

**ACTION PLAN FOR ABATEMENT OF POLLUTION IN  
CRITICALLY POLLUTED INDUSTRIAL CLUSTERS  
(IB VALLEY-JHARSUGUDA AREA)**



**ORISSA POLLUTION CONTROL BOARD  
BHUBANESWAR  
DECEMBER 2010**



## ***PREFACE***

Industries tend to grow in cluster due to certain favourable conditions, which provides them competitive advantage over the others infrastructures. Coal, water and iron ore are one of those favourable factors for Orissa, which has been attracting industries leading to clusterisation. Clusters of industries, no doubt provide competitive advantage to the industries and opportunities for waste utilisation, at the hind side, the cumulative impact on environment tends to cross the threshold of environmental carrying capacity. Assessment of environmental impacts in a cluster is a complex multi-dimensional problem which is often difficult to measure and manage. In order to address such complex problem Central Pollution Control Board (CPCB) has developed a Comprehensive Environmental Pollution Index (CEPI).

This is a rational number to characterize the environmental quality of an industrial cluster following an algorithm of source-receptor-pathway framework. Industrial clusters having aggregated CEPI score of 70 and above is considered a critically polluted cluster. In Orissa there are three industrial clusters; Angul-Talcher, Ib-valley and Jharsuguda with CEPI score of more than 70, thus considered as critically polluted.

This Action Plan for abatement of pollution in Critically Polluted Industrial Cluster (CPIC) aims at identifying the boundary, critical environmental attributes and formulates action plans to abate pollution with an ultimate objective of bringing down the CEPI score. The draft action plans were presented before the Steering Committee of Central Pollution Control Board (CPCB) and also uploaded on the web site of SPCB, Orissa ([www.ospcboard.org](http://www.ospcboard.org)) for stakeholder's opinion. The final report is prepared after incorporating the views of all concerned and revised committee of CPCB. While going to the press certain omissions and commissions were observed, which were corrected and also incorporated in this printed version.

This report is being published for the sensitising all the stakeholders who can use it for implementing, monitoring and regulating the action plans. Hope, this meets the expectation of all concerned. I thankfully acknowledge the efforts of Shri Nihar Ranjan Sahoo, SEE, Shri Simanchal Dash, EE and Ms. Subhadarsini Das, AEE for preparation of this action plan.

**BHUBANESWAR**  
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## CONTENTS

Chapter	Titles	Page No
<b>1.0</b>	<b>Introduction and objectives of study .....</b>	01
	1.0 Introduction and objectives of study .....	
	1.1 Area details and location.....	02
	1.2 Demarcation of geographical boundaries and impact zone with Management area	04
	1.3 CEPI Score (Air, Water, Land and total) .....	08
	1.4 Population details of the area .....	08
	1.5 Flora and fauna of the area.....	10
	1.6 Industry classification and distribution.....	10
	1.7 Grossly polluting industries (GPIs) .....	13
	1.8 Environmental Issues in the cluster .....	13
	1.9 The salient features – Ib Valley- Jharsuguda CPIC	15
<b>2.0</b>	<b>Water Environment .....</b>	16
	2.1 Present status .....	16
	2.2 Sources of water pollution .....	18
	2.3 Action plan for control of water pollution.....	21
	2.4 Existing infrastructure facilities.....	23
	2.5 Technological Intervention.....	23
	2.6 Installation of Common Effluent Treatment Plants (CETPs)	23
	2.7 Government budgetary support requirement.....	24
	2.8 Data linkages to SPCB/ CPCB (of monitoring devices).....	24
<b>3.0</b>	<b>Air Environment .....</b>	25
	3.1 Present status of Air Environment .....	25
	3.2 Sources of air pollution .....	26
	3.3 Impact of activities of nearby area on the CPIC area.....	27
	3.4 Quantification of the air pollution load and relative contribution by different sources.....	27
	3.5 Action Plan for compliance and control of air pollution .....	29
<b>4.0</b>	<b>Land Environment (Soil and Ground Water) .....</b>	34
	4.0 Land Environment.....	34
	4.1 Soil Contamination .....	34

4.2	Action plan for abatement, treatment and restoration of soil quality.....	34
4.3	Ground Water Contamination .....	36
4.4	Solid waste Generation and Management.....	36
<b>5.0</b>	<b>Summary.....</b>	<b>40</b>
5.1	Summary of proposed action points (Action Plan for abatement of pollution)	40
<b>6.0</b>	<b>Calculation of CEPI</b>	<b>44</b>
6.1	Air Environment	44
6.2	Water Environment	47
6.3	Soil / Ground Water Environment	49
6.4	Conclusion	52
i	Compliance Status to the comments received from CPCB on action plan for Ib Valley – Jharsuguda area	
ii	Summary of Action Plan, Industries to whom it is applicable, target date short term and long term goals, the current status with implementation schedule	Annexure - I
iii	List of Orange and Green Category of Industries in Ib Valley – Jharsuguda area	Annexure - II

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## List of Abbreviations ( Ib valley)

01. AAQ	– Ambient Air Quality
02. BDL	- Below Detectable Limit
03. BF	– Bag Filter
04. BOD	– Biochemical Oxygen Demand
05. CBM	– Coal Bed Methane
06. CEPI	- Comprehensive Environmental Pollution Index
07. CETP	– Common Effluent Treatment Plant
08. CPCB	– Central Pollution Control Board
09. CPP	– Captive Power Plant
10. CPIC	– Critically Polluted Industrial Cluster
11. CTL	– Coal to Liquid
12. DG	- Diesel Generator
13. DO	- Dissolved Oxygen
14. DRI	– Direct Reduced Iron
15. EMP	– Environmental Management Plan
16. ESP	– Electrostatic Precipitator
17. GPIs	- Grossly Polluting Industries
18. GOI	- Govt. of India
19. HCSD	– High Concentration Slurry Disposal
20. IDCO	- Industrial Infrastructure Development Corporation of Orissa
21. INDAL	- Indian Alluminium Company Limited
22. IPP	- Integrated Power Plant
23. KL	– Kilo Liter
24. KLD	– Kilo Liter per Day
25. LTPA	- Lakh Ton per Annum
26. MLD	– Million Liter per Day
27. MPN	- Most Probable Number
28. MSW	- Municipality Solid waste
29. MTPA	– Million Ton per Annum
30. MW	– Mega Watt
31. NAAQM	- National Ambient Air Quality Monitoring
32. NAAQS	- National Ambient Air Quality Standard
33. NO <sub>x</sub>	- Oxides of Nitrogen
34. NRCD	– National River Conserver Directorate
35. OCP	- Open Cast Project
36. PDHS	- Pneumatic Dust Handling System
37. PM	– Particulate Matter
38. PPP	- Public Private partnership
39. REMP	– Regional Environmental Management Plan
40. RSPM	– Respirable Suspended Particulate Matter
41. SMS	– Steel Melting Shop
42. SO <sub>2</sub>	- Sulpher Dioxide

43. SPCB	– State Pollution Control Board
44. SPM	– Suspended Particulate Matter
45. TC	- Total Colliform
46. TOC	- Total Organic Carbon
47. TPP	– Thermal Power Plant
48. TPA	– Ton per Annum
49. TRL	- Tata Refractory Limited
50. TOR	– Term of Reference
51. TSDF	– Treatment Storage Disposal Facility
52. VAL	- Vedanta Aluminium Limited



**1.0 Introduction and objectives of the study**

Environmental pollution in industrial clusters has been a national issue particularly in a period which is witnessing a rapid industrial growth. The environmental problem in a cluster is a complex multi-dimensional problem which is often difficult to measure and manage. In order to address such complex problem, Central Pollution Control Board (CPCB) developed a Comprehensive Environmental Pollution Index (CEPI). This is a rational number to characterize the environmental quality of an industrial cluster following an algorithm of source-receptor-pathway framework. Increasing value of CEPI indicates adverse impact on environment. The objective is to identify the planning needs for abatement strategies for polluted clusters and eventually bringing down the level of impact to an acceptable level. Industrial clusters having aggregated CEPI score of 70 and above is considered as critically polluted cluster. In Orissa there are three industrial clusters; Angul-Talcher, Ib-valley and Jharsuguda are identified with CEPI score of more than 70, thus considered as critically polluted area. ***However, Ib-valley and Jharsuguda industrial area are adjacent and have overlapping geographical area, thus for clarity and comprehensiveness these two areas are considered to be one.*** The model action plan for abatement of pollution in the critically polluted clusters were prepared on the basis of previous studies conducted by the State Pollution Control Board (SPCB) and data collected during various periodical monitoring program.

Central Pollution Control Board (CPCB) has calculated the **CEPI score of Ib valley area is 74.0 and that of Jharsuguda is 73.34, which is beyond 70** and suggested a Terms of Reference (TOR) to formulate an action plan for prevention, control, and remediation of various environmental components of the area. The present report is outcome of the recommendation of Steering Committee of CPCB. The objective of this model action plan is:

1. Collect background details of the area with present industrial status and determine the boundary limits of the industrial cluster
2. Determine the status of present water and air environment and critical environmental pollution issues within the cluster and draw up model action plan for abatement of pollution with infrastructural renewal, managerial and financial aspects and self monitoring system within the industrial cluster
3. Determine the status of present land and ground water environment and critical environmental land and ground water pollution issues within the cluster and draw up model action plan for abatement of land and ground water pollution within the industrial cluster
4. Determine the status of present generation of industrial and municipal solid waste and hazardous waste. For proper management draw up a model action plan for management of solid waste within the industrial cluster
5. Determine the Public Private Partnership (PPP) model for both the options of technological intervention and infrastructural renewal for effective implementation of model action plan.
6. Draw up any other specific scheme or plan for abatement of environmental pollution in the cluster
7. Incorporate the views of various stakeholders for refinement of the action plan and effective implementation.

### **1.1 Area details and location**

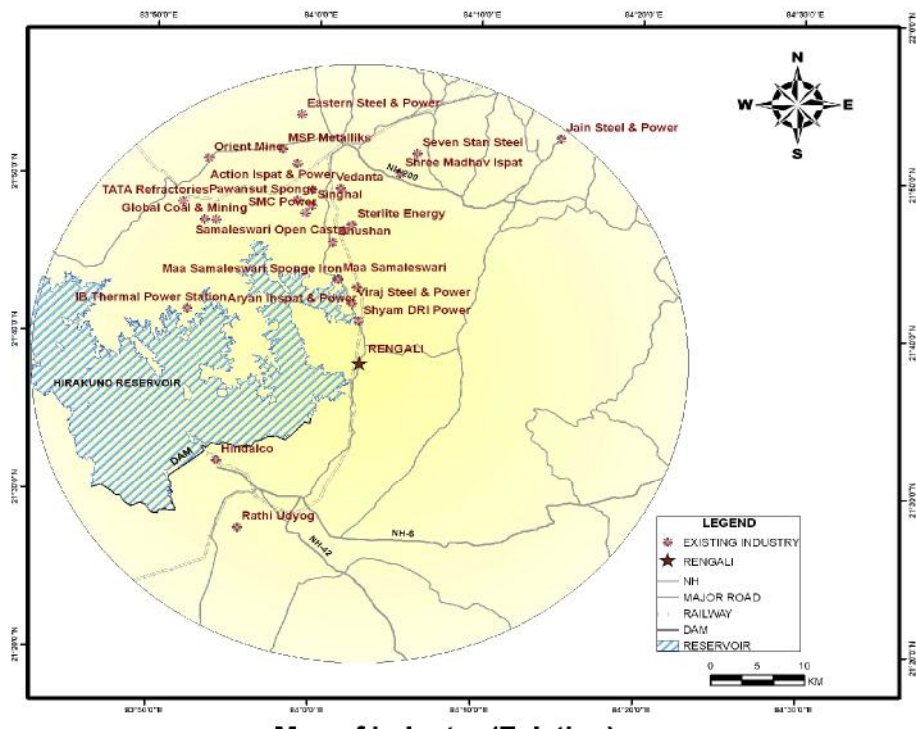
The area was earlier characterized by mining and trading activities but a number of sponge iron plants, thermal power plants, aluminium smelters as well as iron and steel plants have come up in the region in the past few years. Huge deposits of coal in proximity to Hirakud & one of the largest water reservoirs have made Ib valley-Jharsuguda area as one of the most attractive and globally most competitive destination for mineral based industries. The region makes an ideal site for production of iron & steel, thermal power and aluminum. Small scale industries like rice mills, brick kilns and stone crushers are also operating in clusters in this region.

Hirakud reservoir is the lifeline of the entire industrialization process in the region. Runoff contamination is the major problem in the region. The runoff in

this region is likely to be contaminated with fluoride and cyanide since Aluminium smelters are in operation in this region. Besides this, run-off from various stock piles like coal, iron ore and char also has potential for water pollution.

At present the solid waste generation is mostly from power plants, steel plants and aluminium smelter. Conversion of natural land into dump sites would enhance soil erosion and the rate of siltation of the reservoir.

Sensing that Ib valley-Jharsuguda area as an emerging industrial hub, SPCB has initiated study to prepare a Regional Environmental Management Plan (REMP) through National Environmental Engineering Institute (NEERI), Nagpur. Inputs of the REMP study, SPCB's own monitoring and survey reports were taken into consideration for demarcation of boundary of Critically Polluted Industrial Cluster (CPIC) evaluating the environmental quality, pollution load and drawing up the action plan. The Sambalpur-Jharsuguda Region centering Rengali (84° 3' 0" E – 21° 37' 48" N) with location of industries are shown in **Figure. 1.1**.



Source- Regional Assimilative Capacity Based Planning for Sambalpur- Jharsuguda Region, NEERI, Nagpur

**Figure-1.1 Location of Ib valley-Jharsuguda industrial area**

## 1.2 Demarcation of geographical boundaries and impact zone with Management area

The boundary limit of the critically polluted industrial cluster was determined on the basis of locating the industries on a map. For this purpose survey of India topo sheets were collated and the Ib valley-Jharsuguda area was digitized. The report of CPCB for critically polluted cluster identifies Ib valley and Jharsuguda as two separate clusters. However, in reality these two areas are adjacent or even having over lapping areas. While the coal mines cover the valley area, industries are mostly in and around Jharsuguda. There is a strong symbiosis between the industries and mines in the Ib valley and Jharsuguda area. On this ground it is thought appropriate that these two areas be combined and action plan be prepared for the combined area. For this purpose the cluster is termed as “Ib valley-Jharsuguda” area. The positions of existing polluting industries were marked on the collated topo sheet. The industries and mines that have an impact on CEPI scores was considered for this purpose.

The demarcation of boundary for implementation of action plan for critically polluted cluster for Ib Valley - Jharsuguda area with the other management area was prepared on the following basis.

1. All the major polluting industries are included in the cluster. The industries and mines that have a bearing on CEPI score have a fall out area and the fall out area of different polluting industries and mines over lap one another to produce critically polluted cluster of area.
2. The cluster faces common environmental problems.
3. MoEF notification on Critically polluted area The respective industries and mines are located on the collated map of relevant topo sheets to demarcate the tentative critically polluted area and **Environment Management Area** for implementation of action plan in a time bound manner. This Environment Management Area is a larger area and beyond the Critically Polluted Industrial Cluster Area.

The boundary, was drawn by including all the major polluting industries and mines which are under operation and closely located. While determining the boundary care was taken to include areas having common environmental problems as per the public opinion expressed in the local news papers and also expressed during various public hearings that took place in the past for different projects in the area. The boundary of CPIC area was drawn on collated topo sheet and is shown in red line in **Figure- 1.2**.

The CPIC is a trapezium shaped is bounded by Hirakud Reservoir in the South. The coordinates of the area are:

