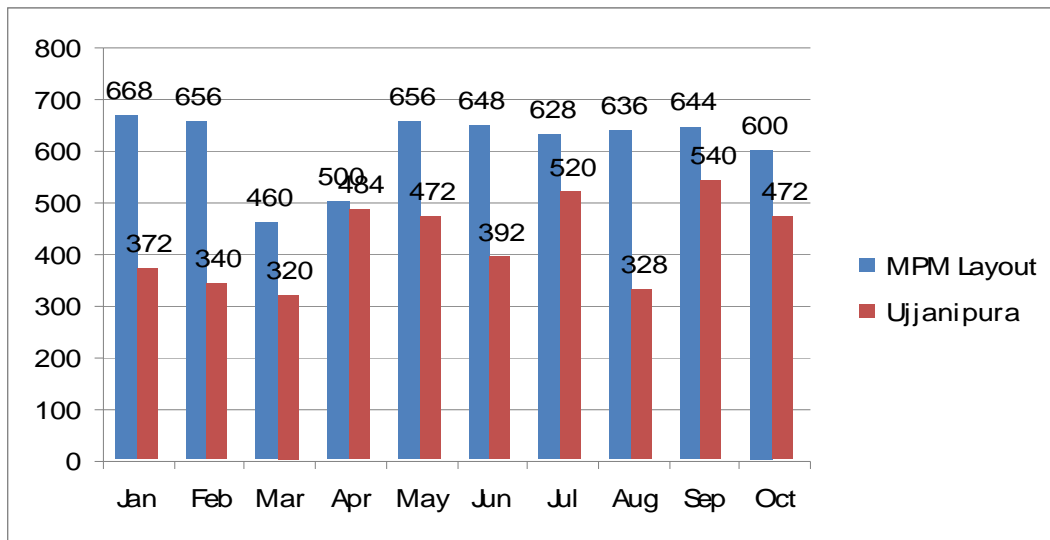




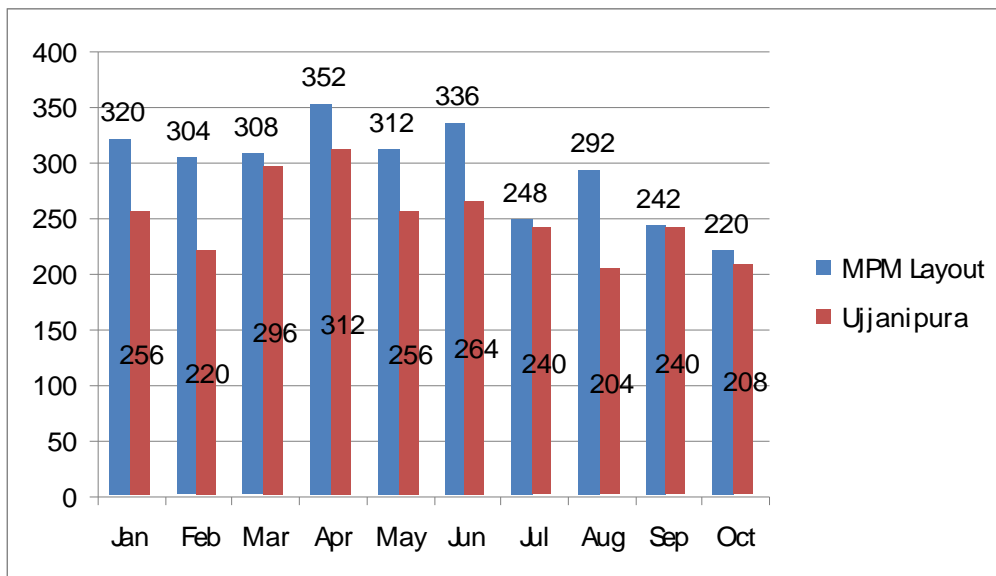
**Total Dissolved Solids in mg/l**



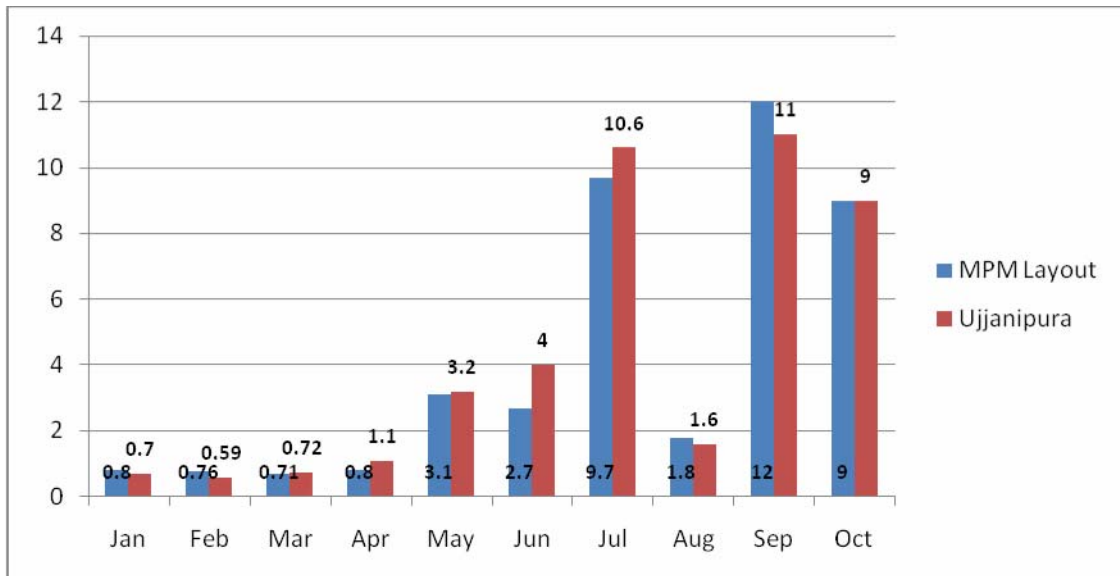
**Total Hardness as CaCO3 in mg/l**



**Chloride in mg/l**



### Nitrate as No3



There are no specific standards available for monitoring carcinogens in groundwater & Board is monitoring groundwater against drinking water standards every month at two locations near MPM dump site. The analysis for the special and water toxins relevant to the area will be carried out. The Hardness is more in the samples and this may be due to the natural phenomenon in the area.

#### **4.1.4. Predominant sources contributing to or posing danger of pollution of land and ground water such as hazardous/toxic wastes or chemicals dumps/storage etc.**

The major industries are storing their hazardous & other wastes in proper container or with proper lining of the ground to prevent the leachate from reaching the aquifer.

#### **4.1.5. Sources of Soil Contamination**

The MPM is dumping the following at the dump sites

- Primary ETP sludge
- Secondary ETP sludge
- Lime sludge
- Ash
- Press mud
- Municipal solid waste from the colony

The VISL is dumping the following solid waste in side the premise

- Scrubber sludge from ETP
- Flue Dust
- SMS slag

#### **4.1.6. Types of existing pollution**

There are no reported cases of contamination of land/groundwater within the cluster.

#### **4.1.7. Remedies for abatement, treatment and restoration of normal soil quality.**

The present situation does not warrant remediation.

There is no need for any abatement at present.

The MPM has proposed the following to reduce land and under ground water pollution.

- a) Installation of Rotary Lime Kiln (RLK) project has already been started. This will reduce lime sludge generation by 50% and it also reduces Lime stone consumption by 50%, which is a natural resource.
