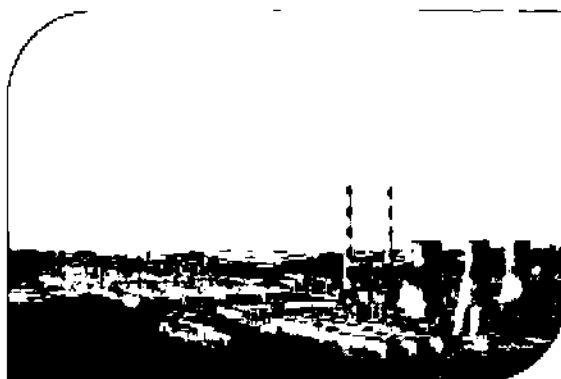


**IMPLEMENTATION STATUS AND
ACTION PLAN IN
CRITICALLY POLLUTED AREAS**

(Ib Valley- Jharsuguda)



**STATE POLLUTION CONTROL BOARD, ODISHA
BHUBANESWAR**

March 2016

PREFACE



Industries tend to grow in clusters due to certain favourable conditions, which provides them competitive advantage over the others, in future. Coal, water and iron ore are one of those favourable factors for Odisha, which have been attracting industries leading to clusterisation. Clusters of industries, no doubt provide competitive advantage to the industries and opportunities for waste utilisation, but 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).

CEPI is a rational indicator 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 as a critically polluted cluster. In Orissa there are three such critically polluted industrial clusters; Angul-Talcher, Ib-Valley and Jharsuguda.

The Action Plan for abatement of pollution in Ib Valley-Jharsuguda area was prepared by SPCB in association with CPCB for implementation during 2010-11 to 2014-15. In order to monitor the progress of implementation of Action Plan, the SPCB constituted a Committee under the Chairmanship of Dr. C.R. Mohapatra, IFS, former PCCF and former Chairman of SPCB. The committee had representations from academicians, industry, NGO and SPCB. Now after a gap of five years it was thought prudent to evaluate the impact of implementation of action plan and to formulate next action plan. This report is being published for the sensitising all the stakeholders who can use it for formulating, implementing, monitoring and regulating the action plans. Hope, this meets the expectation of all concerned. The efforts of Dr. C R Mohapatra, Prof. M C Dash, Shri Jiban Mohapatra and Ms. Swapnashree Sarangi while reviewing the implementation status need special mention. I also thankfully acknowledge the efforts of Sri Rajiv Kumar, IFS, Member Secretary, Sri Nihar Ranjan Sahoo, SEE, Sri Simanchala Dash, SEE and Mrs. Subhadarsini Das, DEE in preparing the report

BHUBANESWAR
March, 2016



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List of Abbreviations

1. AAQ – Ambient Air Quality
2. AFBC – Atmospheric Fluidized Bed Combustion
3. APC – Air Pollution Control
4. APCD – Air Pollution Control Device
5. BF – Bag Filter
6. BOD – Biochemical Oxygen Demand
7. CBM – Coal Bed Methane
8. CEPI – Comprehensive Environmental Pollution Index
9. CETP – Common Effluent Treatment Plant
10. CMH – Cubic Meter per Hour
11. CPCB – Central Pollution Control Board
12. CPP – Captive Power Plant
13. CPIC – Critically Polluted Industrial Cluster
14. CTL – Coal to Liquid
15. DO – Dissolved Oxygen
16. DRI – Direct Reduced Iron
17. D/s – Down Stream
18. EC – Environmental Clearance
19. EF – Exceedence Factor
20. EMA – Environment Management Area
21. EMP – Environmental Management Plan
22. ESP – Electrostatic Precipitator
23. ETP – Effluent Treatment Plant
24. FTP – Fume Treatment Plant
25. GOI – Govt. of India
26. GPls – Grossly Polluting Industries
27. HCSD – High Concentration Slurry Disposal
28. IPP – Independent Power Plant
29. KL – Kilo Liter
30. KLD – Kilo Liter per Day
31. MCL – Mahandi Coal-field Limited

32. MLD – Million Liter per Day
33. MPN – Most Probable Number
34. MSL – Mean Sea Level
35. MTPA – Million Ton per Annum
36. MW – Mega Watt
37. NAMP – National Ambient Air Monitoring Programme
38. NEERI – National Environmental Engineering Research Institute
39. NO_x – Oxides of Nitrogen
40. NRCDD – National River Conservation Directorate
41. OB – Over Burden
42. OCP – Open Cast Project
43. OWSSB – Orissa Water Supply and Sewerage Board
44. PDHS – Pneumatic Dust Handling System
45. PM – Particulate Matter
46. PPM – Parts Per Million
47. PPP – Public Private Partnership
48. REMP – Regional Environmental Management Plan
49. RSPM – Respirable Suspended Particulate Matter
50. SLF – Secured Land Fill
51. SMS – Steel Melting Shop
52. SO₂ – Sulphur Dioxide
53. SPCB – State Pollution Control Board
54. SPM – Suspended Particulate Matter
55. Sq Km – Square Kilometer
56. STP – Sewage Treatment Plant
57. TC – Total Coliform
58. TOC – Total Organic Carbon
59. TPP – Thermal Power Plant
60. TPA – Ton per Annum
61. TOR – Term of Reference
62. TSDF – Treatment Storage Disposal Facility
63. U/s – Up Stream
64. VAL – Vedanta Aluminium Limited

Chapter - 1

Introduction

- Introduction and objectives of the study
- Comprehensive Environmental Pollution Index
- The Monitoring Committee for monitoring of implementation of Action Plan in CPA



Chapter-1

Introduction

1.1 Introduction and objectives of the study

Environmental pollution in industrial clusters has been a national issue particularly in a period of 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) in the country. The CEPI is a rational number designed 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 Odisha three industrial clusters; Angul-Talcher, Ib-valley and Jharsuguda are identified with CEPI score of more than 70, thus considered as critically polluted area.

The Ministry of Environment & Forest, Government of India imposed a moratorium on grant of Environmental Clearance to projects in the Critically Polluted Areas (CPA) and subsequently lifted the moratorium on selected CPAs on the basis of Action Plans prepared by SPCBs for abatement of pollution. The lifting of moratorium was subject to implementation of action plan and rigorous monitoring by the CPCB.

The model action plan for abatement of pollution in the critically polluted areas of Ib Valley and Jharsuguda taken together was prepared on the basis of previous studies conducted by the State Pollution Control Board (SPCB), Odisha and data collected during various monitoring programme.

The model action plan for Ib Valley-Jharsuguda area was implemented by SPCB through its Consent Administration and it was monitored periodically by a Monitoring Committee constituted for the purpose. After a lapse of five years it was felt necessary to evaluate the impact of action plan over the CEPI score and also formulate revised action plan. Therefore the objective of this report is to evaluate the implementation of action plan over a period of 2010-11 to 2014-15 and formulate model action plan for the period 2015-20, keeping the on-going action points and incorporating additional action points for different sectors for abatement of pollution in critically polluted area.

1.2 Comprehensive Environmental Pollution Index

The Central Pollution Control Board (CPCB) developed a framework to evaluate the environmental status of industrial clusters, taking into account the pollution being generated by various activities, the people living in the neighbourhood, and the ecosphere being affected due to the pollution generated. The framework was developed by CPCB in association with the IIT, Delhi within a source-pathway-receptor modelling framework, so that the environmental effect is determined in a comprehensive manner. The schematic diagram (**Figure-1.1**) depicts the framework of CEPI.

The CEPI is aimed at evaluating the areas primarily subjected to industrial pollution for assessing the effect of pollution at local level around industrial clusters. It however does not cover and accidental release of pollutants in the area or in a nearby area. The other features are;

- i. The basic framework of the CEPI is based on three factors such as pollutant source (Factor-A), pathway (Factor-B) and receptor (Factor-C). The source is evaluated in terms of presence and identification of toxins; the pathway is evaluated as ambient concentration of toxins in air, water and ground water environment; and receptor is evaluated in terms of exposure of people and eco-geological conditions. Additional risks to sensitive receptors are also built into the framework. It takes into account of factor #D which is additional high-risk element (inadequacy of pollution control measures for large-scale, medium-scale and small-scale industries and also due to the unorganized sector). It is cumulative of Effluent Treatment Plants (ETPs), Common Effluent Treatment Plants (CETPs), Air Pollution Control Devices (APCDs), and unorganized waste disposal.
- ii. The Environmental Pollution Index is estimated for three environmental media; air, surface and ground water separately and the comprehensive Index (CEPI) is determined through a weighted average, method by assigning maximum weight to the worst polluted media following the framework depicted in **Figure-1.1**. The Comprehensive Environmental Pollution Index (CEPI) is estimated in the following manner :

The aggregated CEPI score = $i_m + \{ (100 - i_m) \times (i_2/100) \times (i_1/100) \}$

Where i_m = Maximum Sub index and i_2 and i_1 are sub indices for other media



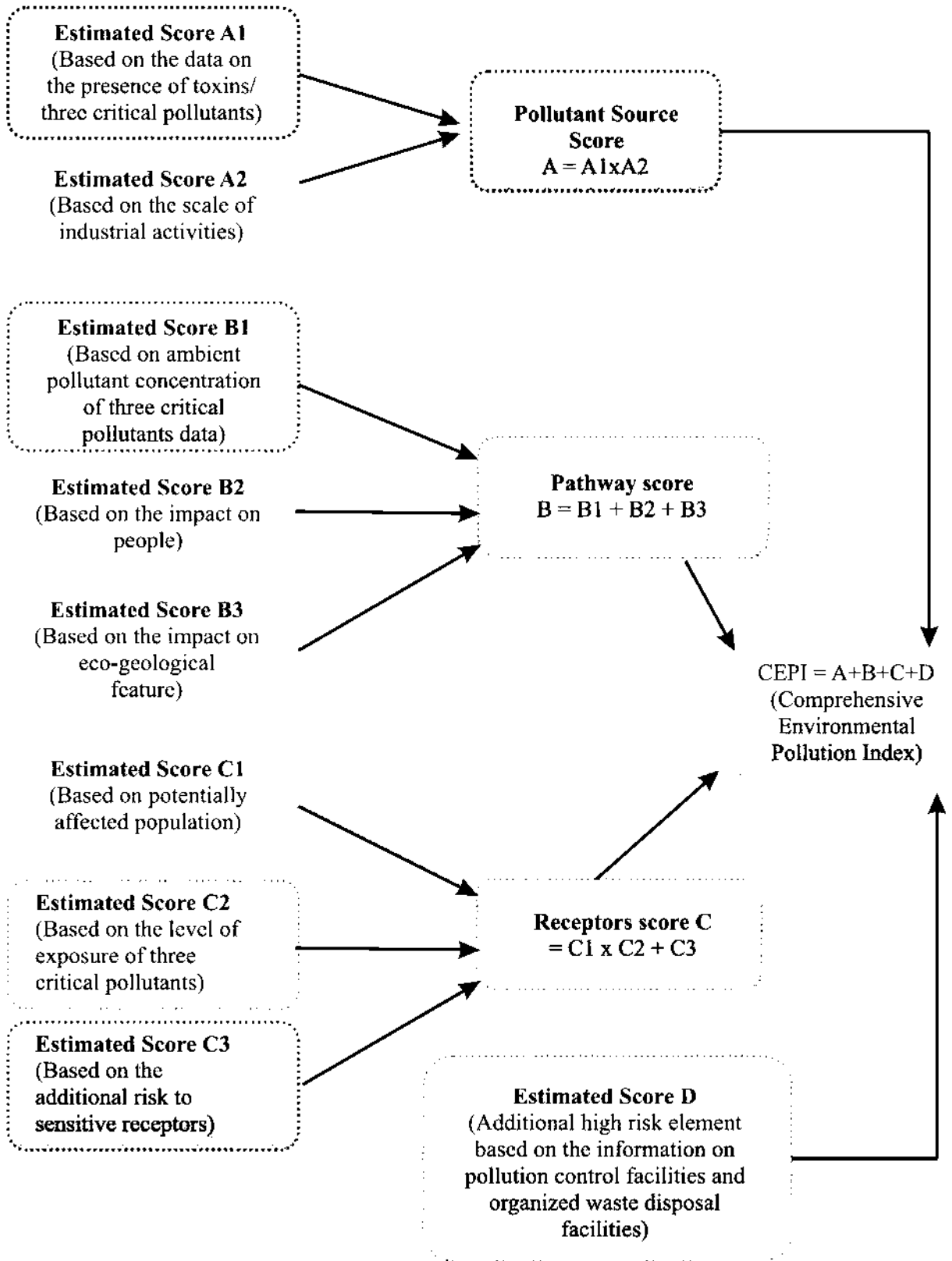


Fig-1.1 The Schematic diagram of Framework of CEPI

The Industrial clusters are then classified on the basis of extent of pollution and sensitivity of receptors in the following manner in **Table - 1.1**

Table - 1.1 Classification of Industrial Clusters

Classification	CEPI Score
Not Polluted/ Marginally Polluted	<60
Severely polluted	60 – 70
Critically polluted	> 70

- i. The comprehensive environmental pollution index (CEPI) helps in quantifying the environmental health of the critically polluted areas by synthesizing available information on environmental status by using quantitative criteria.
- ii. The CEPI is intended to act as an early warning tool, which is easy and quick to use. It can help in categorizing the industrial clusters/areas in terms of priority. These industrial clusters/areas shall be investigated for defining the spatial boundaries as well as the extent of eco-geological damages. The outcome shall be subjected to structured consultation with the stakeholders for determining comparative effectiveness of alternative plans and policies. The effective implementation of the remedial action plan will help in abatement of pollution and to restore the environmental quality of these industrial clusters.

1.3 The Monitoring Committee for monitoring of implementation of Action Plan in Critically Polluted Area

In order to monitor the progress of implementation of Action Plan for both the CPAs the SPCB constituted a Committee under the Chairmanship of Dr. C.R.Mohapatra, IFS, former PCCF and former Chairman of SPCB. The committee had representations for academicians, industry, NGO and SPCB. The composition of the Committee is given in **Table - 1.2**.

Table - 1.2 The Composition of the Review Committee

Sl	Name and Designation	Position in the Committee
1.	Dr C R Mohapatra <i>Former Chairman of State Pollution Control Board, Odisha and Member of State Environmental Appellate Authority</i>	Chairman
2.	Prof. MC Dash <i>Former Chairman of State Pollution Control Board, Odisha, Former V.C of Sambalpur University and Member of State Environmental Appellate Authority</i>	Member
3.	Shri Jiban Mohapatra <i>Chief Manager (Env.), SHE Deptt. NALCO, Convener, Environmental Safety, and Health Panel, CII and Member of Central Pollution Control Board.</i>	Member

Sl.No	Name and Designation	Position in the Committee
4.	Ms Swapnashree Sarangi <i>Civil Society, Team Leader of Foundation for Ecological Security</i>	Member
5.	Er. N. R. Sahoo <i>Sr. Env Engineer, State Pollution Control Board, Odisha</i>	Member Convener

The committee visited the areas several times, interacted with the industries and also on several occasions, advised the industries on implementation is action plan. The committee submitted the progress report on status of implementation of action plan in critically polluted area from time to time which was duly forwarded by SPCB to CPCB for consideration and review of progress.

Sl. No	Name & Address	Product	Capacity
2.	Tarini Motors, Manoj Ku. Sahu, Bypass Road, Ganesh Market Complex, Talcher, Angul.	Servicing of Two Whilers (make- Hero Honda)	-
3.	Samal Automobiles Ltd. GangadharSamal, Banarpal, Angul,	Auto Servicing (make- TATA)	75 nos/Months
4.	Zcet Automobiles, RanjitPradhan, Kandasar, Nalconagar, Angul,	Servicing Like Maruti vehicle	20 nos./Months

Table- A2.3.6 Mines

Sl. No	Name & Address	Product	Capacity
1.	Kakudi Sand Mine, Kakudi, Angul,	Sand	6000 TPM
2.	Chandpur Quartz and quartzite Mine, Kamakhyanagar, DKL, 1	Quartz and quartzite Mine,	2027 TPM
3.	Mandapal Sand Mines, MCL, Deulbera Colliery, Angul	Sand	20,000 TPM

Table- A2.3.7 Parboiled Rice Mill

Sl. No	Name & Address	Product	Capacity
1.	Nityan Rice Mill, SovonSouravRath, Industrial Estate, South Balanda, Angul,	Parboiled rice	240 TPM
2.	Tulashi Rice Tech Pvt. Ltd., KisharilalSaralia, Santiri, Banarpal, Angul-759128	Parboiled rice Broken rice	1250 TPM

Table- A2.3.8 Paints & Pigment

Sl. No	Name & Address	Product	Capacity
1.	IZAR Chemicals JagatJibanPani, AT-B-9,Talcher I.ESouth Balanda, Angul,	Paints, Pigment, Cement paints & distempers,	65.6TPM

Table- A2.3.9 Hotmix Plant

Sl. No	Name & Address	Product	Capacity
1.	Hotmix plant of Girish Ch. Bhutia, Bangaru, Radharamanpur, Talcher,Angul	Hot mix	750 TPM

Chapter - 2

Area Description

- Critically Polluted Areas (CPAs) in Odisha
- Ib Valley - Jharsuguda area



Chapter-2

Area Description

2.1 Critically Polluted Areas (CPAs) in Odisha

The Central Pollution Control Board (CPCB) determined CEPI for 88 industrial clusters in the country. Out of this, the CEPI score in the case of 43 industrial clusters were observed to be more than 70 and were classified as Critically Polluted Area (CPA). In Odisha, three clusters; Angul-Talcher, Ib valley and Jharsuguda came under the category of critically polluted. The location of critically and severely polluted areas in Odisha and their respective CEPI scores are depicted in **Figure-2.1**

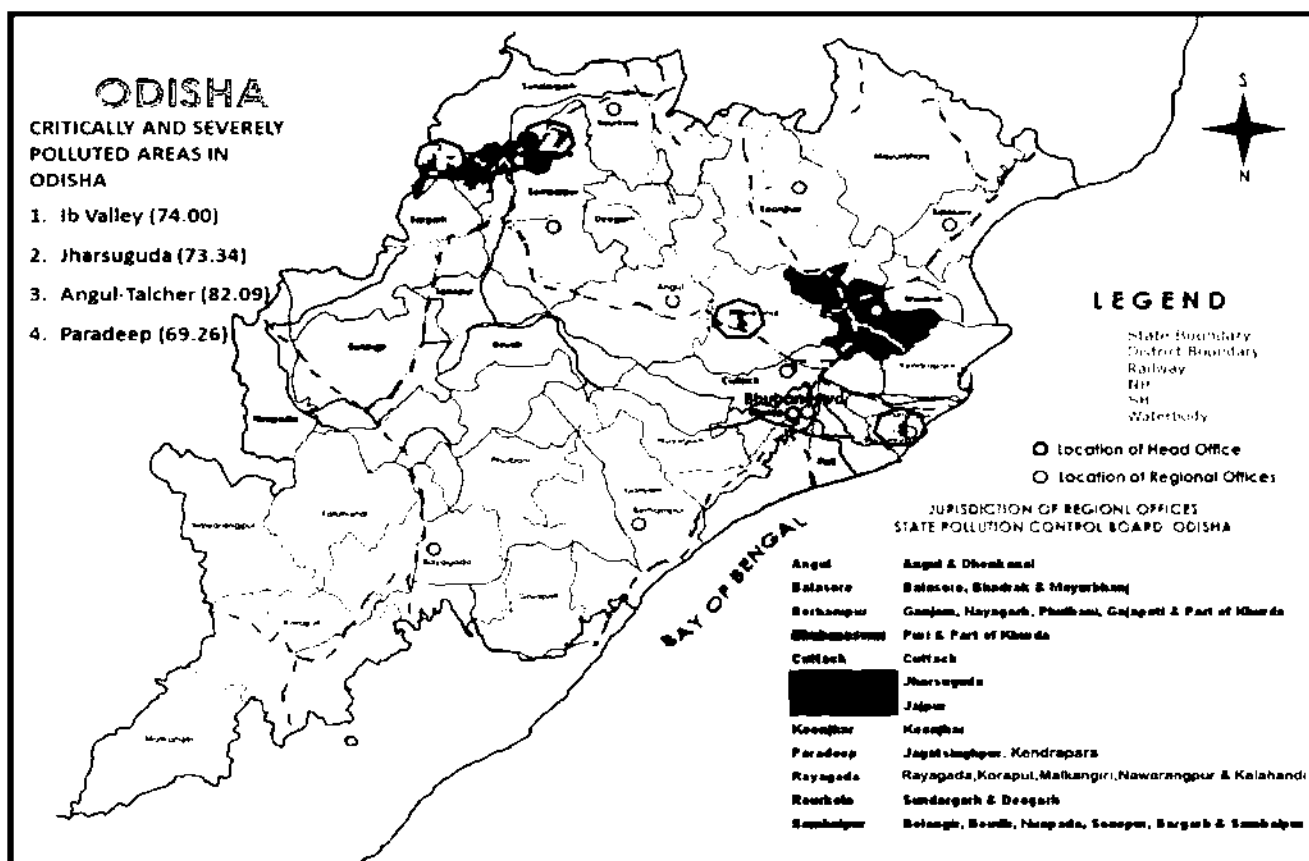


Fig - 2.1 Location of critically and severely polluted areas of Odisha.

The Ministry of Environment and Forest, Government of India, through its Office Memorandum dated 13-01-2010 (**Annexure – 1**) directed to prepare Action Plans for each of the CPAs for abatement of pollution. The CPCB provided necessary technical support in preparation and evaluation of the Action Plans. For Odisha, two separate Action Plans; one for Angul-Talcher area and the other for combined Ib valley-Jharsuguda area were prepared by the State Pollution Control Board, Odisha and was finalised after presentation before the CPCB. For Ib Valley and Jharsuguda area a single action plan were prepared since thus two areas are adjacent and has similar features. In this report we only discuss about Ib Valley-Jharsuguda area.

2.2 Ib Valley-Jharsuguda area

Huge deposits of coal in Ib Valley Coalfields and proximity to Hirakud 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.

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 Area and evaluating the environmental quality, pollution load and thus drawing up the action plan. The Sambalpur-Jharsuguda Region centering Rengali ($84^{\circ}30' E - 21^{\circ} 37' 48'' N$) with location of industries are shown in **Figure- 2.2**.

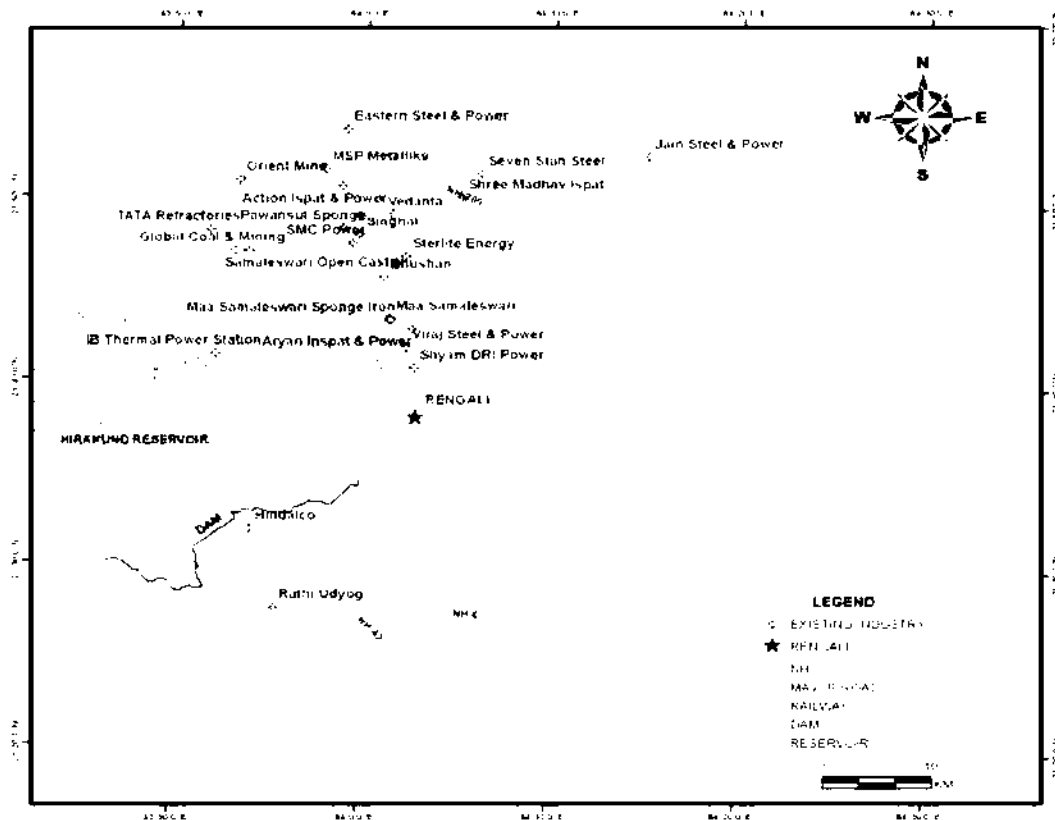


Fig - 2.2 Location of Ib valley-Jharsuguda industrial area

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

The boundary of CPA was drawn by including all the major polluting industries and mines which are under operation and were closely located. While determining the boundary care has been taken to include areas having common environmental problems as per the public opinion expressed in the local newspapers and also expressed during various public hearings that were conducted in the past for different projects in the area. The boundary of CPA was drawn on collated Topographic sheet as shown in red line in **Figure- 2.3**.