**A-  $21^{\circ} 54' 25''$  N -  $83^{\circ} 50' 02''$  E**

**B-  $21^{\circ} 55' 08''$  N -  $84^{\circ} 02' 36''$ E**

**C-  $20^{\circ} 39' 07''$  N -  $84^{\circ} 02' 07''$  E**

**D-  $21^{\circ} 39' 48''$  N -  $83^{\circ} 50' 19''$  E**

**The area of the cluster is approximately 580 sqkm.**

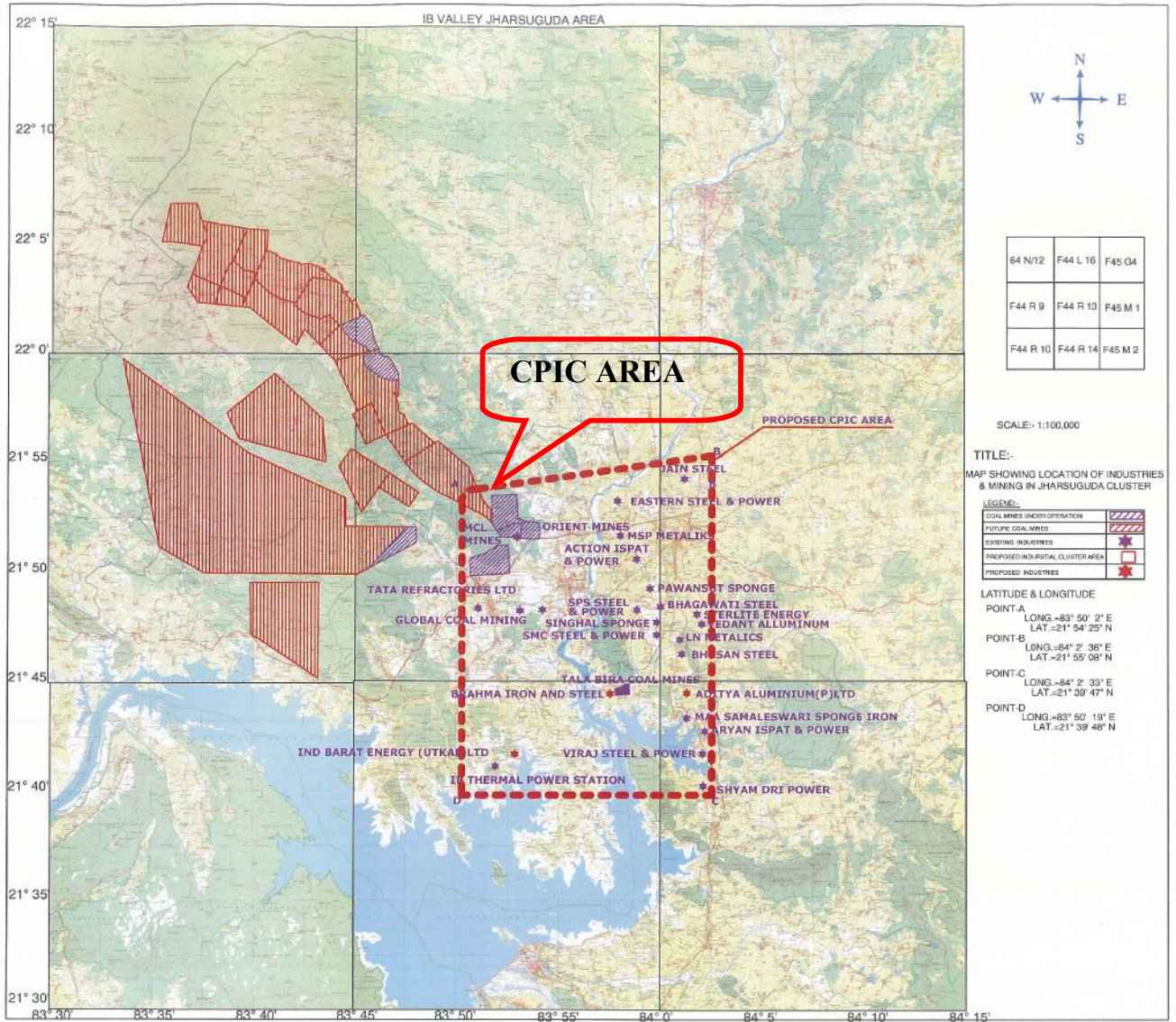
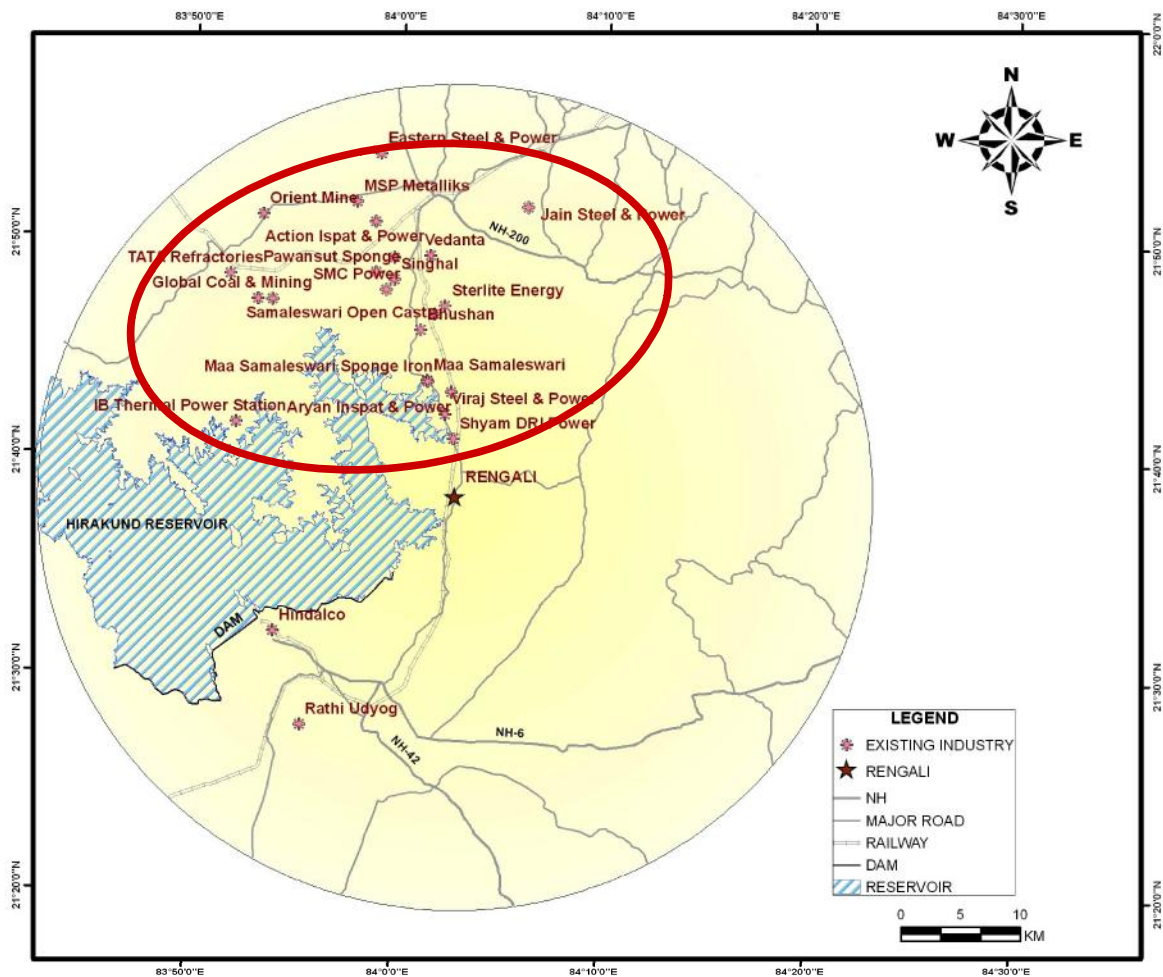


Figure-1.2- Geographical boundary of CPIC for implementation of action plan

### 1.2.1 Environmental Management Area (EMA)

The environmental management area is an area beyond the CPIC, which is expected to carry the impact of CPIC. For Ib Valley- Jharsuguda area this area has been demarcated as “An area bounded by a circle with a radius of 35 km having Rengali village (84° 3’ 0” E – 21° 37’ 48” N) as the center”. The demarcated critically polluted industrial cluster with the environmental management area is shown in **Figure-1.3**. The EMA area is 3850 Sq Km which includes CPIC area and Hirakud Reservoir.



**Figure-1.3 CPIC with Environmental Management area**

### 1.3 CEPI Score (Air, Water, Land and total)

The CEPI as calculated by Central Pollution Control Board with summary of sub indices is presented in **Table-1.1**.

**Table-1.1 The abstract of CEPI score for Ib Valley area**

	Air				Surface Water				Land/Ground water			
	A	B	C	D	A	B	C	D	A	B	C	D
Actual Value of EPI	25	6	30	15	10	9	22.5	15	15	9	20	15
Maximum Value of EPI	30	20	30	20	30	20	30	20	30	20	30	20
Total EPI	61				56.5				59			
<b>CEPI</b>	<b>74.0</b>											

### 1.4 Population details

The total population of the cluster (CPIC) would be approximately 3.0 lacs. However actual population can be determined after the villages which are within the cluster are identified. The demographic profile of entire Sambalpur-Jharsuguda District covered under Environmental management area is given along with the village map of the Environmental Management area at **Figure 1.4**.

#### ***The salient details of Sambalpur District***

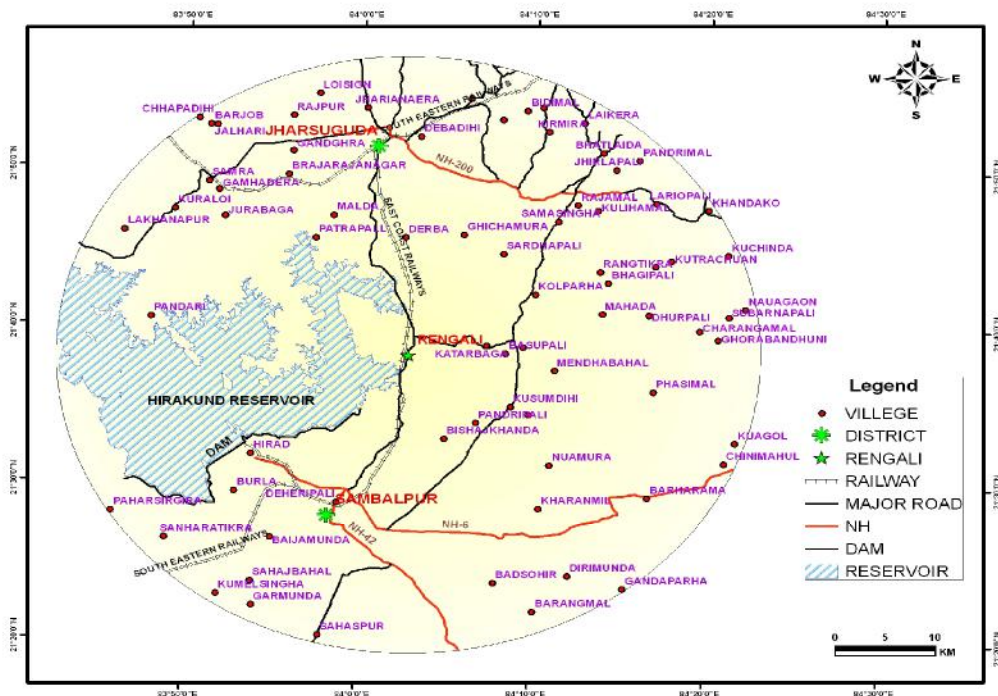
- ◆ Total population of the district as per 2001 census record is 935613 out of which 475122 are male and 460491 are female.
- ◆ Sambalpur is the 9<sup>th</sup> district in terms of size & 20<sup>th</sup> in terms of population in the state of Orissa.
- ◆ 1238 villages are inhabited and 84 villages are uninhabited villages and 5 statutory towns in Sambalpur district.
- ◆ Total number of inhabited households in the district is 202247.
- ◆ District exist in 6657 sq. km. with 141 persons per square kilometer which is 22<sup>nd</sup> densely populated district in the state.
- ◆ Sex ratio (number of female per 1000 male) in the district is 969.
- ◆ 17.04% covered by the scheduled caste population.



- ◆ Literacy rate of the population in the district is about 67.25% which is higher than the state which is 63.08%
- ◆ Total main worker population is about 30.16%, 14.87% come under marginal worker category and 54.97% belong to non worker category

**The salient details Jharsuguda District**

- ◆ Total population of the district as per 2001 census record is 509716 which rank 27th in the state
- ◆ Total 348 villages 1238 and 3 statutory towns in the district
- ◆ Total number of inhabited households in the district is 106839
- ◆ District exist in 2081 sq. km. with 245 persons per square kilometer which is 10th densely populated district in the state
- ◆ Sex ratio (number of female per 1000 male) in the district is 969
- ◆ 17.07% covered by the scheduled caste population
- ◆ Literacy rate of the population in the district is about 70.65% which is higher than the state which is 63.08%
- ◆ Total main worker population is about 26.12%, 11.07% come under marginal worker category and 62.80% belong to non worker category



**Figure- 1.4. Village map of Env Management area**

## 1.5 Flora and fauna of the area

The flora of the area includes natural vegetation and plantation by social forestry department and industries. The study area comprised of Jharsuguda and Sambalpur forest division. The forest community is dominated by *Shorea robusta*, *Woodfordia fruticosa*, *Anogeissus latifolia*, *Madhuca latifolia*, *Lagerstroemia flosreginae*, *Terminalia belerica*, *Terminalia tomentosa*, *Adina cordifolia* & *Holarrhena antidysenterica* etc. *Shorea robusta* (Sal) is the most dominant tree of the forest community including Sal dense and reserve forests.

The roadside along NH-42 and other roads in the study area are planted with trees in single to double rows. The common trees are *Acacia auriculiformis*, *Azadirachta indica*, *Peltophorum*, *Syzigium sp.*, *Mangifera indica*, *Bombax ceiba*, *Delonix regia*, *Cassia siamea*, etc.

For other industrial premises and residential areas, the common plants are *Cassia siamea*, *Leucaena leucocephala*, *Dalbergia sisso*, *Saraca indica*, *Delonix regia*, *Azadirachta indica*, *Acacia auriculiformis*, *Mangifera indica*, *Prunus amygdolus*, *Callistemon lanceolatus*, etc

## 1.6 Industry classification and distribution

There are about 50 major industries already existing in the region. The total industrial belt in the area has been divided into four sectors namely Aluminium smelters, Thermal power plants, Iron & Steel industries including sponge iron plants and coal mines. The industries in the region mainly comprise of 17 Category of highly polluting industries i.e Red(A) category, 54 category of other red industries including coal mines, other orange and green industries. The list of 23 RED (A) categories of industries i.e 17 Category of highly polluting industries operating within the cluster is presented in **Table 1.2** and 26 Red category of industries with Mines is as per **Table-1.3**

**Table-1.2. List of 17 Category of highly polluting industries i.e. Red (A) industries in CPIC.**

SL No	Name of the industry	Product	Capacity
1	Vedant Aluminium Ltd., Jharsuguda	Aluminium	2.5 LTPA
2	Vedanta Aluminium Ltd. (CPP), Jharsuguda	Thermal Power	5 x135 MW
3	Sterlite Energy Ltd. Bhurkhamunda, Jharsuguda	Thermal Power	1 x 600 MW
4	Bhusan Steel Ltd., CPP Telkoi, Rengali	Thermal Power	230 MW

SL No	Name of the industry	Product	Capacity
5	Shyam DRI Power Pvt Ltd, Pandloi, Sambalpur	Thermal Power	30 MW
6.	Ib Thermal Power Station, Banaharpalli, Jharsuguda	Thermal Power	2x 210 MW
7	Bhusan Power & Steel Ltd, Telkoi, Rengali, Sambalpur	Sponge Iron & Integrated Steel	2.2 MTPA
8	Shyam DRI Power Ltd., Pandaloi, Sambalpur	Sponge Iron & Integrated Steel	2x 350TPD, 2 LTPA steel billet, 0.3 MTPA Coal washery, 10 MW-AFBC, 15MW- WHRB
9	SMC Power Generation (P) Ltd, Hirma, Jharsuguda	Sponge Iron & Integrated Steel	2 x300 TPD, 8 MW WHRB, 17 MW AFBC 1.2 LTPA Coal Washery , 1 LTPA Re-rolled Products
10	SPS Sponge Iron Ltd, Badmal, Jharsuguda	Sponge Iron & Integrated Steel	6 x100 TPD 2.8 LTPA Blast furnace 2x16 MVA Ferro Alloys 1.0 LTPA Rolling Mill
11	MSP Metaliks Ltd, Markuta, Jharsuguda	Sponge Iron & Integrated Steel	4 x100 TPD, 48,000 TPA MS Billet. 1,88,000 TPA Pig Iron
12	Jain Steel & Power Ltd, Jharsuguda	Sponge Iron & Integrated Steel	1 x350 TPD, DRI
13	Aryan Ispat & Power Ltd, Bamaloi, Rengali, Sambalpur	Sponge Iron	2x 100 TPD + 1x300 TPD
14	Viraj Steel & Energy Gurupali, Rengali, Sambalpur	Sponge Iron	2x350 TPD
15	Action Ispat & Power (P) Ltd, Jharsuguda	Sponge Iron	2x350 TPD, 8 MW WHRB, 20 MW AFBC
16	Bhagawati Steels (P)Ltd, Badmal, Jharsuguda	Sponge Iron	1x 50 TPD
17	Eastern Steel & Power Ltd., Jharsuguda	Sponge Iron	1x 350 TPD, 8 MW WHRB, 4 MW AFBC 150 TPH Coal Washery 1 LTPA Re-rolled Products
18	Maa Samaleswari Industries (P) Ltd, Lapanga, Sambalpur	Sponge Iron	2x 100 TPD
19	L.N. Metaliks Ltd, Sripura, Sambalpur	Sponge Iron	2 x100 TPD
20	Pawansut Sponge (P) Ltd, Badmal, Jharsuguda	Sponge Iron	2 x100 TPD
21	Singhal Enterprises (P) Ltd, Hirma, Jharsuguda	Sponge Iron	2x 100 TPD
22	Jai Hanuman Udyog Ltd. Jharsuguda	Sponge Iron	2 x100 TPD
23	Ultra Tech Cement Limited, Arda, Jharsuguda	Cement	2000 TPD

**Table-1.3 List of RED (B) categories of industries and mines operating within the cluster**

SI No	Name of the industry/mine	Product	Capacity
1	Belpahar OCP (MCL)	Coal	4.5 MTPA
2	Himgir Rampur (MCL)	Coal	0.144 MTPA
3	Hirakhand Bundia (MCL)	Coal	0.18 MTPA
4	Lajkura OCP (MCL)	Coal	1 MTPA
5	Lakhanpur OCP (MCL)	Coal	10 MTPA
6	Lilari OCP (MCL)	Coal	0.6 MTPA
7	Orient Colliery I & II	Coal	0.3 MTPA
8	Orient Colliery III	Coal	0.39 MTPA
9	Orient Colliery IV	Coal	0.096 MTPA
10	Samaleswari OCP (MCL)	Coal	5 MTPA
11	Talabira OCP , INDAL	Coal	1.5 MTPA
12	Bhatia International, Chualiberna	Beneficiated Coal	2 MTPA
13	Earth Minerals Company Ltd, Belpahar, Jharsuguda.	Beneficiated Coal	4 MTPA
14	Global Coal and Mining Pvt. Limited, Jharsuguda	Beneficiated Coal	3.5 MTPA
15	J.J.Refractories H.Katapali, Jharsuguda	Refractory Brick BP Sets	17,000 TPA
16	Shah Refractories Pvt. Limited, Brundamal Jharsuguda	Refractory Brick	13,840 TPA
17	Sri Mineral & Metals, At-Karlakhaman., Belpahar, Dist-Jharsuguda	Refractory Brick and Other Items	36,000 TPA
18	Tata Refractories Limited, Belpahar, Jharsuguda	Silica Bricks, Basic Bricks, High Alumina Bricks, Dolomite Bricks and other refractory items	1.5 Lakh TPA
19	Durga Agro Industries, Jharsuguda	Parboiled Rice	544 TPM
20	Pawansut Rice Mill, H. Katapali Jharsuguda	Parboiled Rice	544 TPM
21	Sri Sarada Rice Mill At-Pandripathar, PO- Badmul, Dist-Jharsuguda	Parboiled Rice	544 TPM
22	Anjan Kumari rice and flour and Oil Mill, Jharsuguda	Parboiled Rice	544 TPM
23	Jai Ambe Rice Industry, Sarbahal Jharsuguda	Parboiled Rice	544 TPM
24	Maa Kali Rice Mill, Sarasmal Jharsuguda	Parboiled Rice	544 TPM
25	Shree Bajrang Rice Mill, Pandripathar, Jharsuguda	Parboiled Rice	544 TPM
26	Sri Laxmi Rice and Chuda Mill, Jharsuguda.	Parboiled Rice	544 TPM

Thus to conclude about the industrial activity in the CPIC area there are about 23 industries of 17 category type already existing in the region and proposals are already approved for further 22 more Industries. The total industrial belt in the area has been divided into four sectors namely Aluminum smelters, Thermal power plants, steel industries including sponge iron and coal mines. Current abstract of Sector-wise scenario of the industries are presented in **Table-1.4.**

**Table-1.4: Number and capacities of industries in Ib Valley-Jharsuguda area**

Sl. No	Industrial sector	Numbers	Capacity
1.	Coal mines	11	23.71 MTPA
2.	Thermal power plants	5	1955 MW
3.	Iron and Steel including sponge iron plants	16	4 MTPA
4.	Aluminum smelter	1	0.25 MTPA
5.	Cement	1	2000 TPD
6.	Coal Washeries	3	9.0 MTPA
7.	Other Red - B industry including stone crusher and iron ore crushers	30	--
8.	Orange and green industries	46	--
	Total	113	--

### 1.7 Grossly polluting industries (GPIs)

The industry is classified as Grossly Polluting Industry when the BOD load exceeds 100 Kg/day or it contains hazardous substances in the effluent. Three major GPIs are operating in the CPIC are Captive power plant of Vedanta, IPP of Sterlite Energy Ltd at Bhurkhamunda and Aluminum smelter of Vedanta at Badamal,.










