

**ACTION PLAN FOR ABATEMENT OF POLLUTION IN  
CRITICALLY POLLUTED INDUSTRIAL CLUSTERS  
(ANGUL-TALCHER AREA, ORISSA)**



**ORISSA POLLUTION CONTROL BOARD  
BHUBANESWAR  
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**POLLUTION ABATEMENT ACTION PLAN FOR CRITICALLY POLLUTED  
INDUSTRIAL CLUSTERS  
(ANGUL-TALCHER AREA)**

**1.0 Background**

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

The action plan for abatement of pollution in the critically polluted clusters was prepared on the basis of previous studies conducted by the SPCB and data collected during various monitoring program.

**2.0 Objective**

Since the CEPI score of Talcher-Angul area is 82.09, which is beyond 70 a detailed action plan for pollution prevention and control as well as remediation of various environmental components is formulated as per the terms of reference (TOR) suggested by Central Pollution Control Board, New

Delhi communicated to Orissa State Pollution Control Board vide CPCB letter dated 15.06.2010. The objective of the exercise is to:

1. Determine the boundary of the industrial cluster
2. Determine the critical environmental issues within the cluster
3. Determine the critical environmental parameters which needs to be addressed through an appropriate action plan
4. Draw up an action plan for abatement of environmental pollution in the cluster
5. Engage with various stakeholders for refinement of the action plan and effective implementation.

Though efforts were made to prepare this action plan to fulfill the above objective, consultation with the stakeholders could not be made possible since only two weeks time was made available to the SPCB for preparation of this action plan.

### 3.0 Talcher-Angul area

Talcher-Angul area in the state of Orissa is oldest industrial cluster of the country. This area is located in the central part of Orissa about 120km from the state capital and 160km from the Bay of Bengal.

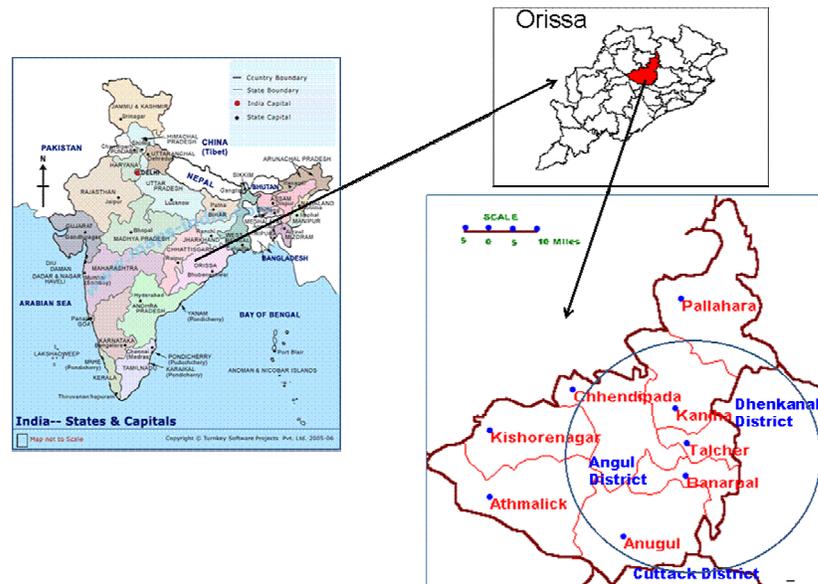
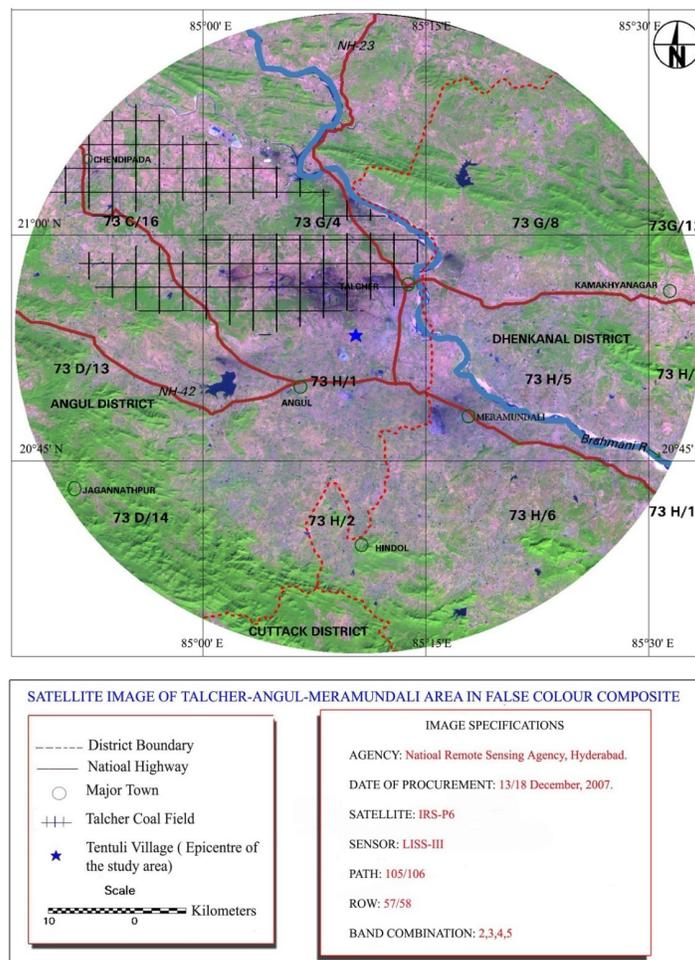