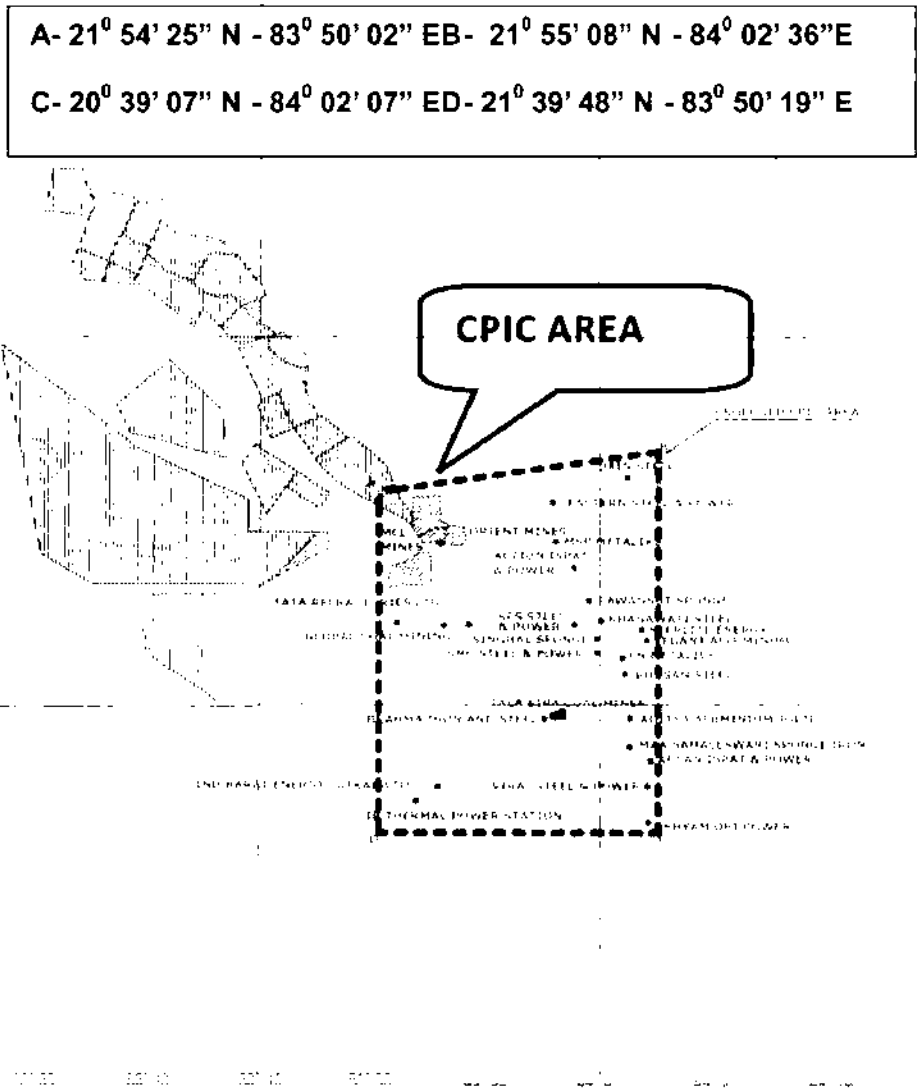


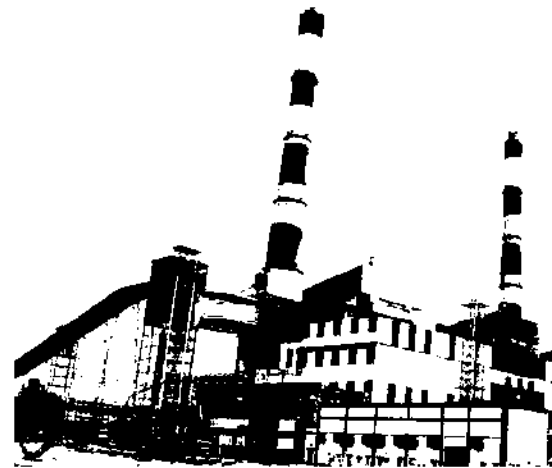
Fig-2.3 The boundary demarcation of CPA of Ib Valley-Jharsuguda of Odisha

The Critically Polluted Area of Ib Valley-Jharsuguda spreads over an area of about 580 km² which falls partly in Sambalpur district and partly in Jharsuguda district. Rengali (partly) Block of Sambalpur district and Jharsuguda including Brajarajnagar NAC and Lakhanpur Block of Jharsuguda districts either partly or fully falls within this area. Estimated population living within the critically polluted area of Ib Valley-Jharsuguda is about 218000, based on 2011 census.

Chapter - 3

Status of Industrial and Mining Activities (2010-11 to 2014-15)

- Industrial Growth during 2010-15
- Pollution control practices in major sectors



Chapter-3

Status of Industrial and Mining Activities (2010-11 to 2014-15)

3.1 Industrial Growth during 2010-15

Industries are classified as Red, Orange and Green on the basis of pollution potential of the unit. The Red Category is again sub-divided into Red-A (17 category of Highly polluting industry) and Red-B (54-categories of polluting industries). Within the CEPI framework it is the Red Category (i.e. both Red-A and Red-B) industries which are factored in for determining the aggregate index.

Ib Valley-Jharsuguda is dominated with RED category of industries mostly power plants, steel, cement, aluminium and coal mines. However minor industries in this area are mostly in the sector of Stone Crusher, Health Care Units, brick kilns and Hotels. The environmental quality of the area is mostly driven by the major industries. The numbers of such industries have remained same i.e. for 49 in 2010 and 49 in 2015 as shown in **Table- 3.1**. The list of RED (A) and Red (B) category of industries operating within the cluster at the time of commencement of action plan and addition or expansion in capacity during the plan period within the cluster is presented **Annexure-2**.

It is observed that the capacities of some the industrial units in this cluster have grown during period of implementation of action plan. A sector-wise comparative scenario of the industries and mines operating within the CPA during the action plan period is presented in **Table - 3.2, Figure - 3.1 and Table - 3.3**.

Table - 3.1 Summary of RED Category industries in Angul- Talcher area during 2010-11 to 2014-15

Sl. No.	Type of industries	Nos During 2010-11	Nos During 2014-15
1	RED-A (17 categories of highly polluting type)	23	26
2	RED-B Refractories & Coal Washerries	15	13
3	RED-B (Coal Mines)	11	10
TOTAL		49	49

Growth of polluting units

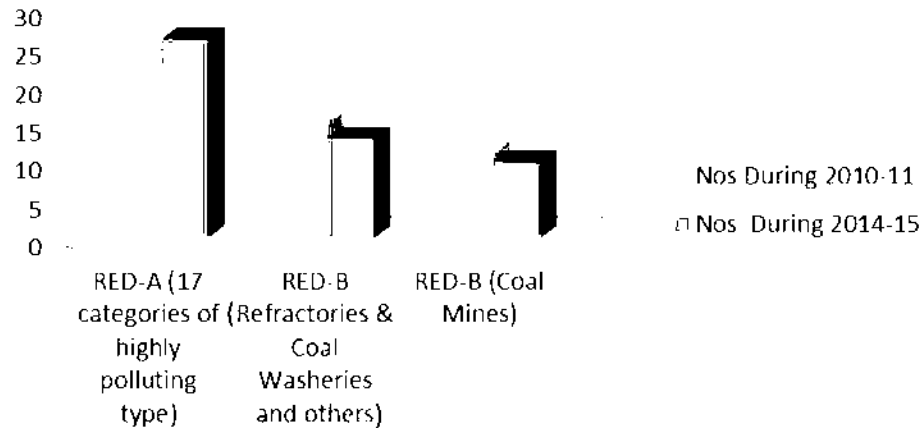


Fig - 3.1 Red Category of Industries in CPA of Ib valley-Jharsuguda

Table - 3.2 Numbers and capacities of RED industries in Ib Valley-Jharsuguda CPA during 2010-11 to 2014-15

Sl. No	Industrial sector	Period 2010-11		Period 2014-15	
		Numbers	Capacity	Numbers	Capacity
1.	Coal mines	11	23.71 MTPA	10	51.086 MTPA
2.	Thermal power plants	5	1955 MW	7	5301 MW
3.	Iron and Steel including sponge iron plants	16	4 MTPA	16	4.42 MTPA
4.	Aluminum smelter	1	0.25 MTPA	2	1.135 MTPA
5.	Cement	1	0.70 MTPA	1	4 MTPA
6.	Coal Washeries	3	9.5 MTPA	3	9.5 MTPA

There are a good number of other red category units. The list of such other units like Health Care Units, Hotels, Automobile Service Centres etc. are also given in **Annexure-2**. The number of such units is given in **Table - 3.3**.

Table - 3.3 The number of industrial units in CPA

Industries	Type Number
Induction Furnace	02
Railway Sidings	03
Mineral Stack Yards	01
Stone Crushers	14
Miscellaneous Red	23
Health Care Units	29
Brick Kilns	14
Hotels	25
Miscellaneous Orange	14
Fly Ash Brick Units	13
Miscellaneous Green	18

3.2 Pollution Control Practices in Major Sectors

As indicated in **Table-3.3** and **Table-3.3** , the area is dominated with Red Category of industries like Thermal Power Plant, Iron & steel, Refractory Industries, Aluminium Smelter, Coal Mines and Coal Washeries. These industries being highly polluting in nature requires robust infrastructure for pollution control and part of action plan focus was for improvement in these infrastructure. The pollution control infrastructure in these industries in terms of Air Pollution Control, Water Pollution Control, Solid & Hazardous Waste Management over a period of five years is given in following paragraphs for each sector.

3.2.1 Thermal Power sector

3.2.1.1 Air Pollution Control:

All the Thermal Power Plants (TPPs) have installed Electro Static Precipitator as basic air pollution control device for control of particulate matter from stacks. The standard for emission of particulate matter from stacks of TPPs is 150 mg/Nm³ as per the provisions of Environment Protection Act 1986. However in order to reduce concentration of the Suspended Particulate Matter (SPM) and Respirable Suspended Particulate Matter with diameter of 10 µm or less in the ambient air, a stringent standard of 50 mg/Nm³ for particulate matter emission from TPP stacks was envisaged through the action plan. The TPPs have also installed bag filters/ dust suppression measures at coal circuits for control of air pollution during coal handling. During formulation of action plan all the thermal power plants were instructed to augment the capacity of ESP to achieve stricter emission standard.

3.2.1.2 Water Pollution Control:

All the thermal power plants within the CPA have adopted recirculation of ash pond effluent for control of water pollution. The TPPs have installed Sewage Treatment Plants (STPs) in their townships for control of organic pollution from domestic discharge. During formulation of action plan all the thermal power plants were instructed to recycle industrial effluent to achieve zero discharge during non-monsoon season.

3.2.1.3 Solid/ Hazardous Waste Management

The Thermal Power Plants have installed Ash Pond/ Ash Mounds for ash management. The TPPs have also installed ash silos for storage of dry fly ash for subsequent utilization of making ash based products. The utilization of fly ash during last five years is presented in **Figure-3.2**

Used oil and waste oil are two major hazardous waste generated form TPPs. The used oil is disposed of through authorized recyclers and waste containing oil is stored in impervious pits and utilized for energy recovery.

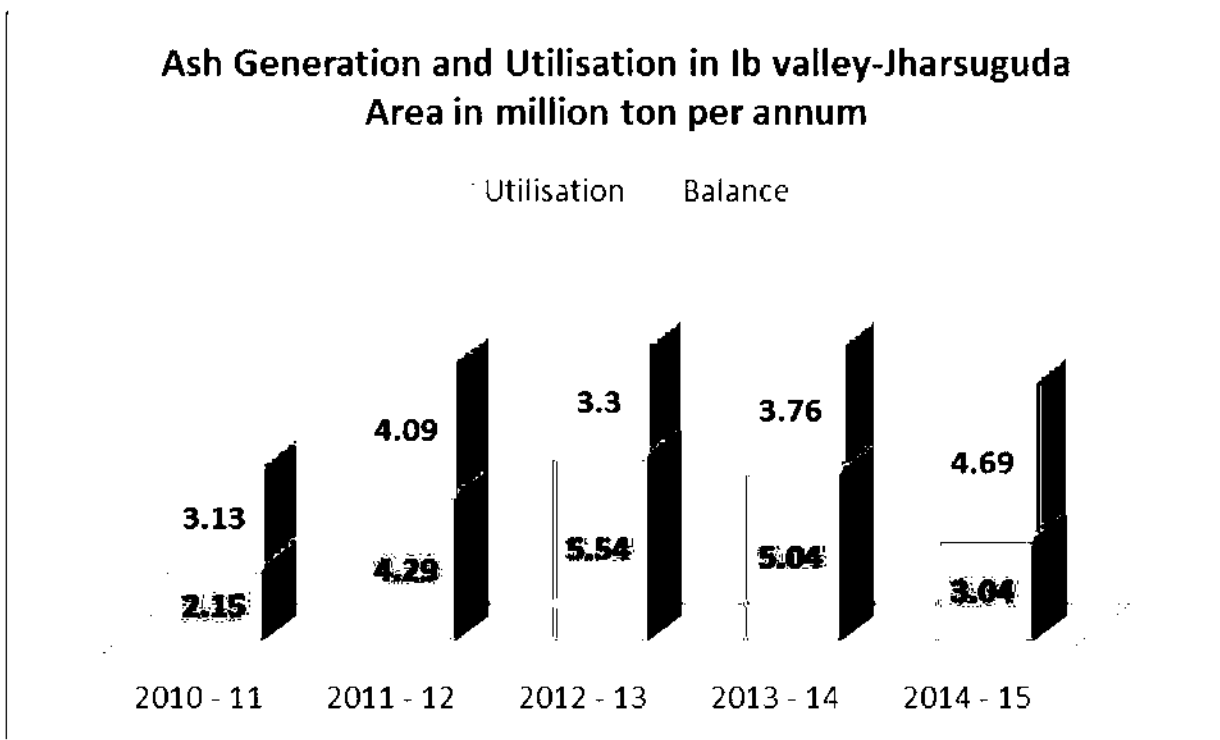


Fig-3.2 Ash generation and Utilization in Ib Valley-Jharsuguda area

3.2.2 Aluminium Smelter

3.2.2.1 Air Pollution Control

Vedanta Smelter was the only aluminium smelter in the CPA. During implementation of action plan, another smelter namely Aditya Alluminium has commissioned its Smelter Plant in CPA. Fluoride is the main pollutant in aluminium smelters, which is emitted from the pot room and also fluoride is also discharged through the effluent. Both the smelters have provided dry type fume treatment plant (FTP) for controlling fluoride emission from the potlines. The collected fluoride bearing dust is recycled back into the process. The bake ovens are also provided with FTPs for control of fluoride emission from the units. During implementation of action plan both the Smelters have also installed online monitoring facilities for round the clock emission monitoring. Stricter Fluoride emission standard has been enforced.

3.2.2.2 Water Pollution Control:

VAL and Aditya Aluminium have installed de-fluoridation plant for control of discharge of fluoride bearing effluent to nearby water body. The Smelters have installed STPs in their townships to control organic pollution from domestic discharge. Online monitoring of ETP outlet has been enforced for keeping a round the clock vigil on the plant.

3.2.2.3 Solid/ Hazardous Waste Management

The solid waste generated from Aluminium smelter is mostly hazardous in nature because it is primarily contaminated with fluoride and cyanide. VAL has installed Secured Land Fill within its premises for disposal of land fillable hazardous waste in the secured landfill. VAL has also installed one hazardous waste incinerator for disposal of incinerable hazardous waste. During the implementation of action plan VAL has taken steps for reuse/ recycle of hazardous waste like, green anode waste, rodding shop waste, aluminum dross etc. for minimization of quantity of hazardous waste for final disposal. VAL has also been accorded with permission under Rule 11 of Hazardous Waste (Management, Handling and Transboundary Movement) Rule 2008 for Co-incineration of hazardous waste like spent anode butts in its Captive Power Plants. Further utilization of hazardous waste like Spent Pot linings in Cement Kilns/ TPPs is under trial.

3.2.3 Iron, Steel & Ferro Alloy Plants

3.2.3.1 Air Pollution Control:

All the Ferro Alloys, iron and steel plants have installed Electrostatic Precipitator as basic air pollution control device for control of particulate matter emission from stacks. The Steel Plants have also installed bag filters/ dust suppression measures at coal circuits for control of air pollution during coal handling. The ferro alloy plants have installed Gas Cleaning Plants in Ferro Alloy Furnaces for control of particulate matter emission. These industries have also been directed to install Pneumatic Dust Handling System at the hoppers of ESPs and Bag filters for mechanized handling of dust.

3.2.3.2 Water Pollution Control:

All the Iron and Steel plants have provided garland drains around dump sites for control of water pollution. The water used for cooling is recycled.

3.2.3.3 Solid/ Hazardous Waste Management

All the Steel Plants have provided Solid Waste dumpsites for disposal of char and dusts. During the implementation of action plan the Steel Plants have taken steps for utilization of mineral char for energy recovery in AFBC boilers.

Used oil and waste oil are two major hazardous waste generated from Steel and Ferro alloy Plants. The used oil is disposed of through authorized recyclers and waste containing oil is stored in impervious pits and utilized for energy recovery. The flue dust collected from air pollution device of ferro alloy units is briquetted and recycled into the furnace as raw material.



3.2.4 Coal Mines

3.2.4.1 Air Pollution Control:

The excavation of coal through conventional drilling, blasting and Dumper-Shovel method in open cast mining has been replaced by surface mining technology which is considered as a clean technology. In the FY 2014-15, 94.55% of coal production has been done through surface miner technology. Use of surface miner having inbuilt dust suppression system has reduced the air pollution problem that is being caused due to the drilling, blasting and Dumper-Shovel method of mining followed by sizing of coal in CHP adopted earlier. However for removal of OB, drilling and blasting method is practiced and for control of air pollution, wet drilling and controlled blasting is being adopted. Water sprinkling on mine haulage road & internal coal transportation roads by deploying mobile water tankers is being done to prevent the dust generation due to movement of heavy earth moving vehicles and other material transportation vehicles. Dust suppression systems in coal handling plants wherever exist, fire fighting arrangements in coal stockyard, fixed water sprinkling at the railway siding area has been provided for control of air pollution. Enhancement of rake loading facilities of coal has also been implemented. At present maximum quantity of coal is being transported through rail. In the year 2014-15 83% of total production has been transported through rail. Since road transportation has been reduced, pollution potential has been minimized.

3.2.4.2 Water Pollution Control:

Mine strata water and surface runoff water are generally accumulated in the opencast mine sumps (decoaled area). Such mine drainage water is used for water sprinkling purpose, in mine lease area for control of dust emission. Excess water if any is discharged to outside whenever required after compliance of stipulated standards. Oil and grease traps (ETPs) with settling arrangement is provided for treatment of workshop effluent in the mines and the treated wastewater is generally reused. The domestic wastewater generated in the townships is discharged to septic tank and soak pit or treated in Sewage Treatment Plant (STPs) before discharging to outside. Three numbers of STPs have been constructed in Ib Valley Area in different residential colonies for treatment of domestic wastewater which covers Samaleswari OCP, Lajkura OCP and Belpahar OCP. Garland drains with settling pond wherever required have been provided for controlled discharge of surface runoff generated during rainy season.

3.2.4.3 Solid and hazardous waste Management

The external OB dumps in the mines have been stabilized & biologically reclaimed. Backfilling of the mined out area (decoaled area) using internal OB is presently continuing in opencast mines followed by technical reclamation of the backfilled area. Since the mines are yet to be declared abandoned, the mine void filling in OCP using fly ash is yet to commence in Ib Valley area.

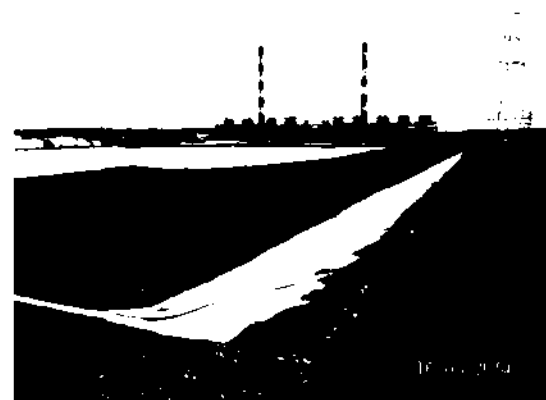
Used oil, waste oil and oil filters are major hazardous waste generated from Coal Mines. The used oil is disposed of through authorized recyclers and waste containing oil is stored in impervious pits for disposal in hazardous waste incinerators.



Chapter - 4

Key Action Points

- Summary of Action Points for abatement of pollution in Ib Valley - Jharsuguda area



Chapter-4

Key Action Points

4.0 Introduction

Based on the background information, monitoring reports, findings of REMP under preparation by National Environmental Engineering Research Institute (NEERI), Nagpur and taking into the consideration public concerns on local environmental issues, voiced through the local news papers and through the public hearings conducted by SPCB, a five year action plan for Ib Valley-Jharsuguda area was prepared. It was envisaged to implement this action plan during 2010-11 to 2014-15. The action points were aligned to the environmental issues of the area and sector specific abatement strategies were drawn up with time line set for achievement of sector specific objectives. Some of the action points had short terms goals and other are medium to long term goals. In this chapter a brief summary of the Action Plan is described, and for details the full volume of Action Plan may be referred.

4.1 Summary of Action Points for abatement of pollution in Ib valley-Jharsuguda area

Improvement in environmental management practice, technological up-gradation in process and pollution control, development of adequate infrastructure remained the main thematic area of the Action Plan. The detailed Action Plan describes the action to be undertaken by each unit within the CPA which is available in full volume of the Action Plan. The Action Plan is summarized by aggregating the common actions in each sector to be taken and the a summary of sector wise action points is described in **Annexure-3**. However for bird's-eye view the key action points are further summarized and the summarized Key Action Points and expected environmental benefits of implemented actions are presented the **Table- 4.1**

Table- 4.1 Key Action Points for Abatement of Pollution in Ib Valley-Jharsuguda area

Sl.No.	Action	Expected Environment Benefit
1.	Up-gradation of ESPs in Thermal Power Plants	Reduction of PM_{10} and $PM_{2.5}$ in ambient air
2.	Installation of Online Monitoring equipment in major polluting industries for continuous monitoring of stack emission and ambient air quality	Ensures that the air pollution control equipment are operated at all times and monitoring results can be obtained on a real time basis.
3.	Coal production through surface miners	This eliminates drilling and blasting in mines, thus reduces fugitive dust emission.
4.	Installation of ESP/GCP in sponge iron plant	Particulate matter emission reduction from sponge iron plant thus reduction of PM_{10} , $PM_{2.5}$ in ambient air

Annexure 5

Online Monitoring Facility for Stacks and Ambient Air

- Real time Ambient Air Quality monitoring facility
- Online Stack monitoring facility



Chapter-5

Status of Action Plan Implementation

5.0 Introduction

The Action Plan for abatement of pollution in Ib Valley-Jharsuguda area envisaged various activities to be taken up in the area; installation and up-gradation of pollution control equipment, establishment of STPs, development of infrastructure and establishment of a monitoring system. It was envisaged in the Action Plan to implement the projects within a period of five years. The unit wise implementation of action points is given in **Annexure-4** and is summarised in following sections.

5.1 Upgradation of Electro Static Precipitators

At the time of formulating Action Plan the emission standard of particulate matter from the stacks of thermal power plants was 150 mg/ Nm^3 . The Electrostatic Precipitator (ESPs) are the basic Air Pollution Control Device (APCD) for control of particulate matter emission from the boilers of thermal power plants. It was envisaged under the action plan, to upgrade the ESPs so that they can meet a stringent emission standard of 50 mg/ Nm^3 for particulate matter, as a result suspended particulate matter and respirable particulate matter at ground level can be brought down. Under this action point it was proposed to upgrade/install 33 ESPs to enable them to meet a PM emission standard of 50 mg/ Nm^3 , out of which at the end of Action Plan period 32 ESPs have achieved the desired result to meet emission standard of 50 mg/ Nm^3 (**Figure-7.1**). The detail unit wise status of up gradation of ESPs in different TPPs is given in **Annexure-4**.

5.2 Online Monitoring for Stacks and Ambient Air

The monitoring of environmental parameters for ambient air is carried out by means of High Volume Samplers/ Respirable Dust Samplers installed at specific locations. The monitoring results provide the average concentration of air quality parameters like suspended particulate matter, respirable particulate matter (PM_{10} and $\text{PM}_{2.5}$), Sulphur Dioxide (SO_2), Nitrogen Oxides (NO_x) and other parameters like, Carbon Monoxide, Ozone etc.

Similarly the monitoring of emission quality parameters for Stack emission is carried out by stack monitoring kits. The monitoring results provide the concentration of air pollutant parameters like Particulate Matter, Sulphur Dioxide (SO_2), Nitrogen Oxides (NO_x). The manual monitoring methods were proven to be inadequate in the case of highly fluctuating emission quality.

It was envisaged under the action plan to make provisions for online monitoring of stack emission and ambient air quality for major polluting industries in the CPA, so that AAQ and Stack Emissions can be monitored in real time and these observed data can be made directly available at the server of SPCB. Under this action point it was proposed to install 40 real-time AAQ Monitoring Stations, out of which at the end of Action Plan period 28 nos of real-time AAQ Monitoring Stations have been installed and similarly it was envisaged to install 63 online Stack Monitoring facility for monitoring of particulate matter emission from stacks, out of which at the end of Action Plan period 57 of online stack monitoring facilities have been installed for monitoring of different parameters. The status of implementation of online stack

monitoring and AAQ in major polluting industries is given in **Table-5.1**. Apart from these M/S Bhusan Power and Steel Ltd. and other steel industries have also installed online stack monitoring facility for Sinter Plant, Coke Ovens, and SMS units. The details of online monitoring facility for Stack Emissions and AAQ monitoring in individual industries is presented in **Annexure-5**.

Table - 5.1 Installation of Online Stack Monitoring equipment and AAQ Monitoring Station

Sector	No. of Industries	Nos. of Online Stack monitoring facility	Nos. of real-time AAQ monitoring stations
Aluminium	02	11	8
Iron & Steel (Including sponge iron)	15	18	12
Thermal Power	07	28	08
Total	24	57	28

5.3 Installation of ESPs in all DRI Kilns with PDHS for handling of dust

The sponge iron plant emit particulate matter to the atmosphere and also generate significant quantity of solid waste to the tune of 0.7 to 1 ton of solid waste per ton of sponge iron produced. This solid waste collected from APC devices like ESPs and Bag filters generate fugitive emission during unloading and handling. It was envisaged under the action plan that, all the DRI units shall provide ESPs at the Kiln and bag filters at other dust generating points. These units shall also install pneumatic dust handling system for collection of dust from ESP as well as Bag filter hoppers. These dust are to be collected in silos and to be disposed of at designated dump yards. With the persistent effort of SPCB all the DRI Units have installed ESPs at Kilns and provided PDHS at hoppers of ESP and bag filters. Under this action point it was proposed to install 52 ESPs with PDHS for dust handling out of which at the end of Action Plan period 52 ESPs with PDHS have been installed (**Figure-7.1**). The compliance status of individual units is given in **Annexure-4**.

5.4 Production of coal through surface miners

Drilling and blasting in mining area are a major source of fugitive emission of particulate matter. It was therefore envisaged to replace the conventional mining methods having shovel-dumper, since they require drilling and blasting. Use of surface miner in coal mines have been proved to be useful since in this method the drilling and blasting is eliminated.

Mining through conventional Dumper-Shovel method in open cast mining has been replaced with surface mining technology in most of the mines. Water jets are in-built in the cutting/milling drum of surface miners and there is interlocking arrangement for water spraying with cutting/milling drum in surface miners. As water spraying is done during cutting of coal, the coal is wet, so less dust is generated during loading and transportation. Further, the surface miners have inbuilt dust suppression systems, which takes care of the air pollution problems.

Mining through surface miners result in smooth high wall and no blast induced cracks, therefore entry of oxygen is restricted, thus it reduces the possibility of fire and spontaneous heating in coal seam and stock.

In Ib Valley coal production through surface miner was increased from 80% in 2010-11 to 95% in 2014-15. The status of increase in use of surface mines in coal mining in Ib Valley Coal Fields for the year 2010-11 to 2014-15 is presented in the **Figure-5.1**. The statistical details are presented in **Annexure-6**.

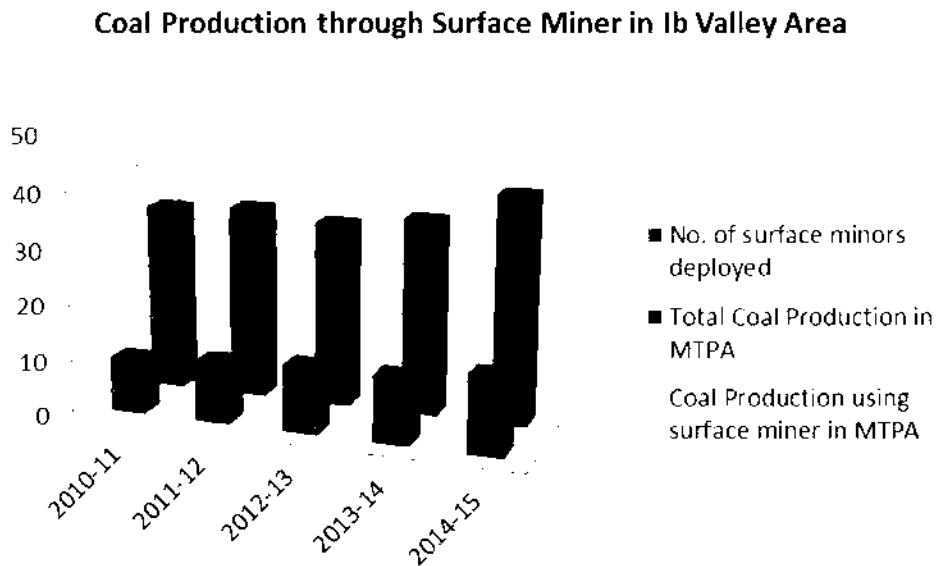


Fig - 5.1 Use of Surface Miner for raising of coal in Ib Valley Area

5.5 Construction of dedicated coal corridor

Coal transportation through public road causes a lot of inconvenience to locals and also has significant impact on local air quality due to generation of fugitive dust. As far as practicable coal transportation to the consumers through Rail is the top priority and preference, because one single rake transports approximately 3,800 ton of coal causing less pollution and for transporting the same quantity of 3,800 ton of coal approximately 250 trucks will be required, which will have significant pollution. However to cater to the coal demand of local Industries, the principle of minimum possible truck transportation is required. In Ib Valley coal field around 80% to 85% of coal is transported through rail.