### 1.8 Environmental Issues in the cluster

Nature and magnitude of environmental issues relevant to an area forms the basis on which action plans are drawn. To identify the critical environmental issues in this area, all major local news papers and proceedings of public

hearing conducted during last two years were scanned and the environmental issues raised are aggregated and summarized as in the following section. The identified issues were then corroborated with the various monitoring studies conducted by SPCB, interim report on Regional Environmental Management Plan prepared by NEERI, Nagpur.

1. There has been a rapid growth of iron and steel industries around Jharsuguda. The problem of air pollution particularly black dust from the sponge iron plants is a major problem in this area.
2. An aluminum smelter plant is operating close to Bheden river which is discharging its waste water to Hirakud reservoir. Since the smelter plant handles substantial quantity of fluoride bearing materials it may find its way to Bheden River and contaminate the water.
3. During monsoon the run-off from various stock piles like coal, minerals, solid waste etc flows down the area and gets discharged to river Ib, Bheden and Hirakud reservoir through its feeder streams.
4. The ambient temperature of this area rises close to 50°C and the general perception that the temperature of this area is going high on three accounts. First, the industrial process like thermal power generation, aluminium smelting and iron and steel making are all being high temperature operation releases a lot of heat to the environment. Secondly, after the coal mines are exposed, the black surface of coal mines cause increase in temperature. Thirdly, the exposed coal seam and stack yards catch fire during summer season due to self oxidation. Continuous burning of coal is also thought to be one of the causes of rising temperature in the vicinity.
5. The sewage from Jharsuguda and Brajarajnagar town is discharged to river Ib without any treatment causing contamination of river water.
6. Increasing amount of land is being converted to ash ponds and solid waste disposal facilities. This process converts agricultural land to unproductive barren land.
7. Groundwater level around the mining area is gradually depleting due to extraction of ground water by the mining activity. This causes acute shortage of water in the surrounding villages.

### 1.9 Salient features – Ib Valley- Jharsuguda CPIC

	<b>CPIC AREA:</b>	<b>580 km<sup>2</sup></b>
	<b>ENV. MANAGEMENT AREA:</b>	<b>3850 km<sup>2</sup></b>
	<b>POPULATION:</b>	<b>&gt; 300,000</b>
	<b>MAJOR RIVER:</b>	<b>Ib and Mahanadi</b>
	<b>MAJOR STREAMS:</b>	<b>Bheden, Lilari, Kharkhari</b>
	<b>MAJOR TOWN:</b>	<b>Jharsuguda, Brajarajnagar</b>
	<b>HIGHWAY:</b>	<b>NH-6, SH-10</b>
	<b>RED-A INDUSTRIES:</b>	<b>23</b>
	<b>RED-B INDUSTRIES:</b>	<b>44</b>

2.1 Present status

The Mahanadi River system with Hirakud reservoir is the major water body in the CPIC area. River Mahanadi with its tributary Ib is the major river flowing through Ib Valley and Jharsuguda area. River Mahanadi and its tributaries provide bulk of water supply and carry effluent load from this area. The river system drains into the Hirakud reservoir. The drainage map of the CPIC with Environment Management area is shown the **Figure 2.1**.

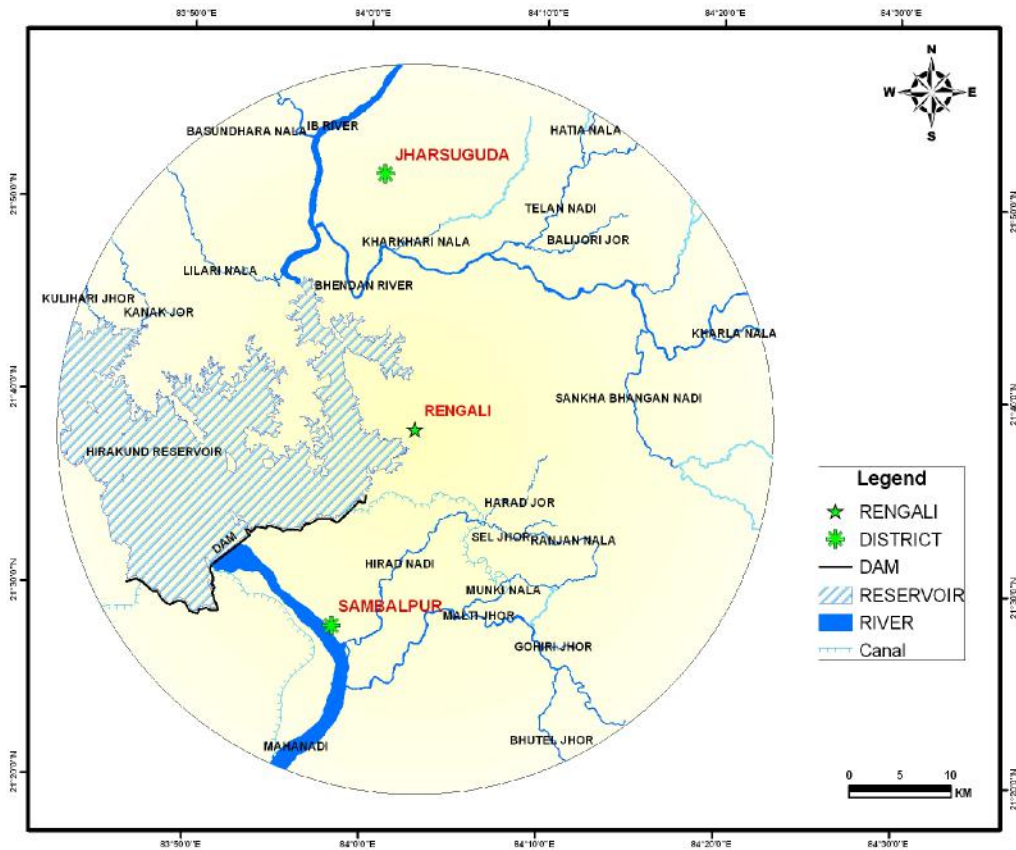


Figure 2.1. Drainage map of CPIC with Env Management area



## 2.1.1 Present levels of pollutants in water bodies

The water quality of river Mahanadi is being monitored periodically by the Board under National Water Monitoring Program at 32 locations of entire stretch. Out of 32 locations, 5 locations come under Ib Valley –Jharsuguda (CPIC) area. The water quality data of river Mahanadi and its river system for CPIC area is summarized at **Table-2.1**

**Table-2.1 Water monitoring data of four Criteria Parameters for Mahanadi Basin**

Sl. No	Location	No. of Obs.	Annual average (2009) value (Range of values) Parameters				Frequency of violation (Percent of violation) from designated criteria value		Designated Class	Existing Class
			pH	DO (mg/l)	BOD (mg/l)	TC (MPN/100 ml)	BOD (mg/l)	TC (mg/l)		
<b>Ib river</b>										
1.	Sundargarh	12	7.7 (6.8-8.2)	8.3 (7.3-9.2)	0.95 (0.3-1.4)	1542 (1100-2100)	0	0	C	C
2.	Jharsuguda	12	7.6 (6.7-8.2)	7.9 (6.2-9.0)	1.0 (0.4-1.6)	2533 (2100-3500)	0	0	C	C
3.	Brajarajnaragar U/s	12	7.7 (7.0-8.3)	7.7 (6.5-9.3)	1.0 (0.4-2.2)	1495 (940-2100)	0	0	C	C
4.	Brajarajnaragar D/s	12	7.9 (7.1-8.4)	7.6 (6.0-9.0)	1.4 (0.6-2.4)	1817 (1400-2400)	0	0	C	C
<b>Bheden river</b>										
5.	Jharsuguda	12	7.8 (6.9-8.4)	7.8 (6.9-9.2)	0.9 (0.4-2.2)	373 (130-1500)	0	0	C	C
6.	Hirakud reservoir	4	7.4 (7.1-7.9)	8.3 (6.3-10.3)	0.9 (0.6-1.4)	2925 (2200-4300)	0	0	C	C
<b>Class 'C' water quality Criteria (IS-2296-1982)</b>			<b>6.5-8.5</b>	<b>4 and above</b>	<b>3 or less</b>	<b>5000 or less</b>			<b>Drinking water source with conventional treatment followed by disinfection</b>	

The State Pollution Control Board, Orissa monitors discharges of the concerned industries and mines and also monitors environmental parameters of the area. The Board takes peoples feedbacks during public hearings. The critical parameters were chosen by linking the environmental issues and

relevance of the parameter. The water quality data of those critical parameters are presented in **Table 2.2**.

**Table-2.2 : Critical Environmental parameter**

Water quality					
Parameter	Avg. Result	Standard	Total Sample	Nos of sample Exceeded	Percent exceedance (%)
Fluoride	0.094	1.5	15	00	0
Hg	0.0009	0.001	15	00	0
Cd	0.009	0.005	15	12	80
BOD	2.72	8.00	15	00	0

For water quality parameters the results were compared with the water quality parameters as per CPCB, 2002, "Water quality criteria and goals" Monitoring of Indian national aquatic Resources series: MINARS/17/2001-2002. The data for surface water quality and ground water quality were taken for the critical season. For surface water during summer season was considered as critical and for ground water quality post monsoon was considered as critical.

## 2.2 Sources of Water Pollution

The sources of water pollution are basically from industrial, domestic, agricultural run off and others. Estimated quantities of effluent generated by major industries are summarized below.

### 2.2.1 Industrial sources

The list of industries with discharge potential and steps taken for recycle, reuse and treatment is presented in the following **Table.2.3**.

**Table2.3- Effluent generation in major industries**

SL No	Name of the industry	Product	Capacity	Quantity of Effluent discharged to river
1	Vedant Aluminium Ltd., Jharsuguda	Alluminium	2.5 LTPA	5040 KLD Effluent, Not completely recycled, Discharged to Kharkhari Nallah and Bheden River
2	Vedanta Aluminium Ltd (CPP), Jharsuguda	Thermal power	675 MW	Discharged outside after treatment
3	Sterlite Energy Ltd. Bhurkhamunda, Jharsuguda	Thermal power	1x 600 MW	To be commissioned

SL No	Name of the industry	Product	Capacity	Quantity of Effluent discharged to river
4	Bhusan Steel Ltd., (CPP)Telkoi, Rengali, Sambalpur	Thermal power	230 MW	Run off water discharged to Bheden River
5	Ib Thermal Power Station, Banharpalli, Jharsuguda	Thermal Power	2x 210 MW	Zero discharge
6	Shyam DRI Power Pvt Ltd, Pandloi,Sambalpur	Thermal power	30 MW	Zero discharge
7	Bhusan Power & Steel Ltd, Telkoli, Rengali, Sambalpur	Sponge iron & integrated steel	2.2 MTPA	Run off water discharged to Bheden River
8	Shyam DRI Power Ltd., Pandaloi, Sambalpur	Sponge Iron & Integrated Steel	2 x350 TPD, 2 LTPA steel billet, 0.3 MTPA Coal washery, 10 MW-AFBC, 15MW-WHRB	Zero discharge
9	SMC Power Generation (P) Ltd, Hirma, Jharsuguda	Sponge Iron & Integrated Steel	2 x300 TPD, 8 MW WHRB, 17 MW AFBC 1.2 LTPA Coal Washery , 1 LTPA Re-rolled Products	Zero discharge
10	SPS Sponge Iron Ltd, Badmal, Jharsuguda	Sponge Iron & Integrated Steel	6 x100 TPD 2.8 LTPA Blast furnace 2 x16 MVA Ferro Alloys , 1.0 LTPA Rolling Mill	Zero discharge
11	MSP Metaliks Ltd, Markuta, Jharsuguda	Sponge Iron & Integrated Steel	4 x100 TPD, 48,000 TPA MS Billet. 1,88,000 TPA Pig Iron	Zero discharge
12	Jain Steel & Power Ltd, Jharsuguda	Sponge Iron & Integrated Steel	1 x350 TPD, DRI	Zero discharge
13	Aryan Ispat & Power Ltd, Bamaloi, Rengali, Sambalpur	Sponge iron	2 x100 TPD + 1 x300 TPD	Zero discharge
14	Viraj Steel & Energy Gurupali, Rengali, Sambalpur	Sponge Iron	2x 350 TPD	Zero discharge
15	Action Ispat & Power (P) Ltd, Jharsuguda	Sponge Iron	2 x350 TPD, 8 MW WHRB,20 MW	Zero discharge

SL No	Name of the industry	Product	Capacity	Quantity of Effluent discharged to river
			AFBC	
16	Bhagawati Steels (P)Ltd, Badmal	Sponge Iron	1 x50 TPD	Zero discharge
17	Eastern Steel & Power Ltd., Lahandapud, Jharsuguda	Sponge Iron	1 x350 TPD, 8 MW WHRB, 4 MW AFBC 150 TPH Coal Washery 1 LTPA Re-rolled Products	Zero discharge
18	Maa Samaleswari Industries (P) Ltd, Lapanga, Sambalpur	Sponge Iron	2 x100 TPD	Zero discharge
19	L.N. Metaliks Ltd, Sripura, Sambalpur	Sponge Iron	2 x100 TPD	Zero discharge
20	Pawansut Sponge (P) Ltd, Badmal, Jharsuguda	Sponge Iron	2 x100 TPD	Zero discharge
21	Singhal Enterprises (P) Ltd, Hirma, Jharsuguda	Sponge Iron	2 x100 TPD	Zero discharge
22	Jai Hanuman Udyog Ltd. Jharsuguda	Sponge Iron	2 x100 TPD	Zero discharge
23	Ultra Tech Cement Limited, Arda, Jharsuguda	Cement	2000 TPD	Zero discharge

### 2.2.2 Domestic sources

The Jharsuguda town, Brajaraj Nagar town, Township of M/S Bhusan Steel Ltd, and M/s Vedanta Aluminium Ltd. Townships of M/S Mahanadi Coal Fields Ltd. are the major sources of domestic effluent to the surrounding water bodies of River Mahanadi and its tributaries. MCL has installed one 0.5 MLD STP for its residential colony of Samaleswari OCP and and 1.7 MLD STP for residential colony of Belpahar OCP and Lakhanpur OCP. Vedanta Aluminium Limited (VAL) has installed 20 cum per hour industrial STP for smelter and installation of another STP of capacity 20 cum per hour is under progress. Vedanta Alumina Limited (VAL) has installed 10 cum per hour industrial STP for Captive Power Plant. Sterlite Energy Limited has installed 2 x10 cum per hour industrial STP for Captive Power Plant. VAL has installed 900 KLD STP for its residential colony and another 900 KLD STP is under expansion. OPGC has installed 1 MLD STP for its residential colony. Bhusan Limited has

installed 300 KLD STP for its residential colony and installation of 600 KLD STP is under progress. Municipalities are yet to install Sewage Treatment Plants. The quantity of effluent generated by townships with disposal status is tabulated in Table 2.4.

**Table2.4- Quantity of effluent generated by Townships with disposal status**

SI No	Township	Effluent Quantity in Million Liters per day (MLD)	Receiving water body
1.	JharsugudaTown	10 MLD (Estimated)	Local nallah
2	Brajaraj Nagar Township	8 MLD (Estimated)	Ib river
3.	MCL Townships	9.0 MLD	Ib, Lilari nallah

### 2.3 Action Plan for compliance and control of water pollution

Based on the background information, monitoring reports, interim report prepared by NEERI, Nagpur for REMP of this area and factoring into the public concerns on local environmental issues voiced through the local news papers and through the public hearings conducted by SPCB for the proposed projects in this area, an action plan for Ib valley-Jharsuguda area is prepared. In this action plan, sector specific abatement strategies were drawn up. Improvement in environmental management practice, technological up-gradation in process, pollution control, development of adequate infrastructure remained the thematic area. Sector-wise action plan is prepared after a few rounds of brain storming sessions between the officers, including the concerned Regional Officer of SPCB. The plan and possible target date to achieve it, is presented in the **Tables 2.5 to Table-2.9**.

