IMPLEMENTATION STATUS AND ACTION PLAN IN CRITICALLY POLLUTED AREAS

(ANGUL- TALCHER)

ODISHA

STATE POLLUTION CONTROL BOARD, ODISHA
BHUBANESWAR
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PREFACE

Industries tend to grow in cluster 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 Odisha there are three such critically polluted industrial clusters; Angul-Talcher, Ib-valley and Jharsuguda.

The Action Plan for abatement of pollution in Angul-Talcher 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.

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List of Abbreviations

1. AAQ – Ambient Air Quality
2. AFBC – Atmospheric Fluidized Bed Combustion
3. APC – Air Pollution Control
4. BF – Bag Filter
5. BOD – Biochemical Oxygen Demand
6. CBM – Coal Bed Methane
7. CEPI – Comprehensive Environmental Pollution Index
8. CETP – Common Effluent Treatment Plant
9. CMH – Cubic Meter per Hour
10. CPCB – Central Pollution Control Board
11. CPP – Captive Power Plant
12. CPIC – Critically Polluted Industrial Cluster
13. CTL – Coal to Liquid
14. DO – Dissolved Oxygen
15. DPR – Detailed Project Report
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. GOI – Govt. of India
24. GPIs – Grossly Polluting Industries
25. HCSD – High Concentration Slurry Disposal
26. IPP – Independent Power Plant
27. ISMU – Indian School of Mining University
28. KL – Kilo Liter
29. KLD – Kilo Liter per Day
30. MCL – Mahandi Coalfield Limited
31. MLD – Million Liter per Day
32. MPN – Most Probable Number
33. MSL – Mean Sea Level
34. MTPA – Million Ton per Annum
35. MW – Mega Watt
36. NALCO – National Aluminium Company
37. NAMP – National Ambient Air Monitoring Programme
38. NOx – Oxides of Nitrogen
39. NRCD – National River Conservation Directorate

40. NTPC – National Thermal Power Corporation
41. OCP – Open Cast Project
42. OWSSB – Orissa Water Supply and Sewerage Board
43. PDHS – Pneumatic Dust Handling System
44. PM – Particulate Matter
45. PPM – Parts Per Million
46. PPP – Public Private Partnership
47. REMP – Regional Environmental Management Plan
48. RSPM – Respirable Suspended Particulate Matter
49. SLF – Secured Land Fill
50. SMS – Steel Melting Shop
51. SO_2 – Sulphur Dioxide
52. SPCB – State Pollution Control Board
53. SPM – Suspended Particulate Matter
54. Sq Km – Square Kilometer
55. TC – Total Colliform
56. TOC – Total Organic Carbon
57. TPP – Thermal Power Plant
58. TPA – Ton per Annum
59. TOR – Term of Reference
60. TSDF – Treatment Storage Disposal Facility
61. U/s – Up Stream

Chapter 1

Introduction

- Introduction and objectives of the study
- Concept of Comprehensive Environmental Pollution Index
- Monitoring of the Action Plan

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) has developed a Comprehensive Environmental Pollution Index (CEPI) in the country. 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 CEPI score to an acceptable level. Industrial clusters having aggregated CEPI score of 70 and above are 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 CPCB.

The model action plan for abatement of pollution in the critically polluted clusters 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 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 to 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 in different sectors for abatement of pollution in critically polluted areas.

1.2 Concept of Comprehensive Environmental Pollution Index

The Central Pollution Control Board (CPCB) has 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 so generated. The framework was developed by CPCB in association with the IIT, Delhi within a source-pathway-receptor modelling framework, so that the environmental impact is determined in a comprehensive manner. The schematic diagram **(Fig.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 any 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 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

ii. The Environmental Pollution Index is estimated for three environmental media; air, surface water 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 **Fig.1.1**.The Comprehensive Environmental Pollution Index (CEPI) is estimated in the following manner ;

The aggregated CEPI score $= i_m + \{(100 - i_m) \times (i_2/100) \times (i_3/100)\}$

Where i_m = Maximum Sub index and i_2 , i_3 are sub-indices for other media

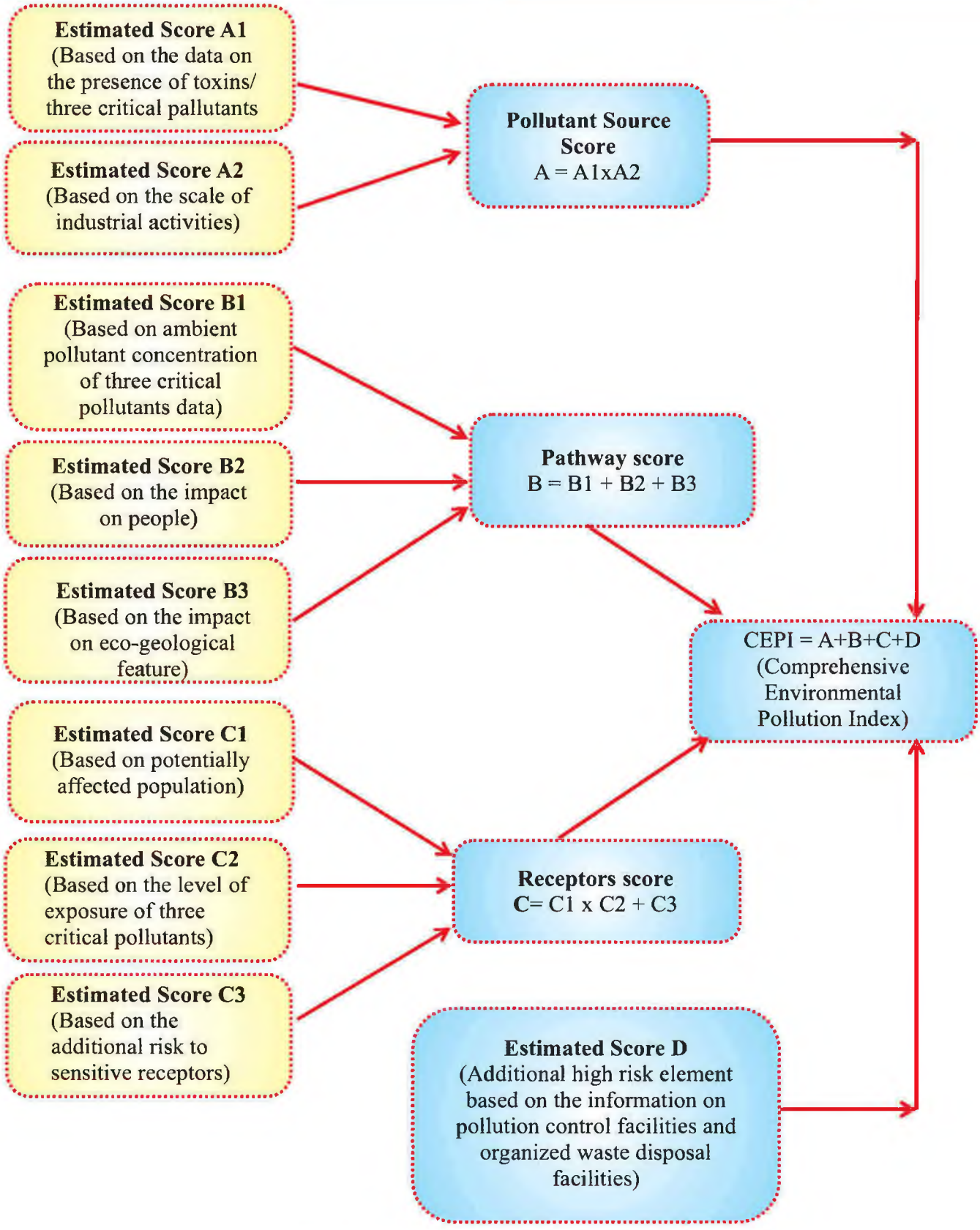


Fig-1.1: The Schematic diagram of framework of CEPI

The Industrial clusters are then classified on the basis of CEPI score in the following manner as shown in **Table-1.1**

Table-1.1 Classification of Industrial Clusters

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

iii. 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. 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 or areas shall be investigated to 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 Monitoring of the Action Plan

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 for academicians, industry, NGO and SPCB for comprehensive monitoring of implementation of the Action Plan for abatement of pollution. The composition of the Committee is given in **Table-1.2**.

Table-1.2. The Composition of the Monitoring Committee

Sl.	Name and designation	Position in the committee
1.	Dr C R Mohapatra *Former Chairman of State Pollution Control Board, Odisha and Member of State Environmental Appellate Authority*	**Chairman**
2.	Prof. M C Dash *Former Chairman of State Pollution Control Board, Odisha, Former V.C of Sambalpur University and Member of State Environmental Appellate Authority*	**Member**
3.	Shri Jiban Mohapatra *Chief Manager (Env.), SHE Deptt. NALCO, Convener, Environmental Safety, and Health Panel CII, and Member of Central Pollution Control Board.*	**Member**
4.	Ms Swapnashree Sarangi *Civil Society, Team Leader of Foundation for Ecological Security, Angul*	**Member**
5.	Er. N. R. Sahoo *Sr. Environmental Engineer, L-I, State Pollution Control Board, Odisha*	**Member Convener**

The committee visited the area several times, interacted with the industries and also on several occasions, advised the industries on implementation 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.

Chapter2

Area Description

- Critically Polluted Areas (CPAs) in Odisha
- Angul-Talcher area

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 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 during 2009 are shown in **Figure-2.1**.

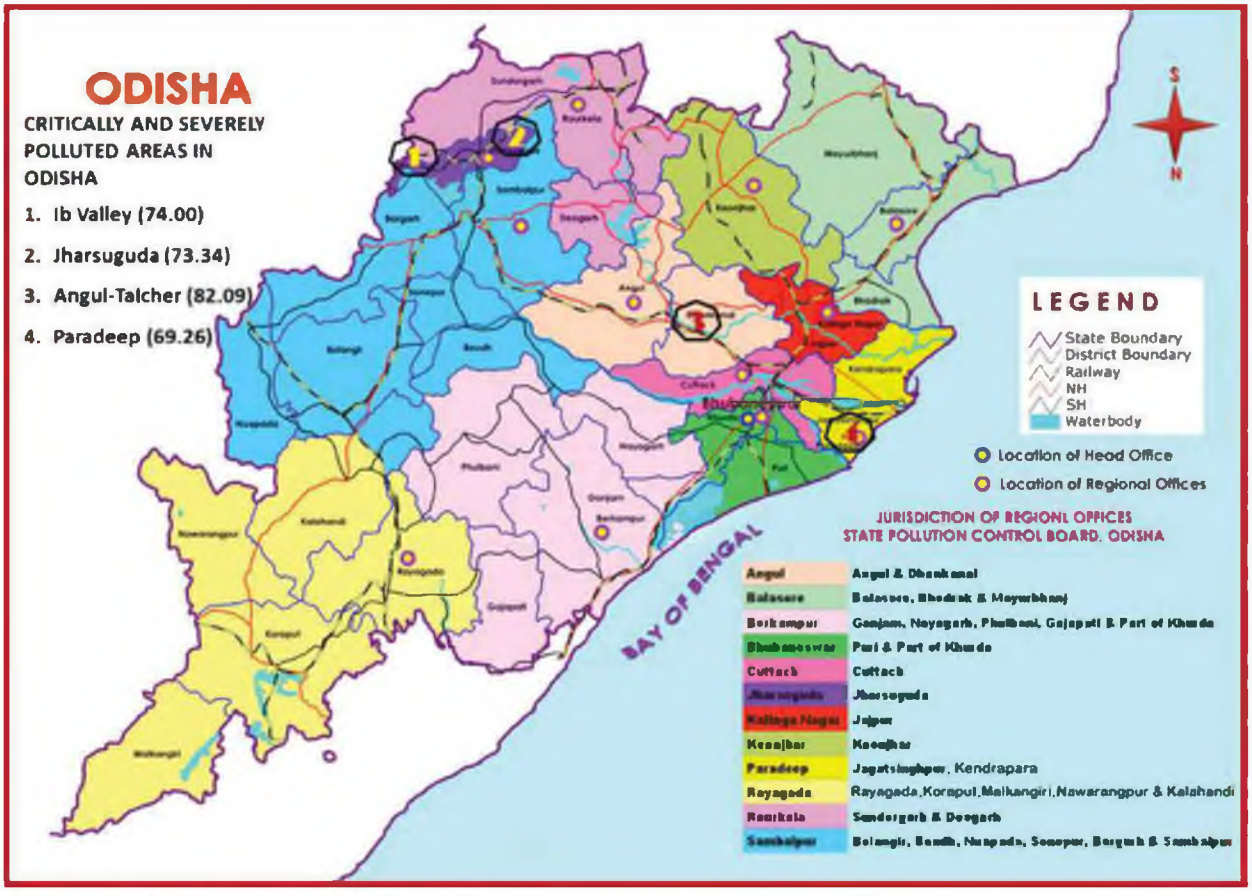


Fig - 2.1 Location of critically and severely polluted areas of Odisha.

The Ministry of Environment and Forest, Government of India, through its Office Memorandum dated 13-01-2010 **(Annexure – 1)** directed respective SPCBs to prepare Action Plans for each of the CPA for abatement of pollution. The CPCB however provided necessary technical support for 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 the presentation before CPCB.

2.2 Angul-Talcher area

Angul- Talcher area is one of the oldest industrial clusters located in the central part of Odisha about 120 km from the state capital Bhubaneswar and 160 km from the Bay of Bengal. It is 139 m above the Mean Sea Level (MSL) and is bounded between 20°37′N to 21°10′N and 84°28′E to 85°28′E **(Fig-2.2)**. River Brahmani and its tributaries form the main drainage system and source of water. Two National Highways pass through the area making it an attractive industrial destination. The industrial activities in this area picked up in sixties, eighties and during first decade of this century. This area has grown steadily and now is a prominent industrial hub of the country. Coal mines, thermal power, aluminium smelting, iron and steel, sponge iron and ferro-alloys are the dominant sectors in this region.

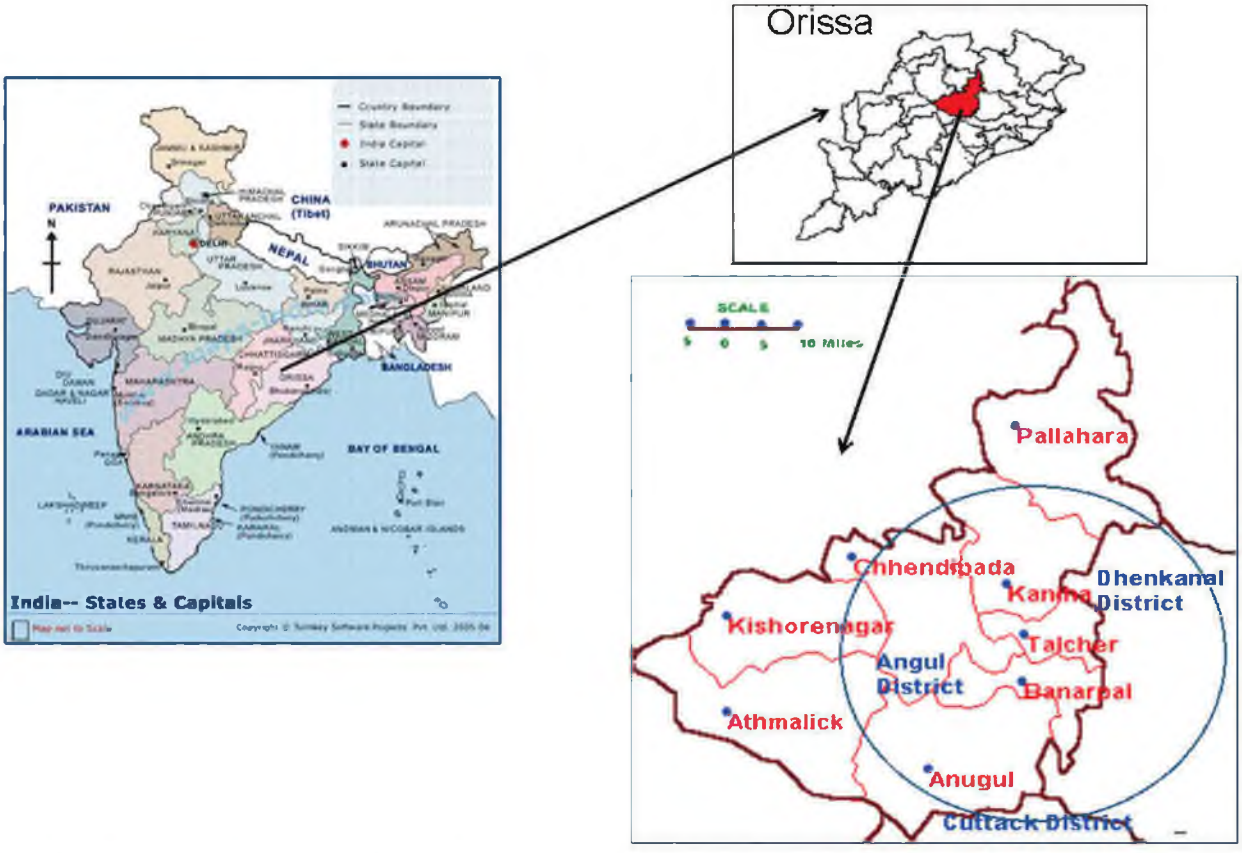


Fig - 2.2 Location of Angul- Talcher industrial area

The boundary of the CPA was drawn including all the major polluting industries and mines which were under operation and were closely located. While determining the boundary care was taken to include areas having common environmental problems as per the public opinion expressed in the local 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 blue line in **Figure- 2.3**.

The CPA of Angul-Talcher spreads over an area of about 350 km^2 which falls partly in Angul and partly in Dhenkanal district. Talcher and Banarpal Blocks of Angul district and Odopada Block of Dhenkanal districts either partly or fully falls within this area. Estimated population living in critically polluted area of Angul-Talcher is about 2,12,000 based on 2011 census.

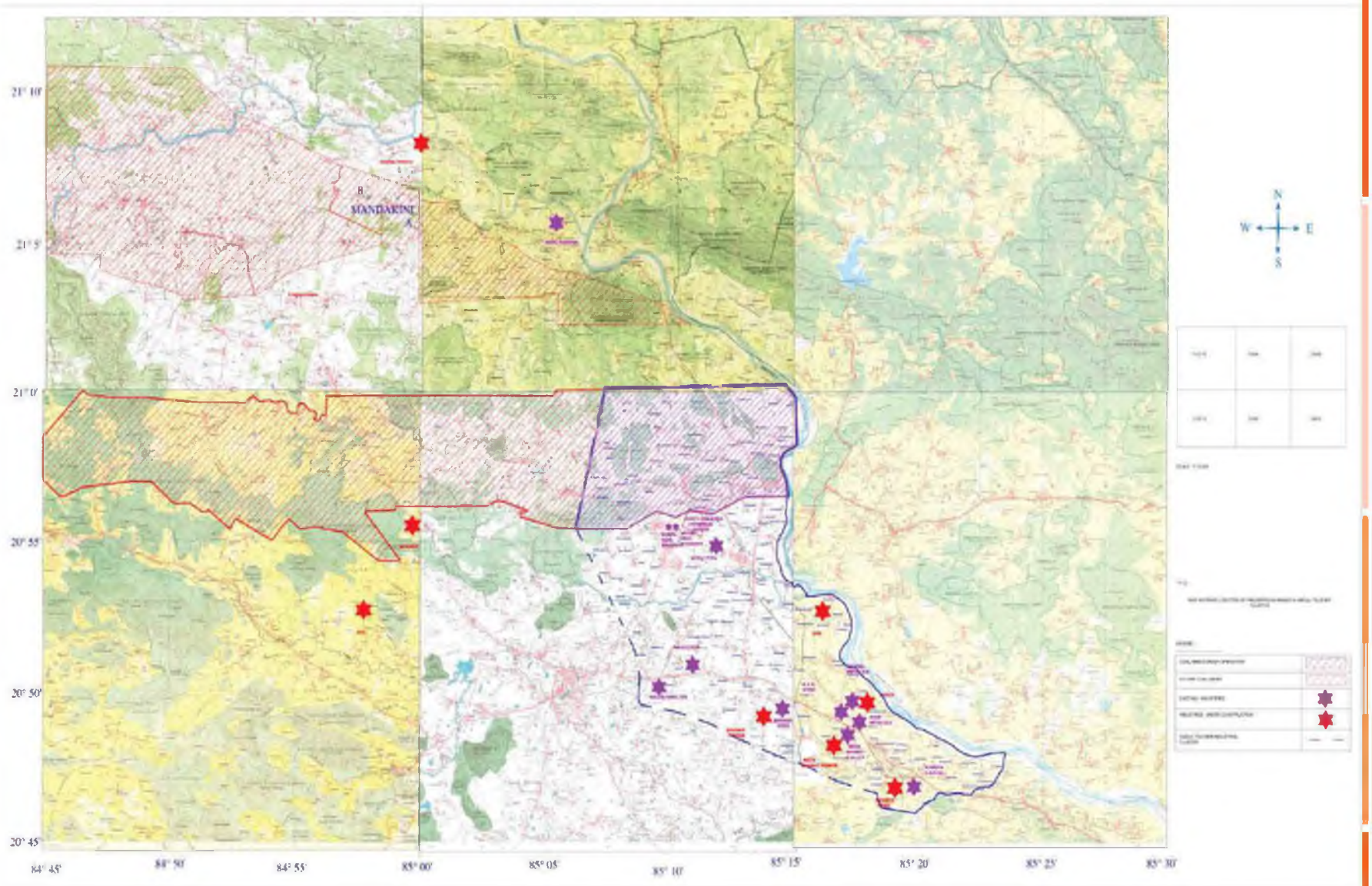


Fig- 2.3 The boundary demarcation of CPA of Angul-Talcher of Odisha

Chapter3

Status of Industrial and Mining Activities

- Industrial Growth
- Pollution Control Practices in Major Sectors

3.1 Industrial Growth

Industries are classified as Red, Orange and Green on the basis of their pollution potential. 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 (both Red-A and Red-B) industries which are factored in for determining the aggregate index.

