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VL/MoEF/006/2022-016
May 31, 2022

The Director
I.A. Division
Ministry of Environment, Forest & Climate Change
Indira Paryavaran Bhawan
Jor Bagh Road
New Delhi-110003

Sub.: **Submission of Half Yearly Compliance Report and Environment Quality data of Smelter & CPP of Vedanta Limited, Jharsuguda for the period from October 2021 to March 2022**

Ref.:
1. **Environment Clearance letter No. J-11011/144/2006-IA.II (I) dated 07.03.2007**
2. **Environment Clearance letter No. J-13011/10/2006-IA.II (T) dated 14.03.2007**
3. **Environment Clearance letter No. J-11011/29/2007-IA.II (I) dated 11.06.2008**
4. **Stipulation of additional conditions in respect of Mega Projects already granted Environment Clearance- regarding, Office memorandum letter No. J-11013/41/2006-IA.II (I) dated 06.04.2011**
5. **Change in conditions stipulated in Environment Clearances of Thermal Power Plants and Coal Mines in line with the Fly Ash Notification and subsequent amendments, Office Memorandum no. F.No. 22-13/2019-IA.III- dated 28.08.2019**

Dear Sir,

This has reference to the above subject and cited references. As per the provision of Environment Clearance and EIA notification 2006, we are herewith submitting the half yearly compliance status for conditions in the Environment Clearance for 2.5 LTPA Aluminium Smelter in **Annexure–I,** Captive Power Plant 675 MW in **Annexure–II**, expansion of Aluminium Smelter (2.5 to 16 LTPA) and Captive Power Plant (675 MW to 1350 MW) in **Annexure-III,** the compliance status of the additional conditions stipulated for the mega projects already granted Environment Clearance in **Annexure-IV** and the compliance status of the change in conditions stipulated in Environmental Clearances of Thermal Power Plants and Coal Mines in line with Fly Ash Notification and subsequent amendments in **Annexure-V** for Smelter & CPP of Vedanta Limited, Jharsuguda. The environment quality data including stack emission, ambient air quality, noise, water quality (surface, ground and industrial effluent), and soil analysis and forage fluoride in and around the plant premises is also submitted in **Annexure-VI** for your records.

Thanking you,
Yours faithfully,
For Vedanta Limited

Ashok Kumar Mishra
Head- Env. Compliance & Strategy

Encl.: Annexure I, II, III, IV, V & VI
Copies to:
1. The Additional Director, Ministry of Environment, Forests & Climate Change, Regional Office, Odisha, Bhubaneswar
2. The Member Secretary, Central Pollution Control Board, New Delhi
3. The Member Secretary, State Pollution Control Board, Odisha, Bhubaneswar

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CIN: L13209MH1965PLC291394

Annexure I

Compliance Status
On

Environment Clearance of Aluminium Smelter 2.5 LTPA

VEDANTA LIMITED, JHARSUGUDA

Compliance Status on

Environmental Clearance – 2.5 LTPA Smelter vide letter No. J-11011/144/2006-IA-II (I) dated 7th March 2007

Sl. No.	CONDITIONS	COMPLIANCE STATUS
SPECIFIC CONDITIONS		
1.	The gaseous emissions from various process units shall confirm to the standards prescribed by the concerned authorities from time to time. The OSPCB may specify more stringent standards for the relevant parameters keeping in view the nature of the industry and its size and location. At no time the emissions level shall go beyond the prescribed standards. In the event of failure of any pollution control system adopted by the unit, the respective unit shall not be restarted until the control measures are rectified to achieve the desired efficiency. The particulate emissions from the bake oven plant shall not exceed 50 mg/ NM^3.	The gaseous emissions from various process units are confirming to the prescribed standards. The particulate matter emission from Bake Oven ranges between 3.5 to 5.6 mg/Nm^3. In case of failure of any of the pollution control system of any unit, the respective unit will be started only after the control measures are rectified and achieve the desired efficiency.
2.	Particulate fluoride emissions shall not be more than 0.65 mg/ NM^3 and fugitive particulate fluoride emissions from pot room shall not be more than 1.85 mg/ NM^3.	The particulate fluoride emission and fugitive particulate fluoride emission monitored were within 0.65 mg/ NM^3 and 1.85 mg/NM^3 respectively.
3.	In-plant, control measures for checking fugitive emissions from spillage /raw materials handling shall be provided. Fugitive fluoride emissions from the pot room and in the forage around the smelter complex shall be monitored and data submitted regularly to the Ministry's Regional Office at Bhubaneswar and OSPCB. Further dry scrubbing system to control the emissions from the pot lines shall be provided. Total fluoride emissions shall not exceed 0.8 kg/ton of Aluminium produced. Further, the pot emissions through fume treatment plant shall not exceed 0.30 kg/ ton of Aluminium produced.	We have provided dry scrubbing system and State of the art gas collection and handling system to extract the gaseous emissions generated in the process of aluminium smelting and baking of anodes to maintain the total fluoride emissions below the stipulated standards of 0.8 kg/T of aluminium produced. Fugitive fluoride emissions from the pot room and forage fluoride in the surrounding villages are being monitored regularly. The fluoride emissions through the fume treatment plants is being maintained below <0.3 Kg/T in case of pot rooms and <0.1 Kg/T in case of bake oven. The monitoring report is being submitted periodically to the Ministry's Regional Office.
4.	The company shall install bag-filters, dry scrubbing system, dust suppression system to control the emissions from all melting and casting units. The emissions shall conform to the standards prescribed by the ministry /CPCB /SPCB whichever is more stringent.	The furnace provided in the cast house for melting and holding of metal are electrically operated and no fuel burning is done. Therefore, provisions of bag filters, dry scrubbing system, dust suppression system etc. has not been done.

<table>
<tr><td>5.</td><td>The poly-aromatic hydrocarbons (PAH) from the carbon plant (anode bake oven) shall not exceed 2 mg/Nm^3. The data on PAH shall be monitored quarterly and report submitted regularly to the Ministry, it's Regional Office at Bhubaneswar and OSPCB.</td><td>PAH is being monitored in the stack emission of Bake Oven and is found in the range of 0.12 to 0.21 mg/Nm^3. The same is monitored regularly and the report is submitted quarterly to the Regional office of the Ministry and monthly to the OSPCB.</td></tr>
<tr><td>6.</td><td>Fluoride consumption shall be less than 10 kg/ton of Aluminium produced as specified in the CREP guidelines.</td><td>We have adopted the state-of-the-art prebaked technology with dry scrubbing system. Average fluoride consumption for the period October 21 to March 22 is 10.45 kg/MT Al. The action plan to achieve the fluoride consumption below 10 kg/T of Aluminium produced is given below:
<table>
<tr><th>Sl. No.</th><th>Key Focus Area</th><th>Control Measure</th><th>Methodology</th><th>Target Date</th><th>Impact (Kg/T)</th><th>Fluoride Consumption (Kg/T)</th></tr>
<tr><td>1</td><td>Input Control</td><td>Procurement of low sodium content alumina</td><td>Increasing the proportion of low sodium alumina.</td><td>Dec ’21</td><td>1.0</td><td>9.78</td></tr>
<tr><td>2A</td><td>Emission Control</td><td>Fume Treatment Plant (FTP 1) Revamping in Smelter 1</td><td>Improved re-circulation feeder</td><td>Jul’22</td><td>0.1</td><td>9.68</td></tr>
<tr><td>2B</td><td>Emission Control</td><td>Revamping in Smelter 1 (Balance 3 FTPs)</td><td>Improved re-circulation feeder</td><td>Mar’23</td><td>0.3</td><td>9.38</td></tr>
<tr><td>3</td><td>Performance Improvement</td><td>Smart Pot Implementation through GE</td><td>Advanced Analytics by Pot Digital Twin</td><td>Mar’23</td><td>0.1</td><td>9.28</td></tr>
<tr><td>4</td><td>Thermal Balance Optimization</td><td>Development of Indigenous Pot Controller</td><td>Tweaking the pot controller logic to get better AlF3 feed control and thermal balance</td><td>Apr’23</td><td>0.4</td><td>8.88</td></tr>
</table></td></tr>
</table>

7.	The spent pot lining generated from the smelter shall be properly treated by setting up of spent pot lining treatment plant to remove fluoride and cyanide and disposal off in secured landfill. The location and design of the landfill site shall be approved by the OSPCB as per Hazardous Wastes (Management and Handling) Rules, 2003. Leachate collection facilities shall be provided to the secured landfill facility (SLF). The dross shall be recycled in the cast house. Fly ash and bottom ash shall be disposed off in concentrate form to the ash pond shall be provided to the cement/ brick manufacturing unit. STP sludge shall be utilized as manure for green belt development. All the used oil and batteries should be sold to the authorized recyclers/ reprocessors.	• The SPL generated from our smelter is being sent to OSPCB authorized agency M/s Green Energy Resources located at Sambalpur for detoxification which in turn is sending the detoxified material for further utilization in various industries including cement and steel. The refractory portion is being stored under covered shed till an approved disposal mechanism is in place. • The secured landfill has been constructed including leachate collection system and collection of surface run off around the SLF to a common sump from where it is taken to the ETP for treatment. • The dross generated is either being internally processed for metal recovery or being sold to authorized re-processors. • Currently Fly ash is being utilized in various avenues such as cement and brick manufacturing, road and infrastructure development, reclamation of low- lying areas, quarry back filling etc. and the balance is being sent to ash ponds through High Concentrated slurry disposal pipelines. We are in the process of exploring alternate options/avenues for fly ash utilization. • STP sludge is composted and used for green belt/ green cover. • Used batteries and Used oil is being stored in designated sheds and is disposed to authorized recyclers/ re-processors.
8.	Regular groundwater monitoring shall be carried out by installing Peizometers all around the secured land fill site in consultation with the OSPCB / SGWB /CGWB and data submitted to the Ministry's Regional Office and OSPCB.	Piezometers have been installed and the ground water monitoring around the SLF area is being done as per the CPCB guidelines and the same is being reported to SPCB and Regional Office of the Ministry.
9.	The total water requirement from Hirakud Reservoir shall not exceed 6,240m^3/day as per the permission accorded by the State Govt. Reverse Osmosis plant shall be installed to treat effluent from cooling tower blow down and recycle to raw water reservoir for further	Currently the drawl of water from the Hirakud reservoir for 2.5 LTPA smelter operation is within 6240 m^3/ day, which is below the water allocation received from the Water Resources Department, Govt of Odisha. Water conservation measures are being adopted to reduce the

	utilization for fire protection, dust suppression, gardening etc. ETP and RO permeate will be recycled back. The rejects from the RO plant shall be disposed off in the HDPE lined secured landfill (SLF) within smelter premises. Domestic effluent shall be treated in Sewage treatment Plant (STP). No effluent shall be discharged during the non-monsoon period and shall be discharged during monsoon period, only after proper treatment and meeting the norms of the OSPCB/CPCB.	water consumption. Reverse Osmosis plant has been installed and the treated effluent is recycled completely. The rejects are evaporated in solar ponds. Domestic effluent is treated in the sewage treatment plant and reused for green belt development. No effluent is being discharged outside. However, during monsoon period, treated effluent post meeting the standards prescribed by OSPCB/CPCB is being discharged in case of exigency.
10.	Green belt of adequate width and density around the project site shall be developed in 117.5 ha (33%) out of total 355.47 ha. in consultation with the DFO as per the CPCB guidelines having density of 2000 trees/ ha.	Green belt/cover has been developed in 33% of the area (275 Ha) and density has been increased to 2500 trees/ha by doing gap filling.
11.	Occupational Health Surveillance of the workers should be done on a regular basis and records maintained as per the Factories Act.	The periodic health check-up of the workers is being undertaken regularly. The same is also undertaken as a part of pre-employment medical examination and records being maintained as per the Factories Act.
12.	The company shall develop rainwater structures to harvest the runoff water for recharge of groundwater in consultation with the Central Ground Water Authority /Board.	The groundwater level as measured at plant site ranges between 2.53 to 3.18 m bgl. As per CGWA guidelines, industries falling under hazardous category should not implement any recharge measures within the plant premises. Hence, we have carried out roof top rainwater harvesting facilities at our site to utilize the collected/harvested water. Four numbers of Roof Top Rainwater Harvesting facilities have been installed at Smelter & CPP with a capacity of harvesting 6876 m3 water.
13.	Rehabilitation and Resettlement Plan prepared and submitted to the state Govt. shall be implemented as per the R & R Policy of the State Government. All the recommendations mentioned in the R & R Plan shall be strictly followed including suitable employment and other facilities to all the oustees.	The R & R Package has been finalized by the RPDAC based on Odisha Government's R & R Policy 2006. This approved package is being implemented fully under the supervision of District Administration. There are 148 PDF's who have been provided with a house and other facilities as per the RPDAC. We have also provided certain additional facilities apart from the RPDAC requirement.

14.	The environmental clearance for the 675 MW captive power plant (5 X 135) from the Ministry shall be obtained before initiating construction work and operation of the proposed smelter plant.	We have received the Environmental Clearance for the 675 MW CPP vide letter no J-13011/10/2006-IA.II (T) dated 14th March, 2007.
15.	All the recommendations made in the Charter on Corporate Responsibility for Environment Protection (CREP) for the Aluminium sector shall be strictly implemented.	All recommendations as per CREP for Aluminium sector are being implemented **(Annexure-A).**
16.	Ministry of Environment and Forests shall regularly be informed about the source and quantity of bauxite ore produced from captive /indigenous /imported sources.	The main raw material for Smelting is alumina and not Bauxite. The source of Alumina is from our alumina refinery located at Lanjigarh and other imported sources.
17.	Bauxite ore shall be obtained only from those mines, which have been accorded environmental clearance by the Ministry of Environment and Forests.	We are not procuring any bauxite ore as alumina is the main raw material for aluminum smelting. Alumina sourced within India is from refineries that have been granted Environment Clearance by MoEF&CC.
18.	Seven reserve forests are located around the project site. While transporting bauxite ore from captive /indigenous /import sources, prior permission from the State Forest Department shall be obtained due to likely impact of transport of ore to the smelter site on the reserve forests and wildlife.	As already stated, this plant is not using bauxite ore. Alumina is being transported through existing rail and road networks through wagons and bulkers (which are closed containers). Therefore, no impact exists due to transportation on the reserve forest. The mitigation measures for conservation of flora and fauna are being implemented as per the approved site-specific Wildlife conservation plan vide letter no. 4488/7WL-FD & WLC -32/2021 dated 30th April 2021.
19.	Recommendations regarding mitigative measures suggested by the State Forest Department and Chief Wildlife Warden, Govt. of Orissa shall be strictly followed.	The recommended mitigative measures as per the approved site - specific Wildlife conservation plan vide letter no. 4488/7WL-FD & WLC-32/2021 dated 30th April 2021 is under implementation.
20.	The forest and Environment Department, Govt. of Odisha shall undertake the carrying capacity of the region at the expense of the Project Proponents by associating the Wildlife Institute of India, Dehradun having regard to all relevant aspects including the impact of existing plants on elephants and their movement.	As directed by the Ministry a study on "Establishing Elephant Corridors in Jharsuguda Sambalpur region of Odisha" by IISc. has been undertaken by the group company erstwhile M/s. Sterlite Energy Limited. The report has been submitted to Director, Project Elephant, MoEF and CWLW & PCCF, Govt. of Odisha for necessary vetting. The conclusion of the study is detailed in Chapter 5, Pg. 27 and reads as "We therefore do not recommend the establishment of any corridor through this virtually nonexistent (or non viable) habitat in the Sambalpur North Forest Division. We strongly recommend that the

		overall viability of the Sambalpur Elephant Reserve is strengthened in the Sambalpur South Forest Division."
21.	In case the Govt. of Orissa comes up with the proposed elephant reserve, the same may be informed to the Ministry for imposing additional safeguards, if any.	In case of any upcoming/proposed elephant reserve by Govt. of Odisha, the same will be intimated to the Ministry.
GENERAL CONDITIONS		
1.	The project authorities must strictly adhere to the stipulations made by the Orissa State Pollution Control Board and the State Government.	We are strictly adhering to the stipulations made by OSPCB.
2.	No expansion or modification in the plant should be carried out without prior approval of the Ministry of Environment and Forests.	No expansion or modernization will be undertaken without prior approval of the Ministry.
3.	Adequate number of ambient air quality monitoring stations should be established in the downward direction as well as where maximum ground level concentration of SPM, SO_2 and NO_x are anticipated in consultation with the OSPCB. Data on ambient air quality and stack emission should be regularly submitted to this Ministry including its Regional office at Bhubaneswar and Orissa State Pollution Control Board once in six months.	Adequate no of AAQ monitoring stations have been established around the Smelter and CPP complex in consultation with the Odisha State Pollution Control Board. These stations have been fixed in line with the CPCB guidelines. Monitoring data is submitted periodically to the Regional office of the Ministry and OSPCB. Apart from this, 4 no. of Continuous Ambient air Quality Monitoring Stations have been installed around Smelter & CPP Complex.
4.	Industrial wastewater should be properly collected, treated so as to conform to the standards prescribed under GSR 422 (E) dated 19th May, 1993 and 31st December, 1993 or as amended from time to time. The treated wastewater should be recycled in the plant as well as utilization for plantation purposes.	The wastewater generated from the plant is collected and treated in the effluent treatment plant to conform to the prescribed standards. The treated water is being recycled and reused in the plant.
5.	The project authorities must strictly comply with the rules and regulations with regard to handling and disposal of hazardous wastes in accordance with the Hazardous Wastes (Management and Handling) Rules, 2003. Authorization from OSPCB must be obtained for collection, storage, treatment and disposal of hazardous wastes.	We are strictly complying with the rules and regulations with regard to handling, collection, transport, treatment, storage and disposal of Hazardous waste in accordance with the Hazardous Wastes (Management and Handling) Rules, 2016 and are having a valid Hazardous waste authorization for the management of Hazardous wastes from OSPCB.
6.	The overall noise levels in and around the plant area should be kept well within the standards (85 dBA) by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all sources of noise generation. The ambient noise levels should conform	The overall noise levels are being maintained below the stipulated standards as per EPA Rules, 1989. The ambient noise levels monitored are observed within 55.3 dB(A) to 74.1 dB(A) during day time and 50.60 dB(A) to 69.70 dB(A) in night time.