**Table-2.5 Action Plan for control of water pollution in Thermal Power Plants**

SI. No.	Action plan	Target Date	Issues being addressed
1.	All lean slurry disposal system to be converted to (High Concentration Slurry Disposal) HCSD or mine void filling	31.03.2012	<ul style="list-style-type: none"> <li>• Water (Cd &amp; Hg)</li> <li>• Land requirement</li> </ul>
2.	All the thermal power plants shall adopt zero discharge	31.03.2012	Water scarcity

**Table-2.6 : Action Plan for control of water pollution in Coal Mines**

Sl. No.	Action plan	Target Date	Issues being addressed
1.	Creation of reservoir for storage of mine drainage water and runoff which can be used for industrial purpose	31.03.2013	Water conservation
2.	Making provision for supply of drinking water in the peripheral villages of coal mining area	31.12.2011	Water scarcity
3.	Back filling of the mine voids and restoration of the mined out area. An action plan to be prepared.	30.06.2011	Land degradation

**Table-2.7 : Action Plan for control of water pollution in Iron & Steel and Ferro Alloys sector**

Sl. No.	Action plan	Target Date	Issues being addressed
1.	All steel plants and sponge iron plants have to develop collection and treatment facility for mineral char and coal pile runoff during monsoon.	30.06.2011	Water pollution

**Table-2.8 : Action Plan for control of water pollution in Aluminium Plants**

Sl. No.	Action plan	Target Date	Issues being addressed
1.	Construction of secured landfill by Vedanta Aluminium Limited within its premises	31.03.2011	Fluoride in water and soil
2.	Conducting a comprehensive wastewater audit for the smelter plant including runoff management	31.03.2012	Fluoride in water and soil
3.	VAL is to install defluoridation plant to prevent fluoride contamination in Bheden River	31-03-2011	Fluoride in water

**Table-2.9 : Action Plan for control of water pollution through Common infrastructure and services**

Sl. No.	Action plan	Target Date	Issues being addressed
1.	Construction of a sewage	31.12.2012	Organic

Sl. No.	Action plan	Target Date	Issues being addressed
	treatment plant and drainage network for Brajaraj Nagar and Jharsuguda town		pollution of river
2.	Construction of water storage reservoirs to collect the mine water from the underground mines.	31.03.2015	Water conservation
3.	The establishment of on-line monitoring station for water quality monitoring of River Mahanadi and online data transmission facility with SPCB and CPCB. The parameters shall also include Fluoride, Cadmium and TOC.	31.03.2013	Real time Data transmission.
4.	Pb, Cr, Cd and Fluoride concentrations in Ground water is to be monitored.	31.03.2013	Data availability
5.	All the STPs will be provided with a stand-by DG sets to prevent discharge of sewage during power failure	31.03.2012	BOD and TC

#### 2.4 Existing infrastructure facilities

The industrial townships of M/s MCL has installed Sewage Treatment Plants. The installation of sewage treatment plant is required for Brajaraj Nagar and Jharsuguda towns.

#### 2.5 Technological Intervention

The following technological interventions are suggested.

1. Sewage treatment plant for Jharsuguda town with complete sewage network is required.
2. The sewage treatment schemes of MCL townships need to be improved.
3. The industries & mines in the area and other institutions of the area should be encouraged to adopt rain water harvesting practices.

Appropriate action points have been included in the action plan.

## **2.6. Installation of Common Effluent Treatment Plants (CETPs)**

CETP may not be feasible in this area. The major industries and mines operating in this area have their own Effluent treatment and sewage treatment plants; their up-gradation will improve the water quality. The STPs should have dedicated DG sets at all pumping locations to avoid overflow of untreated effluent during power failure.

## **2.7 Government budgetary support requirement**

The budgetary support of Union and State Government is necessary for improvement of road net work, and installation of sewage treatment plants for urban local bodies for the area.

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

The water quality monitoring station of Mahanadi Basin at all the locations of **Table 2.1** needs to have online data transmission facility. Besides this water quality of streams which carry the effluent needs to be identified at critical locations. The data transmission of online data needs to be integrated with offices of SPCB and CPCB. Action plan for on-line monitoring is included as an action point.



### 3.1 Present status of Air Environment

Ambient Air Quality Monitoring is carried out by State Pollution Control Board, Orissa through external agencies at three locations in Sambalpur – Jharsuguda-Ib Valley with respect to **Suspended Particulate Matter (SPM), Respirable Suspended Particulate Matter (RSPM), Sulphur Dioxide (SO<sub>2</sub>) & Oxides of Nitrogen (NO<sub>x</sub>)**.. However it is observed that there are no NAAQM stations within the demarcated CPIC area. The Board has carried out one study to monitor AAQ of the Jharsuguda-Ib Valley area through external agencies. The monitoring data for 2007 Month wise maximum, minimum and average values of the respective parameters are given in **Table.3.1.**

**Table 3.1- Status of Ambient Air Quality at Jharsuguda Area during 2007**

AAQ Locations	Category	No. of Obs. (24 hrs.)	Parameters (values expressed in microgram per cubic meter)				Frequency of violation of 24 hrs. average data from prescribed standard (% of violation)			
			SPM	RSPM	SO <sub>2</sub>	NO <sub>x</sub>	SPM	RSPM	SO <sub>2</sub>	NO <sub>x</sub>
			Annual Average (Range of 24 hourly average)							
<b>Jharsuguda</b>										
1. Badmal	R	65	220 (23-591)	83 (11-232)	BDL (BDL-8.6)	36.8 (10-80.8)	40 (61.5)	24 (36.9)	--	1 (1.5)
2. Jharsuguda Town Municipality Office	R	65	250 (32-525)	98 (11-238)	BDL (BDL-9.7)	36.8 (13-80.9)	39 (60)	26 (40)	--	1 (1.5)
3. Brajarajnagar	R	65	204 (41-366)	92 (21-194)	BDL (BDL-8.9)	34.8 (BDL-90.8)	27 (41.5)	28 (43)	--	1 (1.5)
<b>NAAQS (24 Hour Average)</b>	R		200	100	80	80				
	I		500	150	120	120				
<b>NAAQS (24 Hour Average)</b>	R		140	60	60	60				
	I		360	120	80	80				

**N.B.:** BDL - Below Detectable Limit

For SO<sub>2</sub> BDL is < 4 µg/m<sup>3</sup>

For NO<sub>x</sub> BDL is < 9 µg/m<sup>3</sup>

R – Residential, I = Industrial

NAAQS - National Ambient Air Quality Standard  
SPM - Suspended Particulate Matter

RSPM - Respirable Suspended Particulate Matter

SO<sub>2</sub> - Sulphur Dioxide, NO<sub>x</sub> – Oxides of Nitrogen

The critical parameters were chosen by linking the environmental issues and relevance of the parameter. The abstract of data collected from SPCB's own monitoring and data collected by NEERI, Nagpur during preparation of REMP for Jharsuguda area is summarized in **Table 3.2**

**Table-3.2: Critical Environmental parameter**

Air quality					
Parameter	Avg. Result ( $\mu\text{g}/\text{m}^3$ )	Standard ( $\mu\text{g}/\text{m}^3$ )	Total Sample	Nos of sample Exceeded	Percent exceedance (%)
RPM	60	100	118	06	5
SPM	154.77	200/500	119	11	9
SO <sub>2</sub>	10	80	119	00	0

### 3.1.1 Critical locations for air quality monitoring

With the nature of industrial activity, suspended particulate matter (SPM), Sulphur dioxide (SO<sub>2</sub>) and PM<sub>10</sub> are the three critical parameters in air quality management. Fluoride which is emitted from the smelting process is the most potent to cause extensive damage to agriculture and forest.

The critical locations of ambient air quality monitoring are

- i. MCL mining area
- ii. Brajaraj Nagar town
- iii. Jharsuguda town
- iv. Badamal industrial area
- v. Bhurkhamunda area

AAQ monitoring stations should be set up at these areas with online monitoring and data logging facility for monitoring and transmission of data.

### 3.2 Sources of air pollution

The sources of air pollution can be categorized into industrial, domestic and mines sources. The major industries contributing to air pollution are thermal power plants, Smelter and sponge iron plants. Apart from the above sources the fugitive emissions from the burning of wood and coal as domestic fuel, transportation of vehicles and emissions from the mines also contribute to air pollution.

### 3.3 Impact of activities of nearby area on the CPIC area

The major air pollution potential in the CPIC is Suspended Particulate Matter and PM<sub>10</sub>. Fluoride is also a major concern around Vedanta Aluminium Ltd. However activities outside the CPIC area are not significant to have impact on the CPIC area.

### 3.4 Quantification of the air pollution load and relative contribution by different sources

The air pollution load from the major air polluting industries are listed in **Table-3.3**.

**Table 3.3- The pollution load from the major industries**

SL No	Name of the industry	Product	Capacity	PM in Kg/day	SO <sub>2</sub> in Kg/Day
1	Vedant Aluminium Ltd., Jharsuguda	Alluminum	2.5 LTPA	3860	31320
2	Vedanta Aluminium Ltd. (CPP), Jharsuguda	Thermal Power	675 MW	130722	91800
3	Sterlite Energy Ltd. Bhurkhamunda, Jharsuguda	Thermal Power	1 x600 MW	To be commissioned	
4	Bhusan Steel Ltd., CPP Telkoi, Rengali	Thermal Power	230 MW	2515	43200
5.	Ib Thermal Power Station, Banaharpali, Jharsuguda	Thermal Power	2 x210 MW		
6	Shyam DRI Power Pvt Ltd, Pandloi, Sambalpur	Thermal Power	30 MW	117	1360
7	Bhusan Power & Steel Ltd, Telkoli, Rengali, Sambalpur	Sponge Iron & Integrated Steel	2.2 MTPA	882	25080
8	Shyam DRI Power Ltd., Pandaloi, Sambalpur	Sponge Iron & Integrated Steel	2 x350 TPD, 2 LTPA steel billet, 0.3 MTPA Coal washery, 10 MW-AFBC, 15MW-WHRB	253	10080
9	SMC Power Generation (P) Ltd, Hirma, Jharsuguda	Sponge Iron & Integrated Steel	2x 300 TPD, 8 MW WHRB, 17 MW AFBC 1.2 LTPA Coal Washery , 1 LTPA Re-rolled Products	116	4320
10	SPS Sponge Iron Ltd, Badmal,	Sponge Iron & Integrated	6 x100 TPD 2.8 LTPA Blast	320	8640

SL No	Name of the industry	Product	Capacity	PM in Kg/day	SO <sub>2</sub> in Kg/Day
	Jharsuguda	Steel	furnace 2 x16MVA Ferro Alloys , 1.0 LTPA Rolling Mill		
11	MSP Metaliks Ltd, Markuta, Jharsuguda	Sponge Iron & Integrated Steel	4 x100 TPD, 48,000 TPA MS Billet. 1,88,000 TPA Pig Iron		
12	Jain Steel & Power Ltd, Jharsuguda	Sponge Iron & Integrated Steel	1 x350 TPD DRI	132	5040
13	Aryan Ispat & Power Ltd, Bamaloi, Rengali, Sambalpur	Sponge Iron	2 x100 + 1 x300 TPD , DRI	350	4200
14	Viraj Steel & Energy Gurupali, Rengali, Sambalpur	Sponge Iron	2 x350 TPD	2668	10080
15	Action Ispat & Power (P) Ltd, Jharsuguda	Sponge Iron	2 x350 TPD, 8 MW WHRB,20 MW AFBC	429	12800
16	Bhagawati Steels (P)Ltd, Badmal, Jharsuguda	Sponge Iron	1 x50 TPD	15	72
17	Eastern Steel & Power Ltd., Jharsuguda	Sponge Iron	1 x350 TPD, 8 MW WHRB, 4 MW AFBC 150 TPH Coal Washery 1 LTPA Re-rolled Products	158	5584
18	Maa Samaleswari Industries (P) Ltd, Lapanga, Sambalpur	Sponge Iron	2 x100 TPD	350	4200
19	L.N. Metaliks Ltd, Sripura, Sambalpur	Sponge Iron	2 x100 TPD	80	2880
20	Pawansut Sponge (P) Ltd, Badmal, Jharsuguda	Sponge Iron	2 x100 TPD	69	2880
21	Singhal Enterprises (P) Ltd, Hirma, Jharsuguda	Sponge Iron	2 x100 TPD	70	2880
22	Jai Hanuman Udyog Ltd. Jharsuguda	Sponge Iron	2 x100 TPD	99	2880
23	Ultra Tech Cement Limited, Arda, Jharsuguda	Cement	2000 TPD	-	224

### 3.5 Action Plan for compliance and control of air pollution

Based on the background information, monitoring reports, interim report prepared by NEERI, Nagpur for REMP of this area and factoring into the public concerns on local environmental issues voiced through the local news papers and through the public hearings conducted by SPCB for the proposed projects in this area, an action plan for Ib valley-Jharsuguda area has been prepared. In this action plan, sector specific abatement strategies were drawn up. Improvement in environmental management practice, technological up-gradation in process and pollution control, development of adequate infrastructure remained the thematic area. Sector-wise action plan is prepared after a few rounds of brain storming sessions between the officers, including the concerned Regional Officer of SPCB. The plan and possible target date to achieve it, is presented in the **Tables 3.4 to 3.8**

**Table-3.4: Action plan for control of air pollution for Thermal Power Plants**

Sl. No.	Action plan	Target Date	Issues being addressed
1.	All TPPs to install ESP/BF to meet the emission standard of 50 mg/m <sup>3</sup> with one spare field <ul style="list-style-type: none"> <li>• Existing Plants</li> <li>• Future Plants</li> </ul>	<ul style="list-style-type: none"> <li>• 31.03.2012</li> <li>• Concurrently with commissioning</li> </ul>	<ul style="list-style-type: none"> <li>• SPM and RPM in ambient air</li> </ul>
2.	Online monitoring with real time display facility to be installed	30.06.2011	Particulate matter
3.	Real time ambient air quality monitoring (SO <sub>x</sub> , NO <sub>x</sub> , CO, PM <sub>10</sub> , P.M <sub>2.5</sub> )	31.03.2011	SPM, RPM, SO <sub>2</sub> , NO <sub>x</sub>

**Table-3.5: Action plan for control of air pollution for Coal Mines**

Sl. No.	Action plan	Target Date	Issues being addressed
1.	A dedicated coal transport corridor to be constructed in Ib valley coalfields.	31.03.2015	SPM in ambient air, Traffic Congestion
2.	Use of surface miner for coal mining purpose. At least 60% coal in this area to be produced by surface miner technology.	31.03.2013	Particulate matter
3.	Enhancement of rake loading facility in the coal mines.	31.03.2015	SPM, Traffic Congestion
4.	MCL to take up a comprehensive coal mine fire control plan	30.06.2011	SO <sub>2</sub> , Heat

**Table-3.6 : Action plan for control of air pollution for Iron & Steel and Ferro Alloys Sector**

Sl. No.	Action plan	Target Date	Issues being addressed
1.	All DRI plants to install ESPs in the kiln, bag filter in dust generating points and pneumatic dust handling system	31.03.2011	Air pollution (SPM)
2.	Installation of online stack monitoring system with real time display system in 300 TPD DRI Kiln or more for subsequent control of particulate matter.	30.06.2011	Particulate matter
3.	Real time ambient air quality monitoring (SO <sub>2</sub> , NO <sub>x</sub> , CO, PM <sub>10</sub> , PM <sub>2.5</sub> ) in 300 TPD capacity or DRI plant with integration facility	31.03.2011	SPM, SO <sub>2</sub> , NO <sub>x</sub> , RPM

**Table-3.7: Action plan for control of air pollution for Aluminium Plants**

Sl. No.	Action plan	Target Date	Issues being addressed
1.	Pot lines of smelter plant to be upgraded to meet the emission norm of 0.3 kg of fluoride per ton of Aluminum by revamping the fume treatment plant.	31.03.2012	Fluoride in air
2.	Online stack emission monitoring system with display system shall be installed	31.03.2011	Fluoride in air
3.	Installation of fluoride removal (Fume treatment) system from bake oven plant	31.03.2012	Fluoride in air
4.	Real time ambient air quality monitoring (SO <sub>2</sub> , NO <sub>x</sub> , CO, PM <sub>10</sub> , PM <sub>2.5</sub> )	31.03.2011	SO <sub>2</sub> , NO <sub>x</sub> , CO, RPM

**Table-3.8 : Action plan for control of air pollution through Common infrastructure and services**

Sl. No.	Action plan	Target Date	Issues being addressed
1.	Establishment of an extensive air quality monitoring network for Ib valley-Jharsuguda area.	31.03.2013	Air quality parameter
2.	Monitoring of PM <sub>2.5</sub> and Ozone on the points of traffic congestions should be done.	31.03.2013	Data generation for decision making

### 3.5.1 Existing infrastructure facilities – Ambient Air Quality (AAQ) Monitoring network

There is no NAAQM monitoring stations in CPIC area, but there is one AAQ monitoring stations within the EMP area. The major industries have their own

monitoring stations. SPCB also envisages expansion of its network under NAMP.

### 3.5.2 Pollution control measures installed by the individual source of pollution

The major air polluting industries in the area and devices installed for control of air pollution is enumerated at **Table-3.9**.