- b) Installation of Belt Press filter for dewatering of primary sludge at ETP, in order to further increase the consistency of sludge from 20 to 50%. This sludge will be burnt in the Boiler. This will avoid dumping of ETP sludge in the solid waste dump yard and to avoid land, ground water pollution.
- c) Installation of Decanter for dewatering of Secondary (Excess Biological) sludge at ETP, in order to further increase the consistency of sludge from 2 to 10% and this will be burnt in the Boiler after Sun drying. This will avoid dumping of ETP sludge in the solid waste dump yard and to avoid land, ground water pollution.

#### **4.2. Ground water contamination**

##### **4.2.1. Present status/quality of ground water**

##### **4.2.2. Source Identification (Existing sources of Ground water Pollution)**

Regional Office, KSPCB, Shivamogga is collecting bore wells & river samples located in the cluster every month & analysis report reveals that, no ground water contamination is observed in the Bhadravathi Industrial Cluster.

##### **4.2.3. Ground water quality monitoring program**

The Board is collecting the bore well samples every month at two locations near MPM dump site. The analysis reports are reported in **Annexure 7. Only Hardness and Sodium are exceeding the tolerance limits.**

##### **4.2.4. Action Plan for control of pollution including cost/time aspects**

Action as indicated in 4.1.7 will reduce the possibility of ground water pollution.

#### **4.2.5. Treatment and management of contaminated ground water bodies, etc.**

There are no reported cases of contamination of groundwater within the cluster.

#### **4.2.6. Impact on CEPI score after abatement of pollution**

Although there is no contamination of ground water seen in the cluster and impact zone, the industries in the cluster as a proactive measure have taken up steps to store non hazardous waste with lined surface and also plans to take up plans to take certain measures like installation of RLK, belt press filter and decanters which will ultimately reduce the volume of non-hazardous waste. This will reduce the CEPI score substantially.