	to the standards prescribed under EPA Rules, 1989 viz. 75 dBA (daytime) and 70 dBA (nighttime).	
7.	The project proponent shall also comply with all the environmental protection measures and safeguards recommended in the EIA / EMP / risk analysis and DMP report.	All environmental protection measures and safeguards as recommended in the EIA/EMP/risk analysis and DMP are being implemented.
8.	Rs. 193.46 Crores and Rs. 2.60 Crores have been earmarked toward the capital cost and Rs. 1.20 Crores towards the recurring the expenditure /annum for environmental protection measures. The fund so provided shall be used judiciously to implement the conditions stipulated by the Ministry of Environment and Forests as well as the State Government. The funds so provided shall not be diverted for any other purposes.	About 198.5 crores have been spent towards installation of environmental control and monitoring systems. The budget allocated for green belt development of Rs. 2.60 crores has been utilized only for the purpose. Every year the budget is separately allocated for the O&M of the pollution control and monitoring systems which is not diverted for any other purpose.
9.	The Regional office of this Ministry at Bhubaneswar / Central Pollution Control Board /OSPCB will monitor the stipulated conditions. A six-monthly compliance report and the monitored data along with statistical interpretation should be submitted to them regularly.	A six-monthly compliance report on the EC conditions along with the environment monitoring report is being periodically submitted to the Ministry Regional Office, CPCB and SPCB.
10.	The Project Proponent should inform the public that the project has been accorded environmental clearance by the Ministry and copies of the clearance letter are available with State pollution Control Board/ Committee and may also be seen at Website of the Ministry of Environment and Forests at http://enfor.nic.in This should be advertised within seven days from the date of issue of the clearance letter at least in two local newspapers that are widely circulated in the region of which one shall be in the vernacular language of the locality concerned and a copy of the same should be forwarded to the Regional Office.	Complied
11.	The Project Authorities should inform the Regional Office as well as ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of commencing the land development work.	Plant is in operation.

Annexure II

Compliance Status
On

Environment Clearance of Captive Power Plant (CPP)-675 MW

VEDANTA LIMITED, JHARSUGUDA

Compliance Status on

Environmental Clearance – CPP 675 MW vide letter no. J-13011/10/2006-IA-II(T) dated 14th March 2007

Sl. No.	CONDITIONS	COMPLIANCE STATUS
1.	All the conditions stipulated by Orissa State Pollution Control Board vide their letter no. 8064/ ind-II-NOC-3633 dated 31.03.2006 shall be strictly implemented.	All the conditions stipulated by Odisha State Pollution Control Board vide their letter no. 8064/ ind-II-NOC-3633 dated 31.03.2006 has been implemented strictly.
2.	The total land requirement shall not be exceed 233.92 ha for all the activities/ facilities of the power project put together.	The total land on which the Plant facilities of CPP has been set up within 233.92 ha.
3.	Ash and sulphur contents in the coal to be used in the project shall not exceed 41.6% and 0.5% respectively.	The average ash and sulphur contents in the coal during the period is 44.61% and 0.22% respectively.
4.	One multi-flue stack of 275 m height shall be provided with continuous online monitoring equipments. Exit velocity of at least 23.6 m/sec shall be maintained	One multi-flue stack of 275 m height with online monitoring system has been provided. Exit velocity of minimum 23.6 m/sec is being maintained.
5.	High efficiency Electrostatic Precipitators (ESPs) with efficiency not less than 99.9% shall be installed to insure that particulate emission does not exceed 100 mg/NM^3. It shall also be ensured that the AAQ levels in the notified ecologically sensitive areas including Reserve forests and Sanctuaries falling in the impact zone of the project do not exceed the prescribed standards for these areas.	ESP's of 99.9% efficiency have been provided. The upgradation of ESPs of 9x135 MW Captive Power Plant with hybrid ESP (ESP followed by bag filters) to ensure emissions below the stipulated limit has been completed. The Particulate emissions are within 50 mg/Nm^3.
6.	Space provision shall be made for Flue Gas De-sulphurisation (FGD) unit, if required at a later stage.	Necessary space has been earmarked for setting up of Flue Gas De-sulphurisation Plant (FGD).
7.	Closed Circuit Cooling system with Cooling Towers shall be provided. COC shall be optimized for ensuring water conservation.	Closed circuit cooling system with cooling towers (IDCT) has been provided and an optimum level of COC is being maintained as part of water conservation measures.
8.	Environmental clearance is subjected to obtaining clearance under the Wildlife (Protection) Act, 1972 from the Competent Authority.	The project does not fall either in a National Park or a Wildlife sanctuary. Wildlife (Protection) Act, 1972 is not applicable in our case.
9.	Environmental clearance is subject to final order of the Hon'ble Supreme Court of India in the matter of Goa Foundation Vs Union of India in Writ Petition (Civil) No. 460 of 2004 as may be applicable to this project.	Not Applicable at present.
10.	A conservation plan for Schedule-I animals reported in the study area of the project, shall be prepared in consultation with an expert	The site specific wildlife conservation plan for Schedule -I fauna reported in the study area of the project, has been prepared by

	organization like Wildlife Institute of India at Dehradun and duly approved by State Wildlife Department of Orissa. A copy of the same shall be submitted to the Ministry and the regional Office at Bhubaneswar within six months of the date of issue of this letter. The plan so prepared shall be implemented effectively. Necessary allocation of funds for the same shall be made and will be included as project cost.	empaneled consultant of State Wildlife Department, Odisha and the same has been approved by Chief Wildlife Warden , Odisha/PCCF (Wildlife) vide letter no. 4488/7WL-FD & WLC – 32/2021 dated 30th April 2021.An amount of 610.894 lakhs has been earmarked towards implementation of this plan over a period of 10 years.
11.	Adequate dust extraction such as bag filters and water spray system in dusty areas such as coal and ash handling areas, transfer areas and other vulnerable areas shall be provided.	Necessary dust extraction and dust suppression system such as rain guns, water sprinklers, mist cannons etc. have been provided to suppress/collect the dust generated in coal and ash handling areas including transfer point.
12.	Fly ash shall be collected in dry form and ash generated shall be used in a phased manner as per provisions of the notification on Fly ash utilization issued by the ministry in September 1999 and its amendment. By the end of 9th year full fly ash utilization should be ensured. Unutilized ash shall be disposed off in the ash pond in the form of High Concentration Slurry.	Fly ash is being collected in dry form in two silos each of 1500 m3 capacity for supply to downstream users like cement and brick manufacturing, further two more silos each of 1500 m^3 capacity has been constructed. Currently ash is being utilized in cement and brick manufacturing, road and infrastructure activities, reclamation of low lying areas, quarry back filling and the balance ash is being sent to ash pond through High Concentrated Slurry Disposal pipelines.
13.	Ash pond shall be lined with impervious lining to avoid leaching into ground water. Adequate safety measures shall also be taken so that pond ash does not become air borne to air pollution in the surrounding areas.	With the implementation of High Concentration Slurry Disposal system, water in the slurry will be minimum thereby making the entire mass a rock like structure so that no water will be available for leaching into ground and the ash will not get airborne. This method of disposal is such that there will be no pressure on the bunds making it vulnerable for a breach. Further, proper design of the dyke through reputed consulting firm/institution, appropriate remediation for breach management and communication process followed in case of eventuality. The ash pond has been lined with impervious clay/ HDPE lining to avoid any leaching into ground water.
14.	Rainwater harvesting shall be practiced. A detailed scheme for rainwater harvesting to recharge the groundwater aquifer shall be prepared in consultation with Central Ground Water Authority / State Ground Water Board and a copy of the same will be submitted within three months to the Ministry.	The groundwater level as measured at plant site ranges between 2.53 to 3.18 m bgl. As per CGWA guidelines, industries falling under hazardous category should not implement any recharge measures within the plant premises. Hence, we have carried out roof top rainwater harvesting facilities at our site to utilize the

		collected/harvested water. Four numbers of Roof Top Rainwater Harvesting facilities have been installed at Smelter & CPP with a capacity of harvesting 6876 m3 water.
15.	The treated effluents conforming to the prescribed standards shall be re-circulated and reused within the plant. There shall be no discharge outside the plant boundary. In case of emergency, only 30 m^3/hr discharges from the plant may be done in the drain.	The effluent generated in CPP (9 x 135 MW) is from CTBD, BBD and DM plant back wash which is recycled after necessary treatment in ash handling system for slurry preparation, for water sprinkling in coal yard and for service water requirement and in case of exigency, treated wastewater is discharged after meeting the prescribed standards/norms.
16.	Regular monitoring of groundwater in and around the ash pond area shall be carried out, records maintained, and quarterly reports shall be furnished to the Regional Office of this Ministry.	Ground water monitoring in the villages around the ash pond is being undertaken and the quarterly report is being submitted to the Regional Office of the Ministry, apart from four piezometric bore wells around the ash pond. The list of ground water monitoring locations in the villages along with direction in respect of the ash pond in use is as under – Gudigaon (N), Kurebaga (N), Siriapali (NE) Katapali (NW), Katikela (SE), Bhurkhamunda (SW), R&R colony (NW),Tumbakela (W), Brundamal (NW), Sripura(S)
17.	A 50 m wide greenbelt shall be developed all along the plant and ash pond boundary covering 1/3rd of the total area.	Green belt/cover has been developed in 33% of the area (275 Ha) and density have been increased to 2500 trees/ha by doing gap filling.
18.	First aid and sanitation arrangements shall be made for the drivers and other contract workers during construction phase.	First aid and sanitation facilities have been provided to all the drivers and contract workers in the construction phase.
19.	Leq of Noise level should be limited to 75 dBA and regular maintenance of equipment be undertaken. For people working in the high noise areas, personal protection devices should be provided.	The equipment procured are low noise generating and wherever the noise levels are on the higher side (turbines) enclosures have been provided to reduce the impact. Apart from these measures Personal Protective Equipment have been provided to all the personnel working in high noise areas. Periodic maintenance of the equipment is also being undertaken.
20.	Regular monitoring of the ambient air quality shall be carried out in and around the power plant and records maintained. The location of the monitoring stations and frequency of monitoring shall be decided in consultation with SPCB. Quarterly reports shall be submitted to the	Adequate no. of AAQ monitoring stations have been established around the CPP and Smelter complex in consultation with the State Pollution Control Board, Odisha. These stations have been fixed in line with the CPCB guidelines. Monitoring data is submitted

	Regional Office of this Ministry.	periodically to the Regional office of the Ministry and OSPCB. Apart from this, 4 numbers of Continuous Ambient Air Quality Monitoring Stations have been installed.
21.	The project proponent shall advertise in at least two local newspapers widely circulated in the region around the project, one of which shall be in the vernacular language of the locality concerned, informing that the project has been accorded environmental clearance and copies of clearance letters are available with the State Pollution Control Board/ Committee and may also be seen at the Website of the Ministry of Environment and Forests at http://envfor.nic.in.	Complied
22.	A separate environment monitoring cell with suitable qualified staff should be set up for implementation of the stipulated environmental safeguards.	A separate Environment Management Cell with qualified personnel is in place for implementation of environmental safeguards.
23.	Half yearly report on the status of implementation of the stipulated conditions and environmental safeguards should be submitted to this Ministry, Regional Office, CPCB and SPCB.	Half yearly report on the status of implementation of the conditions is being submitted to the Ministry, Regional office, CPCB and OSPCB regularly.
24.	Regional Office of the Ministry of Environment and Forests located at Bhubaneswar will monitor the implementation of the stipulated conditions. Complete set of Environmental Impact Assessment Report and Environmental Management Plan along with the additional information submitted from time to time shall be forwarded to the Regional Office for their use during monitoring.	Complete set of EIA & EMP along with all relevant information has been submitted to the Regional Office of the Ministry. Any additional information required will be provided from time to time.
25.	Separate funds should be allocated for implementation of environmental protection measures along with item-wise break-up. This cost should be included as part of the project cost. The funds earmarked for the environment protection measures should not be diverted for other purposes and year-wise expenditure should be reported to the ministry.	Separate fund has been allocated for implementation of the Environmental Protection measures and will not be diverted for other purposes.
26.	Full co-operation should be extended to the Scientists /officers from the Ministry/ Regional Office of the Ministry at Bhubaneswar / the CPCB /the SPCB who would be monitoring the compliance of environmental status.	We shall extend full co-operation to the scientists/ officers from the Ministry/ Regional Office/ CPCB and OSPCB who would be monitoring the compliance of Environmental status.

Annexure III

Compliance Status
On

Environment Clearance of Expansion from 2.5 LTPA to 16 LTPA Smelter and
675 MW to 1350 MW Captive Power Plant

VEDANTA LIMITED, JHARSUGUDA

Compliance Status on

Environmental Clearance – Expansion of Aluminium Smelter (2.5 to 16 LTPA) and CPP (675 MW to 1350 MW) vide letter no. J-11011/29/2007-IA II (I) dated 11th June, 2008

Sl. No.	CONDITIONS	COMPLIANCE STATUS
SPECIFIC CONDITIONS		
i	The gaseous emissions (PM, SO_2, NO_X, PAH, HC, VOCs and Fluoride) from various process units shall conform to the standards prescribed by the concerned authorities from time to time. The OSPCB may specify more stringent standards for the relevant parameters keeping in view the nature of the industry and its size and location. At no time, the emission levels shall go beyond the prescribed standards. In the event of failure of any pollution control system adopted by the unit, the respective unit shall not be restarted until the control measures are rectified to achieve the desired efficiency. The particulate emissions from the bake oven plant shall not exceed 50 mg/Nm^3.	The gaseous emissions (PM, SO_2, NO_X, PAH, HC, VOCs and Fluoride) are conforming to the standards prescribed by Odisha State Pollution Control Board. The particulate matter emission from Bake Oven ranges between 3.5 to 5.6 mg/Nm^3. In case of failure of any of the pollution control system of any unit, the respective unit will be started only after the control measures are rectified and achieve the desired efficiency.
ii	Particulate fluoride emissions shall not be more than 0.65 mg/Nm^3 and fugitive particulate fluoride emissions from pot room shall not be more than 1.85 mg/Nm^3.	The particulate fluoride emission and fugitive particulate fluoride emission monitored is within 0.65 mg/ NM^3 and 1.85 mg/NM^3 respectively.
iii	The poly-aromatic hydrocarbons (PAH) from the carbon plant (anode bake oven) shall not exceed 2 mg/Nm^3. The data on PAH shall be monitored quarterly and report submitted regularly to the Ministry/Regional Office at Bhubaneswar and OSPCB.	PAH has been monitored in the stack emission of Bake Oven and is found in the range of 0.12 to 0.21 mg/Nm^3. The same is being monitored periodically and report is submitted to the Regional office of the Ministry and OSPCB.
iv	In-plant control measures like fume extraction and dust extraction system for controlling fugitive emissions from all the material handling/transfer points shall be provided to control dust emissions. Fugitive Fluoride emissions from the pot room and in the forage around the smelter complex shall be monitored and data submitted regularly to the Ministry's Regional Office at Bhubaneswar and OSPCB. Further dry scrubbing system to control the emissions from the pot lines shall be provided.	We have provision of dry scrubbing system to maintain the total fluoride emissions below the standards stipulated. Necessary monitoring is being undertaken as directed and reports submitted periodically to the Ministry's Regional Office and OSPCB.
v	Electrostatic precipitator (ESP) will be provided to Captive Power Plant (CPP) to control emissions below 100 mg/Nm^3. The company shall	Hybrid ESP's comprising of bag filters have been installed to maintain emission level below 50 mg/Nm^3 in CPP. Bag-filters,

	provide bag-filters, dry scrubbing system and dust suppression system to control the all the emissions including fluoride emissions from all melting and casting units. Tar, dust and fluoride in the fumes shall be controlled in baking furnace by providing dry scrubber. The emissions shall conform to the standards prescribed by the Ministry/CPCB/SPCB whichever is more stringent.	dry scrubbing system and dust suppression system is being provided to control the emissions including fluoride emissions from all melting and casting units. Dry scrubber with a chilling/condensing unit is being provided to control tar, dust and fluoride in the fumes in baking furnace. All efforts will be made to ensure emissions levels within the standards prescribed by the Ministry/CPCB/OSPCB.
vi	Fluoride consumption shall be less than 10 kg/ton of Aluminium produced as specified in the CREP guidelines.	Average fluoride consumption for the period October 21 to March 22 is 10.45 kg/MT Al . The detailed action plan to bring down the fluoride consumption below 10 kg/MT of Aluminium has been submitted to MoEF & CC vide letter no. VL/MOEF/006/2021-031 dated 23.10.2021.
vii	Anode butts generated from the pots shall be cleaned and recycled to the Anode Plant. The spent pot lining generated from the smelter shall be properly treated in spent pot lining treatment plant to remove fluoride and cyanide and disposed off in secured landfill. The location and design of the landfill site shall be approved by the OSPCB as per Hazardous Wastes (Management and Handling) Rules, 2003. Leachate collection facilities shall be provided to the secured landfill facility (SLF). The dross shall be recycled in the cast house. STP sludge shall be utilized as manure for green belt development. All the used oil and batteries shall be sold to the authorized recyclers/ re-processors.	• Anode butts generated from the pots is being recycled in the Green Anode Plant. • The SPL generated from our smelter is being sent to OSPCB authorized agency M/s Green Energy Resources located at Sambalpur for detoxification which in turn is sending the detoxified material for further utilization in various industries including cement and steel. The refractory portion is being stored under covered shed till an approved disposal mechanism is in place. • The dross generated is either being internally processed for metal recovery or being sold to authorized re-processors. • STP sludge is composted and used for green belt development. • Used batteries and Used oil is being disposed to authorized recyclers/ re-processors.
viii	Integrated Ash Management Plan shall be prepared for the utilization of fly ash as per Fly Ash Notification, 1999 as amended in 2003 and implemented. A copy of the plan shall be submitted to the Ministry's	Integrated Ash Management Plan has been prepared and submitted as part of the REIA. Further, a detailed plan has been submitted for the utilization of fly ash as per Fly Ash

