

ADITYA BIRLA



UTKAL ALUMINA

UAIL /ENV/2015-16/116

25.05. 2016

To

The Addl. Principle Chief Conservator of Forest (C)
MoEF & Climate Change, Govt. of India
Eastern Regional Office
A/3, Chandrasekhar
Bhubaneswar 751023.

Subject: Six monthly compliance status of conditions imposed in Environment Clearance for 1 MTPA Refinery & 50 MW Co- Generation Power Plant Expansion of Alumina Refinery (1 MPTA to 3 MTPA) along with Co-Generation Power Plant (50 MW to 90 MW) & 8.5 MTPA Bauxite mines.

Dear Sir,

We are enclosing herewith six monthly compliance status of the conditions imposed in the Environmental Clearance for the period from 1st October 2015 to 31st March 2016 with respect to our following projects.

1. 1.0 MTPA Refinery & 50 MW Co- generation power plant vide Ministry's letter no. J-11011/76/94-IA.II (I) dated 27.09.95 & Expansion of Alumina Refinery (1 to 3 MTPA) and Co- Generation Power Plant (50MW to 90 MW) vide Ministry's letter no. J-11011/753/2007-IA II (I) dated 29.01.2008.
2. 8.5 MTPA Bauxite mines vide Ministry's letter no. J-11015/650/2007-IA.II(M) dated 19.02.09,

This is for your kind information please,

Thanking you,

Yours faithfully,

For Utkal Alumina International Ltd.


(N. Nagesh)
Joint President

Encl: As above.

CC: Member Secretary, OSPCCB, Bhubaneswar
CC: Regional Office, CPCB, Kolkata
CC: Regional Officer, OSPCCB, Rayagada

UTKAL ALUMINA INTERNATIONAL LIMITED

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**COMPLIANCE STATUS OF CONDITIONS IMPOSED IN ENVIRONMENTAL CLEARANCE FOR
8.5 MTPA BAUXITE MINING VIDE LETTER NO J-11015/650/2007-IA.II (M), DTD.19.02.09.
PROJECT NAME: UTKAL ALUMINA INTERNATIONAL LIMITED.
Period: From 1st October, 2015 to 31st March, 2016.**

| Sl. No. | Imposed Condition | Compliance Status |
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| A. Specific Condition | | |
| i | All the conditions stipulated by the State Pollution Control Board, Orissa in their consent to establish shall be effectively implemented. | All the conditions stipulated in NOC have been effectively implemented. |
| ii | The project proponent shall effectively address the concerns raised by the locals in the public hearing as well as during consideration of the project while implementing the project. | All the concerns raised in the public hearing are being implemented such as:- a) Health care by appointing doctors, paramedical staff with Medical Health Unit b) Supply of drinking water by repairing and constructing tube wells, Promoting education by constructing new school building and renovation of old school building. c) Improving the livelihood by employing local people directly/ indirectly. d) Improvement in infrastructures like Development & repair of village roads, irrigation channels, bridges/culverts, avenue plantations etc. |
| iii | The project proponent shall develop fodder plots in the non-mineralized area in lieu of use of grazing land. | The entire plateau of the ML area consisting of Mineralized (M) & Non-Mineralized (NM) are capped with hard Khondalite which normally prevents the tree growth. So the NM area will be suitably dealt by removing hard surface to develop as grazing lands likely at the mine closure stage. |
| iv | The mining operations shall be restricted to above ground water table and it should not intersect groundwater table. In case of working below ground water table, prior approval of the Ministry of Environment and Forests and the Central Ground Water Authority shall be obtained, for which a detailed hydro-geological study shall be carried out. | Our Mining operation is restricted above the ground water table. Now the lowest working depth of our existing mine pit is around 1003.3 m RL, whereas the presence of ground water table has been estimated to be around 100-150 m RL. Therefore, there is no probability of any GW Intersection or exploitation of GW thereby. |
| v | The project proponent shall ensure that no natural watercourse and/or water resources are obstructed due to any mining operations. Adequate measures shall be taken while diverting seasonal channels emanating from the mine lease, during the course of mining operation. | No natural watercourse or water resources are obstructed due to our mining operations. Necessary care is being taken during monsoon to divert /channelize run off rain water so that it does not carry any sediment to obstruct / affect the water bodies at the foot hill. |
| vi | The project proponent shall take adequate environmental safeguard measures for control of rolling down of silt and sediments and protection of the catchment area of upper Indrāvati Reservoir during the course of mining operation. | In addition to as stated in Sl. No. 5, number of check dams/siltation ponds will be constructed during the course of running of the mines. 1. Details of Check Dams and garland drains. Refer Annexure-I 2. All the protective structures are made up of hard Khondalite/laterite & cement punned over its surface & walls. 3. Encompassed drainage area controlled by these structures. |