It was envisaged under the action plan that a dedicated coal transport corridor is to be constructed to avoid traffic congestion and reduction of fugitive dust in the area. The MCL has planned 12.5 km long all weather Pucca road from Bundia Mines to NH 200 (near Orient Mine No.4) that includes the internal roads from different mines connecting the Road Corridor. Black topping of coal corridor is completed. However as the contract for re-surfacing at a cost of Rs. 272 Cr was not started by the contractor M/s ARSS. Now the Coal Corridor from Bundia Mines to NH 200 (near Orient Mine No.4), which is of 12.54 km length has been proposed for re-surfacing for which re-tendering of the work is being taken up. Annual repair and maintenance of this corridor being taken up, departmentally/ contractually as and when required basis. The photograph of coal transport corridor is given in **Figure-5.2**.

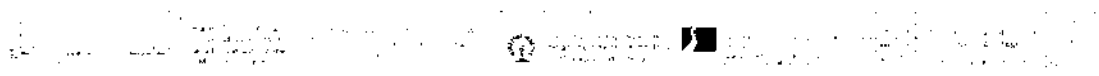


Fig - 5.2 Proposed dedicated coal transport corridor.

5.6 Drinking Water supply to peripheral villages

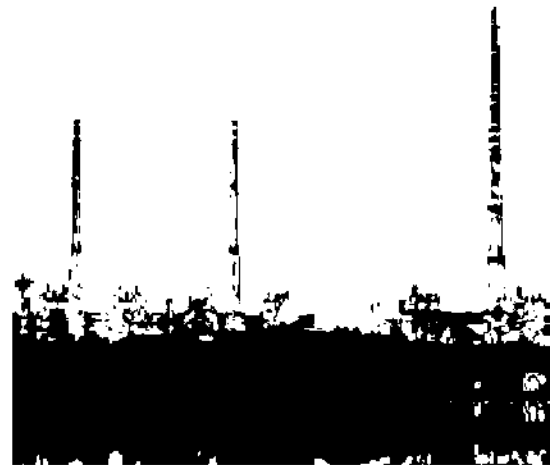
The Coal Mines area of Ib Valley coalfields is a water scarce area. The availability of potable drinking water for the locals in coal belt is a challenging task. Large Scale mining below the ground water table cause recession of ground water level in this vicinity. The pollution issue for water and ground water environment are two components of CEPI. During coal mining operation, dewatering of ground water table or pumping out of mine strata water is required to ease mining operation. This water, with treatment can be used as a drinking water source. It was envisaged under the action plan that MCL should make available drinking water to the peripheral villages to solve the water scarcity problem of the area. It will have an indirect impact on the CEPI for water and ground water environment.

The MCL has taken up this action point and supplying potable water to the peripheral villages through pipe water supply and also through water tanker. The source of water are local nalas, River Ib and mine strata water. The execution of pipe water supply scheme completed during 2014-15. In Ib Valley coalfield area for the period 2014-15, one peripheral villages are covered under piped water supply scheme of MCL being implemented through Departmental Services. Under this scheme 100 people are covered and 5 KLD of water is supplied to the village. The MCL is also supplying drinking water to peripheral villages of Coal Mines through water tanker. The status of supply of drinking water to the peripheral villages by MCL through water tanker supply are presented in **Figure-5.3**. For further details **Annexure-6** may be referred.

Annexure 7

Monitoring of Environmental Quality in CPA by SPCB

- Concentration range of critical parameters in the surface water environment
- BOD and TC in Brahmani river in CPA during 2010-2014
- Analysis results of water samples collected from surrounding area of M/s. Nalco Smelter, Angul.
- Ground water quality monitoring report for sample collected during October, 2014



Capacity of water storage reservoirs in Ib Valley Coalfields

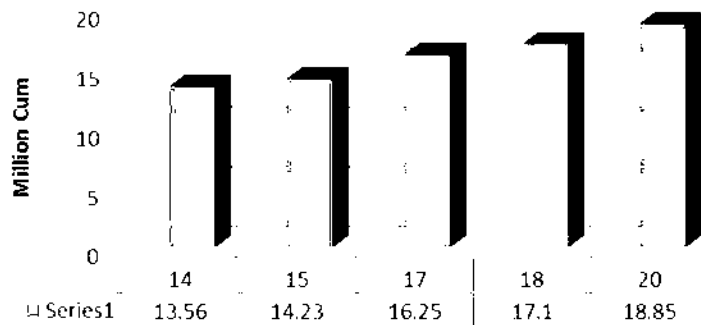


Fig - 5.5 The growth of water storage reservoirs in Ib Valley Coal Fields during last five years

5.8. Concurrent backfilling of fly ash in OB Dump area and filling of fly ash in mine voids

During excavation of coal, terminal voids are created in the coalfield. Presently no Quarry or Mine has been abandoned in Ib valley area. Stripping ratio is also relatively high. Lower seams have not been exhausted. Hence, Ib Valley coalfield opencast mines are not in a position to accommodate flyash in the quarry voids at present.

5.9 Enhancement of rake loading facility in coal mines

As far as practicable coal transportation to the consumers through Rail is the top priority, because one single rake transports approximately 3,800 ton of coal which is equivalent to 250 trucks by road. However to cater to the coal demand of local Industries, MCL is following the principle of minimum possible truck transportation. In Ib Valley coalfield 17% of total dispatch was made through road transportation in 2014-15 and, balance 83% was through rail transportation. The details of despatch of coal through railway rakes for the period 2010-11 to 2014-15 is given in **Figure-5.6** and **5.7** and statistical details is given in **Annexure-6**

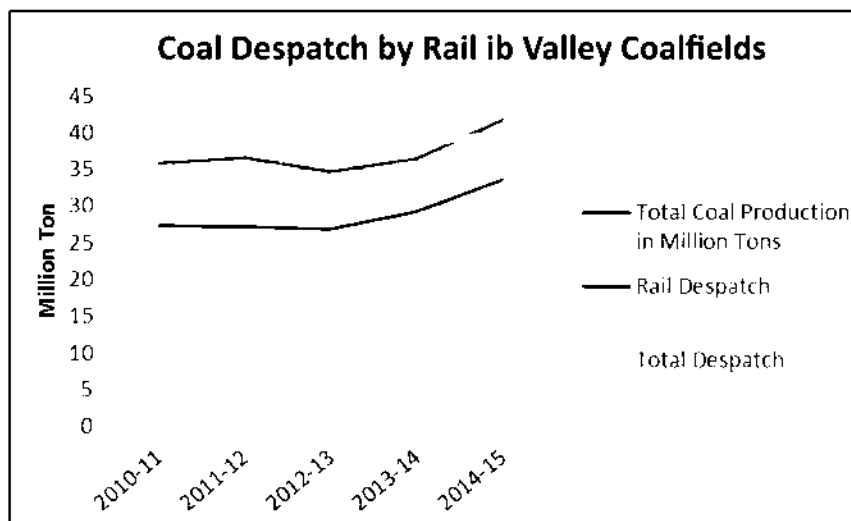


Fig - 5.6 Enhancement of rake loading facility in coal mines



Fig - 5.7 Rake loading facility in Railway siding in Lakhanpur OCP

5.10 Comprehensive Coal Mine Fire Control Plan

In summer season due to self-oxidation, the exposed coal seam and stockyards of the coal mines catch fire and contribute to rise in temperature. For effective fire control in the Ib Valley coalfields, it was envisaged that, MCL shall take up a comprehensive coal mine fire control plan and implement it mine wise. The MCL has made pipe line arrangement for water spraying on exposed coal seams. It has engaged water tankers for water spraying for fire control. The coal stock is made dome shaped for least exposure to heat. Sometimes blanketing is done to prevent coal fire. Besides minimum coal stock is maintained to prevent coal fire (Fig-5.8).



Fig - 5.8 Fire fighting at coal stockyard and compaction of stock to prevent fire

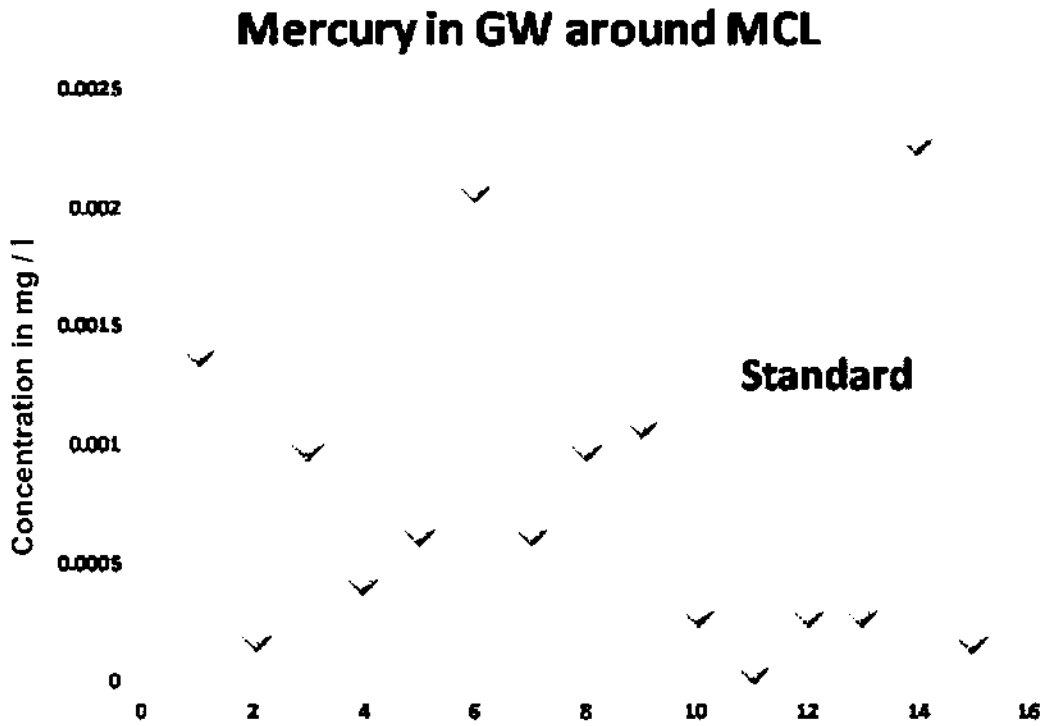


Fig-6.10 The Concentration of Mercury in Ground Water Environment around MCL area of CPA

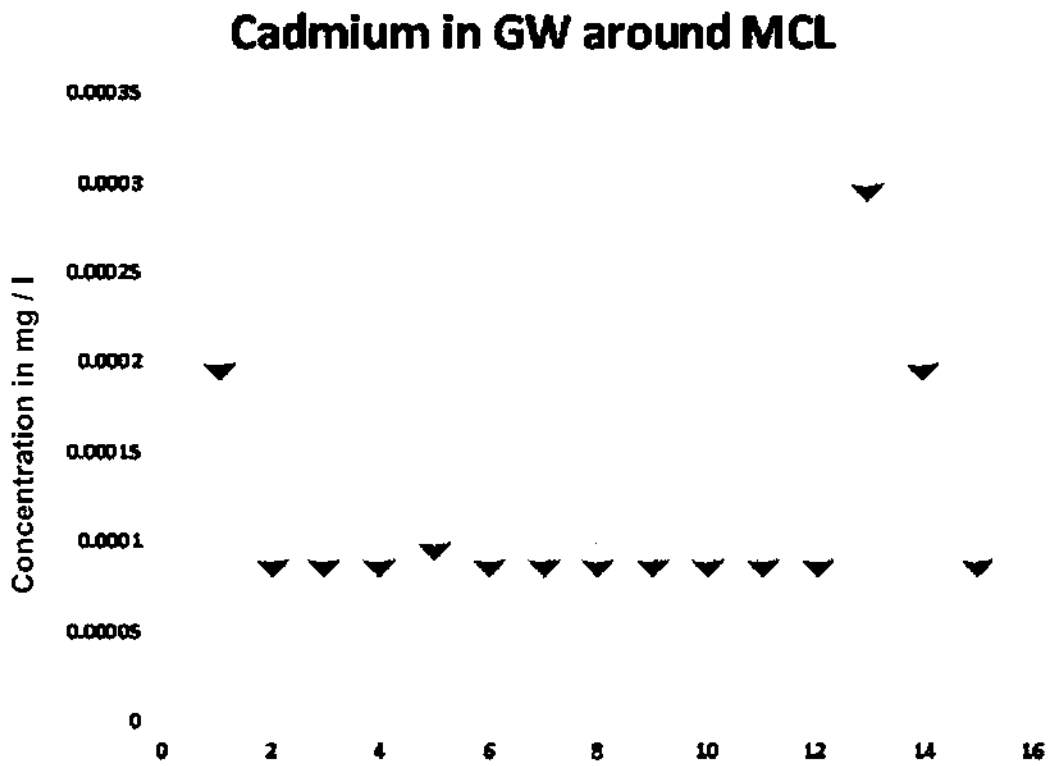


Fig-6.11 The Concentration of Lead in Ground Water Environment around MCL area of CPA

5.12 Installation of Sewage Treatment Plants in CPA

Discharge of untreated sewage is the major reason of water pollution in rivers. With the persistent effort of SPCB, most of the major water polluting industries have installed effluent treatment plants and are reusing/ recycling treated effluent for achieving zero process discharge. The treated effluent from STPs are utilised for horticulture purpose. It was therefore envisaged under the action plan to install STPs for treatment of domestic effluent from Brajaraj Nagar and Jharsuguda town for control of organic pollution in river Mahanadi and its tributaries. As per the latest information received the construction of STP has not commenced. The status of STPs in Industrial and Mining Establishments in area is given in **Table-5.3**. In this area about 7.22 MLD of sewage is treated in 11 STPs in different industrial and mining colonies.

Table - 5.3 STPs in Industrial & Mining Establishments in CPIC area

Sl No.	Name and location of the unit	No of STP	Capacity (KLD)	Total capacity (KLD)
1.	Odisha Power Generation Corporation Ltd., ITPS Banharpali, Jharsuguda	01	1000	1000
2.	Vedanta Limited, Bhurkhamunda, Jharsuguda, (Smelter & CPP)	02	240 (Smelter & CPP) 1200 (Township)	1440
3.	Vedanta Limited, Bhurkhamunda, Jharsuguda, IPP	02	2x240	480
4.	TRL Krosaki Refractories Ltd., Belpahar, Jharsuguda	01	100 (Under Construction)	100
5.	Samaleswari OCP of M/s. MCL, Ib Valley Area, Dist: Jharsuguda	01	500	500
6.	Lajkura OCP of M/s. MCL, Ib Valley Area, Dist: Jharsuguda	01	500 (Under Construction)	500
7.	Belpahar OCM of M/s. MCL, Lakhanpur Area, At/Po - Bandhabahal, Jharsuguda	01	1700 (At integrated township of Lakhanpur Area)	1700
8.	Bhusan Steel and Power Ltd. Telkoi, Sambalpur	02	300 (Plant) 900 (Township)	1200
9.	Aditya Aluminium Ltd. Sambalpur	02	600 (Plant) 300 (Township)	900
	Total	13		--

5.13 Promotion of industries that uses waste products like fly ash, char and waste heat

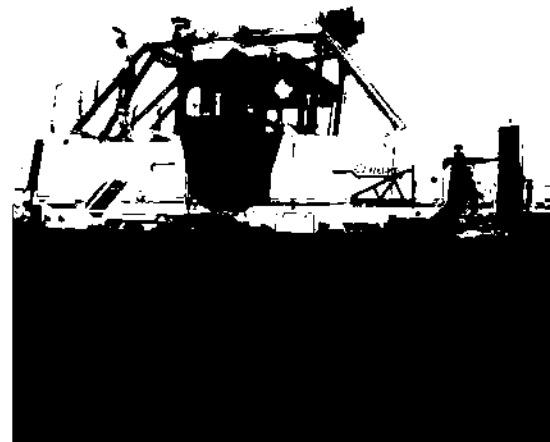
It was envisaged under the action plan to promote establishment of industries that can use waste products like fly ash, char, waste heat etc as raw material and transform them into suitable products. The fly ash bricks in general adopt FAL-G technology to manufacture fly bricks. It was envisaged under the action plan to create ash silos in TPPs for storage of fly ash for uninterrupted supply of fly ash to the fly ash brick plant and ash based product units. All the TPPs in this CPA have created ash silos for storage of dry ash for supply to fly ash brick units. The status of installation of ash silos in individual TPPs is given in **Annexure-3**. It is observed that the total capacity of ash silos established in CPA is 26020 Tons. In Ib Valley Jharsuguda area 13 Fly Ash brick plants have been established with combined ash brick making capacity of 45.5 million bricks per annum. The details of fly ash brick units in this area is given in **Annexure-2**

The Char and waste heat generating DRI industries have also installed 17 AFBC boilers and 29 WHRB Boilers for utilisation of char and waste heat respectively for generation of electric power.

Chapter - 6

Quality of Environment in Ib Valley - Jharsuguda Area

- Environmental Monitoring by SPC Board
- Environmental Monitoring by CPCB



Chapter-6

Quality of Environment in Ib Valley-Jharsuguda Area

6.0 Introduction

Environmental parameters are monitored in CPA to determine the level of pollution in ambient air, surface and ground water and subsequent evaluation of CEPI. Two types of the environmental parameters are monitored 'parameters requiring close watch' and 'critical parameter'. The parameters which requires close watch depends upon the local geo-ecological condition and the nature of industrial and mining activity. The criticality of environmental parameters however does not mean that the level of concentration of these parameters has exceeded the desired level, rather it means that efforts must be made to see that the concentration of such parameters remains within the limit. The CEPI score is sensitive to the change in concentration of these critical parameters. The sensitive parameters for Ib Valley-Jharsuguda area as identified is given in **Table-6.1**

The parameters for different environmental media such as air, surface water and ground water were selected for monitoring keeping in mind the industrial and urban activities prevalent within the CPA and characteristics of pollution generated from such activities.

Table - 6.1 The sensitive environmental parameters in CEPI Framework.

Environmental media	Sensitive parameters	Group to which toxin belongs
Surface water	Fluoride, Nitrate-Nitrogen(NO ₃ -N) as N, Total Khejaldal Nitrogen (TKN)	Fluoride- Group-A Nitrate-Nitrogen(NO ₃ -N) as N - Group-B Total Khejaldal Nitrogen (TKN): Group-B
Ambient Air	PM ₁₀ , PM _{2.5} , Benzo (a) Pyrene (BaP)	PM ₁₀ , PM _{2.5} : Group-B Benzo (a) Pyrene (BaP):Group-C
Ground water	Fluoride, Nitrate-Nitrogen(NO ₃ -N) as N, Lead (Pb)	Fluoride- Group-A Nitrate-Nitrogen(NO ₃ -N) as N - Group-B Lead (Pb): Group-C

Monitoring of these parameters was conducted by CPCB, SPCB and MCL at different locations. The CPCB independently monitored the environmental quality of the CPA through third party under the monitoring program for CPA. Similarly SPCB monitors the water quality of rivers under National Water Quality Monitoring Program (NWQMP) and air quality under National Air Quality Monitoring Program (NAMP). Besides this, specific monitoring of important parameters are carried out by SPCB. Under the Action Plan, SPCB requested Mahanadi Coalfields Ltd. (MCL) to monitor certain heavy metals in ground water around the coalfield area. In this chapter we discuss the environmental quality as monitored by different agencies by compiling data sourced from all the above monitoring programs.

6.1 Environmental Monitoring by SPC Board

6.1.1 Water Quality Monitoring of Ib River

River Ib, a tributary of River Mahanadi flows within the CPA of Ib Valley and Jhasrsuguda. River Bheden also flows in this areas and joins river Mahanadi. State Pollution Control Board, Odisha monitors surface water quality parameters at two locations of Ib River in Ib Valley area namely at upstream and downstream of Brajaraj Nagar at Sundargarh. At Jhasrsuguda Surface water quality of Ib River and River Bheden is also monitored. The values of above parameters during the period 2010 to 2014 are annexed at **Annexure-7**.

In this report we focus on two conventional parameter, Biochemical Oxygen Demand (BOD) and Total Coliforms (TC) and three critical parameters - Fluoride, Nitrate and Total Khejaldal Nitrogen (TKN).

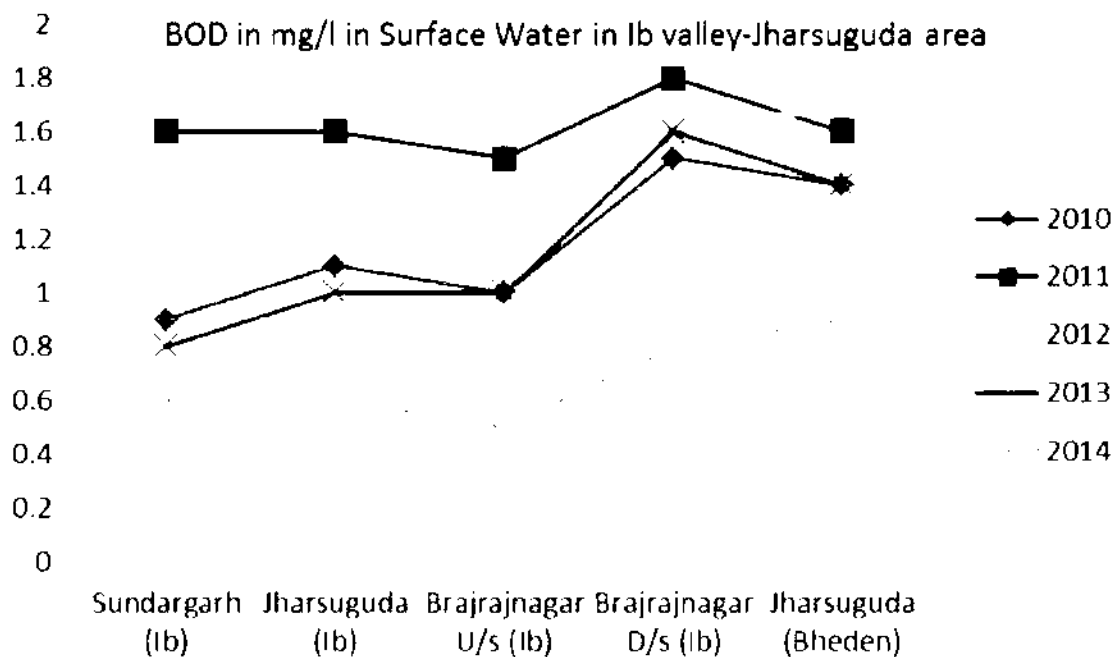


Fig - 6.1 The annual variation of BOD in surface water environment

The monitoring result for BOD suggests that BOD at Brajarajnagar downstream is always higher than upstream level likely due to the municipal wastewater contribution from Jhasrsuguda Municipality. Otherwise no definite trend is observed. It remains within the Class-C criteria of 3.0 mg/l (**Figure-6.1**). Similarly the value of Total Coliform (TC) also shows an increasing trend (**Figure-6.2**) in the same stretch.

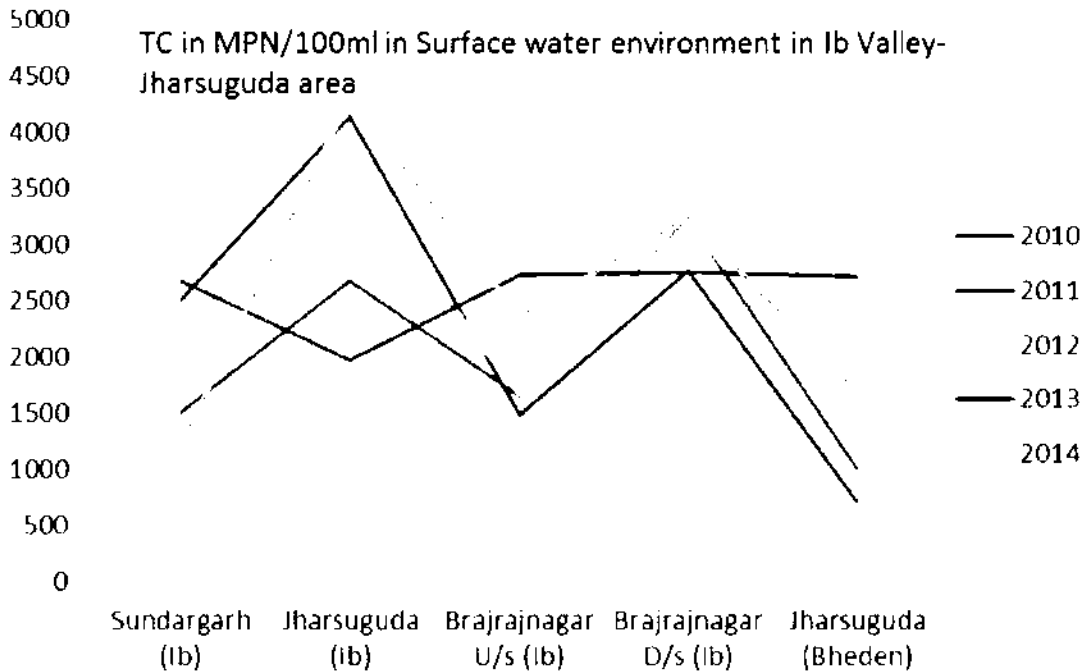


Fig - 6.2 The annual variation of TC in surface water environment

The trend and value of BOD and TC indicates that, river Ib in the downstream of Brajaraj Nagar is affected due to discharge of untreated sewage. But the BOD and TC value remain within the acceptable limit, of 3.0 mg/l, and 5000 MPN/100 ml.

The concentration of specific pollutants such as, Fluoride, Nitrate and TKN, in river Ib and Bheden flowing within the CPA remain within the norm during the five year period (**Figure-6.3** and **Figure-6.4**).