	Regional Office. Fly ash shall be collected pneumatically in silos and used by cement and brick manufacturers for further utilization. Bottom Ash shall be disposed off in ash pond using high concentrated slurry disposal method.	Notification, 1999 as amended in 2003 & 2009 to the Ministry's Regional Office vide letter no. VAL/MoEF/SMA-106/2012-011 dated June 30, 2012. Fly ash is being utilized in various avenues such as cement and brick manufacturing, road and infrastructure development, reclamation of low- lying areas, quarry back filling etc. and the balance is being sent to ash ponds through High Concentrated slurry disposal pipelines.
ix	As proposed, spent pot lining waste shall also be provided to cement and steel industries for further utilization.	The SPL generated from our smelter is being sent to OSPCB authorized agency M/s Green Energy Resources located at Sambalpur for detoxification which in turn is sending the detoxified material for further utilization in various industries including cement and steel. The refractory portion is being stored under covered shed till an approved disposal mechanism is in place.
x	Regular ground water monitoring shall be carried out by installing Peizometers all around the secured landfill site in consultation with the Orissa Pollution Control Board, Central Ground Water Authority and State Ground Water Board and data submitted to the Ministry's Regional Office and OSPCB.	Regular ground water monitoring is being carried out all around the secured landfill site and the data is being submitted to OSPCB and Regional Office of the Ministry.
xi	Total water requirement for the expansion from Hirakud Reservoir shall not exceed 2,580 m^3/hr and prior permission for the existing and proposed expansion shall be obtained from the concerned department before commissioning of the plant. All the effluent including from cooling tower and de-mineralization plant shall be treated in the effluent treatment plant and treated effluent shall be recycled / reutilized in the process in the smelter and CPP and also for fire protection, dust suppression, green belt development etc. Domestic effluent shall be treated in Sewage Treatment Plant (STP) and treated domestic wastewater will be used for green belt development.	The total water drawl from Hirakud Reservoir as requirement for the expansion facility is within 2,580 m^3/hr. All the effluent including cooling tower and de-mineralization plant is being treated in the effluent treatment plant in CPP, and further the treated effluent is being recycled and used in AHP and CHP areas. Adequate ETPs are in place to treat the effluent from Smelter and the treated effluent is being recycled back in the smelter process for fire protection, dust suppression, green belt development etc. Domestic effluent is treated in Sewage Treatment Plant (STP) and the treated water is reused for green belt development.

xii	No effluent shall be discharged outside the premises during the non-monsoon period and shall be discharged during the monsoon period only after proper treatment and meeting the norms of the OSPCB/CPCB.	There is no discharge of wastewater from the plant in non-monsoon season. However, in case of exigency, treated wastewater post meeting the standards is being discharged during monsoon period.
xiii	Green belt of adequate width and density around the project site shall be developed in 33 % area in consultation with the DFO as per the CPCB guidelines having density of 2,000 trees/ha.	Green belt/cover has been developed in 33% of the area (275 Ha) and density have been increased to 2500 trees/ha by doing gap filling.
xiv	Occupational Health Surveillance of the workers should be done on a regular basis and records maintained as per the Factories Act.	Occupational health surveillance of the workers is being undertaken periodically and records maintained as per Factories Act.
xv	The company shall develop rainwater structures to harvest the runoff water for recharge of ground water in consultation with the Central Ground Water Authority/Board.	The groundwater level as measured at plant site ranges between 2.53 to 3.18 m bgl. As per CGWA guidelines, industries falling under hazardous category should not implement any recharge measures within the plant premises. Hence, we have carried out roof top rainwater harvesting facilities at our site to utilize the collected/harvested water. Four numbers of Roof Top Rainwater Harvesting facilities have been installed at Smelter & CPP with a capacity of harvesting 6876 m^3 water.
xvi	Rehabilitation and Resettlement (R & R) Plan prepared and submitted to the State Govt. shall be implemented as per the R & R Policy of the State Government. All the recommendations mentioned in the R & R Plan shall be strictly followed including suitable employment and other facilities to all the oustees.	The R & R Package has been finalized by RPDAC based on Odisha Govt. R&R policy 2006.This approved package is being implemented fully under the supervision of District Administration. PDFs have been provided with a house and other facilities as per RPDAC. We have also provided certain additional facility from RPDAC requirement.
xvii	All the recommendations made in the Charter on Corporate Responsibility for Environment Protection (CREP) for the Aluminium sector shall be strictly implemented.	All recommendations as per CREP for Aluminium smelting is being strictly implemented **(Annexure-A).**
xviii	All the environmental conditions stipulated by the Ministry vide letter no. J-11011/144/2006- IA II (I) dated 7th March, 2007 for the Aluminium Smelter Plant (2,50,000 TPA) at Village Bhurkamunda /	All the environmental conditions stipulated for the Aluminium Smelter Plant (2.5 LTPA) are being complied and half yearly compliance report is being submitted to the Ministry's Regional

	Brundamal, District Jharsuguda, Orissa by M/s Vedanta Aluminium Ltd. shall be satisfactorily be complied and regular compliance report submitted to the Ministry's Regional Office at Bhubaneswar.	Office at Bhubaneswar.
xix	Prior permission from the State Forest Department shall be obtained due to likely impact of transport of raw material and end product and gaseous emissions from the smelter on the surrounding reserve forests and wildlife. Recommendations regarding mitigative measures suggested by the State Forest Department and Chief Wildlife Warden, Govt. of Orissa shall be strictly followed.	Raw material and end products are transported through existing rail and road networks through wagons, bulkers and covered trucks (which are closed and covered). The mitigative measures as per the approved site-specific Wildlife Conservation plan vide letter no. 4488/7WL-FD & WLC – 32 /2021 dated 30th April 2021 is under implementation.
xx	Ministry of Environment and Forests shall regularly be informed about the source and quantity of Alumina procured from captive/indigenous/imported sources.	We regularly inform about the source and quantity of Alumina procured from captive/ indigenous/ imported sources. The source and quantity of alumina procured during October 2021 to March 22 is as below: Captive – 9.01 Lakh MT Indigenous – 136600 MT Imported – 6.35 Lakh MT Imported alumina sources are as follows: 1. Worsley Refinery, Western Australia 2. Queensland Alumina Limited, Gladstone, Australia 3. Alcoa of Australia Limited, Australia 4. Vietnam Coal & Mineral Industries Hoding Corporation Limited (Viancomin), Vietnam 5. PT Well Harvest Winning Alumina Refinery, Indonesia 6. Maaden Alumina, Saudi Arabia 7. PT Bintan, Indonesia 8. Utkal Alumina Refinery, Doraguda, Rayagada, India 9. NALCO Alumina Refinery, Damanjodi, Odisha
xxi	Alumina shall be obtained only from those refineries, which have been accorded environmental clearance by the Ministry of Environment and Forests.	We ensure that alumina is being sourced from own refinery or from refineries in India which have been accorded Environmental Clearance by MoEF&CC. We also import

		alumina from other countries.
GENERAL CONDITIONS		
I	The project authorities must strictly adhere to the stipulations made by the Orissa State Pollution Control Board and the State Government.	The stipulations of OSPCB and the State Government is being adhered to.
II	No expansion or modification in the plant shall be carried out without prior approval of the Ministry of Environment and Forests.	No expansion or modernization will be undertaken without prior approval of the Ministry of Environment and Forests.
III	Adequate number of ambient air quality monitoring stations should be established in the downward direction as well as where maximum ground level concentration of SPM, SO_2 and NO_X are anticipated in consultation with the OSPCB. Data on ambient air quality and stack emission should be regularly submitted to this Ministry including its Regional Office at Bhubaneswar and Orissa State Pollution Control Board once in six months.	AAQ stations have been fixed in consultation with OSPCB in the downwind direction for monitoring ground level concentration of SPM, SO_2 and NOx. The data on ambient air quality and stack emission along with other data is being regularly submitted to the Ministry, Regional Office of the Ministry and OSPCB.
IV	Industrial wastewater should be properly collected, treated so as to conform to the standards prescribed under GSR 422 (E) dated 19th May, 1993 and 31st December, 1993 or as amended from time to time. The treated wastewater should be recycled in the plant as well as utilization for plantation purposes.	Industrial wastewater is collected, treated to confirm to the standards prescribed under GSR 422 (E) dated 19th May, 1993 and 31st December, 1993 or as amended from time to time. The industrial wastewater treatment facility has been provided and the treated water is being recycled back in the plant as well as utilized for plantation purposes.
V	The project authorities must strictly comply with the rules and regulations with regard to handling and disposal of hazardous wastes in accordance with the Hazardous Wastes (Management and Handling) Rules, 2003. Authorization from the OSPCB must be obtained for collection, storage, treatment and disposal of hazardous wastes.	The rules and regulations as prescribed under the Hazardous and other Waste (Management and Trans-boundary Movement) Rules 2016, is being complied and the authorization for collection, storage, treatment and disposal of hazardous wastes has been obtained from OSPCB
VI	The overall noise levels in and around the plant area should be kept well within the standards (85 dBA) by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all sources of noise generation. The ambient noise levels should conform to the standards prescribed under EPA Rules, 1989 viz. 75 dBA (daytime) and 70 dBA (nighttime).	The overall noise level is being maintained below 85 dB (A) around the plant area by providing necessary engineering controls on all sources of noise generation. The overall noise levels are being maintained below the stipulated standards as per EPA Rules, 1989. The ambient noise levels monitored are observed within 55.3 dB(A) to 74.1 dB(A) during day time and

		50.60 dB(A) to 69.70 dB(A) in night time.
VII	The project proponent shall also comply with all the environmental protection measures and safeguards recommended in the EIA / EMP /risk analysis and DMP report.	All measures suggested in the EIA/ EMP/ risk analysis and DMP are being implemented.
VIII	As proposed in EIA/EMP, Rs. 505.00 Crores earmarked toward the capital cost and recurring the expenditure/annum for environmental protection measures shall be used judiciously to implement the conditions stipulated by the Ministry of Environment and Forests as well as the State Government. The funds so provided shall not be diverted for any other purposes.	The funds provided towards the capital cost and recurring cost provided for environmental control measures and for implementation of the conditions is being used judiciously for implementing the conditions stipulated by the Ministry of Environment and Forests as well as the State Government. The funds so provided shall not be diverted for any other purposes.
IX	The Regional Office of this Ministry at Bhubaneswar/Central Pollution Control Board/ OSPCB will monitor the stipulated conditions. A six monthly compliance report and the monitored data along with statistical interpretation should be submitted to them regularly.	Half yearly report on the status of implementation of the conditions is periodically being submitted to the Ministry's Regional Office and SPCB.
X	The Project Proponent should inform the public that the project has been accorded environmental clearance by the Ministry and copies of the clearance letter are available with the State Pollution Control Board/ Committee and may also be seen at Website of the Ministry of Environment and Forests at http:/envfor.nic.in. This should be advertised within seven days from the date of issue of the clearance letter at least in two local newspapers that are widely circulated in the region of which one shall be in the vernacular language of the locality concerned and a copy of the same should be forwarded to the Regional office.	Necessary advertisement with information as advised by the Ministry has been released in two local newspapers one in vernacular and one in English.
XI	The Project Authorities should inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of commencing the land development work.	Funds for the proposed project is from internal sources, therefore financial closure is not applicable in this case.

Annexure IV

Compliance Status
On

Stipulation of additional conditions in respect of Mega Projects already granted Environment Clearance- regarding, Office memorandum letter No. J-11013/41/2006-IA.II (I) dated 06-04-2011

VEDANTA LIMITED, JHARSUGUDA
THERMAL POWER PLANT (2400 MW)

Compliance Status on

Stipulation of Additional Conditions in respect of Mega Projects already granted Environmental Clearance – regarding.

Sl. No.	CONDITIONS	COMPLIANCE STATUS
(i)	Continuous monitoring of stack emissions as well as ambient air quality (as per notified standards) shall be carried out and continuous records maintained. Based on the monitored data, necessary corrective measures as may be required from time to time shall be taken to ensure that the levels are within permissible limits. The results of monitoring shall also be put on the website of the company in the public domain.	We have installed continuous emission monitoring systems (CEMS) in all our operating plants as well as 8 no. of continuous ambient air quality monitoring equipment at Jharsuguda site. We are taking necessary measures to ensure the emission levels are well within the permissible limit. The monitoring results have been put in the web site of the company.
(ii)	The six-monthly monitoring report as well as the monitored data on the various parameters as stipulated in the environment clearance conditions shall be put on the website of the company and also regularly updated. The monitored data shall also be submitted to respective State pollution Control Board / UTPCCs and the Regional Office of MoEF.	Six Monthly compliance report along with the monitoring data have been put on the company website and is being updated regularly. The monitored data is being submitted to State Pollution Control Board and regional Office of MoEF.
(iii)	The ambient air quality data as well as the stack emission data will also be displayed in public domain at some prominent place near the main gate of the company and updated in real time.	The ambient air quality data and the stack emission data are being displayed in public domain near our main gate.

Annexure V

Compliance Status
On

Change in conditions stipulated in Environment Clearances of Thermal Power Plants and Coal mines in line with the Fly Ash Notification and subsequent amendments- Office memorandum No. F.No. 22-13/2019-IA.III, dated 28-08-2019

VEDANTA LIMITED, JHARSUGUDA

Compliance Status on

Change in conditions stipulated in the Environmental Clearances of the Thermal Power Plants and Coal Mines in line with the Fly Ash Notification and subsequent amendments, Office Memorandum no. F.No. 22-13/2019-IA.III dated 28.08.2019

Sl. No.	CONDITIONS	COMPLIANCE STATUS
1	General Comment	-
2	General Comment	-
3	General Comment	-
4	General Comment	-
5	General Comment	-
6	General Comment	-
7	In view of the recommendation of EAC (Thermal Power) in its Meeting held on 12.07.2019, after careful examination of the matter and to meet the objectives of the Fly Ash Notification, 1999 and its amendments, the Ministry hereby stipulates the following conditions in the existing Environmental Clearances of Thermal Power Plants and Coal mines which have valid Environmental Clearances accorded by the Ministry/ SEIAA, that will replace the existing conditions (Specific & General) which prohibited the use of fly ash in abandoned mines/ low lying areas/ soil conditioner in agriculture.	Noted and will be complied.
i.	The guidelines prepared by CPCB for disposal of fly ash for reclamation of low-lying areas and in stowing/ backfilling of abandoned mines/ quarries shall be followed during disposal of ash in abandoned or working mines, as annexed.	Being Complied.
ii.	There should at least clearance of 500 m of safe distance be maintained from river and water body in case of ash disposal in abandoned mines to prevent embankment failures and fly ash flowing in to the nearby water body.	The clearance of 500 m safe distance will be maintained from river and water body in case of ash disposal in abandoned mines.

iii.	The top layer of fly ash disposal area in the abandoned mines shall be kept moist during disposal	The top layer of ash disposal area in the abandoned mines will be kept moist during disposal.
iv.	Top layer of the disposed area should have 70 cm overburden or gravels/ stones and then 30 cm sweet soil cover. Subsequently the vegetation shall be raised on the soil cover.	Will be complied.
v.	Bioaccumulation and bio-magnification tests shall be conducted on surrounding flora and fauna (tree leaves, vegetation, crop yields and cattle population) during pre-monsoon and post monsoon to find out any trace metals escaped through groundwater or runoff.	Bioaccumulation and bio-magnification tests will be conducted on surrounding flora and fauna (tree leaves, vegetation, crop yields and cattle population) during pre- monsoon and post monsoon.
vi.	Surface runoff and supernatant water, in any case shall not be let in to the surrounding areas. It shall be collected by providing adequate drains around the mines. The supernatant water along with surface runoff shall be treated and re-used for mixing ash and plant operations.	Surface runoff and supernatant water will be collected, treated and re-used for mixing ash.
vii.	To the extent possible, only decanted water from mine, make up water from treated effluents such as cooling tower blow down and treated sewage water shall be used for making ash slurry.	Being complied.
viii.	Fly ash to be used as soil conditioner in agriculture needs and to be applied in controlled manner to limit excessive application so as to prevent soil degradation. The optimize proportion of ash to be applied which is to be certified by the State Agricultural Universities/colleges based on the soil testing.	Will be complied as and when fly ash will be utilised as soil conditioner in agriculture needs.
ix.	Approval from DGMS shall be obtained before disposing the ash in the mine voids.	Approval from DGMS will be obtained prior to disposal of ash in the mine voids.
x.	Technology for conversion of fly ash in to coarse granules for	Technology for conversion into coarse granules will be explored.

	stowing in the underground mines to be explored.	
xi.	All the power plants should install different silos for dry collection of fly ash.	Separate Silos have been installed for dry collection of fly ash.
xii.	Records pertaining to details of month-wise quantity of fly ash disposed and water consumption along with nature/ source of water shall be maintained and submitted to Ministry/Regional office annually.	Records pertaining to details of month-wise quantity of fly ash disposed is being maintained and submitted to Regional office annually
xiii.	Before starting the disposal of ash into the mine voids, NOC/Permission from the mine owner is to be obtained in case the mine closure activities are not completed or State Government in case the mine has been handed over to the state Govt. after its closure. A copy of such NOC/Permission is to be submitted to the Ministry and its Regional Offices.	Will be complied as and when disposal of ash into the mines void will start.