Angul-Talcher area is dominated with RED category of industries, mostly power plants, steel, aluminium smelter and coal mines. However minor industries in this area are mostly in the sector of Stone Crusher, Health Care Unit and Hotel. The environmental quality of the area is mostly affected by the major industries. The numbers of such industries have increased from 26 in 2010 to 31 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 2010-15

Sl. No.	Type of industries	Nos during 2010 -11	Nos during 2014 -15
1	RED-A (17 category of highly polluting)	08	09
2	RED-B (Ferro Alloy Plants & Coal Washeries)	08	09
3	RED-B (Coal Mines)	10	13
TOTAL		**26**	**31**

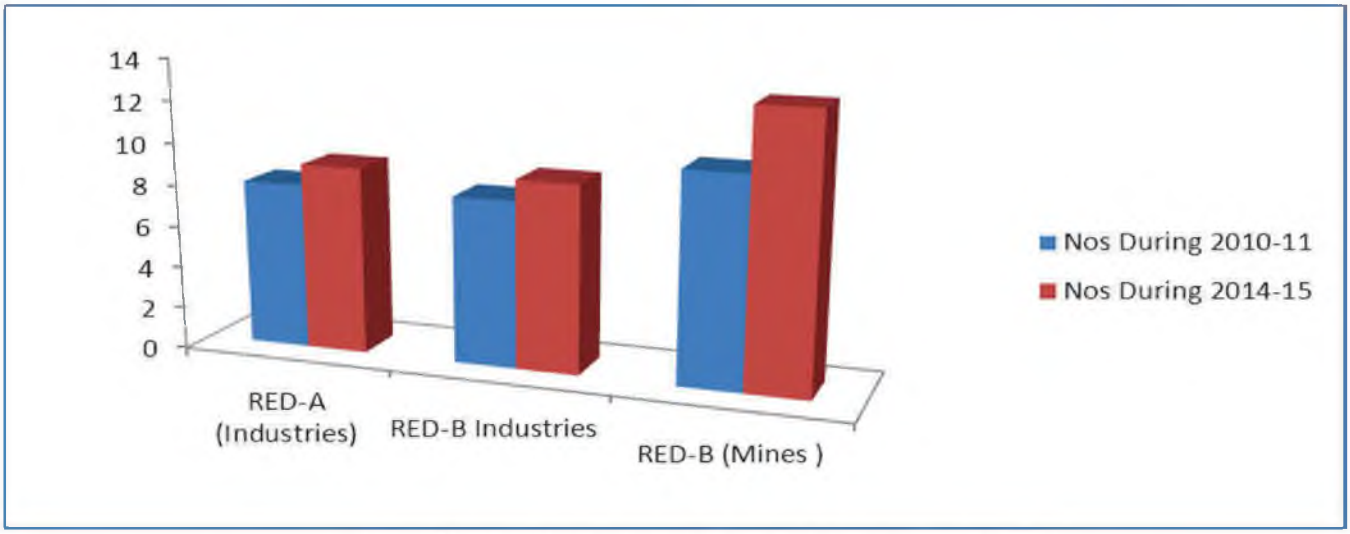


Fig- 3.1 Red Category of Industries in CPA

Table-3.2 Number and capacities of RED industries in Angul- Talcher CPA during 2010-15

Sl. No	Industrial sector	Period 2010-11		Period 2014-15	
		Numbers	Capacity	Numbers	Capacity
1.	Coal mines	10	74 MTPA	13	107.82 MTPA
2.	Thermal power plants	5	2011 MW	6	3310 MW
3.	Iron and Steel including sponge iron plants	2	3.16 MTPA	2	6.6 MTPA
4.	Aluminum smelter	1	0.345 MTPA	1	0.46 MTPA
5.	Ferro alloys	4	0.187 MTPA	4	0.190 MTPA
6.	Coal Washeries	4	9.456 MTPA	5	11.656 MTPA

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

Table-3.3 Number of Industrial Units in CPA

Industries Type	Number	Industries Type	Number
Induction Furnace	1	Explosives	04
Railway Sidings	2	Health Care Units	31
Mineral Stack Yards	3	Brick Kilns	05
Stone Crushers	13	Hotels	7
Automobile Service Centres	4	Tyre Retreading Units	02
Mines (other than coal mines)	3	Fabrication Units	2
Rice Mills	2	LPG Bottling/Industrial Gases	02
Paints & Pigments	02	Soft drinks Units	03
Hot Mix Plants	3	Fly Ash Brick Units	10

3.2 Pollution Control Practices in Major Sectors

As indicated in **Table-3.2** and **Table-3.3**, the CPA is dominated with Red Category of industries like Thermal Power Plant, Iron steel & Ferro Alloy 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 Plants

3.2.1.1 Air Pollution Control

All the Thermal Power Plants (TPPs) have installed Electro Static Precipitators (ESPs) as basic air pollution control device for control of particulate matter emission from stacks. The standard for emission of particulate matter from stacks of TPPs is 150 mg / Nm^3 as per the provisions of Environment Protection Act 1986. However in order to reduce the concentration of Suspended Particulate Matter (SPM) and Respirable Suspended Particulate Matter with diameter of 10 μm or less (PM_{10}) in the ambient air, a stringent standard of 50 mg / Nm^3 for particulate matter emission from TPP stacks was envisaged through the action plan. The TPPs have also installed bag filters and other dust suppression measures at coal circuits for control of air pollution during coal handling. During implementation of action of action plan all the thermal power pants were instructed to augment the capacity of ESPs to achieve stricter emission standard.

3.2.1.2 Water Pollution Control

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 implementation of action 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 established Ash Pond / Ash Mounds for ash management. During the implementation of action plan the TPPs have taken steps for utilization of ash for mine void filling. The TPPs have also installed ash silos for storage of dry fly ash for subsequent utilization, in making ash based products. The utilization status 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 off through authorized recyclers and waste containing oil is stored in impervious pits and utilized for energy recovery.

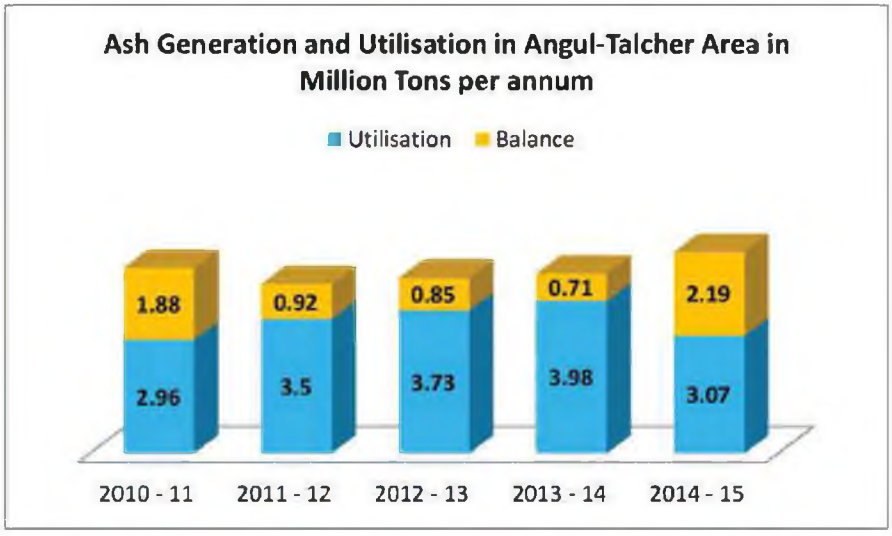


Fig-3.2 Ash generation and utilization in Angul-Talcher area

3.2.2 Aluminum Smelter

3.2.2.1 Air Pollution Control

NALCO Smelter is the only aluminum smelter in the CPA. Fluoride is the main pollutant in aluminium smelters, which is emitted from the pot room and also discharged through the effluent. NALCO has provided dry type fume treatment plant (FTP) for controlling fluoride emission from the pot lines. 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 NALCO augmented capacity of APC devices in Bake Ovens and also installed online monitoring facilities for round the clock emission monitoring.

3.2.2.2 Water Pollution Control:

NALCO has installed de-fluoridation plant for control of discharge of fluoride bearing effluent to nearby water body. The Smelter has installed STPs in its townships to control organic pollution from domestic discharge. During implementation of action plan NALCO took up a wastewater audit and also took steps for lining of guard ponds for control of fluoride level in ground water. 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 Alluminium is mostly hazardous in nature because it is primarily contaminated with fluoride and cyanide. NALCO has installed Secured Land Fill within its premises for disposal of land fillable hazardous waste in the secured landfill. NALCO has also installed on hazardous waste incinerator for disposal incinerable hazardous waste. During the implementation of action plan NALCO 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. 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 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 and 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 form 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 are 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, 85.48% 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 and 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, 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, 86% of total production has been transported through rail. Since road transportation has been reduced, pollution potential from coal transportation has been reduced.

3.2.4.2 Water Pollution Control

Mine strata water and surface runoff water are generally accumulated in the open cast mine sumps (de-coaled 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 the same to outside. During this period five STPs have been

constructed in Talcher Area in different residential colonies for treatment of domestic wastewater which covers Ananta OCP, Lingaraj OCP, Jagannath OCP, Bharatpur OCP, Balaram OCP, Hingula OCP and CWS (Talcher). 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 / 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 open cast mines followed by technical reclamation of the backfilled area. Further, fly ash of nearby Thermal Power Plants (M/s TTPS, M/s. NTPC, M/s. NBVL & M/s Bhusan Steel Ltd) is utilized for filling up the mine void of South Balanda and Jagannath OCP. The mine void of Bhratpur OCP is also planned to be filled up with fly ash generated from NALCO. 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

- Introduction
- Summary of Action Points for Abatement of Pollution

4.0 Introduction

Based on the background information, monitoring reports, findings of REMP prepared by Indian School of Mining (ISMU), Dhanbad and taking into the consideration public concerns on local environmental issues voiced through the local newspapers and through the public hearings conducted by SPCB, a five year action plan for Angul- Talcher area was prepared. 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 term goals and other are medium to long term goals. It was envisaged to implement this action plan during 2010-11 to 2014-15. 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

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 summarised by aggregating the common actions in each sector to be taken and a summary of sector wise action points is described in **Annexure-3.** However for bird eye view the key action points are further summarised and presented along with the expected environmental benefits of its implementation in **Table- 4.1**.

Table- 4.1 Key Action Points.

Sl.No.	Action	Expected Environment Benefit
1.	Upgradation 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
5.	Construction of dedicated coal corridor	Reduction of fugitive dust during on road coal transportation
6.	Construction flyover in the highway in front of M/s Bhusan Steel Ltd.	Reduction of fugitive dust during transportation in National Highway near the plant area
7.	Installation of Sewage Treatment Plant in industrial township and mining area.	Reduction in water pollution in river
8.	Installation of STP for Talcher town	Reduction in water pollution in river
9.	Improvement in ash transport system and construction of ash silo for ash utilization	Improvement in ash utilization
10.	Utilization of SMS Slag in road making	Improvement in utilization of bulk industrial waste
11.	Construction of water impoundment structures	Bulk water storage and Ground water recharge
12.	Drinking Water supply to peripheral villages	Improvement of drinking water availability in surrounding villages
13.	Concurrent backfilling of fly ash in OB Dump area and filling of fly ash in mine voids	Bulk utilization of fly ash

Besides above key points, several other initiatives like, remediation of hazardous waste contaminated site, ground water quality monitoring, installation of silos for storage of dry fly ash, comprehensive waste water audit, co-processing of hazardous waste in cement kiln, etc. were taken up for abatement of pollution within the critically polluted area.

Chapter 5

Status of Action Plan Implementation

- Upgradation of electro-static precipitators
- Online monitoring for stacks and ambient air
- Pollution control in sponge iron plants
- Construction of flyover on the highway
- Coal production using environmentally sound technology
- Construction of dedicated coal transport corridor
- Drinking water supply to peripheral villages
- Managing mine drainage water and run off, for water conservation
- Concurrent backfilling of fly ash in OB dump area and filling of fly ash in mine voids
- Enhancement of rake loading facility in coal mines
- Comprehensive coal mine fire control
- Back filling of the mine voids and restoration of the mined out area

5.0 Introduction

The Action Plan for abatement of pollution in Angul-Talcher area envisaged various activities to be taken up such as; installation and upgradation of pollution control devices, 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 status of implementation of action points is given in **Annexure-4** and is summarised in following sections.

5.1 Up-gradation 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 of which suspended particulate matter and respirable particulate matter at ground level can be brought down. Under this action point it was proposed to upgrade/install 32 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 13 ESPs have achieved desired result **(Fig-7.1)**. The detail unit wise status of up gradation of ESPs in different TPPs is given in **Annexure-4**. Therefore the achievement in under this action point is 40 %.

During implementation of this action point, it was observed that some of the ESPs were old for which the up gradation was difficult. In some cases adequate space for providing additional field is also not available. Therefore some of the ESPs have been upgraded to meet the PM emission standard of 100 mg/ Nm^3 in the first phase. Besides this, ESPs which are commissioned recently have been designed for particulate matter emission standard of 50 mg/ Nm^3.

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 $PM_{2.5}$), 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 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 29 real-time AAQ Monitoring Stations, out of which at the end of Action Plan period all 29 of real-time AAQ Monitoring Stations have been installed and similarly all 57 online Stack Monitoring facility for monitoring of particulate matter emission from stacks has been installed **(Fig-7.1)**. The status of implementation of online AAQ and Stack Monitoring in major polluting industries is given in **Table-5.1**. Apart from these Bhusan Steel has 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 and AAQ Monitoring Facilities

Sector	No. of Industries	Nos. of Online Stack monitoring facility	Nos. of real-time AAQ monitoring stations
Aluminium	01	10	04
Iron & Steel (Including sponge iron)	02	17	11
Thermal Power	6	30	14
Total	**09**	**57**	**29**

5.3 Pollution Control in Sponge Iron Plant

The sponge iron plants 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 generates 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 dusts are to be collected in silos and to be disposed off 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 17 ESPs with PDHS for dust handling out of which at the end of Action Plan period 17 ESPs with PDHS have been installed. The compliance status of individual units is given in **Annexure-4**.

5.4 Construction of flyover on the highway

Bhusan Steel and Power Ltd. and Bhusan Energy Ltd. are located adjacent to NH-43 near Meramunduli. Bhusan Ltd. is operating with a 5.4 MTPA steel plant and Bhusan Energy Ltd. is operating with 300MW Power Plant in this area. The traffic congestion in NH near this plant due to movement of transportation vehicles from the plant premises along with the general traffic is a major cause of fugitive emission in this area. It was envisaged under the action plan that a bypass flyover to be constructed to avoid the traffic congestion and reduction of fugitive dust in the area. Bhusan Ltd. deposited the required fund with NHAI, and NHAI took up the construction work. The construction of bypass flyover near Bhusan Ltd. is complete. The photograph of this flyover is shown in **Figure-5.1**. With the opening of this bypass flyover the traffic congestion in this area is likely to be improved and may have direct bearing on ambient air quality of the area.

Fig-5.1 Construction of flyover in the highway in front of M/s BSL

5.5 Coal Production using environmentally sound technology

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 using 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 inbuilt in the cutting/milling drum of surface miners and there is interlocking arrangement for water spraying in 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 Talcher area coal production through surface miner was increased from 48.57% in 2010-11 to 85.76% in 2014-15. The status of increase in use of surface miners in coal mining in Talcher Coal Fields for the year 2010-15 is presented in the **Figure-5.2**. The statistical details are presented in **Annexure-6**.

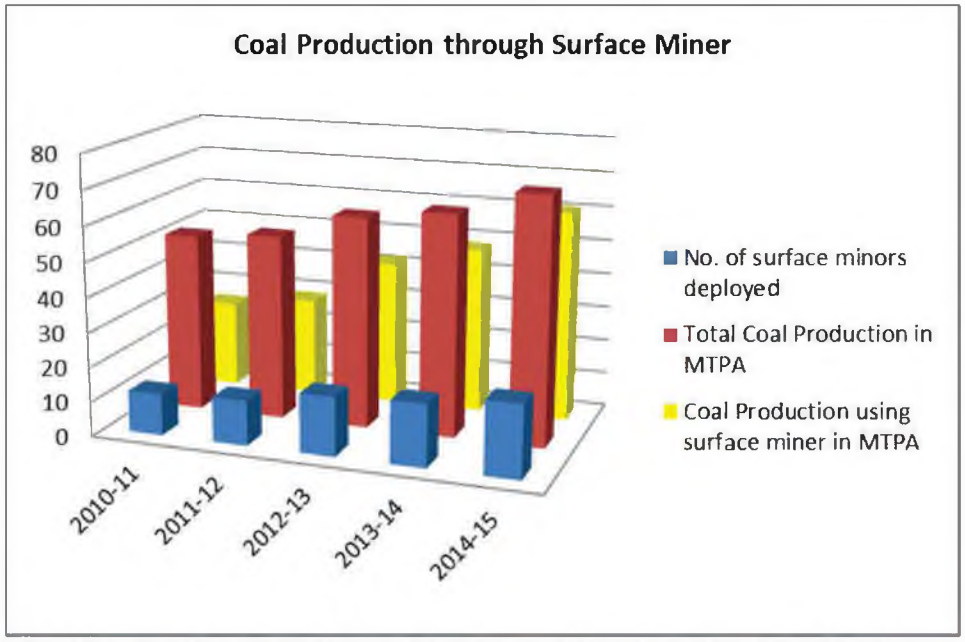


Fig-5.2 Use of Surface Miner for raising of coal in Angul-Talcher area

5.6 Construction of dedicated coal transport 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 cause significant pollution. However to cater to the coal demand of local Industries, the principle of minimum possible truck transportation is required. In Talcher coal field around 14% to 20% of coal is transported through trucks.

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 initially planned for a 41.5 km long corridor that includes the internal roads from different mines connecting the Main Road Corridor. However as the contract for Re-Surfacing with concrete pavement of the 41.5 km road failed, the Main Coal Corridor from Hingula Mine to NH 200, which is of 25 km length, has been taken up for repair and maintenance. Now Main Coal Corridor from Hingula Mine to NH 200, which is of 25 km length has been proposed for Re-Surfacing with concrete pavement with a project cost of Rs. 251 Crores. **(Figure-5.3)**

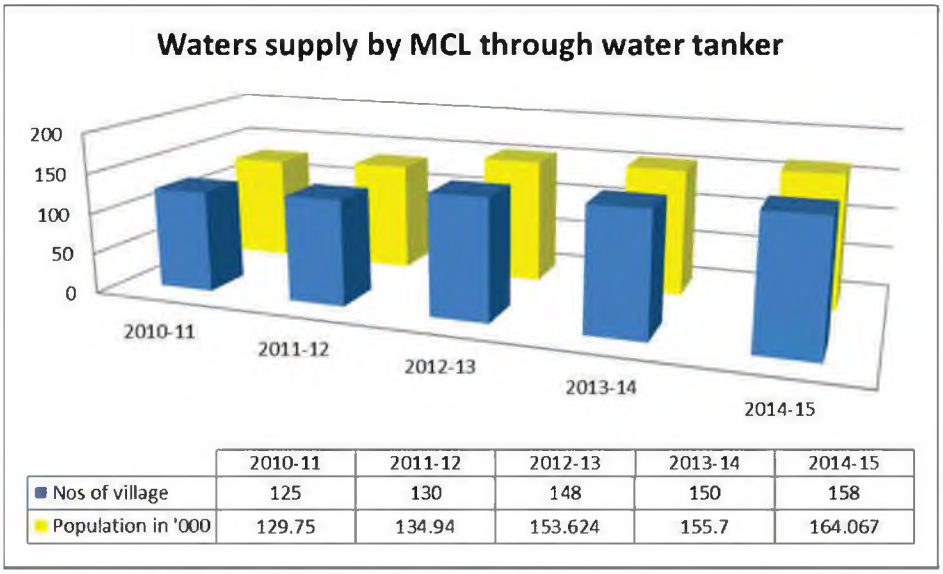
Fig-5.3 Proposed coal transport corridor

5.7 Drinking Water supply to peripheral villages

The Coal Mines area of Talcher coal fields 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 Brahmani and mine strata water. The Detailed Project Report (DPR) preparation of pipe water supply scheme commenced during 2010-11 and the execution of pipe water supply scheme completed during 2013-14. In Talcher coalfield area for the period 2014-15, 19 peripheral villages are covered under piped water supply scheme of MCL being implemented through. Rural Water Supply and Sanitation Department of Govt. of Odisha (RWSS) Under this scheme 33600 people are covered and 4522 KLD of water is supplied to the villages. 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-5.4**. For further details **Annexure-6** may be referred.