**Table-3.9 air pollution control measures in major air polluting industries**

SL No	Name of the industry/mine	Product	Capacity	Air Pollution Control Equipment and Measures
1	Vedant Aluminium Ltd., Jharsuguda	Alluminium	2.5 LTPA	Fume Treatment Plant
2	Vedanta Aluminum Ltd., (CPP)Jharsuguda	Thermal Power	675 MW	ESP
3	Sterlite Energy Ltd. Bhrukhamunda, Jharsuguda	Thermal Power	1 x600 MW	ESP
4	Bhusan Steel Ltd., (CPP), Telkoi, Rengali	Thermal Power	230 MW	ESP
5.	Ib Thermal Power Station, Banharpali, Jharsuguda	Thermal Power	2 x210 MW	ESP
6	Shyam DRI Power Pvt Ltd, Pandloi, Sambalpur	Thermal Power	30 MW	ESP
7	Bhusan Power & Steel Ltd, Telkoi, Rengali, Sambalpur	Sponge Iron & Integrated Steel	2.2 MTPA	ESP and Bag Filters
8	Shyam DRI Power Ltd., Pandaloi, Sambalpur	Sponge Iron & Integrated Steel	2 x350 TPD, 2 LTPA steel billet, 0.3 MTPA Coal washery, 10 MW-AFBC, 15MW- WHRB	ESP and Bag Filters
9	SMC Power Generation (P) Ltd, Hirma, Sambalpur	Sponge Iron & Integrated Steel	2 x300 TPD, 8 MW WHRB, 17 MW AFBC 1.2 LTPA Coal Washery , 1 LTPA Re-rolled Products	ESP and Bag Filters
10	SPS Sponge Iron Ltd, Badmal, Jharsuguda	Sponge Iron & Integrated Steel	6 x100 TPD 2.8 LTPA Blast furnace 2x 16 MVA Ferro	ESP and Bag Filters

SL No	Name of the industry/mine	Product	Capacity	Air Pollution Control Equipment and Measures
			Alloys , 1.0 LTPA Rolling Mill	
11	MSP Metaliks Ltd, Markuta, Jharsuguda	Sponge Iron & Integrated Steel	4 x100 TPD, 48,000 TPA MS Billet. 1,88,000 TPA Pig Iron	ESP and Bag Filters
12	Jain Steel & Power Ltd, Jharsuguda	Sponge Iron & Integrated Steel	1 x350 TPD, DRI	ESP and Bag Filters
13	Aryan Ispat & Power Ltd, Bamaloi, Rengali, Sambalpur	Sponge Iron	2 x100 TPD + 1 x300 TPD	ESP and Bag Filters
14	Maa Samaleswari Industries (P) Ltd, Lapanga	Sponge Iron	2 x100 TPD	ESP and Bag Filters
15	Viraj Steel & Energy Gurupali, Rengali, Sambalpur	Sponge Iron	2 x350 TPD, 8 MW WHRB, 20 MW AFBC	ESP and Bag Filters
16	Action Ispat & Power (P) Ltd, Jharsuguda	Sponge Iron	1 x50 TPD	ESP and Bag Filters
17	Bhagawati Steels (P)Ltd, Badmal, Jharsuguda	Sponge Iron	1x 350 TPD, 8 MW WHRB, 4 MW AFBC 150 TPH Coal Washery 1 LTPA Re-rolled Products	ESP and Bag Filters
18	Eastern Steel & Power Ltd., Jharsuguda	Sponge Iron	2 x100 TPD	ESP and Bag Filters
19	L.N. Metaliks Ltd, Sripura, Sambalpur	Sponge Iron	2 x100 TPD	ESP and Bag Filters
20	Pawansut Sponge (P) Ltd, Badmal, Jharsuguda	Sponge Iron	2 x100 TPD	ESP and Bag Filters
21	Singhal Enterprises (P) Ltd, Hirma, Jharsuguda	Sponge Iron	2 x100 TPD	ESP and Bag Filters
22.	Jai Hanuman Udyog Ltd. Jharsuguda	Sponge Iron	2 x100 TPD	ESP and Bag Filters
23	Ultra Tech Cement Limited, Arda, Jharsuguda	Cement	2000 TPD	ESP



### **3.5.3. Inventorisation of industrial sources of pollution with technological gaps**

The inventory of major industrial source of air pollutants are presented in **Table-3.9.**

### **3.5.4 Identification of low cost and advance cleaner technology for air pollution control**

The advance technology that can be further installed for control of air pollution is scrubber in Bake oven units in smelter plant and addition fields in the ESP for thermal power plants. These have been appropriately included in Action plan.

### **3.5.5 Introduction or switch over to cleaner fuel**

Coal to liquid (CTL) and Coal Bed Methane (CBM) can be considered as clean fuel substitutes of coal in the area. A few proposal in this regard have been received, however its outcome is still uncertain.

### **3.5.6 Need for infrastructure Renovation**

On-line AAQ monitoring stations should be set up in this CPIC area to get on-line, real time data for taking appropriate measures.

### **3.5.7 Development of roads**

The road improvement programme should be taken up by MCL and other authorities in this area. Separate coal transportation corridor should be implemented to control fugitive emission from coal transport. Fly over / by passes on the National and State Highways should be constructed to avoid traffic congestion.

### **3.5.8 Impact on CEPI score after installation / commissioning of full fledged air pollution control systems**

The CEPI score is likely to come down with the implementation and commissioning of all Air Pollution Control (APC) measures. The details are presented in Chapter-6.

## **Chapter 4**

### ***Land Environment (Soil and Ground water)***

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#### **4.0 Land Environment (Soil and Ground Water)**

Out of total 580 Sq km area of CPIC about one third is coal bearing area. The remaining two third area are mostly covered with houses other industrial units, ash ponds, and waste dump area. There are few patches of agricultural land exist near the Ib and Bheden River. .

#### **4.1 Soil Contamination**

Contamination of soil due to industrial and mining activities is not prominent in the area leaving aside few areas close to the industries. The problem of soil degradation in mining and dumpsites of industrial waste are more prominent. However there are a few sites which may be important from soil contamination point of view; and are listed below.

- i. **Area around Vedanta Aluminium Ltd.** – Fluoride discharge occurs from Aluminum Smelter. But forage fluoride mostly remains within the norm.
- ii. **Ash pond areas:** The ash pond areas of individual TPPs are also potential risk prone areas and needs close monitoring.

#### **4.2 Action plan for abatement, treatment and restoration of normal soil quality**

Based on the background information, monitoring reports, findings of interim report prepared by NEERI Nagpur and factoring into the public concerns on local environmental issues voiced through the local news papers and through the public hearings conducted by SPCB for the proposed projects in this area, an action plan for Ib Valley- Jharsuguda area is prepared. In this action plan, sector specific abatement strategies for soil and ground water environment were drawn up and presented in **Table- 4.1 to 4.5.**

**Table-4.1 : Action plan for control of land and ground water pollution in Thermal Power Plants**

Sl. No.	Action plan	Target Date	Issues being addressed
1.	All lean slurry disposal system to be converted to (High Concentration Slurry Disposal) HCSD	31.03.2012	<ul style="list-style-type: none"> <li>• Water (Cd &amp; Hg)</li> <li>• Land requirement</li> </ul>
2.	Create silo for a capacity of at least 2 to 3 days ash generation for its dry storage and subsequent utilization for cement and fly ash based products	31.12.2011	Ash utilization

**Table-4.2: Action plan for control of land and ground water pollution in Coal Mines**

Sl. No.	Action plan	Target Date	Issues being addressed
1	Adoption of concurrent mine filling with dry ash from the thermal power plants	30.06.2012	Ash disposal
2.	Enhancement of rake loading facility in the coal mines.	31.03.2015	SPM, Traffic Congestion
3.	Back filling of the mine voids and restoration of the mined out area. An action plan to be prepared.	30.06.2011	Land degradation

**Table-4.3 : Action plan for control of land and ground water pollution in Iron & Steel and Ferro Alloys sector**

Sl. No.	Action plan	Target Date	Issues being addressed
1.	Use of SMS slag and ferro alloys slag for haul road construction in the mine area	30.06.2012	Metallurgical solid waste utilization
2.	The char generated by DRI Industries (200 TPD or more) is to be used in AFBC Boilers as supplementary fuel.	31.03.2013	Solid waste utilization

**Table-4.4 : Action plan for control of land and ground water pollution in Aluminum plants**

Sl. No.	Action plan	Target Date	Issues being addressed
1.	Construction of secured engineering landfill by VAL within its premises	31.03.2011	Fluoride in water and soil
2.	Conducting a comprehensive wastewater audit for the smelter plant including runoff management	31.03.2012	Fluoride in water and soil

Sl. No.	Action plan	Target Date	Issues being addressed
3.	Co processing of spent pot-lines in cement kilns is to be explored		Hazardous waste utilization

**Table-4.5: Action plan for control of land and ground water pollution in Common infrastructure and services**

Sl. No.	Action plan	Target Date	Issues being addressed
1.	Construction of a sewage treatment plant for Brajaraj Nagar and Jharsuguda town	31.03.2013	Organic pollution of river
2.	Construction of common disposal site facility for char and other iron and steel plant waste.	31.03.2013	Unsafe waste disposal and demand on land
3.	Development of a municipal solid waste disposal facility for Jharsuguda town	31.03.2015	MSW management
4.	Promotion of industries within CPIC area which uses waste products like fly ash, char and waste heat.		Waste utilization

### 4.3 Ground Water Contamination

Ground water contamination has not been observed in this area.

#### 4.3.1 Ground water quality monitoring programme

It is proposed to institute round the year monitoring of ground water in villages around Vedanta smelter. Lead, Chromium, Cadmium and Fluoride concentration in ground water needs to be monitored.

#### 4.3.3 Action Plan for control of pollution including cost / time aspects

The action plan can be drawn to provide treated pipe water to all the fluoride affected villages in VAL management area. The summary of action points stipulates the target date against which the action is to be completed.

### 4.4 Solid waste Generation and Management

The solid waste and hazardous solid waste generated from prominent industries and their disposal status is as per **Table- 4.6** and **table- 4.7**

**Table-4.6- The solid waste generated from prominent industries and their disposal**

SL No	Name of the industry/mine	Product	Capacity	Solid waste	Disposal	Remarks
1	Vedant Aluminium Ltd., Jharsuguda	Aluminium	2.5 LTPA	SPL-6000TPA SPL and Al Dross-2000TPA	6000TPA= SPL SPL-6000TPA SPL and Al Dross-2000TPA	SPL stored under covered shed for further disposal of SLF. Dross stored inside the premises for further disposal to authorized party
2	Vedanta Aluminum Ltd (CPP), Jharsuguda (CPP)	Thermal Power	675 MW	3594TPD (Fly ash)	3594TPD	Disposed off in ash pond
3	Sterlite Energy Ltd. Bhurkhamunda, Jharsuguda	Thermal Power	1 x600 MW	Not yet commissioned.		
4	Bhusan Steel Ltd., (CPP) Telkoi, Rengali, Sambalpur	Thermal Power	230 MW	1732TPD (Fly ash)	1732TPD	Dumped at a designated area out side the plant premises
5.	Ib Thermal Power Station, Banharpali, Jharsuguda	Thermal Power	2 x210 MW			
6	Shyam DRI Power Pvt Ltd, Pandloi, Sambalpur	Thermal Power	30 MW	100TPD (Fly ash)	100TPD	Utilized in low land filling
7	Bhusan Power & Steel Ltd, Telkoi, Rengali, Sambalpur	Sponge Iron & Integrated Steel	2.2 MTPA	3368TPD (Char & Slag and others)	1500TPD	Char is dumped at a designated area out side the plant premises and others slag and others are reused
8	Shyam DRI Power Ltd., Pandaloi, Sambalpur	Sponge Iron & Integrated Steel	2 x350 TPD, 2 LTPA steel billet, 0.3 MTPA Coal washery, 10 MW-AFBC, 15MW-WHRB	1075TPD (Char & Slag.)	700TPD (Char)	Char is dumped at designated dump site and slag is used for road making
9	SMC Power Generation (P) Ltd, Hirma, Jharsuguda	Sponge Iron & Integrated Steel	2 x300 TPD, 8 MW WHRB, 17 MW AFBC 1.2 LTPA Coal Washery, 1 LTPA Re-rolled Products	340TPD (Char and slag)	340TPD	Dumped at designated solid waste dump site and used for low land filling

SL No	Name of the industry/mine	Product	Capacity	Solid waste	Disposal	Remarks
10	SPS Sponge Iron Ltd, Badmal, Jharsuguda	Sponge Iron & Integrated Steel	6 x100 TPD 2.8 LTPA Blast furnace 2 x16 MVA Ferro Alloys , 1.0 LTPA Rolling Mill	300TPD (Char)	300TPD	Designated solid waste dump site
11	MSP Metaliks Ltd, Markuta, Jharsuguda	Sponge Iron & Integrated Steel	4 x100 TPD, 48,000 TPA MS Billet. 1,88,000 TPA Pig Iron	(Char, Slag and Fly ash)	????	Char is dumped at designated solid waste dump site and utilized in CPP, slag is sold to cement plant and fly ash is utilized in low land filling
12	Jain Steel & Power Ltd, Jharsuguda	Sponge Iron & Integrated Steel	1x 350 TPD, DRI	175TPD (Char)	175TPD	Designated solid waste dump site
13	Aryan Ispat & Power Ltd, Bamaloi, Rengali, Sambalpur	Sponge Iron	2 x100 + 1 x300 TPD	1096TPD (Char, Fly ash and Slag)	133TPD	Char is dumped at designated dump site and Others are reused
14	Viraj Steel & Energy Gurupali, Rengali, Sambalpur	Sponge Iron	2x 350 TPD	350 TPD (Char)	350TPD	Designated solid waste dump site
15	Action Ispat & Power (P) Ltd, Jharsuguda	Sponge Iron	2 x350 TPD, 8 MW WHRB, 20 MW AFBC	(Char, Fly ash and slag)	????	Designated solid waste dump site
16	Bhagawati Steels (P)Ltd, Badmal	Sponge Iron	1 x 50 TPD	25TPD (Char)	25TPD	Designated solid waste dump site
17	Eastern Steel & Power Ltd. Jharsuguda	Sponge Iron	1x 350 TPD, 8 MW WHRB, 4 MW AFBC 150 TPH Coal Washery 1 LTPA Re-rolled Products	300TPD (Char)	300TPD	Designated solid waste dump site
18	Maa Samaleswari Industries (P) Ltd, Lapanga, Sambalpur	Sponge Iron	2 x100 TPD	100TPD (Char)	100TPD	Designated solid waste dump site
19	L.N. Metaliks Ltd, Sripura, Sambalpur	Sponge Iron	2 x100 TPD	100TPD (Char)	100TPD	Designated solid waste dump site

SL No	Name of the industry/mine	Product	Capacity	Solid waste	Disposal	Remarks
20	Pawansut Sponge (P) Ltd, Badmal, Jharsuguda	Sponge Iron	2 x100 TPD	100TPD (Char)	100TPD	Designated solid waste dump site
21	Singhal Enterprises (P) Ltd, Hirma, Jharsuguda	Sponge Iron	2 x100 TPD	100TPD (Char)	100TPD	Designated solid waste dump site
22	Jai Hanuman Udyog Ltd. Jharsuguda	Sponge Iron	2 x100 TPD	100TPD (Char)	100TPD	Designated solid waste dump site
23	Ultra Tech Cement Limited, Arda, Jharsuguda	Cement	2000 TPD	Not applicable	Not applicable	Not applicable

**Table-4.7 – Generation of hazardous waste from industries and mines**

SI No	Nature of Hazardous waste	Quantity
1.	Used oil and waste containing oil	200 KL/ Annum
2.	Fluoride and cyanide containing hazardous waste	8000 Ton/ Annum

#### **4.4.1 Identification of waste minimization and waste exchange options**

Few options are listed below.

- Spent Pot Lines of Aluminium Smelter can be used in Thermal Power Plants as a supplementary fuel.
- Fly ash can be used in cement plant and in brick making.

#### **4.4.2 Existing TSDF / Incineration facilities including capacities**

There is no TSDF/ incineration facility in the CPIC area. The major Hazardous Waste generator is Vedanta Aluminum. The aluminum smelter plant has already provided Secured Land Fill within its premises.

#### **4.4.3 Treatment and management of contaminated waste disposal sites etc.**

Contaminated site has not been observed in CPIC area.

#### **4.4.4 Impact on CEPI score after proper management of Solid waste**

CEPI is expected to come down with the implementation of above projects and action plan. The details are presented in Chapter-6

## Chapter 5

### Summary of action points

#### 5.1 Summary of proposed action points (Action Plan for abatement of pollution)

Based on the background information, monitoring reports, interim report prepared by NEERI, Nagpur for REMP of this area and factoring into the public concerns on local environmental issues voiced through the local news papers and through the public hearings conducted by SPCB for the proposed projects in this area, an action plan for Ib valley-Jharsuguda area is prepared. In this action plan, sector specific abatement strategies were drawn up. Improvement in environmental management practice, technological up-gradation in process and pollution control, development of adequate infrastructure remained the thematic area. Sector-wise action plan is prepared after a few rounds of brain storming sessions between the officers, including the concerned Regional Officer of SPCB. The plan and possible target date to achieve it, is presented in the **Table5.1 to 5.5**.

**Table-5.1 : Action Plan for abatement of pollution in Thermal Power Plants**

Sl. No.	Action plan	Target Date	Issues being addressed
1.	All TPPs to install ESP/BF to meet the emission standard of 50 mg/m <sup>3</sup> with one spare field <ul style="list-style-type: none"><li>Existing Plants</li><li>Future Plants</li></ul>	<ul style="list-style-type: none"><li>31.03.2012</li><li>Concurrently with commissioning</li></ul>	<ul style="list-style-type: none"><li>SPM &amp; RPM in ambient air</li></ul>
2.	All lean slurry disposal system to be converted to (High Concentration Slurry Disposal) HCSD or mine void filling.	31.03.2012	<ul style="list-style-type: none"><li>Water (Cd &amp; Hg)</li><li>Land requirement</li></ul>
3.	Online monitoring with real time display facility to be installed	30.06.2011	Particulate matter
4.	Create silo for a capacity of at least 2 to 3 days ash generation for its dry storage and subsequent utilization for cement and fly ash based products	31.12.2011	Fly Ash utilization
5.	Real time ambient air quality monitoring (SO <sub>x</sub> , NO <sub>x</sub> , CO, PM <sub>10</sub> , PM <sub>2.5</sub> )	31.03.2011	SPM, RPM, SO <sub>2</sub> , NO <sub>x</sub> ,
6.	All the thermal power plants shall adopt zero discharge	31.03.2012	Water scarcity



**Table-5.2 : Action Plan for Abatement of Pollution in Coal Mines**

<b>Sl. No.</b>	<b>Action plan</b>	<b>Target Date</b>	<b>Issues being addressed</b>
1.	A dedicated coal transport corridor to be constructed in Ib valley coalfields.	31.03.2015	SPM in ambient air, Traffic Congestion
2.	Creation of reservoir for storage of mine drainage water and run off which can be used for industrial purpose	31.03.2013	Water conservation
3.	Use of surface miner for coal mining purpose. At least 60% coal in this area to be produced by surface miner technology.	31.03.2013	Particulate matter
4.	Adoption of concurrent mine filling with dry ash from the thermal power plants	30.06.2012	Ash disposal
5.	Making provision for supply of drinking water in the peripheral villages of coal mining area	31.12.2011	Water scarcity
6.	Enhancement of rake loading facility in the coal mines.	31.03.2015	SPM, Traffic Congestion
7.	MCL to take up a comprehensive coal mine fire control plan	30.06.2011	SO <sub>2</sub> , Heat
8.	Back filling of the mine voids and restoration of the mined out area. An action plan to be prepared.	30.06.2011	Land degradation

**Table-5.3: Action Plan for abatement of Pollution in Iron & Steel and Ferro Alloys Sector**

<b>Sl. No.</b>	<b>Action plan</b>	<b>Target Date</b>	<b>Issues being addressed</b>
1.	All DRI plants to install ESPs, in the kiln, bag filter in dust generating points and pneumatic dust handling system	31.03.2011	Air pollution (SPM)
2.	All steel plants and sponge iron plants to develop collection and treatment facility for mineral char and coal pile runoff during monsoon.	30.06.2011	Water pollution
3.	Installation of online stack monitoring system in 300 TPD DRI kiln or more with real time display system	30.06.2011	Particulate matter
4.	Real time ambient air quality monitoring (SO <sub>2</sub> , NO <sub>x</sub> , CO, PM <sub>10</sub> , PM <sub>2.5</sub> ) in 300 TPD or more capacity with	31.03.2011	SPM, SO <sub>2</sub> , NO <sub>x</sub> , RPM