Annexure VI

Environment Quality Data

VEDANTA LIMITED, JHARSUGUDA
SMELTER & CPP

Half Yearly Environment Quality Report
(October 2021 – March 2022)

1. Stack Emission:

a) Pot Room Fume Treatment Plant (FTP) Outlet

i. Particulate Matter (mg/Nm^3)

Stack Description	Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
FTP 1- Pot Line-1	2.90	2.50	2.70	2.90	2.60	3.90
FTP 2- Pot Line-1	3.30	2.90	2.40	2.10	2.40	2.30
FTP 3- Pot Line-2	3.20	3.40	3.20	3.60	3.30	2.60
FTP 4- Pot Line-2	2.60	3.10	2.90	3.20	3.50	1.70
FTP 5- Pot Line-3	2.50	2.40	2.10	2.40	2.20	1.80
FTP 6- Pot Line-3	2.10	2.00	1.40	1.90	1.30	1.50
FTP 7- Pot Line-4	1.90	1.80	1.50	1.40	1.40	1.70
FTP 8- Pot Line-4	3.20	4.10	3.90	3.30	3.10	2.60
FTP 9- Pot Line-5	2.30	2.60	2.30	2.10	1.60	1.40
FTP 10- Pot Line-5	2.70	2.40	2.60	2.50	2.20	2.00
FTP 11- Pot Line-6	1.70	1.50	1.60	1.80	1.60	1.90

ii. Total Fluoride (Kg/MT. Al.)

Stack Description	Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
FTP 1- Pot Line-1	0.09	0.08	0.08	0.10	0.09	0.09
FTP 2- Pot Line-1	0.08	0.09	0.09	0.07	0.09	0.10
FTP 3- Pot Line-2	0.10	0.09	0.08	0.09	0.10	0.09
FTP 4- Pot Line-2	0.07	0.07	0.07	0.08	0.09	0.08
FTP 5- Pot Line-3	0.08	0.06	0.06	0.08	0.06	0.07
FTP 6- Pot Line-3	0.07	0.07	0.07	0.07	0.08	0.07
FTP 7- Pot Line-4	0.08	0.07	0.06	0.08	0.07	0.08
FTP 8- Pot Line-4	0.07	0.08	0.08	0.08	0.09	0.09
FTP 9- Pot Line-5	0.07	0.07	0.07	0.06	0.08	0.07
FTP 10- Pot Line-5	0.08	0.09	0.08	0.09	0.08	0.07
FTP 11- Pot Line-6	0.07	0.06	0.06	0.07	0.07	0.09

Note: The Environment Monitoring is done by third party M/s. Visiontek Consultancy Services Pvt. Ltd. The required data is put in format from their report

b) Bake Oven Fume Treatment Plant (FTP) Outlet

i. Particulate Matter (mg/Nm^3)

Stack Description	Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
FTP 1- Bake Oven	4.50	5.10	5.30	4.70	4.40	5.30
FTP 2- Bake Oven	4.70	4.40	4.80	5.10	5.60	5.00
FTP-3 – Bake Oven	4.50	4.20	4.70	3.90	3.50	4.40
FTP-4 – Bake Oven	4.90	5.30	4.40	4.20	4.60	4.20
FTP-5 – Bake Oven	4.10	4.60	5.10	4.50	4.10	4.80

ii. Total Fluoride (Kg/T)

Stack Description	Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
FTP 1- Bake Oven	4.50	5.10	5.30	4.70	4.40	5.30
FTP 2- Bake Oven	4.70	4.40	4.80	5.10	5.60	5.00
FTP-3 – Bake Oven	4.50	4.20	4.70	3.90	3.50	4.40
FTP-4 – Bake Oven	4.90	5.30	4.40	4.20	4.60	4.20
FTP-5 – Bake Oven	4.10	4.60	5.10	4.50	4.10	4.80

iii. Total PAH (mg/Nm^3)

Stack Description	Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
FTP 1- Bake Oven	0.15	0.16	0.14	0.17	0.19	0.17
FTP 2- Bake Oven	0.13	0.13	0.15	0.20	0.16	0.21
FTP-3 – Bake Oven	0.16	0.15	0.17	0.16	0.15	0.18
FTP-4 – Bake Oven	0.14	0.16	0.14	0.19	0.21	0.16
FTP-5 – Bake Oven	0.12	0.18	0.19	0.18	0.17	0.20

c) Captive Power Plant (CPP)

i. Particulate Matter (mg/Nm^3)

Stack Description	Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
CPP- Unit 1	41	42	26	34	32	34
CPP- Unit 2	44	43	43	40	44	42
CPP- Unit 3	39	38	42	37	35	37
CPP- Unit 4	40	41	42	40	46	40
CPP- Unit 5	42	43	41	43	32	33
CPP- Unit 6	38	42	46	42	43	37
CPP- Unit 7	44	44	34	38	38	43
CPP- Unit 8	43	44	SD	SD	SD	38
CPP- Unit 9	41	41	47	43	43	42

ii. Mercury (mg/Nm^3)

Stack Description	Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
CPP- Unit 1	0.025	0.019	0.017	0.018	0.015	0.021
CPP- Unit 2	0.018	0.021	0.023	0.021	0.017	0.015
CPP- Unit 3	0.023	0.022	0.019	0.016	0.013	0.017
CPP- Unit 4	0.018	0.019	0.018	0.019	0.016	0.018
CPP- Unit 5	0.019	0.021	0.016	0.015	0.021	0.016
CPP- Unit 6	0.021	0.018	0.015	0.017	0.018	0.019
CPP- Unit 7	0.022	0.024	0.021	0.022	0.017	0.021
CPP- Unit 8	0.018	0.019	SD	SD	SD	0.014
CPP- Unit 9	0.024	0.021	0.020	0.018	0.015	0.021

2. Fugitive Fluoride:

Stack Description	Total Fluoride (Kg/MT. Al.)					
	Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
Potline-1 (Section-2)	0.36	0.38	0.37	0.36	0.39	0.38
Potline-2 (Section-7)	0.34	0.35	0.34	0.39	0.37	0.37
Potline-3 (Section-1)	0.37	0.37	0.35	0.37	0.39	0.39

3. Ambient Air Quality:

i. PM 10 size <10 (µg/m^3)

Sl. No.	Sampling Location	Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
Limit (24 Hours Weighed Average)		**100**					
1	Near Carbon Plant, Smelter-1	50.30	52.10	53.60	56.20	59.30	62.40
2	Near Rectifier of Expansion Pot Room	43.40	46.50	47.10	48.70	51.40	58.60
3	Near R & R colony	41.50	42.30	42.80	45.50	48.00	59.20
4	Near China Gate Weigh Bridge	54.50	59.10	57.50	60.60	65.00	68.30
5	Near Cooling Tower IPP	48.60	50.40	51.10	52.80	54.70	58.40
6	Near ETP, Smelter-1	41.80	44.50	42.30	47.40	46.80	51.20
7	Near Cast House, Smelter-1	47.80	49.70	50.40	53.70	58.30	62.30
8	Near Pot Room, Smelter-1	48.10	53.60	54.20	57.30	61.20	65.60
9	Near Coal Yard of CPP	60.40	66.30	63.60	65.20	67.70	70.30
10	Near Cooling Tower of CPP	52.30	56.20	54.90	58.20	62.30	61.40

ii. PM 2.5 size < 2.5 (µg/m^3)

Sl. No.	Sampling Location	Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
Limit (24 Hours Weighed Average)		**60**					
1	Near Carbon Plant, Smelter-1	34.10	38.50	36.50	32.60	31.80	32.50
2	Near Rectifier of Expansion Pot Room	30.30	33.10	32.40	29.20	28.70	30.70
3	Near R & R colony	25.70	27.20	28.10	27.30	26.50	31.00
4	Near China Gate Weigh Bridge	38.20	40.40	39.70	36.40	35.30	35.70
5	Near Cooling Tower IPP	32.50	34.20	33.50	31.50	30.60	30.60
6	Near ETP, Smelter-1	30.30	33.50	34.10	28.30	26.00	26.80
7	Near Cast House, Smelter-1	33.70	37.40	36.40	32.50	33.40	33.20
8	Near Pot Room, Smelter-1	34.20	36.20	35.70	34.40	34.20	34.70
9	Near Coal Yard of CPP	40.70	44.60	42.20	38.00	38.30	37.30
10	Near Cooling Tower of CPP	30.50	34.70	33.90	35.30	34.70	32.40

iii. SO_2 (µg/m^3)

Sl. No	Sampling Location	Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
Limit (24 Hours Weighed Average)		**80**					
1	Near Carbon Plant, Smelter-1	21.80	25.30	28.70	27.60	25.30	23.70
2	Near Rectifier of Expansion Pot Room	29.50	33.70	28.30	17.40	18.80	19.20
3	Near R & R colony	17.30	20.80	24.40	15.70	17.80	16.20
4	Near China Gate Weigh Bridge	27.50	34.60	36.20	24.30	25.30	27.10
5	Near Cooling Tower IPP	22.10	26.40	27.80	23.70	22.60	23.50
6	Near ETP, Smelter-1	26.60	29.20	31.30	22.60	25.20	24.80
7	Near Cast House, Smelter-1	28.80	31.60	34.00	27.40	28.70	25.50
8	Near Pot Room, Smelter-1	29.50	33.70	31.50	24.80	23.40	24.60
9	Near Coal Yard of CPP	29.30	37.10	38.40	35.40	36.70	33.20
10	Near Cooling Tower of CPP	25.30	29.60	26.80	26.30	27.40	26.40

iv. NOx (µg/m^3)

Sl. No	Sampling Location	Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
Limit (24 Hours Weighed Average)		**80**					
1	Near Carbon Plant, Smelter-1	26.40	28.80	30.40	32.70	31.40	30.50
2	Near Rectifier of Expansion Pot Room	26.30	36.40	37.50	24.50	23.60	26.60
3	Near R & R colony	25.60	23.80	26.50	22.30	25.30	27.10
4	Near China Gate Weigh Bridge	41.40	43.30	44.50	38.20	37.20	38.60
5	Near Cooling Tower IPP	38.70	39.70	38.30	33.50	30.60	29.70
6	Near ETP, Smelter-1	40.30	40.50	41.30	35.60	36.20	33.70
7	Near Cast House, Smelter-1	37.10	42.10	40.60	37.30	34.80	32.60
8	Near Pot Room, Smelter-1	36.30	38.30	39.20	33.80	32.50	30.40
9	Near Coal Yard of CPP	27.60	29.50	26.70	23.50	24.70	25.20
10	Near Cooling Tower of CPP	29.40	33.20	34.50	31.30	30.70	32.20

v. CO (mg/m^3)

Sl. No.	Sampling Location	Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
Limit (24 Hours Weighed Average)		**2.0**					
1	Near Carbon Plant, Smelter-1	0.47	0.49	0.53	0.58	0.55	0.57
2	Near Rectifier of Expansion Pot Room	0.59	0.54	0.52	0.54	0.51	0.54
3	Near R & R colony	0.36	0.33	0.38	0.35	0.37	0.39
4	Near China Gate Weigh Bridge	0.64	0.60	0.59	0.66	0.62	0.64
5	Near Cooling Tower IPP	0.53	0.51	0.52	0.47	0.41	0.48
6	Near ETP, Smelter-1	0.56	0.53	0.55	0.51	0.53	0.55
7	Near Cast House, Smelter-1	0.61	0.63	0.6	0.58	0.56	0.61
8	Near Pot Room, Smelter-1	0.60	0.58	0.61	0.57	0.44	0.52
9	Near Coal Yard of CPP	0.54	0.57	0.54	0.63	0.53	0.56
10	Near Cooling Tower of CPP	0.44	0.46	0.49	0.52	0.48	0.51

vi. Pb (µg/m^3)

Sl. No.	Sampling Location	Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
Limit (24 Hours Weighed Average)		**1.0**					
1	Near Carbon Plant, Smelter-1	0.09	0.10	0.09	0.11	0.09	0.10
2	Near Rectifier of Expansion Pot Room	0.07	0.09	0.09	0.08	0.10	0.11
3	Near R & R colony	BDL	BDL	BDL	BDL	BDL	BDL
4	Near China Gate Weigh Bridge	0.10	0.11	0.1	0.11	0.13	0.14
5	Near Cooling Tower IPP	0.09	0.08	0.09	0.1	0.09	0.11
6	Near ETP, Smelter-1	0.11	0.10	0.11	0.08	0.07	0.09
7	Near Cast House, Smelter-1	0.08	0.09	0.1	0.11	0.12	0.15
8	Near Pot Room, Smelter-1	0.10	0.11	0.08	0.09	0.11	0.13
9	Near Coal Yard of CPP	0.09	0.10	0.1	0.12	0.14	0.16
10	Near Cooling Tower of CPP	BDL	BDL	BDL	BDL	BDL	BDL

vii. As (mg/m^3)

Sl. No.	Name of Location	Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
Limit (24 Hours Weighed Average)		**06**					
1	Near Carbon Plant, Smelter-1	BDL	BDL	BDL	BDL	BDL	BDL
2	Near Rectifier of Expansion Pot Room	BDL	BDL	BDL	BDL	BDL	BDL
3	Near R & R colony	BDL	BDL	BDL	BDL	BDL	BDL
4	Near China Gate Weigh Bridge	BDL	BDL	BDL	BDL	BDL	BDL
5	Near Cooling Tower IPP	BDL	BDL	BDL	BDL	BDL	BDL
6	Near ETP, Smelter-1	BDL	BDL	BDL	BDL	BDL	BDL
7	Near Cast House, Smelter-1	BDL	BDL	BDL	BDL	BDL	BDL
8	Near Pot Room, Smelter-1	BDL	BDL	BDL	BDL	BDL	BDL
9	Near Coal Yard of CPP	BDL	BDL	BDL	BDL	BDL	BDL
10	Near Cooling Tower of CPP	BDL	BDL	BDL	BDL	BDL	BDL

viii. Ni (mg/m^3)

Sl. No.	Name of Location	Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
Limit (24 Hours Weighed Average)		**20**					
1	Near Carbon Plant, Smelter-1	0.10	0.09	0.10	0.11	0.08	0.10
2	Near Rectifier of Expansion Pot Room	0.09	0.10	0.11	0.12	0.13	0.12
3	Near R & R colony	BDL	BDL	BDL	BDL	BDL	BDL
4	Near China Gate Weigh Bridge	0.09	0.11	0.09	0.10	0.13	0.12
5	Near Cooling Tower IPP	0.08	0.09	0.10	0.09	0.08	0.09
6	Near ETP, Smelter-1	0.10	0.11	0.08	0.07	0.09	0.12
7	Near Cast House, Smelter-1	0.09	0.10	0.06	0.08	0.11	0.13
8	Near Pot Room, Smelter-1	0.11	0.10	0.12	0.11	0.13	0.11
9	Near Coal Yard of CPP	0.09	0.08	0.10	0.09	0.15	0.18
10	Near Cooling Tower of CPP	0.10	0.09	0.11	0.08	0.12	0.14

ix. BaP (mg/m^3)

Sl. No	Name of Location	Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
Limit (24 Hours Weighed Average)		**01**					
1	Near Carbon Plant, Smelter-1	0.09	0.01	0.06	0.11	0.1	0.13
2	Near Rectifier of Expansion Pot Room	0.08	0.09	0.07	0.09	0.07	0.09
3	Near R & R colony	BDL	BDL	BDL	BDL	BDL	BDL
4	Near China Gate Weigh Bridge	0.08	0.07	0.07	0.08	0.09	0.11
5	Near Cooling Tower IPP	0.09	0.01	0.05	0.07	0.1	0.13
6	Near ETP, Smelter-1	BDL	BDL	BDL	BDL	BDL	BDL
7	Near Cast House, Smelter-1	0.08	0.09	0.08	0.09	0.10	0.11
8	Near Pot Room, Smelter-1	0.09	0.08	0.07	0.10	0.09	0.10
9	Near Coal Yard of CPP	0.07	0.01	0.06	0.09	0.15	0.14
10	Near Cooling Tower of CPP	BDL	BDL	BDL	BDL	BDL	BDL

x. Benzene (µg/m^3)