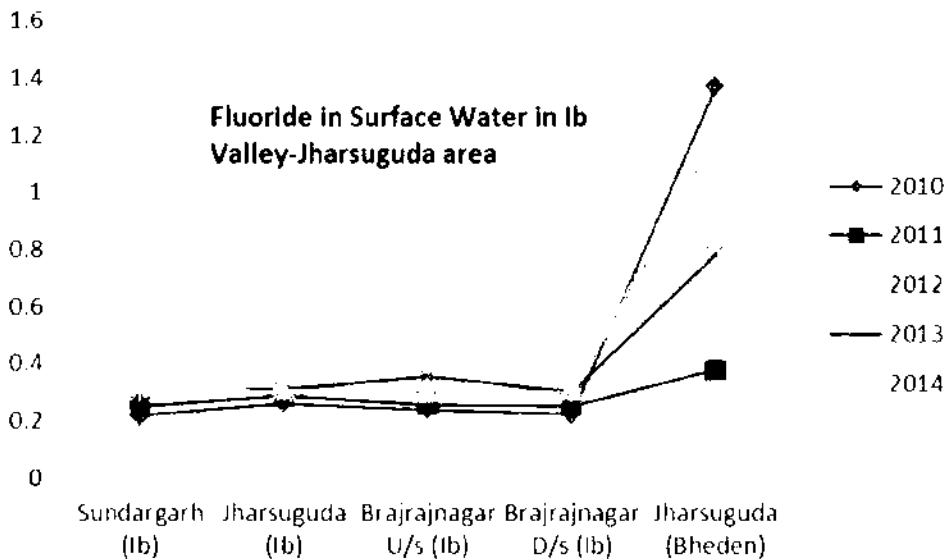


Fig - 6.3 The annual variation of Fluoride in surface water environment

The fluoride concentration, through within limit shows an increasing trend in the downstream of Bheden. On the contrary the nitrate concentration did not exhibit any specific trend (**Figure-6.4**) and its value also remain well within the standard of 45 mg/l. Similarly the concentration of Total Khejaldal Nitrogen (TKN) was observed to be within the acceptable limit.

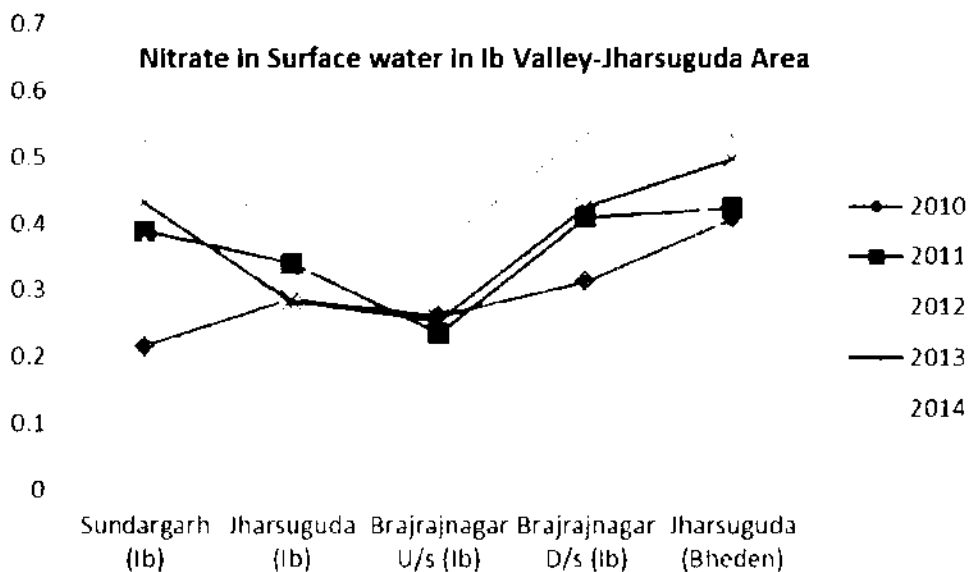


Fig - 6.4 The annual variation of Nitrate in surface water environment

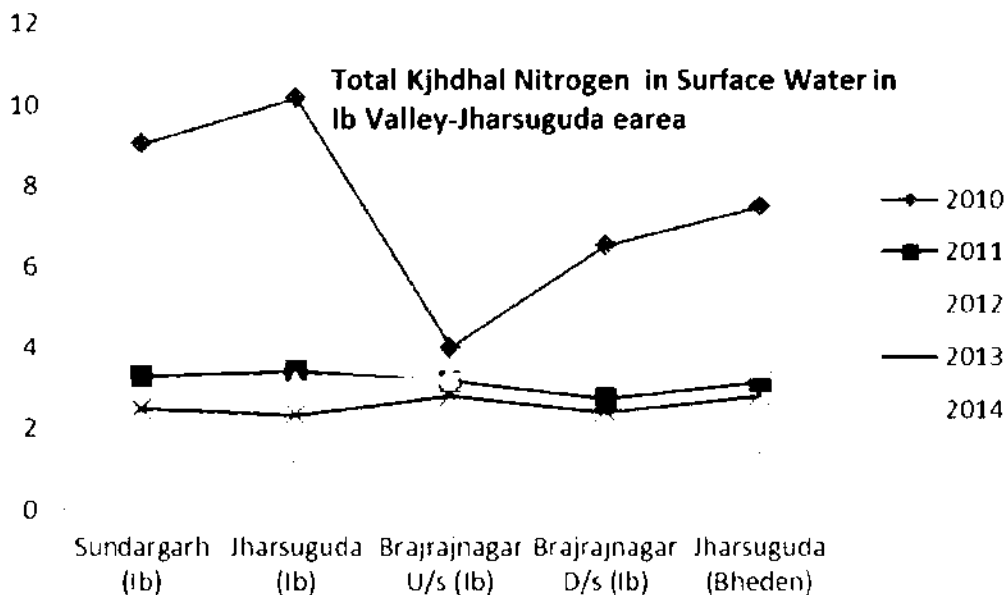


Fig - 6.5 The annual variation of TKN in surface water environment

6.1.2 Ambient Air Quality Status

For assessing the ambient air quality, the SPC Board, Odisha monitors ambient air quality in one location at Jharsuguda within the CPA at regular interval.

Within the CEPI framework, concentration of PM₁₀, PM_{2.5} and Benzo (a) Pyrene (BaP) in the ambient air are taken into consideration. Out of these three parameters, SPCB monitors PM₁₀ and PM_{2.5} and its value for 2014 shows that the mean annual value remain above the standard (Table-6.2).

Table-6.2 Ambient Air Quality Status of SPM & RSPM (Jharsuguda in 2014) Annual Average Value (24hourly range)

Location	Category	No of observation	SPM (µg/m ³)	RSPM (µg/m ³)
RO Building, COX Colony, Babubagicha, Jharsuguda	R	38	193 (173-220)	112 (102-125)

On the contrary the monitoring conducted by CPCB on 24 hours basis under the CEPI-monitoring program for Ib valley and Jharsuguda which indicates that the PM₁₀ concentration in ambient air is within the standard (Table -6.5 & 6.6). At the same time, concentration of PM_{2.5} and BaP as monitored by CPCB (Table- 6.5 & 6.6) is found to be within the standard.

On the other hand SO₂ being a common air pollutant was monitored and the results (Table-6.3) indicates that the concentration remains within the standard during 2014.

Table - 6.3 Ambient Air Quality Status of SO₂ & NO_x(Jharsuguda in 2014) Annual Average Value (24hourly range)

Location	Category	No of observation	SO ₂ (µg/m ³)	NO _x (µg/m ³)
RO Building, Cox Colony, Babubagicha, Jharsuguda	R	38	11.0 (8.8-15.0)	19.6 (15.5-24.0)

6.1.3 Ground Water Quality in CPA

Within the CPA, risk of ground water contamination is expected to be high in the zone of coalfields area around Vedanta Smelter. While the ground water contamination in coalfield area is expected due to heavy metals such as Pb, Hg, Cd and Zn, the ground water contamination around Vedanta Smelter is expected to be due to fluoride.

In the Action Plan for abatement of environmental pollution in Ib Valley-Jharsuguda area, an action point was envisaged that MCL will monitor the ground water quality in the CPA for the parameters like lead, chromium, cadmium and fluoride. MCL is regularly conducting ground water monitoring through CMPDI on monthly basis.

The monitoring results of ground water around coalfield area by MCL (Table - 6.4) suggests that Pb, Hg, Cd and Zn in most of the locations remain within the acceptable limit.

Table- 6.4 Pb, Cr, Cd and Fluoride Concentrations in mg/l in Ground water being monitored by MCL for the period 2010-11 to 2014-15

Year	Lead			Chromium			Cadmium			Fluoride		
	N	R	M	N	R	M	N	R	M	N	R	M
2010-11	88	<0.05 (BDL)	<0.05	88	< 0.01 (BDL)	<0.01	ND	ND	ND	88	0.48 to 0.05	0.34
2011-12	96	<0.005 (BDL)	<0.005	96	< 0.01 (BDL)	<0.01	ND	ND	ND	96	0.49 to 0.08	0.271
2012-3	96	<0.005 (BDL)	<0.005	96	< 0.01 (BDL)	<0.01	ND	ND	ND	96	0.38 to 0.09	0.251
2013-14	96	<0.005 (BDL)	<0.005	96	< 0.01 (BDL)	<0.01	96	<0.005 (BDL)	<0.005	96	0.46 to 0.06	0.238
2014-15	94	<0.005 (BDL)	<0.005	94	< 0.01 (BDL)	<0.01	94	<0.005 (BDL)	<0.005	94	3.1 to 0.06	0.154

N- Number of samples;

R- Range of values (Max-Min)

M-Mean

ND-Not done

BDL-Below Detectable Limit

6.2 Environmental Monitoring by CPCB

For evaluation of CEPI, CPCB has engaged third party NABL accredited laboratories and has monitored range of values for critical as well as other parameters. The Sampling location for Ambient Air, Surface water and Ground Water is given in Annexure-8. The present concentration of sensitive parameters in Ib Valley area is presented in Table -6.5 and for Jharsuguda area it is presented in Table-6.6. The monitoring results in respect of identified toxins have been used for calculation of CEPI score for Ib Valley and Jharsuguda area.

Table-6.5. Range of present concentration of sensitive parameters in Ib Valley Area for the during 2013

Environment Type	Concentration	Range of critical parameters in the ambient environment	
Ambient Air	PM ₁₀ in µg/ m ³ 72.5 to 98.0	PM _{2.5} in µg/ m ³ 21.8 to 34.4	BaP in ng/ m ³ <0.5
Standard	100 (24 hrs)	60 (24 hrs)	1.0 (Annual)
Surface Water	Fluoride in mg/l 0.3 to 0.4	Nitrate Nitrogen in mg/l 0.23 to 0.90	Total Khejaldal Nitrogen in mg/l <1
Standard	1.5	45	0.1
Ground Water	Fluoride in mg/l 0.3 to 0.4	Nitrate Nitrogen in mg/l 0.23 to 5.42	Lead in mg/l <0.01
Standard			

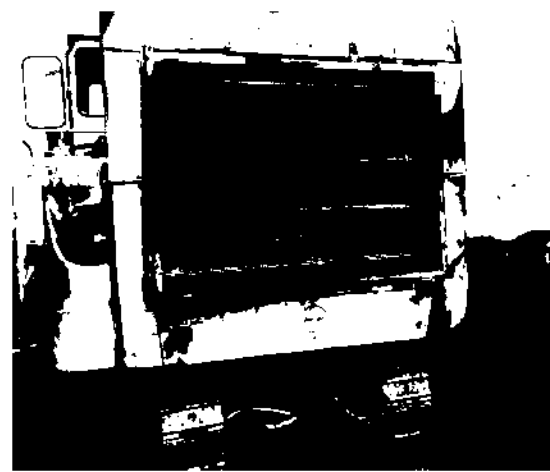
Table-6.6. Range of present concentration of sensitive parameters in Jharsuguda Area during 2013

Environment Type	Concentration	Range of critical parameters in the ambient environment	
Ambient Air	PM ₁₀ in µg/ m ³ 69.6 to 185	PM _{2.5} in µg/ m ³ 28.2 to 49	BaP in ng/ m ³ <0.5
Standard	100 (24 hrs)	60 (24 hrs)	1.0 (Annual)
Surface Water	Fluoride in mg/l 0.3 to 0.9	Nitrate Nitrogen in mg/l 0.23 to 0.45	Total Khejaldal Nitrogen in mg/l <1 to 2.4
Standard	1.5	45	0.1
Ground Water	Fluoride in mg/l 0.3 to 0.6	Nitrate Nitrogen in mg/l 2.03 to 7.23	Lead in mg/l <0.01
Standard	-	-	-

Chapter - 7

CEPI of Ib Valley-Jharsuguda Area

- Compliance status of major action and effect on environmental Quality
- CEPI Score for Ib valley-Jharsuguda area



Chapter-7

CEPI of Ib Valley-Jharsuguda Area

The Ib Valley area and Jharsuguda area were critically polluted area of the State with a score of 74 and 73.34 respectively. The individual scores on air pollution, water pollution and ground water (soil) pollution were also either above or close to 60, indicating the level of pollution on all accounts were above safe level. The combined Action Plan for both CPAs were formulated to address all issues of pollution to bring down the CEPI score to a safe level. In this Chapter we will attempt to correlate implementation of Action Plan with CEPI Score.

7.1 Compliance status of major action and effect on environmental quality

Under the Action Plan up gradation of air pollution control equipment like Electro Static Precipitator, Bag Filters in thermal power, sponge iron and steel plants were envisaged. Similarly, for control of fugitive emission due to coal mining and transportation of minerals and other goods emphasis was given on rail transportation, development of special transport corridor for coal transport and improvement of existing roads. For protecting the ground water, the main focus was to minimise the quantity of solid waste disposal. The detailed unit wise status of implementation of Action Plan in Ib Valley-Jharsuguda area is presented at **Annexure-4**. However the present status of key action points are depicted in **Figure-7.1**

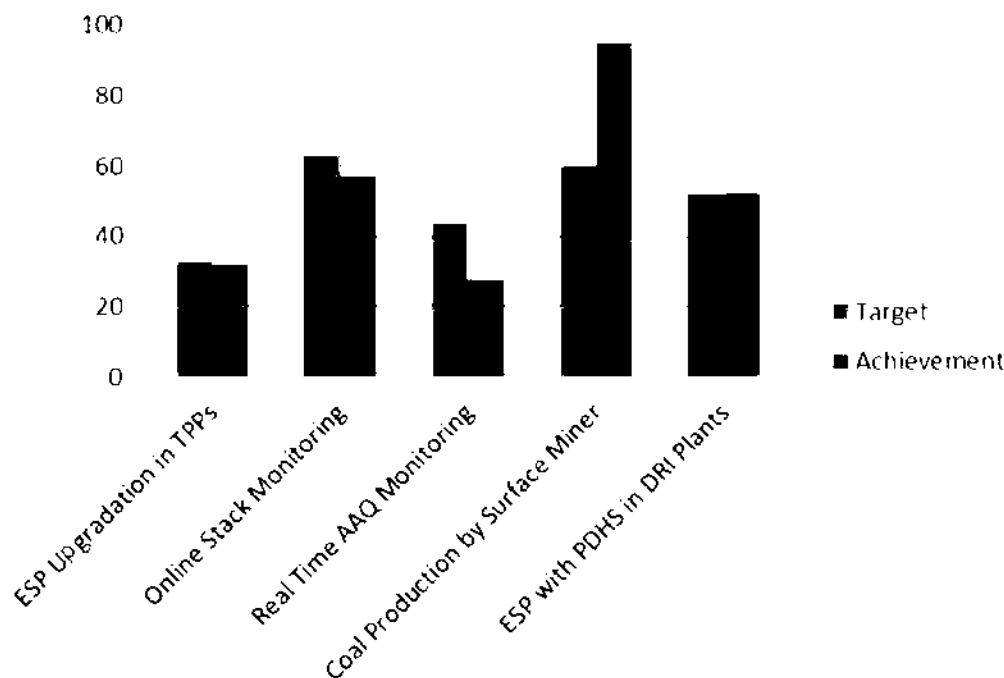


Fig - 7.1 The compliance status of major action points in Ib valley-Jharsuguda area

The action for control of air pollution has been largely implemented except installation of real time AAQ Monitoring stations in industries. The coal production methods have been greatly modified leaving a positive impact on air quality. Similar improvement was observed in Steel Sector.

In water pollution front, the river water is mostly affected in terms of BOD and TC indicating pollution due to discharge of sewage. The action plan resulted in increasing overall STP capacity to 7.22 MLD, but still more is required to be done.

7.2 CEPI Score for Ib Valley-Jharsuguda area

Central Pollution Control Board independently monitors various parameters for evaluating the CEPI score and accordingly has published the CEPI score of 43 industrial clusters including that of Ib Valley and Jharsuguda for the period 2009, 2011 and 2013. The CEPI is determined in a process of weighted aggregation of sub indices under water, air and ground water pollution. The comparative CEPI score for the year 2009, 2011 and 2013 for air, water and ground water environment is also shown in **Figure-7.2** and **Figure-7.3** respectively for Ib valley and Jharsuguda. The individual values of factors of each media for each sub-indices (**Figure-1.1**) is given in **Table 7.1** and **Table-7.2**. It can be seen that the implementation of abatement of action plan is quite effective in bringing down the CEPI score from 73.34 in 2009 to 73.31 in 2013 for Jharsuguda area despite huge capacity expansion of industries in the region. Thus the action plan should be continued with additional points for bringing down of CEPI index below safe and acceptable level for Jharsuguda area. For Ib Valley area the CEPI has come down below 60 indicating it is present at safe level. But for maintaining it below safe and acceptable level the action plan should be continued with additional points which has been highlighted in Chapter-8.

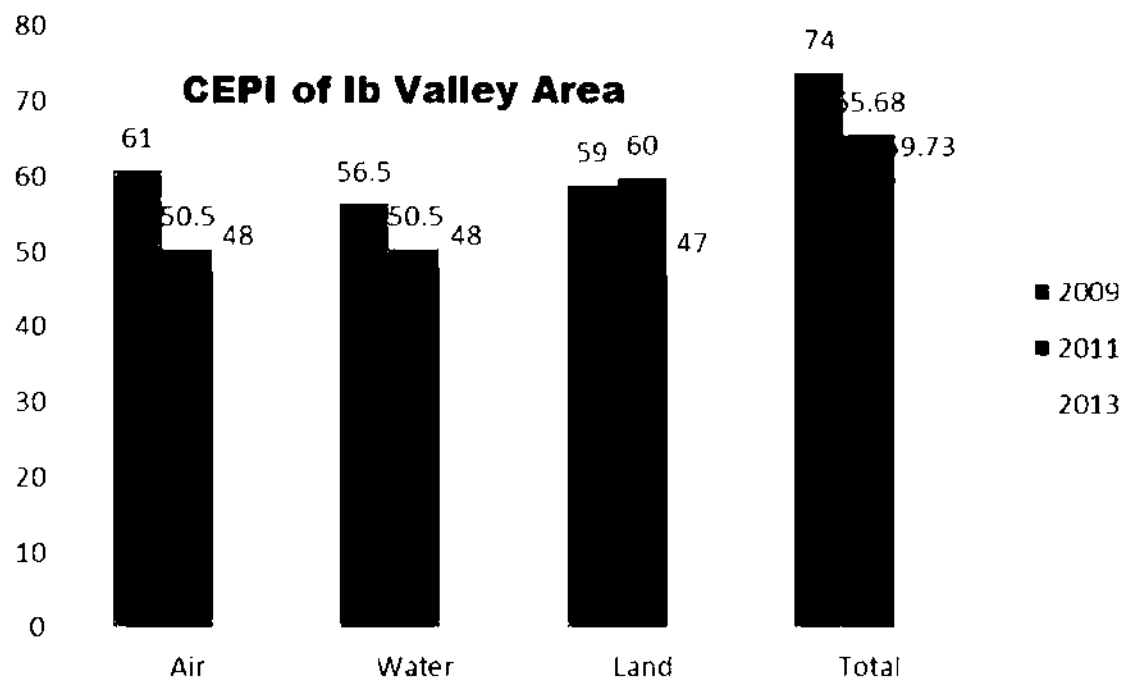


Fig -7.2 The CEPI score of Ib Valley for the period 2009 to 2013

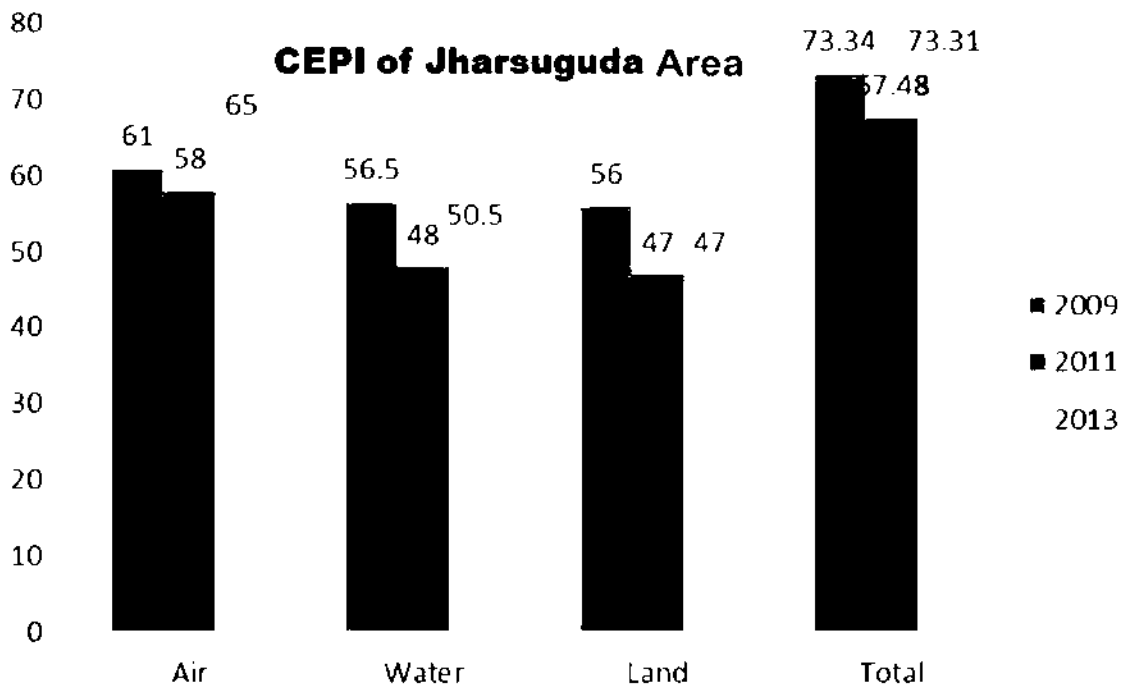


Fig - 7.3. The CEPI score of Jharsuguda for the period 2009 to 2013

Table - 7.1 Comprehensive Environmental Pollution Index Values for (Ib valley) for the year 2009 to 2013

Year of Assessment	A (Air)	B (Air)	C (Air)	D (Air)	A (Water)	B (Water)	C (Water)	D (Water)	A (Land)	B (Land)	C (Land)	D (Land)	CEPI (Individual Composite)	CEPI (Composite)
2009	A1-5	B1-3	C1-5	D-15	A1-2	B1-6	C1-5	D-15	A1-3	B1-3	C1-5	D-15	Air- 61.00	74.00
	A2-5	B2-0	C2-3		A2-5	B2-0	C2-3.5	A2-5	B2-3	C2-3	Water-56.50			
	A-25	B3-3	C3-0		A-10	B3-3	C3-5	A-15	B3-3	C3-5	Land-59			
		B-6	C-15			B-9	C-22.5			B-9	C-20			
2011	A1-3	B1-2	C1-5	D-15	A1-3	B1-2	C1-5	D-15	A1-3	B1-4	C1-5	D-15	Air- 50.5	65.68
	A2-5	B2-3	C2-1.5		A2-5	B2-3	C2-1.5	A2-5	B2-3	C2-3	Water-50.5			
	A-15	B3-3	C3-5		A-15	B3-3	C3-5	A-15	B3-3	C3-5	Land-60			
		B-8	C-12.5			B-8	C-12.5			B-10	C-20			
2013	A1-3	B1-2	C1-5	D-15	A1-3	B1-2	C1-5	D-15	A1-3	B1-1	C1-5	D-15	Air- 48.0	59.73
	A2-5	B2-3	C2-1		A2-5	B2-3	C2-1	A2-5	B2-3	C2-1	Water-48			
	A-15	B3-3	C3-5		A-15	B3-3	C3-5	A-15	B3-3	C3-5	Land-47.00			
		B-8	C-10			B-8	C-10			B-7	C-10			

(A1. Presence of toxins, A2. Scale of industrial activity; B1- Pollutant Concentration, B2- Impact on people, B3- Impact on ecological geological features; C1- Potentially affected population, C2- Level of exposure, C3- Risk to sensitive receptors; D- Additional high risk element based on pollution control facilities)

Table-7.1 Comprehensive Environmental Pollution Index Values for (Jharsuguda) for the year 2009 to 2013

Year of Assessment	A (Air)	B (Air)	C (Air)	D (Air)	A (Water)	B (Water)	C (Water)	D (Water)	A (Land)	B (Land)	C (Land)	D (Land)	CEPI (Individual Composite)	CEPI (Composite)
2009	A1-5	B1-3	C1-5	D-15	A1-2	B1-6	C1-5	D-15	A1-3	B1-3	C1-5	D-15	Air- 61.00	73.34
	A2- 5	B2-0	C2-3		A2- 5	B2-0	C2-3.5		A2- 5	B2-0	C2-3		Water-56.5	
	A- 25	B3-3	C3-0		A- 10	B3-3	C3-5		A- 15	B3-3	C3-5		Land- 56	
		B-6	C-15			B-9	C-22.5			B-6	C-20			
2011	A1-3	B1-2	C1-5	D-15	A1-3	B1-2	C1-5	D-15	A1-3	B1-1	C1-5	D-15	Air- 58	67.48
	A2- 5	B2-3	C2-3		A2- 5	B2-3	C2-1.5		A2- 5	B2-3	C2-1		Water-48	
	A- 15	B3-3	C3-5		A- 155	B3-3	C3-5		A- 15	B3-3	C3-5		Land- 47	
		B-8	C-20			B-8	C-12.5			B-8	C-10			
2013	A1-3	B1-4	C1-5	D-15	A1-3	B1-2	C1-5	D-15	A1-3	B1-1	C1-5	D-15	Air- 65.0	73.31
	A2- 5	B2-3	C2-4		A2- 5	B2-3	C2-1.5		A2- 5	B2-3	C2-1		Water-50.5	
	A- 15	B3-3	C3-5		A- 15	B3-3	C3-5		A- 15	B3-3	C3-5		Land- 47.00	
		B-10	C-15			B-8	C-12.5			B-7	C-10			

(A1. Presence of toxins, A2. Scale of industrial activity; B1- Pollutant Concentration, B2- Impact on people, B3- Impact on ecological geological features; C1- Potentially affected population, C2- Level of exposure, C3- Risk to sensitive receptors; D- Additional high risk element based on pollution control facilities)

Chapter - 8

Action Points for 2015-2020

- Action Points of previous Action Plan for Abatement of Pollution to be continued for the period 2015-16 to 2019-20
- New Action Points for Action Plan for Abatement of Pollution to be implemented during the period 2015-16 to 2019-20.



Chapter-8

(Way forward)

Action Points for 2015-2020

8.1 Action Points of previous Action Plan for Abatement of Pollution to be continued for the period 2015-16 to 2019-20

The Action plan for abatement of environmental pollution in CPA of Ib Valley-Jharsuguda was prepared based on the background information, monitoring reports, findings of REMP 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. The Action Points which have been achieved during the plan period of 2010-15 is thus omitted and actions points which are yet to be achieved fully or achieved partly is proposed to be continued for the next plan period of 2015-20. The action points to be continued is given is **Tables-8.1 to 8.5**.