Sl. No.	Action plan	Target Date	Issues being addressed
	integration DRI industries for evaluation of air quality data		
5.	Use of SMS slag and ferro alloys slag for haul road construction in the mine area	30.06.2012	Metallurgical solid waste utilization
6.	The char generated by DRI industries (200 tpd or more) is to be utilized in AFBC boilers as supplementary fuel.	31-03-2013	Solid waste utilisation

**Table-5.4 : Action Plan for abatement of pollution in Aluminium Plants**

Sl. No.	Action plan	Target Date	Issues being addressed
1.	Pot lines of smelter plant to be upgraded to meet the emission norm of 0.3 kg of fluoride per ton of Aluminum by revamping the fume treatment plant.	31.03.2012	Fluoride in air
2.	Online stack emission monitoring system with display system shall be installed	31.06.2011	Fluoride in air
3.	Installation of fluoride removal (Fume treatment) system in bake oven plant	31.03.2012	Fluoride in air
4.	Construction of secured landfill by VAL within its premises	31.03.2011	Fluoride in water and soil
5.	Conducting a comprehensive wastewater audit for the smelter plant including runoff management	31.03.2012	Fluoride in water and soil
6.	Real time ambient air quality monitoring (SO <sub>2</sub> , NO <sub>x</sub> , CO, PM <sub>10</sub> , PM <sub>2.5</sub> )	31.03.2011	SO <sub>2</sub> , NO <sub>x</sub> , CO, RPM
7.	Co processing of spent pot-lines in cement kilns is to be explored		Hazardous waste utilization
8.	VAL is to install defluoridation plant to prevent fluoride contamination in Bheden River	31-03-2011	Fluoride in water

**Table-5.5: Action Plan for abatement of pollution through Common infrastructure and services**

<b>Sl. No.</b>	<b>Action plan</b>	<b>Target Date</b>	<b>Issues being addressed</b>
1.	Construction of a sewage treatment plant with drainage network for Brajaraj Nagar and Jharsuguda town	31.12.2012	Organic pollution of river
2.	Establishment of an extensive air quality monitoring network for Ib valley-Jharsuguda area.	31.03.2013	Air quality parameter
3.	Construction of water storage reservoirs to collect the mine water from the underground mines.	31.03.2015	Water conservation
4.	Construction of common disposal site facility for char and other iron and steel plant waste.	31.03.2013	Unsafe waste disposal and demand on land
5.	Development of a municipal solid waste disposal facility for Jharsuguda town	31.03.2015	MSW management
6.	Promotion of industries within CPIC area which uses waste products like fly ash, char and waste heat.		Waste utilization
7.	The establishment of on-line monitoring station for water quality monitoring of River Mahanadi and online data transmission facility with SPCB and CPCB. The parameters shall also include Fluoride, Cadmium and TOC.	31.03.2013	Real time Data transmission.
8.	Pb, Cr, Cd and Fluoride concentrations in Ground water is to be monitored.	31.03.2013	Data availability
9.	Monitoring of PM <sub>2.5</sub> and Ozone on the points of traffic congestions should be done.	31.03.2013	Data generation for decision making
10	All the STPs will be provided with a stand-by DG sets to prevent discharge of sewage during power failure	31.03.2012	BOD and TC

**6.1 AIR ENVIRONMENT**

**6.1.1 POLLUTANTS (A)**

The total study area of Ib Valley- Jharsuguda is 580 km<sup>2</sup>. In this area mainly mining, iron & steel, thermal power generation and Aluminium smelting activities going on. Depending on these industrial activities the three critical air pollutants viz. Respirable Particulate Matter (RPM), Suspended Particulate Matter (SPM) and Sulphure Dioxide (SO<sub>2</sub>).

**a. Factor # A1 – Presence of Toxin**

The aforesaid three air pollutants are not assessed as acute or systemic. So the three parameters are coming under group - A and there combination is A A A. The penalty value for this combination is 0.

**A1 = 0.**

**b. Factor # A2 – Scale of Industrial Activities**

In the study area 23nos. of R17 category industries and 26 nos. of R54 category industries are operating. So out of Large (5), Medium (2.5) and Limited (1) the scale of industrial activities is **Limited** and it has the scoring 1.

**A2 = 1**

Now the pollutant Factor is  $A = A1 \times A2$

$\Rightarrow A = 0 \times 1$

$\Rightarrow \mathbf{A = 0}$

**6.2.2 PATHWAY (B)**

**a. Factor # B1 – Ambient Pollutant Concentration**

The ambient environmental quality has been categorized into four broad categories based on exceedence factor.

$$\text{Exceedence Factor (EF)} = \frac{\text{Observed Mean concentration of critical pollutant}}{\text{Prescribed standard for the respective pollutant and area class}}$$

EF for Respirable Particulate Matter (RPM)

- Total 118 nos of samples of RPM taken in the study area.
- The mean concentration of the RPM analysis is 60.
- The prescribed standard for RPM is 100.
- $EF = 60 / 100 = 0.60$
- 0.60 is Moderate (M) scoring and comes between 0.5 and 1.0. So its scoring is 2.

EF for SPM

- Total 119 nos of samples of SPM taken in the study area.
- The mean concentration of the SPM analysis is 154.77.
- The prescribed standard for SPM is 200 / 500.

- $EF = 154.77 / 200 = 0.77$
- 0.77 Moderate (M) scoring and comes between 0.5 and 1.0. So its scoring is 2.

EF for SO<sub>2</sub>

- Total 119 nos of samples of SO<sub>2</sub> taken in the study area.
- The mean concentration of the SO<sub>2</sub> analysis is 10.
- The prescribed standard for SO<sub>2</sub> is 80.
- $EF = 10 / 80 = 0.125$
- 0.125 is Low (L) scoring and comes below 0.5. So its scoring is 1.

The final combination for ambient pollutant is M M L. The scoring of this combination is maximum of three. So scoring value for M is **2**.

- The combination value for M M L is **0**.
- **B1 = 2 + 0 = 2**

**b. Factor # B2** – Evidence of adverse impact on people

In the study area there is evidence of symptoms of exposure. But there is no evidence of fatality or disease(s) leading to fatality (such as) cancer due to exposure. So the scoring value is 3.

$$B2 = 3$$

**c. Factor # B3** – Reliable evidence of adverse impact on eco-geological features

In the study area there is evidence of symptoms of exposure. But there is no evidence of loss of flora / fauna / significant damage to eco-geological features, (irreparable loss / damage). So the scoring value is 3.

$$B3 = 3$$

Hence, the pathway factor  $B = B1 + B2 + B3$

$$\Rightarrow B = 2 + 3 + 3$$

$$\Rightarrow B = 8$$

### 6.3.3 RECEPTOR (C)

**a. Factor # C<sub>1</sub>** – Number of people potentially affected within 2 km radius from industrial pollution source.

The population is more than 1 lakh in the study area .

$$\text{Hence, } C_1 = 5$$

**b. Factor # C2**

SNLF = (Number of samples exceeded the standard / total number of samples) x  
(Exceedence Factor)

(i) RPM

Total No of Samples taken = 118

Number of samples exceeded the standard = 06

Exceedence Factor = 0.60

$$SNLF = (6 / 118) \times 0.60$$

$$= 0.031 \text{ which less than } 0.25$$

$$\text{Hence } C_{21} = 1.5 \text{ (Moderate)} \dots \dots \dots (1)$$

**(ii) SPM**

Total No of Samples taken = 119  
Number of samples exceeded the standard = 11  
Exceedence Factor = 0.77

$$\text{SNLF} = (11 / 119) \times 0.77 \\ = 0.071 \text{ which less than } 0.25$$

Hence  $C_{22} = 1.5$  (Moderate).....(2)

**(iii) SO<sub>2</sub>**

Total No of Samples taken = 119  
Number of samples exceeded the standard = 0  
Exceedence Factor = 0.125

$$\text{SNLF} = (0 / 119) \times 0.125 \\ = 0$$

Hence  $C_{23} = 1$  (Low).....(3)

The combination of SNLF is M M L and the penalty for it is 0.

$C_2$  is the addition of maximum of equation no. 1, 2 & 3 and penalty value.

$$\text{Hence } C_2 = 1.5 + 0 \\ = 1.5$$

**c. Factor # C<sub>3</sub> – Additional Risk to sensitive receptors**

Within 2 km radius from source no historical / archeological / religious / national parks / sanctuary / ecological habitat.

**But 500 no of sensitive population is within 2km radius from source.**

**Hence C<sub>3</sub> = 5**

$$C = (C_1 \times C_2) + C_3 \\ \Rightarrow C = (5 \times 1.5) + 5 \\ = 12.5$$

**6.1.4 ADDITIONAL RISK ASSESMENT**

**Factor # D**

- Pollution Control in Large scale Industries – Adequate
- Pollution Control in Medium & Small scale Industries – Adequate
- Pollution Control in Common Facilities – Inadequate

The combination is A A I.

Hence **D = 10**

$$i_a = \text{Sub-Index Score} = A + B + C + D \\ = 0 + 8 + 12.5 + 10 \\ = 30.5$$

## 6.2 WATER ENVIRONMENT

### 6.2.1 POLLUTANTS (A)

Depending on the industrial activities in the CPIC area the three critical water pollutants are Fluoride, BOD and Cadmium (Cd).

#### a. Factor # A1 – Presence of Toxin

The aforesaid three air pollutants are not assessed as acute or systemic. So the three parameters are coming under group - A and their combination is A A A. The penalty value for this combination is 0.

$$A1 = 0.$$

#### b. Factor # A2 – Scale of Industrial Activities

In the study area 25 nos. of R17 category industries and 72 nos. of R54 category industries are operating. So out of Large (5), Medium (2.5) and Limited (1) the scale of industrial activities is **Limited** and it has the scoring 1.

$$A2 = 1$$

Now the pollutant Factor is  $A = A1 \times A2$

$$\Rightarrow A = 0 \times 1$$

$$\Rightarrow A = 0$$

### 6.2.2 PATHWAY (B)

#### a. Factor # B1 – Ambient Pollutant Concentration

The ambient environmental quality has been categorized into four broad categories based on exceedence factor.

Observed Mean concentration of critical pollutant

$$\text{Exceedence Factor (EF)} = \frac{\text{-----}}{\text{Prescribed standard for the respective pollutant and area class}}$$

EF for Fluoride

- Total 15 nos of samples of Fluoride taken in the study area.
- The mean concentration of the Fluoride analysis is 0.094.
- The prescribed standard for Fluoride is 1.5.
- $EF = 0.094 / 1.5 = 0.063$
- 0.063 is Low (L) scoring and comes below 0.5. So its scoring is 1.

EF for BOD

- Total 15 nos of samples of BOD taken in the study area.
- The mean concentration of the BOD analysis is 2.72.
- The prescribed standard for BOD is 8.
- $EF = 2.72 / 8 = 0.34$
- 0.34 is Low (L) scoring and comes below 0.5. So its scoring is 1.

EF for Cadmium (Cd)

- Total 15 nos of samples of Cd taken in the study area.
- The mean concentration of the Cd analysis is 0.009.
- The prescribed standard for Cd is 0.005.
- $EF = 0.009 / 0.005 = 1.8$
- 1.8 is Critical (C) scoring and comes more than 1.5. So its scoring is 6.

- The final combination for ambient pollutant is L L C. The scoring of this combination is maximum of three. So scoring value for M is 6.
- The combination value for L L C is **0**.
- **B1 = 6 + 0 = 6**

**b. Factor # B2 – Evidence of adverse impact on people**

In the study area there is evidence of symptoms of exposure. But there is no evidence of fatality or disease(s) leading to fatality (such as) cancer due to exposure. So the scoring value is 3.

**B2 = 3**

**d. Factor # B3 – Reliable evidence of adverse impact on eco-geological features**

In the study area there is evidence of symptoms of exposure. But there is no evidence of loss of flora / fauna / significant damage to eco-geological features, (irreparable loss / damage). So the scoring value is 3.

**B3 = 3**

Hence, the pathway factor B = B1 + B2 + B3

$\Rightarrow B = 6 + 3 + 3$

$\Rightarrow B = 12$

**6.2.3 RECEPTOR (C)**

**a. Factor # C1 – Number of people potentially affected within 2 km radius from industrial pollution source.**

The population is more than 1 lakh in the study area.

Hence, **C<sub>1</sub> = 5**

**b. Factor # C<sub>2</sub>**

SNLF = (Number of samples exceeded the standard / total number of samples) x (Exceedence Factor)

**(i) Flouride**

Total No of Samples taken = 15

Number of samples exceeded the standard = 0

Exceedence Factor = 0.063

SNLF = (0 / 15) x 0.063

= 0

Hence C<sub>21</sub> = 1 (Low).....(1)

**(ii) BOD**

Total No of Samples taken = 15

Number of samples exceeded the standard = 0

Exceedence Factor = 0.34

SNLF = (0 / 15) x 0.34

= 0

Hence C<sub>22</sub> = 1 (Low).....(2)



(iii) **Cd**  
 Total No of Samples taken = 15  
 Number of samples exceeded the standard = 12  
 Exceedence Factor = 1.8

$$\begin{aligned} \text{SNLF} &= (12/ 15) \times 1.8 \\ &= 1.44 \text{ which is } > 0.5 \\ \text{Hence } C_{23} &= 3 \text{ (Critical).....(3)} \end{aligned}$$

The combination of SNLF is L L C and the penalty for it is 0.  
 C<sub>2</sub> is the addition of maximum of equation no. 1, 2 & 3 and penalty value.

$$\begin{aligned} \text{Hence } C_2 &= 3 + 0 \\ &= 3 \end{aligned}$$

**c. Factor # C<sub>3</sub> – Additional Risk to sensitive receptors**

Within 2 km radius from source no historical / archeological / religious / national parks / sanctuary / ecological habitat.

**But 500 no of sensitive population is within 2km radius from source.**  
**Hence C<sub>3</sub> = 5**

$$\begin{aligned} C &= (C_1 \times C_2) + C_3 \\ \Rightarrow C &= (5 \times 3) + 5 \\ \Rightarrow C &= 20 \end{aligned}$$

**6.2.4 ADDITIONAL RISK ASSESMENT**

**Factor # D**

- Pollution Control in Large scale Industries – Adequate
- Pollution Control in Medium & Small scale Industries – Adequate
- Pollution Control in Common Facilities – Inadequate

The combination is A A I.  
 Hence **D = 10**

$$\begin{aligned} i_w = \text{Sub-Index Score} &= A + B + C + D \\ &= 0 + 12 + 20 + 10 \\ &= 42 \end{aligned}$$

**6.3 SOIL / GROUND WATER ENVIRONMENT**

**6.3.1 POLLUTANTS (A)**

Depending on the industrial activities in the CPIC area the three critical ground water pollutants are Fluoride, Cadmium (Cd) and Mercury (Hg).

**a. Factor # A1 – Presence of Toxin**

The aforesaid three air pollutants are not assessed as acute or systemic. So the three parameters are coming under group - A and there combination is A A A. The penalty value for this combination is 0.

$$A_1 = 0.$$

**b. Factor # A2 – Scale of Industrial Activities**

In the study area 25 nos. of R17 category industries and 72 nos. of R54 category industries are operating. So out of Large (5), Medium (2.5) and Limited (1) the scale of industrial activities is **Limited** and it has the scoring 1.

$$A_2 = 1$$

Now the pollutant Factor is  $A = A_1 \times A_2$

$$\Rightarrow A = 0 \times 1$$

$$\Rightarrow A = 0$$

**6.3.2 PATHWAY (B)**

**a. Factor # B1 – Ambient Pollutant Concentration**

The ambient environmental quality has been categorized into four broad categories based on exceedence factor.

Observed Mean concentration of critical pollutant

Exceedence Factor (EF) = -----  
Prescribed standard for the respective pollutant and area class

EF for Fluoride

- Total 19 nos of samples of Fluoride taken in the study area.
- The mean concentration of the Fluoride analysis is 0.327.
- The prescribed standard for Fluoride is 1.
- $EF = 0.327 / 1 = 0.327$
- 0.327 is Low (L) scoring and comes below 0.5. So its scoring is 1.

EF for Cd

- Total 19 nos of samples of Cd taken in the study area.
- The mean concentration of the Cd analysis is 0.0087.
- The prescribed standard for Cd is 0.005.
- $EF = 0.0087 / 0.005 = 1.74$
- 1.74 is Critical (C) scoring and come more than 1.5. So its scoring is 6.

EF for Hg

- Total 19 nos of samples for Hg taken in the study area.
- The mean concentration of the Hg analysis is 0.0008.
- The prescribed standard for Hg is 0.001.
- $EF = 0.0008 / 0.001 = 0.80$
- 0.80 is Moderate (M) scoring and comes between 0.5 and 1. So its scoring is 2.

The final combination for ambient pollutant is L C M. The scoring of this combination is maximum of three. So scoring value for C is **6**.

- The combination value for L C M is **0**.
- **B1 = 6 + 0 = 6**

**b. Factor # B2 – Evidence of adverse impact on people**

In the study area there is evidence of symptoms of exposure. But there is no evidence of fatality or disease(s) leading to fatality (such as) cancer due to exposure. So the scoring value is 3.

$$B2 = 3$$

**e. Factor # B3** – Reliable evidence of adverse impact on eco-geological features  
 In the study area there is evidence of symptoms of exposure. But there is no evidence of loss of flora / fauna / significant damage to eco-geological features, (irreparable loss / damage). So the scoring value is 3.

$$\mathbf{B3 = 3}$$

Hence, the pathway factor  $B = B1 + B2 + B3$

$$\Rightarrow B = 6 + 3 + 3$$

$$\Rightarrow \mathbf{B = 12}$$

### **6.3.3 RECEPTOR (C)**

**a. Factor # C1** – Number of people potentially affected within 2 km radius from industrial pollution source.

The population is more than 1 lakh in the study area.