### **LAND ENVIRONMENT**

<b>A1 = 3.00</b>	<b>A2 = 2.50</b>		<b>A=A1 x A2</b> <b>A = 7.50</b>
<b>B1 = 2.00</b>	<b>B2 = 3.00</b>	<b>B3 = 3.00</b>	<b>B=B1+B2+B3</b> <b>B= 8.00</b>
<b>C1 = 5.00</b>	<b>C2 = 1.50</b>	<b>C3 = 5.00</b>	<b>C=C1 x C2 + C3</b> <b>C = 12.50</b>
<b>D = 10.00</b>			<b>D = 10.00</b>
			<b>TOTAL = 37.50</b>

#### **Justification:**

- M/s MPM Ltd has proposed the installation of Belt Press filter for dewatering of primary sludge at ETP, in order to further increase the consistency of sludge from 20 to 50%. This sludge will be burnt in the Boiler, thereby avoiding dumping of ETP sludge in the solid waste dump yard.
- M/s MPM Ltd also proposed the installation of decanter for dewatering of Secondary (Excess Biological) sludge at ETP, in order to increase sludge consistency from 2 to 10% to be burnt in the Boiler after Sun drying.

- The presence of TWO large industries; M/s MSM Ltd. and M/s VISL, in this cluster reduces the scale of operation, and as per the agreed parameters, only account for a penalty of **2.5** (factor: A2).
- The construction of Rotary Lime Kiln is under progress in the MPM, this reduces the quantity of lime sludge and Lime stone consumption by 50%.
- The BMW generated from cluster is handed over to the common treatment facility located in Machenahalli industrial area (outside impact zone) for safe disposal.
- The CMC, Bhadravathi has proposed scientific landfill site for municipal solid waste.

### **4.3. Solid waste Generation and management**

#### **4.3.1. Waste classification and quantification**

##### **4.3.1.1. Hazardous waste**

The units in Bhadravathi are generating mainly used oil. Hazardous wastes generated from the industries are as follows:

<b>Name of the industry</b>	<b>Hazardous waste</b>	<b>Quantity generated /Annum</b>	<b>Mode of disposal</b>
MPM	Used oil	21.855KL/A	Burning in boilers
	Cotton waste	4.11 MT/A	Burning in boilers
	Discarded containers	5968 nos/A	Disposed to authorized
VISL	Used oil	3.75 KL/A	Used for lubrication of machineries

##### **4.3.1.2. Bio-medical waste**

The Bhadravathi city is having 13 Bedded Hospital. Most of the Nursing Homes have provided Liquid waste treatment plant. However the bio-medical waste generated in the cluster is handed over to the common bio medical waste treatment facility located out side the impact zone in Machenhalli Industrial Area for final disposal.

##### **4.3.1.3. Electronic waste**

No industry which generates E waste in considerable quantity in the cluster. However inventrisation of quantity of different types of Electronic Waste generated in the cluster will be carried out.

#### 4.3.1.4. Municipal solid Waste/Domestic Waste/Sludge from ETPs/CETPs/STPs and other industrial sources

- a) **CMC-Bhadravati:** About 40 TPD of solid waste generated from the municipal limits. The solid waste generated from the CMC limits is disposed in the designated site located at Sy No: 36 and 37 of Hiriyur -village, in an area of 20 acres, which is at distance about 6 Km from Bhadravati city. They are dumping the waste in the pits.
- b) **MPM** – The municipal solid waste generated from the township is about 2TPD and the same is dumped in the existing solid dump site. The sludge generated from the primary and secondary treatment section is at 7500 TPA and 3500 TPA respectively and the same is dumped in the existing site in unlined pits. MPM has provided sludge drying beds to treat the sludge generated from the STP. The treated sludge is used as manure in the premises.
- c) **VISL** – The municipal solid waste generated from the township is about 1.2TPD and the same is dumped in the existing solid dump site. The sludge generated from the ETP is at 10 TPD and the same is dumping in the premises. The sludge generated from the STPs is about 0.2 TPD and the same is treated in sludge drying beds. After drying it is used as manure.

#### 4.3.1.5. Plastic waste-

The plastic waste generated from the municipal limits is about 3 to 4TPD and the same is dumped along with solid waste without segregation.

#### 4.3.1.6. Quantification of wastes and relative contribution from different sources

##### a) MPM

Sl. No	Solid wastes (Dry basis) generation	Ton/A	Disposal mechanism
1	ETP primary sludge	7500	Part of this is being used as fuel in Boilers and remaining quantity is used as manure by the local farmers after composting.
2	ETP Secondary sludge	3500	Used as manure after composting by the local farmers.
3	Fly Ash	45000	Given to Cement & Brick manufacturing units.
4	Lime sludge	35000	Contract was granted to agency for disposal to use as Agricultural Gypsum by Farmers.