	2010-11	2011-12	2012-13	2013-14	2014-15
Nos of village	125	130	148	150	158
Population in '000	129.75	134.94	153.624	155.7	164.067

Fig-5.4 Supply of drinking water to the peripheral villages by MCL through water tanker

5.8 Managing mine drainage water and run off, for water conservation

The mining operation in coal mines necessitates pumping out of mines strata water. For maintaining the water table in the region, this water need to be put back and be stored in the water storage reservoirs for recharge of ground water. The surface run off from areas also need to be stored for water conservation and avoidance of surface water pollution. It was envisaged under the action plan to create water storage reservoirs in the coal mines area for

water conservation purpose. This conserved water can be sustainably used for industrial and domestic purpose during summer months. MCL has created water storage reservoirs by converting some of the terminal mine pits as reservoirs **(Fig-5.5)**. Surplus water is stored in the water reservoir. Presently about 90 million M^3 of voids are available to be used as water reservoirs. The details of water storage reservoirs in Talcher Coal Fields till the year 2014-15 is presented in **Annexure-6** and growth pattern of water storage capacity is given in **Figure-5.6.**

Fig-5.5 Water storage reservoirs in MCL area

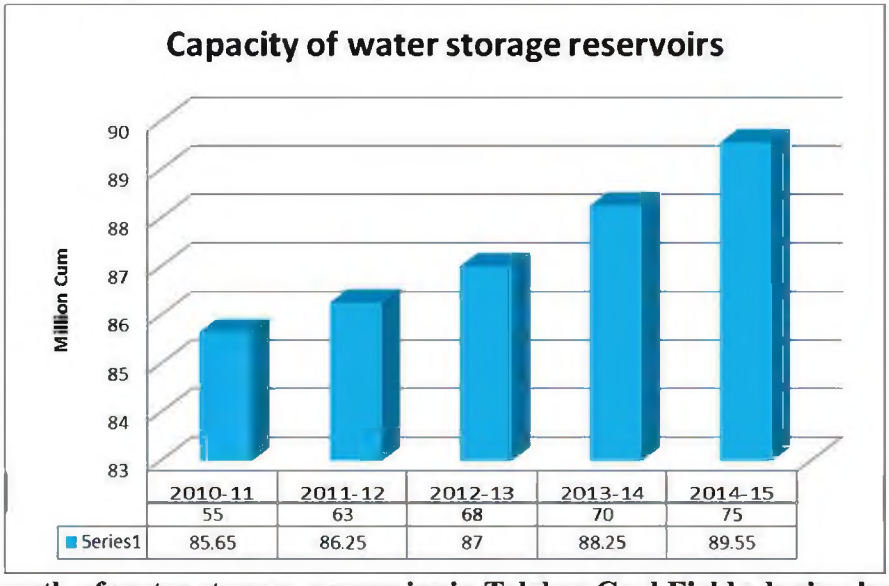


Fig-5.6 Growth of water storage reservoirs in Talcher Coal Fields during last five years

5.9. 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 coal field. Near the Talcher Coal Fields some power plants are located namely; NALCO Angul, NTPC Talcher, Nav Bharat, Bhusan Steels, GMR Kamalanga etc within a range of 25km. It was envisaged that, Thermal Power Plants shall take steps to dispose off the fly ash in abandoned mine voids and also, MCL should adopt concurrent back filling of fly ash. The MCL has assigned mine

to the following five power plants for filling up the mine voids of Balanda OCP and JagannathOCP with fly ash:

1. M/s NTPC Kaniha.
2. M/s NALCO (CPP)
3. M/s Bhushan Steel Ltd.
4. M/s Nava Bharat Ventures Ltd.
5. M/s TTPS (NTPC)

Out of the above, currently TTPS (NTPC), Bhusan Steel Ltd, Bhusan Energy Ltd. and Nava Bharat Ventures Ltd. are disposing fly ash in abandoned mine voids. The TTPS conveys its ash slurry through pipeline upto the voids and other plants transport ash in moist condition. Laying of pipeline for ash disposal by NALCO (CPP) in abandoned mine pits are under progress. It has been reported by MCL that concurrent mine filling is not possible in active mine due to safety reasons. Presently about 10MTPA of ash goes to the mine voids which was just 6 MTPA in 2010-11. The status of mine void filling in abandoned mine pits in Talcher Coal Fields is given in **Table-5.2** and the growth of mine void filling over the period is given in **Figure-5.7**. The statistical details are given in **Annexure-6**. The photographs of mine void filling in abandoned mine void of South Balanda Mines of MCL Talcher by NTPC Talcher is shown in **Figure-5.8** and **Figure-5.9**.

Table-5.2 Mine void filling in abandoned mine void of MCL

Name of the mine	Volume available for ash filling	Volume filled in with ash	Sources of ash (name of the TPP)
Bharatpur OCP	13.30 Million M^3	Nil	M/S NALCO
Jagannath OCP	45.21 Million M^3 (approx.)	0.2 Million Tonnes	TTPS(NTPC), NTPC, Kaniha, Bhushan Steel
Balanda OCP	15.62 Million M^3	10.95 Million Tonnes	Talcher Thermal & NBVL

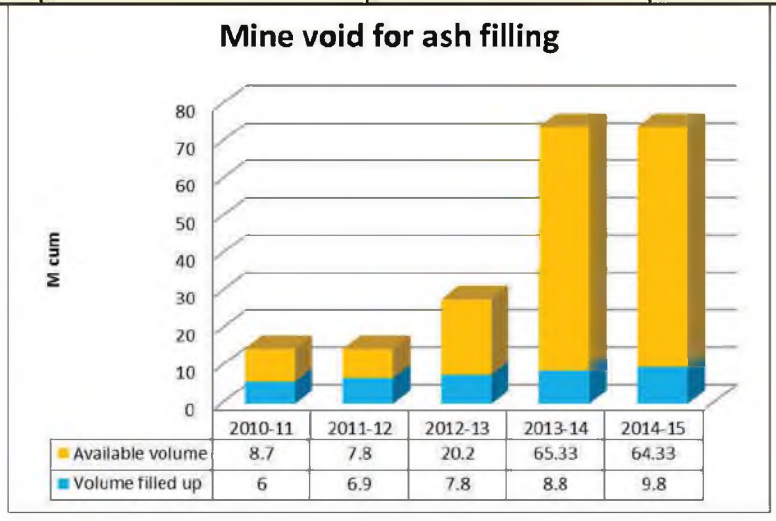


Fig:5.7 Mine void filling in abandoned mine void of MCL

Fig-5.8 Ash filling in abandoned South Balanda Coal Mine Voids in Talcher area

Fig-5.9 Ash filling in abandoned Jagannath Coal Mine Voids in Talcher area

5.10 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 Talcher Coalfield 14% of total despatch was made through road transportation in 2014-15 and, balance **86%** was through rail transportation and conveyor belt . The details of despatch of coal through railway rakes and belt for the period 2010-11 to 2014-15 is given in **Figure-5.10** and **5.11** and statistical details is given in **Annexure-6.**

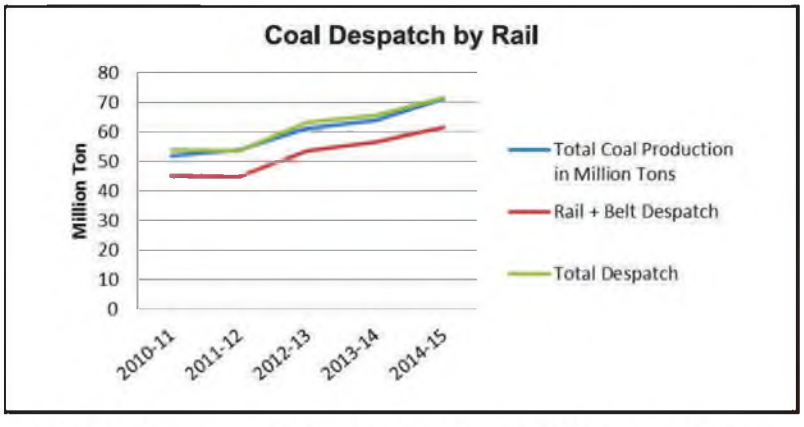


Fig- 5.10 Enhancement of rake loading facility in coal mines

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 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 during 2009 are shown in **Figure-2.1**.

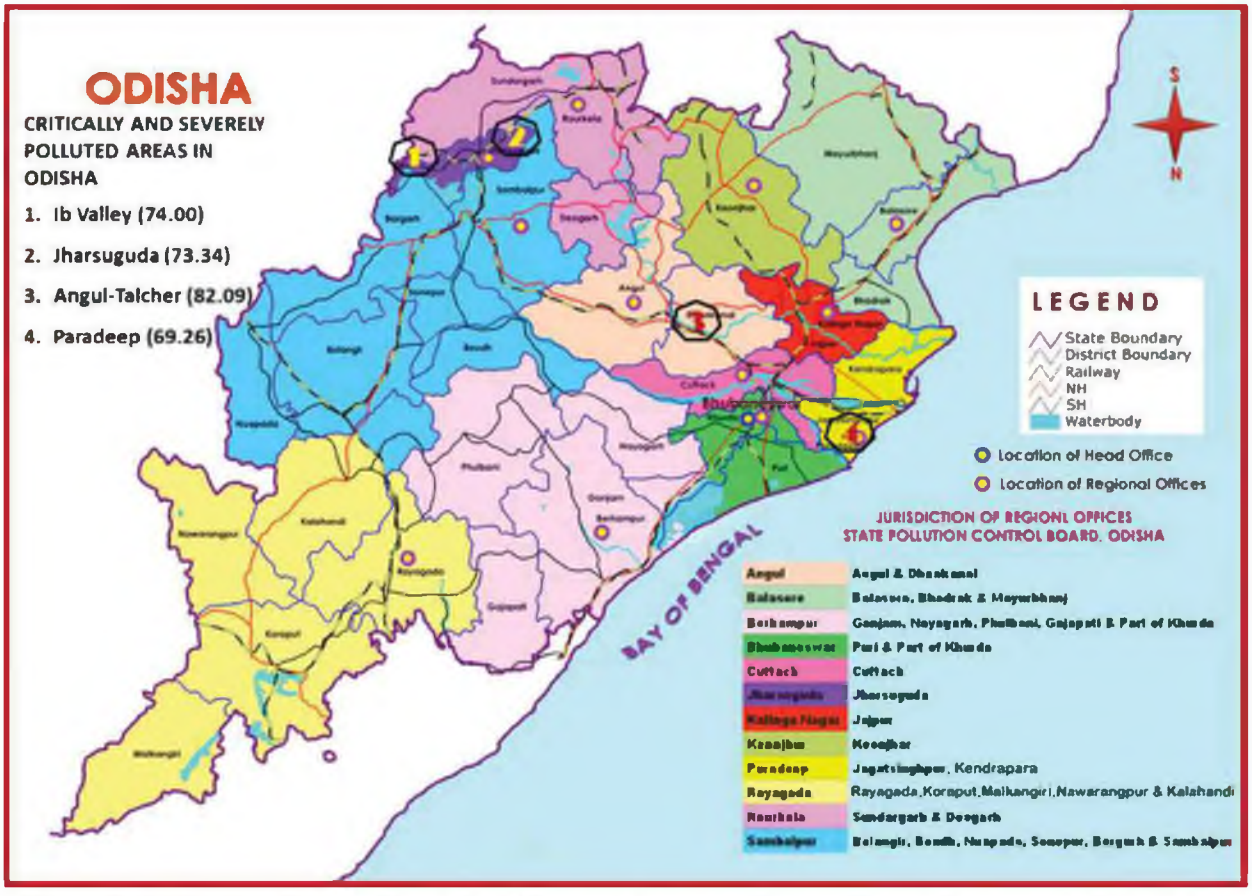


Fig - 2.1 Location of critically and severely polluted areas of Odisha.

The Ministry of Environment and Forest, Government of India, through its Office Memorandum dated 13-01-2010 **(Annexure – 1)** directed respective SPCBs to prepare Action Plans for each of the CPA for abatement of pollution. The CPCB however provided necessary technical support for preparation and evaluation of the Action Plans. For Odisha, two separate Action Plans; one for Angul-Talcher area and the other for combined

general and coal mining in the CPA in particular alters the land topography. It was envisaged under the action plan to backfill the mined out area to restore the topography of the region.

Entire de-coaled area cannot be back filled because some area is required to be left, for creation of sump for collection of seepage and runoff water etc. Roads are required to be maintained for transportation of coal and OB. Safety area, slope portion of the internal dumps, benches of uncut OB and Coal etc , between active coal mining area and area where back filling activity is going on are required to be maintained. Thus 50 to 55% 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 upto 55% in Talcher coalfield even after considering the bulking factor. The present status of mine voids vis-a-vis the reclaimed area is presented in **Table- 5.3**. The photograph of some technically and biologically reclaimed area is also shown in **Figure-5.13.**

Table-5.3 Backfilling of the mine voids and restoration of the mined out area

Name of the Mine	De-coaled area as on date (Ha)	De-coaled area already backfilled (Ha)	Area technically and biologically reclaimed. (Ha)
Bharatpur OCP	375.20	300.38	112.18
Chhendipada OCP	8.00	4.00	0.00
Ananta OCP	364.68	220.68	72.26
Bhubaneswari OCP	63.54	44.64	27.77
Jagannath OCP	310.77	199.65	157.35
Hingula OCP	188.27	125.17	2.00
Balram OCP	399.71	308.59	80.54
Lingaraj OCP	114.23	88.71	21.8
Kaniha OCP	30	4.20	nil

Fig-5.13 Backfilling and Biological reclamation of mined out/ decoaled area

5.13 Installation of Sewage Treatment Plants

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 STP for treatment of domestic effluent from Talcher Town for control of organic pollution in river Brahmani and its tributaries. The status of STPs in Industrial and Mining Establishments in the area is given in **Table-5.4**. In this area about 18 MLD sewage is treated in 14 STPs in different industrial and mining colonies.

Table - 5.4 STPs in Industrial and Mining Establishments

Sl No.	Name and location of the unit	No of STP	Capacity (KLD)	Total capacity (KLD)
1.	NALCO Township, Angul	1	5000	5000
2.	NALCO Plant, Angul	1	600	600
3.	Talcher Thermal Power Station, Talcher	1	2650	2650
4.	Bhusan Steel Ltd. Dhenkanal	4	3600 + 500+ 600+ 200	4900
5.	GMR Kamalanga Energy Ltd. Dhenkanal	2	960+225	1185
6.	AnantaVihar Colony for Ananta OCP and Lingaraj OCP	1	510	510
7.	Jagannath Colony for Jagannath Colliery and adjoining mines	1	1000	1000
8.	Nehru Satabdi Colony for Bharatpur OCP	1	990	990
9.	Kalinga/ Balaram Township for Balaram OCP and Hingula OCP	1	1200	1200
10	CWS Township for CWS (Talcher)	1	350	350
	Total	**14**		**18385**

5.14 Promotion of industries which 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 ash 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 area 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 15600 Tons. In Angul-Talcher area 10 Fly Ash brick plants have been established with combined ash brick making capacity of 28.5 million bricks per annum. The details of fly brick units in this area is given in **Annexure-2**.

The Char and waste heat generating DRI industries have installed AFBC boilers and WHRB Boilers for utilisation of char and waste heat respectively for generation of electric power. Bhusan Steel Ltd. Has installed 10 WHRB Boilers of 55 TPH each and 6AFBC Boilers (1x120 TPH + 3 x75 TPH + 2 x275 TPH) for compliance of this action point.

Chapter 6

Quality of Environment in Angul-Talcher Area

- Environmental Monitoring by SPCB
- Environmental Monitoring by CPCB

6.0 Introduction

Environmental parameters are monitored in CPA to determine the level of pollution in ambient air, surface and ground water and for 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 Angul-Talcher 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, Hexavalent Chromium (Cr^{+6})	Fluoride- Group-A Nitrate-Nitrogen(NO_3-N) as N - Group-B Hexavalent Chromium (Cr^{+6}): Group-C
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 were 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 (NWMP) 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 River Brahmani

The boundary of Angul-Talcher CPA runs adjacent to River Brahmani for Talcher area. State Pollution Control Board, Odisha monitors surface water quality parameters at four locations of Talcher upstream and Talcher downstream on monthly basis. The values of above parameters during the period 2010 to 2014 are presented 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 Hexavalent Chromium.

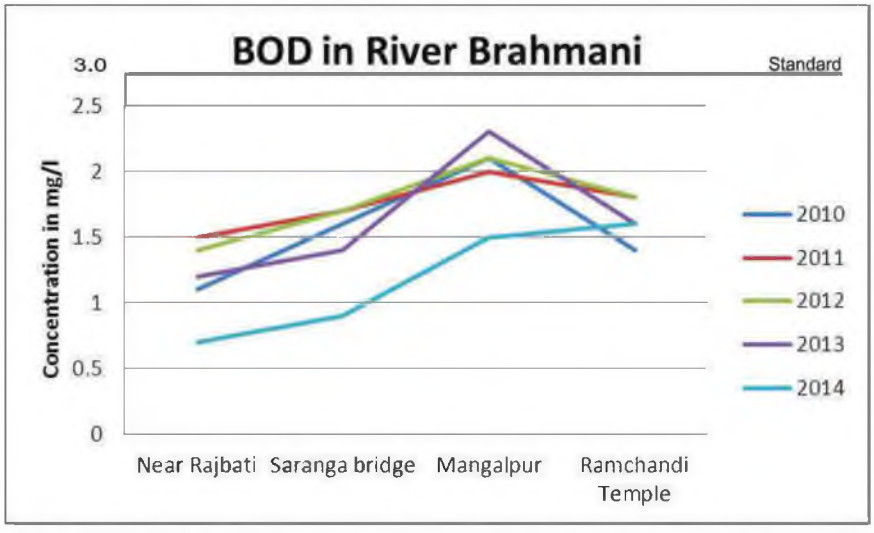


Fig-6.1 The annual variation of BOD in surface water environment

The monitoring result for BOD suggests, that the BOD in Brahmani river exhibits an increasing trend from the downstream of Talcher, near Rajbati till Mangalpur and from Mangalpur BOD value starts receding; nevertheless it remains within the Class-C criteria of 3.0 mg/l (**Figure-6.1**). The trend thus indicates excess BOD load from Talcher town.

Similarly the value of Total Coliform (TC) also shows an increasing trend (**Figure-6.2**) in the same stretch.

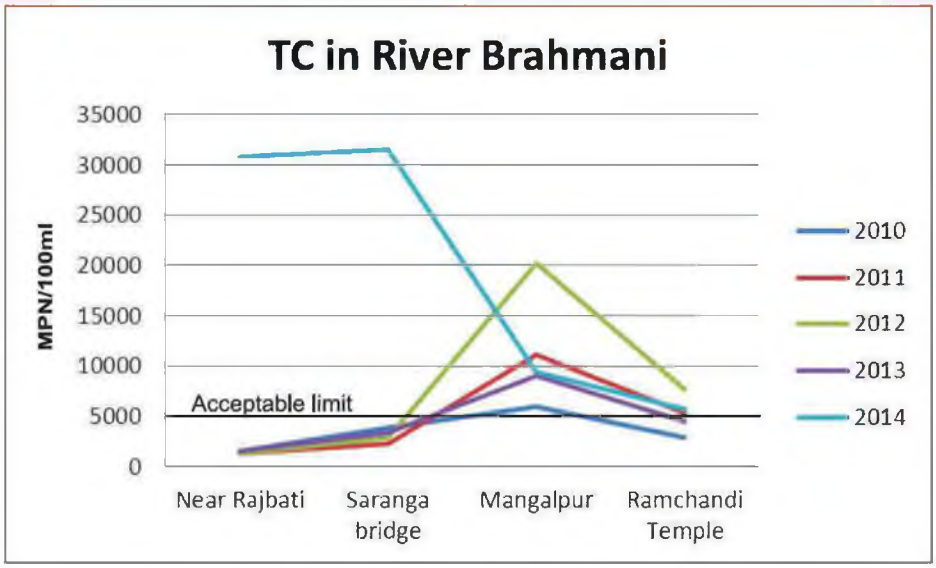


Fig-6.2 The annual variation of TC in surface water environment

in downstream of Talcher but it remains above the acceptable limit of 5000 MPN/100ml. The trend and value of BOD and TC indicates that, Brahmani in the downstream of Talcher is affected due to discharge of untreated sewage. While the BOD value remain within the acceptable limit, of 3.0 mg/l, but the TC is always above the limit of 5000 MPN/100 ml.

The concentration of specific pollutants such as, Fluoride, Nitrate and Chromium (Hexavalent), in river Brahmani flowing adjacent to the CPA remain within the norm during the five year period (**Fig.6.3 and Fig-6.4**).