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| | | The garland drains & Check dams of above dimensions are adequate to catch the run-offs & hold the siltation within the stipulated norms of surface water run-off discharge. The test reports at the outlet of the check dams are being carried out & the TSS levels are always within 100 mg/l. After this the water confluence with the nearby seasonal nallah & ultimately to River Indrāvati after moving a distance of 7 to 8 Kms & will have hardly any bearing on the water quality of Indrāvati. |
| vii | A 3 km stretch on the upstream and 3 Km in the downstream of the river passing through the project area should be taken up by the project authorities for plantation to arrest river bank erosion and sediment flow into the river. | To arrest bank erosion and sediment flow into the nallah/river, plantation is being carried out since 2005 over the hill slopes and will be continued in the future also. In the year 2015-16 we have planted around 62,500 nos. of saplings in an area of 25 Ha. |
| viii | The top soil shall temporarily be stored at earmarked site(s) only and it should not be kept unutilized for long. The topsoil shall be used for land reclamation and plantation. | Top soil generation in the mine is very less. Till date around 99455 Mt of top soil has been generated, out of which 1500 Mt (approx.) has been utilized for plantation. Remaining top soil is being stored at earmarked site which will be utilized for afforestation at the mined out pit during mine reclamation period. |
| ix | The over burden (OB) generated during the initial years of the mining operation shall be temporarily stacked at the earmarked dump site(s) only for backfilling. Backfilling shall start from the 4 th year onwards of the mining operation and the entire quantity of the waste to be generated shall be backfilled. There shall be no external over burden dumps after the 8 th year of the mining operation. The entire backfilled area shall be afforested. Monitoring and management of rehabilitated areas should continue until the vegetation becomes self-sustaining. Compliance status shall be submitted to the Ministry of Environment & Forests and its Regional Office located at Bhubaneswar on six monthly basis. | <ul style="list-style-type: none"> ❖ The Over Burden is being dumped as per plan and within the earmarked area. ❖ As per Mining scheme, during the year 2016-17, provision is there to fill the Overburden as the backfilling material in the voids of the mined out area followed by plantation. ❖ Monitoring and management of rehabilitated areas will be continued until the vegetation become self-sustaining and its compliance status will be submitted to the Ministry of Environment & Forests and its Regional Office located at Bhubaneswar on six monthly basis. |
| x | <p>Catch drains and siltation ponds of appropriate size shall be constructed around the mine working, mineral and temporary OB dumps to prevent run off of water and flow of sediments directly into the Kandabindha Nallah, the San River, the Indravati River and other water bodies. The water so collected shall be utilized for watering the mine area, roads, green belt development etc. The drains shall be regularly desilted, particularly after the monsoon, and maintained properly.</p> <p>Garland drains, settling tanks and check dams of appropriate size, gradient and length shall be constructed around the mine pit, topsoil dump, temporary over burden dumps and mineral dumps to prevent run off of water and flow of sediments</p> | <p>Garland drains, settling tanks and check dams of appropriate size, gradient and length has been constructed both around the mine pit and the over burden dump to prevent run off of water and flow of sediments directly into the Natural Nallah and other water bodies.</p> <p>The sump capacity has been designed keeping 50% safety margin over and above peak sudden rainfall. Sump capacity is having adequate retention period to allow proper settling of silt material. . The drains had been de-silted before the onset of monsoon & have been maintained properly.</p> <p>Further, the rain water collected in the mine pits during monsoon is not pumped out. Rather, it is allowed to be</p> |