Table - 8.1 Action Plan for abatement of pollution in Thermal Power Plants

Sl. No.	Action plan	Issues being addressed
1.	All TPPs to install/ upgrade ESP and or BF wherever technically feasible to meet the emission standard of 50 mg/Nm ³ with one spare field.	PM ₁₀ and PM _{2.5} in ambient air
2.	All lean slurry disposal system to be converted to (High Concentration Slurry Disposal) HCSD or mine void filling subject to technical feasibility	Surface water quality Land requirement for ash disposal

Table - 8.2 Action Plan for Abatement of Pollution in Coal Mines

Sl. No.	Action plan	Issues being addressed
1.	Dedicated coal transport corridor to be widened and strengthened (Concreted/ Blacktopped) with proper drainage facility in Ib Valley coalfields.	PM ₁₀ and PM _{2.5} in ambient air, Traffic Congestion
2.	Adoption of mine void filling with dry ash from the thermal power plants.	Ash disposal from TPPs
3.	Enhancement of rake loading facility in the coal mines	PM ₁₀ and PM _{2.5} in ambient air, Traffic Congestion

- 4.1.2 **This restrict on consideration of projects from critically polluted clusters/areas above will apply for a period of 8 months upto August, 2010** during which time the Central Pollution Control Board /UT Pollution Control Committees will finalize a time bound action plan for improving the environmental quality in these identified clusters/areas. The situation will be reviewed thereafter and further instruction issued accordingly; provided that projects relating to renewal of mining lease without any increase in production and /or lease area which are already in operation in these clusters will continue to be appraised in accordance with the procedure prescribed under EIA Notification, 2006 and decision taken on merits; and provided further that the projects of public interest, such as projects of natural importance, pollution control, defence and security, with prior approval of the Competent Authority, MoEF/SEIAA for category 'A' & 'B' respectively, on a case to case basis, will continue to be appraised in accordance with the procedure prescribed under EIA Notification, 2006 and decision taken on merits.
- 4.2 The developmental projects from industrial clusters with CEPI score between 60-70 (as listed at serial no. 44 to 75 of the Annexure), which are in the pipeline or are received for grant of environmental clearance in terms of provisions of EIA Notification, 2006 [including projects for stage I clearance i.e. scoping (TORs)], will be considered following the procedure outlined in this Ministry's earlier circular no. J-11013/18/2009-IA.II.(I) dated 25th August, 2009 relating to 'proposals for environmental clearance for the projects located in the critically polluted areas as identified by the Central Pollution Control Board, which is available on the website of Ministry www.envfor.nic.in.
5. In the eventually of any dispute regarding the location of any project within the critically polluted area or otherwise, a reference will be made to CPCB and based on their advice a view will be taken on such projects.

This issues with the approval of the Competent Authority.

(S. K. Aggarawal)
Director

To

1. All the Officer of IA Division
2. Chairperson / Member Secretaries of all the SEIAAs/ SEACs
3. Chairman, CPCB
4. Member Secretaries of all SPCBs/UTPCCs

Copy to:

1. PS to MEF
2. PPS to Secretary (E & F)
3. PPS to AS (JMM)
4. Advisor (GKP)
5. Advisor (NB),
6. Website, MoEF
7. Guard File

8.2 New Action Points for Action Plan for Abatement of Pollution to be implemented during the period 2015-16 to 2019-20

Based on the experience of implementation of Action Plan for abatement of environmental pollution in Critically Polluted Areas, some new Action Points have been considered for implementation during the period 2015-16 to 2019-20 as outlined in Tables 8.6-8.10.

Table – 8.6 Action Plan for abatement of pollution in Thermal Power Plants

Sl. No.	Action plan	Issues being addressed
1.	All the TPPs of 100 MW or more shall achieve Zero Liquid Discharge except during monsoon.	Water Scarcity and resource conservation
2.	Installation of in-house Fly Brick Plants and other fly ash based product plants for demonstration purpose and popularization of fly ash utilization	Fly ash utilization

Table – 8.7 Action Plan for Abatement of Pollution in Coal Mines

Sl. No.	Action plan	Issues being addressed
1.	All Opencast Coal Mines either individually or in combination shall achieve Zero Liquid Discharge	Ground water depletion, water pollution
2.	Enhancement of number of population covered under provision for supply of drinking water in the peripheral villages of coal mining area	Availability of drinking water for population residing mining area for better health
3.	Implementation of comprehensive coal mine fire control plan by MCL	SO ₂ , Heat, PM ₁₀ and PM _{2.5} in ambient air
4.	Increase in concurrent back filling of the mine voids and restoration of the mined out area for technical and biological reclamation of mined out area	Land degradation/ Land scape improvement/ PM ₁₀ and PM _{2.5} in Ambient Air/ Improvement of water quality in surface runoff
5.	Construction of ground water recharge pits in Coal Mines area	Water Conservation
6.	Installation of Closed Conveying Systems for transport of coal from pit head to railway siding	SPM in ambient air, Traffic Congestion

Table – 8.8 Action Plan for abatement of Pollution in Iron & Steel And Ferro Alloys Sector

Sl. No.	Action Plan	Issues being addressed
1.	The dead dumps shall be biologically reclaimed and rehabilitated in such a manner so as to make it gainfully utilized for other purpose.	Land degradation
2.	Treatment and utilization of phenol and cyanide bearing effluent from recovery type coke - ovens/ coal gasification plants	Water pollution

Table – 8.9 Action Plan for abatement of pollution in Aluminium Plants

Sl. No.	Action Plan	Issues being addressed
1.	The Alluminium Smelter either by itself or in combination with its CPP shall, achieve Zero Liquid Discharge except during monsoon months	Level of fluoride in surface water environment around the smelter, water scarcity
2.	Co-incineration of Spent pot linings (SPLs) in CPPs of Aluminium Smelters subject to technical feasibility	Utilisation of Hazardous Waste for energy recovery
3.	Study of Recycle/ recovery/ Reuse and waste minimization potential of hazardous waste in aluminum smelter	Utilization of Hazardous Waste

Table – 8.10 Action Plan for abatement of pollution through Common infrastructure services and studies

Sl. No.	Action plan	Issues being addressed
1.	Epidemiological Study for Assessment of Effect of Pollutants on Human Health in Critically Polluted Areas (Angul -Talcher and Ib Valley -Jharsuguda) in Odisha	Human Health in CPA
2.	Development of Geo-database for Environmental Mapping and Web based GIS application in Critically Polluted Areas (CPAs) in Odisha	Display of Environmental Data of CPA in a common platform for decision support system
3.	Land use and land cover Study in CPA	Estimation of Area usage
4.	Improve plantation raised by industries and mines in CPA	CO ₂ sequestration through vegetation
5.	Source Apportionment study in CPA	Pollution source ascertainment



Annexure - 1

CEPI Notification

- Office Memorandum dated 13-01-2010 of Ministry of Environment and Forest and Climate Change Government of India.



Annexure-1

J-11013/5/2010-IA.II (I)
Government of India
Ministry of Environment & Forests

ParyavaranBhavan,
C.G.O Complex, Lodi Road,
New Delhi – 110003,
Telefax:24362434

Office Memorandum

Dated 13th January, 2010

Sub: Consideration of projects for Environmental Clearance based on Comprehensive Environmental Pollution Index – Regarding.

Central Pollution Control Board (CPCB) in association with Indian Institute of technology (IIT), New Delhi, have recently, carried out an environmental assessment of industrial clusters across the country based on Comprehensive Environmental Pollution Index (CEPI) with the aim of identifying polluted industrial clusters, and prioritizing planning clusters and the nation as a whole. The assessment so carried out has been documented in the form of a report entitled 'Comprehensive Environmental Assessment of Industrial Clusters' which is available on the website of CPCB www.cpcb.nic.in and website of Ministry www.envfor.nic.in. In all 88 industrial clusters have been assessed.

The industrial clusters have been listed in table 8 (annexed herewith) of the report in descending order of environmental pollution index scores. The report has conducted that the industrial clusters /areas having aggregated CEPI scores of 70 and above should be considered as critically polluted; the clusters/areas and shall be kept under surveillance and pollution control measures should be efficiently implemented; and the critically polluted industrial clusters/ areas need further detailed investigation in terms of the extent of damage and formulation of appropriate remedial action plan.

The Environment (Protection) Act, 1986 enjoins upon the Central Government to take all such measures as it deems necessary or expedient for the purpose of protecting and improving the quality of environment including restriction of areas in which any industries, operations or process shall not be carried out or shall be carried out subject to certain safeguards. Accordingly, the Environment Impact Assessment Notification, 2006 has mandated certain category of projects/activities listed therein to obtain prior environmental clearance under the provisions thereof.

With the identification of industrial clusters/areas by CPCB which are critically or severely polluted, Ministry of Environment & Forests hereby imposes temporary restriction on consideration of developmental projects in such clusters/ areas and prescribes the following procedure to be adopted with immediate effect.

- 4.1.1 The developmental projects from industrial clusters with CEPI score above 70 (as listed at serial no. 1 to 43 of the Annexure) received for grant of environmental clearance in terms of the provision of EIA Notification, 2006 [including projects for stage –I clearance i.e. scoping (TORs)], which are presently in pipeline for environmental clearance or which would be received hereafter shall be returned to the project proponents.

- 4.1.2 **This restrict on consideration of projects from critically polluted clusters/areas above will apply for a period of 8 months upto August, 2010** during which time the Central Pollution Control Board /UT Pollution Control Committees will finalize a time bound action plan for improving the environmental quality in these identified clusters/areas. The situation will be reviewed thereafter and further instruction issued accordingly; provided that projects relating to renewal of mining lease without any increase in production and /or lease area which are already in operation in these clusters will continue to be appraised in accordance with the procedure prescribed under EIA Notification, 2006 and decision taken on merits; and provided further that the projects of public interest, such as projects of natural importance, pollution control, defence and security, with prior approval of the Competent Authority, MEF/SEIAA for category 'A' & 'B' respectively, on a case to case basis, will continue to be appraised in accordance with the procedure prescribed under EIA Notification, 2006 and decision taken on merits.
- 4.2 The developmental projects from industrial clusters with CEPI score between 60-70 (as listed at serial no. 44 to 75 of the Annexure), which are in the pipeline or are received for grant of environmental clearance in terms of provisions of EIA Notification, 2006 [including projects for stage-I clearance i.e. scoping (TORs)], will be considered following the procedure outlined in this Ministry's earlier circular no. J-11013/18/2009-IA.II.(I) dated 25th August, 2009 relating to 'proposals for environmental clearance for the projects located in the critically polluted areas as identified by the Central Pollution Control Board, which is available on the website of Ministry www.envfor.nic.in.
5. In the eventually of any dispute regarding the location of any project within the critically polluted area or otherwise, a reference will be made to CPCB and based on their advice a view will be taken on such projects.

This issues with the approval of the Competent Authority.

(S. K. Aggarawal)
Director

To

1. All the Officer of IA Division
2. Chairperson / Member Secretaries of all the SEIAAs/ SEACs
3. Chairman, CPCB
4. Member Secretaries of all SPCBs/UTPCCs

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4. Advisor (GKP)
5. Advisor (NB),
6. Website, MoEF
7. Guard File

Annexure - 2

Status of Industrial and Mining Activities (2010-11 to 2014-15)

- List of 17 Category of highly polluting industries i.e. Red (A) industries in CPA area during 2010-11 to 2014-15
- List of RED (B) categories of industries and mines operating in CPIC area during 2010-11 to 2014-15
- List of other units operating in CPA of Ib valley-Jharsuguda Area



Annexure-2

Status of Industrial and Mining Activities (2010-11 to 2014-15)

Table -A2.1 List of 17 Category of highly polluting industries i.e. Red (A) industries in CPA area during 2010-11 to 2014-15

Sl. No	Name of the industry / mine	Sector	Capacity in 2010-11 with plant facilities	Capacity in 2014-15 with plant facilities
1.	Vedant Aluminium Ltd., Jharsuguda	Aluminium	2.5 LTPA	7.75 LTPA
2.	Vedanta Aluminium Ltd. (CPP), Jharsuguda	Thermal Power	5 × 135 MW	9×135MW
3.	Sterlite Energy Ltd. Bhurkhamunda, Jharsuguda	Thermal Power	1 × 600 MW	4×600 MW
4.	Bhusan Steel Ltd., CPP Telkoi, Rengali	Thermal Power	230 MW	3×130 MW, 1×60MW & 1×40 MW
5.	Shyam DRI Power Pvt Ltd, Pandloi, Sambalpur	Thermal Power	30 MW	2×30 MW& 10MW
6.	Ib Thermal Power Station, Banaharpalli, Jharsuguda	Thermal Power	2× 210 MW	2×210 MW
7.	Action ispat & power (p) ltd. At-Pandripathar, P.o.:Marakuta, Dist: Jharsuguda	Thermal Power	20 MW	2×43 MW and 1×20 MW
8.	Aditya Aluminium Ltd. Lapanga Sambalpur	Aluminium Smelter	-	3.6 LTPA
9.	Aditya Aluminium Ltd. (CPP) Lapanga Sambalpur	Thermal Power	-	4×150 MW
10.	Bhusan Power & Steel Ltd, Telkoli, Rengali, Sambalpur	Sponge Iron & Integrated Steel	2.2 MTPA	3.0 MTPA Sponge Iron (Kiln-I,II,III,IV,V,VI,VII,VIII, I× & ×)-10×500 TPD Coal Washery -4.5 MTPA Steel Melting Shop (SMS) & Casting Unit i) Electric Arc Furnace-2×90 T +2×100T, ii) Ladle Furnace -2×90T-2×100T, iii) Billet Caster -1×2 +1×4 Strand iv) Single continuous thin slab caster -1×2 Strand, Blast Furnace -1×1008m ³ Sinter plant -1×105m ² Coke Oven Plant (Non-Recovery Type)-0.45 Million TPA Oxygen Plant -1×400 TPD CSP (HRM)-1.8 Million TPA Lime & Dolo Plant -2×300 TPD, Cold Rolling Mill (CRM)-1 Million TPA Wire / Rod Mill Complex (WRM)-0.45 Million TPA Galvanizing / Glavolume Unit -0.50 MTPA, Pellet Plant -3.5 MTPA, Pipe and Tube Mill - 0.2 MTPA

Sl. No	Name of the industry / mine	Sector	Capacity in 2010-11 with plant facilities	Capacity in 2014-15 with plant facilities
11.	Shyam Metallics & Energy Ltd, Pondloi, Rengali, Sambalpur	Sponge Iron & Integrated Steel	<u>0.27 MTPA</u> 2× 350TPD, 2 LTPA steel billet, 0.3 MTPA Coal washery, 10 MW- AFBC, 15MW- WHRB	<u>0.27 MTPA</u> Sponge Iron - DRI Kiln - I & II -2×350 TPD Sponge Iron - DRI Kiln - I & II -2×350 TPD Sponge Iron - DRI Kiln -III & IV-2×100 TPD Captive Power Plant (CPP-I)-30 MW Captive Power Plant (CPP-II)-30 MW Captive Power Plant -25MW (15 MW WHRB 10 MW AFBC) Induction Furnace-4×18 T/H Billet Caster (1×3) Rolling Mill -5000 TPM Ferro Alloys Plant -2×6 MVA, 2×9 MVA & 3×11 MVA Producer Gas Plant -60,000m ³ /day Pellet Plant -3.0 LTPA Coal washery-0.3 MTPA
12.	SMC Power Generation (P) Ltd, Hirma, Jharsuguda	Sponge Iron & Integrated Steel	<u>0.1 MTPA</u> 2 ×300 TPD, 8 MW WHRB, 17 MW AFBC 1.2 LTPA Coal Washery, 1 LTPA Re-rolled Products	<u>0.18 MTPA</u> Sponge Iron - DRI Kiln (I & II) - 2×300 TPD Captive Power Plant (CPP) - 33 MW (16 MW WHRB + 17 MW AFBC) , Induction Furnace - 6×12 T/H Rolling Mill with Producer Gas plant - 1.8 LTPA Coal washery - 10,000 TPM Iron Ore crusher - 24,000 TPM
13.	Concast Steel & Power Ltd (Formerly SPS Sponge Iron Ltd), Badmal, Jharsuguda	Sponge Iron & Integrated Steel	<u>0.24 MTPA</u> 6 ×100 TPD DRI, 2.8 LTPA Blast furnace, 2×16 MVA Ferro Alloys, 1.0 LTPA Rolling Mill	<u>0.24 MTPA</u> Sponge Iron - DRI Kilns (I,II,III,IV,V,VI,VII & VIII) 8×100 TPD Blast Furnace (1×450m ³) Hot Metal 2,80,000 TPA Induction Furnace 4×20 T/H Ferro Alloys Plant 2×16 MVA Structural and TMT Bar (Rolling Mill) 1 LTPA Sinter Plant (50m ²) 45,000 Metric Ton per Month
14.	MSP Metaliks Ltd, Markuta, Jharsuguda	Sponge Iron & Integrated Steel	4 ×100 TPD, 48,000 TPA MS Billet, 1,88,000 TPA Pig Iron	<u>0.4 MTPA</u> Sponge Iron - DRI Kiln (I,II,III,IV,V,VI, VII & VIII) -8×100 TPD, Captive Power Plant (CPP)-24 MW (8 MW WHRB + 16 MW AFBC) Induction Furnace - 2×30 T/H Blast Furnace (1×225m ³)- 1,88,000 LTPA Coal Washery -7 LTPA Sinter Plant - 4.6 LTPA Pellet Plant - 6.0 LTPA
15.	Jain Steel & Power Ltd, Jharsuguda	Sponge Iron & Integrated Steel	1 ×350 TPD, DRI	1 ×350 TPD, DRI
16.	Aryan Ispat & Power Ltd, Bamaloi, Rengali, Sambalpur	Sponge Iron	2× 100 TPD + 1×300 TPD	Sponge Iron - DRI Kiln (I &II) -2x100 TPD Sponge Iron - DRI Kiln (III)-1x350 TPD Coal Washery-7 LTPA Railway Siding - (Iron Ore 8 LTPA, Coal 14 LTPA, Dolomite, Manganese & Coke -4 LTPA, MS Billet – 5 LTPA)

Sl. No	Name of the industry / mine	Sector	Capacity in 2010-11 with plant facilities	Capacity in 2014-15 with plant facilities
17.	Viraj Steel & Energy Gurupali, Rengali, Sambalpur	Sponge Iron	2×350 TPD	Sponge Iron - Kiln -II - 1×350 Power Plant -(WHRB)- 8 MW Induction Furnace -2×12 T/heat
18.	Action Ispat & Power (P) Ltd, Jharsuguda	Sponge Iron & Integrated Steel	2×350 TPD, 8 MW WHRB, 20 MW AFBC	0.23 MTPA Sponge Iron - DRI Kiln – I & II -2×350 TPD Captive Power Plant (CPP)-2×8 MW WHRB, 1×20 MW AFBC, 2×43 MW CFBC Induction Furnace -6×12 T/H Coal Washery -250 TPH Ferro Alloys Plant - 1×9 MVA
19.	Bhagawati Steels (P)Ltd, Badmal, Jharsuguda	Sponge Iron	1× 50 TPD	1×50 TPD DRI
20.	Thakur Prasad Sao & Sons (P) Ltd (Formerly Eastern Steel & Power Ltd.), Lahandabud, Jharsuguda	Sponge Iron & Integrated Steel	1× 350 TPD, 8 MW WHRB, 4 MW AFBC 150 TPH Coal Washery 1 LTPA Re-rolled Products	0.1 MTPA Sponge Iron(1×350 TPD) - 350 TPD, Power Plant (8MW WHRB +4MW FBC Boiler)-12 MW, Induction Furnace - 4 × 8 T/H, Coal Washery (150 TPH) - 5.76 LTPA (Washed Coal) Oil Fired Rolling Mill- 1.0 LTPA, Producer Gas Plant - 6000 Nm ³ / Hr
21.	Maa Samaleswari Industries (P) Ltd, Lapanga, Sambalpur	Sponge Iron	2×100TPD	2×100TPD
22.	L.N. Metaliks Ltd, Sripura, Sambalpur	Sponge Iron	2 ×100 TPD	2 ×100 TPD DRI and 1×50 TPH Iron Ore Crusher
23.	Pawansut Sponge (P) Ltd, Badmal, Jharsuguda	Sponge Iron	2 ×100 TPD	Closed, merged into M/s. Concast Steel & Power Ltd
24.	Singhal Enterprises (P) Ltd, Hirma, Jharsuguda	Sponge Iron	2×100TPD	2×100TPD
25.	Jai Hanuman Udyog Ltd. Jharsuguda	Sponge Iron	2 ×100 TPD	2 ×100 TPD DRI
26.	Ultra Tech Cement Limited, Arda, Jharsuguda	Cement	2000 TPD	4.0 MTPA

N.B.: Steel making capacity indicated in the table have been estimated based on the present melting capacity of individual plants. However, CTO has not been granted in terms of such capacity in MTPA, rather it is granted in terms of process modules. Hence, the capacities of steels indicated in the table is tentative and may have variations with the actual figures claimed by industries.

Sl. No	Name & Address	Type of HCU	No of Beds
9.	Jagannath Clinic &Nurshing Home, Dr.UdayanathBehera, Prop., Banarpal, Angul	Pvt.	15
10.	PHC, Banarpal, Angul	Govt.	06
11.	SubhalaxmiNurshing Home, At/Po- Jagannathpur, Via-Chainpal, Talcher, Angul,	Pvt.	18
12.	CHC,Godibandha PO-Radharamapur, PS-Talcher, Dist-Angul	Govt.	06
13.	Bharatpur Dispensary N.S.Nagar, Bharatpur Angul,	Govt.	02
14.	Purusottam Nursing Home Pradeep Kumar Behera, At-Padiabhanga, PO- Chainpal Colony, Talcher .Angul	Pvt.	05
15.	LaxmiKiran Eye Care Pvt.Ltd. Arnapurna Market Complex Sharmachhak, Angul.	Pvt	03
16.	Chandan Nursing home HandidhuaChhak, Talcher, Angul	Pvt.	05
17.	KarunakarSevasadan Badadandsahi, TalcherAngul,	Pvt	07
18.	Sub- Divisional Hospital, Talcher.Angul.	Govt.	52
19.	TTPS Hospital, TalcherTharmal, Angul.	PSU	12
20.	NALCO Hospital, S&P Complex Nalco Nagar, Angul.	PSU	64
21.	Gayatri Nursing Home, Prabin Kumar Rath, Prop., At-Anand Bazar, Po-Santhapada, Talcher, Angul.	Pvt.	04
22.	Sanjivani Clinic & Nursing Home, ITI Line, Hatatota, Talcher, Angul.	Pvt.	05
23.	FCI Hospital, Talcher ,Angul..	PSU	40
24.	Govt. Hospital, Meramandali, Meramandali, Dhenkanal	Govt.	

Sl No	Name of the industry/mine	Product	Capacity in 2010-11 with plant facilities	Capacity in 2014-15 with plant facilities
17.	Sri Mineral & Metals, At-Karlajori., Belpahar, Dist- Jharsuguda	Refractory Brick and Other Items	36,000 TPA	36,000 TPA
18.	TRL Krosaki Refractories , Belpahar, Jharsuguda	Refractory Bricks	1.5 Lakh TPA	2.5 Lakh TPA
19.	Durga Agro Industry, Pudhamal, Sarasmal, Jharsuguda	Parboiled Rice	544 TPM	544 TPM
20.	Pawansut Rice Mill, Katapali, Jharsuguda	Parboiled Rice	544 TPM	544 TPM
21.	Sri Sarada Rice Mill At- Pandripathar, PO- Badmul, Dist- Jharsuguda	Parboiled Rice	544 TPM	544 TPM
22.	AnjanKumari rice and flour and Oil Mill, Jharsuguda	Parboiled Rice	544 TPM	Closed
23.	Jai Ambe Rice Industry, Sarbahal, Jharsuguda	Parboiled Rice	544 TPM	Closed
24.	Maa Kali Rice Mill, Sarasmal, Jharsuguda	Parboiled Rice	544 TPM	544 TPM
25.	Shree Bajrangbali Rice Mill, Pandripathar, Jharsuguda	Parboiled Rice	544 TPM	544 TPM
26.	Sri Laxmi Rice and Chuda Mill, Jharsuguda.	Parboiled Rice	544 TPM	Closed
27.	Kalinga commercial Corporation At- Kishan Nagar, Po- Rengali, Dist- Sambalpur	Parboiled Rice mill	204 TPM	204 TPM

Table - A2.3 List of other units operating in CPA of Ib valley-Jharsuguda Area
RED CATEGORY UNITS

Table - A2.3.1 Railway Siding

Sl. No	Name & Address	Product	Capacity
1.	Railway siding of Global Coal & Mining Pvt.Ltd At: Belpahar&Chingriguda, Jharsuguda	Handling of coal	3.5MTPA
2.	Earth Minerals Company Ltd, Kirarama, Bandhabahaol, Jharsuguda.	Handling of coal	4.0MTPA
3.	Aryan Ispat & Power Ltd. (Railway Siding commercial use) At- Bomali, Rengali Dist- Sambalpur	Handling of Coal (captive & commercial use)	1.4MTPA

Table - A2.3.2 Stone Crushers

Sl No	Name & Address	Product	Capacity
1.	Bajrang Stone Crusher, At/P.O: Sarandamal, Jharsuguda	Stone Chips	680 TPM
2.	Bajrangbali Stone Crusher, At/P.O: Sarandamal, Jharsuguda	Stone Chips	Closed
3.	Chandinimal Minerals At/Po-Chandinimal, Jharsuguda	Stone Chips	1000TPM
4.	G. S Stone Crusher Kirarama, Bandhabahal, Jharsuguda.	Stone Chips	400TPM
5.	Maa Samaleswari Stone Crusher, Dalgaon, Jharsuguda	Stone Chips	2200 TPM
6.	OMEGA Enterprises, Kantapali (A), Rampur, Brajarajnagar, Jharsuguda.	Stone Chips	1460 TPM
7.	Pradhan Enterprises, Sarandamal, Jharsuguda	Stone Chips	2200 TPM
8.	Pradeep Stone Crusher, Siriapali, Ram Kumar Chowk, Jharsuguda	Stone Chips	Closed
9.	Ritika Engineers, Basupali, Dalgaon, Jharsuguda, Prop -Smt Sanju Agrawal	Stone Chips	16000 TPM
10.	Samaleswari Stone Crusher, Chhelkuti, Rajpur, Jharsuguda	Stone Chips	2700 TPM
11.	Shree Balaji Stone Crusher, At-Piplikani, Bandhabahal, Jharsuguda.	Stone Chips-	45 TPM
12.	Shree Sain Minerals, M. Katapali, Jharsuguda	Stone Chips	1812 TPM
13.	Singh Enterprises, Tilia, Lakhanpur, Jharsuguda	Stone Chips	2214 TPM
14.	Sharma stone crusher, At/Po -Sarandamal, Dist -Jharsuguda	Stone Chips-	1000TPM