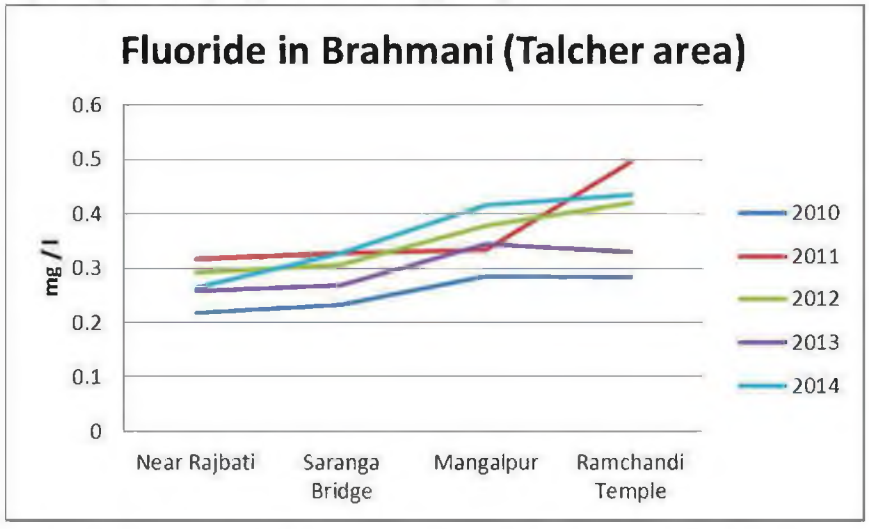


Fig-6.3 The annual variation of Fluoride in surface water environment

The fluoride concentration, though within limit shows an increasing trend in the downstream of Talcher. On the contrary the nitrate concentration did not exhibit any specific trend (**Fig.6.4**) and its value also remain well within the standard of 45 mg/l. Similarly the concentration of hexavalent chromium (Cr^{+6}) were observed to be within the acceptable limit.

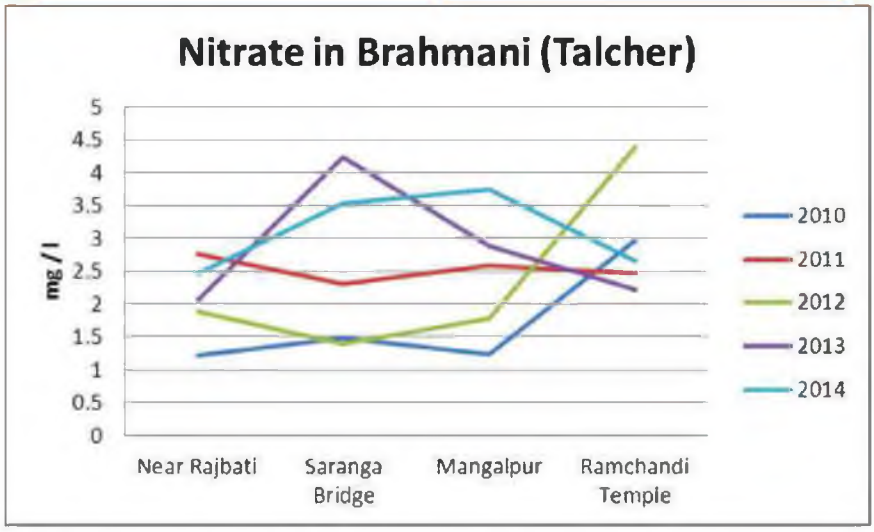


Fig-6.4 The annual variation of Nitrate in surface water environment

Besides river Brahmani, there are two rivulets, Nandira and Kisinda flows through the area, River Nandira flows in close proximity to NALCO (CPP) and TTPS. The water quality of river Nandira indicates that the mean value of BOD remains in a close range of acceptable limit, but the maximum value at time goes above the acceptable limit. However, the mean TC value in Nandira river have been consistently found to be above the acceptable limit since 2012.

Similarly Kisinda river flows in close proximity of NALCO (Smelter), Bhusan Steel Ltd. and BRG Iron and Steel. The fluoride concentration in Kisinda river is found above the standard (**Fig. 6.5**).

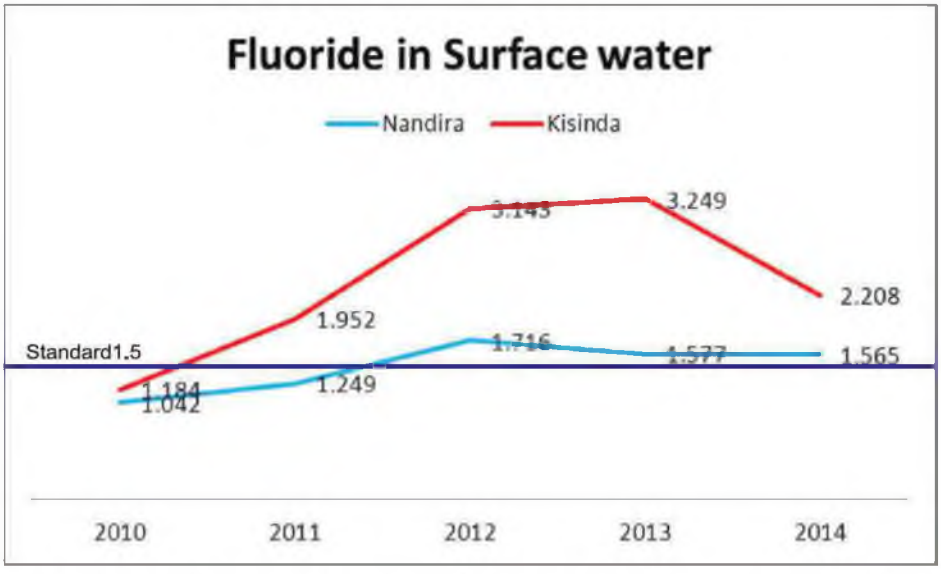


Fig-6.5 The annual variation of Fluoride in other surface water environment

The mean BOD value of Kisinda river remains mostly within the limit, but the TC value in Kisinda river shows a consistent increasing trend and its value has been seen to be above the limit since 2012.

The nitrate value in Nandira and Kisinda river does not show any specific trend and its concentration remains well within the standard of 45 mg/l (**Fig-6.6**).

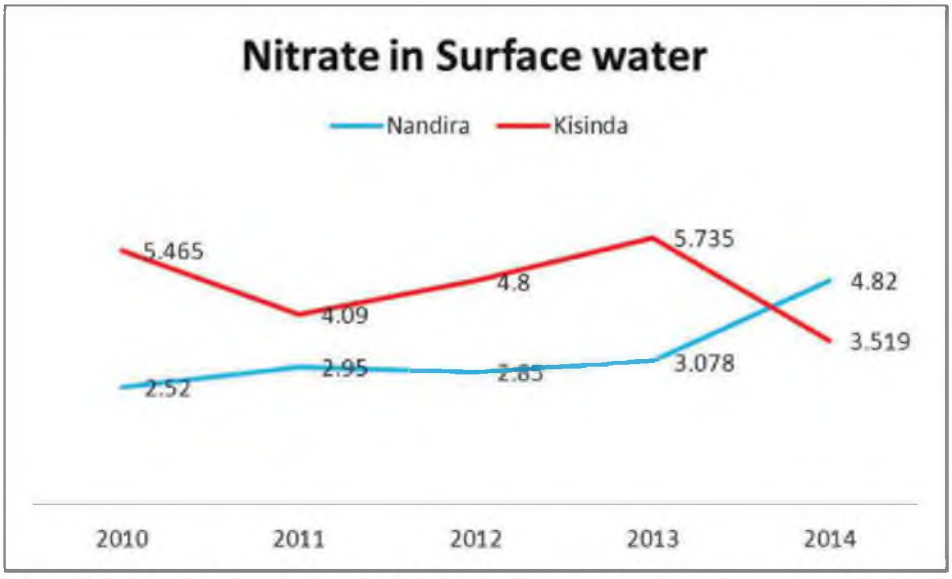


Fig-6.6 The annual variation of Nitrate in other surface water environment

Thus the major surface water in this area – Brahmani, Nandira and Kisinda are showing high value of TC concentration. River Nandira and Kisinda besides having high value of TC, also show increasing value of fluoride from the results it can be inferred that the impact of industrial activities are more profound in Nandira and Kisinda river and the pollution of Brahmani is due to discharge of untreated sewage.

6.1.2 Ambient Air Quality Status

For assessing the ambient air quality, the SPCB, Odisha monitors ambient air quality in four locations in CPA at regular interval.

Within the CEPI framework, concentration of PM_{10}, $PM_{2.5}$ and Benzo (a) Pyrine (BaP) in the ambient air are taken into consideration. Out of these three parameters, SPCB monitors PM_{10} and its trend shows that the mean annual value in most of the years remain above the standard. (**Fig-6.7 and Table-6.1**.).

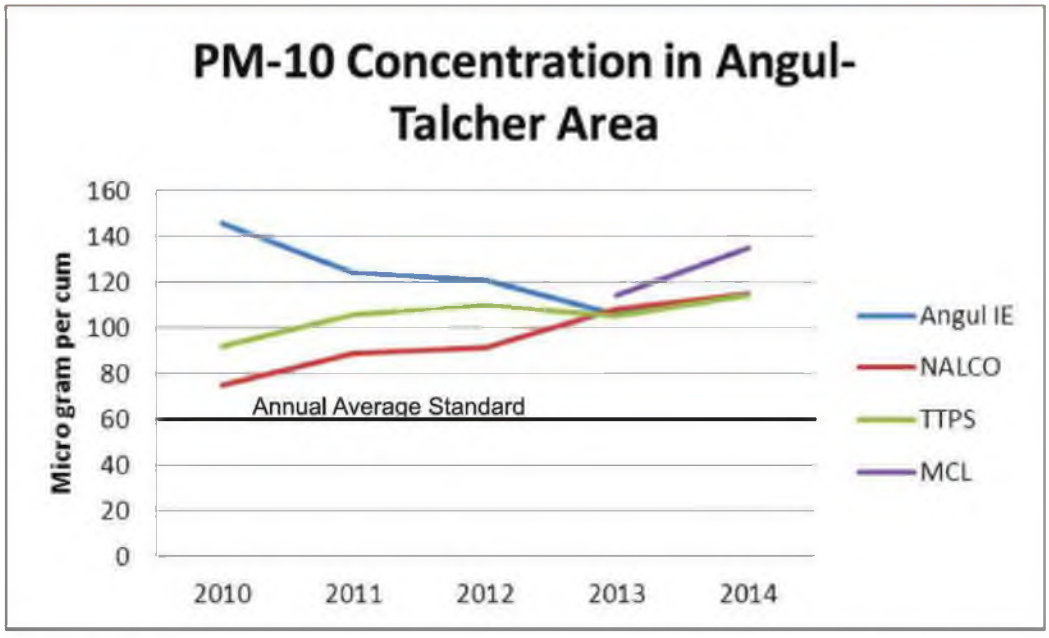


Fig-6.7 The annual variation of PM-10 in Ambient Air Environment

On the contrary the monitoring conducted by CPCB on 24 hours basis under the CEPI-monitoring program which indicates that the PM_{10} concentration in ambient air is within the standard (**Table-6.3**). At the same time, concentration of $PM_{2.5}$ and BaP as monitored by CPCB (**Table-6.3**) is found to be within the standard. On the other hand SO_2 being a common air pollutant was monitored and the results (**Fig.6.8**) indicates that the concentration though remains within the standard has been exhibiting a rising trend since 2012.

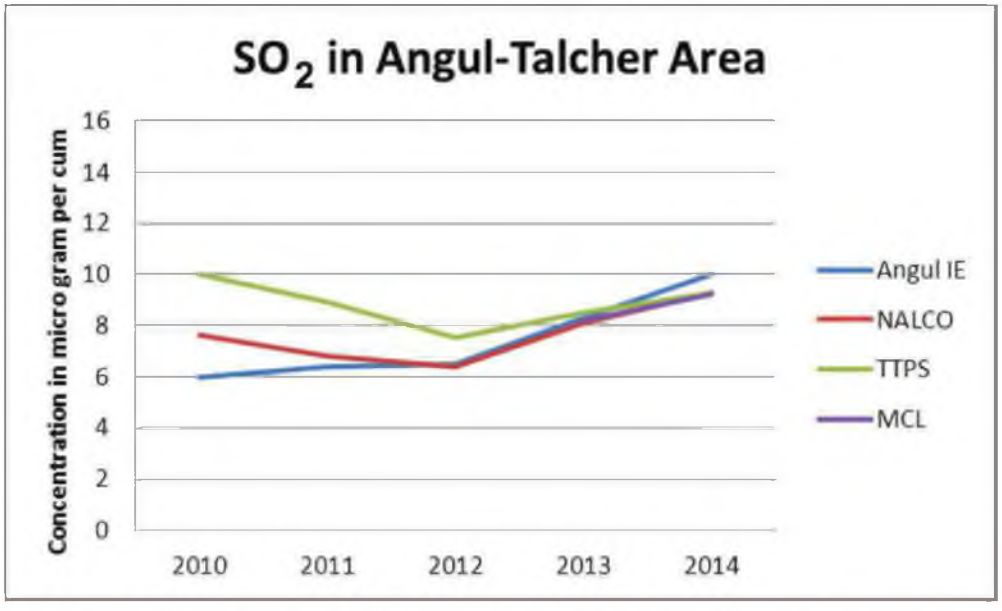


Fig-6.8 The annual variation of SO_2 in Ambient Air Environment

Table-6.1 Concentration range and average value of respirable particulate matter PM_{10} in µg/ m^3 in Ambient Air Environment

Location	2010			2011			2012			2013			2014		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
1. Industrial Estate Angul	58	215	146.0	52	210	124.0	29	187	121.0	39	**219**	106.0	**28**	**221**	115.0
2. NALCO Nagar, Angul	27	119	75.0	58	146	89.0	39	142	91.0	38	214	108.0	45	191	115.0
3. TTPS Talcher	39	128	92. 0	59	155	106.0	33	180	110.0	32	230	105.0	34	243	114.0
4. MCL Talcher	49	253	135.0	-	-	-	-	-	-	43	183	114.0	51	215	135.0
Annual Average standard*	60.0														

** GSR 826 (E) dtd. 16 November 2009, MoEF Notification*

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 and area around NALCO 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 NALCO Smelter is expected to be due to fluoride.

In the Action Plan for abatement of environmental pollution in Angul-Talcher 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 SPCB **(Figure-6.9 – Figure-6.12)** suggests that Pb, Hg, Cd and Zn in most of the locations remain within the acceptable limit. Similarly the results of ground water quality monitoring being carried out by MCL also corroborate the result **(Table-6.2).**

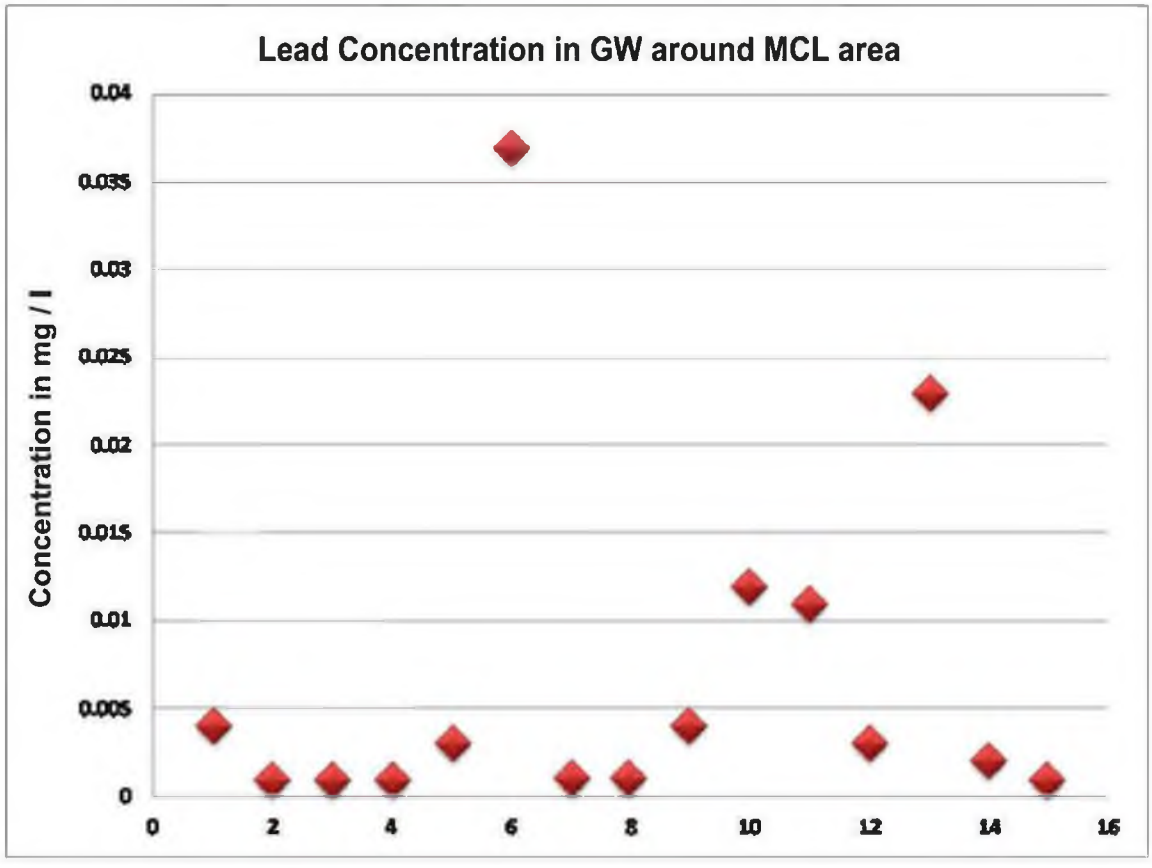


Fig-6.9 The Concentration of Lead in Ground Water Environment around MCL area of CPA

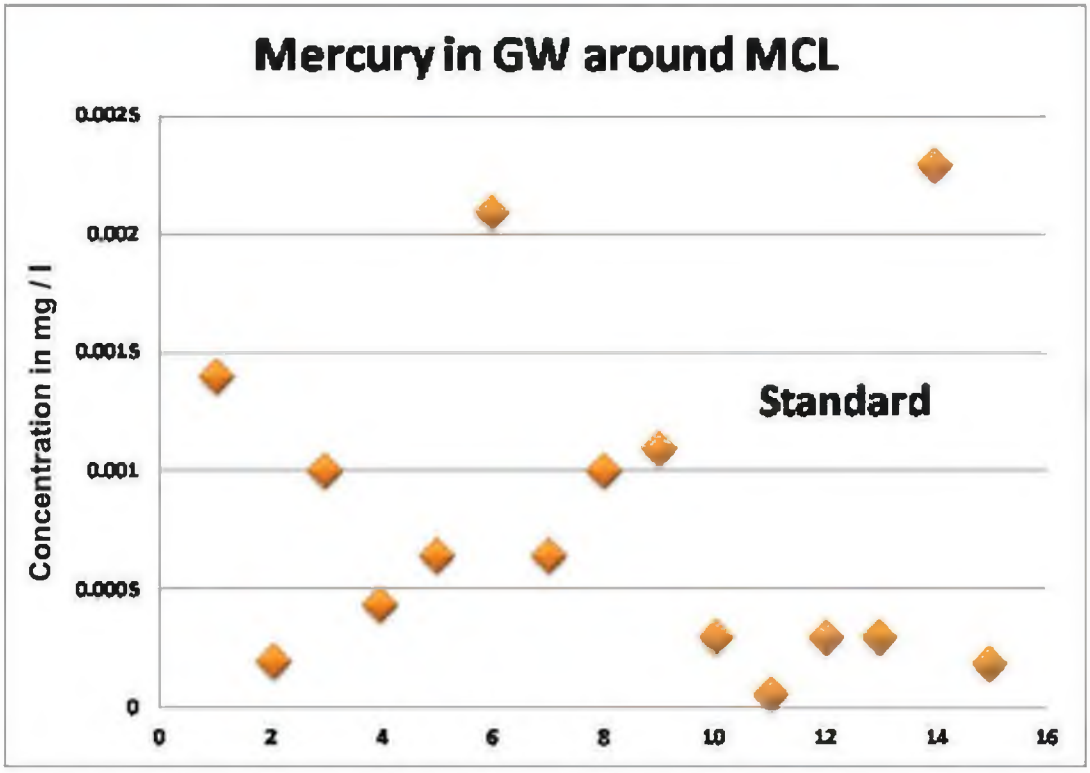


Fig-6.10 The Concentration of Mercury in Ground Water Environment around MCL area of CPA