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| | directly into the Kandabindha Nallah, the San River, the Indravati River and other water bodies and sump capacity shall be designed keeping 50% safety margin over and above peak sudden rainfall (based on 50 years data) and maximum discharge in the area adjoining the mine site. Sump capacity shall also provide adequate retention period to allow proper settling of silt material. Sedimentation pits shall be constructed at the corners of the garland drains and desilted at regular intervals. | collected in the lowest level to augment the ground water resources gradually. In addition to above, we have deputed NIT, Rourkela to conduct a scientific study on surface runoff management and the process in on .The recommendation, if any for the improvement of surface runoff management will be implemented in future. |
| xi | Dimension of the retaining wall at the toe of temporary OB dump(s) and the over burden benches within the mine to check run-off and siltation shall be based on the rain fall data | Retaining walls of dimension 1meter (height) x 0.8 meter (width) and running meterage of 1200 meter have been provided at the toe of over burden dumps and the overburden benches to check run-off & siltation. This is being effective to meet the purpose even during peak rain fall. All the retaining walls are made up of hard Khondalite/laterite & cement punned over its surface & walls. |
| xii | Plantation shall be raised in an area of 680ha including a 7.5m wide green belt in the safety zone around the mining lease, backfilled and reclaimed area, around void, roads etc. by planting the native species in consultation with the local DFO/Agriculture Department. The density of the trees should be around 2500 plants per ha. | <ul style="list-style-type: none"> ❖ Native species like Acacia, Chakunda, Mango, KrushnaChuda, silver oak, Radhachuda Karanja etc. are being planted at the rate of 2500 plants/Hectare for the development of green belt. In the year 2015-16 we have planted around 62,500 no's of saplings in an area of around 25 hectares. Plantation activities will be continued in coming years also. ❖ However, we are planning for rising of around 25000 no's of saplings at our mine nursery in order to utilize the same for plantation in the mine slope area initially and subsequently in the backfilling area. |
| xiii | The void left unfilled in an area of 250ha shall be converted into the water body. The higher benches of the excavated void/mine pit shall be terraced and plantation done to stabilize the slopes. The slopes of higher benches shall be made gentler for easy accessibility by the local people to use the water body. Peripheral fencing shall be carried out all along the excavated area. | The void to be left unfilled after exhaust of ore in an area of 250ha, which will be converted into water body. The higher benches of the excavated void pit will be terraced / planted with Trees in consultation with the local DFO/Agriculture Department to stabilize the slopes. Provision will be made for easy accessibility by the local people to use the water body. Peripheral fencing shall be carried out all along the excavated area in due course incase required. |
| xiv | Regular water sprinkling shall be carried out in critical areas prone to air pollution and having high levels of SPM and RSPM such as around crushing and screening plant, loading and unloading point and all transfer points. Extensive water sprinkling shall be carried out on haul roads. It shall be ensured that the Ambient Air Quality parameters conform to the norms prescribed by the Central Pollution Control Board in this regard. | Regular water sprinkling is done on haul roads, loading & unloading areas and material transfer points by deploying four dedicated water tankers of capacity 12 KL. In addition to this for effective dust suppression we are using dust suppressants in the sprinkling water i.e. Dust bloc chemical. Dust bloc is a stable emulsion of bitumen in water that is sprayed on the haul roads and stock piles. As the water is absorbed into the road, the micro spheres of bitumen contained within Dust bloc are released to |



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| | | <p>bind together the fine materials in the road surface. This reduces dust emission and water is no longer required to act as the binding agent.</p> <p>Regular ambient air quality monitoring is being done in four locations i.e. Mining Pit, Near Crusher, Near Weigh Bridge and Near Office. The result of the monitored air quality data shows that all parameters are well within the prescribed limit and varies as mentioned below:</p> <ul style="list-style-type: none"> ❖ Sulphur-dioxide level: 4.19 - 5.01 $\mu\text{g}/\text{m}^3$. ❖ Nitrogen-dioxide level: 11.27 - 12.67 $\mu\text{g}/\text{m}^3$. ❖ Particulate Matter < 10 micron (PM10): 49.51-63.84 $\mu\text{g}/\text{m}^3$. ❖ Particulate Matter < 2.5 micron: (PM 2.5) 28.76 - 36.19 $\mu\text{g}/\text{m}^3$. <p>The result of monitored data for the period of October-15 to March-16 is enclosed in ANNEXURE- II.</p> |
| xv | Regular monitoring of the flow rate of the springs and perennial nallahs flowing in and around the mine lease shall be carried out and records maintained. | <p>The flow rate of the small perennial nallah, which is flowing near the Baphlimali hill lock close to the lease boundary, is being monitored regularly and the records are maintained. The average data monitored during October-15 to March-16 are mentioned below :-</p> <ol style="list-style-type: none"> 1. Paikupakhala Nala : - 1319.33 m^3/hr. 2. Near Dandabad Nala: - 3438.66 m^3/hr. 3. Chandragiri Nala : - 1955.66 m^3/hr. 4. Mishripada : - 1064.83 m^3/hr. |
| xvi | Regular monitoring of water quality upstream and downstream of the Khandabindha Nallah shall be carried out and record of monitored data should be maintained and submitted to the Ministry of Environment and Forests, its Regional Office, Bhubaneswar, the Central Groundwater Authority, the Regional Director, Central Ground Water Board, the State Pollution Control Board and the Central Pollution Control Board. | <p>The same is being carried out and recorded. The results of surface water quality are enclosed in Annexure-III. The same is also being submitted to the Central Groundwater Authority, the Regional Director, Central Ground Water Board, the State Pollution Control Board and the Central Pollution Control Board.</p> |
| xvii | The project authority shall implement suitable conservation measures to augment ground water resources in the area in consultation with the Regional Director, Central Ground Water Board. | <p>The following Conservation measures have been taken to augment ground water resources:-</p> <ol style="list-style-type: none"> i. Rainwater harvesting is being carried out by collecting the precipitated water through a network of drainage system into the exhaust mining pit for storage and ground recharge. ii. Movement of mine faces is being carried out systematically as per mine plan following the contour lines such that the faces have self-draining slopes. Precipitated water of the adjacent area is being collected within the mined out area. iii. Earthen dams have been constructed to arrest |