5	Press mud	5000	Used as manure after composting by the local farmers.
6	Electronic waste	Accumulated 250 kgs	Stored in secured manner
7	Municipal solid waste	2TPD	Dumped in designated site

**b) VISL**

<b>Name of waste / its source</b>	<b>Generation in TPD</b>	<i>Disposal mechanism</i>
Blast Furnace slag	180 -200	Sold to cement manufacturing units
SMS Slag	40	Sold to cement manufacturing units
Scrubber sludge from ETPs	10	Stored in the premises
Flue dust collected from BF	15	Stored with in the premises
Coke fines	52	Sold/stored in the premises for future use
Refractory waste	45	Recycled/sold
Sludge drying beds	0.2	Used as manure after drying in sludge drying beds.
E-Waste	30 kgs/annum	Stored in secured manner
Municipal solid waste	1.2	Dumped in designated site

**C) CMC-Bhadravati**

<b>Name of waste / its source</b>	<b>Generation in TPD</b>	<i>Disposal mechanism</i>
Municipal waste	40	Dumped in designated site

## **Construction of RLK of MPM**

### **4.3.2. Identification of waste minimization and waste exchange options**

a) MPM – The unit has proposed the following to minimize the quantity of waste at different levels.

- 1) At Present the lime sludge generated is dumped in the existing land fill site. Now they are constructing the Rotary lime kiln to recover lime from sludge which will reduce the volume of the sludge.
- 2) Propose to Install the Belt Press filter for dewatering of primary sludge at ETP, in order to reduce the volume of sludge.
- 3) Propose to Install the Decanter for dewatering of Secondary (Excess Biological) sludge at ETP, in order to reduce the volume of sludge.

### **4.3.3. Reduction/Reuse/Recovery/Recycle options in the co-processing of wastes.**

**MPM –**

- a) Fly ash is generated from Boiler section. They are handing over the fly ash to cement manufacturing units.
- b) Press mud generated from Sugar mill sold to farmers to use as manure.



c) **VISL –**

- a) Slag generated from Blast furnace is sold to cement manufacturing units.
- b) Refractory waste is reused in the plant.

**4.3.4. Infrastructure facilities**

**4.3.4.1. Existing TSDF/Incineration facilities including capacities**

There are no TSDF/incineration facilities in the cluster. The Government has set up TSDF at Dabaspeta which is at a distance of about 220 KM. The said facility is having the capacity to handle land fillable waste of about 8 lakh tones for 20 years.

**4.3.4.2. Present status/performance and need of up gradation of existing facilities including enhancement of capacities**

There is a need for segregation of different types of waste and the segregated waste should be land filled in properly designed Solid waste Land Fill site and capped.

**4.3.4.3. Treatment and management of contaminated waste disposal sites, etc.**

There is no identified contaminated waste disposal site.

**4.3.4.4. Impact on CEPI score after proper management of Solid Wastes.**

After providing solid waste management site CEPI score will come down substantially.

**5. PPP Model**

**5.1. Identification of project proposals (for both the options i.e. technology intervention and infrastructure renewal) for implementation under the PPP mode under the Action Plan.**

No PPP is possible as both MPM and VISL are PSUs. Hence contribution is expected from the respective industries and government for KSPCB and CMC, Bhadravathi.

## **5.2. Identification of stakeholders/agencies to be involved and to evolve financial and managerial mechanisms for implementation of PPP projects.**

Not applicable.

## **6. Other infrastructural Renewal measures:**

### **6.1. Green Belts**

**MPM** - In and around the mill premises about 6.00 ha. of area will be brought under Green cover. The industry has proposed to plant 15000 saplings in and around the plant.

**VISL** - About 40000 no's of saplings in and around the industry have been planned. Out of which 8000 are already planted with in the premises.

### **6.2. Development of Industrial Estate(s)**

At present there is one industrial estate developed by KSSIDC. There are only small scale industries in the estate.

### **6.3. Development/shifting of industries located in the non-industrial areas to the existing/new industrial estates.**

There are no major large polluting industries except MPM and VISL.

## **7. Specific Schemes:**

### **7.1. GIS-GPS system for pollution sources monitoring**

At present there is no such system for pollution sources monitoring. The possibility will be explored.

### **7.2. Hydro-geological fracturing for water bodies rejuvenation**

No such proposal.

### **7.3. In-situ remediation of sewage**

No such proposal.

### **7.4. Utilization of MSW inert by gas based brick kilns**

No gas based brick kilns.

## 7.5. Co-processing of wastes in cement industries

The fly ash generated from MPM is handed over to Cement manufacturing units The slag generated from the BF plant in VISL is handed over to cement manufacturing plants

## 8. Public awareness and training Programmes

The Board is conducting awareness and training programmes.

