REPORT ON ENVIRONMENTAL IMPACTS & MANAGEMENT PLAN

REQUEST FOR EC AMENDMENT

at

Existing Smelter and Captive Power Plant, Unit - Aditya Aluminium

Lapanga Village, Rengali Tehsil, Sambalpur District, Odisha

Project Proponent:



M/s Hindalco Industries Ltd (Unit - Aditya Aluminium)

PO Lapanga, Beside SH-10, Sambalpur-768212

Environmental Consultants:



Bhagavathi Ana Labs Pvt. Limited (A Bureau Veritas Group Company)

7-2-C14, Industrial Estate, Sanath Nagar, Hyderabad- 500018
NABET Certificate No: NABET/EIA/1619/RA/0049, dated 29.05.2017

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September 2017



Report on Environmental Impacts & Environmental Management Plan at Existing Smelter and Captive Power Plant REQUEST FOR EC AMENDMENT Unit - Aditya Aluminium Lapanga Village, Rengali Tehsil, Sambalpur District, Odisha M/s Hindalco Industries Ltd

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Date: 23 August, 2017

E Shyam Sundar

Head-Environment

Bhagavathi Ana Labs Pvt. Ltd.

Report on Impacts & Environment Management Plan

II REVIEW AND REVISION HISTORY

History of revisions of the present report:

Rev	Date	Modifications
00, Draft	30/12/2016	First issue for Customer review
00A, Draft	15/03/2017	Revised issue, incorporating inputs from Customer for review
00B, Draft	25/05/2017	Revised issue, incorporating comments from Customer for review
00C, Draft	27/06/2017	Revised issue, incorporating comments from Customer for review
00D, Draft	20/07/2017	Revised draft issued for review, incorporating suggestions from Concall with HIL on 30/06/2017 and 11/07/2017 and subsequent inputs
01, Final	23/08/2017	Final issue for submission to MoEF&CC

Table I: History of the Revisions

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			Gove .	State	State
01, Final	23/08/2017	Final Report	PB	ESS	ESS
00D, Draft	20/07/2017	Draft Report	PB	ESS	ESS
00C, Draft	27/06/2017	Draft Report	PB	ESS	ESS
00B, Draft	25/05/2017	Draft Report	PB	ESS	ESS
00A, Draft	15/03/2017	Draft Report	PB	ESS	ESS
00, Draft	30/12/2016	Draft Report	PB	ESS	ESS
REV	DATE	DESCRIPTION	REVIEW-1	REVIEW-2	APPROVAL



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IV ABBREVIATIONS

1	AAQ	Ambient Air Quality
2	AA	Aditya Aluminium
3	BALPL	Bhagavathi Ana Labs Private Limited
4	BV	Bureau Veritas
5	EMP	Construction Environmental Management Plan
6	CPCB	Central Pollution Control Board
7	CPP	Captive Power Plant
8	DG	Diesel Generator
9	DSIR	Department for Scientific & Industrial Research
10	EC	Environmental Clearance
11	EIA	Environment Impact Assessment
12	EMP	Environmental Management Plan
13	ES	Environmental Statement
14	ESP	Electro Static Precipitator
15	FY	Financial Year
16	GCV	Gross Calorific Value
17	Gol	Government of India
18	HFO	Heavy Fuel Oil
19	HIL	Hindalco Industries Ltd
20	ISO	International Standard Organisation
21	KLD	Kilo Litres per Day
22	KTPA	Kilo Tonnes Per Annum
23	MCL	Mahanadi Coalfields Ltd
24	MoC	Ministry of Coal
25	MoEF&CC	Ministry of Environment, Forests and Climate Change
26	MSIHCR	Manufacture, Storage and Import of Hazardous Chemicals Rules
27	MTPA	Million Tonnes Per Annum
28	MW	Mega Watt
29	NABET	National Accreditation Board of Education and Training
30	PO	Post Office
31	PPE	Personal Protection Equipment
32	R&D	Research & Development
33	TPA	Tonnes Per Annum
34	UoM	Unit of Measurement

V UNITS AND MEASURES

Ha : 1 hectare=10,000 square meters

km : 1 kilometre = 1,000 meters kV : 1 kilovolt =1,000 volts

MW : 1 megawatt = 1,000 Kilowatt

MWh : 1 megawatt hour = 1,000 Kilowatt hour



Bhagavathi Ana Labs Pvt Ltd (a Bureau Veritas Group Company)
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Rev. 01, Final



Report on Impacts & Environment Management Plan

1.0 INTRODUCTION

1.1 Preamble

Aditya Aluminium, a Unit of M/s Hindalco Industries Ltd (HIL) is operating an integrated Smelter with a Captive Power Plant (CPP) at Lapanga in Sambalpur district of Odisha.

The Smelter and CPP are operating at capacities of 0.36 MTPA and 900 MW (6x150 MW) respectively in existing Phase-I and will be ultimately upgraded to 0.72 MTPA and 1650 MW (11x150 MW) in proposed Phase-II. Environmental Clearance (EC) has been obtained for both the Phases.

Meanwhile, Aditya Aluminium has identified few process optimization options which lead to slight enhancement in production capacity. Further, change in coal sourcing has been proposed based on the coal availability. Though, minimal environmental impacts have been identified due to the proposals, implementation of the same requires an environmental nod and thus **amendment in EC** has been proposed.

The present Report provides the study on Environmental Impacts and Environmental Management Plan w.r.t. request for amendment in EC for the following proposals:

- 1. Change in Coal Source to CPP
- 2. Pot Production enhancement Upgradation of amperage
- 3. Sale of Molten Metal, Baked Anodes, Bath material

1.2 About Project Proponent

M/s Hindalco Industries Ltd (HIL) is one of the largest integrated primary producer of aluminum in Asia. With a pan-Indian presence that encompasses the entire gamut of operations, from bauxite mining, alumina refining, Aluminium smelting to downstream rolling, extrusions and recycling, Hindalco enjoys a leadership position in Aluminium and downstream value-added products in India.

Hindalco's integrated complex at Renukoot, in Uttar Pradesh, India, houses an alumina refinery, an Aluminium smelter and facilities for the production of semi-fabricated products. Power is sourced from Renusagar power plant, located about 45km from Renukoot. Hindalco's facilities also include an Aluminium smelter and an Aluminium FRP facility (for rolled products, extrusions products and wire rods) at Hirakud (Odisha) with a captive power plant, and alumina refinery at Muri (Jharkhand). Chemical grade alumina plant is located at Belgaum (Karnataka), and rolling mills at Belur (West Bengal), Taloja near Mumbai and Mouda near Nagpur (Maharashtra). Foil rolling facilities are situated at Mouda near Nagpur (Maharashtra), Kollur (Andhra Pradesh) and Silvassa (Union Territory of Dadra and Nagar Haveli), and extrusion plant at Alupuram (Kerala).

Hindalco's new age smelters at Aditya Aluminium, Lapanga (Odisha), operating on state-of-the-art AP36S technology, have not only resulted in installation of capacities, but also improved cost-efficiency of operations. Aditya Aluminium is a smelter-power plant complex at Lapanga in Sambalpur district of Odisha with 360,000 tonnes smelter supported by a 6 x 150 MW coal based captive power. Alumina is sourced from the Refinery at Utkal Alumina, Odisha, 100% subsidiary of Hindalco Industries Ltd. Utkal



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Alumina (Odisha) is a world class refinery with one of the lowest cost structure in the world.

Most of the units are ISO 9001, ISO 14001 and OHSAS 18001 certified. Furthermore, many of the units have adopted Integrated Management System (IMS) certification, reflecting a combined business excellence model. Apart from being a dominant player in the domestic market, Hindalco's products are well-accepted in the international markets.

1.3 Status of the Statutory Clearances

1.3.1 Present Status

The Smelter and CPP are operating at capacities of 0.36 MTPA and 900 MW respectively in existing Phase-I and will be upgraded to 0.72 MTPA and 1650 MW in proposed Phase-II. Alumina, the raw material for production of aluminum is primarily sourced from the Utkal Alumina refinery at Doragurah near Tikri, Rayagada, Odisha, a 100% subsidiary of Hindalco and other suitable sources.

The proposed expanded capacity will boost the industrialization efforts of the State as well as add revenue to the National exchequer.

Details of the plant capacity under operation are provided in **Table 1**.

Table 1: Operating Capacity of Aditya Aluminium Unit

S. No	Product	Operating Plant Capacity (Phase-1, EC obtained)	Proposed Expansion (Phase-2, EC obtained)
	Aluminium Smelter	Phase-1: 0.36 MTPA	Phase-2: 0.72 MTPA
		(presently under operation)	(to be implemented)
	Products:		
1	1 a) Pig ingots		
	b) Sow	360 kty	360 ktv
c) Al Slab		0 kty	360 kty
	Production	O KLY	
2	CPP-Electricity	Phase-1: 900 MW (6x150	Phase-2: 1650 MW (11 x
		MW from Unit-1,2,3,4,5,6)	150 MW)

^{*}Quantity of Ingots, Sow and Slab will vary depending on the market demand.

1.3.2 Status of the Statutory Clearances

- EC for 0.26 MTPA Aluminium smelter was accorded vide MoEF vide letter no J-11011/142/2004-IA.II (I) dated 27 January, 2006.
- Further, EC for 650 MW Captive Power Plant was accorded vide MoEF letter no. J-13011/7/2005-IA.II (T) dated 22 November, 2005.
- Later, EC for expansion of the production capacity of its aluminium smelter from 0.26 MTPA (Primary Aluminium Metal) to 0.72 MTPA and CPP from 650 MW to



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1650 MW was accorded by MoEF&CC vide letter no J-11011/136/2009-IA.II (I) dated 29 November, 2012.

Aditya Aluminium is committed to the environmental aspects of business. Inline
with its commitment, Aditya Aluminium has also been accorded in-principle
approval for establishment of 30 MW solar power plant inside its premises.

The permissions and consents for the plant as on date in chronological order are summarized in **Table 2**.