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| | | <p>rain water resulting ground water recharge. Also the Surface water flow near the pit has been diverted towards the pit and this accumulation influences to recharge ground water table.</p> <p>iv. Arrangement has been made that the mining method and the peripheral barrier all around mining area does not allow the storm water to go outside valley areas. The water thus trapped, percolates down and recharges the ground water.</p> |
| xviii | <p>Regular monitoring of ground water level and quality shall be carried out in and around the mine lease by establishing a network of existing wells and constructing new piezometers during the mining operation. The monitoring shall be carried out four times in a year, pre- monsoon (April-May), monsoon (August), post-monsoon (November) and winter (January) and the data thus collected may be sent regularly to the Ministry of Environment and Forests and its Regional Office, Bhubaneswar, the Central Ground Water Authority and the Regional Director, Central Ground Water Board. If at any stage, it is observed that the ground water is depleted due to mining activity, necessary corrective measures shall be carried out.</p> | <p>Regular monitoring of ground water level and quality is being carried out in each season of the open wells/ dug wells located around the nearby villages and the data is being submitted to Regional Office, MoEF and SPCB, Bhubaneswar once in every six month.</p> <p>❖ The fluctuation of ground water level varies from 4.1 to 7.1 meter (approx.) during the period October-2015 – March-2016.</p> <p>The monitoring results of Ground water quality & level are enclosed as Annexure – IV.</p> <p>However monitoring report reveals that the parameters mostly conform to the within permissible values as per IS 10500. (Drinking water standard) and there is no significant impact on ground water table due to mining activity.</p> |
| xix | <p>Appropriate mitigative measures shall be taken to prevent pollution of the San River and the Indravati River in consultation with the State Pollution Control Board.</p> | <p>The following measures are being implemented and will be implemented in course of time also.</p> <ol style="list-style-type: none"> 1. Deep garland drains are under construction to check erratic flow of precipitated water. 2. Check dams are constructed around the slopes of valley to arrest silts and sediments if any. 3. Retaining wall of height 1.5 meter has been constructed at the edge of the valley. 4. The naked areas of the valley slopes have been covered by mass afforestation and the same will be continued till full cover. <p>San River & Indravati are flowing at a distant location 12 Kms & 9 Kms respectively. The above protection measures written Sl No. 1 to 4 shall never create any untoward situation to affect the water quality of the above two rivers due to our contribution.</p> |



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| xx | The project proponent shall obtain necessary prior permission of the competent authorities for drawl of requisite quantity of water (surface water and ground water, if any) required for the project. | There is no proposal to with draw ground water for the project and surface water is being used for mining purpose. To this effect, an agreement was made between M/s Utkal Alumina Int. Ltd & Water Resource Dept. Govt. of Odisha for drawl of 9.0 cusec or 7776000 cft/day of water from Govt. water source/ from San River upstream of Indravati River. A copy the same agreement is being submitted vide letter no UAIL/ENV/2014-15/04 dated 7-05-2014. |
| xxi | Suitable rainwater harvesting measures on long term basis shall be planned and implemented in consultation with the Regional Director, Central Ground Water Board. | As a step towards rain water harvesting, the following measures have been implemented - <ul style="list-style-type: none"> ❖ Rainwater harvesting is being carried out by collecting the precipitated water through a network of drainage system into the exhaust mining pit for storage, it is not used for the mining purpose. Rather, it is allowed to be collected in the lowest level to augment the ground water resources gradually. ❖ Movement of mine faces is being carried out systematically as per mine plan following the contour lines such that the faces have self-draining slopes. Precipitated water of the adjacent area is being collected within the mined out area. ❖ In addition to this four numbers of Concreted Weir have been constructed to arrest rain water resulting ground water recharge. Also the Surface water flow near the pit has been diverted towards the pit and this accumulation influences to recharge ground water table. |
| xxii | Vehicular emissions shall be kept under control and regularly monitored. Measures shall be taken for maintenance of vehicles used in mining operations and in transportation of mineral within the mine lease. The mineral transportation within the mine lease shall be carried out through the covered trucks only and the vehicles carrying the mineral shall not be overloaded. | Pollution testing certificate of all machinery is being verified regularly to check vehicular emission. Further emission level is kept under control by rigorous maintenance of all engines and changing of lubricants as per the recommendation of the manufacturer. All the transporting vehicles are being covered with tarpaulin and over loading are strictly avoided. |
| xxiii | No blasting shall be carried out after the sunset. Blasting operation shall be carried out only during the daytime. Controlled blasting shall be practiced. The mitigative measures for control of ground vibrations and to arrest fly rocks and boulders should be implemented. | Blasting is being carried out only during daytime. Controlled blasting is being practiced to reduce ground vibrations and to arrest fly rocks and boulders. |
| xxiv | Drills shall either be operated with dust extractors or equipped with water injection system. | Drilling machine with in-built vacuum cyclone dust collector & equipped with water spraying system is being used. |
| | Mineral handling area shall be provided with adequate number of high efficiency dust extraction | Water sprinkling is being carried by water tankers. Metal hoods are provided at transfer points in Crushing |