Table - A2.3.3 Health Care Units

Sl. No	Name & Address	Product	Capacity
1.	Agrawal Nursing Home ,At/Po-Jharsuguda	Hospital	8 Beds (Private)
2.	Asha Devi Hospital At-Pahadimandir, Kalimandir Road Jharsuguda	Hospital	9 Beds (Private)
3.	Barik Cure Point &Physotherapy Clinic ,At- Gumadera ,Po-Belpahar,Jharsuguda	Hospital	6 Beds (Private)
4.	Central Hospital, IB Valley, MCL, P.O: BrajrajnagarJharsuguda,	Hospital	150 Beds(PSU)
5.	Dist HQ Hospital, Jharsuguda	Hospital	150 Beds (Govt.)
6.	Dr.Lamays& Trauma Care Centre, Jharsuguda	Hospital	9 Beds (Private)
7.	ESI Hospital, At/Po-Brajrajnagar, Jharsuguda.	Hospital	50 Beds (Govt.)
8.	First Aid Centre, M/s. Vedanta Aluminium Ltd. Bhurkamunda, Jharsuguda	Hospital	0 Beds (Private)
9.	First Aid Centre-II, M/s. Vedanta Aluminium Ltd. Bhurkamunda, Jharsuguda	Hospital	8 Beds (Private)
10.	Gourishankar Hospital & Trauma Centre, Badmal(Sahapada) Jharsuguda	Hospital	20 Beds (Private)
11.	IB Thermal Hospital, Banharpali, Jharsuguda	Hospital	14 Beds(PSU)
12.	Jagyasini Hospital, At-Bcheramal (Infront of LIC Office) Jharsuguda	Hospital	9 Beds (Private)
13.	Jehangir Gandhi Hospital, TRLBelpahar, Jharsuguda	Hospital	50 Beds (Private)
14.	Lakshya Care & Cure Nursing Home, Beheramal	Hospital	9 Beds (Private)
15.	MaaSamaleshwari Nursing Home, Jharsuguda	Hospital	10 Beds (Private)
16.	MotilalYadav Memorial Samaleswari Hospital, Beherapet	Hospital	50 Beds (Private)
17.	New Care Nursing Home, Brajrajnagar, Jharsuguda	Hospital	9 Beds (Private)
18.	CHC Brajarajnagar, Brajarajnagar, Jharsuguda	Hospital	16 Beds (Govt.)
19.	R. K. Multicare At-Infront of old daily market, Jharsuguda	Hospital	50 Beds (Private)
20.	Sai Ram Hospital,BTM By Pass Road,Jharsuguda	Hospital	10 Beds (Private)
21.	Samaleswari Hospital At-Bijunagar, Jharsuguda	Hospital	11 Beds (Private)
22.	Sanjeevani Hospital, By-Pass Road, SH-10	Hospital	25 Beds (Private)
23.	SesaSterlite Ltd, Bhurkhamunda, Jharsuguda	Hospital	04 Beds (Private)
24.	St. Mary Hospital,CoxColony, Jharsuguda	Hospital	35 Beds (Charitable)
25.	Mousumi Memorial Hospital, Jharsuguda	Hospital	10 Beds (Private)

26.	The Apollo Clinic M/s. Vedanta Aluminium Ltd. Township, Bhurkamunda, Jharsuguda	Hospital	0 Beds (Private)
27.	Agrawal Nursing Home ,At/Po-Jharsuguda	Hospital	8 Beds (Private)
28.	Asha Devi Hospital At-Pahadimandir, Kalimandir Road Jharsuguda	Hospital	9 Beds (Private)
29.	Barik Cure Point &Physiotherapy Clinic ,At-Gumadera ,Po-Belpahar,Jharsuguda	Hospital	6 Beds (Private)

Table - A2.3.4 Miscellaneous & Others (Red Category)

Sl. No	Name & Address	Product	Capacity
1.	Allied Technocrats Beherapali Road, Badmal, Dist: Jharsuguda	Ammonia(Ammonium Hydroxide) and Anhydrous Ammonia in the Plastic container/Cylinder	1200 TPM
2.	AnkitalspatPvt. Limited Beherapali, BadmalJharsuguda	M. S. Rod	297.5 TPM
3.	Fortis Ceramics Pvt.Ltd.Ragunathpali, Kolabira, Jharsuguda	Refractory Bricks	Refractory (Dolomite, Alumina, Silica)- 1500TPM, Monolithics- 1000TPM
4.	Fortis chemical Pvt. Ltd., At/Po-Raghunathpali, Jharsuguda	Chemicals	Oleo chemicals- 2730 TPM, Resin-120 TPM
5.	GajanandaAgrawalBrajrajnagar, Lamtibahl, Jharsuguda	Aluminium Ingot from Aluminium Dross	200 TPM
6.	Ganapati Ferro India (P) Ltd. Pandripathar, Jharsuguda	MS Ingots	1200 TPM
7.	Ganapati Minerals Pvt. Ltd., Sripura, Jharsuguda	Storage & Trading of Iron Ore fines	Closed
8.	Gaurav Aluminium Hirima, Jharsuguda	Aluminium ingot from Aluminium Dross	150 TPM
9.	Ganapati Ferro India (P) Ltd. Pandripathar, Jharsuguda	MS Ingots	Closed

Sl. No	Name & Address	Product	Capacity
10.	Hexa Steels & Power Ltd., Pandripathar, Marakuta, Jharsuguda	Slag (metal recovery) processing unit	----
11.	India Carbon Ltd. At-Industrial estate, Badmal, Kukurjanga, Dist-Jharsuguda	Blended Calcined Petroleum Coke	8333 TPM
12.	Indian Explosive Ltd., Belpahar, Jharsuguda	Explosive	Bulk Premix - 390TPM, Solid Nitrate - 0.8TPM, Sodium Thio-Cyanide- 0.8TPM
13.	Samaleswari Urja Udyog, Amdarha, Jharsuguda	Soft Coke	480 TPM
14.	Shah Urja Udyog Pvt. Ltd., Brundamal, Jharsuguda, Smt. Gayatri Shah	Soft Coke	3300TPM
15.	Solar Industries India Limited, Beherapali, P.O/Dist: Jharsuguda	Bulk Emulsion Matrix	1650TPM
16.	SVG Chemicals, Beherapali, Jharsuguda	Calcium Nitrate (Melt)	500 TPM
17.	Shree Minerals & Metals (Unit-2), Karlakhman, Lakhanpur, Jharsuguda	Rejected fire Bricks processing (castables & monolithic)	1000 TPM
18.	Kalinga Refractories Brundamal, Badmal, Jharsuguda	Refractory Bricks	200 TPM
19.	Micro Minerals, Sarbahal Road, Jharsuguda	Mineral Powder	60 TPM
20.	OCP India Pvt. Ltd., Jharsuguda	PSC Mono Block Railway Sleepers	16000 Nos./Month
21.	Parfect Sales Corporation Sripura, Jharsuguda	Clean Magnetic Iron Slag	5000 TPM
22.	Zenith Steels, Industrial Growth Centre, Shed No: D/4, Badmal, Jharsuguda	Screening of iron ore	5000 TPM
23.	Sterlite Technologies Ltd., Near Vedanta Aluminium Ltd., PO-Bhurkamunda, Dist-Jharsuguda-768202	Aluminum Products	Aluminum Conductor-2500 TPM & EC &

14.	Hitech Energy & Renewables, At/Po- H.Katapali, Dist-Jharsuguda	Tyre Pyrolysis	Furnace Oil - 62 TPM, Carbon Black - 54 TPM, Scrap Steel Wire - 15 TPM
15.	UrjaUdyog, Dalki, Jharsuguda	Soft Coke	Soft Coke - 491 TPM, Coal Briquette (GR - I) - 167 TPM, Briquette (GR - II) - 62.5 TPM

ORANGE CATEGORY UNITS

Table - A2.3.1 Brick Kilns

Sl. No	Name & Address	Product	Capacity
1.	Leo Bricks (Fixed Chimney) At/Po-Marakuta, Dist- Jharsuguda Prop. Sri D. K.Sahoo	K.B.bricks	2.0 Lakhs Nos/Month
2.	Puspa Bricks,(VSBK) Atr/Po.-SodamalDist- Jharsuguda Prop. Mrs.Puspanjali Patel	K.B.bricks	3.0 Lakhs Nos/Month
3.	Sriya Bricks Industry,(Fixed Chimney) AT - Pipilimal, PO-Belpahar, Dist- Jharsuguda	K.B.Bricks	1.34 Lakhs Nos/Month
4.	P.S Bricks (Fixed Chimney) AT/PO -Talpatia, Dist- Jharsuguda Prop	K.B.bricks	2.0 Lakhs Nos/Month
5.	DDP Bricks (Fixed Chimney) AT/PO - Pandripathar (Near Power House) Dist- Jharsuguda Prop	K.B.bricks	1.0 Lakhs Nos/Month
6.	Geetanjali Bricks(Fixed chimney) AT - Khaliamal, PO-Gandghore, BrajrajnagarDist- Jharsuguda Prop-SmtGeetanjaliPradhan	K.B.bricks	Closed
7.	Aman Bricks, Laripali, (Fixed chimney) Rengali, Sambalpur	K.B.bricks	Closed
8.	PNS Fixed Chimney, Dudosingha, Jharsuguda	K.B.bricks	2.08 Lakhs Nos/Month
9.	Bajrang Bricks, At: Lahandabud, P.O: H. Katapali, Jharsuguda	K.B.bricks	2.5 Lakhs Nos/Month
10.	JET Bricks , At: Mahulmunda, P.O: Kolabira, Jharsuguda	K.B.bricks	2.5 Lakhs Nos/Month
11.	Sai Bricks, At/P.O: Loisingh, Jharsuguda	K.B.bricks	2.5 Lakhs Nos/Month
12.	Baba Bholanath Chimney Bricks, Aintapali, Jharsuguda	K.B.bricks	1.0 Lakhs Nos/Month
13.	S.K.B Bricks,Bausenpali,Machida, Jharsuguda	K.B.bricks	2.5 Lakhs Nos/Month
14.	G.S Bricks, Badabahal, Jharsuguda	K.B.bricks	3.6 Lakhs Nos/Month

Table - A2.3.2 Hotels

Sl. No	Name & Address	Product	Capacity (Numbers of Room)
1.	Hotel Yogendra, Main Road, Near Railway Station, Jharsuguda	Hotel	18
2.	Hotel Micro Continental (A Unit of Micro Hotels Pvt. Ltd.), Beheramal, PO: Industrial Estate Jharsuguda	Hotel	40
3.	M/s. RL Abhishek Pvt. Ltd. (Hotel Meghdoot), At – Lath Complex, Main Road, Jharsuguda	Hotel	79
4.	Hotel King Palace (Formerly Hotel Kalinga), Beheramal Main Road, Jharsuguda, 09437054130	Hotel	51
5.	Hotel Bishnu Palace, Main Road, Beheramal, PO: Industrial Estate Jharsuguda	Hotel	34
6.	Shree Shankar Hotel, At: Beheramal, PO/Dist: Jharsuguda	Hotel	30
7.	Hotel Aryan, Beheramal, PO: Industrial Estate, Jharsuguda	Hotel	58
8.	Hotel Ananta Balia Hotel, At Biju Nagar, PO Industrial Estate, Main Road, Jharsuguda	Hotel	20
9.	Hotel Bandana, Badmal, Jharsuguda	Hotel	20
10.	M/s. Garden Palace Hotel & Resorts (P) Ltd (Hotel Orcard), At- By pass Road, Ekatali, Jharsuguda	Hotel	48
11.	Hotel The Crown (Formerly M/s. Green Villa & Resorts Pvt. Ltd), Sahupara, Badmal, Jharsuguda	Hotel	30
12.	Hotel Kaniska, Belpahar, Jharsuguda	Hotel	20
13.	Hotel Paul Height, Sarbahal, Jharsuguda	Hotel	40
14.	Hotel Konark, Main Road, Jharsuguda	Hotel	20
15.	Hotel Midtown, Beheramal, Jharsuguda	Hotel	15
16.	Hotel Payal, Main Road, Jharsuguda	Hotel	27
17.	Hotel Nilkamal, Main Road, Jharsuguda	Hotel	16
18.	Hotel Rajdoot, Main Road, Jharsuguda	Hotel	20
19.	Hotel Puspa, Belpahar, Jharsuguda	Hotel	30
20.	Hotel Amar Lodge, Main Road, Jharsuguda	Hotel	12
21.	Hotel Sun City Palace, At/PO: Belpahar, Dist: Jharsuguda	Hotel	44



Table - A2.3.3 Miscellaneous & Others (Orange Category)

Sl. No	Name & Address	Product	Capacity
1.	UtkalInnovatives, Plot no. 2-A/4, Industrial Area, Jharsuguda,SriChintamani Mishra	Engineering works	Conveyer Chains- 25set/M, Feedecr Breaker Spares- 75TPM, HEMM Spares - 15TPM
2.	GM Engineers, Plot No.2-A/5, Industrial Estate, PO/Dist-Jharsuguda - 768203	Engineering works	Engineering - 323 TPM
3.	Essenn LPG Bottling Pvt. Ltd., At- ParmanpurDist-Jharsuguda	LPG Bottling	1000 TPM
4.	GA Tyre Retreaders, Brajarajnagar, Ward No. 12, Sanjob, Lamtibahal, Jharsuguda	Tyre Retreading	575 Nos./Month
5.	Hencon Services India Pvt. Ltd., Badmal, Jharsuguda	Heavy Engineering works	250 No/M
6.	Megha Industries IDCO Shed No. S-3/4, Industrial Estate, Jharsuguda	Tyre Retreading	Retreaded tyre - 400 Nos./M
7.	Om Shanti Roller Flour Mill Beherapat, Ekatali, Jharsuguda	Atta, Maida, Suji	225 TPM
8.	Treco Consultancy Services Pvt. Ltd., IDCO Growth Center, Badmal, Jharsuguda	Tyre Retreading	Retreated Tyres 225 Nos./Month
9.	Unique Utensil (India) Pvt.Ltd,Industrial Estate, PO/Dist: Jharsuguda	Aluminium Circle	11.7 TPM
10.	Indian Oil Corporation Limited(MD),LPG Bottling Plant,At/Po-Panchpada,Jharsuguda	LPG Bottling	-1700 TPM
11.	MaaSaralaThermopack, At- Beherapali, Jharsuguda	Thermocol	4000 Nos./Month

Table - 3.3 Action Plan for abatement of Pollution in Iron & Steel and Ferro-Alloys Sector

Sl. No.	Action Plan	Issues being addressed
1.	All DRI plants to install ESPs, in the kiln, bag filter in dust generating points and pneumatic dust handling system	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.	Water pollution
3.	Installation of online stack monitoring system with real time display system	Particulate matter
4.	Real time ambient air quality monitoring (SO _x , NO _x , CO, PM ₁₀ , PM _{2.5})	SPM, SO ₂ , NO _x , RPM
5.	Use of SMS slag and ferro alloys slag for haul road construction in the mine area	Metallurgical solid waste utilization
6.	The char generated by the DRI industries is to be utilized in AFBC boilers as a supplementary fuel	Solid waste utilization.

Table - 3.4 Action Plan for abatement of pollution in Aluminium Plants

Sl. No.	Action Plan	Issues being addressed
1.	1 st and 2 nd pot line of NALCO to be upgraded to meet the emission norm of 0.3 kg of fluoride per ton of Aluminum deterioration by revamping the fume treatment plant.	Fluoride in air
2.	Online stack emission monitoring system with display system shall be installed	Fluoride in air
3.	Installation of fluoride removal (Fume treatment) system from bake oven plant	Fluoride in air
4.	Construction of secured landfill by NALCO within its premises	Fluoride in water and soil
5.	Conducting a comprehensive wastewater audit for the smelter plant including runoff management	Fluoride in water and soil
6.	Real time ambient air quality monitoring (SO _x , NO _x , CO, PM ₁₀ , P.M _{2.5})	SO ₂ , NO _x , CO, RPM
7.	Installation of hazardous waste incinerator by NALCO.	Hazardous waste
8.	Co-processing of spent pot lines in Cement Kilns	Hazardous waste

Sl No.	Name and Address	Product	Capacity
4.	Sri Sai Industrial Gases, Lahandabud, H.Kantapali, Jharsuguda	Oxygen, Nitorgen, CO2 & Argon Gas	35650 Cum/Month
5.	Kamalasati Oxygen Pandaripathar, Marakuta, Jharsuguda	Oxygen Gas, Nitorgen Gas	90000 Cum/Month
6.	Asiatic Gases Limited, Kukurjangha, Industrial Estate Growth Center, Badmal, Jharsuguda	Oxygen Gas, Nitorgen Gas	85000 Cum/Month
7.	Sai Ram Enterprises, Hari Om Vihar, Brajrajnagar, Jharsuguda,	Packaged drinking water	220 KL/Month
8.	Samda Enterprises, Belpahar, Jharsuguda	Packaged drinking water - 48000KLA	4000 KL/Month
9.	Shree Salasar Industries, Kumudapali, Kalimandir Road, Jharsuguda	Pre-Stresses Concrete Ploes-24000 Poles/Annum	2000 Nos. / Month
10.	Precision Cores and Allied Products At – Beherapali, PO – Badmal, Dist – Jharsuguda	Paper cores, cones and tube pipes	1920 TPM
11.	Shakti Transformers, Shed No.D-II/4, Industrial Estate, Jharsuguda	Manufacturing & repairing of Transforme	33 Nos./Month
12.	Ib Diamond Water Products At – Budhipadar, PO – H.Kantapali, Dist – Jharsuguda	Packaged Drinking Water	100 KL/Month
13.	Shree Ranisati Plast At Biju Pattnaik Chowk, PO Badmal, Dist Jharsuguda	Plastic Granules	42 TPM
14.	SKS Plast, At - Budhipadar, PO - H. Kantapali, Dist - Jharsuguda	Plastic Granules, Tarpaulin Plastic, Pipe Plastic	50 TPM
15.	Mahamaya Industries, Beherapali, Jharsuguda	Disposabe Products	30 TPM

Annexure-3

Summary of sector wise action points

- Action Plan for abatement of pollution in Thermal Power Plants
- Action Plan for Abatement of Pollution in Coal Mines
- Action Plan for abatement of Pollution in Iron & Steel and Ferro Alloys Sector
- Action Plan for abatement of pollution in Aluminium Plants
- Action Plan for abatement of pollution through Common infrastructure and services



Annexure-3

Summary of sector wise action points

Table - A3.1 Action Plan for abatement of pollution in Thermal Power Plants

Sl. No.	Action plan	Issues being addressed
1.	All TPPs to install ESP/BF to meet the emission standard of 50 mg/m ³ with one spare field <ul style="list-style-type: none"> • Existing Plants • Future Plants 	• SPM & RPM in ambient air
2.	All lean slurry disposal system to be converted to (High Concentration Slurry Disposal) HCSD or mine void filling.	• Water (Cd & Hg) • Land requirement
3.	Online monitoring with real time display facility to be installed	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	Fly Ash utilization
5.	Real time ambient air quality monitoring (SO _x , NO _x , CO, PM ₁₀ , PM _{2.5})	SPM, RPM, SO ₂ , NO _x ,
6.	All the thermal power plants shall adopt zero discharge	Water scarcity

Table - A3.2 Action Plan for Abatement of Pollution in Coal Mines

Sl. No.	Action plan	Issues being addressed
1.	A dedicated coal transport corridor to be constructed in Ib valley coalfields.	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	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.	Particulate matter
4.	Adoption of concurrent mine filling with dry ash from the thermal power plants	Ash disposal
5.	Making provision for supply of drinking water in the peripheral villages of coal mining area	Water scarcity
6.	Enhancement of rake loading facility in the coal mines.	SPM, Traffic Congestion
7.	MCL to take up a comprehensive coal mine fire control plan	SO ₂ , Heat
8.	Back filling of the mine voids and restoration of the mined out area. An action plan to be prepared.	Land degradation

Table - A3.3 Action Plan for abatement of Pollution in Iron & Steel and Ferro Alloys Sector

Sl. No.	Action plan	Issues being addressed
1.	All DRI plants to install ESPs, in the kiln, bag filter in dust generating points and pneumatic dust handling system	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.	Water pollution
3.	Installation of online stack monitoring system in 300 TPD DRI kiln or more with real time display system	Particulate matter
4.	Real time ambient air quality monitoring (SO ₂ , NO _x , CO, PM ₁₀ , PM _{2.5}) in 300 TPD or more capacity with integration DRI industries for evaluation of air quality data	SPM, SO ₂ , NO _x , RPM
5.	Use of SMS slag and ferro alloys slag for haul road construction in the mine area	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.	Solid waste utilisation

Table - A3.4 Action Plan for abatement of pollution in Aluminium Plants

Sl. No.	Action plan	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.	Fluoride in air
2.	Online stack emission monitoring system with display system shall be installed	Fluoride in air
3.	Installation of fluoride removal (Fume treatment) system in bake oven plant	Fluoride in air
4.	Construction of secured landfill by VAL within its premises	Fluoride in water and soil
5.	Conducting a comprehensive wastewater audit for the smelter plant including runoff management	Fluoride in water and soil
6.	Real time ambient air quality monitoring (SO ₂ , NO _x , CO, PM ₁₀ , PM _{2.5})	SO ₂ , NO _x , 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	Fluoride in water

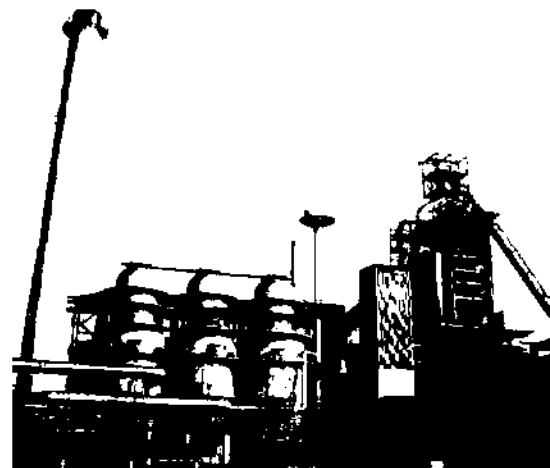
Table - A3.5 Action Plan for abatement of pollution through Common infrastructure and services

Sl. No.	Action plan	Issues being addressed
1.	Construction of a sewage treatment plant with drainage network for Brajaraj Nagar and Jharsuguda town	Organic pollution of river
2.	Establishment of an extensive air quality monitoring network for Ib valley -Jharsuguda area.	Air quality parameter
3.	Construction of water storage reservoirs to collect the mine water from the underground mines.	Water conservation
4.	Construction of common disposal site facility for char and other iron and steel plant waste.	Unsafe waste disposal and demand on land
5.	Development of a municipal solid waste disposal facility for Jharsuguda town	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.	Real time Data transmission.
8.	Pb, Cr, Cd and Fluoride concentrations in Ground water is to be monitored.	Data availability
9.	Monitoring of PM _{2.5} and Ozone on the points of traffic congestions should be done.	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	BOD and TC

Annexure-4

Summary of Unit Wise Implementation of Action Plan for Abatement of Pollution

- Thermal Power Plants
- Action Plan for Abatement of Pollution in Coal Mines
- Action Plan for abatement of Pollution in Iron & Steel and Ferro Alloys Sector
- Action Plan for abatement of pollution in Aluminium Plants
- Action Plan for abatement of pollution through Common infrastructure and services



Annexure-4

Summary of Implementation of Action Plan for CPA of IB Valley-Jharsuguda (2010-11 to 2014-15)

Table - A4.1 Thermal Power Plants

Action plan	Stakeholder agency	Current status with action plan for implementation	Remarks
All TPPs to install ESP/BF to meet the emission standard of 50 mg/m ³ with one spare field	Vedanta Aluminium Ltd. (CPP) (9x135MW)	<i>Retrofitting</i> 09 Nos of Hybrid Air Pollution Control System (APCS) - ESP and Bag filters have been <i>completed</i> and meeting the emission standard of 50 mg/Nm ³ .	Complied
	Vedanta Aluminium Ltd. (IPP) (4x600 MW)	04 Nos of Hybrid Air Pollution Control System (APCS) - ESP and Bag filters have been installed and meeting the emission standard of 50 mg/Nm ³ .	Complied
	Bhusan Power and Steel Ltd. (CPP) (40 MW + 60 MW +3x130 MW)	8 Nos of ESPs installed/ retrofitted to meet the emission standard of 50 mg/Nm ³	Complied
	Shyam Metallics and Energy Ltd. CPP (10 MW + 30 MW + 30 MW)	3 Nos of ESPs installed/ retrofitted to meet the emission standard of 50 mg/Nm ³ .	Not complied
	<i>Ib Thermal Power Station,ITPS, OPGC (2x210MW)</i>	Up-gradation of ESP of Unit -I has been completed and Up -gradation of ESP of Unit-II is in progress to achieve the emission target of 50mg/Nm ³	Job under progress. Up-gradation work of Unit -II is likely to be completed by Mar, 2016.
	Action Ispat and Power (P) Limited (2x43 MW, 1x20MW)	3 Nos of ESPs installed/ retrofitted to meet the emission standard of 50 mg/Nm ³ .	Complied
	Aditya Aluminium (A unit of Hindalco Ind. Ltd.) 4x150 MW	4 Nos of numbers of ESPs provided which are designed for 50 mg/Nm ³ with all the fields in operation. The emission standard for all the units prescribed is 50 mg/Nm ³ .	Complied
All lean slurry disposal system to be converted to High Concentration Slurry Disposal (HCSD) or mine	Vedanta Alluminium Ltd. (CPP)	The ash is being disposed in HCSD form.	Complied
	Vedanta Aluminium Ltd. (IPP)	The ash is being disposed in HCSD form.	Complied

void filling	Bhusan Power and Steel Ltd (CPP)	Dry disposal method has been adopted by the unit. The ash is transported to designated place in a covered vehicle in moist condition.	Complied
	Shyam Mettalics and Energy Ltd CPP	Dry disposal method has been adopted by the unit.	Complied
	Ib Thermal Power Station, (OPGC)	OPGC has been pursuing with MCL to get allotment of Belpahar Open Cast Mine void at an early date. Once the mine allotment to OPGC happens, mine void filling job will be taken up on top priority. Presently ash is being disposed of in Ash Pond in lean slurry form.	Not complied
	Action Ispat and Power (P) Limited	Dry disposal method has been adopted by the unit. The ash is transported to designated place in a covered vehicle in moist condition.	Complied
	Aditya Aluminium (A unit of Hindalco Ind. Ltd.)	Most of the ash is supplied to M/s. Ultratech Cement Ltd. Construction of High Concentration Ash Slurry Disposal (HCSD) method is under progress.	Complied
3. Online monitoring at Stacks (Continuous Emission Monitoring System, CEMS) with real time display facility to be installed.	Vedanta Alluminium Ltd. (CPP)	The industry has installed online monitoring system for measuring particulate matter emission from the stack for all 9 units.	Complied
	Vedanta Aluminium Ltd. (IPP)	The industry has installed online monitoring system for measuring particulate matter emission from the stack for all 4 units.	Complied
	Bhusan Power and Steel Ltd	The industry has installed online monitoring system for measuring particulate matter emission from the stack for all 5 units.	Complied
	Shyam Mettalics and Energy Ltd CPP	The industry has installed online monitoring system for measuring particulate matter emission from the stack for all units (2stacks).	Complied
	Ib Thermal Power Station, (OPGC)	The industry has installed online monitoring system for measuring particulate matter emission from the stack for all 02 units.	Complied
	Action Ispat and Power (P) Limited	The industry has installed online monitoring system for measuring particulate matter emission from the stack for all 3 units.	Complied
	Aditya Aluminium (A unit of Hindalco Ind. Ltd.)	The industry has installed online monitoring system for measuring particulate matter emission from the stack for all 4 units.	Complied