Table 2: Summary of the Statutory Clearances of the Aditya Aluminium Unit

S. No	Permission/ Consent	Reference Letter No & Date
1	Environmental Clearance (EC) for 0.26 MT PA Aluminium smelter from Ministry of Environment and Forests (MoEF)	J-11011/142/ 2004-IA.II (I) dated 27 January, 2006
2	EC for 650 MW Captive Power Plant from MoEF	J-13011/7/2005-IA.II (T) dated 22 November, 2005
3	EC for expansion of aluminium smelter from 0.26 MTPA to 0.72 MTPA and captive coal based power plant from 650 MW to 1650 MW	J-11011/136/2009-IA.II (I) dated 29 November, 2012 Amendment in conditions: dated 14 June, 2013
4	Latest Consent to Operate under Air (Prevention & Control of Pollution) Act, 1981 and Water (Prevention & Control of Pollution) Act, 1974	For Units 1 to 6: 4872/IND-I-CON-6120 dt 31 March, 2017 and renewed on dated 30 th June 2017 and valid upto 31 st March 2018.
5	MoU letters to take-off fly ash	Available with Ultratech Cement Ltd and OCL India Ltd
6	Long-term Coal linkage	Signed with MCL and CIL dated 06.09.2016
7	Hazardous Wastes Authorization	IND-IV-HW-980/4928 dt 31 March, 2015 and valid upto 31st March 2018.
8	Status of EC Compliance Report, certified by MoEF&CC	The latest communication from the Regional office of MOEF, Bhubaneswar regarding Sixmonthly compliance report being submitted from time to time is enclosed herewith along with the reply submitted to MoEF&CC.

1.4 Summary of Present Proposal

Aditya Aluminium is seeking an amendment in EC as follows in **Table 3**.





Table 3: Summary of Project Proposal- EC Amendment

SI.	Item	Existing Practice/	<u>-</u>	Remarks
No	Ol	as per EC	Amendment	
1	Change in Coal Source to CPP as proposed in EC	EC: Coal from captive Talabira-II & III coal block of Ib valley and imported coal Existing practice: Coal is being procured from own Gare Palma mines in Chatisgarh state, Long term linkages, through e-auctions, from Open markets and import as & when necessary	Coal mix options proposed: • 0-20% imported, • 80-100% Indian domestic coal (from own mines, linkage & e-auction coal, coal from open market and e-auction)	No capital investment Incremental
2	Pot rating enhancement - Upgradation of amperage	Production Level of Smelter at 360 KTPA	Increment in Production Level of Smelter from 360 to 380 KTPA Modifications at micro level for improved pot utilization and pot Turn Around Time (TAT) and improvement in energy efficiency of pots	 No changes in Sp. Alumina and Carbon consumption, however, AA will require additional alumina and Carbon to meet this enhanced volume Specific energy conservation No additional resource requirement No capital investment
3	Selling of molten metal- Purchaser will also take necessary approval	In-house consumption	As per Aditya Aluminium Metal Project, it is proposed to sell about 75 KTPA Hot metal to Private Parties which are planning to set up	 Proposed facilities involve Civil construction (road & lighting) & Crucibles inside the Plant premise Capital investment : Civil = Rs 3.1 Crores

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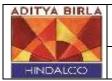
SI. No	Item	Existing Practice/ as per EC	Proposal for EC Amendment	Remarks
			their factory for downstream close to the plant boundary.	and other items for carrying molten metal
4	Sale of baked anodes	As per the EC letter, Point no xiv, Anode butts generated from the pots shall be cleaned and recycled to the Anode Plant.	AA proposes to sell approx. 5,000 nos. of the generated baked anode to private parties.	 Anode is generated due to less rejection after plant stabilization No capital investment
5	Sale of Bath Material	In-house consumption	AA proposes to sell 1,500 TPA of the generated bath material to private parties.	 Generated during Pot operation No capital investment

1.4.1 Proposed Project Cost

The investment envisaged for implementing the minor changes as proposed is provided as under:

Table 4: Project Cost

S. No	Item	Estimated Project Cost
1	Change in Coal Source to CPP as proposed in EC	Nil
2	Pot production enhancement - Upgradation of amperage	Nil
3	Selling of hot metal	Rs 3.9 Crores (Rs 3.1 Crores for road laying/civil and infrastructure facilities and remaining Rs 0.8 for other facilities)
4	Sale of baked anodes	Nil
5	Sale of bath material	Nil



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1.4.2 <u>Implementation Schedule</u>

Table 5: Project Implementation Schedules

S. No	Item	Time-frame
1	Change in Coal Source to CPP as proposed in EC	Immediate
2	Pot rating enhancement - Upgradation of amperage	Immediate
3	Selling of hot metal	Six months
4	Sale of baked anodes	Immediate
5	Sale of bath material	Immediate

Aditya Aluminium has retained **M/s Bhagavathi Ana Labs Pvt. Ltd. (BALPL)** for carrying out the study on changes in impacts due to proposed project proposal. BALPL is a NABET accredited company for carrying EIA Study for Metallurgical industries as well as Thermal Power Plants. The changes in impacts due to the present project proposal have been studied and presented in this report.

1.5 Project Location

Project Location is at Lapanga, Sambhalpur District, Odisha which is 20 km from Jharsuguda. Note: Sambalpur – Latitude 21 deg. 28 ft. N and Longitude 83 deg. 58 ft. E – is at an elevation of 148 m above MSL whereas the site is at an elevation of 218 m above MSL. Latitude and longitude of Project site at Lapanga is 21.7326 N, and 84.0154 E.

The project location map is given in **Figure-1**. The Google map and 10 km Radius Topographic Map are given in **Figure-2** and **Figure-3** respectively. The plant layout map is given in **Figure-4**. The photographs of the existing plant complex are given in **Figure-5**.

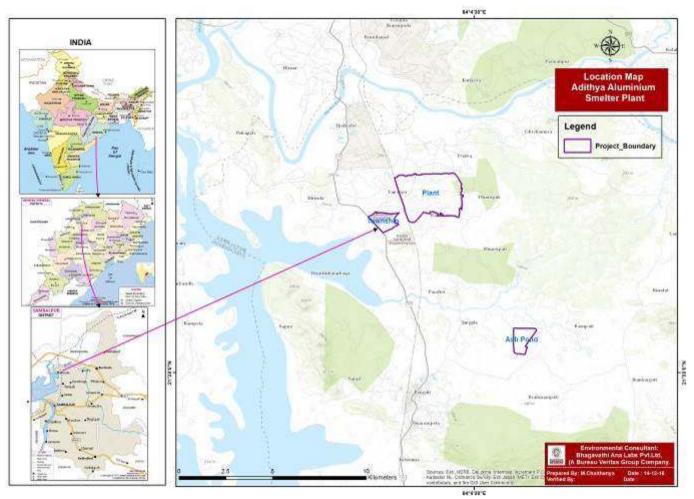


Figure 1: Location Map



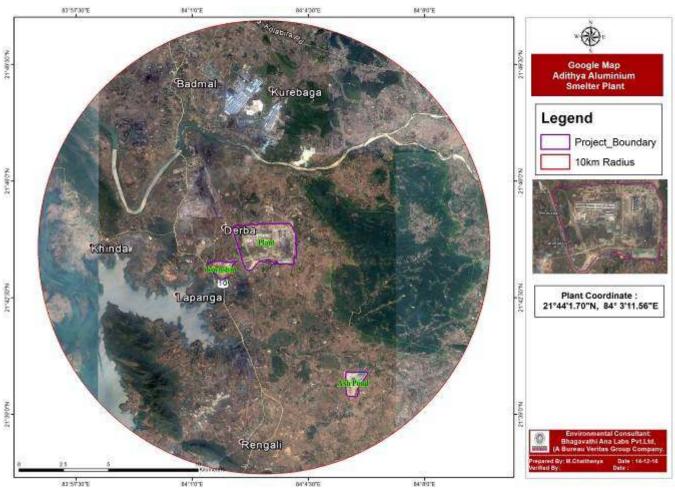


Figure 2: Google Map (10 km radius)



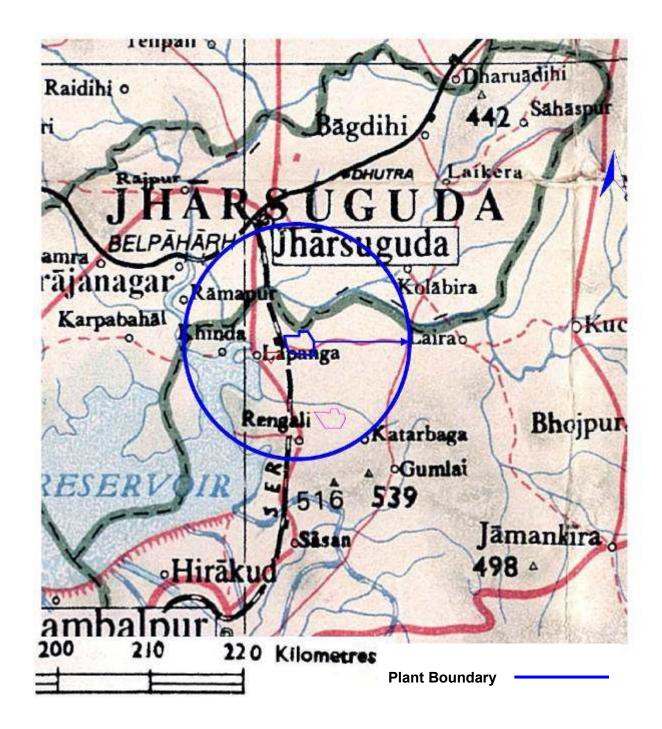


Figure 3: Topographic Map - 10 km Radius





Figure 4: Plant Layout Map







Figure 5: Panoramic View of Smelter Plant Site





Figure 6: Night View of the Plant



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1.6 Evaluation of Project Aspects

The project activities have been identified w.r.t. the present project proposal to draw a line of action for environmental impact analysis. The Impact analysis has been done and mitigation measures have been proposed subsequently in the report.

Table 6: Project Aspect-Impact Matrix

			Identification of impacts for evaluation (Identified impacts: x)				
S. No	Project Activity	Environmental Aspect	Change in Coal Source to CPP	Pot rating enhancement - Upgradation of amperage	Sale of molten metal	Sale of baked anodes	5 Sale of Bath Material
1	Additional Cost	-			х		
2	Additional Resources	Molten metal carrying crucibles and dispatch units within the plant complex			х		
3	Energy Requirement	Sp. energy consumption		X	x		
4	Source emissions	Incremental pollution load & GLCs – analysis required	х	No impact (In Sp. Emission)	- 55		
		Incremental pollution load & GLCs – analysis required	х	,			
5	Transportation impacts	Adequacy of approach road to handle incremental traffic load – analysis required	X				
6	Material Handling System	Material storage and handling- fugitive emissions	X				
7	Solid Waste Generation	No significant change; reduction in ash generation envisaged	X				
8	Water requirement	No significant change					



			Identification of impacts for evaluation (Identified impacts: x)					
S. No	Project Activity	Environmental Aspect	Change in Coal Source to CPP	Pot rating enhancement - Upgradation of amperage	Sale of molten metal	Sale of baked anodes	5 Sale of Bath Material	
	and source							
9	Noise levels	No significant change						
10	Operating Safety	Industrial activities have operational risks, which are mitigated by well laid EHS practices by the Unit.						