Figure-1 Location of Talcher-Angul industrial area

It is 139m above the mean sea level and is bounded between 20°37'N to 21°10'N and 84°28'E to 85°28'E. Industrialization started in this area quiet early with operation of coal mines.

The first coal mine started operating in 1922 and the area had its first operational railway line in 1923. 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 then 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, aluminum smelting, iron and steel, sponge iron and ferro-alloys are the dominant sectors in this region.



**Figure-2 Satellite map of the study area**

This area had been a focal point of industrial development of the state and at the same time complex environmental problems like bad air quality, contamination of ground water with fluoride, contaminated soil and surface water with chromium bearing waste, pollution of river Nandira (A tributary to main river Brahmani), conflict over land for solid waste disposal are few of the issues which this area has witnessed during last four decades. This area is identified by CPCB as one of the twenty-four industrial hotspots in the country from environmental point of view.

Since Talcher-Angul area was amongst the 24 problem areas of the country and therefore OPCB had prepared a Regional Environmental Management Plan (REMP) in 1994. The action plan recommended in the study is largely implemented. Keeping in further industrial development in the area in recent time another similar study was taken up by OPCB and it was conducted by Indian School of Mines University (ISMU), Dhanbad in 2009. For demarcation of boundary, evaluating the environmental quality, pollution load and drawing up the action plan, inputs from this study was extensively used. Inputs from OPCB's own monitoring and survey were also used in this exercise.

#### **4.0 Demarcation of geographical boundary**

Determination of the boundary of the critically polluted cluster started with identifying and locating the industries on a map. For this purpose survey of India topo sheets was collated and the total Talcher-Angul area was digitised. The positions of existing polluting industries were marked on the collated topo sheet. The industries and mines that have an impact CEPI scores was considered for this purpose.

The capacities of the industrial sectors in this cluster have grown many times during past few years. Current Sector-wise scenario of the industries is presented in Table-1.

**Table-1 : Industrial scenario in Talcher-Angul area**

<b>Sl. No</b>	<b>Industrial sector</b>	<b>Numbers</b>	<b>Capacity</b>
1.	Coal mines	15	81 MTPA
2.	Thermal power plants	4	1713 MW
3.	Iron and Steel including sponge iron plants	3	2 MTPA

Sl. No	Industrial sector	Numbers	Capacity
4.	Aluminum smelter	1	0.345 MTPA
5.	Ferro alloys	3	0.2 MTPA
6.	Coal Washeries	4	9.456 MTPA
7.	Other Red industry	13	--
	Total	43	

The boundary was drawn by including all the major polluting industries and mines which are under operation and closely located. While determining the boundary care was taken to include areas having common environmental problems as per the public opinion expressed in the local news papers and also expressed during various public hearings that took place in the past for different projects in the area. The summary of industries in terms of RED category industries is shown in Table-2.