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| xxv | system. Loading and unloading areas including all the transfer points should also have efficient dust control arrangements. These should be properly maintained and operated. | and Conveying System apart from provision of Covers all along the Conveyor System (18.2 km long) to restrict the dispersion of dust. In the Fixed crusher house, an efficient dry fog system is installed for suppression of dust at ROM hopper and Transfer points. |
| xxvi | Consent to operate shall be obtained from the State Pollution Control Board, Orissa prior to start of production from the mine. | Consent to Operate has been obtained from the State Pollution Control Board, Odisha vide letter No. 10769/IND-I-CON- 5450 dated 28.05.2012 & renewed up to 31.03.2017 vide letter no. 2697 dated 11.02.2016. |
| xxvii | Sewage treatment plant shall be installed for the colony. ETP shall also be provided for the workshop and wastewater generated during the mining operation. | No residential colony is proposed within ML area and it is proposed at a distance of 25 KM from mines, where the sewage treatment plant will be installed. Provision of ETP is not envisaged as no scope of generation of mine drainage water and deployment of mine machinery on contract basis. However, provision is there to install a Modular STP of 75 KLD as advance environmental measures. |
| xxviii | The project authorities shall undertake sample survey to generate data on pre-project community health status within a radius of 1 km from proposed mine. | Already complied. |
| xxix | Pre-placement medical examination and periodical medical examination of the workers engaged in the project shall be carried out and records maintained. For the purpose, schedule of health examination of the workers should be drawn and followed accordingly. | Pre-placement medical examination and periodical medical examination of the workers engaged in the project are carried out regularly. Annual Schedule of PME is being made for all eligible employees as per DGMS requirement and necessary PME is carried out. The details of occupational health surveillance of the employees and workers conducted during 2012-13 is already being submitted to your good office vide letter no. UAIL/ENV/2012-13/78 dated 14.02.14. |
| xxx | Provision shall be made for the housing of construction Labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project. | Work shed have been provided to the workers at the mine site having all facilities such as fuel for cooking, permanent toilets followed with septic tanks & soak pits drinking water, medical health care. Since the mining operation has already been commenced, the regular employees & executives are coming from the integrated town ship adjacent to the alumina refinery. Domestic effluent generation is very less as no residential colony exist within the ML area. The small quantity of domestic effluent is treated in soak pits via septic tank. However, provision is there to install a Modular STP of 75 KLD as advance environmental measures. |
| xxxi | The project proponent shall take all precautionary measures during mining operation for conservation and protection of endangered fauna namely; python, panther, sloth bear, wild dog etc. spotted in the study area. Action plan for conservation of flora and fauna shall be prepared and implemented in consultation with the State Forest and Wildlife Department. Necessary allocation of funds for implementation of | The Action Plan for conservation of wildlife has been approved by PCCF (WL) & Chief wildlife Warden, Odisha vide letter No. 8183/1 WL(C)SSP- 398/2013 dated 11.10.2013 with financial forecast of Rs. 1,23,57,852/- and an amount of Rs.17,17,57,852/- has been deposited in CAMPA FUND for implementation of the same. Further, as per the demand of Forest & Environment Department, Govt. of Odisha vide letter |