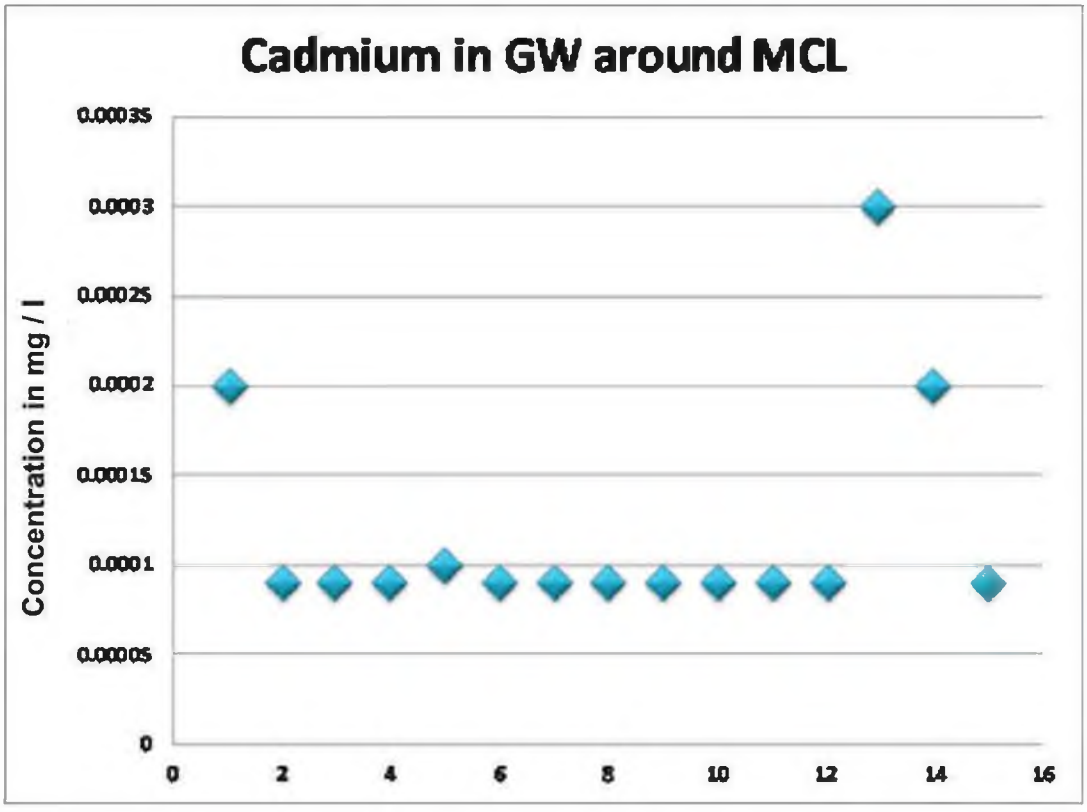


Fig-6.11 The Concentration of Lead in Ground Water Environment around MCL area of CPA

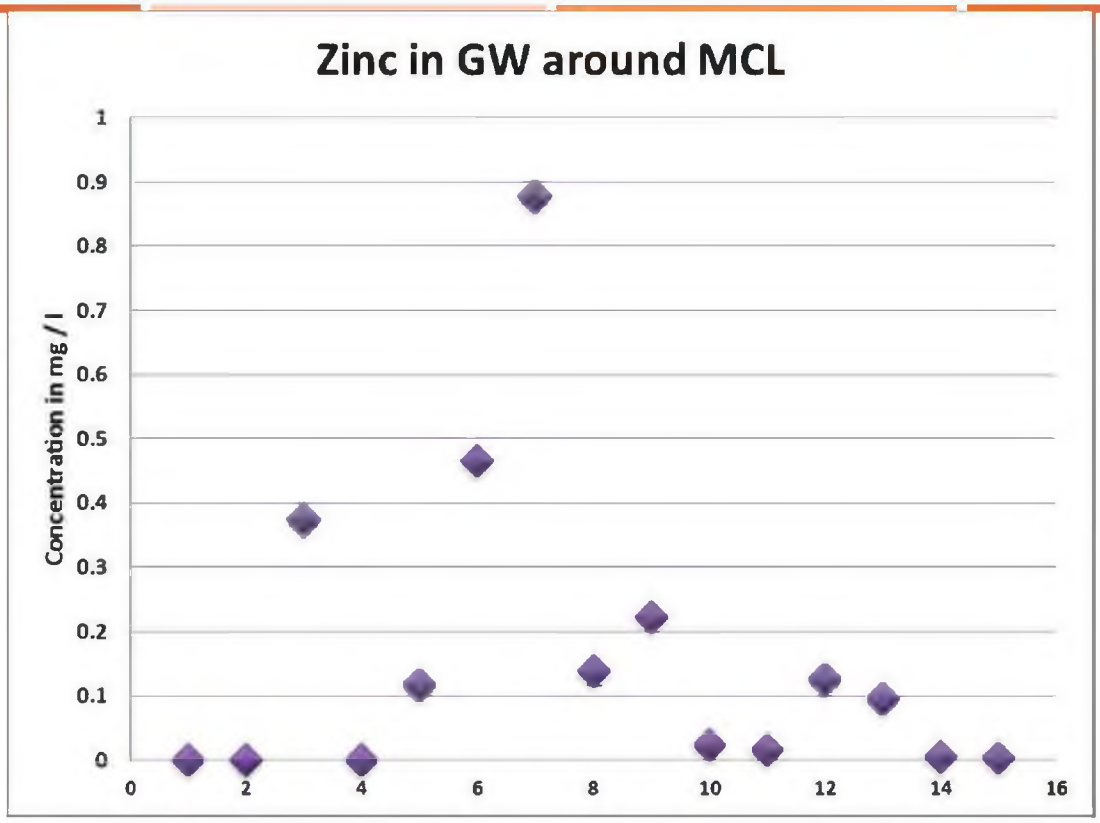


Fig-6.12 The Concentration of Lead in Ground Water Environment around MCL area of CPA

Table- 6.2 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	120	<0.05 (BDL)	<0.05	120	< 0.01 (BDL)	<0.01	ND	ND	ND	120	0.13 to 0.65	0.4
2011-12	132	<0.005 (BDL)	<0.005	132	< 0.01 (BDL)	<0.01	ND	ND	ND	132	0.17 to 0.62	0.455
2012-13	132	<0.005 (BDL)	<0.005	132	< 0.01 (BDL)	<0.01	ND	ND	ND	132	0.17 to 0.69	0.465
2013-14	132	<0.005 (BDL)	<0.005	132	< 0.01 (BDL)	<0.01	132	<0.005 (BDL)	<0.005	132	0.13 to 0.98	0.481
2014-15	168	<0.005 (BDL)	<0.005	168	< 0.01 (BDL)	<0.01	168	<0.005 (BDL)	<0.005	168	0.22 to 0.95	0.51

N-Number of samples; R- Range of values (Max-Min); M-Mean;
ND-Not Done; BDL-Below Detectable Limit

6.1.4 Monitoring of Fluoride in Ground water around NALCO Smelter by SPCB

The ground water quality with respect to concentration of fluoride around the premises of Aluminium Smelter of NALCO has been monitored by the SPC Board.The monitoring results for the period 2010-11 to 2014-15 is tabulated and shown in **Annexure-7** and presented at **Figure-6.13** respectively. The level of fluoride remains within standard except at one village.

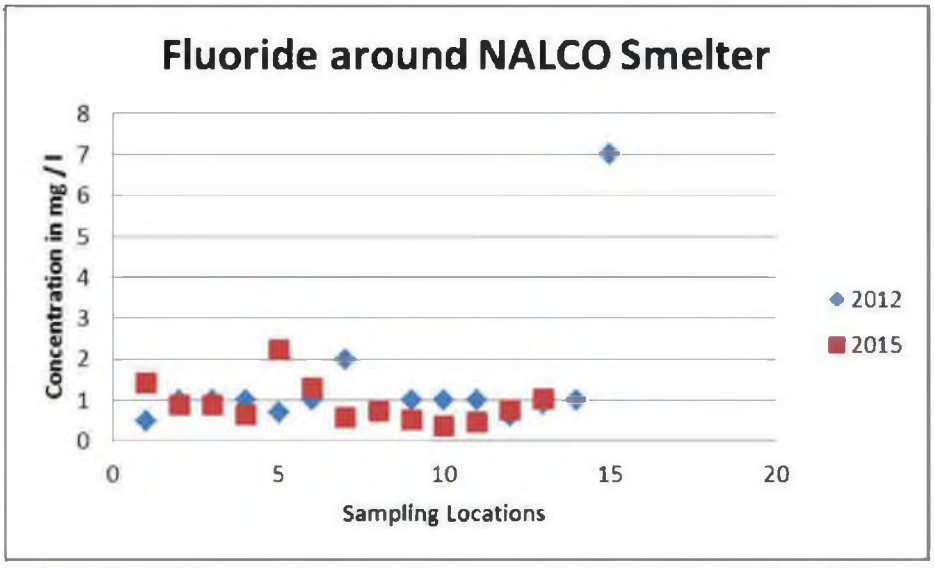


Fig- 6.13 Fluoride concentration in ground water around NALCO smelter

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 **Annxure-8**. The present concentration of sensitive parameters in Angul-Talcher area is presented in **Table -6.3**. The monitoring results in respect of identified toxins have been used for calculation of CEPI score for Angul-Talcher area.

Table-6.3. Range of present concentration of sensitive parameters in Angul-Talcher Area for the during 2013

Environment Type	**Concentration Range of critical parameters in the ambient environment**		
Ambient Air	PM_{10} in µg/ m^3	$PM_{2.5}$ in µg/ m^3	BaP in ng/ m^3
	65.4 to 85.7	19.7 to 29.8	<0.5
Standard	100 (24 hrs)	60 (24 hrs)	1.0 (Annual)
Surface Water	Fluoride in mg/l	Nitrate Nitrogen in mg/l	Hexavalent Chromium (Cr^{+6}) in mg/l
	0.3 to 1.3	0.23 to 3.66	<0.05
Standard	1.5	45	0.1
Ground Water	Fluoride in mg/l	Nitrate Nitrogen in mg/l	Lead in mg/l
	0.5 to 0.9	0.23 to 14.9	<0.01

Chapter 7

CEPI of Angul-Talcher Area

- Compliance status of major actions
- CEPI score for Angul-Talcher area

7.0 Introduction

The Angul-Talcher area was one of the most critically polluted area of the State had a score of 82.09 in 2009. The individual score on air pollution, water pollution and ground water (soil) pollution was above 60, indicating that the level of pollution on all accounts were above safe level. The Action Plan was formulated to address all issues of pollution to bring down the CEPI score to a safe level. In this chapter we attempt to correlate implementation of action plan with the CEPI score.

7.1 Compliance status of major action

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, quality the main focus was to minimise the quantity of solid waste disposal. The detailed unit wise status of implementation of Action Plan in Angul-Talcher area is presented at **Annexure-4**. The summarised status of implementing key action points in Angul-Talcher area are depicted in **Figure-7.1**.

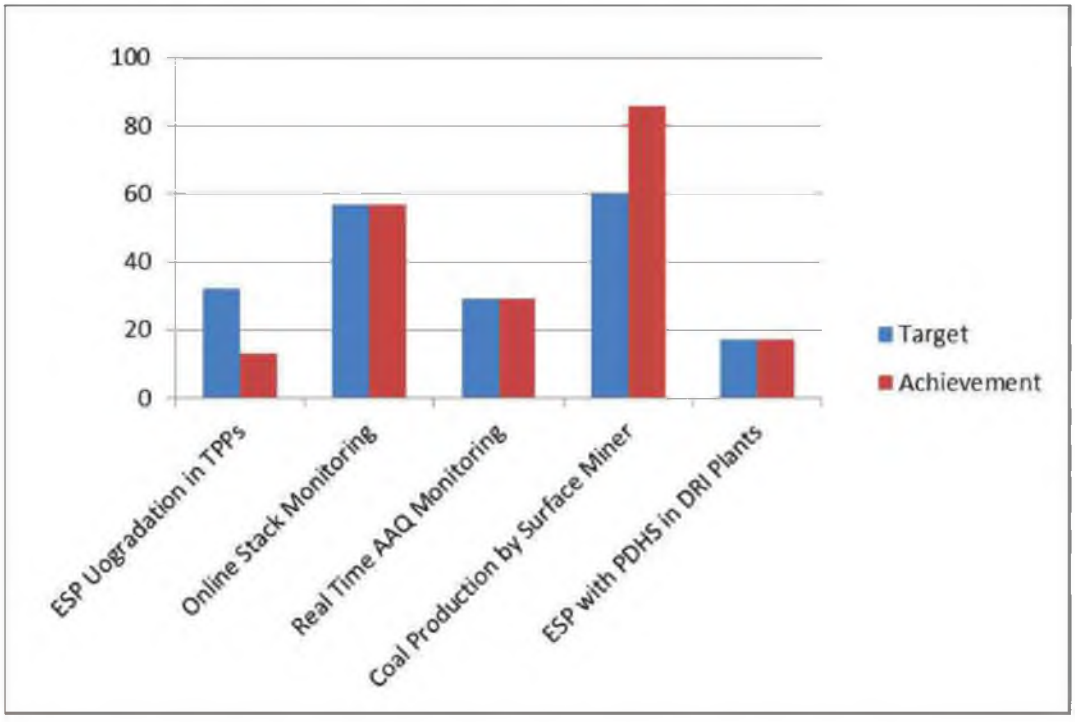


Fig-7.1 The compliance status of major action points in Angul-Talcher area

The action for control of air pollution has been largely implemented except upgradation of ESPs in Thermal Power Plants. The coal production methods have been greatly modified leaving a positive impact on air quality. Similar improvement was also 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 18MLD, but still more is required to be done.

At the same time, level of fluoride in smaller streams like Nandira and Kisinda indicates a possibility of contamination due to industrial activity.

7.2 CEPI Score for Angul-Talcher 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 Angul-Talcher for the period 2009, 2011 and 2013. The CEPI is determined in a process of weighted aggregation of sub-indicies 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 shown in **Figure-7.2**. The individual value of factors of each media for each sub indices **(Figure-1.1)** is also given in **Table- 7.1**. It can be seen that the implementation of abatement of action plan is quite effective in bringing down the CEPI score from 82.09 in 2009 to 72.86 in 2013. Thus the action plan should be continued with additional points for bringing down of CEPI index below safe and acceptable level.

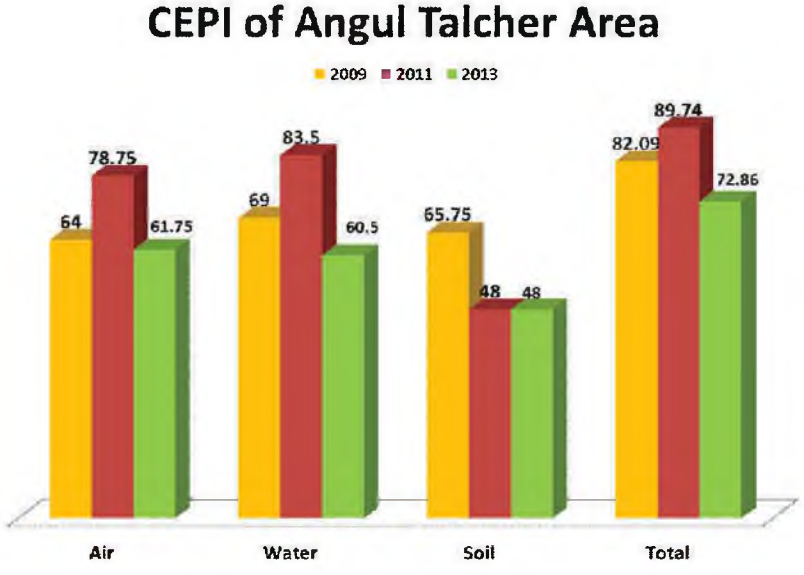


Fig- 7.2 CEPI score for Angul-Talcher area during 2009-2013

Table-7.1 Comprehensive Environmental Pollution Index Values for (Angul-Talcher) 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)	CEPI (Composite)
2009	A1-2 **A2- 5** A- 10	B1- 3 B2-3 B3-3 B-9	**C1-5** C2-5 C3-5 C-30	D-15	A1-3 **A2- 5** A- 15	B1- 6 B2-0 B3-3 B-9	**C1-5** C2-5 C3-5 C-30	D-15	A1-3 **A2- 5** A- 15	B1-7.75 B2-0 B3-3 B-10.75	**C1-5** C2-4 C3-5 C-25	D-15	Air- 64.00 Water-69.00 Land- 65.75	82.09
2011	A1- 5.75 **A2- 5** A- 28.75	B1- 4 B2-3 B3-3 B-10	**C1-5** C2-4 C3-5 C-25	D-15	A1-5.5 **A2- 5** A- 27.5	B1- 7.5 B2-3 B3-3 B-13.5	**C1-5** C2-4.5 C3-5 C-27.5	D-15	A1-3 **A2- 5** A- 15	B1-2 B2-3 B3-3 B-8	**C1-5** C2-1 C3-5 C-10	D-15	Air- 78.75 Water-83.5 Land- 48	89.75
2013	A1- 5.75 **A2- 5** A- 28.75	B1- 2 B2-3 B3-3 B-8	**C1-5** C2-1 C3-5 C-10	D-15	A1-5.5 **A2- 5** A- 27.5	B1- 2 B2-3 B3-3 B-8	**C1-5** C2-1 C3-5 C-10	D-15	A1-3 **A2- 5** A- 15	B1-2 B2-3 B3-3 B-8	**C1-5** C2-1 C3-5 C-10	D-15	Air- 61.75 Water-60.5 Land- 48.00	72.86

(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

Summary of 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

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 Angul-Talcher was prepared based on the background information, monitoring reports, findings of REMP prepared by ISMU, Dhanbad and factoring into the public concerns on local environmental issues voiced through the local newspapers 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 in **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 new coal transport corridor is to be constructed avoiding populated areas, institutions, schools etc. in Talcher 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 ambi ent air, Traffic Congestion

Table - 8.3 Action Plan for abatement of pollution in Iron & Steel and Ferro Alloys sector

Sl. No.	Action Plan	Issues being addressed
1	All steel plants and sponge iron plants to develop collection a nd treatment facility for runoff from char dumps and coal stock piles during monsoon.	Water pollution
2.	Use of SMS slag and ferro alloys slag for haul road construction in the plant premises and surrounding areas	Metallurgical solid waste utilization
3.	The DRI industries having AFBC Boilers is to utilise 30% of dolo-char as a supplementary fuel in AFBC Boilers.	Solid waste utilization.

Table - 8.4 Action Plan for abatement of pollution in Aluminium Plants

Sl. No.	Action Plan	Issues being addressed
1.	Implementation of findings of comprehensive wastewater audit including runoff management for the smelter plant	Fluoride concentration in water and soil
2.	Utilisation of carbonaceous portion spent pot lines by Cement Kilns / Authorised reprocesses	Hazardous waste Utilization

Table - 8.5 Action Plan for abatement of pollution through Common infrastructure services and studies

Sl. No.	Action plan	Issues being addressed
1.	Construction of a sewage treatment plant for Talcher town	Water pollution of river Brahmani
2.	Establishment of an extensive air quality monitoring network for Angul- Talcher area	Ambient Air Quality management
3.	Construction of water impoundment structures in Nandira, Lingra, Singda and Bangur nallah	Water conservation
4.	Remediation of contaminated site near ORICHEM Ltd.	Ground and surface water quality in respect of Chromium pollution
5.	Promotion of industries in CPAwhich uses waste products like fly ash, char and waste heat.	Waste utilization and Waste minimisation
6.	The establishment of on -line monitoring station for water quality monitoring of River Brahmani and online data transmission facility with SPCB and CPCB.	River water quality monitoring
7.	Monitoring of ground water quality inclusive of Pb, Cr, Cd and Fluoride concentrations	Baseline data generation for remedial measures if required
8.	Monitoring of $PM_{2.5}$ and Ozone at traffic intersections	Ambient air quality management

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 subsequent 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

- Consideration of Projects for Environmental Claearance based on Compressive environmental pollution index

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

Dated 13th January, 2010

Office Memorandum

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, 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

Annexure 2

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

- List of 17 category of highly polluting industries
- List of Red-B category of industries and mines
- List of other industries

Table -A2.1 List of 17 Category of highly polluting industries i.e. Red (A) industries in CPA 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	Aluminium Smelter Plant (NALCO)	Aluminium Metal	0.345 MTPA	4.6 LTPA
2	Captive Power Plant (NALCO)	Thermal Power	1080 MW (9 x120 MW)	1200 MW (10 x120MW)
3	Talcher Thermal Power Station (NTPC)	Thermal Power	460 MW (4 x 60 MW + 2 x110 MW)	460 MW (4 x60 MW + 2 x110 MW)
4	Bhusan Steel Ltd. (CPP)	Thermal Power	77 MW	142 MW - (77 MW + 33MW +20 MW + 12 MW)] ***The capacities of this CPP has also been included in the capacities of M/s. Bhushan Steel Ltd.***
5	Bhusan Steel Ltd.	Integrated Steel (DRI)	**3.1 MTPA having-** **Sponge Iron** – 8x500 TPD, **Sinter Plant** ($117m^2$), **Blast Furnace** ($1x1681\ m^3$), **Power Plant** by WHRB (77 MW) & FBC (33 MW), **SMS**-1x180 T/H CONARC, 1x60 T/H EAF, 1x60 T/H LRF, 6x15 T/H Induction Furnace, 1x60 T VD/VOD, 1x180 T RH-OB, 2x2 Strand Billet Caster, Slab Caster (2.5 MTPA), **HSM** (2.5 MTPA),	**5.6 MTPA having -** **Sponge Iron** 10×500 TPD; **Sinter Plant-I** - 1×177m2; **Sinter Plant – II & III** 2×204m2; **Blast Furnace –I** 1×1681m3 ; **Blast Furnace –II** - 1×3814m3 ; CFBC Boilers of BF-II - 2×275 TPH ; **Captive Power Plant** - (Total=142 MW with 4 Tourbogenerators) **SMS -I & II** i) Induction Furnace - 6×15T/H ii) Electric Arc Furnace - 1×60T/H iii) Ladle Refining Furnace-1×60T/H,1×15 T/H & 1×180T/H