## 9. Overall Impact of installation/commissioning of pollution control equipments/measures on the CEPI score

After implementation of the proposed action plan the CEPI score will reduce substantially.

No	Industrial Area/clusters	Air	Water	Land	CEPI
35	Bhadravathi (Karnataka)	30.5	39	37.5	45.97

## 10. Assessment of Techno-economical feasibility of pollution control systems in clusters of small/medium scale industries.

Not applicable since small & medium polluting industries are not located in the cluster.

## 11. Efforts shall be made to encourage use of Bio-compost and Bio-Fertilizer along with the chemical fertilizer in the state to minimize the unutilized chemical fertilizer run-off into the natural water resources from agriculture fields (through Govt. policy)

Possibilities will be explored

## 12. Summary of proposed action points:

Sl. No.	Action Points(including Source and mitigation measures)	Responsible Stake Holders	Time limit	Cost in Lakhs	Remarks
1	Monitoring of Air/Water & soil in cluster for	KSPCB	30-09-2011	30	

	special parameters and toxins				
2	Study on impact of effluent and sewage discharge on Bhadra river including bio mapping.	KSPCB	30-09-2011	10	
3	Air quality modeling study for the cluster	KSPCB	30-06-2011	10	
4	Up gradation and strengthening of existing laboratory at Davanagere	KSPCB	31-12-2011	100	
5	Setting up of new Continuous Ambient Air quality monitoring station on PPP model	PPP	31-12-2011	100	
6	<ul style="list-style-type: none"> <li>• Performance study of ETP</li> <li>• water auditing</li> <li>• Quantification of Green House Gas emissions.</li> </ul>	MPM	31-12-2011	25	
7	Upgradation of existing ETP <ul style="list-style-type: none"> <li>• Installation of Diffused aeration system at Post Aeration Basin</li> <li>• Installation of Decanter for Secondary (Bio) sludge de-watering</li> <li>• Installation of</li> </ul>	MPM	31-12-2011	610	

	Filter Press for Primary sludge de-watering • .Installation of Diffused Aeration system at Aeration Basin				
8	Installation of Rotary Lime Kiln (RLK)	MPM	31-03-2011	3100	
9	Refurbishing of 190 M3/hr STP at Township	VISL	31-12-2010	18.40	
10	Dust Collection System at Blast Furnace Cast House.	VISL	30-11-2011	45	
11	Revamping of existing Air pollution control system – Bag Filter at SMS	VISL	30-11-2011	30	
12	Improvement of existing MSW treatment and disposal facility as per MSW Rules	CMC-Bhadravati	After the release of funds from Government	605	
13	Providing UGD system in 2 <sup>nd</sup> Phase to cover the entire town	CMC-Bhadravati		1800	

**Actions initiated/completed by KSPCB and Industries after the declaration of Bhadravathi as critically Polluted area**

**Actions by KSPCB**

- KSPCB has not considered any new project and expansion of the existing projects within Bhadravathi industrial cluster
- KSPCB has initiated discussions with industries to implement cleaner technologies

- Working with MPM & VISL to install on-line monitoring system and arrange for data transfer to Board.
- KSPCB has initiated green belt development in the cluster in association with Forest Dept.

#### **Actions taken by VISL on the commitments made;**

- Provided liquid waste treatment facility at the VISL hospital during September 2010
- Developed garbage disposal yard for township during October 2010
- Fabrication and erection of three Air quality monitoring platforms during June 2010
- Provided sprinkler near day bunker and belt conveyor system to suppress dust- August 2010
- Procured HDPE sheet to cover raw material yard when ever necessary to prevent fugitive dust
- Planted about 27500 saplings
- New Standard operating procedures developed for efficient operation and to reduce emissions during July 2010 for the following activities
  - Arching of Liquid metal at lower tapping
  - Addition of alloying elements and Fluxes in batches
  - Addition of Carburizing materials only after achieving high temperature
  - Preparation of reducing slag with more additions of Aluminum Shots
  - Avoiding Vigorous Argon purging
  - Modification of Tapping System at BF Cast House during tapping.