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2.0 PROJECT DETAILS

2.1 Preamble

The present chapter provides the details of following proposed EC amendment proposal:

- 1. Change in Coal Source to CPP
- 2. Pot Production enhancement Upgradation of amperage
- 3. Sale of molten metal, Baked Anodes and Bath material

2.2 Existing Plant Details

2.2.1 <u>Smelter Plant Details</u>

Details of the existing plant are provided as under:

Table 7: Details of the Existing Smelter Facilities

S.No	Parameter	Description			
1	Smelter Capacity	0.72 MTPA based on AP36S (360 kA) electrolysis			
		process technology of Rio-Tinto Alcan (Aluminium			
		Pechiney), 0.36 MTPA in Phase-1 and 0.72			
		MTPA in Phase-2.			
2	Actual Production	0.36 MTPA in Phase-1			
3	Land Requirement	Total Project Area: 1347.35 ha			
4	Water requirement	52.73 cusecs from Hirakud reservoir			
	and source				
5	Fuel	Heavy Fuel Oil: 79.4 KL/day (Smelter)			
6	Gross calorific value	HFO : 9600 Kcal/kg			
7	Ash content	HFO: 0.1% max)			
8	Sulphur content	HFO : 4.5% (max)			
9	Major Stack details	Gas Treatment Centre (GTC) - 04 Nos.			
		Baking Furnace - 03 Nos.			
10	Solid waste generation	 Carbon portion of Spent Potline is being sold to authorized reprocessors and Refractory portion will be transferred to CHSTWF of Ramky Enviro as per the CPCB protocol. Used batteries are being returned to the suppliers/manufacturers. Dross is being processed, metal recovered 			
		and residue portion transferred to Ramky for disposal.			

Source: Project Report





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2.2.2 CPP Details

Aditya Aluminium operates a coal based Captive Power Plant (CPP) for supply of power to the smelter plant. Aditya Aluminium is presently operating 900 MW (6x150 MW from Unit-1,2,3,4,5,6) out of the total capacity of 1650 MW for which EC has been obtained. The salient features of the CPP under operation are given as under:

Table 8: Details of the CPP

S. No.	Parameter	Description				
		900 MW (6x150 MW from Unit-1,2,3,4,5,6)				
1)	CPP Capacity	including one standby unit, based on Coal Fired				
		Boilers				
2)	Water requirement and	52.73 Cusecs of water approved by the State				
	source	Government from Hirakud reservoir.				
3)	Coal	2.61 MTPA (2015-16 data, AA)				
		3.88 MTPA (2016-17 data, AA)				
		Coal is being procured through long term				
		linkages from CIL, e-auctions from CIL, from				
		Gare Palma captive mines and through open				
	market/import					
4)	Gross calorific value	2500 - 5100 (Avg. 3600 Kcal/ kg)				
5)	Ash content	29 - 42%				
6)	Sulphur content	0.4% (max)				
7)	Stack details	3 Nos., 275 m high				
8)	Solid waste generation	Approx. 4000 tonnes of ash is being generated				
		and 100% ash utilization is being achieved				
		through supplying to cement plants, road				
		making, low lying area filling/development and				
		ash bricks manufacturing units till December				
		2016. The ash pond started operating recently				
		and part of the ash generated is being				
		conveyed by HCSD system.				

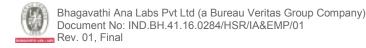
2.3 Change in Coal Source to CPP

• EC Condition: As per the expansion EC letter dated 29 November, 2012:

'Coal for the proposed expansion of power plant will be sourced from captive Talabira-II & III coal block of Ib valley at a distance of 12 km and till these mines become operational, shall be imported from Singapore, for which, MoU has been signed with M/s Swiss Singapore Overseas PT Ltd.'

• Present Scenario:

Aditya Aluminium has installed & commissioned 6 units of pulverized coal fired CPPs.





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The coal availability scenario has drastically changed in India due to cancellation of allotted coal block by the Supreme Court of India and introduction of various e-auction schemes. So the allotted Talabira-II&III coal block was cancelled. Therefore, AA proposes to use the Indian domestic coal (captive mines, linkage coal, coal from open market and e-auction) and imported coal. Depending upon the requirement of plant, imported component may be used in addition to aforesaid coal mix.

The requirement of coal for the existing 900 MW captive power plant is also met partly from captive mines called Gare Palma IV/4 and IV/5 in Chattisgarh State at a distance of around 135 Km. Coal to the tune of 11 lakhs MT is transported from the nearest siding by road. Remaining quantity is procured through Linkage coal, e-auction and from traders in the open market. AA has signed Agreements for 5 years to procure coal to the tune of 23 lakhs MT through linkage from MCL & SECL by rail/road.

Around 2.0 lakhs MT of coal is proposed to be procured through e-auction from MCL, SECL & CCL and around 1.0 lakhs MT from open market through traders. In case of requirements, AA has planned to procure maximum 20% imported coal by port & rail and accordingly the domestic coal from e-auction/linkage will be reduced. The coal procurement is planned by keeping in view of the quantity available from own mines, assured linkage for 5 years and remaining quantity through e-auctions and traders. The blended coal quality, i.e., coal mix is able to meet the maximum ash upto 42% and Sulphur (S) upto 0.4%.

Transportation of coal is preferred to be done through rail and wherever rail connectivity is not available, transport by road is being carried out at present. AA will upgrade to rail transport as soon as the coal mines are connected by rail & sidings. There are also few mines under the process of development by MCL, SECL & CCL in near future and AA intends to procure coal from those mines by rail/road based on the production schedule and connectivity. Therefore, the quantity mentioned in the attached **Table 9** is likely to change depending on the sources of supply through e-auctions and the linkages decided by MCL/SECL at any point of time and during subsequent renewals.

Considering the requirement of coal for 1650 MW captive power plant, the remaining quantity for 750 MW will be met from sourcing through e-auctions, imports etc. AA will also make efforts to own captive coal mines and linkages in future depending on the techno-commercial opportunities at that point of time.

Earlier planning for sourcing of coal was from Talabira-II&III blocks under Ib-valley & Jharsuguda area. At present, the Ash content and GCV is not much different than the earlier one. The captive coal blocks are not connected by rail network. Hence, transportation of coal from captive coal block is only through environmentally compliant



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high volume trucks. The imported coal is generally brought through Gangavaram port and linkage coal are transported by rail and road based on the connectivity.

In view of the above reasons, Aditya Aluminium has proposed following coal source options based on techno-economic feasibility analysis:



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Table 9: Proposed Coal Mix Quality Envisaged

S. No	Type of Sourcing	Name of Mines	Туре	Avg GCV (Kcal)	S%	Ash %
I	EC Condition (Domestic or Imp	, ,				
1	Domestic Coal	Captive Talabira-II & III coal block of lb valley at a distance of 12 km	Own Mines	3750	0.40	42
2	Imported coal	Singapore	Imported	5804	0.40	17.51
Ш	Proposed: 0-20% Imported, 80	0-100% Domestic				
	DOMESTIC Coal					
1	Captive Mines	Gare Palma IV/4	Own Mines	3900	0.45	38.00
2		Gare Palma IV/5		4400	0.41	26.00
3	Linkage Coal (5	Lakhanpur	Mahanadi	2800	0.35	45.82
4	Years)	Lajpura Opencast Mines siding (LOCM)	Coalfields	3200	0.45	40.00
5		Belpahar Opencast Mines siding (BOCM)	(MCL)	2800	0.29	45.28
6		Kulda		3100	0.61	44.00
7		New Kusmunda	South Eastern	4000	0.46	35.44
8		Dipka	Coalfields	3200	0.35	48.00
9		Junadih	(SECL)	3700	0.46	45.00
10	E-Auction	Samaleswari	MCL	3100	0.27	48.00
11		Basundhara		3000	0.25	54.73
12		Hingula		3200	0.28	49.00
13		Balram		3100	0.4	47.00
14		Belpahar		2800	0.29	45.00
15		Baroud	SECL	4000	0.54	37.00
16			CCL	·		
17	Trader Coal	Hind at present by Rail- Various Traders in & around the Plant site	Open Market	4000	0.43	38.00
	IMPORTED Coal					
18		Imported Coal - S.Africa/ Indonesia etc :Sourced through nearest feasible port Gangavaram/Vizag to the plant by railway transport	Imported	5800	0.4	24.00

Source: Aditya Aluminium

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2.4 Pot Production Enhancement - Upgradation of Amperage

AA proposes modifications at micro level for improved pot utilization and pot Turn Around Time (TAT) and improvement in energy efficiency of pots. This will result in slight increase in production, for which EC amendment is presently requested.

Background

The salient features of the existing smelter at Lapanga, Sambalpur district, Odisha are presented in **Table 5.** For both phases, reduction plant will have two pot lines having 360 pots in each pot line. There will be four Gas Treatment Centers (GTC), one each for 180 pots. The existing product mix is presented in **Table 10**. However, the quantity of each product varies according to the market fluctuations.

Table 10: Existing Product Mix

S.		Quantities				
No	Parameters	Parameters Phase-I (360 KTPA Under Operation) (3		Total		
1	Standard Ingots (23.7 kg)	119333.5	119333.5	2,38,667 TPA		
2	Sow Ingots (~450 kg)	39811.0	39811.0	79,622TPA		
3	Slabs	199155.5	199155.5	3,98,311 TPA		
	TOTAL			720000 TPA		

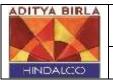
The production quantity of three varieties is likely to vary as per the market demand

Alumina, the raw material for production of aluminum is primarily sourced from the Utkal Alumina refinery at Tikri, Rayagada, Odisha, a 100% subsidiary of Hindalco or from other plants (Domestic/Import) as per plant requirement.

Technology Description

The AP36S (360 kA) electrolysis process technology of RIO TINTO ALCAN (AP) is considered superior than other pre-baked anode technologies. The general principles of the process are summarized below.

The smelting process is based on Hall-Heroult process of electrolytic reduction of alumina to aluminium metal. Alumina is dissolved in molten Cryolite (bath) and DC current is passed through molten electrolyte for the reduction of alumina to form liquid aluminium deposited at the cathode and oxygen collects at the anodes, where it combines with carbon to form CO₂. The pot is made of steel which is lined with carbon material along with refractory in the outer layer. The pots are of point feeding type using pre-baked anodes. The accumulated liquid metal is periodically siphoned out from the pots into refractory lined ladles and transported to form finished product.



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The oxygen separated in the reduction of alumina reacts with carbon of anodes causing them to be consumed regularly. The consumed (spent) anodes are changed periodically and replaced by the new anodes. The spent anodes are changed by the specialized grabs fitted with special cranes called as Pot Tending Assemblies. During anode changing operation, bath crust is also removed along with the spent anodes. After new replacement of Anode, a predetermined quantity of anode covering mix is spread to the top and sides of the new anode to prevent air burning of new anode carbon.