Sl. No	Name of the industry / mine	Sector	Capacity in 2010-11 with plant facilities	Capacity in 2014-15 with plant facilities
				SMS-III i) BOF-2×180 T/H ii) ARS-2×180 T/H iii) LRF - 1×180 T/H iv) CAS-OB-1×180 T/H v) HMDS-2 numbers **HSM** -2.5 MTPA **Coke Oven Plant -I** (Recovery Type 0.85 MTPA Coke oven Plant –II (Recovery Type) 1.25 MTPA **Coal Washery** 2.4 MTPA **Cold Rolling MillComplex** i) Cold rolled steel products - 0.35 MTPA ii) Galvanized steel products -0.225 MTPA iii) Colour coated steel products- 0.15 MTPA iv) Hot rolled, pickled and oiled products- 0.1 MTPA
6	Bhusan Energy Ltd.	Thermal Power	300 MW (2 x150 MW)	300 MW (2 x150 MW)
7	Nav Bharat Ventures Ltd. (CPP)	Thermal Power	94 MW (1x 34MW+1x64 MW)	158 MW (1x 34MW+2x 64 MW)
8	BRG Iron & Steel Co. Ltd.	Steel Plant (DRI)	**DRI**-2x100 TPD (60,000 TPA) **SMS Plant** – (i) Induction Furnace – 2x20 T+ 2x7 T (ii) Electric Arc Furnace (EAF) -1x25 T, (iii) AOD- 2x35 T, (iv) Continuous Caster Machine -2x35 T,	DRI-2x100 TPD(60,000 TPA) Ferro Alloys Plant 2×9 MVA Steel Melting Shop (SMS) i) Induction Furnace 2×20 T/H + 2×7 T/H ii) Electric Arc Furnace (EAF) 1×25 Ton/H iii) AOD Converter 2×35 Ton/H

Sl. No	Name of the industry / mine	Sector	Capacity in 2010-11 with plant facilities	Capacity in 2014-15 with plant facilities
			Ferro Alloys Plant – 1x9 MVA.	iv) Ladle Refinery Furnace 1×35 Ton/H v) Continuous Casting Machine (2 nos.) -- Cold Rolling Mill (CRM) 2,40,000 TPA Hot Rolling Mill (HRM) 7,90,000 TPA i) M.S. Plates 3,78,000 TPA ii) S.S. Plates 72,000 TPA iii) Mild Steel Coil 1,00,000 TPA iv) Stainless Steel Coil 2,40,000 TPA
9.	GMR Kamalanga	Thermal Power	Not Commissioned	1050 MW (3 x350 MW)

Table-A2.2 List of RED (B) categories of industries and mines operating in CPA during 2010-11 to 2014-15

Sl No	Name of the industry/mine	Product	Capacity in 2010-11 with plant facilities	Capacity in 2014-15 with plant facilities
1	Heavy Water Plant (DAE)	Heavy Water	62.7 TPA	220 TPA
2	Heavy Water Plant (Boron Enrichment Exchange Distillation))	Enriched Boron exchange distillation	Nil	Boron – 10 (65%) to 50 kg/Annum & Boron – 10 (90%) to 5 kg/Annum
2	Ananta OCP (MCL)	Coal	12.0 MTPA	12 MTPA
3	Jagannath OCP (MCL)	Coal	4.4 MTPA	6 MTPA
4	Lingaraj OCP (MCL)	Coal	13.0 MTPA	13 MTPA
5	Bharatpur OCP (MCL)	Coal	15.0 MTPA	20 MTPA
6	Balaram OCP (MCL)	Coal	6.4 MTPA	7.74 MTPA
7	Hingula OCP (MCL)	Coal	12.0 MTPA	12 MTPA
8	Bhubaneswari OCP (MCL)	Coal	10.0 MTPA	25 MTPA
9	Chendipada OCP(MCL)	Coal	0.35 MTPA	0.35 MTPA
10	Talcher U/G Colliery (MCL)	Coal	0.198 MTPA	0.27 MTPA
11	Nandira U/G Colliery (MCL)	Coal	0.27 MTPA	0.3 MTPA
12	Natraj U/G Colliery, Talcher	Coal	-	0.64 MTPA
13.	Talcher West Colliery, Talcher (U/G)	Coal	-	0.52 MTPA
14	Kaniha OCP (MCL)	Coal	-	10 MTPA
15	Nav Bharat Ventures Ltd.	Ferro Alloy	75,000 TPA	75,000 TPA (2 Nos. submerged Arc furnace.22.5 MVA each).
16	MangilalRungta (Ferro Alloy Division)(P) Ltd.	Ferro Alloy	54,000 TPA	Ferro Manganese - 4584 TPM / Silco Manganese - 3330 TPM (2 Nos. of submerged Arc furnaces of 18 MVA and 9 MVA)
17	Hind Mettaliks Ltd	Ferro Alloy	30,000 TPA	33600 TPA (2 Nos. submerged arc furnaces – 7.5 MVA and 9 MVA)

Sl No	Name of the industry/mine	Product	Capacity in 2010-11 with plant facilities	Capacity in 2014-15 with plant facilities
18	Global Coal & Mining (P) Ltd.	Beneficiated coal	2.04 MTPA	2.04 MTPA (Washed coal = 1,70,000 TPM and Reject coal = 60,000 TPM)
19	Aryan Energy (P) Ltd. - Beneficiated coal	Beneficiated coal	1.8 MTPA	1.8 MTPA (Washed coal = 1,50,000 TPM/Reject Coal = 45,000 TPM)
20	Spectrum Coal & Power Ltd.	Beneficiated coal	4.8 MTPA	7.0 MTPA (Washed coal = 7.0 MTPA)
21	Ardee Hi-Tech Pvt. Ltd.	Beneficiated coal	0.816 MTPA	0.816 MTPA (Washed coal = 68,000 TPM)
22	K.R. Enterprises, Jaybardhan Mishra, Hill top, college road, Talcher,Angul	Beneficiated coal	12,0000 TPM	75,600 MT/ shift (Middling, Coal rejects and sized clean coal = 75,600 MT / shift)
23	SamalMetalicPvt. Ltd (Ferro Alloy Plant), Kharagprasad, Dhenkanal	High Carbon Ferro Chrome / Silico Manganese	28380 TPA	28380 TPA (2 Nos. submerged arc furnace. 2 x 9 MVA)

LIST OF OTHER UNITSIN CPA OF ANGUL -TALCHER

RED CATEGORY

Table- A2.3.1 Induction Furnace

Sl. No	Name & Address	Product	Capacity
1.	Jagannath Casting Pvt. Ltd., Surendra Kumar Singhal, Near Surya Filling Station, Talcher, Angul,	M.S. Ingots	1000 TPM

Table- A2.3.2 Railway Siding

Sl. No	Name & Address	Product	Capacity
1.	Global Coal & Mining (P) Ltd. KartikeswarPatra, 1. E. Plot no-23824, South Balanda, Talcher, Angul,	Coal handling	3.0 MTPA
2.	Spectrum Coal & Power Ltd At-Danara,Talcher,Angul-759148	Handling of Washed Coal	7.0 MTPA

Table- A2.3.3 Minerals Stackyard

Sl. No	Name & Address	Product (Mineral Handling)	Capacity
1.	Nibaran Rout Stockyard, Nibaran Rout, Kharagprasad, DKL,	Stock of quartz	500 TPM
2.	Kharagprasad Quartz &Quartizite Depot, Jyotiprasad Rout, Kharagprasad, DKL,	Stock of Quartz & Quartzite	1000 TPM
3.	K.R.Enterprises, Sanjaya Kumar Mohapatra, Hilltop, Talcher, Angul	Stock of Manganese Stock of iron ore Stock of China Clay Fines & Lumps	1000 TPM 2500 MT 500 MT

Table- A2.3.4 Stones Crusher

Sl No	Name & Address	Product	Capacity
1.	Bandana Stone Crusher, SmtBandanaraniSarangi Kalusahukateni, Haladiabahal	Stone chips	750 TPM

Sl No	Name & Address	Product	Capacity
2.	Jena Stone Crushers, Banesh Ku. Jena, Chheliabeda, Balaramprasad	Stone chips	500 TPM
3.	Shivadutta Stone Crusher, Bijay Ku. Dhal, Meramandali	Stone chips	1400 TPM
4.	MaaRamachandi Stone Crusher, (I) Prasanna Ku. Sahoo, Bramanabasa, Narendrapur	Stone chips	1500 TPM
5.	Satyam Stone Crusher, Dileswar Rout Kharagprasad.	Stone chips	2800 TPM
6.	Shiva Shakti Stone Crusher, Prakash Ch. Dhar, HaladiabahalaKaranda Hindol,.	Stone chips	500 TPM
7.	Jay Hanuman Stone Crusher, Narottam Rout, Kharagprasad, Odapada,	Stone chips	1125 TPM
8.	Pattnaik Stone Crusher, PrasantaPattnaik, Nimabahali, Hindol, DKL	Stone chips	720 TPM
9.	Road & Roof construction, C.N.Vivekanand, Promodprasad, Dharampur, Talcher, Angul -	Stone chips	750 TPM
10.	M.S. Stone Crusher, Sebati Swain, Giranga, Kulad, Angul– Birabhanu Stone Crusher, Smt. KuniraniBhanja, Budhapanka, Angul-	Stone chips Stone chips	750 TPM 170 TPM
11.	MaaRamachandi Stone Crusher, (II) Prasanna Ku. Sahoo, Bramanabasa, Narendrapur	Stone chips	300 TPM
12.	MaaMangala Stone Crusher, RashmikantaPratap Singh, Kalusahikateni, Haladiabahal, DKL	Stone Chips	1250 TPM
13.	Jashobanti Stone Crushe, Bijaya Ku. Sahoo, Nimabahali, DKL	Stone Chips	500 TPM
14.	Shiva Shakti Stone Crusher, SudhakarSahoo, Prop., At-Haladiabahala, DKL	Stone Chips	2000 TPM

Table- A2.3.5 Automobile Serviceing Center

Sl. No	Name & Address	Product	Capacity
1.	Shree Bharat Motors Ltd. PradoshAcharya, Kulad, Angul,	Servicing of Vehicle	100-120 vehicles per month

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.	Zeet 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 quartizite Mine, Kamakhyanagar, DKL, 1	Quartz and quartizite 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

Sl. No	Name & Address	Product	Capacity
2.	Hot mix plant of Sri BajiBehera, Gotamara, Angul,	Hot mix	1000 TPM
3.	Sahu Construction, Pradeep Kumar Sahoo, Rodasar, Dera, Angul	Hot mix	660 TPM

Table- A2.3.10 Explosives & Non-explosives

Sl. No	Name & Address with telephone no.	Product	Capacity
1.	Indian Explosives Ltd., L.S.Babu, Bulk Support Plant, Industrial Estate, South Balanda, Angul,	Bulk premix	445 TPM
2.	Navabharat Fuse Co. Ltd., A.K.Dash, Industrial Estate, South Balanda, Angul,	Bulk imulsion explosive	6000 TPM
3.	Indian Oil Corporation Ltd (IBP Division), DebhinkarBaidya, South Balanda, Angul,	Site mixed slurry (explosive)	5,000 TPM
4.	IDL Explosives, Industrial Estate, South Balanda, Angul,	Non- explosive matrix storage	250 TPM

Table- A2.3.11 Health Care Units

Sl. No	Name & Address	Type of HCU	No of Beds
1.	KarunakarDiagnonistic Badadandasahi,Talcher town, Angul.	Pvt.	Nil
2.	Popular Nurshing Home. FCI Road, Nalco nagar, Angul,	Pvt.	11
3.	SevakNurshing Home. Ballhar,Chhaak,Talcher, Angul,	Pvt.	14
4.	Krishna Clinic & Nursing Home, BallharChhak, Talcher, Angul,	Pvt.	14
5.	Sidharth Maternity home BallharChhak, Talcher, Angul	Pvt	05
6.	Samal care Pvt.Ltd Banarpal, Angul	Pvt	102
7.	Nehru SatabdiCentarl Hospital(MCL), Dera, Talcher, Angul)	Govt	115
8.	Jena & Jena Nurshing Home, MedicalRoad, Amalapda, Talcher, Angul	Pvt	09

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. Arnnapurna 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 & Address	Type of HCU	No of Beds
25.	Guru CharanPradhan, M/s. Surendra Hospital, At- GMR Site, At/Po-Kamalanga, PS-Motanga, Dist-Dhenkanal. Formerly known as Care Hospital (GMR Kamalanga Energy Ltd.), Kamalanga, DKL.	Pvt.	30
26.	PHC (N) Balarampur, Dhenkanal	Govt.	
27.	Thyrocare Subra Singh Roy, Derachhalk, Dera, Talcher, Angul.		
28.	M/s. Bhushan Steel Ltd., (Health Center), Mr. NeerajSingal, At-Narendrapur, Kuspanga, Meramandali, DKL	Pvt.	15
29.	RanaxizPhysio Home, MinaketanBehera, At-NizigarhZami, Ballhar, Talcher main Road, Angul	Pvt.	20
30.	City Hospital, Sri Subash Jena, Occupier, At-Near Sriram Petrol Pump, Plot No.2844/4916, Khata No.599/370, NizigarhZami, Talcher, Angul	Pvt	14
31.	M/s.S.S.Hospital, Mrs.UllasiniPrusty, Occp At-Dighi, Ananda Bazar, PO-Talcher, Thermal, Dist – Angul – 759101	Pvt.	14

Table- A2.3.11 Miscellaneous &Others:

Sl. No	Name & Address.	Product	Capacity
1.	Jalan Carbon & Chemicals Pvt. Ltd., (formerly known as Intercontinental Tar Refiners Pvt. Ltd.), NishantBhalotia, Ekagharia, Talcher, Angul	Coal Tar Pitch	3000 TPM
2.	Gourisankar Lubricants, MunaPani, Gurujang, Talcher, Angul,	Refined Lubricating Oil	50 KLM
3.	Chetana Industries, Bimal Kumar Mishra, Turanga, Angul,	Glass Beads	1.12 TPM
4.	S.S.Cristals, Susil Kumar Mishra, Turanga, Angul,	Glass Beads	2 Lakhs Nos/ Month

Orange Category Units

Table- A2.3.12 Brick Kilns

Sl. No	Name & Address	Product	Capacity
1.	Kalia Bricks, GyanendraSamal, Kharagprasad DKL	K.B.bricks	1.5 Lakhs/Month
2.	Sree Ram K.B. Bricks, BibhutiBhusan Dhal, Kharagaprasad, DKL,	K.B.bricks	2.5 Lakhs/Month
3.	Suvam Bricks, GobardhanSahoo, Kharagprasad, DKL,	K.B.Bricks	3.6 Lakhs/Month
4.	Durgamata Kiln Bricks, Ganeswar Rout, Suravi, Bido , Motanga, DKL	K.B.bricks	2.0 Lakhs/Month
5.	MaaTareni Bricks, Brajkishore Rout, Kharagprasad, DKL	K.B.bricks	1 Lakhs/Month

Table- A2.3.13 Hotels

Sl. No	Name & Address
1.	Hotel Shakti International, R.C.Tripathy, HandidhuaChhak, Talcher, Angul, 240384
2.	Hotel Durga, SatyanandaDalabehera, NH-42, Turanga, Angul,
3.	Hotel Prasanti Pvt. Ltd, NilamaniPani, Turanga, Angul,
4.	Kalinga Guest House & Resorts, Satyabrata Swain, Kulad, Nalconagar, Angul,
5.	Hotel Ganapati, Lokesh Chandra Jena, Nalco FCI Road, Nalconagar, Angul,
6.	Hotel Brundaban, Hatatota, Talcher, Angul,
7.	Hotel Swagat, B.B.Pattnaik, FCI road, Nalconagar, Angul,

Table- A2.3.14 Tyre manufacturing &Retreading

Sl. No	Name & Address with Telephone No	Product	Capacity
1.	Singh Tyre Retreading, Dinabandhu Singh, Industrial Estate, South Balanda, Angul	Tyre Re-treading	4000 Pieces./Annum
	KhambeswariTyre Re-Trading, Sanjay Kumar Nayak, Tentuloi, Balaramprasad,	Tyre redreading	150 Tyres
2.	V.S.Industries, Mrs. Vidya Singh, Tentoloi, Ghantapada, Angul,	Rubber &Velcanizing Gum	36 MT/Annum

Green Category Units

Table- A2.3.15 Fabrication / Engineering

Sl. No	Name & Address	Product	Capacity
1.	Indfab Projects Pvt. Ltd, Kurunti, Kuspanga, DKL,	Febricated structural steel works, industrial spare parts, tanks, vessel etc.	100 TPM
2.	Indfab, FCI Road, Kulad, Nalconagar, Angul,	Structural fabrication work	1200 TPM

Table- A2.3.16 LPG Bottling / Industrial Gas

Sl. No	Name & Address	Product	Capacity
1.	Solar Industries India, Rahul Ku. Guha, Industrial Estate, Talcher, Angul,	Emulsion matrix	500 TPM
2.	Indian Oil Corporation, Krushna Chandra Mallick, South Balanda, Talcher, MCL Area, Angul,	Handling & storage of HSD	2,000 KL

Table- A2.3.17 Soft Drinks (Orange Category) / Mineral Water

Sl. No	Name & Address	Product	Capacity
1.	Ranjit industry, RanjitKesariIndrajit, Padiabhanga, Chainpal, Angul	Packaged Drinking Water	575 KL/A
2.	Sairam Drinking Water, Smt.AshalataPani, Prop., At-Amrutideipur, Talcher, Angul	Packaged Drinking Water	500 KLA
3.	Deep Innovatives (P) Ltd., Harjit Singh, Director, At-Pramod Prasad, PO-Talcher, Dist-Angul	Packaged Drinking Water	1354 KLA

Table- A2.3.18 Fly ash Brick Industries

Sl No.	Name and Address of the Industry	Product	Capacity in number of bricks per Annum
1.	Krishna Fly Ash Bricks, GatikrishnaDeo, Girang, Kulad, Nalco, Angul	Fly Ash Bricks	36 lakh
2.	Flashpro Industries, Pradipta Ku. Panda, Bahgubul, Talcher, Angul,	Fly Ash Bricks	18 lakh

Sl No.	Name and Address of the Industry	Product	Capacity in number of bricks per Annum
3.	Maruti Enterprises, Manoj Ku. Pradhan, BikasnagarTuranga, Angul, 1	Fly Ash Bricks	30 lakh
4.	SMP Infra Pvt. Ltd., Manoj Ku. Agarwalla, Ekagharia, Angul,	Fly Ash Bricks	57.6 lakh
5.	Omm Ash Bricks, Sonali Nanda, Gurujang, Talcher, Angul,	Fly Ash Bricks	30 lakh
6.	MaaSantoshi Fly Ash Bricks, Tapas Kumar Samal, Santiri, Angul,	Fly Ash Bricks	30 lakh
7.	Nav Bharat Ventures Fly Ash Unit, A.K.Roy, Kharagprasad, DKL,	Fly Ash Bricks	18 lakh
8.	Maa fly ash bricks, RamachandraNath, Itapa, Kuspanga, DKL	Fly Ash Bricks	27 lakh
9.	Snehalata fly ash bricks, Smt. KabitaSamal, Balimi, DKL	Fly Ash Bricks	20 lakh
10.	Jay Hanuman Fly Ash Bricks, Harihara Rout, Kharagprasad, DKL,	Fly Ash Bricks	18 lakh

Annexure 3

Summary of sector wise action pints

- 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 FerroAlloys Sector
- Action Plan for abatement of pollution in Aluminium Plants
- Action Plan for abatement of pollution through Common infrastructure and services

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 Existing Plants Future Plants Concurrently with commissioning	SPM and 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	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 Talcher coalfields.	SPM in ambient air, Traffic Congestion
2.	Creation of reservoir for storage of mine drainage water and runoff 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 FerroAlloys 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, SO2, NOx, 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 - A3.4 Action Plan for abatement of pollution in Aluminium Plants

Sl. No.	Action Plan	Issues being addressed
1.	1st and 2nd 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, NOx, CO, RPM
7.	Installation of hazardous waste incinerator by NALCO.	Hazardous waste
8.	Co-processing of spent pot lines in Cement Kilns	Hazardous waste

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 for Talcher town	Organic pollution of river
2.	Establishment of an extensive air quality monitoring network for Angul- Talcher area	Air quality parameter
3.	Construction of water impoundment structures in Nandira, Lingra, Singda and Bangurnallah	Water conservation
4.	Remediation of contaminated site near ORICHEM Ltd.	Chromium pollution
5.	Construction of a bypass / flyover for avoiding traffic congestion on the national highway near Bhushan Steel & Power plant.	SPM, Traffic Congestion
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 Brahmani 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 PM2.5 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

- 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 Sector and FerroAlloys Plant
- Action Plan for abatement of pollution in Aluminium Plants
- Action Plan for abatement of pollution through Common infrastructure and services