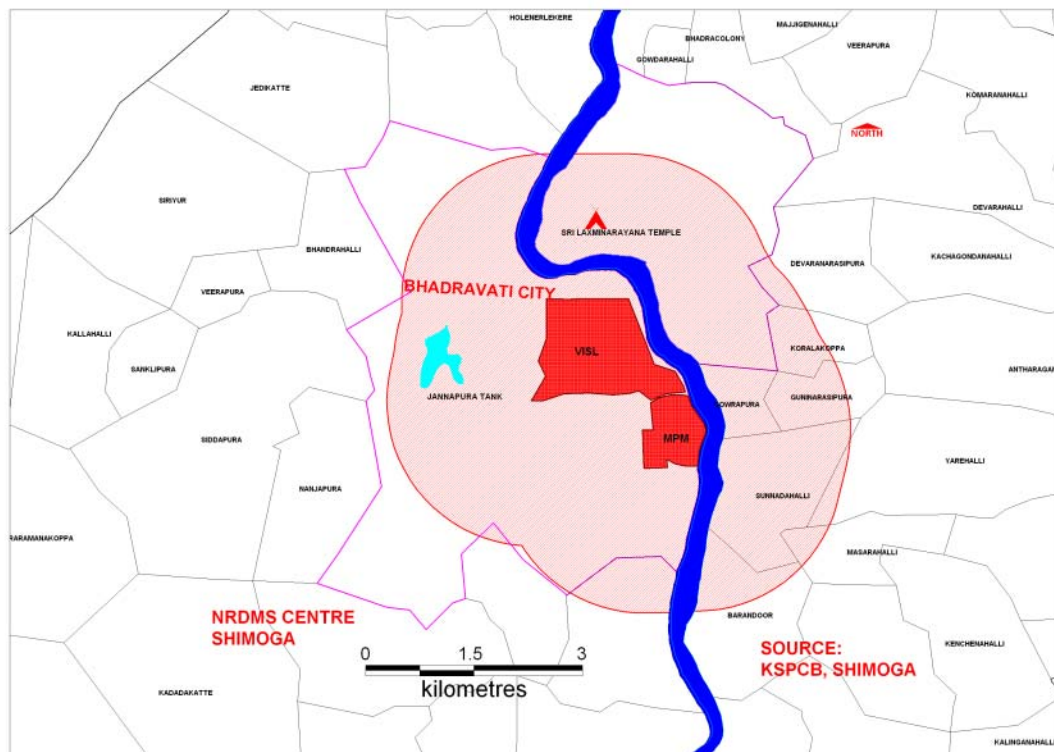
#### **Actions taken by MPM on the commitments made**

- Work on erecting RLK is in progress
- MPM has planted about 20000 saplings, in areas of about 5-10 hectare available around the solid waste dump site and vacant lands in & around the mill premises. Prior to this in the last Four years Mill had taken up extensive afforestation measures to cover most of the vacant lands/ Old Dumping areas and to reclaim the areas for beneficial use. Out of about 85 acres of land available in the present solid waste disposal site, about 30 acres of area has been already covered up with these plantations.

- The accumulated solid wastes at the dump yard are being sold. The Old solid waste dumping areas available at dump yard has been leveled with help of Bulldozer and about 5000 saplings have been planted to increase green belt. A bund is provided at the periphery of the dump yard to arrest run off. There is green belt around the dump yard.
- Once the RLK project is commissioned, the generation of lime sludge and dumping of the same at dump yard will be reduced approximately by about 50%.