Spent anodes are cooled and sent to anode rodding shop for removing bath and carbon part. The carbon is crushed and is recycled to green anode plant as input material for new anodes. The bath crust is removed, crushed and transported back to the pot line for the new anode covering material.

The alumina content in the molten electrolytic bath is kept within a set range by means of an automatically controlled feeding system. The alumina is continuously distributed to the pots by means of the HDPS (Hyper Dense Phase System), starting from the silos and running along the pot rooms and through the Gas Treatment Centers (GTC) where it gets enriched with the pot off gases by adsorbing the fluoride gas generated during electrolysis process. The entire pot off gases and particulates are collected and cleaned at the GTC and the enriched alumina is recycled back to the pots. The addition of solid fluorinated products (in the form of aluminum fluoride,) is required to maintain bath chemistry.

Cathode linings have a limited service life of approximately 72 months. The pot containing the spent lining is removed from the pot line and replaced by newly prelined pot shell. The pot with spent lining is transferred to De-lining and Relining shop for replacement of lining material. Carbon anodes are produced from petroleum coke, recycled spent anodes and liquid coal tar pitch. The solid carbon components are crushed, sized, blended with hot liquid pitch and mixed to form a dry green paste. The paste is then vibro-compacted to form green anode blocks that are cooled by water spray prior to natural cooling. The green anodes are then transported to an anode baking furnace, where they are gradually heated. During baking, pitch volatiles are released and burned in furnace to provide required heat energy and remaining pitch is converted to coke and binds the carbon to form the baked anode suitable for the electrolytic reduction process. The baking process consists of pre-heating, heating and controlled cooling. Baked anode are cleaned and transported to interim storage before being transported to the Anode Roding Shop (ARS). A fume generated during the anode baking process contains fluoride that are cooled up to a certain temperature and reacted with fresh alumina in Fume Treatment Center (FTC) where the fluorides are adsorbed. The reacted alumina is stored in a silo and periodically transported back to the pot line for use as pot feed. The process flow diagram is shown in Figure as under.

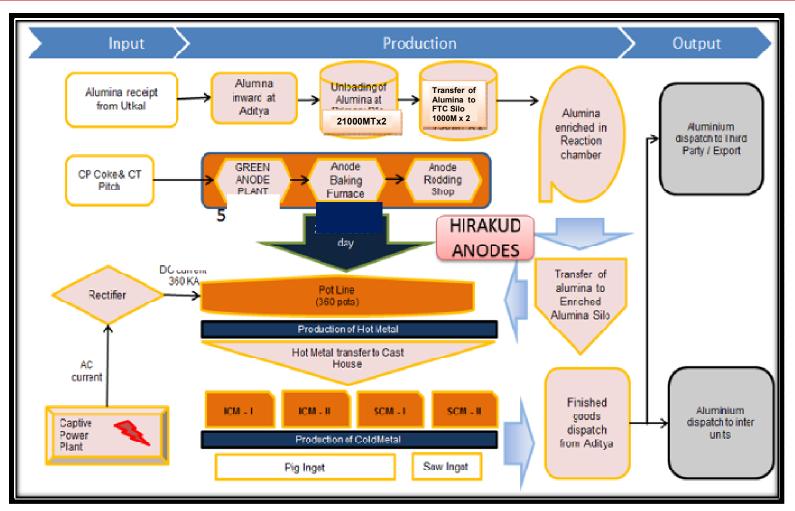


Figure 7: Process Flow Diagram

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Present Proposal:

Through Process Optimization, Aditya Aluminium plans to increase the Current Amperage from the existing level of 360 kA to 380 kA. This will be achieved with the existing systems in the Smelter Plant without installation of additional Pots. Enhancement of input amperage will result into marginal increase (5.5%), to the tune of 20 KTPA, in Aluminium Production Level.

The emission details from the operation of existing smelter capacity are provided as under:

Table 11: Emission Source Characteristics and Emission Rates of the Existing **Aluminium Smelter**

Stacks	l lmi4	GTC -1	GTC - 2	FTC-1	FTC-2	
Attached	Unit	GIC-1	GIC-2	FIC-1	FIC-2	Sub-Total:
Diameter	m	10.4	10.4	2.06	1.6	Pollution
Н	m	100	100	70	70	Load of
Exit	m/s	10	10	12.96	11.38	Existing
Exit	°C	111	111	99	99	Aluminum
Volumetric Flow	Nm³/hr	21,71,732	20,37,606	1,10,140	59,277	Smelter
Emission Rate	es					
SO ₂	mg/Nm ³	BDL	BDL	311	357	668
NO _x as NO ₂	mg/Nm ³	BDL	BDL	60	88	148
CO	mg/Nm ³	762	841	53	36	1692
PM	mg/Nm ³	19.6	15.5	17.3	32.8	85.2
Particulate Fluoride	mg/Nm ³	0.07	0.09	0.07	0.09	0.32
Gaseous Fluoride PM	mg/Nm ³	0.2	0.28	0.25	0.2	0.93
Total Fluoride	mg/Nm ³	0.27	0.37	0.32	0.3	1.26

Source: M/s Aditya Aluminium, Latest Monitoring Reports

Further, GTC -3 and GTC-4 and Bake Furnace-3 have been proposed in Phase-2. The pollution control measures as given below will be sufficient to handle the enhanced production.

The incremental pollution levels shall be insignificant as the existing operating capacity is lesser than the approved capacity, the pollution load is within the approved limits.

Molten Metal Project- AA-APAR 2.5

Aditya Aluminium has planned to sell about 80 KTPA Hot metal to M/s APAR Industries. M/s APAR is planning to set up their factory close to the northern boundary of the Plant for downstream products and will obtain necessary statutory clearances.





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Aditya Aluminium will construct a new road for this purpose and buy crucibles. Total capital cost to be incurred by HIL is around Rs 3.9 Crores which includes Rs 3.1 Crores for civil construction activities like road infrastructure, lighting etc.

It involves the following activities -

- Liquid metal transfer after weighment by crane mounted weigh scale
- Weighed metal will be transported to APAR through Metal Taping Vehicle
- Empty ladle will be received back and always be in circulation.

This proposal has been recommended based on the techno-economic feasibility analysis by Aditya Aluminium. The proposed selling of molten metal to the adjacent factory will reduce remelting options outside the Plant for downstream products and this will conserve energy & resources and shall not lead to any increment in existing pollution levels due to plant operations. MTV will be used to safeguard the metal transportation

2.6 Sale of Baked Anode

AA proposes to sell baked anode being produced due to lesser rejection during the routine manufacturing process in the Carbon plant.

Brief Description of Baking Process:

Green anodes from the Green anode plant are subjected to bake in the baking furnaces to drive away the volatiles and to impart strength to the anodes. These green anodes are baked in state-of-the-art ring type furnaces which are above the ground level. The anodes are packed in several layers in the pits with packing coke all around them. The furnaces are HFO fired and their temperature is controlled by specially designed firing system. In Anode baking furnace green anodes are slowly heated up and slowly cooled down to get desired quality.

After packing Green anodes in a section it takes few days to complete the baking cycle. The baked anode is then unpacked by FTA and is being stored after cleaning in the Anode storage area by Stacking cranes. From anode storage area these anodes are supplied to Rodding Shop for further processing.

Quantity of anodes produced per annum as per design:

Anode production quantity has been designed by considering the production efficiency and rejections during the manufacturing.



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Table 12: Aditya Anode Production Details

S. No	Description	UOM	Quantity
1	Aditya Anode Production per day	Nos.	554
2	Aditya Anode Production per annum	Nos.	202292
3	Anode required by Rodding shop per day	Nos.	540
4	Anode required by Rodding shop per annum	Nos.	197100

Reason for Sale

The Designed Capacity of the Aditya Furnace to produce the Baked Anode is 202292 Nos./ Annum by considering the rejection rate of 1% of total Anodes Produced. As the process has been stabilized and is being optimized in the recent past, the Rejection rate has been reduced to 0.15% of the Total Baked Anode and increases the Good Anode Production.

Due to the reduced rate of Rejection, Furnace is producing extra good quality Baked Anodes. In last 6 Months, Average Rejection: 0.15%. Total No. of Baked Anodes Rejected/ Annum: 303. Therefore, inventory Build-up of Good Baked Anode/Annum: 4889. HIL intends to sell approx. 5,000 nos. of Anodes per annum.

2.7 Sale of Bath Material

Aditya Aluminium proposes to sell bath material generated of approx. 1,500 TPA of bath material from one pot line of 360 pots.

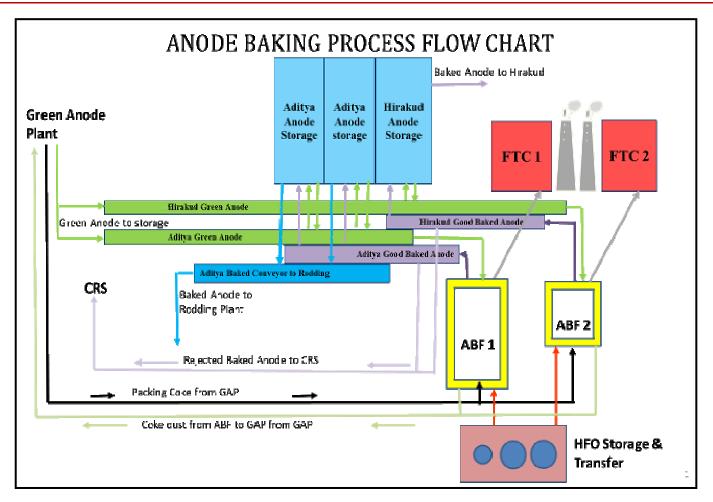


Figure 8: Process Flow Diagram - Anode Bake Process

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3.0 ENVIRONMENTAL BASELINE STATUS

3.1 Preamble

Regular Ambient Air Quality (AAQ) as well as stack monitoring is conducted by AA within the plant premise. Summary of the existing monitored environmental baseline parameters w.r.t. stack emission, ambient air quality and ash utilization is provided in this chapter.

3.2 Existing Stack Emission Details

Regular monthly monitoring of the existing stacks is undertaken by Aditya Aluminium. Online CEMS installed in the stacks also provide realtime data to the servers of OSPCB and CPCB.

The stack emission detail of CPP and Smelter Plant is provided in Table 13.