Table - A4.1 Action Plan for abatement of pollution in Thermal Power Plants

	Action plan	Stakeholder agency	Current status with action plan for implementation	Remarks
1.	All TPPs to install ESP/BF to meet the emission standard of 50 mg/Nm3 with one spare field.	NALCO, CPP	Retrofitting of ESPs completed and commissioned for Unit#1, 2, 3, 4, & 6 with emission target of below 100 mg/Nm^3. ESPs of unit no.1 to 8 are prescribed with emission standard of 100 mg/ $Nm^3$and ESPs of unit no.9 to 10 are prescribed with emissi0on standard of 80 mg/ Nm^3.	Partially complied as up-gradation for phase wise up gradation.
		TTPS (NTPC), Talcher	The Stage-I (Unit#1, 2,3&4) was commissioned during 1968-1972 and Stage-II (Unit#5 & 6) is approximately 30 year old. In Stage –I ESP retrofitting is not possible due to space constraints, since one phase of retrofitting has already been done. ESP augmentation work is complete for Unit-5 and ESP augmentation for Unit-6 is expected to be complete by March 2016. Ammonia flue gas dosing done to keep the emission at 100 mg/Nm^3.	Direction has been issued to achieve emission norm of 100 mg/Nm^3 under the Action Plan.
		Nav Bharat Ventures Ltd.	ESP of Unit-I is designed for 90 mg/Nm^3. ESPs of Unit-II & III are designed for 50 mg/Nm3. To meet the emission standard in Unit-I ammonia dozing is done. The emission standard for all the units prescribed is 50 mg/Nm3.	Complied
		Bhusan Steel Ltd. CPP Bhusan Energy Ltd. (IPP)	4 number of ESPs attached to Bhushan Energy Limited have been designed for 50 mg/Nm3 with all the fields in operation. 3 gas fired boilers are designed for 50 mg/Nm^3 and three AFBC Boilers (33 MW + 20 MW + 12	Complied

	Action plan	Stakeholder agency	Current status with action plan for implementation	Remarks
			MW) are designed for 100 mg/Nm^3	
		GMR Kamalanga Energy Ltd.	3 numbers of ESPs provided which are designed for 50 mg/Nm^3 will all the fields in operation. The emission standard for all the units prescribed is 50 mg/Nm3.	Complied
2.	All lean slurry disposal system to be converted to (High Concentration Slurry Disposal) HCSD/ Mine void filling	NALCO,CPP	Currently the ash is disposed in ash ponds in lean slurry mode for Unit#1-6. For Unit#7-10 ash is disposed in ash ponds in HCSD form. The industry has undertaken a project to transport ash in lean slurry mode for disposal in abandoned mine pit of Bharatpur OCP. Disposal in the mine void through HCSD mode is not technically feasible due to long distance. The project is in advanced stages of completion.	Ash disposal in mine void is under implementation phase and in advance stage of completion.
		TTPS (NTPC), Talcher	Ash is disposed of in abandoned mine pit of BalandaMine through wet disposal (lean slurry) mode.HCSD is not possible in current pipe line due to technical limitation of distance factor.	Complied and to be continued
		Nav Bharat Ventures Ltd	Ash is disposed off through mine void filling (Balanda area) by dry ash disposal mode. Ash is transported in closed container.	Complied and to be continued
		Bhusan Steel Ltd. CPP Bhusan Energy Ltd. (IPP)	Ash is disposed off through mine void filling ((Jagannath OCP , quarry No. 4)) by dry ash disposal mode. Ash is transported in closed container.	MoEF has permitted temporary filling and asked the unit to undertake study of impact on ground water. Permission is valid upto Feb 2016.
		GMR Kamalanga Energy Ltd.	Fly ash is disposed in HCSD mode in Ash Pond.	Complied and to be continued

	Action plan	Stakeholder agency	Current status with action plan for implementation	Remarks
3.	Online monitoring with real time display facility to be installed for stacks	NALCO,CPP	The industry has installed online monitoring system for measuring particulate matter emission from the stack for all 10 units.	Complied and online monitoring to be continued
		TTPS, Talcher	The industry has installed online monitoring system for measuring particulate matter emission from the stack for all 6 units.	Complied and online monitoring to be continued
		Nav Bharat Ventures Ltd	The industry has installed online monitoring system for measuring particulate matter emission from the stack for all 3 units.	Complied and online monitoring to be continued
		Bhusan Steel Ltd. CPP	The industry has installed online monitoring system for measuring particulate matter emission through the stack for all 6 units.	Complied and online monitoring to be continued
		Bhusan Energy Ltd. (IPP)	The industry has installed online monitoring system for measuring particulate matter emission from the stack for all 3 units.	
		GMR Kamalanga Energy Ltd.	The industry has installed online monitoring system for measuring particulate matter emission from the stack for all 3 units.	Complied and online monitoring to be continued
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	NALCO,CPP	4 Silos of capacity 500 T each and 2 silos of capacity 1500 tons each installed.	Complied and online monitoring to be continued
		TTPS, Talcher	2 Silos of capacity 100 T each installed. Due to space constraint, further silos within the plant premises are not possible.	Complied and online monitoring to be continued
		Nav Bharat Ventures Ltd	2 Silos of capacity 350 T each and 2 silos of capacity750 tons each installed.	Complied and online monitoring to be
		Bhusan Steel	6 silos of capacity 200 T each	Complied and

Fig-5.11 Rake loading facility in Railway siding in Bharatpur OCP

5.11 Comprehensive Coal Mine Fire Control

In summer month 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 Talcher coal fields, it was envisaged that, MCL shall take up a comprehensive coal mine fire control plan and implement it mine wise. The MCL has made pipeline 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 exposer to heat. Sometimes blanketing is done to prevent coal fire. Besides minimum coal stock is maintained to prevent coal fire **(Figure-5.12)**

Fig-5.12 Fire fighting at coal stockyard through deployment of fire tender

5.12 Back filling of the mine voids and restoration of the mined out area

During excavation of coal voids are created in the area. The over burden dumps are also created during excavation of top soil to facilitate coal mining. Thus the mining operation in

Action plan	Stakeholder agency	Current status with action plan for implementation	Remarks
	Bhusan Steel Ltd. CPP Bhusan Energy Ltd. (IPP)	Unit has installed ETP (i.e. ETP-I & II) for the effluent management of thermal power plant area and steel plant complex. .	Additional ETP-III is in advance stage of completion
	GMR Kamalanga Energy Ltd.	Zero discharge adopted except 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	Remarks
I.	A dedicated coal transport corridor to be constructed in Talcher coalfields to control SPM in ambient air and traffic congestion.	Mahanadi Coal Fields Ltd. for its operating and future coal mines in Talcher area and Other Govt. agency as applicable	A dedicated coal transportation road network is existing from Hingula to Lingaraj connecting NH-200. The length of the road is 25km. This road is to be widened and strengthened at total project cost of Rs.251 Cr. Coal transportation through this road corridor is expected to be 14 to 20%.	The Action Point is partially implemented. As reported by MCL the project slowed down due to local agitations.
2.	Creation of reservoir for storage of mine drainage water and run off which can be used for industrial purpose for water conservation	Same as above	Water reservoirs have been created in 8 opencast mines and 2under ground 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

	Action plan	Stakeholder agency	Current status with action plan for implementation	Remarks
3.	Use of surface miner for coal mining purpose. At least 60% coal in this area to be produced by surface miner technology for control of particulate matter in ambient air	Same as above	A total of 21 Nos of Surface Miners engaged for coal production. For the FY 2013-14 out of total production of 63.97Million Tons 48.12 Million tons of coal (75.23%) has been produced through Surface Miner. Similarly for the FY 2014-15 out of total production of 70.825 Million Tons 60.743 Million tons of coal (85.76%) has been produced through Surface Miner.	Complied and to be continued
4.	Adoption of concurrent mine filling with dry ash from the thermal power plants to facilitate concurrent Ash disposal.	Same as above	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.
5.	Making provision for supply of drinking water in the peripheral villages of coal mining area to solve the problcm of water scarcity in nearby arcas	Same as above	In Talcher coalfield area, 19 peripheral villages are covered under piped water supply scheme by MCL. Rural Water Supply and Sanitation Department of Govt. of Odisha (RWSS) is the implementing agency. 33600 people are covered under this pipe water supply scheme. MCL is also supplying drinking water to peripheral villages of Coal Mines through water tanker.	Complied and to be continued

	Action plan	Stakeholder agency	Current status with action plan for implementation	Remarks
6.	Enhancement of rake loading facility in coal mines for control of SPM in ambient air & traffic congestion.	Same as above	For the FY 2013-14 out of total despatch of 65.65 Million Tons 56.52 Million tons of coal (86.09%) has been despatched through Rail and Belt Conveyor. Similarly for the FY 2014-15 out of total despatch of 71.54 Million Tons 61.5 Million tons of coal (85.97 %) has been despatched through Rail and Belt Conveyor.	Complied and to be continued
7.	MCL to take up a comprehensive coal mine fire control plan for control of SO2 in ambient atmosphere and heat in the area	Same as above	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 and to be continued
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.	Same as above	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. MCL has assigned mine voids to 5 nos. power plant for filling up the mine voids (Balanda OCP &Jagannath OCP) with fly ash. 1. M/s NTPC 2. M/s NALCO 3. M/s Bhushan Steel Ltd. 4. M/s Navbharat Ventures 5. M/s TTPS (NTPC) Out of the above, currently TTPS, Bhusan and Nav Bharat Ventures are disposing fly ash in abandoned mine voids.	Complied and to be continued

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

	Action plan	Stakeholder agency	Current status with action plan for implementation	Remarks
1	All DRI plants install ESPs in the kiln, bag filter in dust generating points and pneumatic dust handling system for control of air pollution in the area	Bhusan Steel Ltd.	Individual ESPs installed in all 10 DRI Kilns and Dedusting 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 and to be continued
		BRG Iron and Steel Ltd.	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 dust generating points.	Complied and to be continued
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 Steel Ltd.	The industry has provided garland drain and toc wall around the ash mound and catch pit for runoff management from ash mounds. The unit has also installed two ETPs ie ETP-I near Talabahal side (for power plant & SMS area) and ETP-II near nursery side (for DRI plant, RMHS and coal washery area). Overflow of these ETP goes to 3 ponds from which the effluent is discharged to the Kisinda nallah after settling.	Complied and to be continued
		BRG Iron and Steel Ltd.	Garland drain and earthen settling pond has been constructed for runoff from solid waste dump site.	Complied and to be continued in future with improvement.
3	Installation of online stack monitoring system with real time display system for monitoring and subsequent control of particulate	Bhusan Steel Ltd.	The industry has installed online monitoring system for measuring particulate matter emission from the stack attached to all 10 DRI units and the stack attached to all 5 Dedusting ESPs.	Complied and to be continued.
		BRG Iron and Steel Ltd.	The industry has installed online monitoring system for measuring particulate matter emission from the common	Complied and online stack monitoring to be continued.

	Action plan	Stakeholder agency	Current status with action plan for implementation	Remarks
	matter		stack attached 2 DRI units	
		Navabharat Ventures Ltd. (Ferro Alloy)	It may not be technically feasible to install online stack monitoring system in Ferro Alloy Plant.	Technical feasibility is under evaluation.
4	Real time ambient air quality monitoring (SOx, NOx, CO, PM10, PM2.5) evaluation of air quality data	Bhusan Steel Ltd.	The industry has installed 7 Nos of real time AAQMS (Ambient air quality monitoring system) for BSL and BEL in the plant premises for monitoring of environmental parameters.	Complied and real time AAQ monitoring to be continued.
		BRG Iron and Steel Ltd.	The industry has installed 4 Nos of real time AAQMS (Ambient air quality monitoring system)in the plant premises for monitoring of environmental parameters.	Complied and real time AAQ monitoring to be continued.
		Navabharat Ventures Ltd. (Ferro Alloy)	The industry has installed 1 Nos of real time AAQMS (Ambient air quality monitoring system) in the ferro ally plant premises for monitoring of environmental parameters.	Complied and real time AAQ monitoring to be continued.
5	Use of SMS slag and ferro alloys slag for haul road construction in the mine area for utilization of metallurgical solid waste.	Navabharat Ventures Ltd. (Ferro Alloy)	Currently the slag is used in their own road making.	Generation of surplus slag if any is under evaluation.
		Mangilal Rungta (P) Ltd (Ferro Alloy)	Currently the slag is used in their own road making. Presently the plant is not in operation.	Generation of surplus slag if any is under evaluation.
		Hind Mettaliks Ltd. (Ferro Alloys) (closed)	Currently the slag is used in their own road making. Presently the plant is not in operation.	Generation of surplus slag if any is under evaluation.
		Bhusan Steel Ltd.	Currently the slag is used in their own road making.	Generation of surplus slag if any is under evaluation.
		BRG Steel Ltd.	Currently the slag is used in their own road making.	Generation of surplus slag if any is under evaluation.

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

	Action plan	Stakeholder agency	Current status with action plan for implementation	Remarks
1.	1st and 2nd pot line of NALCO to be upgraded to meet the emission norm of 0.3 kg of fluoride per ton of Aluminium by revamping the fume treatment plant for control of fluoride in ambient air	NALCO	The revamping / up-gradation of Fume treatment plant was proposed keeping in the view of proposed high ampearage (220KA) operation of pots instead of normal 180KA.	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)
2.	Online stack emission monitoring system with display system shall be installed for evaluation of load of fluoride in ambient air.	NALCO	The industry has installed online monitoring system for measuring particulate matter and hydrogen fluoride emission and from the stack for 8 pot room units (FTP-1 to 8) and 2 bake oven units (FTC-1 & 2).	Complied and online stack monitoring to be continued.
3.	Installation of fluoride removal (Fume treatment) system from bake oven plant control of fluoride in air.	NALCO	Fume treatment system for Bake oven-I, II & III have been installed.	Complied
4.	Construction of secured landfill by NALCO within its premises for control fluoride.	NALCO	Secured land fill at NALCO is constructed and the industry is disposing its hazardous waste at the secured landfill.	Complied and hazardous waste disposal at secured land fill is to be continued.

	Action plan	Stakeholder agency	Current status with action plan for implementation	Remarks
5.	Conducting a comprehensive wastewater audit for the smelter plant including runoff management by ultimate control of fluoride in water and soil.	NALCO	The auditing work is completed by IIT Roorkee. Report is submitted to SPCB Odisha. The recommendation contained in the report is under implementation.	Complied and the report is under implementation.
6.	Real time ambient air quality monitoring (SOx, NOx, CO, PM10, PM2.5) for evaluation of environmental parameters.	NALCO	The industry has installed 3 Nos of real time AAQMS (Ambient air quality monitoring system)in the plant premises for monitoring of environmental parameters.	Complied and real time AAQ monitoring to be continued.
7.	Installation of hazardous waste incinerator by NALCO for disposal of hazardous waste	NALCO	Hazardous Waste Incinerator installed for incineration of liquid and solid hazardous waste.	Complied and incineration of hazardous waste is to be continued.
8.	Co-processing of spent pot-lining in Cement kilns	Cement plants and NALCO	Steps are being initiated for co-processing of Spent Pot Lines in the Cement Kiln of ACC Baragarh and Co incineration of SPL in Captive Thermal Power Plant of NALCO.	Under implementation. This activity requires approval of CPCB under Rule-11 of HW (MHT&M) Rule 2008.

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

Sl No	Action plan	Stakeholder agency	Current status with action plan for implementation	Remarks
1.	Construction of a sewage treatment plant for Talcher town for control of organic pollution in river.	OWSSB	One 2 MLD STP for treatment of sewage of Talcher Town is under construction.	Under Construction. The construction work was delayed reportedly due to backing out of one contractor from the work.
2.	Establishment of an extensive air quality monitoring network for Angul - Talcher area for evaluation of air quality parameters in the area.	SPCB, NALCO, NTPC, Bhusan Steel	i. The SPCB is monitoring AAQ in CPIC area at 4 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 Talcher under SPCB/ CPCB Collaboration Project area is under progress.	Complied and to be continued with improvement as necessary.
3.	Construction of water impoundment structures in Nandira, Lingra, Singda and Bangurnallah for water Conserveation.	Water Resources Department and user agency	The WR Department has constructed certain water impoundment structures for water conservation and irrigation purpose.	Complied and to be continued with improvement as necessary.

Sl No	Action plan	Stakeholder agency	Current status with action plan for implementation	Remarks
4.	Remediation of contaminated site near ORICHEM Ltd for control of leaching of chromium.	ORICHEM Ltd.	M/s ORICHEM has shifted about 5000 T hazardous waste to TSDF, Sukhinda. MoEF funded scheme for remediation of contaminated site of ORICHEM is under progress. Presently DPR is under preparation.	Under implementation as per MoEF schedule.
5.	Construction of a bypass / flyover for avoiding traffic congestion on the national highway near Bhushan Steel & Power plant for control of traffic congestion and SPM.	Bhusan Steel Ltd. and NHAI	M/s Bhushan Steel has already provided funds to NHAI. The construction of fly over on the national highway near Bhushan Steel & Power plant for control of traffic congestion and Suspended Particulate Matter in ambient air is complete and Flyover has been opened for traffic.	Under progress and at completion stage.
6.	Promotion of industries within CPIC area which uses waste products like fly ash, char and waste heat for gainful utilization of solid waste		i. There are 10 operating Fly Ash Bricks Plants in Angul-Talcher area with combined capacity to produce 28.5 Million Fly Ash Brick per Annum. ii. There are 6 AFBC Boilers (1 x120 TPH+ 3 x75 TPH+ 2 x275 TPH) in Angul-Talcher area. iii. There are 10 Nos of Waste Heat Boilers installed with combined capacity to produce 550 TPH of Steam.	Complied and to be continued with improvement as necessary.

Sl No	Action plan	Stakeholder agency	Current status with action plan for implementation	Remarks
7.	The establishment of on-line monitoring station for water quality monitoring **of River Brahmani** and online data transmission facility with SPCB and CPCB. The parameters include Fluoride, Cadmiumand TOC.	NALCO TTPS (NTPC) Talcher	The location of on-line monitoring station for water quality monitoring of River Brahmani 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 NALCO 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.
9.	Monitoring of PM2.5 and Ozone on the points of traffic congestions should be done.	NALCO, Bhusan Ltd. And MCL	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 standby DG sets to prevent discharge of sewage during power failure	Respective stake holders like MCL, TTPS, NALCO etc.	TTPS has installed a DG set for STP.NALCO has also installed a DG set for STP. Non Operation of STPs due to power failure has not been observed.	Complied.