Sl. No	Name of Location	Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
Limit (24 Hours Weighed Average)		**05**					
1	Near Carbon Plant, Smelter-1	0.10	0.11	0.10	0.12	0.11	0.12
2	Near Rectifier of Expansion Pot Room	0.09	0.10	0.09	0.11	0.14	0.13
3	Near R & R colony	BDL	BDL	BDL	BDL	BDL	BDL
4	Near China Gate Weigh Bridge	0.08	0.09	0.11	0.10	0.11	0.13
5	Near Cooling Tower IPP	0.09	0.08	0.12	0.11	0.12	0.14
6	Near ETP, Smelter-1	0.10	0.09	0.10	0.12	0.11	0.15
7	Near Cast House, Smelter-1	0.11	0.11	0.12	0.10	0.13	0.14
8	Near Pot Room, Smelter-1	0.09	0.08	0.01	0.08	0.09	0.08
9	Near Coal Yard of CPP	0.10	0.09	0.10	0.09	0.13	0.12
10	Near Cooling Tower of CPP	0.09	0.01	0.09	0.11	0.11	0.10

xi. NH3 (µg/m$_3$)

Sl. No	Name of Location	Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
Limit (24 Hours Weighed Average)		**400**					
1	Near Carbon Plant, Smelter-1	26.2	25.6	25.6	27.2	25.8	27.4
2	Near Rectifier of Expansion Pot Room	27.5	24.1	27.4	25.6	24.3	25.2
3	Near R & R colony	19.8	18.2	20.1	24.6	23.8	22.6
4	Near China Gate Weigh Bridge	24.3	25.5	27.3	29.7	29.7	26.7
5	Near Cooling Tower IPP	22.6	21.3	25.4	26.3	26.3	25.5
6	Near ETP, Smelter-1	25.8	24.7	27.8	25.5	25.5	27.6
7	Near Cast House, Smelter-1	22.7	23.5	26.2	27.1	24.1	25.3
8	Near Pot Room, Smelter-1	25.9	26.3	27.1	28.2	28.2	28.8
9	Near Coal Yard of CPP	28.4	27.5	28.6	29.3	30.6	32.5
10	Near Cooling Tower of CPP	24.1	25.2	26.8	24.7	23.6	25.8

xii. Ozone (µg/m^3)

Sl. No.	Name of Location	Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
Limit (8 Hours Weighed Average)		**100**					
1	Near Carbon Plant, Smelter-1	6.9	6.7	7.3	6.5	6.1	6.7
2	Near Rectifier of Expansion Pot Room	7.2	7.3	6.8	6.2	5.7	6.1
3	Near R & R colony	5.9	6.0	5.8	6.3	5.8	6.3
4	Near China Gate Weigh Bridge	7.2	7.0	7.6	7.7	8.2	8.5
5	Near Cooling Tower IPP	7.5	7.3	7.8	7.8	7.1	7.4
6	Near ETP, Smelter-1	7.0	7.1	7.5	8.1	6.7	6.2
7	Near Cast House, Smelter-1	7.4	7.6	7.9	7.3	6.8	6.5
8	Near Pot Room, Smelter-1	6.9	6.8	7.2	7.4	7.3	7.6
9	Near Coal Yard of CPP	8.1	7.7	7.4	8.5	7.9	8.1
10	Near Cooling Tower of CPP	6.9	7.2	7.3	6.8	6.2	6.6

4. Noise:

i. Day Time (6.00 a.m. to 10.00 p.m.)

Sl. No.	Sampling Location	**Day time** (6.00 a.m. to 10.00 p.m.) Noise Level in dB (A)					
		Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
1	In R & R colony	57.80	55.30	63.50	64.80	62.70	60.70
2	Near Boiler of IPP	73.20	72.80	72.60	71.30	74.10	72.60
3	In Green Anode Plant	71.50	70.60	71.80	70.30	71.60	70.50
4	In Cast house- Smelter 1	72.20	71.70	72.60	70.70	72.20	73.80
5	Near Boiler of CPP	72.30	73.80	71.40	72.30	71.40	72.70
6	In Pot Room –Smelter 1	70.70	72.00	63.50	69.70	71.60	72.00

ii.Night Time (10.00 p.m. to 6.00 a. m.)

Sl. No.	Sampling Location	**Night time** (10.00 p.m. to 6.00 a.m.) Noise Level in dB (A)					
		Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
1	In R & R colony	50.60	51.40	54.80	57.30	59.30	55.40
2	Near Boiler of IPP	65.60	65.10	63.70	62.40	68.80	65.30
3	In Green Anode Plant	59.30	62.50	63.20	60.70	63.50	61.60
4	In Cast house- Smelter 1	57.60	60.40	61.60	59.70	65.70	64.70
5	Near Boiler of CPP	69.70	68.40	60.30	63.80	62.70	63.60
6	In Pot Room –Smelter 1	60.30	61.70	54.80	62.60	67.10	63.80

5. Water:

a) Smelter-1 ETP Outlet:

Location of sample: Smelter ETP outlet -E1 (recycled as process make up water)									
Sl. No.	**Parameters**	**Unit**	**Limit**	**E1**					
				Oct'21	**Nov'21**	**Dec'21**	**Jan'22**	**Feb'22**	**Mar'22**
1	pH	-	6.5-9.0	7.42	7.5	7.57	7.73	7.68	7.51
2	Total Suspended Solids	mg/l	100	7.0	6.0	7.0	5.0	8.0	6.0
3	Dissolved Solids	mg/l	2100	72	83	76	88	73	65
4	BOD (3) days at 27°C	mg/l	30	5.7	6.0	6.4	6.1	5.5	6.4
5	COD	mg/l	250	22	24	24	20	22	24
6	Fluoride	mg/l	1.5	0.62	0.48	0.51	0.63	0.63	0.57
7	Oil and Grease	mg/l	10	ND	ND	ND	ND	ND	ND
8	Hexavalent chromium as Cr^{+6}	mg/l	0.1	BDL	BDL	BDL	BDL	BDL	BDL
9	Total Chromium	mg/l	2	0.011	0.016	0.032	0.036	0.041	0.044
10	Cyanide	mg/l	0.2	BDL	BDL	BDL	BDL	BDL	BDL
11	Free ammonia	mg/l	5	ND	ND	ND	ND	ND	ND
12	Total Nitrogen	mg/l	100	2.80	3.1	3.1	4.6	3.5	2.9

b) Smelter-2 ETP Outlet:

Location of sample: Smelter ETP outlet –E2 (recycled as process make up water)									
Sl. No.	**Parameters**	**Unit**	**Limit**	**E2**					
				Oct'21	**Nov'21**	**Dec'21**	**Jan'22**	**Feb'22**	**Mar'22**
1	pH	-	6.5-9.0	7.26	7.08	7.15	6.92	7.14	7.35
2	Total Suspended Solids	mg/l	100	28	26	13	11	15	10
3	Dissolved Solids	mg/l	2100	164	148	153	136	161	186
4	BOD (3) days at 27°C	mg/l	30	6.8	6.7	6	6.6	6.8	7.5
5	COD	mg/l	250	28	22	24	28	26	32
6	Fluoride	mg/l	1.5	0.86	0.72	0.78	0.71	0.65	0.52
7	Oil and Grease	mg/l	10	ND	ND	ND	ND	ND	ND
8	Hexavalent chromium as Cr^{+6}	mg/l	0.1	BDL	BDL	BDL	BDL	BDL	BDL
9	Total Chromium	mg/l	2	0.023	0.031	0.034	0.032	0.037	0.033
10	Cyanide	mg/l	0.2	BDL	BDL	BDL	BDL	BDL	BDL
11	Free ammonia	mg/l	5	ND	ND	ND	ND	ND	ND
12	Total Nitrogen	mg/l	100	2.30	2.4	2.7	3.2	3.8	4.70

c) CPP ETP Outlet:

Location of sample: CPP ETP outlet –E3									
Sl. No.	**Parameters**	**Unit**	**Limit**	**E3**					
				Oct'21	**Nov'21**	**Dec'21**	**Jan'22**	**Feb'22**	**Mar'22**
1	pH	-	6.5-9.0	7.42	7.56	7.67	7.54	7.61	7.74
2	Total Suspended Solids	mg/l	100	13	18	23	19	22	22
3	Dissolved Solids	mg/l	2100	207	228	206	221	196	225
4	BOD (3 days at 27°C)	mg/l	30	8.1	8.6	8.1	7.4	6.8	7.2
5	COD	mg/l	250	38	39	40	32	28	34
6	Oil and Grease	mg/l	10	ND	ND	ND	ND	ND	ND

d) Surface Water:

Sampling location: SW1- Upstream of Bhedan River

Sl. No.	**Parameter**	**Unit**	**Standard**	**SW1**					
				Oct'21	**Nov'21**	**Dec'21**	**Jan'22**	**Feb'22**	**Mar'22**
1	Colour	Hazen	300	10	20	10	10	20	30
2	pH	--	6.5-8.5	7.18	7.22	7.06	7.28	7.74	7.58
3	DO	mg/l	4 (min)	5.5	5.7	5.5	5.3	6.1	6.3
4	Chloride	mg/l	600	17.0	19.5	20	21.5	19.5	17
5	Total Dissolved Solids	mg/l	1500	91	138	151	143	113	134
6	Suspended Solids	mg/l	-	116	86	76	65	46	51
7	Oils& Grease	mg/l	0.1	ND	ND	ND	ND	ND	ND
8	BOD (3) days at 27 ^{0}C	mg/l	3	2.3	2.1	2.3	2.5	2.2	2.4
9	Arsenic as As	mg/l	0.2	BDL	BDL	BDL	BDL	BDL	BDL
10	Lead as Pb	mg/l	0.1	0.031	0.034	0.036	0.031	0.021	0.027
11	Cadmium as Cd	mg/l	0.01	BDL	BDL	BDL	BDL	BDL	BDL
12	Hexavalent Chromium as Cr^{+6}	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
13	Copper as Cu	mg/l	1.5	0.024	0.022	0.021	0.029	0.023	0.028
14	Zinc as Zn	mg/l	15	0.28	0.22	0.18	0.16	0.12	0.15
15	Selenium as Se	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
16	Cyanide as CN	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
17	Fluoride as F	mg/l	1.5	0.25	0.21	0.17	0.20	0.36	0.31
18	Sulphates (SO_4)	mg/l	400	13.6	14.2	15.3	14.6	10.2	9.7
19	Phenolic Compounds as C_6H_5OH	mg/l	0.005	BDL	BDL	BDL	BDL	BDL	BDL
20	Iron as Fe	mg/l	50	0.32	0.35	0.36	0.33	0.22	0.29
21	Nitrate as NO_3	mg/l	50	1.6	1.72	1.65	1.42	1.55	1.63
22	Anionic Detergents	mg/l	1	ND	ND	ND	ND	ND	ND
23	Total Coliform	MPN/ 100ml	5000	210	220	190	170	150	180

Surface Water: Continue……

Sampling location: SW2- Downstream of Bhedan River

Sl. No.	Parameter	Unit	Standard	SW2					
				Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
1	Colour	Hazen	300	15	10	5	10	15	10
2	pH	--	6.5-8.5	7.37	7.43	7.32	7.53	7.66	7.37
3	DO	mg/l	4 (min)	6.2	6.6	6.1	5.9	6.5	6.7
4	Chloride	mg/l	600	21.5	23	22	26	24.5	22.5
5	Total Dissolved Solids	mg/l	1500	114	173	184	162	145	161
6	Suspended Solids	mg/l	-	121	105	92	79	58	66
7	Oils& Grease	mg/l	0.1	ND	ND	ND	ND	ND	ND
8	BOD (3) days at 27 ^{0}C	mg/l	3	2.0	1.8	2	2.2	2	2.1
9	Arsenic as As	mg/l	0.2	BDL	BDL	BDL	BDL	BDL	BDL
10	Lead as Pb	mg/l	0.1	0.037	0.033	0.029	0.025	0.016	0.022
11	Cadmium as Cd	mg/l	0.01	BDL	BDL	BDL	BDL	BDL	BDL
12	Hexavalent Chromium as Cr^{+6}	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
13	Copper as Cu	mg/l	1.5	0.032	0.035	0.034	0.034	0.027	0.034
14	Zinc as Zn	mg/l	15	0.33	0.29	0.24	0.21	0.15	0.19
15	Selenium as Se	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
16	Cyanide as CN	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
17	Fluoride as F	mg/l	1.5	0.38	0.34	0.26	0.24	0.42	0.41
18	Sulphates (SO_4)	mg/l	400	17.1	17.7	18.4	17.2	14.6	15.6
19	Phenolic Compounds as C_6H_5OH	mg/l	0.005	BDL	BDL	BDL	BDL	BDL	BDL
20	Iron as Fe	mg/l	50	0.38	0.42	0.43	0.41	0.35	0.37
21	Nitrate as NO_3	mg/l	50	2.7	2.86	2.53	2.28	2.46	2.27
22	Anionic Detergents	mg/l	1	ND	ND	ND	ND	ND	ND
23	Total Coliform	MPN/ 100ml	5000	330	280	240	210	230	240

Surface Water: Continue……

Sampling location: SW3- Upstream of Kharkhari Nallah

Sl.No.	Parameter	Unit	Standard	SW3					
				Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
1	Colour	Hazen	300	20	10	10	15	5	10
2	pH	--	6.5-8.5	7.11	7.06	7.11	7.63	7.37	7.29
3	DO	mg/l	4 (min)	5.6	5.9	5.8	6	6.3	6.1
4	Chloride	mg/l	600	18.5	16.5	17.5	19.5	23.5	21
5	Total Dissolved Solids	mg/l	1500	195	178	186	167	159	176
6	Suspended Solids	mg/l	-	116	107	95	83	80	75
7	Oils& Grease	mg/l	0.1	ND	ND	ND	ND	ND	ND
8	BOD (3) days at 27 0C	mg/l	3	2.1	1.9	2	2.1	2.2	2.3
9	Arsenic as As	mg/l	0.2	BDL	BDL	BDL	BDL	BDL	BDL
10	Lead as Pb	mg/l	0.1	0.028	0.032	0.028	0.026	0.022	0.029
11	Cadmium as Cd	mg/l	0.01	BDL	BDL	BDL	BDL	BDL	BDL
12	Hexavalent Chromium as Cr+6	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
13	Copper as Cu	mg/l	1.5	0.026	0.029	0.03	0.03	0.024	0.022
14	Zinc as Zn	mg/l	15	0.29	0.27	0.29	0.24	0.2	0.18
15	Selenium as Se	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
16	Cyanide as CN	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
17	Fluoride as F	mg/l	1.5	0.31	0.27	0.29	0.23	0.35	0.32
18	Sulphates (SO4)	mg/l	400	12.6	11.2	13.2	11.6	16.2	12.8
19	Phenolic Compounds as C6H5OH	mg/l	0.005	BDL	BDL	BDL	BDL	BDL	BDL
20	Iron as Fe	mg/l	50	0.33	0.38	0.36	0.37	0.31	0.28
21	Nitrate as NO3	mg/l	50	1.4	1.3	1.14	1.27	1.38	1.6
22	Anionic Detergents	mg/l	1	ND	ND	ND	ND	ND	ND
23	Total Coliform	MPN/ 100ml	5000	250	220	240	250	220	210

Surface Water: Continue……

Sampling location: SW4- Downstream of Kharkhari Nalla

Sl.No.	Parameter	Unit	Standard	SW4					
				Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
1	Colour	Hazen	300	30	20	15	30	15	20
2	pH	--	6.5-8.5	7.46	7.28	7.26	7.35	7.58	7.44
3	DO	mg/l	4 (min)	5.2	5.4	5.5	5.8	5.9	5.6
4	Chloride	mg/l	600	29.0	25.5	24.5	24.5	27	30.5
5	Total Dissolved Solids	mg/l	1500	253	234	248	232	246	259
6	Suspended Solids	mg/l	-	121	113	106	114	106	94
7	Oils& Grease	mg/l	0.1	ND	ND	ND	ND	ND	ND
8	BOD (3) days at 27 ^{0}C	mg/l	3	2.3	2.2	2.4	2.2	2.5	2.6
9	Arsenic as As	mg/l	0.2	BDL	BDL	BDL	BDL	BDL	BDL
10	Lead as Pb	mg/l	0.1	0.025	0.027	0.025	0.022	0.019	0.023
11	Cadmium as Cd	mg/l	0.01	BDL	BDL	BDL	BDL	BDL	BDL
12	Hexavalent Chromium as Cr^{+6}	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
13	Copper as Cu	mg/l	1.5	0.032	0.038	0.039	0.036	0.031	0.035
14	Zinc as Zn	mg/l	15	0.38	0.34	0.31	0.27	0.24	0.26
15	Selenium as Se	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
16	Cyanide as CN	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
17	Fluoride as F	mg/l	1.5	0.36	0.41	0.38	0.34	0.42	0.4
18	Sulphates (SO_4)	mg/l	400	19.3	17.3	18.5	15.5	21.6	19.3
19	Phenolic Compounds as C_6H_5OH	mg/l	0.005	BDL	BDL	BDL	BDL	BDL	BDL
20	Iron as Fe	mg/l	50	0.43	0.46	0.43	0.46	0.38	0.43
21	Nitrate as NO_3	mg/l	50	2.5	2.18	1.84	1.63	2.24	2.54
22	Anionic Detergents	mg/l	1	ND	ND	ND	ND	ND	ND
23	Total Coliform	MPN/ 100ml	5000	410	350	310	260	280	310