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| | the conservation plan shall be made and the funds so allocated shall be included in the project cost. All the safeguard measures brought out in the Wildlife Conservation Plan so prepared specific to the project site shall be effectively implemented. A copy of action plan shall be submitted to the Ministry of Environment and Forests and its Regional Office, Bhubaneswar. | No. 6096 dated. 28.03.14, an amount of Rs. 41, 24,044/- has been deposited in CAMPA FUND for implementation of Regional Wildlife Management Plan. |
| xxxii | Digital processing of the entire lease area using remote sensing technique shall be carried out regularly once in three years for monitoring land use pattern and report submitted to Ministry of Environment and Forests and its Regional Office, Bhubaneswar. | Digital processing of the entire lease area using the remote sensing technique has been carried out by Orissa Remote Space Application Center (ORSAC), Bhubaneswar has been engaged to assess the changes in land use pattern and report is awaited. The same will be submitted immediate after receipt. |
| xxxiii | A final mine closure plan along with details of Corpus Fund shall be submitted to the Ministry of Environment & Forests 5 years in advance of final closure for approval. | The same will be submitted to the Ministry of Environment & Forests 5 years in advance of final closure for approval. |
| B. General conditions | | |
| i | No change in mining technology and scope of working should be made without prior approval of the Ministry of Environment & Forests. | No change in mining technology and scope of working will be made without prior approval of the Ministry of Environment & Forests. |
| ii | No change in the calendar plan including excavation, quantum of mineral bauxite and waste should be made. | There shall be no change in the calendar plan including excavation, quantum of mineral bauxite and waste/OB generation of work without prior approval from competent authority. |
| iii | At least four ambient air quality-monitoring stations should be established in the core zone as well as in the buffer zone for RSPM, SPM, SO ₂ & NO _x monitoring. Location of the stations should be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets and frequency of monitoring should be undertaken in consultation with the State Pollution Control Board. | Four ambient monitoring stations have been established in consultation with the State Pollution Control Board, Odisha. Monitoring reports are attached in ANNEXURE -II. |
| iv | Data on ambient air quality (RSPM, SPM, SO ₂ & NO _x) should be regularly submitted to the Ministry of Environment and Forests including its Regional office located at Bhubaneswar and the State Pollution Control Board / Central Pollution Control Board once in six months. | The monitored AAQ data is being submitted to the concerned authorities along with the half yearly compliance report once in six month. |
| v | Fugitive dust emissions from all the sources should be controlled regularly. Water spraying arrangement on haul roads, loading and unloading and at transfer points should be provided and properly maintained. | Water spraying on haul roads is being practiced through water tankers at an interval of two hours, for which, provision is made to deploy 4 nos. of 12 KL capacity tankers to spray water at dust generating points such as haul roads, loading & unloading areas and material transfer points. The haulage roads are being maintained to avoid rut and pot holes. In addition to this we are using dust suppressant chemical (Dust bloc) to control fugitive dust emission. (Dust bloc is a stable emulsion of bitumen in water which binds the micro dust particles.) |



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| vi | Measures should be taken for control of noise levels below 85 dB (A) in the work environment. Workers engaged in operations of HEMM, etc. should be provided with ear plugs / muffs. | <p>The following measures are taken to control noise levels below 85 dB (A) in the work environment.</p> <ul style="list-style-type: none"> • Maintenance of all machines including checking of silencers regularly, • Controlled blasting using delay detonators, installing immovable machinery on foundations and in closed rooms, provision of earplugs/muffs to workers engaged in noise prone areas. • Regular vehicular checkup for pollution control certificates • The HEMM operators are provided with AC close cabinets which itself is acoustic in nature. |
| vii | Industrial waste water (workshop and waste water from the mine) 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. Oil and grease trap should be installed before discharge of workshop effluents. | All the mining machineries are being deployed on contractual basis and the repair and maintenance is being done at outside workshop. However Oil & Grease Trap facility is in place and will be installed after the commissioning of mechanical workshop. |
| viii | <p>Personnel working in dusty areas should wear protective respiratory devices and they should also be provided with adequate training and information on safety and health aspects.</p> <p>Occupational health surveillance program of the workers should be undertaken periodically to observe any contractions due to exposure to dust and take corrective measures, if needed.</p> | <p>Personal protective equipments are being provided to all workers respective to the nature of the job. Initial and periodical awareness training is being imparted to all workers in the Company's Vocational Training Center located within the lease area on Safety and Health Aspects.</p> <p>Pre-placement medical examination and periodical medical examination as per DGMS guideline of the workers engaged in the project is being carried out and records maintained for corrective measures.</p> |
| ix | A separate environmental management cell with suitable qualified personnel should be set-up under the control of a Senior Executive, who will report directly to the Head of the Organization. | A separate environmental management cell with suitable qualified personnel has been set up under the control of the Agent of Mines, who reports the Head of the Organization directly. |
| x | The funds earmarked for environmental protection measures should be kept in separate account and should not be diverted for other purpose. Year wise expenditure should be reported to the Ministry of Environment and Forests and its Regional Office located at Bhubaneswar. | Separate fund provision has been earmarked for environmental protection measures and it is not diverted for any other purpose. The expenditure incurred during the year 2015-16 is enclosed as Annexure-V . |
| xi | The project authorities should inform to the Regional Office located at Bhubaneswar regarding date of financial closures and final approval of the project by the concerned authorities and the date of start of land development work. | Complied. |
| xii | The Regional Office of this Ministry located at Bhubaneswar shall monitor compliance of the stipulated conditions. The project authorities should extend full cooperation to the officer (s) of the Regional Office by furnishing the requisite data / information / monitoring reports. | We are abide by the condition and shall extend full cooperation to the officer(s) of regional office by furnishing the requisite data / information/monitoring reports during their monitoring of compliance of the stipulated conditions. |