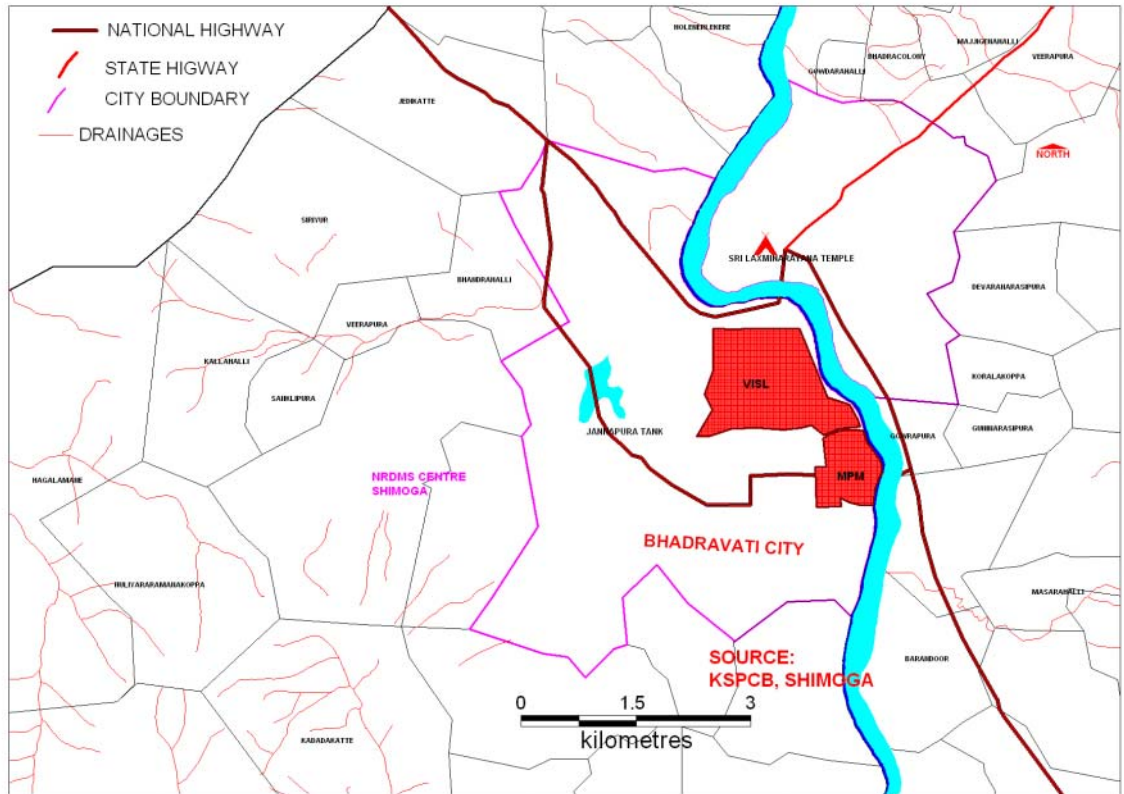
## ANNEXURE \_I

### Bhadravathi Industrial Cluster Map



## ANNEXURE \_2

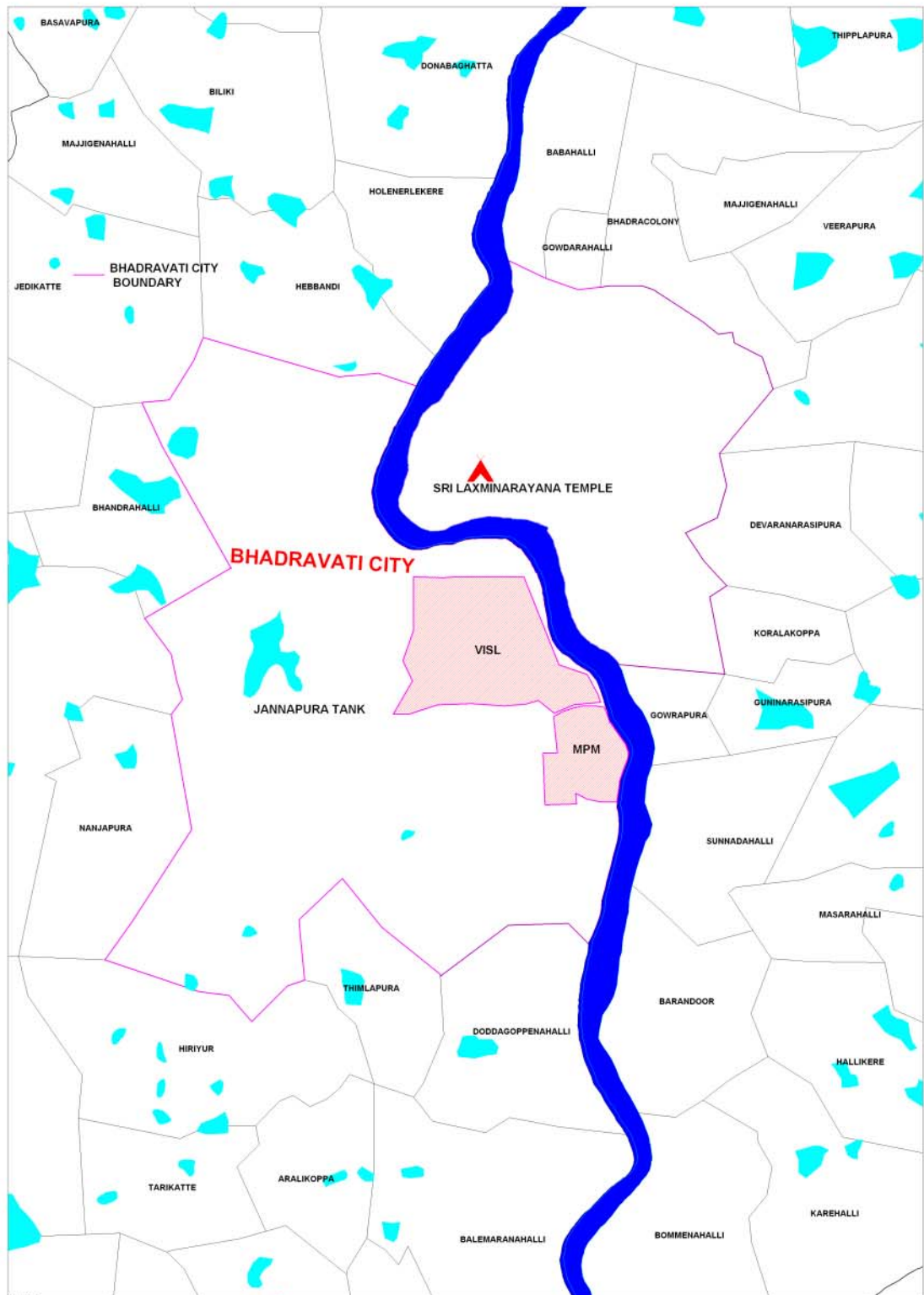
### Bhadravathi Industrial Cluster Drainage Map