3.3 Existing Ambient Air Quality Details

Manual ambient air quality monitoring done in surrounding villages at baselines locations (8 places) on 24 hourly basis for weekly twice basis for 3 months. The summary of AAQ monitoring is provided in **Table 14**.

a) Climatic Data from Secondary Sources

Meteorological conditions as obtained from the observatory at Sambalpur which is 45 km from the site are as follows (Note: Sambalpur – Latitude 21 deg. 28 ft. N and Longitude 83 deg. 58 ft. E – is at an elevation of 148 m above MSL whereas the site is at an elevation of 218 m above MSL).

i)	Highest monthly mean of daily max. temp.	:	42.1°C
ii)	Highest dry bulb temperature	:	47.2°C
iii)	Lowest monthly mean of daily min. temp.	:	12.2°C
iv)	Lowest dry bulb temperature	:	4.4°C
v)	Annual mean wet bulb temperature	:	27.8°C
vi)	Average annual rainfall	:	1661.5mm
vii)	Heaviest rainfall in a month	:	1065.8mm
viii)	Highest average monthly relative humidity	:	84.5%
ix)	Annual mean relative humidity	:	61.5%
x)	Maximum relative humidity	:	87.0%
xi)	Minimum relative humidity	:	27.0%



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xii)	Type of atmosphere	:	Dusty
xiii)	Highest monthly mean of daily wind speed	:	8.0 Kmph
xiv)	No. of days/year with wind speed > 20 Kmph	:	5 days
xv)	No. of days/year with rainfall >0.3 mm	:	92 days
xvi)	Number of days/year with thunder	:	53 days

3.4 Existing Ash Generation and Utilization Details

Details of ash generation and utilization during the past three years are provided in **Table 15.**

Approx. 4000 ton of ash is being generated and 100% ash utilization is being achieved through supplying to Cement Plants, road making, low lying area filling and ash bricks manufacturing units. The ash pond started operation in this year and part of the ash generated is being conveyed by HCSD system.

3.5 Existing Wastewater Management Details

- 1. The DM plant blow down is being treated in common ETP and reused in CPP.
- 2. The cooling tower and Bolier blowdown is being treated in common ETP and reused in CPP.
- 3. Cooling Tower blow-down from Smelter area in being led to the Guard pond and treated in the ETP.
- 4. Outlet water of the common ETP is being reused in CPP.

The domestic effluent in Smelter is being treated in the STP and reused for sprinkling and gardening. Separate STP has been installed for the plant and township.



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Table 13: Stack Emission (mg/Nm³)

Stack	Description of Stack	Stack	Quantity of		Prescribed standard
No	Height (m) Emission (m ³ /hr)		PM (mg/Nm ³)	Fluoride (kg/ton of Al)	
1	Pot room GTC 1 & 2	100	2322000 each	50	0.3 of Al-metal produced for GTC stacks0.4 of Al-metal produced for fugitive emission
2	Anode Baking Furnace FTC - 1	70	133800	50	0.1 of Al-metal produced for all bake oven
3	Anode Baking Furnace FTC - 2	70	75700	50	stacks
4	ESP of CPP Stack 1, 2 & 3 (Tri- flue stacks)	275	1238400 each	50	
5	ESP of CPP Stack 4, 5 & 6 (Tri-flue stacks)	275	1238400 each	50	

Source: AA



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Table 14: Ambient Air Quality Details (micro g/cum)

6			NAAQ		Monitored Average Values						
S. No	Parameter	Unit		AAQMS-1	AAQMS-2	AAQMS-3	AAQMS-4	AAQMS-5	AAQMS-6	AAQMS-7	AAQMS-8
NO			Standards	Gumkarama	Ghichamura	Tileimal	Bolamoli	Kapulas	Phulchanghal	Khadiapali	Thelkolai
1	PM ₁₀	μg/cum	100	48.72	46.28	49.38	49.73	50.62	57.65	62.33	55.57
2	PM _{2.5}	μg/cum	60	23.84	22.82	24.59	24.34	25.2	29.57	33.29	27.51
3	SO ₂	μg/cum	80	<4.82	<4.55	<5.07	<4.88	6.08	7.77	9.55	6.06
4	NO _x	μg/cum	80	<11.38	<10.9	<11.89	<11.58	13.29	15.0	17.89	13.92
5	O ₃	μg/cum	100	<4.0	<4.0	<4.0	<4.0	<4.0	< 5.28	<5.78	<4.52
6	CO	μg/cum	4	<0.16	<0.16	<0.19	<0.16	0.19	0.24	0.31	0.18
7	NH ₃	μg/cum	400	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	27.55	<20.0
8	C ₆ H ₆	μg/cum	5	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
9	BaP	μg/cum	1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
10	Ni	μg/cum	20	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
11	Pb	μg/cum	1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
12	As	μg/cum	6	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
13	F	μg/cum	-	<0.01	<0.01	<0.11	<0.38	<0.01	<2.29	<0.36	<0.99

Source: Monitoring reports, 2016, AA

BDL Values: SO2<4 μ g/cum, NOx <9 μ g/cum, O3<4 μ g/cum, Ni <0.01 ng/cum, As <0.001 ng/cum, C6H6 <0.001 μ g/cum, BaP< <0.002 ng/cum, Pb< <0.001 μ g/cum, F<0.01 μ g/cum, CO <0.1 mg/cum



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Table 15: Ash Generation & Utilization Details

S. No.	Month	Year	Coal Consumption (MT)	Power Installed Capacity (MWH)	Power Generated (MWH)	Quantity of Fly Ash generated (MT)	Quantity of Bottom Ash generated (MT)	Total Ash Generated (MT)
1	April	2016	339249	750	635	140473.18	5853.05	146326.23
2	May	2016	339368	750	646	135587.39	5649.47	141236.86
3	June	2016	305001.16	750	646.115	122327.21	5096.97	127424.18
4	July	2016	307164	750	647	109224.74	4551	113775.74
5	Aug	2016	310986	750	645.22	101944.86	4247.7	106192.57
6	Sept	2016	323431	750	654.167	117930.39	4913.77	122844.16
7	Oct	2016	310169	750	650.914	108572.89	4523.87	113096.76
8	Nov	2016	307378	900	650.208	110107	4587.79	114694.79
9	Dec	2016	339495	900	640.4	125499.62	5229.15	130728.77
10	Jan	2017	356261	900	654	135724.07	5655.2	141379.27
11	Feb	2017	300095	900	650	107269.66	4469.57	111739.23
12	Mar	2017	344932	900	646.5	131447.03	5476.96	136923.99
		Total	3883529.16			1446108.04	60254.5	1506362.55

Source: AA

Disposal Method	Brick manufacturing (MT)	Supplied to cement industries (Ultratech & OCL) in (MT)	Road Making (MT)	Low Lying area filling/ land development (MT)	Through HCSD to Ash Pond	Total Ash Utilized (MT)	% of utilization
Dry disposal	0	91767.88	5959.35	48599	0	146326.23	100
Dry disposal	0	78599	282.24	62355.62	0	141236.86	100
Dry disposal	0	77139.26	0	50284.92	0	127424.18	100
Dry disposal	0	66484.4	0	47291.34	0	113775.74	100
Dry disposal	104.79	50438.77	0	55649.01	0	106192.57	100
Dry disposal	104.24	63273.34	0	59466.58	0	122844.16	100
Dry disposal	96.95	67316.65	0	45683.16	0	113096.76	100
Dry disposal	114.98	61071.72	0	53508.10	0	114694.8	100
Dry disposal	66.57	62656.81	0	68005.39	0	130728.77	100
Dry disposal	108.1	82040.58	0	29860.22	29371	112008.90	79.2
Dry disposal	68.01	66237.71	0	33489.51	11944	99795.23	89.3
Dry disposal	65.87	84079.87	6241.59	44989.25	7789	129134.99	94.3
	729.51	851105.99	6241.59	369329.63	870896.5	1457259.19	97



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4.0 IMPACT ASSESSMENT

4.1 Preamble

The present chapter identifies the impacts, assesses the incremental pollution load, if any and proposes mitigation measures for the same for the present proposal for EC amendment.

4.2 Identification of Environmental Impacts

The impacts due to the proposed change in coal mix and sources have been identified as under:

Table 16: Environmental Impact Assessment Action Plan

S. No	Project Activity	Environmental Aspect	Identification of impacts for evaluation
I	Change in Coal Source - Boiler Operations	Air Quality Impacts Source emissions will change	Incremental pollution load & GLCs – analysis required
II	Change in Coal Source - Transportation of Coal	Air Quality Impacts - Cumulative vehicular emissions on approach roads will change Transportation impacts - load on the approach roads will change	 Incremental pollution load & GLCs – analysis required Adequacy of approach road to handle incremental traffic load – analysis required Adequacy of roads need to be studied – analysis required
III	Change in Coal Source - Coal Handling System	Air Quality Impacts Incremental fugitive emissions at plant complex	Adequacy of Coal Handling System to be evaluated
IV	Change in Coal Source - Ash generation	5) Solid waste impacts - Quantities of ash generation will change	Adequacy of ash generation – analysis required
V	Pot rating enhancement - Upgradation	6) Enhanced production capacity will result in increase of energy	Adequacy of energy conservation measures – analysis required



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S. No	Project Activity	Environmental Aspect	Identification of impacts for evaluation
	of amperage	consumption -	
		various energy	
		conservation	
		measures proposed	

4.2.1 Air Quality Impacts – Stationary Source emissions (CPP)

Based on the present practical scenario, the present proposal (0-20% imported, 80-100% domestic coal) has been considered for studying the environmental impacts due to usage of proposed coal sources in CPP. The same has been compared with the EC condition and the present emission norms.

Various Coal sources and coal mix combinations have been considered for the present proposal. The summary of typical coal analysis of various coal sources is provided as under:

Table 17: Summary of Coal Quality of Various Coal Sources Considered

S. No	Parameters	Percentage Mix (%)	Average GCV (Kcals/kg)	Ash Content (%)	Sulphur Content (%)	Coal Quantity (MTPA)
Α	Option-01: EC Cor	ndition				
1	Domestic Coal	100	3750	42.00	0.4	9.12
2 (or)	Imported Coal - Singapore	100	5804	17.51	0.4	7.0
В	Option-02 : Propos	sed Coal Mix o	of Domestic a	and Import	ed Coal	
1	Domestic Coal	80	3200	42.00	0.4	9.0
2 (and)	Imported Coal - S. African	20	5800	24.00	0.4	1.2

Source: Project Report

The main pollutants from the CPP are Particulate Matter (PM), Sulphur dioxide (SO_2) and Oxides of Nitrogen (NO_x) from the burning of coal. The pollutants are dispersed through stacks of adequate height.

 SO_2 emissions depend on Sulphur content in coal mix used. Thus, incremental SO_2 emissions have been computed to assess the change in impacts due to the proposed change in coal source.