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| xiii | The project proponent shall submit six monthly report on the status of the implementation of the stipulated environmental safeguards to the Ministry of Environment and Forests, its Regional Office, Bhubaneswar, Central Pollution Control Board and State Pollution Control Board. The proponent shall upload the status of compliance on their website and shall update the same periodically. | Six monthly compliance report is being submitted on the status of compliance of the stipulated environmental clearance conditions including results of monitored data to the Ministry of Environment and Forests, its Regional Office Bhubaneswar, the respective Zonal Office of Central Pollution Control Board and the State Pollution Control Board. The status of compliance of the environmental clearance conditions, including results of monitored data is uploaded on company website periodically. |
| xiv | A copy of clearance letter shall be marked to concerned Panchayat / local NGO, if any, from whom suggestion / representation has been received while processing the proposal. | Already complied No complain has been received so far. |
| xv | The State Pollution Control Board should display a copy of the clearance letter at the Regional office, District Industry Centre and the Collector's office/ Tehsildar's Office for 30 days. | Already complied. |
| xvi | The project authorities should advertise at least in two local newspapers widely circulated, one of which shall be in the vernacular language of the locality concerned, within 7days of the issue of the clearance letter informing that the project has been accorded environmental clearance and a copy of the clearance letter is available with the State Pollution Control Board and also at web site of the Ministry of Environment and Forests at http://envfor.nic.in and a copy of the same should be forwarded to the Regional Office of this Ministry located at Bhubaneswar. | Already complied. |



DETAILS OF GARLAND DRAINS, RETAINING WALL & SETTLING POND

| SL NO | TYPE OF WORKS | DETAILS OF WORKS | | | | HEIGHT (avg) |
|-------|---|------------------|-------------|-------------|--------------|--------------|
| | | LENGTH | WIDTH (avg) | DEPTH (avg) | HEIGHT (avg) | |
| 1 | Wall around back side of OB dump | 700 meter | 0.8 meter | | 1 meter | |
| 2 | Drain work at backside of OB dump | 290 meter | 2.8 meter | 1 meter | | |
| 3 | Drain work at ore stock yard | 253 meter | 2.7 meter | 1 meter | | |
| 4 | Drain work at top soil dump | 362 meter | 3 meter | 1 meter | | |
| 5 | Drain work at haul road towards OB dump | 700 meter | 2 meter | 0.6 meter | 1 meter | |
| 6 | Wall around the top soil storage yard | 400 meter | 0.8meter | | 1meter | |
| 7 | Wall beside the cave | 330 meter | 0.8meter | | | |
| 8 | Three settling pond on backside of the OB dump | 10 meter | 8 meter | 2.2 meter | | |
| 9 | Parapet wall between service center facility to mine entrance | 1501 meter | 0.8 meter | | 1 meter | |
| 10 | Check dam between crusher ramp and haul road | 76 meter | 0.8 meter | | 1 meter | |
| 11 | Check dam across the slope from top soil towards mining pit. (two no's) | 47 meter | 0.8 meter | | 1 meter | |
| 12 | Check dam across the slope near mine entrance | 35 meter | 0.8 meter | | 1 meter | |
| 13 | Drain work around the crusher | 306 meter | 2 meter | 1 meter | | |
| 14 | Hume pipe culvert in the natural stream flowing nearby Kalahandi pit. | 5meter | 15 meter | | | |
| 15. | Concreted drain near fixed crusher. | 50 meter | 1.5 meter | | | |
| 16. | Settling pond connected to concreted drain near fixed crusher. | 15 meter | 10 meter | 5 meter | | |
| 17. | Parapet wall along the safety zone area of the kalahandi pit | 500 meter | 1.5 meter | | 2 meter | |
| 18. | Three numbers of Concreted weir across the natural seasonal nallah | 135 meter | 1.2 meter | | 2.5 meter | |



AMBIENT AIR QUALITY MONITORING REPORT

CORE ZONE:-

| CRUSHER | PM-10 µg/m ³ | PM-2.5 µg/m ³ | SO ₂ µg/m ³ | NO _x µg/m ³ | CO mg/m ³ |
|-------------|----------------------------|-----------------------------|--------------------------------------|--------------------------------------|-------------------------|
| October-15 | 59.22 | 33.52 | 4.58 | 12.19 | 0.21 |
| November-15 | 66.75 | 38.04 | 4.96 | 12.91 | 0.26 |
| December-15 | 56.44 | 31.78 | 4.42 | 11.97 | 0.19 |
| January-16 | 67.78 | 38.12 | 5.42 | 13.08 | 0.26 |
| February-16 | 67.00 | 38.18 | 5.41 | 12.99 | 0.26 |
| March-16 | 65.88 | 37.50 | 5.29 | 12.89 | 0.25 |
| Average | 63.84 | 36.19 | 5.01 | 12.67 | 0.24 |