**Table-2 Summary of RED industries in Talcher-Angul area**

Sl. No.	Type of industries	Nos
1	RED-A (17 categories of highly polluting type)	08
2	RED-B (54 categories of polluting type)	20
3	RED-B (Mines)	15

## 5.0 Environmental issues in the cluster

Nature and magnitude of environmental issues relevant to an area forms the basis on which action plans are drawn. To identify the critical environmental issues in this area, all major local news papers and proceedings of public hearing conducted during last two years were scanned and the environmental issues raised were aggregated and summarized as in the following section. Because of paucity of time direct interaction with stakeholders could not be made possible. The identified issues were then corroborated with the various monitoring studies conducted by OPCB, Regional Environmental Management Plan prepared by ISMU, Dhanbad and the Site remediation study conducted by NPC, New Delhi.

1. River Brahmani flows along Talcher from north west to south-east. All the industries in this area are located along the river with a stretch of about 25km. There are few small streams like Nandira, Singada, Lingara, Banguru which flows through this area and feed river

Brahmani during monsoon. These feeder streams flows through the industrial cluster and carry industrial and urban wastewater. The water quality of these streams and Brahmani river in the down stream of Talcher needs to be restored.

2. A sodium dichromate plant was in operation which subsequently closed since 1998. An estimated 79,000 MT of solid residue which is a hazardous waste is lying near the closed site and releasing hexavalent chromium to the water bodies during monsoon.
3. During monsoon the run-offs from various stock piles like coal, minerals, solid waste etc flows down the area and gets discharged to river Brahmani through its feeder streams.
4. The level of fluoride in the ground water around NALCO has been found to be higher than the norm. During post monsoon period there had also been few instances of burning of paddy crops presumably due to the effect of fluoride bearing gasses.
5. The ambient temperature of this area rises close to 50°C and the general perception that the temperature of this area is going high on three accounts. One, the industrial process like thermal power generation, aluminium smelting, steel and ferro alloys making are all being high temperature operation releases a lot of heat to the environment. Two, after the coal mines are exposed the black surface of coal mines causes increase in temperature. Thirdly, the exposed coal seam and stack yards catch fire during summer month due to self oxidation. Continuous burning of coal is also thought to be one of the causes of rising temperature.
6. The activities in this area causes about 75 million tons of materials are transported between the nodes in a year. The transportation by road is a cause of nuisance, air pollution and traffic congestion.
7. The sewage from Talcher town is discharged to river Brahmani without any treatment causing the water quality of river Brahmani in the down stream of Talcher.

8. Increasing amount of land is being converted to ash ponds and solid waste disposal facilities. This process converts agricultural land to unproductive barren land.
9. Groundwater level around the mining area is depleting due to extraction of ground water by the mining activity. This causes acute shortage of water in the surrounding villages.

## 6.0 State of environment

The State Pollution Control Board, Orissa monitors emissions and discharge of the concerned industries and mines and also monitors environmental parameters of the area. The Board takes peoples feedbacks during public hearings and during redressal of public grievances. After the area was tagged as critically polluted an intensive survey was conducted by OPCB on critical parameters and they were compared with either the existing norms stipulated by the Ministry of Environment and Forest or the limits suggested in the report on “Criteria for Comprehensive Environmental Pollution Index” released by CPCB or any other international standard.. The critical parameters were chosen by linking the environmental issues and relevance of the parameter. The abstract of data collected from OPCB’s own monitoring and data collected by ISMU, Dhanbad during preparation of REMP for Talcher-Angul area is summarized in Table-5.

**Table-5 : Critical Environmental parameter**

AIR QUALITY					
Parameter	Avg.Result	Standard	Total Sample	Nos. of sample exceeded the norm	Percent sample exceeded (%)
Fluoride	2.647	2.86*	208	73	35
SO <sub>2</sub>	26.46	80	688	0	0
SPM	178.89	200	688	104	15
RPM	85	100	688	138	20

\* The standard for fluoride in ambient air was adopted from Kentucky state, USA.

SURFACE WATER QUALITY					
Parameter	Avg.Result	Standard	Total Sample	Nos. of sample exceeded the norm	Percent sample exceeded
Fluoride	0.716	1.5	5	1	20
BOD	1.62	8.00	5	0	0
Cd	0.0004	0.005	5	0	0
Pb	0.01	0.01	5	0	0

GROUND WATER QUALITY					
Parameter	Avg. Result	Standard	Total Sample	Nos. of sample exceeded the norm	Percent sample exceeded
Fluoride	1.38	1.5	14	9	64.3
pH	7.26	6.5 – 8.5	14	2	14.3
Cd	0.0004	0.0005	14	0	0
Pb	0.01	0.1	14	0	0

For fluoride in ambient air the standard for Kentucky was taken as the reference norm as suggested by ISMU, Dhanbad in their report. Similarly for water quality parameters the results were compared with the water quality parameters as per CPCB, 2002, "Water quality criteria and goals" Monitoring of Indian national aquatic Resources series: MINARS/17/2001-2002. The data for surface water quality and ground water quality were taken for the critical season. For surface water summer season was considered as critical and for ground water quality post monsoon was considered as critical.