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Table 18: Stack Emission Details (11x150 MW CPP)

S.			De	tails
No	Stack Parameters		For Each Unit of 150 MW	For 1650 MW (11x150 MW)
1	Unit Capacity	MW	150	11x150
2	Stack Height	m	275	275
3	No of Stacks	No	1	4(3 Nos. of tri- flue & 1 No of bi-flue stack)
4	No of Flues per Stack	No	-	3 flues per stack
5	Top Flue Diameter	m	3.7	3.7
6	Exit Velocity	m/s/flue	23.6	23.6
7	Exit Temperature	°C	135	135
8	Volumetric Flow	Nm ³ /s/flue	185.2	185.2
	SO ₂ Emission Rates (0.4 % Sulph	ur)	Per Flue	Total
9	OPTION-1 : Emission Rates - Existing EC - as per EIA Report, 2013	g/s	210.0	2310
10	OPTION-2: Emission Rates - Proposed Coal Mix (Domestic coal + Imported Coal-South Africa)	g/s	208.3	2291

It is evident from the above table that the incremental load due to the proposed change in coal mix will result in reduction of SO_2 emissions by 20.8 g/s (0.9%). Hence, there will be reduction in AAQ impacts due to stationary SO_2 load generation due to the proposed proposal.

The tri-flue RCC chimney with steel flue cans and induced draft fans have been provided. ESPs have been provided as pollution control equipment. AAQ concentrations of less than NAAQ standards of 100 $\mu g/m^3$ for PM and 80 $\mu g/m^3$ for SO₂ and NO_x respectively.

4.2.2 <u>Air Quality Impacts – Vehicular Traffic</u>

The coal transportation options and estimates for number of truck load per day for identified transport routes for the transportation impacts study.

The change in environmental impacts due to transportation of coal from various sources has been identified using recognized model. For estimation of impacts due to vehicular emissions, the impacts dispersion modeling has been carried out by using the air quality model **CALINE4 line source model**, **developed by California Department of Transportation**. The model is based on Gaussian diffusion equation and uses a mixing zone concept to characterize pollutant dispersion over the roadway. The model has been extensively tested for its predictive capability for traffic related air quality impacts.

• Option-1: (Domestic or Imported), EC Condition





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• Option-2: 0-20% imported, 80-100% Indian domestic coal (linkage coal, coal from open market and e-auction)

The coal transport options provided in **Table 2** have been considered for the traffic studies. However, peak truck trips per day have been estimated based on 330 annual average working days and maximum of 2 shift/day of 8 hour each.

Peak hourly truck load on approach roads has been estimated based on the same, as provided in **Table 3**.

4.2.2.1 Identification of Transport Routes

Coal is currently being sourced by road transport from the sources mentioned in **Table 19** along with the distances from mines to plant.

Table 19: Details of Coal Sources

S. No	Type of Sourcing	Name of Mines	Туре	Mode of Transport	
Α	DOMESTIC	COAL			
1	Captive	Gare Palma IV/4	Own Mines	Road	
2	Mines	Gare Palma IV/5	OWITIVIIILES	Road	
3		Lakhanpur		Road	
4		Lajpura Opencast Mines siding (LOCM)	Mahanadi	Rail	
5	Linkage Coal	Belpahar Opencast Mines siding (BOCM)	Coalfields (MCL)	Naii	
6	(5 Years)	Kulda		Road	
7		New Kusmunda	South Eastern		
8		Dipka	Coalfields (SECL)	Rail	
9		Junadih	Coameids (GLOL)		
10		Samaleswari			
11		Basundhara			
12		Hingula	MCL	Road	
13	E-Auction	Balram			
14		Belpahar			
15		Baroud	SECL	Road	
16			CCL	Rail	
17	Trader	Various Traders in & around the	Open Market	Road/Rail	
	Coal	Plant site	Open Market	Ttoau/Ttail	
В	IMPORTED	_			
18		Imported Coal - S. Africa / Indonesia etc: Sourced through nearest feasible port (Vizag / Gangavaram / Paradeep, etc.) to the plant by railway transport	Imported	Sea-route & Rail	

1) Road Transportation Routes

The road routes and distances of various identified mines have been identified. The road route maps of each of the sources to the plant have been provided in **Figure-9**.







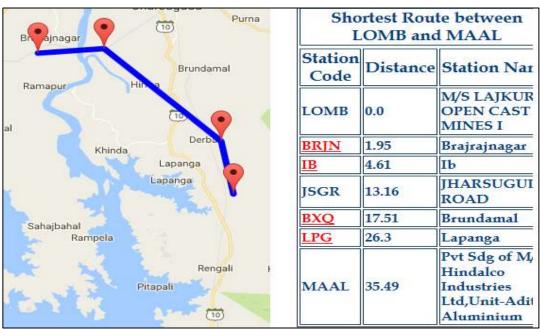
Figure 9: Coal Transportation Route Map

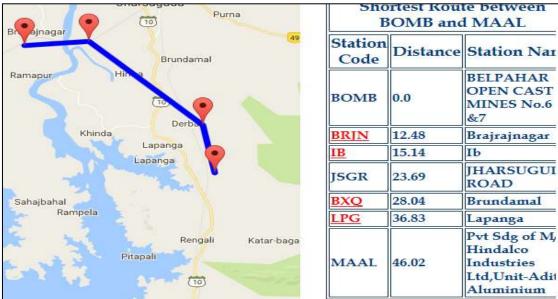


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2) <u>Rail Transportation Details of coal - detailed rail route map - Survey</u> Report, Rail Transportation Effectiveness

Coal sourcing by rail transport is preferred as there is establish facility of wagon trippler and MGR rail network inside Aditya Aluminum plant upto the Captive Power Plant. Transportation of coal is cheaper than road transport, which impacts the final power cost. Aditya Aluminium is in the process of getting coal by rakes from Mahanadi Coalfields Ltd. mines of LOCM group siding and BOCM group sidings and from South Eastern Coalfields Ltd. mines of Dipika siding and New Kusmunda siding etc. Details given below:





1) South Eastern Coalfields Ltd. mines of Gevra siding, Dipka siding and





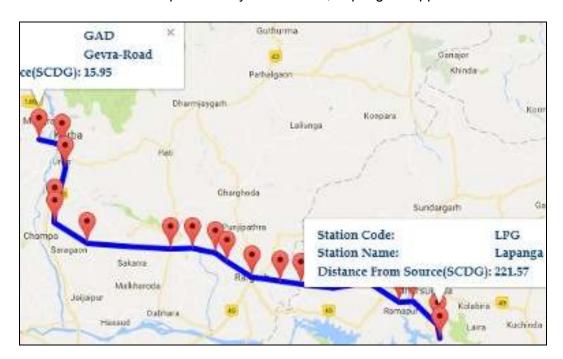
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Kusmunda siding

The distance from Gevra to Aditya Aluminium, Lapanga is approx. 215 Kms



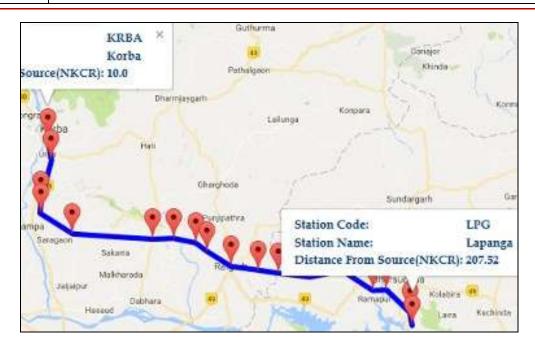
The distance from Dipka to Aditya Aluminium, Lapanga is approx. 225 Kms



The distance from KUSMUNDA to Aditya Aluminium, Lapanga is approx. 215
 Kms



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2) <u>Imported Coal - S. African: Sourced through Gangavaram port to the Plant by Railway Transport</u>

The imported coal from South Africa/Indonesia will be sourced through Gangavaram/ Vishakhapatnam/ Paradeep/ Dhamra port to the plant by railway transport.

AA has always a preference for rail transport due to techno-enviro-commercial benefits. However, few of the Mines are not connected by rail and transportation by road is inevitable in the present condition. Therefore, it is proposed to transport coal by both rail and road depending on the feasibility.

4.2.2.2 Traffic Volume Per Hour (VPH) Considered for Dispersion Modeling

The model requires hourly traffic data. Hence, the peak hourly data is considered in model. The existing traffic data on approach Highway has been assumed to be covered under baseline. The considered traffic load on the approach highway has been considered for entire 1650 MW of CPP capacity, as provided in **Table 20**.



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Table 20: Coal Transport Options Considered for Transportation Impacts

S. No	Type of Sourcing	Name of Mines	Туре	Mode of Transport	Approx. Quantity (MTPA) for 1650 MW	Distance (Km)	Trucks used (Tonnage)	No of Trucks/ day	No of PCUs/ day	
D	OMESTIC Coal									
1	Captive Mines	Gare Palma IV/4	Own Mines	Road	1.80	137	25	218	654	
2		Gare Palma IV/5	OWIT WILLES	Road	1.13	147	25	137	411	
3		Lakhanpur		Road	1.07	53	15	215	645	
4		Lajpura Opencast Mines siding (LOCM)	Mahanadi Coalfields	Rail	1.10	35	-	-	-	
5	Linkage Coal	Belpahar Opencast Mines siding (BOCM)	(MCL)	Kali	0.73	35	-	-	-	
6	(5 Years)	Kulda	-	Road	0.60	100	25	72	216	
7		New Kusmunda	South Eastern		1.31	215	-	-	_	
8		Dipka	Coalfields	Rail	0.49	225	-	-	-	
9		Junadih	(SECL)		0.73	235	-	-	-	
10		Samaleswari				50	25	62	186	
11		Basundhara				110	-	-	-	
12		Hingula	MCL	MCL	Road		270	-	-	-
13	E-Auction	Balram					0.51	260	-	-
14		Belpahar				53	-	-	1	
15		Baroud	SECL	Road		180	-	-	-	
16			CCL	Rail			-	-	-	
17	Trader Coal	Hind at present by Rail	Open Market	Road/Rail	0.25		25	31	93	
IN	MPORTED Coal									
18		Imported Coal - S.Africa/ Indonesia etc :Sourced through nearest feasible port(Vizag/ Gangavaram/ Paradeep etc) to the plant by railway transport	Imported	Sea-route & Rail	0-1.52	400 to 650				

Note: Considering 330 working days/annum, PCU Factor=3





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Model Setup - CALINE4

The California Line Source Dispersion Model, CALINE4 (1989), uses traffic emissions, site geometry and meteorology to predict air pollutant concentrations within 300 meters of the roadways. Predictions can be made for Carbon monoxide (CO) and Nitrogen dioxide (NO₂).