Hence,  $\mathbf{C_1 = 5}$

**b. Factor # C<sub>2</sub>**

SNLF = (Number of samples exceeded the standard / Total number of samples) x  
 (Exceedence Factor)

**(i) Fluoride**

Total No of Samples taken = 19

Number of samples exceeded the standard = 1

Exceedence Factor = 0.33

$$\text{SNLF} = (1 / 19) \times 0.33$$

$$= 0.017 \text{ which is below } 0.25$$

Hence  $C_{21} = 1.5$  (Moderate).....(1)

**(ii) Cd**

Total No of Samples taken = 19

Number of samples exceeded the standard = 5

Exceedence Factor = 1.74

$$\text{SNLF} = (5 / 19) \times 1.74$$

$$= 0.458 \text{ which is between } 0.25 \text{ and } 0.5$$

Hence  $C_{22} = 2$  (High).....(2)

**(iii) Hg**

Total No of Samples taken = 19

Number of samples exceeded the standard = 0

Exceedence Factor = 0.8

$$\text{SNLF} = (0 / 19) \times 0.8$$

$$= 0$$

Hence  $C_{23} = 1$  (Low).....(3)

The combination of SNLF is M H L and the penalty for it is 0.

$C_2$  is the addition of maximum of equation no. 1, 2 & 3 and penalty value.

$$\mathbf{Hence C_2 = 2 + 0}$$

$$= 2$$

**c. Factor # C<sub>3</sub> – Additional Risk to sensitive receptors**

Within 2 km radius from source no historical / archeological / religious / national parks / sanctuary / ecological habitat.

**But 500 no of sensitive population is within 2km radius from source.**

**Hence C<sub>3</sub> = 5**

$$\begin{aligned} C &= (C_1 \times C_2) + C_3 \\ \Rightarrow C &= (5 \times 2) + 5 \\ \Rightarrow C &= 15 \end{aligned}$$

### 6.3.4 ADDITIONAL RISK ASSESMENT

#### Factor # D

- Pollution Control in Large scale Industries – Adequate
- Pollution Control in Medium & Small scale Industries – Adequate
- Pollution Control in Common Facilities – Inadequate

The combination is A A I.

Hence **D = 10**

$$\begin{aligned} i_s &= \text{Sub-Index Score} = A + B + C + D \\ &= 0 + 12 + 15 + 10 \\ &= 37 \end{aligned}$$

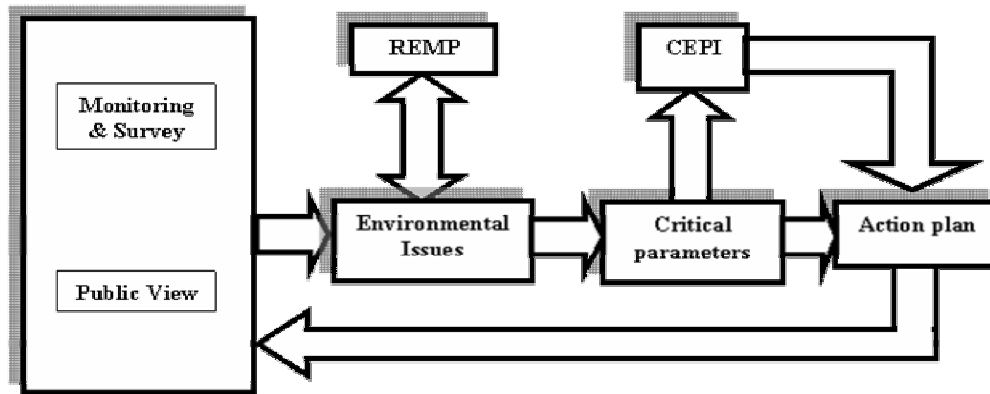
#### Calculation of the Aggregated CEPI

$$\begin{aligned} \text{CEPI} &= i_m + \{(100 - i_m) \times (i_2/100) \times (i_3/100)\} \\ &= 42 + \{(100 - 42) \times (30.5 / 100) \times (37 / 100)\} \end{aligned}$$

<b>CEPI = 48.54</b>
---------------------

## 6.2 Conclusion

The action plan has been prepared to address the environmental issues identified by the people and verified scientifically. The target dates are chosen considering the nature of the activity and its relative importance from environmental point of view .Implementation and monitoring being key aspects of success of an action plan, a framework for monitoring and evaluation of performance of the industrial cluster with CEPI as the key indicator is proposed to be in place, once the action plans are frozen after adequate refinement.



**Fig-Framework of review of action plan**

The main text of this document presents the action plans sector wise. The detailed industry wise action plan is presented in appendix I. The appendix also indicates the target date of each action and corresponding stakeholder agency who will implement the action plan. During the preparation of this action plan several actions were also taken up simultaneously. Some of the actions are already completed and some are under implementation. These actions have caused significant improvement in the environmental quality of the area. CEPI was calculated on the basis of recent monitoring data of the SPCB. The revised CEPI from **Ib valley area of 74.0 and that of Jharsuguda 73.34** to combined CEPI **48.54**, indicates the improvement in environmental quality, which is now well below the level of criticality. However, after the remaining actions are implemented the score is expected to come down further.

**Compliance status to the comments received from CPCB on action plan for  
Ib Valley- Jharsuguda area**

<b>SL No</b>	<b>Comments</b>	<b>Status</b>
1	Projects under expansion including their pollution load should also be taken into consideration in the preparation of remedial action plans.	The sectoral action plans will be applicable to all the future plants in respective sectors.
2	Details of Orange and Green category industries also need to be incorporated.	Included in the action plan as Annexure-2.
3	Details of STPs operating in the area may be given.	Included in the action plan.
4	Conversion of Lean Slurry disposal system to High concentration slurry disposal system should be completed by 31 <sup>st</sup> March, 2012	It is proposed to have a portfolio of options for ash disposal. High concentration slurry and mine void filling are the options that State Board is pursuing. Retrofitting these systems usually has long lead time since there is only one supplier of diaphragm pump in the world. Thus the target date may be kept as 31.03. 2014. The action plan is appropriately modified.
5	Typographical errors need to be corrected (dates of S.N.1 & 2). 60% coal production using surface miner technology should be ensured by 31 <sup>st</sup> March, 2012 and 100% coal production with the same technology should be ensured by 31 <sup>st</sup> March, 2013.	Typographical error corrected.  100% coal production by surface miner may not be feasible due to various practical reasons. We may therefore stick to original stipulation of 60% by 2013.
6	Responsible stakeholders for establishment of air quality monitoring network must be incorporated in the Action Plan	Incorporated in the action plan as a separate Annexure-1
7	A comprehensive proposal with Coal to Liquid and Coal Bed Methane technologies need to be prepared and submitted by 31 <sup>st</sup> December, 2010 and its implementation by 31 <sup>st</sup> December, 2012.	This is a futuristic project and presently in R & D Stage. It may not be possible to include it as an action plan at present.
8	Possibility of coal transportation by belt conveyors need to be explored and the same may be implemented (if feasible) by 31 <sup>st</sup> December, 2011.	In this area coal is transported through all modes; by rail, road and through conveyor.
9	Time limit for installation of silo should be 31 <sup>st</sup> December, 2011.	Agreed
10	Possibility should be explored for co-processing Spent pot lining in Cement kilns.	Trial for co-processing in thermal power plant already commenced. Efforts are on for trial operation in cement kiln
11	Time limit for installation of ESP/Bag Filters should be reduced to 31 <sup>st</sup> March, 2012	Agreed.
12	Conversion of Lean Slurry disposal system to High concentration slurry disposal system should be completed by 31 <sup>st</sup> March, 2012	It is proposed to have a portfolio of options for ash disposal. High concentration slurry and mine void filling are the options the State Board is pursuing. The action plan is appropriately modified.

<b>13</b>	Feasibility report with technical details and facts for adopting zero discharge policy in Thermal Power Plants should be prepared so that it could be monitored and implemented within the prescribed time limit.	Achieving zero discharge in TPPs is feasible during non-monsoons season.
<b>14</b>	Target date for construction of dedicated coal transport corridor should be reduced to 31 <sup>st</sup> March, 2013. Typographical errors need to be corrected.	Dedicated coal transport corridor is a long term project. It needs various action like, planning, land acquisition and construction. Thus it may be considered to keep the target data as 31-03-2015.  Typographical error corrected
<b>15</b>	Provision for drinking water in peripheral villages should be ensured by 31 <sup>st</sup> December, 2011.	Agreed
<b>16</b>	Adequate technology if identified may be defined with a clear line of action for control of mine fire.	This is a national problem. It is only proposed to optimize production and dispatch to maintain minimum stock. It may not be possible to identify appropriate technology by SPCB.
<b>17</b>	Time limit for upgradation of 1-2 potline of NALCO should be reduced to 31 <sup>st</sup> March, 2012.	Agreed. Incorporated in the action plan for Angul-Talcher area.
<b>18</b>	Time limit for installation of fluoride removal system should be reduced to 31 <sup>st</sup> March, 2012.	Agreed. Incorporated in the action plan for Angul-Talcher area.
<b>19</b>	Time limit for construction of STP should be reduced to 31 <sup>st</sup> December, 2012.	Agreed.
<b>20</b>	Time limit for construction of water storage reservoirs should be reduced to 31 <sup>st</sup> March, 2012.	Construction of water impoundment structures are long term action hence may not be possible before 2015.
<b>21.</b>	Other Comments 1. Detailed health impact study should be carried out through a reputed agency.	A health status report has been included in the scope prepared as part of REMP for Ib Valley- Jharsuguda area.
	2. CEPI should be evaluated for same criteria pollutants considered by CPCB on the basis of the real time data after implementation of short term and long term action plans.	CEPI re-evaluated and incorporated in the reported as Chapter-6.
	3. Present status and future plan for greenbelt development should be incorporated as per the norms fixed in the master plan of the area with respect to area under greenbelt, no. and type of saplings.	The master plan of the area is being prepared by Town Planning Authority at Sambalpur. The green belt will be developed as per the master plan.

4. Demographic details and water drainage pattern and road networks in 2 km buffer zone should be incorporated.	Incorporated in the final report
5. Sector-wise and Industry-wise action points should also be incorporated including managerial and financial plans.	Incorporated in the final report as Annexure-1 and cost component will be worked out during implementation of action.
6. Online monitoring system linked with regional office and head office of CPCB / SPCBs should be included in plan.	Incorporated in the final report
7. DG sets should be provided at all pumping stations of CETPs/STPs to avoid overflow of untreated effluent during power failure in all clusters.	Incorporated in the final report
8. Action points to be elaborated in terms of quantification / sources of pollution and cost components.	The cost component will be worked out while implementing the action plan.
9. Plans should be elaborated considering non point source emission, sector wise, cost/ financial implication and future developmental activities.	The cost component will be worked out while implementing the action plan.
10. Action Plan for industries undergoing expansion and those which obtained Environmental Clearance and yet to be commissioned also need to be incorporated.	The sectoral action plans will be applicable to all the future plants in respective sectors.
11. Pb, Cr, Cd and Fluoride concentrations in Ground water should be monitored.	Agreed.
12. Existing infrastructure along-with future plans for sewage treatment in the cluster.	Included in action plan.
13. Responsible stakeholders for the various activities mentioned under the Action Plan should be identified and incorporated in the Action Plan accordingly.	Stakeholder wise action plan is appended in the final report as Annexure-1



14. List of Rolling mills operating in the area needs to be incorporated.	This is incorporated
15. Remedial Action plan for fluoride contamination of Bheden river by the adjacent Aluminium smelter plant.	Vednata Alumina has been asked to install de-fluoridation plant.
16. Monitoring of PM2.5 and Ozone on the points of traffic congestions.	Agreed. Included in the action plan.
17. The parameters like Fluoride, cadmium and TOC also need to be included for online water quality monitoring.	Agreed. Included in the action plan.
18. Cadmium content in fly ash before its usage in road / brick making need to be examined.	Agreed
19. In-situ Bio-remediation of sewage w.r.t. organic pollution.	This will be a research project, thus may be excluded from the action plan
20. Exploration of feasibility and technical viability of reduction of Chromium (Cr 6 <sup>+</sup> to Cr 3 <sup>+</sup> ) by using flue gases or other technological option.	This will be a research project, thus may be excluded from the action plan
21. Issue of management of coal washery rejects should also be considered on priority.	Agreed
22. Plan for Char utilization in Thermal Power Plants.	Utilisation of char as supplementary fuel in AFBC boiler is included in the action plan.

# **Annexure - I**

## Annexure-1

**SUMMARY OF ACTION PLAN, INDUSTRIES TO WHOM IT IS APPLICABLE, TARGET DATE, SHORT TERM AND LONG TERM GOALS, THE CURRENT STATUS WITH IMPLEMENTATION SCHEDULE**

Sl. No.	Action plan	Stakeholder agency	Target date	Goal/ Short term or Long term	Current status with action plan for implementation
1.	All TPPs to install ESP/BF to meet the emission standard of 50 mg/m <sup>3</sup> with one spare field	Vedanta Alluminium Ltd. (CPP)	31-03-2012	Long term goal	Currently all units are prescribed with stack emission standard for 100 mg/Nm <sup>3</sup> . Directions will be issued for achieve a standard of 50 mg/Nm <sup>3</sup> shortly.
		Sterlite Energy Ltd. (IPP)	31-03-2012	Long term goal	Direction will be issued to meet standard of 50 mg/Nm <sup>3</sup>
		Bhusan steel Ltd. (CPP)	31-03-2012	Long term goal	Direction will be issued to meet standard of 50 mg/Nm <sup>3</sup>
		Shyam DRI Power (P) Ltd. CPP	31-03-2012	Long term goal	Direction will be issued to meet standard of 50 mg/Nm <sup>3</sup>
		lb Thermal Power	31-03-2012	Long term goal	Direction will be issued to meet standard of 50 mg/Nm <sup>3</sup>
2.	All lean slurry disposal system to be converted to (High Concentration Slurry Disposal) HCSD or mine void filling	Vedanta Alluminium Ltd. (CPP)	31-03-2012	Long term goal	Currently the ash is disposed in HCSD phase phase.
		Sterlite Energy Ltd. (IPP)	31-03-2012	Long term goal	Currently the ash is disposed in HCSD phase.
		Bhusan steel Ltd. (CPP)	31-03-2012	Long term goal	Dry disposal method has been adopted by the unit.
		Shyam DRI Power (P) Ltd. CPP	31-03-2012	Long term goal	Dry disposal method has been adopted by the unit.

Sl. No.	Action plan	Stakeholder agency	Target date	Goal/ Short term or Long term	Current status with action plan for implementation
		Ib Thermal Power	31-03-2012	Long term goal	Currently the ash is disposed in lean phase. Direction is to be issued to adopt HDS/ mine void filling system.
3.	Online monitoring with real time display facility to be installed	Vedanta Alluminium Ltd. (CPP)	30-06-2011	Short term goal	Direction will be issued to install on-line monitoring with real time display facility at all the stacks.
		Sterlite Energy Ltd. (IPP)	30-06-2011	Short term goal	On-line flue gas monitoring system for Unit-II has been installed.
		Bhusan steel Ltd. (CPP)	30-06-2011	Short term goal	Direction will be issued to install on-line monitoring with real time display facility at all the stacks.
		Shyam DRI Power (P) Ltd. CPP	30-06-2011	Short term goal	Direction will be issued to install on-line monitoring with real time display facility at all the stacks.
		Ib Thermal Power	30-06-2011	Short term goal	Direction will be issued to install on-line monitoring with real time display facility at all the stacks.
4.	Create silo for a capacity of at least 2 to 3 days ash generation for its dry storage and subsequent utilization for cement and after fly ash	Vedanta Alluminium Ltd. (CPP)	31-12-2011	Short term goal	2 Silos of capacity 1500 T each installed.
		Sterlite Energy Ltd. (IPP)	31-12-2011	Short term goal	4 Silos of capacity 2000 T each and 2 silos of capacity 1000 tons each installed.
		Bhusan steel Ltd. (CPP)	31-12-2011	Short term goal	2 Silos of capacity 1500 T each installed.
		Shyam DRI Power (P) Ltd. CPP	31-12-2011	Short term goal	2 Silos of capacity 400 T each installed.

Sl. No.	Action plan	Stakeholder agency	Target date	Goal/ Short term or Long term	Current status with action plan for implementation
	based products	Ib Thermal Power	31-12-2011	Short term goal	1 Silo of capacity 500 T installed.
5.	Real time ambient air quality monitoring (SO <sub>x</sub> , NO <sub>x</sub> , CO, PM <sub>10</sub> , PM <sub>2.5</sub> )	Vedanta Alluminium Ltd. (CPP)	31-03-2011	Short term goal	Direction will be issued to install real time ambient air monitoring station.
		Sterlite Energy Ltd. (IPP)	31-03-2011	Short term goal	Direction will be issued to install real time ambient air monitoring station.
		Bhusan steel Ltd. (CPP)	31-03-2011	Short term goal	Direction will be issued to install real time ambient air monitoring station.
		Ib Thermal Power	31-03-2011	Short term goal	Direction will be issued to install real time ambient air monitoring station.
6.	All the thermal power plants shall adopt zero discharge	Vedanta Alluminium Ltd. (CPP)	31-03-2012	Short term goal	Presently the effluent is being discharged outside after treatment in ETP. Direction will be issued to adopt zero discharge.
		Sterlite Energy Ltd. (IPP)	31-03-2012	Short term goal	Zero discharge adopted except periodic storm discharge during monsoon months.
		Bhusan steel Ltd. (CPP)	31-03-2012	Short term goal	Dry disposal of ash is adopted.
		Shyam DRI Power (P) Ltd. CPP	31-03-2012	Short term goal	Dry disposal of ash is adopted.
		Ib Thermal Power	31-03-2012	Short term goal	Zero discharge adopted except periodic storm discharge during monsoon months.