Annexure 5

Online Monitoring Facility for Stacks and Abmient Air

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

Table - A5.1 Realtime ambient air quality monitoring facility in CPA of Angul-Talcher

Sl No.	Name and Address of the Industry	Type of Industry	Location of Real Time AAQ Monitoring facility	Parameters Monitored
1	Smelter plant, NALCO PO: Nalconagar, Dist: Angul,	Aluminium Smelter	Nalco - Nagar Township CISF Barrack, Near DF plant, Near Rolling Plant,	PM_{10}, $PM_{2.5}$, SO_2, NOx, CO
2	Captive Power Plant(CPP), NALCO,ANGUL	Thermal Power Plant	Over First Aid Centre Near Steel Yard Gate Over STP Building Near Ash Pond	PM_{10}, $PM_{2.5}$, SO_2, NOx, CO
3	BRG Iron & Steel Co. (P) Ltd, At-Kurunti, Dhenkanal	Sponge Iron & Steel	Near ESP of DRI Plant Near FES of SMS Plant Near Main Gate (Pump house) of HRM Near Main Gate of CRM-	PM_{10}, $PM_{2.5}$, SO_2, NOx, CO
4	M/s. Nava Bharat Ventures Ltd., - Kharagprasad, Dist-Dhenkanal	Thermal power	Near makeup pump house Near 132 KV substation Near gate-5	PM_{10}, $PM_{2.5}$, SO_2, NOx, CO
5	Bhushan Steel Limited and Bhushan Energy Limited, At-Narendrapur, Dist: Dhenkanal	Steel and Thermal Power Plant	Near HSM-water complex	CO, SO_2, NO, NO_2, PM_{10}, $PM_{2.5}$,
			Near coke oven-2	CO, SO_2, NO, NO_2, PM_{10}, $PM_{2.5}$,
			Near wagon tippler	CO, SO_2, NO, NO_2, PM_{10}, $PM_{2.5}$,
			Near material gate	CO, SO_2, NO, NO_2, PM_{10}, $PM_{2.5}$,
			Near township area	CO, SO_2, NO, NO_2, PM_{10}, $PM_{2.5}$,
			Near BEL-cooling tower	CO, SO_2, NO, NO_2, PM_{10}, $PM_{2.5}$,

Sl No.	Name and Address of the Industry	Type of Industry	Location of Real Time AAQ Monitoring facility	Parameters Monitored
			Near CRM-ETP	CO, SO_2, NO, NO_2, PM_{10}, $PM_{2.5}$,
6	Talcher Thermal Power Station, NTPC Limited, Talcher Thermal.	Thermal Power	Near Sewage Treatment Plant(STP)	SO_2. NOx, PM_{10}, $PM_{2.5}$, CO_2, and also Meteorological parameters & O_3
			Near Track Hopper (TH)	SO_2. NOx, PM_{10}, PM2.5, CO2 and O3
			Near Water Treatment Plant (WTP)	SO_2. NOx, PM_{10}, $PM_{2.5}$, CO_2 and O_3
7	GMR Kamalanga Energy Limited, -Kamalanga,	Thermal Power	Towards Manpur village, Towards Senapati Barana, Towards Durgapur Near Laboratory gate, Near store building.	PM10, $PM_{2.5}$, O3, NOx, CO, SOx

Table - A5.2 Online Stack Monitoring facility in CPA of Angul-Talcher

Sl No	Name and Address of the Industry	Type of Industry	Online Monitoring Facility for the Stack attached to	Parameters Monitored
1	NALCO Ltd, Smelter, Nalco Nagar, Angul	Smelter	FTP-1 to FTP 8 FTC-1,2 & 3 for Bake oven	PM, HF
2	Captive Power Plant(CPP), NALCO,Angul	Thermal Power Plant	(Unit No. 1 to 10), ID-Fan Exhaust to Chimney	PM,SOx,NOx
3	BRG Iron & Steel Co. (P) Ltd, At-Kurunti,Dhenkanal	Sponge Iron & Steel Plant	Stack attach to ESP of DRI Kiln 1&2, Stack attach to F.E.S of SMS 1, Ferro Alloys	PM & SO_2 PM & SO_2
4	M/s. Nava Bharat Ventures Ltd.,	Thermal power	Stack attached to ESP's of Unit-1 (30 MW CPP) Unit-2 (64MW CPP) Unit-3 (64 MW IPP)	PM, NOx, SO_2, CO
5	Bhushan Energy Limited	Thermal Power	Stack attached to ESP of Boiler 1,2,3 & 4	PM, SOx, NOx, CO, CO2, O2
6	Bhushan Steel Limited	Steel Plant	DRI (Unit-I to 10) SMS-1, 2 & 3 BF-1 (3 Nos) BF-2 PP-AFBC Cokeoven-1 SP-1,2 & 3 (Waste gas ESP) SP-1,2 &3 -De-Dusting ESP BFPP-2 (Boiler 2 & 3)	O_2, CO, CO_2, SO_2, O_2, CO, CO_2, SO_2, NOx, PM NOx, PM O_2, CO, CO_2, SO_2, NOx, PM O_2, CO, CO_2, SO_2, NOx, PM O_2, CO, SO_2, NOx, PM Dust, PM Gas- SOx, NOx,
7	Talcher Thermal Power Station, NTPC Limited	Thermal Power	ESP Outlet of UNIT#1,2,3,4,5 & 6	PM
8	GMR Kamalanga Energy Limited	Thermal Power	Stack attached to ESP outlet of Unit-1, 2 &3	PM, SO_2, NOx& O_2

Annexure 6

Statistics of Action Points in Talcher Coalfields

- Use of Surface Miner for raising of coal in Angul-Talcher area
- Supply of Drinking water to peripheral villages by pipe water supply
- Supply of Drinking water to peripheral villages by water tanker
- The water storage reservoirs in different mines of Talcher Coalfields
- The status of water storage reservoirs in Talcher Coalfields
- Mine void filling in abandoned mine void of MCL
- Enhancement of rake loading facility in coal mines

Table - A6.1 Use of Surface Miner for raising of coal in Angul-Talcher 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	12	51.604	25.065	48.57 %
2011-12	13	53.440	28.337	53.03 %
2012-13	17	60.849	41.801	68.70 %
2013-14	18	63.709	48.123	75.54 %
2014-15	21	70.825	60.743	85.76 %

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

Year	No of Villages covered	Quantity of water supplied in KLD	Population Covered	Source of Drinking Water	Agency
2010-11	Piped Water Supply Scheme DPR Preparation and Sanction				
2011-12	Piped Water Supply Scheme under execution by Rural Water Supply and Sanitation Department (RWSS), Angul through a tripartite agreement among MCL, Angul Collector and the RWSS				
2012-13	Piped Water Supply Scheme under construction by RWSS				
2013-14	Piped Water Supply Scheme under construction by RWSS				
2014-15	19	4522	33600	Brahmani River Through IWSS	RWSS

Table - A6.3 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	125	5125	129750	Ground water from Deulbera, Handidhua,Nandira, Deep Bore Well, Surface Water from Gandhi Sagar,	Contractual water tanker hired by MCL with GPS device for online
2011-12	130	5330	134940		
2012-13	148	6068	153624		
2013-14	150	6150	155700		

Year	No of Villages covered	Quantity of water supplied in KLD	Population Covered	Source of Drinking Water	Agency
2014-15	158	6418	164067	SinghdaJhor, Bangaru etc. Potability test performed regularly	surveillance.

Table - A6.4 The water storage reservoirs in different mines of Talcher Coalfields

Name of Mine	Quantity of mine drainage water generated in M^3/month@	Quantity of surface runoff generated in M^3/Month*	Capacity of water reservoir created in M^3	Use of storage water if any and quantity used in M^3/month
Bharatpur OCP	1,71,600	15,98,000	213,90,000	1,15,500
Chhendipada OCP	600	52,000	4,08,000	180
Ananta OCP	55,116	10,45,000	53,40,000	39,750
Bhubaneswari OCP	1,81,470	10,80,000	59,50,000	47,700
Jagannath OCP	50,000	8,23,000	256,20,000	64,800
Hingula OCP	1,39,260	11,40,000	101,15,000	9,000
Balram OCP	1,38,060	19,85,000	55,90,000	25,000
Lingaraj OCP	1,25,599	10,35,000	32,10,000	78,060
Kaniha OCP	1,04,678	5,98,000	5,76,000	5,160
Talcher Colliery	4,92,666	NA	59,12,000	4,92,966
Nandira Colliery	4,53,666	NA	54,44,000	4,53,666

Note : @ Mine drainage during lean period

* Average figures for monsoon months

Table - A6.5 The status of water storage reservoirs in Talcher Coal Fields

Year	Number of water storage reservoirs	Capacity of water storage reservoirs in Million Cum	Water used for the purpose
2010-11	55	85.65	Domestic+Industrial+Surrounding
2011-12	63	86.25	Domestic+Industrial+Surrounding

Year	Number of water storage reservoirs	Capacity of water storage reservoirs in Million Cum	Water used for the purpose
2012-13	68	87.0	Domestic+Industrial+Surrounding
2013-14	70	88.25	Domestic+Industrial+Surrounding
2014-15	75	89.55	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 consist 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 - A6.6 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	14.7 Mm^3	6 Mm^3	0.9 Mm^3	TTPS,Talcher
2011-12	14.7 Mm^3	6.9 Mm^3	0.9 Mm^3	TTPS,Talcher
2012-13	28.0 Mm^3	7.8 Mm^3	0.9 Mm^3	TTPS,Talcher
2013-14	74.13 Mm^3	8.8 Mm^3	1 Mm^3	TTPS & BSL
2014-15	74.13 Mm^3	9.8 Mm^3	1 Mm^3	TTPS & BSL

Table - A6.7 Enhancement of rake loading facility in coal mines

Year	Total Coal Production in Million Tons	Rail + Belt Despatch	Total Despatch	% of Despatch by Rail + Belt
2010-11	52.04	45.24	53.91	83.91
2011-12	53.86	44.94	53.55	83.92
2012-13	61.20	53.40	63.08	84.65
2013-14	63.97	56.52	65.65	86.09
2014-15	71.07	61.50	71.54	85.97

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

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

Location : Talcher FU/s Near Rajbati(Brahmani River)
Lat : 20°59'46.52"N , Long : 85°14'55.83"E

Year	Fluoride in mg/l			Nitrate in mg/l			Hexavalent Chromium in mg/l		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
2010	0.099	0.260	0.218	0.02	2.79	1.21	<0002	<0.002	<0.002
2011	0.174	0.668	0.317	0.027	15.02	2.76	<0.002	<0.002	<0.002
2012	0.177	0.421	0.292	0.46	7.13	1.89	<0.002	<0.002	<0.002
2013	0.153	0.338	0.257	0.305	9.566	2.061	<0.002	<0.002	<0.002
2014	0.192	0.33	0.265	0.611	7.577	2.465	<0.002	0.043	0.017

Location : Talcher U/s near Saranga Bridge(Brahmani River)
Lat : 20°55'08.33"N , Long : 85°14'27.14"E

Year	Fluoride in mg/l			Nitrate in mg/l			Hexavalent Chromium in mg/l		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
2010	0.086	0.299	0.233	0.01	6.29	1.48	<0.002	<0.002	<0.002
2011	0.176	1.040	0.327	0.16	6.81	2.31	<0.002	<0.002	<0.002
2012	0.205	0.450	0.306	0.04	3.81	1.39	<0.002	<0.002	<0.002
2013	0.195	0.323	0.268	0.221	9.991	4.242	<0.002	<0.002	<0.002
2014	0.235	0.920	0.328	0.485	10.177	3.533	<0.002	0.073	0.025

Location : Talcher D/s at Mangalpur(Brahmani River)
Lat : 20°52'20.25"N , Long : 85°17'32.21"E

Year	Fluoride in mg/l			Nitrate in mg/l			Hexavalent Chromium in mg/l		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
2010	0.105	0.488	0.285	0.58	3.06	1.23	<0.002	<0.002	<0.002
2011	0.174	0.832	0.334	0.09	12.57	2.59	<0.002	<0.002	<0.002
2012	0.288	0.510	0.378	0.06	5.09	1.78	<0.002	<0.002	<0.002
2013	0.234	0.867	0.344	0.660	2.782	2.881	<0.002	<0.002	<0.002
2014	0.237	1.36	0.417	0.424	8.937	3.745	<0.002	0.058	0.017

Location : Talcher FD/s near Ramchandi temple (Brahmani River)
Lat : 20^{0}49'30.31"N , Long : 85^{0}18'58.45"E

Year	Fluoride in mg/l			Nitrate in mg/l			Hexavalent Chromium in mg/l		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
2010	0.079	0.383	0.284	0.46	11.24	2.98	<0.002	<0.002	<0.002
2011	0.242	1.780	0.496	0.16	6.95	2.46	<0.002	<0.002	<0.002
2012	0.220	0.862	0.421	0.03	42.77	4.39	<0.002	<0.002	<0.002
2013	0.249	0.423	0.329	0.304	7.015	2.224	0.003	0.005	0.004
2014	0.234	1.260	0.435	0.854	6.395	2.664	<0.002	0.035	0.007

Location : Nandira D/s at Dasnali (NandiraRiver)
Lat : 20^{0}53'16.85"N , Long : 85^{0}15'26.59"E

Year	Fluoride in mg/l			Nitrate in mg/l			Hexavalent Chromium in mg/l		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
2010	0.401	1.420	1.042	0.82	3.75	2.52	<0.002	<0.002	<0.002
2011	0.177	2.050	1.249	1.09	7.54	2.95	<0.002	<0.002	<0.002
2012	0.663	3.500	1.716	0.19	7.94	2.85	<0.002	<0.002	<0.002
2013	0.260	2.670	1.577	ND	7.396	3.078	0.003	0.010	0.006
2014	0.252	2.940	1.565	0.944	14.543	4.820	<0.002	0.025	0.011

Location : KisindaJhor at Kharagprasad (KisindaJhor)
Lat : 20^{0}49'06.73"N , Long : 85^{0}16'45.58"E

Year	Fluoride in mg/l			Nitrate in mg/l			Hexavalent Chromium in mg/l		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
2010	0.637	1.640	1.184	0.580	11.315	5.465	<0.002	<0.002	<0.002
2011	0.591	3.720	1.952	0.04	9.60	4.09	<0.002	<0.002	<0.002
2012	0.720	8.810	3.143	0.16	12.66	4.80	<0.002	<0.002	<0.002
2013	0.193	6.52	3.249	0.120	22.069	5.735	0.002	0.008	0.006
2014	0.254	3.920	2.208	0.567	13.990	3.519	<0.002	0.033	0.012
Tolerance limit for Class C inland surface water bodies (IS : 2296: 1982)		**1.5 mg/l**			**45 mg/l**			-	

Class C :Drinking water source with conventional treatment followed by disinfection
ND forNitrate= <0.009 mg/l

Table - A7.2 BOD and TC in Brahmani river in CPA during 2010-2014

Annual Average values (range of values) in mg/l

Location : Talcher FU/s						
Year	**BOD (mg/l)**			**TC (MPN/100 ml)**		
	Min	**Max**	**Mean**	**Min**	**Max**	**Mean**
2010	0.4	1.6	1.1	460	5400	1503
2011	1.1	2.0	1.5	700	2100	1257
2012	0.9	2.0	1.4	460	5400	1240
2013	0.4	2.5	1.2	210	4900	1503
2014	0.2	1.2	0.7	460	160000	30760
Location : Talcher U/s						
Year	**BOD (mg/l)**			**TC (MPN/100 ml)**		
	Min	**Max**	**Mean**	**Min**	**Max**	**Mean**
2010	1.2	2.4	1.6	1300	16000	3917
2011	1.0	2.5	1.7	1500	4300	2267
2012	0.9	2.8	1.7	790	9200	2924
2013	0.7	2.6	1.4	1300	7900	3400
2014	0.6	1.5	0.9	490	160000	31472
Location : Talcher D/s						
Year	**BOD (mg/l)**			**TC (MPN/100 ml)**		
	Min	**Max**	**Mean**	**Min**	**Max**	**Mean**
2010	1.6	2.6	2.1	490	16000	5958
2011	1.0	2.4	2.0	2100	43000	11075
2012	1.3	2.6	2.1	7000	54000	20183
2013	1.4	3.0	2.3	2700	24000	9080
2014	0.6	2.7	1.5	1300	22000	9391
Location : Talcher FD/s						
Year	**BOD (mg/l)**			**TC (MPN/100 ml)**		
	Min	**Max**	**Mean**	**Min**	**Max**	**Mean**
2010	0.6	2.0	1.4	330	9200	2894
2011	1.0	2.8	1.8	940	21000	5378
2012	1.2	2.3	1.8	1700	22000	7700
2013	0.8	2.8	1.6	1300	7900	4420
2014	0.5	0.5 – 1.8	1.60	230	17000	5710

Location : Nandira D/s						
Year	BOD (mg/l)			TC (MPN/100 ml)		
	Min	Max	Mean	Min	Max	Mean
2010	2.4	6.6	3.8	320	9200	2126
2011	1.7	4.8	2.8	580	7900	3596
2012	1.6	4.1	2.9	2200	54000	25408
2013	2.1	3.8	3.0	1700	54000	15789
2014	1.1	3.3	2.0	790	54000	18645
Location : Kisindajhor						
Year	BOD (mg/l)			TC (MPN/100 ml)		
	Min	Max	Mean	Min	Max	Mean
2010	1.4	4.0	2.4	110	2400	980
2011	0.8	4.0	2.1	140	35000	6141
2012	1.1	6.8	2.7	1100	24000	6608
2013	1.0	4.7	2.1	490	35000	10349
2014	0.8	2.7	1.7	1100	35000	15682

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)

Table - A7.3 Analysis results of water samples collected fromsurrounding area of M/S. NALCO SMELTER, Angul.

Sl. No.	Location & Date	05.11.12		24.05.14		28.08.14		26.09.14		27.03.15	
		pH	F^-	pH	F^-	pH	F^-	pH	F^-	pH	F^-
1	Turang Village, Hand pump	7.1	0.5	6.8	0.5	7.0	1.0	6.6	0.483	-	-
2	Balaramprasad Village, Hand pump	7.53	1.0	7.4	2.0	7.3	1.0	7.4	1.35	-	-
3	Banarpal Village, Open Pond	8.11	1.0	7.2	1.0	6.8	0.7	7.3	0.722	-	-
4	Gotamara Village, Open well	7.32	1.0	7.5	1.0	7.3	0.9	7.1	0.928	-	-
5	Bonda Village, Hand pump	7.05	0.7	7.2	1.0	7.0	2.0	7.3	1.27	7.7	1.41
6	Bonda Village, Open well	8.26	1.0	7.2	0.8	7.6	0.7	7.0	0.667	-	-
7	Bonda Village, Open pond	7.78	2.0	8.8	2.0	8.5	1.0	8.6	1.06	-	-
8	Chauridia Village, Open well	7.60	0.7	-	-	7.7	0.9	-	-	-	-
9	Chauridia village, hand pump	-	-	7.0	0.8	7.0	0.8	7.0	0.825	7.9	0.882
10	Chauridia village, open pond	-	-	-	-	-	-	6.5	0.527	-	-
11	Tulusipal Village, Open well	7.56	1.0	7.7	1.0	7.7	0.9	7.3	0.644	-	-
12	Tulasipal village, hand pump	-	-	7.5	0.9	7.4	0.9	-	-	-	-
13	Languliabeda Village, Open well	7.58	1.0	7.3	0.9	7.9	1.0	7.9	0.889	-	-
14	Languliabeda Village, Open Pond	7.49	1.0	7.5	1.0	6.9	1.0	7.2	0.742	-	-
15	Languliabeda Village, hand pump	-	-	-	-	-	-	7.0	0.855	7.8	0.875
16	Gadarkhai Village, Hand pump	7.23	0.6	-	-	7.3	0.9	7.0	1.06	7.5	0.636
17	Gadarkhai Village, Open well	7.34	0.9	-	-	-	-	-	-	-	-
18	Gadarkhai village, hand pump	-	-	7.2	0.9	7.3	0.9	-	-	-	-
19	Kulad Village, Hand pump	7.47	1.0	7.2	2.0	7.3	1.0	7.1	1.24	8.1	2.22
20	Kulad Village, Open Pond	8.11	7.0	7.7	3.0	7.5	5.0	8.3	4.54	-	-
21	Tube well water from Gopinathpur village	-	-	-	-	-	-	-	-	8.0	1.29
22	Tube well water near Nuasahi U.P School of Ankula	-	-	-	-	-	-	-	-	6.8	0.582
23	Open well water from Gopinathpur village	-	-	-	-	-	-	-	-	7.6	0.718
24	Tube well water from Ankula village	-	-	-	-	-	-	-	-	7.7	0.526
25	Tube well water from Benthapur village	-	-	-	-	-	-	-	-	7.2	0.358

Sl. No.	Location & Date	05.11.12		24.05.14		28.08.14		26.09.14		27.03.15	
		pH	F^-	pH	F^-	pH	F^-	pH	F^-	pH	F^-
26	Tube well water near Kangula U.P School	-	-	-	-	-	-	-	-	7.4	0.462
27	Tube well water from Banda U.P School	-	-	-	-	-	-	-	-	7.7	0.760
28	Tube well water from Godisahi Primery School, Tulasipal	-	-	-	-	-	-	-	-	8.1	1.03

- **NB: Test Characterstics 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**

Table - A7.4 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 8

Locations of Monitoring of Environmental Quality in by CPCB

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

Table - A8.1 Ambient Air Quality Monitoring Locations

Sample Code	Monitoring Location	Latitude	Longitude
ANG/ AAQ – 1	Angul Industrial Area	N 20^0 49.981'	E 85^0 06.250'
ANG/AAQ – 2	Nalco Nagar	N $20^0$50.718'	E 85^0 09.184'
ANG/AAQ – 3	Mahanadi Coalfield Area	N $20^0$47.992'	E 85^0 18.245'
ANG/ AAQ – 4	NTPC Kaniha Township	N $21^0$06.170'	E 85^0 05.202'
ANG/ AAQ – 5	Talcher Thermal Township	N $20^0$49.631'	E 85^0 15.488'
ANG/ AAQ – 6	Meramundali Area	N $20^0$47.992'	E 85^0 18.295'
ANG/ AAQ – 7	Talcher Township	N $20^0$56.875'	E 85^0 13.542'
ANG/ AAQ – 8	Talcher Industrial Estate	N $20^0$54.162'	E 85^0 12.173'

Table - A8.2 Surface Water Sampling Locations

Sample Code	Monitoring Location	Latitude	Longitude
ANG/ SW – 1	Lingra Nallah Upstream	N $20^0$50.383'	E 85^0 04.631'
ANG/ SW – 2	Lingra Nallah Downstream	N $20^0$49.206'	E 85^0 05.343'
ANG/ SW – 3	Brahmani River Upstream	N $20^0$59.338'	E 85^0 15.313'
ANG/ SW – 4	Brahmani River Downstream	N 20^0 54.968'	E 85^0 14.306'
ANG/ SW – 5	Nandira River	N 20^0 55.873'	E 85^0 09.210'
ANG/ SW – 6	NTPC Kaniha Tikra River	N 21^0 05.887'	E 85^0 03.09.4'
ANG/SW – 7	Shingazore (Khaina)	N 21^0 59.318'	E 85^0 10.026'
ANG/ SW – 8	*Ankura*	N 21^0 25.090'	E 85^0 04.105'

Table - A8.3 Ground Water Sampling Locations

Sample Code	Monitoring Location	Latitude	Longitude
ANG/ GW – 1	Angul Township	N 20^0 50.355'	E 85^0 05.943'
ANG/ GW – 2	Nalco Township	N 20^0 50.076'	E 85^0 09.182'
ANG/ GW – 3	Mahanadi Coalfield	N 20^0 50.453'	E 85^0 08.413'
ANG/GW – 4	NTPC Kaniha	N 20^0 06.168'	E 85^0 05.231'
ANG/GW – 5	Talcher Town	N 20^0 54.246'	E 85^0 12.676'
ANG/GW – 6	Meramunduli Area	N 21^0 48.466'	E 85^0 17.373'
ANG/GW – 7	Talcher Thermal	N 21^0 56.875'	E 85^0 13.528'
ANG/ GW – 8	Banarpal (Talcher-Angul Cross Point)	N 21^0 00.382'	E 85^0 10.933'