The model is based on Gaussian diffusion equation and uses a mixing zone concept to characterize pollutant dispersion over the roadway. The model has been extensively tested for its predictive capability for traffic related air quality impacts. Given the source strength, meteorology, site geometry and site characteristics, the model can reliably predict pollutant concentrations for receptors located within 300 m of the roadway, the most important region for estimating the impacts due to the low elevation emissions.

The averaging time for model predictions is restricted to 60 minutes. The averaging time is so selected because the primary meteorological factors that influence the air quality predictions i.e. wind speeds and directions do not remain steady for longer time periods. Also, during the peak traffic hours, the traffic volumes typically show significant variations over periods longer than one hour. The long-term variations in AAQ scenarios during the project life are expected due to the change in traffic on the approach highway with time.

4.2.2.3 Vehicular Emissions

Estimate of CO and NO_2 emissions considering The "Emission Factor development for Indian Vehicles", as a part of Ambient Air Quality Monitoring and Emission Source Apportionment Studies by Automotive Research Association of India (ARAI)/CPCB has been made. It is assumed that all the vehicles plying on the road, comply with the limits set by CPCB. The considered vehicle emission factors for type - HCV Diesel Trucks, sub-type - >6000 cc is considered as in **Table 21**.

Table 21: Considered Vehicle Emission Factors

Doromotor	Emiss	Emission Factor				
Parameter	g/km	g/mile				
CO	19.32	31.09				
NO ₂	13.84	22.27				

Source: ARAI emission factors for Bharat Stage-II heavy vehicles (diesel)

4.2.2.4 Meteorological Conditions

The air quality scenarios were developed for all stability classes. The average wind speeds and the mixing heights for the particular stability class considered for the modelling studies are given in **Table 22**.



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Table 22: Meteorological Data Considered For Modelling

Atmospheric Stability Class	Valid Wind Speed (m/s)
1	< 4.0
2	< 5.5
3	< 1000
4	< 1000
5	< 5.5
6	< 4.5
7	< 3.5

Site monitored wind rose data has been considered for wind direction based worst case scenario study.

4.2.2.5 Receptors

A set of 10 receptor points were taken with a specified distance from the edge of the mixing zone width (road width + 3 m on each side of the road corridor) i.e. 1 m, 2 m, 5 m, 10 m, 15 m, 25 m, 50 m, 100 m, 150 m and 300 m from the edge of the road on both the sides to know the dispersion of pollutant from the road.

4.2.2.6 Summary of Inputs and Assumptions - CALINE4

Table 23: Summary of Inputs and Assumptions - CALINE4

S. No	Parameters	Values/Units	Source
1	Traffic Data (24-hours)	24 hourly	Manual Count
2	Emission Rates	g/mile	ARAI, 2007
3	Terrain type	suburban	Physically observed
4	Road geometry-	7 m +3 m x 2 =13	Physically observed
	mixing zone width (carriage width + 3 on both sides)	m	
5	Road geometry- Road alignment	straight	Google map
6	Road geometry- Road type	At-grade	Physically observed
7	Meteorological data- Wind Speed	m/s	Plant site-monitored data
8	Meteorological data- wind direction	360 deg (blowing from)	Plant site-monitored data
9	Meteorological data- Stability Class	1,2,3,4,5,6 or 7	Pasquil Stability Classification
10	Background Concentrations	microg/cum	Considering nil
11	Receptors	Nos	10 Nos: 1.0m, 2m, 5m, 10m,
			15m, 25m, 50m, 100m, 150m
			and 300 m from the edge of
			the road on both the sides

Source: Traffic Studies, BALPL





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4.2.2.7 Observations

Caline-4 model is used for predicting the concentrations of CO and NO₂. The model was run for all the stability class. The concentrations of the pollutants are predicted at 10 m to 300 m distance from the edge of the road.

Table 24: Predicted Emission Levels for Worst Case Scenario – 1 hour duration

S. No	Receptor	Distance of Receptor from Edge of the Road	CO Concentration (microg/cum)	NO₂ Concentration (microg/cum)
1	D1	-300	0	0
2	D2	-150	0	0
3	D3	-100	0	0
4	D4	-50	0.1	0
5	D5	-25	0.1	0
6	D6	-15	0.2	0
7	D7	-10	0.3	0
8	D8	10	0.3	0.02
9	D9	15	0.2	0.01
10	D10	25	0.1	0.01
11	D11	50	0.1	0.01
12	D12	100	0	0
13	D13	150	0	0
14	D14	300	0	0

It is observed from the predicted maximum concentrations occur under A stability class. As evident from the model results, the maximum impact of road traffic is limited to 25 m from the centre of the road only, which is generally away from sensitive receptors (settlements, etc.).

Thus, no major incremental concentrations due to the proposed proposal are envisaged.

4.2.3 <u>Evaluation of Adequacy of Road Network</u>

With present level of traffic and the increase in existing traffic due to the project during operational phase has been estimated by comparison with the recommendations stipulated by Indian Road Congress (IRC).

Based on evaluation of various coal source scenarios, it has been concluded that the approach roads shall be loaded with a maximum of 654 PCUs/day at a given time. (Please refer **Table 20**)



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To compare with permissible standards, the IRC recommendations on traffic capacity are presented below in **Table 25**.

Table 25: Recommendations on Traffic Capacity - IRC

S. No.	Category of Road	Maximum PCU/day
1	Two lane roads (7 m) with earthen shoulders	15,000
2	4-lane highway with earthen shoulders	35,000

The estimated peak traffic in terms of PCUs are far less, when compared with the stipulated standards by IRC for traffic capacity of the existing road network of less than 15,000 PCU/day. The existing road network is found adequate for the present traffic scenario.

4.2.4 Air Quality Impacts - Coal Handling System

The impacts are in terms of fugitive dust and coal handling. The processed coal mix is conveyed to the bunkers by covered conveyor belts and at transfer points, coal dust becomes air borne causing fugitive emissions. However, regular water sprinkling would be done at the site and dry fogging system has been provided over the conveyor belts to suppress the fugitive dust. The increase in fugitive dust will be insignificant.

The main pollutant emitted in the crushing and its storage process is fine coal dust (Particulate Matter). Though crushing operation is not a continuous one, but during its operation, large amount of coal dust is generated which will spread in the vicinity. AA has provided adequate dust extraction system and the increase in impact will be insignificant.

The plant fires pulverized coal, resulting in emission to ambient air from coal combustion. Due to change in coal, the changes in impacts are anticipated in the emissions of Particulate Matter (PM), Sulphur dioxide (SO_2) and Oxides of Nitrogen (NO_x). The various measures adopted to minimize the pollution from the power plant are as follows:

- a. One Electrostatic Precipitator (ESP) each has been provided for all the boilers.
- b. To facilitate wider dispersion of pollutants, stacks of 275 m height, each connected to three ESP units have been provided.
- c. The NO_x emissions from the boilers are controlled by controlling combustion measures, by way of low NO_x burners. The low NO_x burners have been designed to limit NO_x emissions.
- d. Fugitive dust is controlled by adopting dust extraction and dust suppression measures and development of greenbelt along the periphery of the plant.



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4.2.5 Solid Waste Impacts - Ash Generation

The ash generation quantity as per previously proposed and now proposed coal mix quality and quantities are given in **Table 26**.

Table 26: Ash Generation Quantity

Option	Coal Consumption MTPA	Max Ash Percentage %	Fly Ash Generation MTPA
Option-1:Domestic or Imported (EC Condition)	4.56	42	1.91
Option-2: 0-20% Imported, 80-100% Domestic	3.9	39	1.5

Computed for 100%PLF

It is clear from the above table that the proposed two options of change in coal mix will generate lesser quantities of ash than the existing EC option. However, as evident from the current ash content experienced at the plant based on test reports and ash generation details, the ash percentage is maintained around 34% with marginal increases based on the coal quality.

As per the Ash Utilization Notification, 2009 the ash utilization will be 100% from the 4th year onwards. AA will comply the Fly Ash Utilization Notification and as amended thereof. HIL was complying to the Notification by utilizing 100% fly ash till 2016 and recently started disposal of ash into the Ash pond and will explore maximum possibilities for ash utilization considering new technologies and avenues and try to achieve the target fixed by MoEF&CC in this regard.

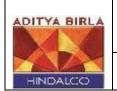
Ash utilization is being achieved through supplying to Cement Plants, road making, low lying area filling and ash bricks manufacturing units.

4.2.6 <u>Energy Conservation Measures</u>

Presently, Smelter consume 630 MW of electricity for its operation. There will be nominal increase in power consumption due to proposed pot rating enhancement. The Sp. Energy consumption is likely to be less.

Solar Power Plant

Aditya Aluminium is committed to the environmental aspects of business. Inline with its commitment, Aditya Aluminium has also been accorded in-principle approval for establishment of 30 MW solar power plant inside its premises.



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5.0 SUMMARY OF ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION

5.1 Impact Matrix

The project activities have been identified w.r.t. the present project proposal to draw a line of action for environmental impact analysis in Section 1.6, Chapter-1. Impact analysis has been done in **Table 27** and mitigation measures have been proposed subsequently.

Table 27: Project Aspect-Impact Matrix

				Identification of Positive/Negative Impacts				
			1	2	3	4	5	
S. No	Project Activity	Environmental Aspect	Change in Coal Source to CPP	Pot rating enhancement - Upgradation of amperage	Sale of molten metal	Sale of baked anodes	Sale of Bath Material	
1	Additional Cost	-			-			
2	Additional Resources	Molten metal carrying crucibles and dispatch units within the plant complex			-			
3	Energy Requirement	Reduction in Sp. energy consumption		+	+			
4	Source emissions	reduction of SO ₂ emissions by 20.8 g/s (0.9%)	+	No impact (In Sp. Emission)				
	Transportatio	No major incremental concentration predicted	-					
5	n impacts	Existing road network adequate for the present traffic scenario	-					
6	Material Handling System	Material storage and handling-fugitive emissions	-					
7	Solid Waste Generation	No significant change; reduction in ash generation envisaged	+					
8	Water requirement	No significant change						



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		Identification of Positive/Negative Impacts					
			1	2	3	4	5
S. No	Project Activity	Environmental Aspect	Change in Coal Source to CPP	Pot rating enhancement - Upgradation of amperage	Sale of molten metal	Sale of baked anodes	Sale of Bath Material
	and source						
9	Noise levels	No significant change					
10	Operating Safety	Industrial activities have operational risks, which are mitigated by well laid EHS practices by the Unit.					