### ANNEXURE\_3

#### Bhadravathi Industrial Cluster with Impact zone



#### **Annexure 4**

Table showing the latitude and longitude of boundaries of cluster of Industries

<b>Direction</b>	<b>Latitude</b>	<b>Longitude</b>
Northern	13.8419552	75.7018948
Southern	13.8195362	75.7068515
Western	13.8296208	75.6939724
Eastern	13.8249119	75.7170439

#### **Annexure-5**

Location map showing the sampling points and discharge points on Bhadra river

## Annexure -6

The treatment system adopted by M/s. MPM and VISL for treatment of trade effluent and domestic effluent is as under

### a) MPM

ETP in respect of M/s. MPM comprises of the following units,

Units	Size	Numbers
Bar Screen	---	4
Flash Mixer		2
Primary clarifier-No-1	Dia-45.7 m, Heiht-3.66	1
Primary clarifier-No-2	Dia-36.6 m, Heiht-3.66	1
Bagasse collection tank	Dia-20 m, Heiht-2.5m	1
Turbo clarifier	Dia-18 m, Heiht-3.5m	1
Bagasse Sludge Thickner	Dia-12 m, Heiht-5m	1
Pre acidification tank	Dia-10.3 m, Heiht-3m	1
Upflow Aneorobic Sludge Blacket reactor( UASBR)	Dia-10.3 m, Heiht-6m	1
Lamella Clarifier	7.5mx4mx4m	2
Aeration basin No-1	127mx18mx4m	With 50 HP -7 nos of aereators
Aeration basin No-2	127mx18mx4m	With 50 HP -7 nos of aereators
Aeration basin No-3	127mx13mx3m	With 25 HP -7 nos of aereators
Secondary clarifier-1	Dia-42.6 m, Heiht-3.66m	1
Secondary clarifier-2	Dia-42.6 m, Heiht-3.66m	1
Bio sludge thickener	Dia-22 m, Heiht-5.0m	1
Post aeration Basin	50mx15mx3m	With 7.5 HP -3

		nos	of
		aerators	

**STP for MPM Township:**

A part of the Township sewage is treated along with trade effluents in ETP. The Mill has also installed a separate sewage treatment plant (STP) of capacity 2500 m<sup>3</sup>/day, having a collection tank, UASB reactor, aeration basin and secondary clarifier to treat the rest of the Town sewage. The treated sewage is partly used for irrigating the plantations developed in and around the mill and the rest is discharged for agricultural use for the nearby farmers.

**b) VISL**

The water is consumed for domestic, scrubbing in air pollution control system and for cooling purposes. There is no generation of trade effluent from the process.

The water is used in the air pollution control system as scrubbing agent to mitigate dust pollution. ETP system comprises of the following,

1. **Blast Furnace Effluent Treatment Plant** :

The effluent from Gas Cleaning Plant (GCP) consists of primary & secondary wet ventureries scrubbers is taken to the distribution chamber. Alum & Poly-Electrolyte are dosed through dosage pump.. The chemically treated effluent is subjected to clarification in primary clarifier. The detention period is 45 min. The cleaned water is taken in to sump pit and recycled to GCP. The sludge settled at the bottom of the clarifier is pumped periodically to the lagoon. The clear water is again recycled to clarifier. There is no water out flow from the ETP. Specification : Clarifier – 2 No’s : 1200 M<sup>3</sup> each,. Lagoon – 2 No’s : 1500 M<sup>3</sup> each, Pump Capacity : 500 M<sup>3</sup>/hr , Head 55 mts, Power : 90 Kw, RPM:1440 Make Kirloskar.

2. **BOF –De-Dusting Plant (DDP) effluent treatment Plant** :

System consist of cleaning the gas from Basic Oxygen Furnace (BOF) with wet ventury scrubber and gas washed water is treated in thickner plant. The solids settle down at bottom and pumped to lagoons. The clear water from thickner plant is recycled back to the system. No letting out of water from DDP.

3. **Domestic effluent treatment plant at township** :

There are two sewage treatment plant with the capacity of 130 M<sup>3</sup>/hr & 190 M<sup>3</sup>/hr. The plant consist of Grit Chamber, Aerator Tank, Sludge drying beds and a clarifier for each of the plant. The treated water is used in the Farm Plantation leased to the farmers. The 190 Cu-m/hr STP is under renovation.