## 7.0 Action Plan for abatement of pollution

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 news papers and through the public hearings conducted by OPCB for the proposed projects in this area an action plan for Talcher- Angul area is prepared. In this action plan, sector specific abatement strategies were drawn up. Improvement in environmental management practice, technological up-gradation in process and pollution

control, development of adequate infrastructure remained the thematic area. All the action plans were aligned to the environmental issues of the area and aims at addressing them Sector-wise action plan is prepared after a few rounds of brain storming sessions between the officers, including the concerned Regional Officer of OPCB. The plan and possible target date to achieve it, is presented in the Tables 6 to Table 10.

**Table-6 : THERMAL POWER PLANT**

<b>Sl. No.</b>	<b>Action plan</b>	<b>Target Date</b>	<b>Issues being addressed</b>
1.	All TPPs to install ESP/BF to meet the emission standard of 50 mg/m <sup>3</sup> with one spare field <ul style="list-style-type: none"> <li>• Existing Plants</li> <li>• Future plants</li> </ul>	<ul style="list-style-type: none"> <li>• 31.03.2014</li> <li>• Concurrently with commissioning</li> </ul>	<ul style="list-style-type: none"> <li>• SPM</li> <li>• RPM in ambient air</li> </ul>
2.	All lean slurry disposal system to be converted to (High Concentration Slurry Disposal) HDSD	31.03.2014	<ul style="list-style-type: none"> <li>• Water (Cd &amp; Hg)</li> <li>• Land requirement</li> </ul>
3.	Online monitoring with real time display facility to be installed	30.06.2011	Particulate matter
4.	Create silo for a capacity of at least 7 days ash generation for its dry storage and subsequent utilization for cement and after fly ash based products	31.03.2012	Ash utilization
5.	Real time ambient air quality monitoring (SO <sub>x</sub> , NO <sub>x</sub> , CO, PM <sub>10</sub> , P.M <sub>5</sub> )	31.03.2011	SPM, RPM, SO <sub>2</sub> , NO <sub>x</sub> ,
6.	All the thermal power plants shall adopt zero discharge	31.03.2012	Water scarcity

**Table-7 : COAL MINES**

<b>Sl.No.</b>	<b>Action plan</b>	<b>Target Date</b>	<b>Issues being addressed</b>
1.	A dedicated coal transport corridor to be constructed in Talcher coalfields.	31.03.1015	SPM in ambient air, Congestion
2.	Creation of reservoir for storage of mine drainage water and run off which can be used for industrial purpose	31.03.2013	Water conservation
3.	Use of surface miner for coal mining purpose. At least 60% coal in this area to be produced by surface miner technology.	31.03.1013	Particulate matter
4.	Adoption of concurrent mine filling with dry ash from the thermal power plants	30.06.2012	Ash disposal
5.	Making provision for supply of drinking water in the peripheral villages of coal mining area	31.03.2013	Water scarcity
6.	Enhancement of rake loading facility in the coal mines.	31.03.2015	SPM, Congestion
7.	MCL to take up a comprehensive coal mine fire control plan	30.06.2011	SO <sub>2</sub> , Heat
8.	Back filling of the mine voids and restoration of the mined out area. An action plan to be prepared.	30.06.2011	Land degradation

**Table-8 : IRON & STEEL AND FERRO ALLOYS**

<b>Sl.No.</b>	<b>Action plan</b>	<b>Target Date</b>	<b>Issues being addressed</b>
1.	All DRI plants to install ESPs, in the kiln, bag filter in dust generating points and pneumatic dust handling system	31.03.2011	Air pollution (SPM)
2.	All steel plants and sponge iron plants	30.06.2011	Water