Note: Positive impacts identified as '+'; Negative impacts identified as '-'

5.2 Summary of Impacts and Mitigation Measures

The summary of the anticipated adverse environmental impacts and possible mitigation measures due to proposed change in coal in CPP are given in the **Table 28.** The table further describes the mitigation measures to be taken and also identifies the probable sources of the pollution.

Table 28: Summary of Anticipated Environmental Impacts & Mitigation

Discipline	Potential Impacts	Mitigation measures
Air Quality Impacts due to Change in coal mix	Incremental AAQ emissions due to the proposed change in coal mix and will result in AAQ concentrations of less than NAAQ standards of 100 μg/m³ for PM and 80 μg/m³ for SO₂ and NO _x respectively.	 ESPs for controlling particulate emissions within the norms of 50 mg/Nm³ Existing mitigation measures, viz. Provision of stacks with adequate height of 275 m for wider
Air Quality	Increase in vehicular	emissions The resultant air quality will
due to	emissions and fugitive	confirm to the stipulated
additional	dust due to vehicular load	standards.
road traffic	on approach roads;	Plantation along the approach



Discipline	Potential Impacts	Mitigation measures
	AAQ will be effected only upto a stretch of <30 m on either side of approach road.	road.
Adequacy of approach roads	Approach highways are suitable for the transport of coal for present scenario. However, the roads may not be adequate with increase in population over the coming years (20-25 years)	 Monitoring of traffic, Maintenance of approach roads, Proposal for expansion of road over the years,
Ash Generation	Proposed change in coal mix will generate lesser ash quantities than the existing EC option.	AA was complying to the Notification by utilizing 100% fly ash till December 2016 and recently started disposal of ash into the Ash pond and will explore maximum possibilities for ash utilization considering new technologies and avenues and try to achieve the target fixed by MoEF&CC in this regard.
Energy consumption	Enhanced production capacity will result-in no changes in specific energy consumption.	Energy conservation measures have been proposed to mitigate the same



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6.0 ENVIRONMENT MANAGEMENT PLAN

6.1 Preamble

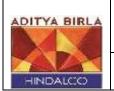
The EMP reflects the commitment of project to create an environmental friendly project. The potential impacts on the environment from the project are identified based on the nature of the various activities associated with the location, construction and operation of the proposed project and also on the current status of the environmental quality at the proposed area.

The EMP for the project is intended to be a living document that can be updated and continually monitored over the course of the project. Making changes to the EMP is an important aspect of improving a project's environmental management. EMP reviews are undertaken by following any major environmental incidents; at the completion of environmental audits and at the end of the project (to allow for improvements in subsequent projects). The review process is to be done by looking at the environmental controls and procedures to make sure they are still applicable to the activities being carried out. Reasons for making changes to the EMP are documented and a copy of the original EMP document and subsequent versions shall be kept for the project records. EMP measures w.r.t. Ambient Air Quality, ash management and greenbelt development to mitigate the environmental impacts w.r.t. the present Proposal have been discussed here.

6.2 Ambient Air Quality

Various efforts have been taken to reduce particulate matter levels in ambient air as summarized below:

- All the major stacks in Smelter and CPP have been installed with online emission monitoring analyzers. Installation of four (04) nos. of CAAQMS completed and commissioned. All the stack emission from operating units and ambient air monitoring stations synchronized with the webserver of the SPCB & CPCB with URL http://117.239.117.27/ospcbrtdas/ & http://113.19.81.38/cpcbrtdas/ respectively.
- Adequate number of de-dusting systems installed at ABF, Rodding shop, GAP, Alumina handling, Coke handling, Cathode sealing, Bath recycling, Carbon recycling shops and also confirm to the emission within the prescribed standard.
- The total fluoride emission from the plant (stack emission) is within the standard.
- For phase-I, two nos. of Fume Treatment Center in Anode Baking Furnaces installed to treat the fluoride, dust and tar in the fumes comes out of the ABF.
 The emission through the FTC is being kept below 0.3 kg per ton of Aluminium Produced.



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- Anodes with hooded cells are installed for reduction of fugitive losses
- 08 nos. of bag filters has been installed in the alumina handling system to reduce the secondary alumina emission. Besides this, alumina is being conveyed through pipe conveyors from alumina silo to FTC and from FTC to pots through Hyper Dense Phase System (HDPS) for control of fugitive loss and control pollution.
- De-dusting system provided at carbon recycling, ABF, GAP, Rodding, bath recycling, butts recycling etc. however, Gas Treatment System (GTC) has been installed in pot line area to treat the fumes comes out from the pots. Adequate measures taken in the shop floors to reduce the fugitive emission.
- De-dusting system, dust suppression system, dry fog system installed and is being operated continuously and effectively to control fugitive dust emission.
- Fugitive emissions due to material transfer, storage and handling shall be controlled efficiently for the proposed modifications within the plant premises.

6.3 Ash Management Plan

Approx. 4000 t of ash is being generated and 100% ash utilization is being achieved through supplying to Cement Plants, road making, low lying area filling/development and ash bricks manufacturing units.

The dust collected is stored in the fly ash and bottom ash silos respectively and supplied to M/s Ultratech & M/s OCL for cement making and supplied for utilization in road making in Sambalpur-Rourkela SH Expansion, brick making projects and remaining utilized in low lying areas inside the plant at approved locations.

HIL in India is spear-headed by its two R&D centers at Belgaum and Taloja, both recognized by the Council of Scientific & Industrial Research, CSIR, Govt. of India. Both centers' are ISO 9001:2000 certified, and Taloja has also been accredited in accordance with the standard ISO/IEC 17025:2005 by the National Accreditation Board for Testing and Calibration Laboratories (NABL). Aditya Aluminium have one central environment laboratory for both CPP & Smelter for testing of environmental pollution. However, efforts will be made to do some R&D activities in the lab.

170 ha land has been earmarked for ash disposal and will not be diverted for other use.

The proposed coal mix option shall result in reduction of ash generation. However, options for 100% ash utilization are being explored by AA.



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6.4 Greenbelt Details

Aditya Aluminium has already initiated actions related to development of Greenbelt along the Core plant, Township boundary (West) and along the approach road inside township area. Efforts are made for plantation of indigenous trees and maintenance of the same so as to increase the rate of survival.

Greenbelt plan of the plant complex is depicted in Figure 6.

A Central Nursery has been developed inside the project area and 1,50,000 saplings are ready for plantation. The total project area is around 3328 acres, out of which, > 2 lakhs nos. of plantation done in an area of approx. 320 acres. There is more than 95% survival of trees in the project area. Suitable Bamboo plantation carried out within the plant premises. Drip irrigation technique has been adopted for irrigation.

Photographs depicting greenbelt development at site are given in Figure 7.

6.5 Environmental Awareness & Training

- Induction Training To all the new Joinees
- Training on Hazardous & other waste Management to all the employees.
- Training on environment incident reporting to all the employees and contract workers.
- Shop Floor training to employees on workplace environment management.
- Employee involvement in plantation for green belt development (1 plant/employees/year).
- Celebration of World Environment Day and Vanmahostav

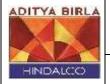
6.6 Sustainable Initiatives

- Bio-digester is installed and commissioned. Food waste upto 100 Kg per day feed to the digester, which will generate 10-12 Kg of Gas per day.
- Mechanical sweeper for cleaning of all Roads
- Water tanker deployed in CHP and ash transportation roads to suppress road dust.
- Gun Sprinkler and Dry fog system in CHP
- Fugitive Dust Monitoring is carried out
- Noise level Monitoring
- Color coded waste bins used

Recently, Pollution Control Excellence Award under Category-Industry has been awarded to M/s Aditya Aluminium, Lapanga. (Please refer **Figure 13**).



Figure 10: Greenbelt Development Plan





Greenbelt development 2016-17, Plantation at different locations



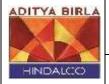




Banamahotsav celebration at Cast house 2016

Figure 11: Project Site Greenbelt Development Photographs









Bio-Digester For Food Waste









Figure 12: Green Initiatives at the Plant Complex







Figure 13: Pollution Control Excellence Award to M/s Aditya Aluminium



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7.0 CONCLUSIONS

7.1 Change in Source Coal

By using mix coal from alternate sources such as captive mines, linkage Coal, Coal from open market, E-auction, Imported coal to top up and enhance the fired coal CV to achieve the minimum required fired coal CV suitable to Boiler in case when Indian coal CV comes lower due to bad quality in domestic coal, there will not be significant impact in air quality owing to higher GCV and lesser quantity of coal consumption. Further, the ash generation will be reduced, owing to lesser ash percentage in the proposed coal mix.

The plant is already fully equipped with effective pollution control measures and environmental management action plan. In view of considerable benefits from the project to the sustainable development of the region, the proposed change of coal mix is most advantageous and beneficial.

7.2 Increase in Production

The proposed production enhancement includes increase in metal production to 380 KTPA by enhancement in Pot Production, i.e., Upgradation of amperage.

Following raw materials and other requirements have been envisaged for the proposed production enhancement:

- Alumina Specific Alumina consumption will remain same, however, AA will require 36,394 MTPA of additional alumina to meet this enhanced volume.
- Power Existing installed capacity will be sufficient
- Water No additional requirement. Water consumption will be within the approved limit of 52.73 cusecs
- Coal Change in coal source requested
- **Carbon** AA will require 7,772 MTPA of additional Carbon to meet this enhanced volume without any change in Specific Consumption.
- Aluminium Fluoride Plant's Fluoride Consumption will remain within approved limit of 10 kg/MT of Aluminium (CREP Guidelines) with additional ALF₃ consumption of 307 MTPA
- Land No additional requirement;



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- Capital Investment No additional Capital Investment is needed to meet this enhanced production capacity
- **Manpower** No additional Manpower requirement
- Addition of New Equipment None
- Change in Product Portfolio None

7.2.1 Changes in Pollution Load

- **ETP** Since there is no additional requirement of water for this enhanced production capacity, no change in Water Pollution Load.
- Fluoride Level Since the increase in production capacity is very marginal (5.5%), with the existing Gas Treatment Centre, we will be able to maintain Fluoride Emission within approved limit of 0.8 kg/T, mentioned in the EC.
- **PAH Level** No change. Will remain within the approved limit with existing Fume Treatment Centre.
- Spent Pot Lining No additional generation, as there is no increase in number of Pots.

Hence, from the above points, it is clear that AA can achieve this additional production capacity without any negative impact to environmental systems.

7.3 Sale of Molten Metal, Baked Anode and Bath Material

The proposal for sale of molten metal, baked anode and bath material will not create any additional pollution load. Rather the sale of molten metal will conserve energy.

The proposed minor developments in the plant operation shall lead to increase in production based on technical feasibility options evaluated. The incremental pollution levels due to increase in production shall be within the permissible limits.



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