### Action Plan for Abatement of Pollution in Coal Mines

Sl. No.	Action plan	Stakeholder agency	Target date	Goal/ Short term or Long term	Current status with action plan for implementation
1.	A dedicated coal transport corridor to be constructed in Ib Valley coalfields to control SPM in ambient air and traffic congestion.	Mahanadi Coal Fields Ltd for operating and future coal mines in Ib Valley area and other suitable stake holder	31-03-2015	Long term goal	Internal corridors with concrete roads have been constructed in some of the major mines. Suitable steps will be taken for complete implementation of this action plan.
2.	Creation of reservoir for storage of mine drainage water and run off which can be used for industrial purpose for water conservation	MCL and INDAL	31-03-2013	Long term goal	Direction will be issued to MCL and INDAL for implementation.
3.	Use of surface miner for coal mining purpose. At least 60% coal in this area to be produced by surface miner technology for control of particulate matter in ambient air.	MCL	31-03-2013	Long term goal	The surface miners are currently in use. The present level of production using surface miner technology is at 50 %. The MCL authority will be asked to enhance the capacity production and achieve the target level by target date.
4.	Adoption of concurrent mine filling with dry ash from the thermal power plants to facilitate concurrent ash disposal.	MCL & INDAL	30-06-2012	Short term goal	The feasibility of concurrent ash filling is now evaluated. This has to be dovetailed with the existing mine plan.

Sl. No.	Action plan	Stakeholder agency	Target date	Goal/ Short term or Long term	Current status with action plan for implementation
5.	Making provision for supply of drinking water in the peripheral villages of coal mining area to solve the problem of water scarcity in nearby areas.	MCL & INDAL	31-12-2011	Short term goal	MCL and INDAL will be communicated in this regard shortly. Presently 15 villages are covered under water supply scheme by MCL.
6.	Enhancement of rake loading facility in the coal mines for control of SPM in ambient air and traffic congestion.	MCL	31-03-2015	Long term goal	A direction in this regard will be issued by the SPCB.
7.	MCL to take up a comprehensive coal mine fire control plan for control of SO <sub>2</sub> in ambient atmosphere and heat in the area.	MCL	30-06-2011	Short term goal	A direction has already been issued to limit the stock volume to 5% of its total production. MCL will be communicated to prepare a comprehensive action plan in this regard shortly.
8.	Back filling of the mine voids and restoration of the mined out area. An action plan to be prepared for control of land degradation in the area.	MCL & INDAL	30-06-2011	Short term goal	Mine restoration plan is included in the respective EMP. Old mines will be directed to prepare an action plan.

**Action Plan for abatement of Pollution in Iron & Steel and Ferro Alloys Sector**

<b>Sl. No.</b>	<b>Action plan</b>	<b>Stakeholder agency</b>	<b>Target date</b>	<b>Goal/ Short term or Long term</b>	<b>Current status with action plan for implementation</b>
1.	All DRI plants to install ESPs, in the kiln, bag filter in dust generating points and pneumatic dust handling system for control of air pollution in the area	Bhusan Steel	31-03-2011	Short term goal	Installed ESP and BFs, PDHS for ESP and BF hoppers.
		Shyam DRI	31-03-2011	Short term goal	Installed ESP and BFs, PDHS for ESP and BF hoppers.
		SMC Power	31-03-2011	Short term goal	Installed ESP and BFs, PDHS for ESP and BF hoppers.
		SPS Sponge	31-03-2011	Short term goal	Installed ESP and BFs, PDHS for ESP and BF hoppers.
		MSP Steel	31-03-2011	Short term goal	Installed ESP and BFs, PDHS for ESP and BF hoppers.
		Jain Steel	31-03-2011	Short term goal	Installed ESP and BFs, PDHS for ESP and BF hoppers.
		Aryan Ispat	31-03-2011	Short term goal	Installed ESP and BFs, PDHS for ESP and BF hoppers.
		Viraj Steel	31-03-2011	Short term goal	Installed ESP and BFs, PDHS for ESP and BF hoppers.
		Action Ispat	31-03-2011	Short term goal	Installed ESP and BFs, PDHS for ESP and BF hoppers.
		Bhagawati Steel	31-03-2011	Short term goal	Installed GCP and BFs, PDHS for GCP hoppers BF hoppers not installed.
		Eastern Steel & Power	31-03-2011	Short term goal	Installed ESP and BFs, PDHS for ESP and BF hoppers.
		Maa Sameleswari, Lapanga	31-03-2011	Short term goal	Installed ESP and BFs, PDHS for ESP hoppers BF hoppers under installation.
L N Mettaliks	31-03-2011	Short term goal	Installed ESP and BFs, PDHS for ESP and BF hoppers.		



Sl. No.	Action plan	Stakeholder agency	Target date	Goal/ Short term or Long term	Current status with action plan for implementation
		Pawansut Sponge	31-03-2011	Short term goal	Installed ESP and BFs, PDHS for ESP hoppers BF hoppers not installed.
		Singhal Enterprises	31-03-2011	Short term goal	Installed ESP and BFs, PDHS for ESP hoppers BF hoppers not installed.
		Jai Hanuman Udyog	31-03-2011	Short term goal	Installed ESP and BFs, PDHS for ESP and BF hoppers.
2.	All steel plants and sponge iron plants to develop collection and treatment facility for mineral char and coal pile run off during monsoon for control of water pollution	Bhusan Steel	30-06-2011	Short term goal	Directions issued for compliance
		Shyam DRI	30-06-2011	Short term goal	Directions issued for compliance
		SMC Power	30-06-2011	Short term goal	Directions issued for compliance
		SPS Sponge	30-06-2011	Short term goal	Directions issued for compliance
		MSP Steel	30-06-2011	Short term goal	Directions issued for compliance
		Jain Steel	30-06-2011	Short term goal	Directions issued for compliance
		Aryan Ispat	30-06-2011	Short term goal	Directions issued for compliance
		Viraj Steel	30-06-2011	Short term goal	Directions issued for compliance
		Action Ispat	30-06-2011	Short term goal	Directions issued for compliance
		Bhagawati Steel	30-06-2011	Short term goal	Directions issued for compliance
		Eastern Steel & Power	30-06-2011	Short term goal	Directions issued for compliance
		Maa Sameleswari	30-06-2011	Short term goal	Directions issued for compliance
		L N Mettaliks	30-06-2011	Short term goal	Directions issued for compliance

Sl. No.	Action plan	Stakeholder agency	Target date	Goal/ Short term or Long term	Current status with action plan for implementation
		Pawansut Sponge	30-06-2011	Short term goal	Directions issued for compliance
		Singhal Enterprises	30-06-2011	Short term goal	Directions issued for compliance
		Jai Hanuman Udyog	30-06-2011	Short term goal	Directions issued for compliance
3.	Installation of online stack monitoring system with real time display system for 300 TPD DRI Kiln and above for monitoring and subsequent control of particulate matter	Bhusan Steel	30-06-2011	Short term goal	Directions issued for compliance
		Shyam DRI	30-06-2011	Short term goal	Direction will be issued
		SMC Power	30-06-2011	Short term goal	Direction will be issued
		Jain Steel	30-06-2011	Short term goal	Direction will be issued
		Viraj Steel	30-06-2011	Short term goal	Direction will be issued
		Action Ispat	30-06-2011	Short term goal	Direction will be issued
		Eastern Steel & Power	30-06-2011	Short term goal	Direction will be issued
4.	Real time ambient air quality monitoring with 300 TPD capacity and above with integration facility (SO <sub>x</sub> , NO <sub>x</sub> , CO, PM <sub>10</sub> , PM <sub>2.5</sub> ) for evaluation of air quality data	Bhusan Steel	31-03-2011	Short term goal	Direction issued for compliance
		Shyam DRI	31-03-2011	Short term goal	Direction will be issued
		SMC Power	31-03-2011	Short term goal	Direction will be issued
		SPS Sponge	31-03-2011	Short term goal	Direction will be issued
		MSP Steel	31-03-2011	Short term goal	Direction will be issued
		Jain Steel	31-03-2011	Short term goal	Direction will be issued

Sl. No.	Action plan	Stakeholder agency	Target date	Goal/ Short term or Long term	Current status with action plan for implementation
		Aryan Ispat	31-03-2011	Short term goal	Direction will be issued
		Viraj Steel	31-03-2011	Short term goal	Direction will be issued
		Action Ispat	31-03-2011	Short term goal	Direction will be issued
		Eastern Steel & Power	31-03-2011	Short term goal	Direction will be issued
5.	Use of SMS slag and ferro alloys slag for haul road construction in the mine area for utilization of metallurgical solid waste	Bhusan Steel	30-06-2012	Long term goal	Currently the slag is used in their own land. Surplus will be sent to mines.
		Shyam DRI	30-06-2012	Long term goal	Currently the slag is used in their own land. Surplus will be sent to mines.
		SMC Power	30-06-2012	Long term goal	Currently the slag is used in their own land. Surplus will be sent to mines.
		SPS Sponge	30-06-2012	Long term goal	Currently the slag is used in their own land. Surplus will be sent to mines.
		MSP Steel	30-06-2012	Long term goal	Currently the slag is used in their own land. Surplus will be sent to mines.
		Viraj Steel	30-06-2012	Long term goal	Currently the slag is used in their own land. Surplus will be sent to mines.
		Action Ispat	30-06-2012	Long term goal	Currently the slag is used in their own land. Surplus will be sent to mines.
		Eastern Steel & Power	30-06-2012	Long term goal	Currently the slag is used in their own land. Surplus will be sent to mines.
6.	The char generated by DRI industries	Bhusan Steel	31-03-2013	Long term goal	AFBC Boiler installed.
		Shyam DRI	31-03-2013	Long term goal	AFBC Boiler installed.
		SMC Power	31-03-2013	Long term goal	AFBC Boiler installed.

Sl. No.	Action plan	Stakeholder agency	Target date	Goal/ Short term or Long term	Current status with action plan for implementation
	(300 TPD or more) is to be utilized in AFBC/ FBC/ CFBC boilers as supplementary fuel .	SPS Sponge	31-03-2013	Long term goal	AFBC Boiler installed.
		MSP Steel	31-03-2013	Long term goal	AFBC Boiler installed.
		Jain Steel	31-03-2013	Long term goal	Direction will be issued to comply and install FBC Boiler
		Viraj Steel	31-03-2013	Long term goal	AFBC Boiler installed.
		Action Ispat	31-03-2013	Long term goal	AFBC Boiler installed.
		Eastern Steel & Power	31-03-2013	Long term goal	AFBC Boiler installed.

#### Action Plan for abatement of pollution in Aluminium Plants

1.	Pot line of smelter plant to be upgraded to meet the emission norm of 0.3 kg of fluoride per ton of Aluminum for control of fluoride in ambient air	VAL	31-03-2012	Short term goal	Currently it is meeting the prescribed standard of 0.3 kg of fluoride per ton of Aluminium.
2.	Online stack emission monitoring system with display system shall be installed for evaluation of load of fluoride in ambient air.	VAL	30-06-2011	Short term goal	Installed.
3.	Installation of fluoride removal (Fume treatment) system from bake oven plant for control of fluoride in air.	VAL	31-03-2012	Short term goal	Installed

4.	Construction of secured landfill by VAL within its premises for control fluoride in water and soil	VAL	31-03-2011	Short term goal	Secured land fill at VAL is completed and in use.
5.	Conducting a comprehensive wastewater audit for the smelter plant including runoff management by 31-03-2012 by ultimate control of fluoride in water and soil.	VAL	31-03-2012	Short term goal	Direction will be issued.
6.	Real time ambient air quality monitoring (SO <sub>x</sub> , NO <sub>x</sub> , CO, PM <sub>10</sub> , P.M <sub>2.5</sub> ) for evaluation of environmental parameters by 31-03-2011 .	VAL	31-03-2011	Short term goal	It is under implementation.
7.	Co processing of spent potlines in cement kilns	Cement plants and VAL		Long term	Trial for co processing in thermal power plants already commenced. Efforts for trial for co processing in cement kilns are on.
8.	VAL will install defluoridation plant to prevent fluoride contamination in Bheden River	VAL	31-03-2011	Short term	Direction issued in this regard.

### Action Plan for abatement of pollution through Common infrastructure and services

Sl. No.	Action plan	Stakeholder agency	Target date	Goal/ Short term or Long term	Current status with action plan for implementation
1.	Construction of a sewage treatment plant with drainage network for Brajaraj Nagar and Jharsuguda town for control of organic pollution in river	OWSSB	31-12-2012	Long term goal	The requirement of STP is drawn by Orissa Water Supply and Sewerage Board in a phased manner.
2.	Establishment of an extensive air quality monitoring network for Ib Vally –Jharsuguda area for evaluation of air quality parameters in the area.	SPCB, Bhusan, VAL, Bhusan	31-03-2013	Long term goal	2 AAQ stations are under installation at VAL. Direction will be issued to MCL and Bhusan for implementation. SPCB is preparing a plan for comprehensive air quality monitoring network.
3.	Construction of water storage reservoirs to collect the mine water from the underground mines for water conservation.	Water Resources Department and user agency	31-03-2015	Long term goal	Department of Water Resources, Govt of Orissa will be informed to take up this action.
4.	Construction of common disposal site facility for char and other iron and steel plant waste for scientific disposal of solid waste	Common Forum and IDCO	31-03-2013	Long term	Since this is multi stake holder issue appropriate action will be taken up with IDCO and other stakeholders.
5.	Development of a municipal solid waste disposal facility for Jharsuguda town for management of MSW	Municipality	31-03-2013		Direction is issued.
6.	Promotion of industries				This action can be implemented

Sl. No.	Action plan	Stakeholder agency	Target date	Goal/ Short term or Long term	Current status with action plan for implementation
	within CPIC area which uses waste products like fly ash, char and waste heat for gainful utilization of solid waste				after the moratorium on establishment of industries is kept in abeyance. SPCB has already stipulated rebate on consent fees for industries using the waste product as a promotional initiative.
7	The establishment of on-line monitoring station for water quality monitoring of River Mahanadi and online data transmission facility with SPCB and CPCB. The parameters shall also include Fluoride, Cadmium and TOC.	VAL, Bhusan, TRL	31.03.2013	Long term goal	Direction will be issued
8	Pb, Cr, Cd and Fluoride concentrations in Ground water is to be monitored.	MCL	31.03.2013	Long term goal	Direction will be issued
9	Monitoring of PM <sub>2.5</sub> and Ozone on the points of traffic congestions should be done.	VAL, Bhusan Ltd. And MCL	31.03.2013	Long term goal	Direction will be issued
10	All the STPs will be provided with a stand-by DG sets to prevent discharge of sewage during power failure	Respective stake holders like MCL, Bhusan and VAL etc.	31.03.2012	Long term goal	Included in the action plan. The direction is to be issued.

## **Annexure - II**



**Annexure-2****List of Orange and Green Category of Industries  
in Ib Valley- Jharsuguda area**

<b>Sl. No.</b>	<b>Name of the Hotel</b>	<b>Category</b>
1.	Hotel Yogendra	Orange
2.	City Palace	Orange
3.	Hotel Meghdoot	Orange
4.	Hotel Kalinga	Orange
5.	Hotel Bishnu Palace	Orange
6.	Hotel Shankar	Orange
7.	Hotel Aryan	Orange
8.	Hotel AnantaBalialia	Orange
9.	Hotel Bandana	Orange
10.	Hotel Orchard	Orange
11.	Hotel Greenvilla	Orange
12.	Hotel Kalinga Residency	Orange
13.	Hotel Kaniska	Orange
14.	Hotel Paulheight	Orange
15.	Hotel Konark	Orange
16.	Hotel Highway	Orange
17.	Hotel Midtown	Orange
18.	Hotel Payal	Orange
19.	Hotel Nilkamal	Orange
20.	Hotel Rajdoot	Orange
21.	Hotel Puspak	Orange
22.	Hotel Payal,Main Road	Orange
23.	Hotel Amar Lodge	Orange

**Brick Kilns**

<b>Sl No</b>	<b>Name of Brick Kiln</b>	<b>Category</b>
1	M/S Leo Bricks (Fixed Chimney) At/Po-Marakuta, Dist- Jharsuguda Prop. Sri D. K.Sahoo	Orange
2	M/S Puspa Bricks,(VSBK) Atr/Po.-Sodamal Dist-Jharsuguda Prop. Mrs. Puspanjali Patel	Orange
3	M/S Sriya Bricks Industry,(Fixed Chimney) AT-Pipilimal, PO-Belpahar, Dist- Jharsuguda. Prop. Mrs. Priyambada Parida,	Orange

4	M/S P.S Bricks (Fixed Chimney ) AT/PO-Talpatia, Dist- Jharsuguda Prop. Sri Pabitra Seth	Orange
5	M/S DDP Bricks (Fixed Chimney) AT/PO-Pandripathar (Near Power House) Dist- Jharsuguda Prop. Sri Mohanlal Patel	Orange
6	M/S Geetanjali Bricks(Fixed chimney) AT-Khaliamal, PO-Gandghore, Brajrajnagar Dist-Jharsuguda Prop-Smt Geetanjali Pradhan	Orange
7	Aman Bricks, Laripali, (Fixed chimney) Rengali, Sambalpur	Orange
8	PNS Fixed Chimney, Dudosingha, Jharsuguda	Organge
9	M/S Sri Ganesh Fly Ash Bricks Industries, (Fly Ash Bricks) At.- H. Katapali, Dist.- Jharsuguda	Green
10.	Laxmi Enterpries, Khinda, Sambalpur (Fly ash Bricks)	Green

#### Other industries in Ib Valley- Jharsuguda area

SI No	Name and address	Type	Category
1.	Ankita Air Product Pvt. Limited, Jharsuguda	Oxygen Cylinder	Green
2.	Ib tyre Retrader, Gandhi Chowk Jharsuguda	Tyre Retrading unit	Green
3.	GA Tyre, Lamtibahal	Tyre Retrading unit	Green
4.	Kanak Durga Oxygen, Patrapali Chowk, Jharsuguda	Oxygen plant	Green
5.	Shreeram Enterprises, Srirambihar, Brajrajnagar, Jharsuguda	Packaged drinking water.	Green
6.	Sambada Enterpries, Belpahar, Jharsuguda	Packaged drinking water.	Green
7.	Shree Jaganath Poles Pvt. Ltd, Industrial Growth Center, Badmal, Jharsuguda	Concrete Pole	Green
8.	Pionner Metals, I. E. Jharsuguda	Wire drawing	Orange
9.	Unique Utensil, I.E,	Aluminium utensil	Green

	Jharsuguda		
10.	Konark Metal (P) Ltd., I.E, Jharsuguda	Wire drawing	Green
11.	Nanda Engineering, I.E, Jharsuguda	Fabrication	Green
12.	Utkal Innovative, I.E., Jharsuguda	Fabrication	Green
13.	Modern Bread, I. E, Jharsuguda	Bakery	Green