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 other fly ash based products	Vedanta Aluminium Ltd. (CPP)	4 Silos of capacity 1500m ³ each installed. The construction work of another 4 silos of 1500m ³ capacity each is under progress.	Partially Complied
	Vedanta Aluminium Ltd. (IPP)	4 Silos of capacity 2000m ³ each constructed.	Complied
	Bhusan Power and Steel Ltd)	The ash storage silos are available with storage capacity of 1500 MT and 2200 MT respectively.	Complied
	Shyam Mettalics and Energy Ltd CPP	1 Silo of capacity 500 T constructed.	Complied
	Ib Thermal Power Station, OPGC, Banaharpali, Jharsuguda	3 nos. of silos provided for ash storage. Total storage capacity is 620 MT.	Partially Complied
	Action Ispat and Power (P) Limited	1 no. of silo of 300 Cum capacity and 3 no. of silo of 600 Cum capacity installed.	Complied
5. Real time ambient air quality monitoring (SO _x , NO _x , CO, PM ₁₀ , PM _{2.5})	Aditya Aluminium (A unit of Hindalco Ind. Ltd.)	1 no. of silo of 2500 MT capacity and 1 no. of silo of 3000 T capacity installed.	Complied
	Vedanta Aluminium Ltd. (CPP)	The industry has installed 04 Nos of real time CAAQMS (Ambient air quality monitoring system) in the plant premises of Smelter and CPP for monitoring of environmental parameter.	Complied
	Vedanta Aluminium Ltd. (IPP)	The industry has installed 04 Nos of real time CAAQMS (Ambient air quality monitoring system) in the plant premises for monitoring of environmental parameter.	Complied
	Bhusan Power and Steel Ltd	The industry has installed 4 Nos of real time CAAQMS (Ambient air quality monitoring system) in the plant premises for monitoring of environmental parameter.	Complied
Ib Thermal Power Station, OPGC, Banaharpali, Jharsuguda	The industry has installed 04 Nos of real time CAAQMS (Ambient air quality monitoring system) in the plant premises for monitoring of environmental parameter.	Complied	

	Shyam Metaliks and Energy Ltd.	The industry has installed 1 Nos of real time CAAQMS (Ambient air quality monitoring system) in the plant premises for monitoring of environmental parameter.	Complied
	Action Ispat and Power (P) Limited	The industry has installed 4 Nos of real time CAAQMS (Ambient air quality monitoring system) in the plant premises for monitoring of environmental parameter.	Complied
	Aditya Aluminium (A unit of Hindalco Ind. Ltd.)	The industry has installed 4 Nos of real time CAAQMS (Ambient air quality monitoring system) in the plant premises for monitoring of environmental parameter.	Complied
6.	All the thermal power plants shall adopt zero discharge		
	Vedanta Alluminium Ltd. (CPP)	Additional ETP of 600m ³ /hr capacity along with existing ETP of 80m ³ /hr capacity have been provided. Zero discharge achieved except periodic storm water discharge during monsoon.	Complied
	Sterlite Energy Ltd. (IPP)	Two ETP of 15 m ³ /hr & 25 m ³ /hr Capacity have been provided and treated effluent is reused. Zero discharge achieved except periodic storm water discharge during monsoon.	Partially Complied
	Bhusan Power and Steel Ltd	The industry has installed 3 WWTPs (Waste water treatment plants) and 1 Effluent treatment plant for CRM & WRM. Effluent is discharged after treatment	Partially Complied
	Shyam Mettalics and Energy Ltd CPP	Zero discharge achieved except periodic storm water discharge during monsoon.	Partially Complied
	Ib Thermal Power Station, OPGC, Banaharpali, Jharsuguda	Effluent mostly recycled and a very small quantity is discharged	Partially Complied
	Action Ispat and Power (P) Limited	Zero discharge achieved except periodic storm water discharge during monsoon.	Complied
	Aditya Aluminium (A unit of Hindalco Ind. Ltd.)	Zero discharge achieved except periodic storm water discharge during monsoon.	Complied

Table - A4.2 Action Plan for Abatement of Pollution in Coal Mines

Action plan	Stakeholder agency	Current status with action plan for implementation	Remark
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	<p>A scheme for dedicated coal transportation has been prepared in consultation with IIT Khargapur.</p> <p>The scheme is under approval of Competent Authority.</p> <p>(i) Lajkura to Mine No.3 (3.7Km + 1 Bridge)</p> <p>(ii) Bundia to NH-200 (12.54Km-4 lane, 0.92Km-2lane)</p> <p>(iii) All coal transport road within and outside of ML area with life more than 5 years shall be concreted.</p> <p>Total estimated cost: 272Cr.</p> <p>Coal transportation through this road corridor is expected to be 20%.</p>	The Action Point is partially implemented. As reported by MCL the project required retendering for Bundia to NH-10.
Creation of reservoir for storage of mine drainage water and run off which can be used for industrial purpose for water conservation	MCL and Hindalco Industries Limited (Formerly INDAL)	Water reservoirs have been created in 5 opencast mines and 4 underground mines of MCL and water is being used for their own domestic consumption and other industrial activities. These storage reservoirs help in water conservation.	Complied and to be continued in future
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	A total of 14 Nos of Surface Miners engaged for coal production for 2014 -15. For the FY 2013-14 out of total production of 35.252 Million Tons 29.292 Million tons of coal (83.09 %) has been produced through Surface Miner. Similarly for the FY 2014 -15 out of total production of 40.752 Million Tons 38.535 Million tons of coal (94.55%) has been produced through Surface Miner.	Complied
Adoption of concurrent mine filling with dry ash from the thermal power plants to facilitate concurrent ash disposal.	MCL & Hindalco Industries Limited (Formerly INDAL)	Concurrent mine filling is not possible in active mine due to safety reasons as reported.	This action point could not be implemented due to associated technical difficulties

Action plan	Stakeholder agency	Current status with action plan for implementation	Remark
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 & Hindalco Industries Limited (Formerly INDAL)	In Ib valley coalfield area, one peripheral village is covered under departmental piped water supply scheme by MCL. 100 people are covered under this pipe water supply scheme. MCL is also supplying drinking water to peripheral villages of Coal Mines through water tanker. For the FY-2014-15 MCL has supplied 2070 KLD drinking water to 48 villages covering a population of 47748.	Complied
6. Enhancement of rake loading facility in the coal mines for control of SPM in ambient air and traffic congestion.	MCL	For the FY 2013-14 out of total despatch of 38.043 Million Tons 29.246 Million tons of coal (76.94%) has been despatched through Rail. Similarly for the FY 2014-15 out of total despatch of 40.31 Million Tons 33.5 Million tons of coal (83 %) has been despatched through Rail.	Complied
7. MCL to take up a comprehensive coal mine fire control plan for control of SO ₂ in ambient atmosphere and heat in the area.	MCL	MCL has adopted fire control plan for each mine. Fire fighting System has been implemented at strategic locations to control fire hazard. MCL is also maintaining minimum stock during summer months for fire control.	Complied
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 & Hindalco Industries Limited (Formerly INDAL)	MCL is back filling the mine voids or de-coaled area as per approved Mine Closer Plan. The back filled areas are also technically and biologically reclaimed. Reportedly only, 60 to 65% of the excavated area can be backfilled upto ground level because overburden material available compared to the void created by removal of coal and overburden from the ground, is maximum 65% in IBV CF even after considering the bulking factor.	Complied

Table - A4.3 Action Plan for abatement of Pollution in Iron & Steel and Ferro Alloys Sector

Sl. No.	Action plan	Stakeholder agency	Current status with action plan for implementation	Remark
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 Power and Steel Ltd	Individual ESPs installed in all 12 DRI Kilns and 5 De-dusting ESPs installed at other dust generating point. Pneumatic Dust Handling System (PDHS) installed for handling of dust collected from ESPs of DRI Kilns and dedusting ESP.	Complied
		Shyam Metallics and Energy Limited	Individual ESPs installed in all 4 DRI Kilns and individual bag filters installed at other dust generating point. Pneumatic Dust Handling System (PDHS) installed for handling of dust collected from ESPs of DRI Kilns and bag filters of other dust generating points.	Complied
		SMC Power Generation Limited	Individual ESPs installed in all 02 DRI Kilns and individual bag filters installed at other dust generating point. Pneumatic Dust Handling System (PDHS) installed for handling of dust collected from ESPs of DRI Kilns and bag filters of other dust generating points.	Complied and to be continued in future
		Concast Steel and Power Limited (Formerly SPS Sponge and Pawansut Sponge)	Individual ESPs installed in all 08 DRI Kilns and individual bag filters installed at other dust generating point. Pneumatic Dust Handling System (PDHS) installed for handling of dust collected from ESPs of DRI Kilns and bag filters of other dust generating points.	Complied
		MSP Metallics Limited	Individual ESPs installed in all 08 DRI Kilns and individual bag filters installed at other dust generating point. Pneumatic Dust Handling System (PDHS) installed for handling of dust collected from ESPs of DRI Kilns and bag filters of other dust generating points.	Complied
		Jain Steel and Power Limited	Individual ESPs installed in 1 nos of DRI Kilns and individual	(Presently the plant is not under

Sl. No.	Action plan	Stakeholder agency	Current status with action plan for implementation	Remark
			bag filters installed at other dust generating point. Pneumatic Dust Handling System (PDHS) installed for handling of dust collected from ESPs of DRI Kilns and bag filters of other dust generating points.	operation)
		Aryan Ispat and Power(P) Limited	Individual ESPs installed in all 3 nos of DRI Kilns and individual bag filters installed at other dust generating point. Pneumatic Dust Handling System (PDHS) installed for handling of dust collected from ESPs of DRI Kilns and bag filters of other dust generating points.	Complied
		Viraj Steel and Energy Limited	Individual ESPs installed in all 2 DRI Kilns and individual bag filters installed at other dust generating point. Pneumatic Dust Handling System (PDHS) installed for handling of dust collected from ESPs of DRI Kilns and bag filters of other dust generating points.	(Presently the plant is not under operation)
		Action Ispat and Power (P) Limited	Individual ESPs installed in all 02 DRI Kilns and individual bag filters installed at other dust generating point. Pneumatic Dust Handling System (PDHS) installed for handling of dust collected from ESPs of DRI Kilns and bag filters of other dust generating points.	Complied
		Bhagawati Steel (P) Limited	GCP comprises of bag filter has been installed in the DRI Kiln (01) and individual bag filters installed at other dust generating point. Pneumatic Dust Handling System (PDHS) installed for handling of dust collected from GCP of DRI Kilns and bag filters of other dust generating points.	Complied

Sl. No.	Action plan	Stakeholder agency	Current status with action plan for implementation	Remark
		M/s.Thakur Prasad Sao & Sons Pvt. Ltd (Formerly Eastern Steels and Power Ltd.,)	Individual ESPs installed in all 01 DRI Kilns and individual bag filters installed at other dust generating point. Pneumatic Dust Handling System (PDHS) installed for handling of dust collected from ESPs of DRI Kilns and bag filters of other dust generating points.	Complied
		M/s.Maa Samaleswari Industries (P) Ltd Lapanga	Individual ESPs installed in all 02 DRI Kilns and individual bag filters installed at other dust generating point. Pneumatic Dust Handling System (PDHS) installed for handling of dust collected from ESPs of DRI Kilns and bag filters of other dust generating points.	Complied
		L N Mettaliks Limited	Individual ESPs installed in all 02 DRI Kilns and individual bag filters installed at other dust generating point. Pneumatic Dust Handling System (PDHS) installed for handling of dust collected from ESPs of DRI Kilns and bag filters of other dust generating points.	Complied
		Singhal Enterprises (P) Limited	Individual ESPs installed in all 02 DRI Kilns and individual bag filters installed at other dust generating point. Pneumatic Dust Handling System (PDHS) installed for handling of dust collected from ESPs of DRI Kilns and bag filters of other dust generating points.	(Presently the plant is not under operation)
		Jai Hanuman Udyog Limited	Individual ESPs installed in all 02 DRI Kilns and individual bag filters installed at other dust generating point. Pneumatic Dust Handling System (PDHS) installed for handling of dust collected from ESPs of DRI Kilns and bag filters of other dust generating points.	Complied

Sl. No.	Action plan	Stakeholder agency	Current status with action plan for implementation	Remark
2.	All steel plants and sponge iron plants to develop collection and treatment facility for mineral char and coal pile runoff during monsoon for control of water pollution.	Bhusan Power and Steel Ltd	The industry has provided garland drain and toe wall around the ash mound and catch pit for runoff management from ash mounds. The unit has also installed 3 WWTPs. Overflow of these WWTPs is discharged to the nearest nalla after settling.	Complied
Shyam Mettalics and Energy Limited		Garland drain and earthen settling pond has been constructed for runoff from solid waste dump site.	Complied	
SMC Power Generation Limited		Garland drain and earthen settling pond has been constructed for runoff from solid waste dump site.	Complied	
Concast Steel and Power Limited (Formerly SPS Sponge)		Garland drain and earthen settling pond has been constructed for runoff from solid waste dump site.	Complied	
MSP Mettalics Limited		Garland drain and earthen settling pond has been constructed for runoff from solid waste dump site.	Complied	
Jain Steel and Power Limited		Garland drain and earthen settling pond has been constructed for runoff from solid waste dump site.	Complied	
Aryan Ispat and Power(P) Limited		Garland drain and earthen settling pond has been constructed for runoff from solid waste dump site.	Complied	
Viraj Steel and Energy Limited		Garland drain and earthen settling pond has been constructed for runoff from solid waste dump site.	Complied	
Action Ispat and Power (P) Limited		Garland drain and earthen settling pond has been constructed for runoff from solid waste dump site.	Complied	
Bhagawati Steel (P) Limited	Garland drain and earthen settling pond has been constructed for runoff from solid waste dump site.	Complied		

Sl. No.	Action plan	Stakeholder agency	Current status with action plan for implementation	Remark
		M/s.Thakur Prasad Sao & Sons Pvt. Ltd (Formerly Eastern Steels and Power Ltd.,)	Garland drain and earthen settling pond has been constructed for runoff from solid waste dump site.	Complied
		M/s.Maa Samaleswari Industries (P) Ltd Lapanga	Garland drain and earthen settling pond has been constructed for runoff from solid waste dump site.	Complied
		L N Mettaliks Limited	Garland drain and earthen settling pond has been constructed for runoff from solid waste dump site.	Complied
		Singhal Enterprises (P) Limited	Garland drain and earthen settling pond has been constructed for runoff from solid waste dump site.	Complied
		Jai Hanuman Udyog Limited	Garland drain and earthen settling pond has been constructed for runoff from solid waste dump site.	Complied
3.	Installation of online stack monitoring system (CEMS) with real time display system for 300 TPD DRI Kiln and above for monitoring and subsequent control of particulate matter	Bhusan Power and Steel Ltd	The industry has installed online monitoring system for measuring particulate matter emission from the stack attached to all 10 DRI units.	Complied
		Shyam Mettalics and Energy Limited	The industry has installed online monitoring system for measuring particulate matter emission from the stack attached to all 4 DRI units at 2 Stacks.	Complied
		SMC Power Generation Limited	The industry has installed online monitoring system for measuring particulate matter emission from the stack attached to all 02 DRI units	Complied
		Jain Steel and Power Limited	Not complied	Not in operation
		Aryan Ispat & Power Pvt. Ltd	The industry has installed online monitoring system for measuring particulate matter emission from the stack attached to all 2 DRI units	Complied
		Viraj Steel and Energy Limited	Not complied	Plant not in Operation
		Action Ispat and Power (P) Limited	The industry has installed online monitoring system for measuring particulate matter emission from the stack attached to all 02 DRI units	Complied

Sl. No.	Action plan	Stakeholder agency	Current status with action plan for implementation	Remark
		M/s.Thakur Prasad Sao & Sons Pvt. Ltd (Formerly Eastern Steels and Power Ltd.)	The industry has not installed online monitoring system for measuring particulate matter emission from the stack attached to DRI unit.	Not complied
4.	Real time ambient air quality monitoring (Continuous Ambient Air Quality Monitoring Stations) (CAAQMS) with 300 TPD capacity and above with integration facility (SOx, NOx, CO, PM ₁₀ , PM _{2.5}) for evaluation of air quality data	Bhusan Power and Steel Ltd	The industry has installed 4 Nos of real time CAAQMS (Ambient air quality monitoring system) in the plant premises for monitoring of environmental parameters.	Complied
		Shyam Metallics and Energy Limited	The industry has installed 1 Nos of real time CAAQMS (Ambient air quality monitoring system) in the plant premises for monitoring of environmental parameters.	Complied
		SMC Power Generation Limited	The industry is yet to install real time CAAQMS (Ambient air quality monitoring system) in the plant premises for monitoring of environmental parameters.	Under installation
		Concast Steel and Power Limited (Formerly SPS Sponge)	The industry is yet to install real time CAAQMS (Ambient air quality monitoring system) in the plant premises for monitoring of environmental parameters.	Not complied
		MSP Metallics Limited	The industry has installed 04 Nos of real time CAAQMS (Ambient air quality monitoring system) in the plant premises for monitoring of environmental parameters.	Complied
		Jain Steel and Power Limited	Not complied	Not in operation
		Aryan Ispat and Power(P) Limited	The industry has installed 3 Nos of real time CAAQMS (Ambient air quality monitoring system) in the plant premises for monitoring of environmental parameters.	Complied
		Viraj Steel and Energy Limited	Not complied	Not in operation
	Action Ispat and Power (P) Limited	The industry has installed 04 Nos of real time CAAQMS (Ambient air quality monitoring system) in the plant premises for monitoring of environmental parameters.	Complied	

Sl. No.	Action plan	Stakeholder agency	Current status with action plan for implementation	Remark
		M/s.Thakur Prasad Sao & Sons Pvt. Ltd (Formerly Eastern Steels and Power Ltd.,)	The industry is yet to install real time CAAQMS (Ambient air quality monitoring system) in the plant premises for monitoring of environmental parameters.	Not complied
5.	Use of SMS slag and ferro alloys slag for haul road construction in the mine area for utilization of metallurgical solid waste	Bhusan Power and Steel Ltd	Currently the slag is used in their own land for road making.	Generation of surplus slag if any is under evaluation
		Shyam Mettalics and Energy Limited	Currently the slag is used in their own land for road making.	Generation of surplus slag if any is under evaluation
		SMC Power Generation Limited	Currently the slag is used in their own land for road making after metal recovery.	Generation of surplus slag if any is under evaluation
		Concast Steel and Power Limited (Formerly SPS Sponge)	Currently the slag is used in their own land for road making after metal recovery.	Generation of surplus slag if any is under evaluation
		MSP Metallica Limited	Currently the slag is used in their own land for road making after metal recovery.	Generation of surplus slag if any is under evaluation.
		Action Ispat and Power (P) Limited	Currently the slag is used in their own land for road making after metal recovery.	Generation of surplus slag if any is under evaluation.
		M/s. Thakur Prasad Sao & Sons Pvt. Ltd (Formerly Eastern Steels and Power Ltd.,)	Currently the slag is used in their own land for road making after metal recovery.	Generation of surplus slag if any is under evaluation
6.	The char generated by DRI industries (300 TPD or more) is to be utilized in AFBC/ FBC/ CFBC boilers as supplementary fuel.	Bhusan Power and Steel Ltd	The industry has installed AFBC Boilers of capacity 1x 75 TPH, 1x 150 TPH, 4x250 TPH and 2x390 TPH in which char along with coal is used as fuel. .	Complied
		Shyam Mettalics and Energy Limited	The industry has installed AFBC Boilers of Power Generation capacity 30MW, 30 MW and 10 MWin which char along with coal is used as fuel. .	Complied
		SMC Power Generation Limited	The industry has installed AFBC Boilers of capacity 1x 80 TPH (17MW) in which char along with coal is used as fuel. .	Complied
		Concast Steel and	The industry has not installed	Not Complied

Sl. No.	Action plan	Stakeholder agency	Current status with action plan for implementation	Remark
		Power Limited (Formerly SPS Sponge)	AFBC Boilers.	
		MSP Metallica Limited	The industry has installed AFBC Boilers of capacity 70TPH (16 MW) in which char along with coal is used as fuel. .	Complied
		Jain Steel and Power Limited	Not installed	Plant is not in operation
		Viraj Steel and Energy Limited	Not installed	Plant is not in operation
		Action Ispat and Power (P) Limited	The industry has installed two CFBC and one AFBC Boilers of capacity 185, 185 and 80TPH (2x43MW+ 1x20MW) in which char along with coal is used as fuel. .	Complied
		M/s.Thakur Prasad Sao & Sons Pvt. Ltd (Formerly Eastern Steels and Power Ltd.)	The industry has installed AFBC Boilers of capacity 22 TPH (4MW) in which char along with coal is used as fuel.	Complied

Table - A4.4 Action Plan for abatement of pollution in Aluminium Plants

Sl. No.	Action plan	Stakeholder agency	Current status with action plan for implementation	Remark
1.	Pot line of smelter plant to be upgraded to meet the emission norm of 0.3 kg of fluoride per ton of Aluminium for control of fluoride in ambient air	Vedanat Aluminium Ltd (VAL)	At present the industry is operating with 180K amperage and meeting the prescribed standard of fluoride emission standard 0.3 kg/T (Fluoride per ton of Aluminium produced).	Complied
2.	Online stack emission monitoring system with display system shall be installed for evaluation of load of fluoride in ambient air.	(VAL)	The industry has installed online monitoring system for measuring particulate matter and hydrogen fluoride emission and from the stack for 04 pot room units (FTP-1 to FTP-4) and 02 bake oven units (FTP-1 & FTP-2 of bake ovens).	Complied
		Aditya Aluminium Ltd	The industry has installed online monitoring system for measuring particulate matter and hydrogen fluoride emission and from the stack for 04 pot room units (FTP-1 to FTP-4) and 01 bake oven units (FTP-1 of bake ovens).	Complied
3.	Installation of fluoride removal (Fume treatment) system from bake oven plant for control of fluoride in air.	(VAL)	Fume treatment system for Bake oven-No.1 and No.2 have been installed.	Complied
4.	Construction of secured landfill by Vedanat Aluminium Ltd (VAL) within its premises for control fluoride in water and soil	(VAL)	Unit has constructed 2nd SLF of 20,000T capacity which is active. Existing Secured land fill (1 st SLF) at VAL is exhausted and capped.	Complied
5.	Conducting comprehensive wastewater audit for the smelter plant including runoff management.	(VAL)	A study on comprehensive wastewater and run-off management has been conducted for the smelter and CPP by M/s APS water industries. Report has been submitted to OSPCB. The recommendation contained in the report is under implementation.	Complied
6.	Real time ambient air quality monitoring (SO _x , NO _x , CO, PM ₁₀ , PM _{2.5}) for evaluation of	(VAL)	The industry has installed 04 Nos of real time AAQMS (Ambient air quality monitoring system) in the plant premises of Smelter and	Complied

Sl. No.	Action plan	Stakeholder agency	Current status with action plan for implementation	Remark
	environmental parameters to be installed	Aditya Aluminum Ltd.	CPP for monitoring of environmental parameter. The industry has installed 04 Nos of real time AAQMS (Ambient air quality monitoring system) in the plant premises of Smelter and CPP for monitoring of environmental parameter.	
7.	Co processing of spent plotlines in cement kilns	Cement plants and VAL	At present Spent Pot Line (SPL) is disposed in Captive SLF. The unit is also discussing with M/s ACC Ltd for Co-processing of SPL in Cement Kiln.	Not Complied
8.	Vedanta Aluminium Ltd (VAL) will install de-fluoridation plant to prevent fluoride contamination in Bheden River	VAL	Industry has installed ETP consisting 03 modules of 100KL/hr capacity each. ETP equipped with 50 KL/hr capacity Ultra Filtration and Reverse Osmosis system to treat the waste water generated from smelter unit.	Complied

Table - A4.5 Action Plan for abatement of pollution through Common infrastructure and services

Action plan	Stakeholder agency	Current status with action plan for implementation	Remark
1. Construction of a sewage treatment plant with drainage network for Brajaraj Nagar and Jharsuguda town for control of organic pollution in river.	Odisha Water Supply and Sewerage Board (OWSSB)	Orissa Water Supply and Sewerage Board is taking up the matter with Orissa Govt.	Not complied
2. Establishment of an extensive air quality monitoring network for Ib Vally Jharsuguda area for evaluation of air quality parameters in the area.	OSPCB, Bhusan Power & Steel, Vedanta Aluminium Ltd (VAL)	<ul style="list-style-type: none"> i. The SPCB is monitoring AAQ in CPA at One Locations under NAMP and SAMP Programme on a continuous basis. ii. Besides for evaluation of CEPI Score CPCB is periodically monitoring AAQ at 8 locations engaging third party NABL accredited Laboratory. iii. Installation of one Continuous Ambient Air Quality Monitoring Station at Jharsuguda under SPCB/ CPCB Collaboration Project area is under progress. 	Complied and to be continued with improvement as necessary
3. Construction of water storage reservoirs to collect the mine water from the underground mines for water conservation.	Water Resources Department and user agency	<p>MCL has provided water storage reservoirs for Underground mines Orient-1&2, Orient 3 and Orient-4 and Hirakhand and Bundia Mines.</p> <p>All the UG mines have sumps & pumps of adequate capacity underground. Treated mine water is used for Colony & Village supply & all industrial purposes</p>	Complied
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	This is multi stake holder issue. Individual industries have installed requisite waste disposal facilities within their premises for scientific disposal of solid waste.	Not complied



Action plan	Stakeholder agency	Current status with action plan for implementation	Remark
5. Development of a municipal solid waste disposal facility for Jharsuguda town for management of MSW.	Municipality	Jharsuguda municipality has provided a municipal solid waste disposal area at Kapumal. However municipality has been instructed for segregation facility at the disposal site.	Partially complied
6. Promotion of industries within CPIC area which uses waste products like fly ash, char and waste heat for gainful utilization of solid waste		<ul style="list-style-type: none"> i. There are 13 nos. of operating Fly Ash Bricks Plants in Ib valley-Jharsuguda area with combined capacity to produce 45.5 Million Fly Ash Brick per Annum. ii. There are 17 AFBC Boilers installed in Ib valley-Jharsuguda. iii. There are 29 Nos of Waste Heat Boilers installed in Ib valley-Jharsuguda 	
7. The establishment of online 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.	Vedanata Aluminium Ltd, Bhusan Power & Steel, Tata Refectories Ltd.	The location of on-line monitoring station for water quality monitoring of Ib is under evaluation after formulation of guidelines for online water quality monitoring by CPCB.	Under implementation
8. Pb, Cr, Cd and Fluoride concentrations in Ground water is to be monitored.	MCL	MCL is regularly monitoring ground water quality with respect to Pb, Cr, Cd and F ⁻ concentration. Similarly VAL is also monitoring ground water quality with respect to target parameters. Besides for evaluation of CEPI Score CPCB is periodically monitoring GW Quality at 8 locations engaging third party NABL accredited Laboratory.	Complied and to GW Quality Monitoring is to be continued

Action plan	Stakeholder agency	Current status with action plan for implementation	Remark
9 Monitoring of PM _{2.5} and Ozone on the points of traffic congestions should be done.	VAL, Bhusan Ltd. And MCL	<ul style="list-style-type: none"> i. The monitoring locations has been finalised by SPCB. The monitoring will commence shortly. ii. Some of the Real Time AAQ Monitoring Location within the industrial premises has Ozone Sensors. 	Under implementation
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 Power & Steel, VAL etc.	OPGC and VAL have installed a DG set for STP. However MCL has not provided stand-by DG set for STP. Non Operation of STPs due to power failure has not been observed.	Partially Complicd

Annexure-5

Online Monitoring Facility for Stacks and AAQ in CPA

- Installation of real-time ambient air quality monitoring facility in CPA of Ib valley Jhasrsuguda
- Installation of Online Stack Monitoring facility in CPA of Ib valley-Jhasrsuguda



Annexure-5

Online Monitoring Facility for Stacks and AAQ in CPA

Table - A5.1 Installation of real-time ambient air quality monitoring facility in CPA of Ib valley Jharsuguda