Sl.No.	Action plan	Target Date	Issues being addressed
	to develop collection and treatment facility for mineral char and coal pile run off during monsoon.		pollution
3.	Installation of online stack monitoring system with real time display system	30.06.2011	Particulate matter
4.	Real time ambient air quality monitoring (SO <sub>x</sub> , NO <sub>x</sub> , CO, PM <sub>10</sub> , P.M <sub>5</sub> )	31.03.2011	SPM, SO <sub>2</sub> , NO <sub>x</sub> , RPM
5.	Use of SMS slag and ferro alloys slag for haul road construction in the mine area	30.06.2012	Metallurgical solid waste utilization

**Table-9 : ALUMINIUM**

Sl.No.	Action plan	Target Date	Issues being addressed
1.	1-2 pot line of NALCO to be upgraded to meet the emission norm of 0.3 kg of fluoride per ton of Aluminum by revamping the fume treatment plant.	31.03.2013	Fluoride in air
2.	Online stack emission monitoring system with display system shall be installed	31.06.2011	Fluoride in air
3.	Installation of fluoride removal (Fume treatment) system from bake oven plant	31.03.2013	Fluoride in air
4.	Construction of secured landfill by NALCO within its premises	31.03.2011	Fluoride in water and soil
5.	Conducting a comprehensive wastewater audit for the smelter plant including runoff management	31.03.2012	Fluoride in water and soil
6.	Real time ambient air quality	31.03.2011	SO <sub>2</sub> , NO <sub>x</sub> ,

Sl.No.	Action plan	Target Date	Issues being addressed
	monitoring (SO <sub>x</sub> , NO <sub>x</sub> , CO, PM <sub>10</sub> , P.M <sub>5</sub> )		CO, RPM
7.	Installation of hazardous waste incinerator by NALCO.	31.03.2011	Hazardous waste

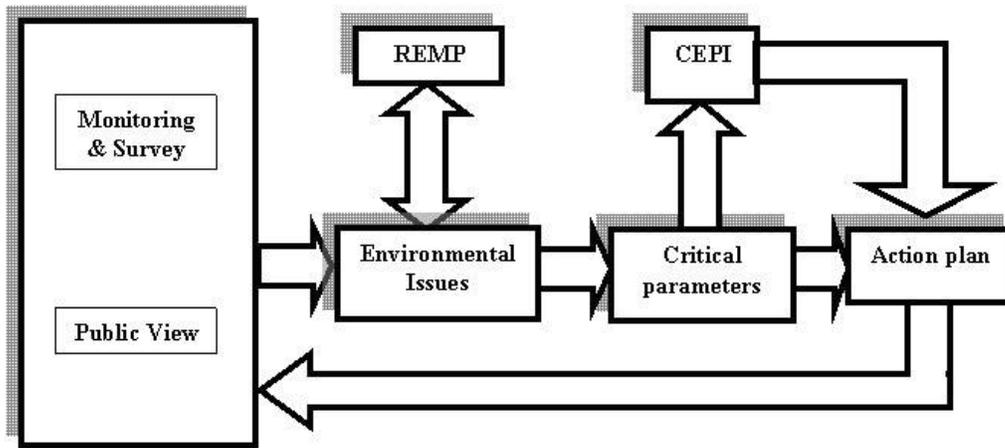
**Table-10 : Common infrastructure and services**

Sl.No.	Action plan	Target Date	Parameter being addressed
1.	Construction of a sewage treatment plant for Talcher town	31.03.2013	Organic pollution of river
2.	Establishment of an extensive air quality monitoring network for Talcher-Angul area	31.03.2013	Air quality parameter
3.	Construction of water impoundment structures in Nandira, Lingra, Singda and Bangur nallah	31.03.2015	Water conservation
4.	Remediation of contaminated site near ORICHEM Ltd.	31.03 2012	Chromium pollution
5.	Construction of a bypass / flyover for avoiding congestion on the national highway near Bhushan Steel & Power plant.	31.03.2013	SPM, Congestion

## 8.0 The way forward

The action plan was prepared to address the environmental issues identified by the people and verified scientifically. The target dates are chosen considering the nature of the activity and its relative importance from environmental point of view .Implementation and monitoring being key aspects of success of an action plan a framework for monitoring and evaluation of

performance of the industrial cluster with CEPI as the key indicator is proposed to be in place once the action plans are frozen after adequate refinement.



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

The proposed action plan has been drawn in an inclusive manner, however since it was formulated in a short span of time, it is essential that this plan be reviewed at different level before finalization and implementation.

At the same time the boundary demarcated on the map shall be subjected to ground tooting and the exact boundary indicating the villages which forms the cluster shall be determined accordingly.