Surface Water: Continue……
Sampling location: SW5- Upstream Hirakud Reservoir

Sl. No.	Parameter	Unit	Standard	SW5					
				Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
1	Colour	Hazen	300	20	10	5	5	10	15
2	pH	--	6.5-8.5	7.51	7.38	7.24	7.44	7.38	7.46
3	DO	mg/l	4 (min)	5.7	6.3	5.9	5.6	5.9	5.9
4	Chloride	mg/l	600	32.0	26.5	24.5	24.5	22	24.5
5	Total Dissolved Solids	mg/l	1500	232	176	135	150	166	183
6	Suspended Solids	mg/l	-	109	72	69	61	67	72
7	Oils& Grease	mg/l	0.1	ND	ND	ND	ND	ND	ND
8	BOD (3) days at 27 ^{0}C	mg/l	3	2.4	2	2.1	2.2	2.3	2.5
9	Arsenic as As	mg/l	0.2	BDL	BDL	BDL	BDL	BDL	BDL
10	Lead as Pb	mg/l	0.1	0.036	0.029	0.025	0.027	0.029	0.032
11	Cadmium as Cd	mg/l	0.01	BDL	BDL	BDL	BDL	BDL	BDL
12	Hexavalent Chromium as Cr^{+6}	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
13	Copper as Cu	mg/l	1.5	0.035	0.026	0.027	0.031	0.034	0.041
14	Zinc as Zn	mg/l	15	0.34	0.21	0.2	0.17	0.15	0.2
15	Selenium as Se	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
16	Cyanide as CN	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
17	Fluoride as F	mg/l	1.5	0.33	0.37	0.3	0.27	0.25	0.3
18	Sulphates (SO_4)	mg/l	400	20.7	22.3	19.6	18.4	16.8	14.7
19	Phenolic Compounds as C_6H_5OH	mg/l	0.005	BDL	BDL	BDL	BDL	BDL	BDL
20	Iron as Fe	mg/l	50	0.45	0.37	0.42	0.29	0.28	0.33
21	Nitrate as NO_3	mg/l	50	2.2	1.94	1.84	1.57	1.43	1.83
22	Anionic Detergents	mg/l	1	ND	ND	ND	ND	ND	ND
23	Total Coliform	MPN/ 100ml	5000	390	250	220	180	210	190

Surface Water: Continue……

Sampling location: SW6- Downstream of Hirakud Reservoir

Sl. No.	Parameter	Unit	Standard	SW6					
				Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
1	Colour	Hazen	300	5	15	10	10	10	10
2	pH	--	6.5-8.5	7.44	7.26	7.15	7.23	7.06	7.13
3	DO	mg/l	4 (min)	6.5	6.1	5.7	5.5	5.7	6.4
4	Chloride	mg/l	600	22.0	28	26	30	31.5	27
5	Total Dissolved Solids	mg/l	1500	141	195	202	176	194	218
6	Suspended Solids	mg/l	-	78	94	83	74	78	81
7	Oils& Grease	mg/l	0.1	ND	ND	ND	ND	ND	ND
8	BOD (3) days at 27 ^{0}C	mg/l	3	1.9	2.2	2	2.3	2.5	2.3
9	Arsenic as As	mg/l	0.2	BDL	BDL	BDL	BDL	BDL	BDL
10	Lead as Pb	mg/l	0.1	0.026	0.041	0.038	0.037	0.034	0.038
11	Cadmium as Cd	mg/l	0.01	BDL	BDL	BDL	BDL	BDL	BDL
12	Hexavalent Chromium as Cr^{+6}	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
13	Copper as Cu	mg/l	1.5	0.029	0.031	0.03	0.035	0.037	0.046
14	Zinc as Zn	mg/l	15	0.25	0.28	0.25	0.23	0.21	0.25
15	Selenium as Se	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
16	Cyanide as CN	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
17	Fluoride as F	mg/l	1.5	0.41	0.39	0.36	0.31	0.28	0.27
18	Sulphates (SO_4)	mg/l	400	21.4	25.4	27.3	21.7	19.5	16.3
19	Phenolic Compounds as C_6H_5OH	mg/l	0.005	BDL	BDL	BDL	BDL	BDL	BDL
20	Iron as Fe	mg/l	50	0.42	0.45	0.43	0.35	0.37	0.36
21	Nitrate as NO_3	mg/l	50	2.10	2.63	2.26	1.92	1.75	2.04
22	Anionic Detergents	mg/l	1	ND	ND	ND	ND	ND	ND
23	Total Coliform	MPN/ 100ml	5000	260	350	280	240	260	250

Surface Water: Continue……

Sampling location: SW7- Confluence point near Kherual bridge

Sl. No.	Parameter	Unit	Standard	SW7					
				Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
1	Colour	Hazen	300	20	10	10	20	10	15
2	pH	--	6.5-8.5	7.16	7.43	7.32	7.47	6.94	7.18
3	DO	mg/l	4 (min)	5.8	6.1	5.7	5.5	6.1	6.3
4	Chloride	mg/l	600	26.5	29.5	28	28	26.5	28
5	Total Dissolved Solids	mg/l	1500	203	211	236	198	221	213
6	Suspended Solids	mg/l	-	107	94	86	94	98	82
7	Oil & Grease	mg/l	0.1	ND	ND	ND	ND	ND	ND
8	BOD (3) days at 27 ^{0}C	mg/l	3	2.1	2	2.2	2.4	2.2	2.4
9	Arsenic as As	mg/l	0.2	BDL	BDL	BDL	BDL	BDL	BDL
10	Lead as Pb	mg/l	0.1	0.040	0.042	0.035	0.034	0.025	0.031
11	Cadmium as Cd	mg/l	0.01	BDL	BDL	BDL	BDL	BDL	BDL
12	Hexavalent Chromium as Cr^{+6}	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
13	Copper as Cu	mg/l	1.5	0.035	0.041	0.037	0.038	0.024	0.029
14	Zinc as Zn	mg/l	15	0.35	0.4	0.36	0.29	0.26	0.31
15	Selenium as Se	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
16	Cyanide as CN	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
17	Fluoride as F	mg/l	1.5	0.40	0.36	0.41	0.37	0.46	0.43
18	Sulphate (SO_4)	mg/l	400	25.4	21.2	22.6	19.3	17.5	16.4
19	Phenolic Compounds as C_6H_5OH	mg/l	0.005	BDL	BDL	BDL	BDL	BDL	BDL
20	Iron as Fe	mg/l	50	0.47	0.42	0.44	0.45	0.48	0.45
21	Nitrate as NO_3	mg/l	50	2.80	2.43	2.13	1.88	1.63	1.75
22	Anionic Detergents	mg/l	1	ND	ND	ND	ND	ND	ND
23	Total Coliform	MPN/ 100ml	5000	390	450	350	310	320	290

e) Ground Water, Secured Land Fill (SLF) Area:

Sampling Location GW1- Secured landfill Bore well (East)

Sl. No	Parameter	Unit	Standard as per IS:10500	GW1					
				Oct'21	**Nov'21**	**Dec'21**	**Jan'22**	**Feb'22**	**Mar'22**
1	Colour	Hazen	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2	Odour	-	U/O	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3	Taste	-	AL	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity (NTU)	-	5	<1	<1	<1.0	<1.0	<1.0	<1.0
5	pH Value	-	6.5-8.5	7.37	7.18	7.26	7.47	7.26	7.38
6	Total Hardness (as $CaCO_3$)	mg/l	300	118	104	92	78	84	76
7	Iron (as Fe)	mg/l	0.3	0.39	0.39	0.31	0.25	0.28	0.37
8	Chloride (as Cl)	mg/l	250	23.5	25	21.5	26.5	28	32.5
9	Residual free Chlorine	mg/l	0.2	ND	ND	ND	ND	ND	ND
10	Dissolved solids	mg/l	500	268	265	259	243	229	248
11	Calcium (as Ca)	mg/l	75	31.6	28.4	24	25.4	26.4	29.6
12	Copper (as Cu)	mg/l	0.05	0.035	0.031	0.028	0.025	0.027	0.028
13	Manganese (as Mn)	mg/l	0.1	BDL	BDL	BDL	BDL	BDL	BDL
14	Sulphate as (SO_4)	mg/l	200	13.1	12.4	11.6	12.6	11.8	10.7
15	Nitrate (as NO_3)	mg/l	45	1.14	0.93	0.68	0.85	1.24	1.45
16	Fluoride (as F)	mg/l	1	0.26	0.23	0.21	0.25	0.28	0.37
17	Phenolic compounds (as C6H5OH)	mg/l	0.001	BDL	BDL	BDL	BDL	BDL	BDL
18	Anionic Detergent (as MBAS)	mg/l	0.2	ND	ND	ND	ND	ND	ND
19	Mercury (as Hg)	mg/l	0.001	BDL	BDL	BDL	BDL	BDL	BDL
20	Cadmium (as Cd)	mg/l	0.01	BDL	BDL	BDL	BDL	BDL	BDL
21	Selenium (as Se)	mg/l	0.01	BDL	BDL	BDL	BDL	BDL	BDL
22	Arsenic (as As)	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
23	Cyanide (as CN)	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
24	Lead (as Pb)	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
25	Zinc (as Zn)	mg/l	5	0.35	0.31	0.24	0.22	0.17	0.18
26	Chromium as (Cr^{+6})	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
27	Mineral oil	mg/l	0.01	ND	ND	ND	ND	ND	ND
28	Alkalinity	mg/l	200	76	72	76	82	78	84
29	Aluminium as Al	mg/l	0.03	0.017	0.02	0.021	0.023	0.026	0.029
30	Boron	mg/l	1	BDL	BDL	BDL	BDL	BDL	BDL

Ground Water, Secured Land Fill (SLF) Area: Continue……

Sampling Location: GW2 -Secured landfill Bore well (West)

Sl. No	Parameter	Unit	Standards as per IS:10500	GW2					
				Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
1	Colour	Hazen	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2	Odour	-	U/O	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3	Taste	-	AL	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity (NTU)	-	5	<1	<1	<1.0	<1.0	<1.0	<1.0
5	pH Value	-	6.5-8.5	7.04	7.15	7.32	7.18	7.05	7.15
6	Total Hardness (as $CaCO_3$)	mg/l	300	106	88	80	86	72	90
7	Iron (as Fe)	mg/l	0.3	0.32	0.38	0.34	0.32	0.34	0.29
8	Chloride (as Cl)	mg/l	250	29.5	26.5	23	25	30	36
9	Residual free Chlorine	mg/l	0.2	ND	ND	ND	ND	ND	ND
10	Dissolved solids	mg/l	500	296	272	276	291	273	311
11	Calcium (as Ca)	mg/l	75	34.2	29.6	26.4	31.6	29.2	33.8
12	Copper (as Cu)	mg/l	0.05	0.029	0.025	0.024	0.027	0.031	0.034
13	Manganese (as Mn)	mg/l	0.1	BDL	BDL	BDL	BDL	BDL	BDL
14	Sulphate as (SO_4)	mg/l	200	12.2	10.6	10.2	10.8	13.2	14.3
15	Nitrate (as NO_3)	mg/l	45	1.03	0.87	0.75	1.32	1.18	0.86
16	Fluoride (as F)	mg/l	1	0.31	0.28	0.26	0.29	0.33	0.41
17	Phenolic compounds (as C6H5OH)	mg/l	0.001	BDL	BDL	BDL	BDL	BDL	BDL
18	Anionic Detergent (as MBAS)	mg/l	0.2	ND	ND	ND	ND	ND	ND
19	Mercury (as Hg)	mg/l	0.001	BDL	BDL	BDL	BDL	BDL	BDL
20	Cadmium (as Cd)	mg/l	0.01	BDL	BDL	BDL	BDL	BDL	BDL
21	Selenium (as Se)	mg/l	0.01	BDL	BDL	BDL	BDL	BDL	BDL
22	Arsenic (as As)	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
23	Cyanide (as CN)	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
24	Lead (as Pb)	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
25	Zinc (as Zn)	mg/l	5	0.36	0.34	0.29	0.25	0.21	0.24
26	Chromium as (Cr^{+6})	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
27	Mineral oil	mg/l	0.01	ND	ND	ND	ND	ND	ND
28	Alkalinity	mg/l	200	68	74	80	66	60	68
29	Aluminium as Al	mg/l	0.03	0.019	0.018	0.017	0.021	0.024	0.027
30	Boron	mg/l	1	BDL	BDL	BDL	BDL	BDL	BDL

Ground Water, Secured Land Fill (SLF) Area: Continue……
Sampling Location: GW3 -Secured landfill Bore well (North)

Sl. No	Parameter	Unit	Standards as per IS:10500	GW3					
				Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
1	Colour	Hazen	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2	Odour	-	U/O	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3	Taste	-	AL	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity (NTU)	-	5	<1	<1	<1.0	<1.0	<1.0	<1.0
5	pH Value	-	6.5-8.5	7.31	7.26	7.22	7.35	7.33	7.56
6	Total Hardness (as $CaCO_3$)	mg/l	300	104	92	84	72	78	70
7	Iron (as Fe)	mg/l	0.3	0.35	0.31	0.28	0.29	0.23	0.31
8	Chloride (as Cl)	mg/l	250	34.0	31	27.5	31.5	27.5	31.5
9	Residual free Chlorine	mg/l	0.2	ND	ND	ND	ND	ND	ND
10	Dissolved solids	mg/l	500	308	284	264	256	245	269
11	Calcium (as Ca)	mg/l	75	28.8	26.8	23.2	24.4	28.6	30.4
12	Copper (as Cu)	mg/l	0.05	0.031	0.034	0.03	0.032	0.028	0.033
13	Manganese (as Mn)	mg/l	0.1	BDL	BDL	BDL	BDL	BDL	BDL
14	Sulphate as (SO_4)	mg/l	200	9.8	9.2	8.7	12.7	12.1	11.6
15	Nitrate (as NO_3)	mg/l	45	0.94	0.85	0.77	1.54	1.35	1.26
16	Fluoride (as F)	mg/l	1	0.34	0.32	0.28	0.31	0.26	0.32
17	Phenolic compounds (as C6H5OH)	mg/l	0.001	BDL	BDL	BDL	BDL	BDL	BDL
18	Anionic Detergent (as MBAS)	mg/l	0.2	ND	ND	ND	ND	ND	ND
19	Mercury (as Hg)	mg/l	0.001	BDL	BDL	BDL	BDL	BDL	BDL
20	Cadmium (as Cd)	mg/l	0.01	BDL	BDL	BDL	BDL	BDL	BDL
21	Selenium (as Se)	mg/l	0.01	BDL	BDL	BDL	BDL	BDL	BDL
22	Arsenic (as As)	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
23	Cyanide (as CN)	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
24	Lead (as Pb)	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
25	Zinc (as Zn)	mg/l	5	0.29	0.25	0.22	0.18	0.15	0.19
26	Chromium as (Cr^{+6})	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
27	Mineral oil	mg/l	0.01	ND	ND	ND	ND	ND	ND
28	Alkalinity	mg/l	200	84	78	70	78	72	70
29	Aluminium as Al	mg/l	0.03	0.021	0.022	0.021	0.024	0.028	0.022
30	Boron	mg/l	1	BDL	BDL	BDL	BDL	BDL	BDL

Ground Water, Secured Land Fill (SLF) Area: Continue……

Sampling Location: GW4 -Secured landfill Bore well (South)

Sl. No	Parameter	Unit	Standards as per IS:10500	GW4					
				Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
1	Colour	Hazen	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2	Odour	-	U/O	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3	Taste	-	AL	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity (NTU)	-	5	<1	<1	<1.0	<1.0	<1.0	<1.0
5	pH Value	-	6.5-8.5	7.47	7.34	7.37	7.52	7.48	7.27
6	Total Hardness (as $CaCO_3$)	mg/l	300	120	108	96	82	86	102
7	Iron (as Fe)	mg/l	0.3	0.33	0.29	0.32	0.36	0.41	0.48
8	Chloride (as Cl)	mg/l	250	31.5	28.5	24.5	29.5	26	33
9	Residual free Chlorine	mg/l	0.2	ND	ND	ND	ND	ND	ND
10	Dissolved solids	mg/l	500	289	298	283	272	286	328
11	Calcium (as Ca)	mg/l	75	33.6	30.4	28.6	32	31.4	35.2
12	Copper (as Cu)	mg/l	0.05	0.026	0.033	0.031	0.034	0.037	0.045
13	Manganese (as Mn)	mg/l	0.1	BDL	BDL	BDL	BDL	BDL	BDL
14	Sulphate as (SO_4)	mg/l	200	11.5	12.1	11.3	13.2	12.6	13.2
15	Nitrate (as NO_3)	mg/l	45	1.21	1.12	0.86	1.23	1.43	1.37
16	Fluoride (as F)	mg/l	1	0.29	0.33	0.3	0.27	0.24	0.28
17	Phenolic compounds (as C6H5OH)	mg/l	0.001	BDL	BDL	BDL	BDL	BDL	BDL
18	Anionic Detergent (as MBAS)	mg/l	0.2	ND	ND	ND	ND	ND	ND
19	Mercury (as Hg)	mg/l	0.001	BDL	BDL	BDL	BDL	BDL	BDL
20	Cadmium (as Cd)	mg/l	0.01	BDL	BDL	BDL	BDL	BDL	BDL
21	Selenium (as Se)	mg/l	0.01	BDL	BDL	BDL	BDL	BDL	BDL
22	Arsenic (as As)	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
23	Cyanide (as CN)	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
24	Lead (as Pb)	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
25	Zinc (as Zn)	mg/l	5	0.27	0.26	0.25	0.21	0.22	0.20
26	Chromium as (Cr^{+6})	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL
27	Mineral oil	mg/l	0.01	ND	ND	ND	ND	ND	ND
28	Alkalinity	mg/l	200	80	86	82	86	78	76
29	Aluminium as Al	mg/l	0.03	0.023	0.02	0.021	0.022	0.021	0.025
30	Boron	mg/l	1	BDL	BDL	BDL	BDL	BDL	BDL

f) Ground Water, Ash Pond Area:

Sampling Location: GW1- Ash Pond Bore well (East), GW2- Ash Pond Bore well (West)

Sl. No	Parameter	Unit	Standard as per IS: 10500	GW1		GW2	
				Oct'21	Jan'22	Oct'21	Jan'22
1	Colour	Hazen	5	<5.0	<5.0	<5.0	<5.0
2	Odour	-	U/O	Agreeable	Agreeable	Agreeable	Agreeable
3	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity	NTU	5	<1.0	<1.0	<1.0	<1.0
5	pH Value	-	6.5-8.5	7.27	7.38	7.41	7.26
6	Total Hardness (as CaCO3)	mg/l	300	98	82	108	76
7	Iron (as Fe)	mg/l	0.3	0.38	0.31	0.25	0.27
8	Chloride (as Cl)	mg/l	250	31	30.5	28.5	29
9	Residual free Chlorine	mg/l	0.2	ND	ND	ND	ND
10	Dissolved solids	mg/l	500	321	253	269	261
11	Calcium (as Ca)	mg/l	75	34.6	27.6	28.2	26.2
12	Copper (as Cu)	mg/l	0.05	BDL	BDL	BDL	BDL
13	Manganese (as Mn)	mg/l	0.1	0.036	0.059	0.032	0.054
14	Sulphate as (SO4)	mg/l	200	15.3	13.5	13.8	9.7
15	Nitrate (as NO3)	mg/l	45	0.75	1.21	0.92	1.14
16	Fluoride (as F)	mg/l	1	0.31	0.29	0.34	0.33
17	Phenolic compounds (as C6H5OH)	mg/l	0.001	BDL	BDL	BDL	BDL
18	Anionic Detergent (as MBAS)	mg/l	0.2	ND	ND	ND	ND
19	Mercury (as Hg)	mg/l	0.001	BDL	BDL	BDL	BDL
20	Cadmium (as Cd)	mg/l	0.01	BDL	BDL	BDL	BDL
21	Selenium (as Se)	mg/l	0.01	BDL	BDL	BDL	BDL
22	Arsenic (as As)	mg/l	0.05	BDL	BDL	BDL	BDL
23	Cyanide (as CN)	mg/l	0.05	BDL	BDL	BDL	BDL
24	Lead (as Pb)	mg/l	0.05	BDL	BDL	BDL	BDL
25	Zinc (as Zn)	mg/l	5	0.47	0.26	0.39	0.22
26	Chromium as (Cr+6)	mg/l	0.05	BDL	BDL	BDL	BDL
27	Mineral oil	mg/l	0.01	ND	ND	ND	ND
28	Alkalinity	mg/l	200	68	80	75	72
29	Aluminium as Al	mg/l	0.03	BDL	BDL	BDL	BDL
30	Boron	mg/l	1	BDL	BDL	BDL	BDL

Ground Water, Village Area: Continue……

Sampling Location: GW3- Ash Pond Bore well (North), GW4- Ash Pond Bore well (South)

Sl. No.	Parameter	Unit	Standard as per IS: 10500	GW3		GW4	
				Oct'21	Jan'22	Oct'21	Jan'22
1	Colour	Hazen	5	<5.0	<5.0	<5.0	<5.0
2	Odour	-	U/O	Agreeable	Agreeable	Agreeable	Agreeable
3	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity	NTU	5	<1.0	<1.0	<1.0	<1.0
5	pH Value	-	6.5-8.5	7.16	7.44	7.24	7.35
6	Total Hardness (as CaCO3)	mg/l	300	92	92	110	80
7	Iron (as Fe)	mg/l	0.3	0.29	0.33	0.35	0.31
8	Chloride (as Cl)	mg/l	250	36.5	34.5	30.5	31
9	Residual free Chlorine	mg/l	0.2	ND	ND	ND	ND
10	Dissolved solids	mg/l	500	282	294	305	251
11	Calcium (as Ca)	mg/l	75	29.6	31.4	35.4	25.6
12	Copper (as Cu)	mg/l	0.05	BDL	BDL	BDL	BDL
13	Manganese (as Mn)	mg/l	0.1	0.031	0.062	0.028	0.057
14	Sulphate as (SO4)	mg/l	200	17.4	15.3	15.7	14.1
15	Nitrate (as NO3)	mg/l	45	0.90	1.36	0.87	0.97
16	Fluoride (as F)	mg/l	1	0.33	0.38	0.35	0.35
17	Phenolic compounds (as C6H5OH)	mg/l	0.001	BDL	BDL	BDL	BDL
18	Anionic Detergent (as MBAS)	mg/l	0.2	ND	ND	ND	ND
19	Mercury (as Hg)	mg/l	0.001	BDL	BDL	BDL	BDL
20	Cadmium (as Cd)	mg/l	0.01	BDL	BDL	BDL	BDL
21	Selenium (as Se)	mg/l	0.01	BDL	BDL	BDL	BDL
22	Arsenic (as As)	mg/l	0.05	BDL	BDL	BDL	BDL
23	Cyanide (as CN)	mg/l	0.05	BDL	BDL	BDL	BDL
24	Lead (as Pb)	mg/l	0.05	BDL	BDL	BDL	BDL
25	Zinc (as Zn)	mg/l	5	0.45	0.31	0.41	0.24
26	Chromium as (Cr+6)	mg/l	0.05	BDL	BDL	BDL	BDL
27	Mineral oil	mg/l	0.01	ND	ND	ND	ND
28	Alkalinity	mg/l	200	82	84	70	70
29	Aluminium as Al	mg/l	0.03	BDL	BDL	BDL	BDL
30	Boron	mg/l	1	BDL	BDL	BDL	BDL

g) Ground Water, Village Area:

Sampling Location: GW1- Gudigaon Village, GW2- Kurebaga Village

Sl. No	Parameter	Unit	Standard as per IS: 10500	GW1		GW2	
				Oct'21	Jan'22	Oct'21	Jan'22
1	Colour	Hazen	5	<5.0	<5.0	<5.0	<5.0
2	Odour	-	U/O	Agreeable	Agreeable	Agreeable	Agreeable
3	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity	NTU	5	<1.0	<1.0	<1.0	<1.0
5	pH Value	-	6.5-8.5	7.27	7.35	7.22	7.18
6	Total Hardness (as CaCO3)	mg/l	300	88	80	84	76
7	Iron (as Fe)	mg/l	0.3	0.25	0.22	0.19	0.18
8	Chloride (as Cl)	mg/l	250	24	27.5	25.5	23.5
9	Residual free Chlorine	mg/l	0.2	ND	ND	ND	ND
10	Dissolved solids	mg/l	500	223	239	189	176
11	Calcium (as Ca)	mg/l	75	27.6	29.2	28	24
12	Copper (as Cu)	mg/l	0.05	BDL	BDL	BDL	BDL
13	Manganese (as Mn)	mg/l	0.1	BDL	BDL	BDL	BDL
14	Sulphate as (SO4)	mg/l	200	11.8	11.8	12.5	12.5
15	Nitrate (as NO3)	mg/l	45	1.25	0.94	1.04	1.27
16	Fluoride (as F)	mg/l	1	0.25	0.22	0.28	0.29
17	Phenolic compounds (as C6H5OH)	mg/l	0.001	BDL	BDL	BDL	BDL
18	Anionic Detergent (as MBAS)	mg/l	0.2	ND	ND	ND	ND
19	Mercury (as Hg)	mg/l	0.001	BDL	BDL	BDL	BDL
20	Cadmium (as Cd)	mg/l	0.01	BDL	BDL	BDL	BDL
21	Selenium (as Se)	mg/l	0.01	BDL	BDL	BDL	BDL
22	Arsenic (as As)	mg/l	0.05	BDL	BDL	BDL	BDL
23	Cyanide (as CN)	mg/l	0.05	BDL	BDL	BDL	BDL
24	Lead (as Pb)	mg/l	0.05	ND	BDL	ND	BDL
25	Zinc (as Zn)	mg/l	5	0.31	0.19	0.25	0.22
26	Chromium as (Cr+6)	mg/l	0.05	BDL	BDL	BDL	BDL
27	Mineral oil	mg/l	0.01	ND	ND	ND	ND
28	Alkalinity	mg/l	200	64.0	72	76	68
29	Aluminium as Al	mg/l	0.03	BDL	BDL	BDL	BDL
30	Boron	mg/l	1	BDL	BDL	BDL	BDL

Ground Water, Village Area: Continue……

Sampling Location: GW3- Siriapali Village, GW4- Katapali Village

Sl. No.	Parameter	Unit	Standard as per IS: 10500	GW3		GW4	
				Oct'21	Jan'22	Oct'21	Jan'22
1	Colour	Hazen	5	<5.0	<5.0	<5.0	<5.0
2	Odour	-	U/O	Agreeable	Agreeable	Agreeable	Agreeable
3	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity	NTU	5	<1.0	<1.0	<1.0	<1.0
5	pH Value	-	6.5-8.5	7.22	7.44	7.18	7.26
6	Total Hardness (as CaCO3)	mg/l	300	84	74	80	72
7	Iron (as Fe)	mg/l	0.3	0.19	0.28	0.27	0.24
8	Chloride (as Cl)	mg/l	250	25.5	29.5	24.5	22.5
9	Residual free Chlorine	mg/l	0.2	ND	ND	ND	ND
10	Dissolved solids	mg/l	500	189	280	218	245
11	Calcium (as Ca)	mg/l	75	28	33.6	29.6	31.2
12	Copper (as Cu)	mg/l	0.05	BDL	BDL	BDL	BDL
13	Manganese (as Mn)	mg/l	0.1	BDL	BDL	BDL	BDL
14	Sulphate as (SO4)	mg/l	200	12.5	17.3	14.6	14.6
15	Nitrate (as NO3)	mg/l	45	1.04	1.21	1.16	1.43
16	Fluoride (as F)	mg/l	1	0.28	0.31	0.29	0.25
17	Phenolic compounds (as C6H5OH)	mg/l	0.001	BDL	BDL	BDL	BDL
18	Anionic Detergent (as MBAS)	mg/l	0.2	ND	ND	ND	ND
19	Mercury (as Hg)	mg/l	0.001	BDL	BDL	BDL	BDL
20	Cadmium (as Cd)	mg/l	0.01	BDL	BDL	BDL	BDL
21	Selenium (as Se)	mg/l	0.01	BDL	BDL	BDL	BDL
22	Arsenic (as As)	mg/l	0.05	BDL	BDL	BDL	BDL
23	Cyanide (as CN)	mg/l	0.05	BDL	BDL	BDL	BDL
24	Lead (as Pb)	mg/l	0.05	ND	BDL	ND	BDL
25	Zinc (as Zn)	mg/l	5	0.25	0.26	0.23	0.18
26	Chromium as (Cr+6)	mg/l	0.05	BDL	BDL	BDL	BDL
27	Mineral oil	mg/l	0.01	ND	ND	ND	ND
28	Alkalinity	mg/l	200	76	88	70.0	76
29	Aluminium as Al	mg/l	0.03	BDL	BDL	BDL	BDL
30	Boron	mg/l	1	BDL	BDL	BDL	BDL

Ground Water, Village Area: Continue……
Sampling Location: GW5- Katikela Village, GW6- Bhurkamunda Village

Sl. No.	Parameter	Unit	Standard as per IS: 10500	GW5		GW6	
				Oct'21	Jan'22	Oct'21	Jan'22
1	Colour	Hazen	5	<5.0	<5.0	<5.0	<5.0
2	Odour	-	U/O	Agreeable	Agreeable	Agreeable	Agreeable
3	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity	NTU	5	<1.0	<1.0	<1.0	<1.0
5	pH Value	-	6.5-8.5	7.26	7.41	7.21	7.13
6	Total Hardness (as CaCO3)	mg/l	300	82	76	68	72
7	Iron (as Fe)	mg/l	0.3	0.25	0.29	0.22	0.25
8	Chloride (as Cl)	mg/l	250	27.5	32	23.5	28.5
9	Residual free Chlorine	mg/l	0.2	ND	ND	ND	ND
10	Dissolved solids	mg/l	500	263	279	232	254
11	Calcium (as Ca)	mg/l	75	34.2	30.6	23.6	28.8
12	Copper (as Cu)	mg/l	0.05	BDL	BDL	BDL	BDL
13	Manganese (as Mn)	mg/l	0.1	BDL	BDL	BDL	BDL
14	Sulphate as (SO4)	mg/l	200	20.3	18.5	13.2	11.7
15	Nitrate (as NO3)	mg/l	45	1.4	1.28	1.08	1.13
16	Fluoride (as F)	mg/l	1	0.37	0.31	0.26	0.27
17	Phenolic compounds (as C6H5OH)	mg/l	0.001	BDL	BDL	BDL	BDL
18	Anionic Detergent (as MBAS)	mg/l	0.2	ND	ND	ND	ND
19	Mercury (as Hg)	mg/l	0.001	BDL	BDL	BDL	BDL
20	Cadmium (as Cd)	mg/l	0.01	BDL	BDL	BDL	BDL
21	Selenium (as Se)	mg/l	0.01	BDL	BDL	BDL	BDL
22	Arsenic (as As)	mg/l	0.05	BDL	BDL	BDL	BDL
23	Cyanide (as CN)	mg/l	0.05	BDL	BDL	BDL	BDL
24	Lead (as Pb)	mg/l	0.05	ND	BDL	ND	BDL
25	Zinc (as Zn)	mg/l	5	0.36	0.28	0.25	0.21
26	Chromium as (Cr+6)	mg/l	0.05	BDL	BDL	BDL	BDL
27	Mineral oil	mg/l	0.01	ND	ND	ND	ND
28	Alkalinity	mg/l	200	78.0	86	70.0	64
29	Aluminium as Al	mg/l	0.03	BDL	BDL	BDL	BDL
30	Boron	mg/l	1	BDL	BDL	BDL	BDL

Ground Water, Village Area: Continue……

Sampling Location: GW7- R & R Colony Village, GW8- Tumbakela Village

Sl. No.	Parameter	Unit	Standard as per IS: 10500	GW7		GW8	
				Oct'21	Jan'22	Oct'21	Jan'22
1	Colour	Hazen	5	<5.0	<5.0	<5.0	<5.0
2	Odour	-	U/O	Agreeable	Agreeable	Agreeable	Agreeable
3	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity	NTU	5	<1.0	<1.0	<1.0	<1.0
5	pH Value	-	6.5-8.5	7.3	7.47	7.06	7.27
6	Total Hardness (as CaCO3)	mg/l	300	86	78	80	94
7	Iron (as Fe)	mg/l	0.3	0.23	0.2	0.28	0.34
8	Chloride (as Cl)	mg/l	250	21.5	19	29	33.5
9	Residual free Chlorine	mg/l	0.2	ND	ND	ND	ND
10	Dissolved solids	mg/l	500	216	226	240	302
11	Calcium (as Ca)	mg/l	75	24.4	27.6	27.2	35.4
12	Copper (as Cu)	mg/l	0.05	BDL	BDL	BDL	BDL
13	Manganese (as Mn)	mg/l	0.1	BDL	BDL	BDL	BDL
14	Sulphate as (SO4)	mg/l	200	10.6	10.6	13.8	15.6
15	Nitrate (as NO3)	mg/l	45	1.13	1.22	0.96	1.54
16	Fluoride (as F)	mg/l	1	0.29	0.23	0.32	0.38
17	Phenolic compounds (as C6H5OH)	mg/l	0.001	BDL	BDL	BDL	BDL
18	Anionic Detergent (as MBAS)	mg/l	0.2	ND	ND	ND	ND
19	Mercury (as Hg)	mg/l	0.001	BDL	BDL	BDL	BDL
20	Cadmium (as Cd)	mg/l	0.01	BDL	BDL	BDL	BDL
21	Selenium (as Se)	mg/l	0.01	BDL	BDL	BDL	BDL
22	Arsenic (as As)	mg/l	0.05	BDL	BDL	BDL	BDL
23	Cyanide (as CN)	mg/l	0.05	BDL	BDL	BDL	BDL
24	Lead (as Pb)	mg/l	0.05	ND	BDL	ND	BDL
25	Zinc (as Zn)	mg/l	5	0.22	0.17	0.31	0.35
26	Chromium as (Cr+6)	mg/l	0.05	BDL	BDL	BDL	BDL
27	Mineral oil	mg/l	0.01	ND	ND	ND	ND
28	Alkalinity	mg/l	200	72	80	62	70
29	Aluminium as Al	mg/l	0.03	BDL	BDL	BDL	BDL
30	Boron	mg/l	1	BDL	BDL	BDL	BDL