Sl No.	Name and Address of the Industry	Type of Industry	Location of Real Time AAQ Monitoring facility	Parameters Monitored
1.	Vedanta Limited, Bhurkhamunda, Jharsuguda, (Smelter & CPP)	Aluminium Smelter & CPP	Near Smelter, ETP Near CPP, Switchyard Near Central Lab, Smelter-1 Near R & R Colony at Vedanta Guest House	PM ₁₀ , PM _{2.5} , SO ₂ , NOx, CO
2.	Vedanta Limited, Bhurkhamunda, Jharsuguda, IPP	Thermal Power	Near Cooling Tower, IPP Admin Building, IPP Near Site office, IPP At Vedanta Township	PM ₁₀ , PM _{2.5} , SO ₂ , NOx, CO
3.	Bhushan Power & Steel limited, Vill-Thekoloji, Po-Lapanga, Dist-Sambalpur	Integrated Steel and Thermal Power Plant	Near DET Hostel Near Railway gate Behind CRM	PM ₁₀ , PM _{2.5} , SO ₂ , NOx, CO, O ₃
4.	Shyam Metall & Energy Ltd. At- Pondloi Po-Lapanga , Dist - Sambalpur	Sponge Iron & Steel & Thermal Power Plant	Near Admin Building	PM ₁₀ , PM _{2.5} , SO ₂ , NOx, CO
5.	Odisha Power Generation Corporation Ltd., ITPS Banharpali, Jharsuguda	Thermal Power	Near MGR At Township Behind Workshop Near Training Hostel	PM ₁₀ , PM _{2.5} , SO ₂ , NOx, CO
6.	Aditya Aluminium (A Unit of Hindalco Industries Limited), Lapanga, Sambalpur	Aluminium Smelter & CPP	Near raw water reservoir of CPP Near fuel oil storage side of CPP Near Rail way siding of smelter area Near market complex of township area.	PM ₁₀ , PM _{2.5} , SO ₂ , NOx, CO
7.	Action Ispat & Power (P) Ltd, Pandripathar,	Integrated Steel Plant	Near Admin Building Near Labour Colony Near Iron Ore Yard	PM ₁₀ , PM _{2.5} , SO ₂ , NOx, CO

Sl No.	Name and Address of the Industry	Type of Industry	Location of Real Time AAQ Monitoring facility	Parameters Monitored
8.	Marakuta, Jharsuguda SMC Power Generation (P) Ltd, Hirma, Jharsuguda	Sponge Iron & Integrated Steel	Near Reservoir Not installed	Not installed
9.	Concast Steel & Power Ltd (Formerly SPS Sponge Iron Ltd), Badmal, Jharsuguda	Sponge Iron & Integrated Steel	Not installed	Not installed
10.	MSP Metallics Ltd, Marakuta, Jharsuguda	Integrated Steel Plant	Near 33 KV Outdoor Switch Yard	PM ₁₀ , PM _{2.5} , SO ₂ , NOx, CO
11.	Aryan Ispat & Power Ltd, At/P.O: Bomaloi, Dist: Sambalpur	Sponge Iron & power	Near Main Gate Near Store Buidling Near Aaryavrate	PM ₁₀ , PM _{2.5} , SO ₂ , NOx, CO
12.	Viraj Steel & Energy Gurupali, Rengali, Sambalpur	Sponge Iron	Not Installed	Not Installed
13.	Thakur Prasad Sao & Sons (P) Ltd, Lahandabud, Jharsuguda	Integrated Steel Plant	Not Installed	Not Installed
14.	Ultra Tech Cement Limited, Arda, Jharsuguda	Cement	Near Wagon Tippler Near Packing Plant Near Labour Colony Near Drama Pandal	PM ₁₀ , PM _{2.5} , SO ₂ , NOx, CO

Table - A5.2 Installation of Online Stack Monitoring facility in CPA of Ibvalley Jharsuguda

Sl No.	Name and Address of the Industry	Type of Industry	Online Monitoring Facility for the Stack attached to	Parameters Monitored
1.	Vedanta Limited, Jharsuguda	Aluminium Smelter & CPP	Potline-1, FTP-1,2 Potline-2, FTP-3,4 Bake Oven, FTP -1,2 CPP Phase-I, Unit-1to5 CPP Phase-II, Unit-6to9	PM, HF PM, HF PM, SO ₂ , NO _x , CO
2.	Vedanta Limited, Jharsuguda, IPP	Thermal Power	IPP Phase-I, Unit-1,2 IPP Phase-II, Unit - 3, 4	PM, SO ₂ , NO _x , CO
3.	Bhushan Power & Steel limited, Vill- Thelkoloji. Po- Lapanga, Dist- Sambalpur, Odisha. 768232	Integrated Steel and Thermal Power Plant	DRI/WHRB Stack 1 to 10 CPP 40 MW Stack CPP 60 MW Stack CPP 130 MW Stack Unit - I to III Dedusting ESP stack of pellet plant Stack of Wind box & Hood exhaust ESP of Pellet plant	PM,SO ₂ ,NO _x ,CO PM,SO ₂ ,NO _x ,CO PM,SO ₂ ,NO _x ,CO PM,SO ₂ ,NO _x ,CO PM PM,SO ₂ ,NO _x
4.	Shyam Metallics & Energy Ltd. At- Pondloi Po- Lapanga , Dist - Sambalpur	Sponge Iron & Steel & Thermal Power Plant	CEMS-1 (AFBC -1, WHRB 1, 2) CEMS -2 (AFBC 2,3) CEMS -3 (WHIRB -3,4) CEMS -4 (Pellet Plant)	PM, SO ₂ ,NO _x PM, SO ₂ ,NO _x PM & SO ₂ PM & SO ₂
5.	Odisha Power Generation Corporation Banharpali, Jharsuguda	Thermal Power	ESP of Unit - I,II	PM, SO ₂ , NO _x , CO
6.	Aditya Aluminium Lapanga, Sambalpur	Smelter and CPP	ESP Unit 1-5 CPP GTC 1,2 of Potline 1 FTC 1,2 of ABF	PM, SO ₂ , NO _x , CO PM, HF PM, HF

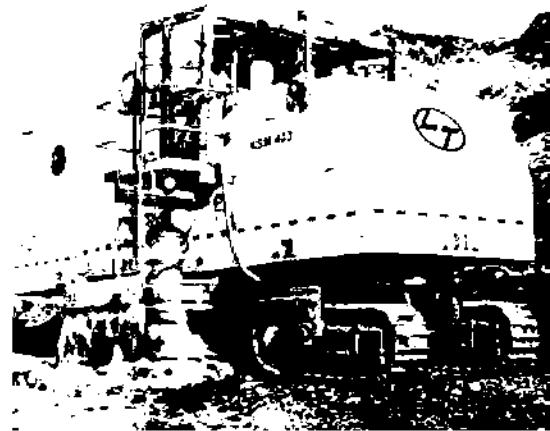
Sl No.	Name and Address of the Industry	Type of Industry	Online Monitoring Facility for the Stack attached to	Parameters Monitored
7.	Action Ispat & Power (P) Ltd, Pandripathar, Marakuta, Jharsuguda	Integrated Steel Plant	ESP stack of DRI kiln – I & II ESP stack of AFBC Boiler ESP stack of CFBC Boiler GCP stack of Ferro Alloys Plant	PM & SO PM , SO ₂ , NO _x PM , SO ₂ , NO _x PM & SO ₂
8.	SMC Power Generation Limited Hirma Jharsuguda	Integrated Steel Plant	Common stack of ESP of DRI Kiln No. I & II Stack attached to ESP of AFBC Boiler	PM & SO ₂ PM , SO ₂ , NO _x
9.	Concast Steel & Power Ltd, Badmal, Jharsuguda	Integrated Steel Plant	ESP stack of DRI kiln- I to VIII Process ESP of Sinter Plant Multi Tube De- dusting Unit of Sinter Plant GCP stack of Ferro Alloys Plant	PM & SO ₂
10.	MSP Metallics Ltd, Marakuta, Jharsuguda	Integrated Steel Plant	ESP stack of DRI kiln- I to VIII Multi cyclone stack of Sinter Plant Bag Filter stack of Sinter discharge end ESP stack of AFBC Boiler ESP Stack of Pellet Plant	SO ₂ PM & SO ₂ PM & SO ₂ PM & SO ₂ PM , SO ₂ , NO _x PM & SO ₂
11.	Aryan Ispat & Power Ltd, At/P.O: Bomaloi, Dist: Sambalpur	Sponge Iron & power	Common Stack attached to 2x100 TPD DRI Kilns Common Stack attached to 350 TPD DRI Kiln & AFBC Boiler	PM, NO _x , SO ₂ PM, NO _x , SO ₂

Sl No.	Name and Address of the Industry	Type of Industry	Online Monitoring Facility for the Stack attached to	Parameters Monitored
12.	Bhagawati Steels (P) Ltd/, Badmal, Jharsuguda	Sponge Iron	Stack of Bag Filter connected to DRI Kiln	PM & SO ₂
13.	L N Metallic (P) Ltd, Sripura, Jharsuguda	Sponge Iron	ESP stack of DRI kiln -I & II	PM & SO ₂
14.	Jai Hanuman Udyog Ltd., Raghunathpali, Kolabira, Jharsuguda	Sponge Iron	Common stack of ESP of Kiln No.I& II of DRI Kiln	PM & SO ₂
15.	Ultra Tech Cement Limited, Arda, Jharsuguda	Cement	Stack of cement mill -1,2	PM

Annexure-6

Statistics of Action Points in Ib Valley Coalfields

- Use of Surface Miner for raising of coal in Jharsuguda area
- Supply of Drinking water to peripheral villages by water tanker
- Creation of Water reservoir for storage of mine drainage and surface runoff
- Mine void filling in abandoned mine void of MCL
- Enhancement of rake loading facility in coal mines



Annexure-6

Statistics of Action Points in Ib Valley Coal Fields

Table - A6.1 Use of Surface Miner for raising of coal in Jharsuguda area

Year	No. of surface minors deployed	Total Coal Production in MTPA	Coal Production using surface miner in MTPA	% of coal production using surface miner
2010-11	10	33.991	27.473	80.82%
2011-12	11	34.891	27.764	79.57%
2012-13	12	33.365	27.799	83.32%
2013-14	12	35.252	29.292	83.09%
2014-15	14	40.752	38.535	94.56%

Note: Water supply scheme for Brajrajnagar town at Jharsuguda amounting to Rs.8.88 Crore sanctioned. Already an amount of Rs. 4.44 Crore has been deposited with Collector, Jharsuguda.

Table - A6.2 Supply of Drinking water to peripheral villages by water tanker

Year	No of Villages covered	Quantity of water supplied in KLD	Population Covered	Source of Drinking Water	Agency
2010-11	35	1720	40254	1WSS IBV, 1WSS LKP, Treated UG Mine Water	Contractual water tanker hired by MCL with
2011-12	37	1850	43502		GPS device for online surveillance.
2012-13	40	1910	44662		
2013-14	46	1950	45347		
2014-15	48	2070	47748		

Table - A6.3 Creation of Water reservoir for storage of mine drainage and surface runoff

Name of Mine	Quantity of mine drainage water generated in M3/month[@]	Quantity of surface runoff generated in M3/Month*	Capacity of water reservoir created in M3	Use of storage water if any and quantity used in M3/month^{\$}
Lajkura OCP	1,12,350	4,12,500	4,00,000	51,060
Samleswari OCP	1,12,350	13,67,500	35,90,000	96,390
Lakhanpur OCP	4,00,000	17,45,000	21,80,000	1,93,333
Belpahar OCP	1,50,000	12,97,500	53,00,000	54,600
Lilari O CP	8,770	2,32,500	2,30,000	18,000
Orient Mine no.1&2	85,879	NA	86,466	85,879
Orient Mine no.3	1,04,264	NA	4,41,000	1,04,264
Orient Mine no.4	70,942	NA	15,200	70,942
HBI	48,554	NA	98,877	48,554

[@] Mine drainage during lean period

* Average figures for monsoon months.

^{\$} The runoff water flowing into the mine is collected in the water reservoir/ sump and from there drawn out for industrial use like spraying for dust control, Vehicle washing, Cleaning, Fire Fighting etc., domestic use and supply to surrounding.

The status of water storage reservoirs in IB Valley Coal Fields

Year	Number of Water storage reservoirs	Capacity of water storage reservoirs in Million Cum	Water used for following purpose
2010-11	14	13.56	Domestic+Industrial+Surrounding
2011-12	15	14.23	Domestic+Industrial+Surrounding
2012-13	17	16.25	Domestic+Industrial+Surrounding
2013-14	18	17.10	Domestic+Industrial+Surrounding
2014-15	20	18.85	Domestic+Industrial+Surrounding

1. Domestic use consists of Supply of water to colonies, Offices, Workshops, Clubs, Community Centres, Market Complex, Plantations etc.
2. Industrial Use consists of Dust suppression, fire-fighting or cooling purpose, Washing of HEMMs in workshop, Stowing UG, Fly ash disposal site etc.
3. Surrounding use consist of supply of water for irrigation in paddy fields, supply of water in village ponds etc.

Table - A6.4 Mine void filling in abandoned mine void of MCL

Year	Area/ volume available for ash filling	Area / volume already filled in with ash	Volume of ash filled during the year	Sources of ash (name of the TPP)
2010-11	Nil	Nil	Nil	
2011-12	Nil	Nil	Nil	
2012-13	Nil	Nil	Nil	
2013-14	Nil	Nil	Nil	
2014-15	Nil	Nil	Nil	

Note : No Quarry or Mine has been abandoned. Stripping ratio is also relatively high. Lower Seams have not been exhausted. Hence, Ib Valley coalfield opencast mines are not in a position to accommodate flyash in the quarry voids at present.

Table - A6.5 Enhancement of rake loading facility in coal mines

Year	Total Coal Production in Million Tons	Despatch by Rail Mode	Total Despatch	% of Despatch by Rail Mode
2010-11	35.726	27.363	36.775	74.41%
2011-12	36.659	27.2	37.899	71.77%
2012-13	34.696	26.864	36.584	73.43%
2013-14	36.422	29.246	38.013	76.94%
2014-15	41.778	33.513	40.315	83.13%

Annexure-7

Monitoring of Environmental Quality in CPA by SPCB

- Concentration Range of critical parameters in the surface water environment in Ib valley-Jharsuguda area (Ib and Bheden river)
- BOD and TC in IB and Bheden river in CPA during 2010-2014

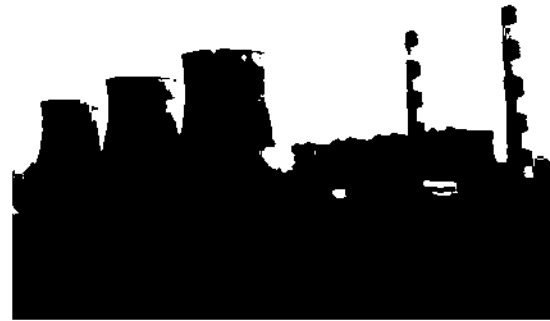


Table - VI.4 Ground water quality monitoring report for sample collected during October 2014

MCL, Talcher Area	Parameters (in mg/l)				
	Pb	C	Hg	Cd	Zn
Method of Analysis	3111A	3111A	3112 B	3111A	3111A
Uncertainty	-	-	-	-	-
1. Seepage water D/s of check dam of South Balanda quarry No.3B	0.004	0.001	0.0014	0.0002	0.001
2. Test well D/s of check dam of South Balanda quarry No.3B	<0.001	<0.001	0.0002	<0.0001	<0.001
3. Test well D/s of check dam of South Balanda quarry No.2	<0.001	0.005	0.0010	<0.001	0.374
4. Test well near pilot quarry of South Balanda	<0.001	<0.001	0.00044	<0.0001	<0.001
5. Mine drainage water of Jagannath OCP near pilot quarry of South Balanda	0.003	0.001	0.00064	0.0001	0.117
6. Test well near old time office of South Balanda OCP	0.037	0.002	0.0021	<0.0001	0.466
7. Tube well near Bharatpur colony (Gobara Chowk)	0.001	0.001	0.00064	<0.0001	0.878
8. Tube well near Jagannath colony (In front of Jagannath Kalakendra)	0.001	0.001	0.0010	<0.0001	0.138
9. Tube well inside Tarini Temple of Jagannath colony	0.004	0.021	0.0011	<0.0001	0.224
10. Tube well inside Balanda colony (In front of Qr. No. MD-13)	0.012	0.014	0.0003	<0.0001	0.024
11. Tube well back side of Black Diamond Stadium (MCL)	0.011	0.008	<0.00006	<0.0001	0.016
12. Tube well inside Balanda colony in front of Balanda Dispensary	0.003	0.003	0.0003	<0.0001	0.126
13. Ash slurry from mixing tank of TTPS (NTPC), Talcher	0.023	0.041	0.0003	0.0003	0.096
14. Ash slurry from pug mill before discharging to Jagannath quarry No.4 of M/s Bhusan Steel Ltd., Dhenkanal	0.002	0.005	0.0023	0.0002	0.006
15. Decanted water of Jagannath quarry No.4 allotted to M/s Bhusan Steel Ltd., Dhenkanal	<0.001	0.001	0.00019	<0.0001	0.004

Annexure-7

Monitoring of Environmental Quality in CPA by SPCB

Table - A7.1 Concentration Range of critical parameters in the surface water environment in

Ib valley-Jharsuguda area (Ib and Bheden river)

Sundargarh (Ib)

Lat : 22^o08'08.68"N, Long : 84^o03'25.62" E

Year	Fluoride in mg/l			Nitrate as NO ₃ ⁻ in mg/l			Total Kjhdhal Nitrogen in mg/l		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
2010	0.136	0.312	0.217	0.035	3.122	0.216	3.920	19.880	9.030
2011	0.040	0.331	0.250	0.071	9.226	0.388	0.840	15.700	3.292
2012	0.241	0.748	0.377	0.089	12.295	0.362	1.120	7.840	2.637
2013	0.210	0.448	0.306	0.128	4.788	0.431	1.120	3.400	2.484
2014	0.230	0.380	0.304	0.372	10.621	0.526	0.560	1.960	1.196

Jharsuguda (Ib)

Lat : 21^o51'49.41"N, Long : 83^o56'51.53"E

Year	Fluoride in mg/l			Nitrate as NO ₃ in mg/l			Total Kjhdhal Nitrogen in mg/l		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
2010	0.142	0.397	0.259	0.049	3.995	0.287	2.240	17.920	10.150
2011	0.067	0.593	0.285	0.009	6.524	0.340	0.840	10.900	3.428
2012	0.248	0.422	0.313	0.049	7.587	0.295	0.840	8.400	3.103
2013	0.175	0.496	0.308	0.469	2.339	0.283	1.120	4.200	2.318
2014	0.215	0.360	0.300	0.554	4.832	0.384	0.280	1.960	1.120

Brajrajnagar U/s (Ib)

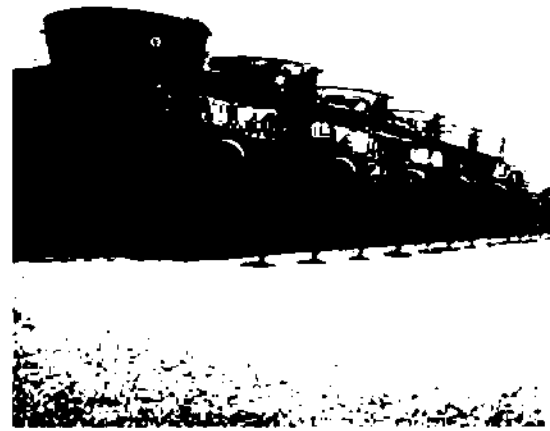
Lat : 21^o49'25.65"N, Long : 83^o56'28.95"E

Year	Fluoride in mg/l			Nitrate as NO ₃ ⁻ in mg/l			Total Kjhdhal Nitrogen in mg/l		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
2010	0.132	0.307	0.236	0.035	3.238	0.261	2.240	4.760	3.990
2011	0.054	0.337	0.256	0.018	4.881	0.235	0.840	9.800	3.173
2012	0.248	0.374	0.304	0.058	7.600	0.595	1.120	8.400	3.220
2013	0.285	0.209	0.353	0.071	2.166	0.255	1.680	4.120	2.780
2014	0.219	0.428	0.304	0.602	2.990	0.368	0.280	1.680	1.196

Annexure 8

Locations of Monitoring of Environmental Quality in by CPCB

- Ambient Air Quality Monitoring Locations
- Surface Water Sampling Locations
- Ground Water Sampling Locations



Jharsuguda (Ib)

Year	BOD (mg/l)			TC (MPN/100 ml)		
	Min	Max	Mean	Min	Max	Mean
2010	0.6	1.6	1.1	1700	5400	2675
2011	0.8	2.5	1.6	220	17000	4135
2012	0.5	2.2	1.4	790	16000	3609
2013	0.3	1.6	1.0	230	3300	1973
2014	0.3	1.2	0.6	78	24000	4306

Brajarajnagar U/s (Ib)

Year	BOD (mg/l)			TC (MPN/100 ml)		
	Min	Max	Mean	Min	Max	Mean
2010	0.6	1.6	1.0	1100	3500	1658
2011	1.0	2.2	1.5	700	2800	1481
2012	0.6	1.8	1.3	330	2800	1676
2013	0.4	1.6	1.0	940	5400	2734
2014	0.2	1.3	0.8	130	5400	2365

Brajarajnagar D/s(Ib)

Year	BOD (mg/l)			TC (MPN/100 ml)		
	Min	Max	Mean	Min	Max	Mean
2010	0.7	2.4	1.5	1500	9200	3225
2011	1.2	2.4	1.8	790	6300	2774
2012	0.8	2.3	1.6	490	5400	3191
2013	0.7	2.2	1.6	790	3900	2759
2014	0.2	1.3	0.8	490	9200	3245

Jharsuguda (Bheden)

Year	BOD (mg/l)			TC (MPN/100 ml)		
	Min	Max	Mean	Min	Max	Mean
2010	0.4	2.2	1.4	220	2200	1016
2011	0.7	2.4	1.6	470	1400	723
2012	1.3	2.3	1.7	490	3500	1456
2013	0.4	2.2	1.4	490	7900	2717
2014	0.1	1.5	0.9	230	4900	1695

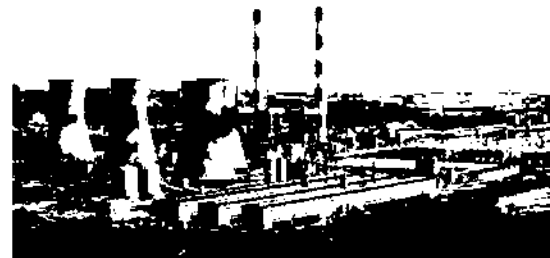
Tolerance limit for BOD for Class C Rivers : 3.0 mg/l, max
Tolerance limit for TC for Class C Rivers : 5000 MPN/ 100 ml
(IS : 2296-1982)

- **NB: Test Characteristics for Drinking Water (IS 10500:1991):** pH = 6.5-8.5 (Desirable Limit), Fluoride as (F) mg/l= 1.0 (Desirable Limit) and 1.50 (Permissible Limit in the absence of alternative source)
- **Tolerance limits for inland surface water subject to pollution (IS: 2296:1982):** Class-A, Class-B & Class-C: pH: 6.5-8.5, Fluoride as (F) mg/l max. = 1.5

Annexure-8

Monitoring Locations of Environmental Quality in CPA by CPCB

- Ambient Air Quality Monitoring Locations
- Surface Water Sampling Locations
- Ground Water Sampling Locations
- Ambient Air Quality Monitoring Locations
- Surface Water Sampling Locations
- Ground Water Sampling Locations



Annexure-8

Jharsuguda Area

Table - A8.1 Ambient Air Quality Monitoring Locations

Sample Code	Monitoring Location	Latitude	Longitude
JSG/AAQ – 1	Near Bhusan side (Thekoli)	N 20 ⁰ 50.359'	E 85 ⁰ 05.940'
JSG/AAQ – 2	Vedanta Aluminium Ltd. (Bhurkamunda)	N 21 ⁰ 48.935'	E 85 ⁰ 01.467'
JSG/ AAQ – 3	Badmal Industrial Estate (SPS Steels)	N 21 ⁰ 49.179'	E 83 ⁰ 59.970'
JSG/ AAQ – 4	Jharsuguda Township	N 21 ⁰ 49.211'	E 84 ⁰ 00.173'

Table - A8.2 Surface Water Sampling Locations

Sample Code	Monitoring Location	Latitude	Longitude
JSG/SW – 1	Bhuden River (Near Kheruwal bridge)	N 21 ⁰ 41.516'	E 85 ⁰ 2.920'
JSG/SW – 2	IB River (Confluence point of Bhuden and IB)	N 21 ⁰ 48.492'	E 83 ⁰ 56.645'
JSG/SW – 3	Kharkari nallah (Vedanta Boundary)	N 21 ⁰ 47.916'	E 84 ⁰ 2.076'
JSG/ SW – 4	Hirakud Reservoir (at Sambalpur)	N 21 ⁰ 29.250'	E 83 ⁰ 51.016'

Table - A8.3 Ground Water Sampling Locations

Sample Code	Monitoring Location	Latitude	Longitude
JSG/GW – 1	Near Bhusan Power and Steels (Thekoli)	N 20 ⁰ 50.360'	E 85 ⁰ 05.936'
JSG/GW – 2	Vedanta Aluminium Ltd. (Bhurkamunda)	N 21 ⁰ 48.935'	E 84 ⁰ 01.467'
JSG/GW – 3	Badmal Industrial Estate (SPS Steels)	N 21 ⁰ 49.180'	E 83 ⁰ 59.820'
JSG/ GW – 4	MSP Metalics	N 21 ⁰ 51.660'	E 83 ⁰ 57.768'

IB Valley Area

Table - A8.4 Ambient Air Quality Monitoring Locations

Sample Code	Monitoring Location	Latitude	Longitude
IBV/AAQ - 1	Brajarajnagar Mining Belt (MCL Rescue office)	N 21 ⁰ 51.313'	E 83 ⁰ 55.254'
IBV/AAQ - 2	Rampura Area (Water tank)	N 21 ⁰ 48.173'	E 83 ⁰ 58.270'
IBV/AAQ - 3	IB Thermal Power Station (OPGC)	N 25 ⁰ 41.729'	E 83 ⁰ 51.763'
IBV/ AAQ - 4	Belpahar (Central Workshop)	N 21 ⁰ 46.466'	E 85 ⁰ 52.427'

Table - A8.5 Surface Water Sampling Locations

Sample Code	Monitoring Location	Latitude	Longitude
IBV/SW 1	IB River Near NH-200 Bridge	N 21 ⁰ 51.906'	E 83 ⁰ 57.058'
IBV/SW 2	IB River in between reservoir of Vedanta	N 21 ⁰ 49.208'	E 83 ⁰ 56.702'
IBV/SW 3	Lilari Nalla (Mines drainage water)	N 21 ⁰ 46.251'	E 83 ⁰ 52.353'
IBV/SW 4	Hirakud Reservoir near IB thermal power station	N 21 ⁰ 46.805'	E 83 ⁰ 02.101'

Table - A8.6 Ground Water Sampling Locations

Sample Code	Monitoring Location	Latitude	Longitude
IBV/GW 1	Brajarajnagar Mining Belt	N 21 ⁰ 51.313'	E 83 ⁰ 55.254'
IBV/GW 2	Rampura Area (Water tank)	N 21 ⁰ 48.173'	E 83 ⁰ 58.270'
IBV/GW 3	IB Thermal Power Station	N 25 ⁰ 41.729'	E 83 ⁰ 51.763'
GW - 4	Belpahar area	N 21 ⁰ 46.466'	E 85 ⁰ 52.427'