Ground Water: Continue……

Sampling Location: GW9- Brundamal Village, GW10-Sripura Village

Sl.No	Parameter	Unit	Standard as per IS: 10500	GW9		GW10	
				Oct'21	Jan'22	Oct'21	Jan'22
1	Colour	Hazen	5	<5.0	<5.0	<5.0	<5.0
2	Odour	-	U/O	Agreeable	Agreeable	Agreeable	Agreeable
3	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity	NTU	5	<1.0	<1.0	<1.0	<1.0
5	pH Value	-	6.5-8.5	7.25	7.38	7.42	7.46
6	Total Hardness (as CaCO3)	mg/l	300	78	86	70	82
7	Iron (as Fe)	mg/l	0.3	0.24	0.22	0.31	0.27
8	Chloride (as Cl)	mg/l	250	22.5	24	28	26.5
9	Residual free Chlorine	mg/l	0.2	ND	ND	ND	ND
10	Dissolved solids	mg/l	500	210	267	232	271
11	Calcium (as Ca)	mg/l	75	29.2	32.6	26.6	31.2
12	Copper (as Cu)	mg/l	0.05	BDL	BDL	BDL	BDL
13	Manganese (as Mn)	mg/l	0.1	BDL	BDL	BDL	BDL
14	Sulphate as (SO4)	mg/l	200	12.7	12.2	15.2	13.3
15	Nitrate (as NO3)	mg/l	45	1.21	1.17	1.07	1.22
16	Fluoride (as F)	mg/l	1	0.35	0.33	0.33	0.29
17	Phenolic compounds (as C6H5OH)	mg/l	0.001	BDL	BDL	BDL	BDL
18	Anionic Detergent (as MBAS)	mg/l	0.2	ND	ND	ND	ND
18	Mercury (as Hg)	mg/l	0.001	BDL	BDL	BDL	BDL
19	Cadmium (as Cd)	mg/l	0.01	BDL	BDL	BDL	BDL
20	Selenium (as Se)	mg/l	0.01	BDL	BDL	BDL	BDL
21	Arsenic (as As)	mg/l	0.05	BDL	BDL	BDL	BDL
22	Cyanide (as CN)	mg/l	0.05	BDL	BDL	BDL	BDL
23	Lead (as Pb)	mg/l	0.05	ND	BDL	ND	BDL
24	Zinc (as Zn)	mg/l	5	0.27	0.24	0.25	0.22
25	Chromium as (Cr+6)	mg/l	0.05	BDL	BDL	BDL	BDL
26	Mineral oil	mg/l	0.01	ND	ND	ND	ND
27	Alkalinity	mg/l	200	74	82	76	80
28	Aluminium as Al	mg/l	0.03	BDL	BDL	BDL	BDL
30	Boron	mg/l	1	BDL	BDL	BDL	BDL

6. Soil Quality:

Sampling locations:

S-1: Gudigaon Village S-2: Kurebaga Village S-3: Siriapali Village

Sl. No.	Parameters	S-1		S-2		S-3	
		Oct'21	Jan'22	Oct'21	Jan'22	Oct'21	Jan'22
1	Colour	Brown	Brown	Brown	Brown	Brown	Brown
2	Type of Soil	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
3	pH	6.92	7.12	7.16	7.25	7.27	7.33
4	Texture	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam
5	Infiltration Rate (cm/hr)	6.4	5.9	5.4	5.5	5.9	6.2
6	Bulk Density (gm/cc)	1.22	1.32	1.23	1.26	1.37	1.18
7	Porosity %	20	19.7	18.8	18.3	21.3	23.8
8	Moisture content %	5.8	5.6	4.6	4.9	4.9	5.2
9	Fluoride %	0.010	0.015	0.008	0.011	0.014	0.018
10	Silica as SiO_2%	20.4	24.3	19.8	20.7	20.5	22.6
11	Chloride %	0.014	0.019	0.027	0.023	0.031	0.026
12	Sulphate %	0.22	0.11	0.12	0.09	0.18	0.15
13	Potassium as K%	0.020	0.015	0.024	0.021	0.021	0.017
14	Magnesium as Mg%	0.30	0.16	0.23	0.25	0.25	0.22
15	Calcium as Ca%	0.71	0.52	0.61	0.57	0.48	0.42
16	Manganese as Mn%	0.47	0.34	0.37	0.32	0.51	0.44
17	Iron as Fe%	0.51	0.46	0.47	0.43	0.56	0.51
18	Available Organic Carbon %	1.33	1.27	1.06	0.92	0.91	0.79
19	Available Nitrogen%	0.043	0.054	0.053	0.058	0.056	0.051

Soil Quality: Continue……

Sampling locations: S-4: Katapali Village S-5: Katikela Village S-6: Bhurkamunda Village

Sl. No.	Parameters	S-4		S-5		S-6	
		Oct'21	Jan'22	Oct'21	Jan'22	Oct'21	Jan'22
1	Colour	Brown	Brown	Reddish	Reddish	Reddish	Reddish
2	Type of Soil	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
3	pH	7.21	7.38	7.34	7.42	7.15	7.22
4	Texture	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam
5	Infiltration Rate (cm/hr)	6.6	6.7	5.6	5.5	6	6.2
6	Bulk Density (gm/cc)	1.31	1.23	1.54	1.18	1.52	1.34
7	Porosity %	21.4	21.6	24.3	23.8	22.7	24.5
8	Moisture content %	5.1	5.4	5.2	4.7	4.4	5.4
9	Fluoride %	0.011	0.011	0.009	0.01	0.012	0.008
10	Silica as SiO_2%	21.3	25.2	24.4	23.4	24.7	20.2
11	Chloride %	0.028	0.022	0.025	0.028	0.024	0.018
12	Sulphate %	0.16	0.16	0.23	0.17	0.21	0.14
13	Potassium as K%	0.018	0.015	0.028	0.021	0.023	0.022
14	Magnesium as Mg%	0.22	0.19	0.27	0.24	0.26	0.23
15	Calcium as Ca%	0.53	0.49	0.51	0.43	0.51	0.46
16	Manganese as Mn%	0.46	0.38	0.52	0.35	0.49	0.43
17	Iron as Fe%	0.62	0.47	0.49	0.42	0.51	0.48
18	Available Organic Carbon %	1.16	0.83	1.25	1.17	1.22	1.31
19	Available Nitrogen%	0.057	0.062	0.057	0.055	0.054	0.052

Soil Quality: Continue……

Sampling locations: S-7: R&R Colony, S-8- Tumbakela Village

Sl. No	Parameters	S-7		S-8	
		Oct'21	Jan'22	Oct'21	Jan'22
1	Colour	Brown	Brown	Brown	Brown
2	Type of Soil	Neutral	Neutral	Neutral	Neutral
3	pH	7.11	7.26	7.33	7.19
4	Texture	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam
5	Infiltration Rate (cm/hr)	6.5	6.8	5.7	5.9
6	Bulk Density (gm/cc)	1.47	1.34	1.39	1.26
7	Porosity %	20.5	25.7	23.8	22.5
8	Moisture content %	5.2	5.5	5.5	5.3
9	Fluoride %	0.008	0.006	0.016	0.014
10	Silica as SiO_2%	23.2	22.6	20.7	23.8
11	Chloride %	0.024	0.021	0.019	0.016
12	Sulphate %	0.22	0.19	0.17	0.13
13	Potassium as K%	0.022	0.018	0.026	0.019
14	Magnesium as Mg%	0.28	0.23	0.22	0.19
15	Calcium as Ca%	0.56	0.51	0.59	0.53
16	Manganese as Mn%	0.43	0.41	0.51	0.46
17	Iron as Fe%	0.47	0.45	0.49	0.51
18	Available Organic Carbon %	1.13	0.76	1.17	1.25
19	Available Nitrogen%	0.055	0.059	0.062	0.056

Soil Quality: Continue……

Sampling locations: S9- Brundamal Village, S10- Sirpura Village

Sl. No.	Parameters	S-9		S-10	
		Oct'21	Jan'22	Oct'21	Jan'22
1	Colour	Brown	Brown	Brown	Brown
2	Type of Soil	Neutral	Neutral	Neutral	Neutral
3	pH	7.28	7.23	7.25	7.37
4	Texture	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam
5	Infiltration Rate (cm/hr)	6.1	6.4	5.6	5.7
6	Bulk Density (gm/cc)	1.43	1.21	1.54	1.33
7	Porosity %	19.6	21.7	24.3	22.8
8	Moisture content %	4.8	5.1	5.2	5.9
9	Fluoride %	0.015	0.013	0.009	0.007
10	Silica as SiO_2%	21.3	25.6	24.4	23.3
11	Chloride %	0.017	0.019	0.025	0.021
12	Sulphate %	0.21	0.18	0.23	0.19
13	Potassium as K%	0.021	0.017	0.028	0.022
14	Magnesium as Mg%	0.18	0.17	0.27	0.23
15	Calcium as Ca%	0.54	0.45	0.51	0.44
16	Manganese as Mn%	0.47	0.42	0.52	0.49
17	Iron as Fe%	0.44	0.47	0.53	0.46
18	Available Organic Carbon %	0.96	1.14	1.25	1.32
19	Available Nitrogen%	0.061	0.054	0.057	0.051

7. Forage Fluoride:

Sl. No	Location	Fluoride (ppm)					
		Oct'21	Nov'21	Dec'21	Jan'22	Feb'22	Mar'22
1	Gudigaon	15.3	15.7	15.6	15.0	17.8	17.0
2	Kuberbaga	18.2	18.5	18.3	19.9	22.3	24.0
3	Siriapali	17.0	17.1	17.2	19.4	17.6	19.0
4	Katapali	16.5	15.7	16.2	18.0	15.8	18.0
5	Katikela	19.1	18.9	18.6	19.6	21	19.0
6	Burkhamunda	19.4	19.2	19.1	19.9	19.6	23.0
7	R&R Colony	15.7	15.4	15.5	16.0	14.2	16.0
8	Tumbakela	18.0	18.6	18.3	19.2	21.7	20.0
9	Brundamal	19.2	19.3	19.0	19.7	22.3	22.0
10	Sripura	17.7	18.2	17.8	19.5	18.2	16.0
Average		17.61	17.66	17.56	18.62	19.05	19.40

Vedanta Limited, Jharsuguda

Aluminium Smelter Plant

Status of Action Points CREP Guidelines recommended for Aluminium Smelter

Sl. No.	Issues	Action Point	Compliance Status
1	Technology	Allowing Pot lines only with Pre-baked Technology. Environment clearance new pot lines to be given by MoEF, after June 2003, only with prebaked technology	Vedanta Aluminium Limited has adopted Pre-baked technology with 320/340 KA line current in its Aluminium smelter.
2	Fluoride Emissions	Prescribing maximum size of the plant. Maximum size of the plant shall be decided based on the assimilative capacity of each plant location. Revision of fluoride emission standard. For Soderberg Technology 2.8 kg/t by December 2005 [1.0kg/t (VCS) & 1.30 kg/t 9HSS) by December 2010] Phasing out Wet Scrubbing System for Fluoride. For Pre-baked Technology 0.8 kg/T by December 2006 Allowing new Pot lines only with Dry Scrubbing System Environmental clearance for new pot lines shall be given by MoEF, after June 2003, only with Dry Scrubbing System. Monitoring of fugitive emissions from pot rooms To start with Indal or any other better method & submit data from January 2004, regularly to SPCBs & CPCB	- Vedanta Limited is a pre-baked Aluminium smelter. Dry scrubbers have been installed in smelter & the total fluoride emission from the smelter is within the range of 0.8 Kg/T of Al. produced. Vedanta Limited has installed dry scrubbing system in Pot lines. Manual roof top monitoring by cassette method has been installed and is available for fugitive fluoride monitoring. The fugitive fluoride emission ranges between 0.34 to 0.39 kg/MT of Al. Additionally, laser-based fluoride monitoring system have been instal**Annexure-A (Contd….)**ing of fugitive fluoride.
3	Fluoride Consumption	Fluoride consumption tonne of aluminum produced (as F)	Vedanta Limited has adopted pre-baked technology in its Aluminium

		[For Soderberg Technology 15 kg/t by December 2005 For Pre-baked technology 10kg/t by December 2005]	smelter with GAMI as technology supplier. Average fluoride consumption for the period October 21 to March 22 is 10.45 kg/MT Al (as F^-). Further to bring down the fluoride consumption to below 10 kg/MT of Aluminium action plan is under implementation as submitted to MoEF&CC Regional Office.
4	Ambient Fluoride	Forage fluoride standards * Twelve consecutive months average-40 ppm * Two consecutive months Average- 60 ppm * One month – 80 ppm Measurement of forage Fluoride To start monitoring and submit data from January 2004, regularly to SPCBs & CPCB. The locations of monitoring may be selected in collaboration with SPCBs & CPCB	Forage fluoride in the surrounding areas /villages is being measured and analyzed by a third party NABL accredited, OSPCB authorized lab. The values reported are in the range of 15.0 to 24.0 ppm on monthly basis which is within the stipulated norms.
5	Spent Pot Lining (SPL)	Setting up a centralized SPL treatment & disposal facility with aluminum fluoride recovery and utilization of SPL in steel/ cement industries Limit for pot life, (for new pots installed after December 31, 2003 2500 day (average) SPL (Carbon & Refractory) to be disposed in Secured Landfill	Permission has been sought from OSPCB for setting up of SPL treatment facility. Vedanta Limited has adopted Pre-baked technology with 320/340 KA line current. We are trying to maximize the lining life to an average of 2500 days. The SPL generated from our smelter is being sent to OSPCB authorized agency M/s Green Energy Resources located at Sambalpur for detoxification which in turn is sending the detoxified material for further utilization in various industries including cement and steel. The refractory portion is being stored under covered shed till an approved disposal mechanism is in place.
6	Red Mud	Phasing Wet disposal Red Mud utilization	Not Applicable for Vedanta Limited, Jharsuguda plant

		To achieve minimum 50% solids in red mud by Dec. 2005 A proposal for practical utilization to be prepared by Aluminium Association of India within six months	
7	Anode Baking Oven	Achieving particulate matter limit of 50 mg/Nm^3 by Dec. 2005	At present, Particulate emission of Bake Oven is reported between 3.50 to 5.60 mg/Nm3.

Annexure-A (Contd….)

Thermal Power Plant

Vedanta Limited, Jharsuguda

Status of Action Points CREP Guidelines recommended for Thermal Power Plant

Sl. No.	Action Point	Compliance Status
1	Implementation of Environmental Standards (emission & effluent) in non- compliant Power Plants (31 & 27) • Submission of action plan : June 30, 2003 • Placement of order for Pollution of control equipment : September, 2003 • Installation & commission: December 31, 2005.	Not applicable
2	For existing thermal power plants, a feasibility study shall be carried out by Central Electricity Authority (CEA) to examine possibility to reduce the particulate matter emissions to 100 mg/Nm3. The studies shall also suggest the road map to meet 100 mg/Nm3 wherever found feasible. CEA shall submit the report by March 2004.	Not applicable
3	New / expansion power projects to be accorded environmental clearance on or after 1.1.2003 shall meet the limit of 100 mg/Nm3 for particulate matter.	Hybrid ESP's have been commissioned and emissions are maintained below the stipulated standards of 50 mg/$NM^{3.}$
4	Development of SO2 & NOx emission standards for coal based plants by December 2003. • New/ expansion power projects shall meet the limit of SO2 & NOx w.e.f. 1.1.2005. • Existing power plants shall meet the limit of SO2 & NOX w.e.f. 1.1.2006.	Will be complied from time to time
5	Install/activate opacity meters/ continuous monitoring system in all the units by December 31, 2004 with proper calibration system.	Continuous online monitoring systems have been installed in all the units and calibration schedules are being followed for calibration of the same.
6	Development of guidelines/ standards for mercury and other toxic heavy metals emissions by December 2003.	_
7	Review of stack height requirement and guidelines for power plants based on micro meteorological data by June 2003	_
8	Implementation of use of beneficiated coal as per GOI Notification: Power plants will sign fuel supply agreement (FSA) to meet the requirement as per the matrix prepared by CEA for compliance of the notification as short term measure. Options/mechanism for setting up of coal washeries as a long term measure	_

	• Coal India will up its own washery • State Electricity Board to set up its own washery • Coal India to ask private entrepreneurs to set up washeries for CIL and taking washing charges • SEBs to select a private entrepreneur to set up a washery near pit- head installation of coal beneficiation plant	
9	Power plants will indicate their requirement of abandoned coal mines for ash disposal & Coal India/ MOC shall provide the list of abandoned mines by June 2003 to CEA	_
10	Power plants will provide dry ash to the users outside the premises or uninterrupted access to the users within six months.	We are trying to maximize the utilization by supplying fly ash to the users.
11	Power Plants should provide dry fly ash free of cost to the users	We have provision of supplying dry fly ash free of cost for other users.
12	State P.W.Ds/ construction & development agencies shall also adhere to the specifications/Schedules of CPWD for ash based products utilization MoEF will take up the matter with State Governments.	Not applicable
13	(i) New plants to be accorded environmental clearance on or after 1.04.2003 shall adopt dry fly ash extraction or dry disposal system or Medium (35-40%) ash concentration slurry disposal system or Lean phase with hundred percent ash water re-circulation system depending upon site specific environmental situation. (ii) Existing plants shall adopt any of the systems mentioned in 13 (i) by December 2004.	The unit has adopted High Concentration Slurry Disposal (HCSD) method for ash disposal. The consistency of 60% solid is maintained.
14	Fly ash Mission shall prepare guidelines/manuals for fly ash utilization by March 2004.	_
15	New plants shall promote adoption of clean coal and clean power generation technologies	_