| MINING PIT | PM-10 µg/m ³ | PM-2.5 µg/m ³ | SO ₂ µg/m ³ | NO _x µg/m ³ | CO mg/m ³ |
|-------------|----------------------------|-----------------------------|--------------------------------------|--------------------------------------|-------------------------|
| October-15 | 49.44 | 28.61 | 4.12 | 11.31 | 0.16 |
| November-15 | 55.13 | 31.51 | 4.26 | 11.98 | 0.17 |
| December-15 | 48.11 | 28.00 | 4.08 | 11.10 | 0.14 |
| January-16 | 57.44 | 32.67 | 4.61 | 12.06 | 0.19 |
| February-16 | 57.88 | 33.13 | 4.68 | 12.00 | 0.19 |
| March-16 | 54.63 | 30.91 | 4.44 | 11.91 | 0.18 |
| Average | 53.77 | 30.80 | 4.36 | 11.73 | 0.17 |

| NEAR OFFICE | PM-10 µg/m ³ | PM-2.5 µg/m ³ | SO ₂ µg/m ³ | NO _x µg/m ³ | CO mg/m ³ |
|-------------|----------------------------|-----------------------------|--------------------------------------|--------------------------------------|-------------------------|
| October-15 | 45.44 | 27.69 | 4.03 | 10.89 | 0.13 |
| November-15 | 50.50 | 29.39 | 4.08 | 11.50 | 0.15 |
| December-15 | 43.78 | 25.66 | 4.03 | 10.64 | 0.12 |
| January-16 | 53.33 | 30.33 | 4.31 | 11.61 | 0.16 |
| February-16 | 54.00 | 30.81 | 4.43 | 11.50 | 0.15 |
| March-16 | 50.00 | 28.66 | 4.28 | 11.46 | 0.16 |
| Average | 49.51 | 28.76 | 4.19 | 11.27 | 0.15 |

| WEIGH BRIDGE | PM-10 µg/m ³ | PM-2.5 µg/m ³ | SO ₂ µg/m ³ | NO _x µg/m ³ | CO mg/m ³ |
|--------------|----------------------------|-----------------------------|--------------------------------------|--------------------------------------|-------------------------|
| October-15 | 53.44 | 30.67 | 4.29 | 11.74 | 0.18 |
| November-15 | 59.88 | 33.65 | 4.56 | 12.45 | 0.21 |
| December-15 | 52.11 | 29.71 | 4.20 | 11.51 | 0.16 |
| January-16 | 62.11 | 34.97 | 4.97 | 12.57 | 0.22 |
| February-16 | 62.00 | 35.10 | 4.98 | 12.46 | 0.23 |
| March-16 | 59.13 | 33.59 | 4.79 | 12.30 | 0.22 |
| Average | 58.11 | 32.95 | 4.63 | 12.17 | 0.20 |



AMBIENT AIR QUALITY MONITORING REPORT

BUFFER ZONE:-

| CHANDRAGIRI | PM-10 µg/m ³ | PM-2.5 µg/m ³ | SO ₂ µg/m ³ | NO _x µg/m ³ | CO mg/m ³ |
|----------------|----------------------------|-----------------------------|--------------------------------------|--------------------------------------|-------------------------|
| October-15 | 47.67 | 28.10 | 4.14 | 11.20 | 0.14 |
| November-15 | 47.00 | 27.58 | 4.10 | 11.11 | 0.14 |
| December-15 | 51.89 | 29.72 | 4.34 | 11.43 | 0.14 |
| January-16 | 46.11 | 27.01 | 4.07 | 11.02 | 0.13 |
| February-16 | 45.50 | 26.78 | 4.09 | 10.70 | 0.14 |
| March-16 | 42.25 | 24.94 | 4.00 | 10.50 | 0.12 |
| Average | 46.74 | 27.35 | 4.12 | 10.99 | 0.14 |

| ADRI | PM-10 µg/m ³ | PM-2.5 µg/m ³ | SO ₂ µg/m ³ | NO _x µg/m ³ | CO mg/m ³ |
|----------------|----------------------------|-----------------------------|--------------------------------------|--------------------------------------|-------------------------|
| October-15 | 53.11 | 30.22 | 4.27 | 11.67 | 0.16 |
| November-15 | 52.38 | 29.99 | 4.24 | 11.60 | 0.16 |
| December-15 | 56.89 | 32.17 | 4.60 | 11.86 | 0.17 |
| January-16 | 52.22 | 30.11 | 4.20 | 11.46 | 0.16 |
| February-16 | 50.38 | 29.24 | 4.21 | 11.20 | 0.16 |
| March-16 | 46.25 | 27.06 | 4.04 | 10.91 | 0.14 |
| Average | 51.87 | 29.80 | 4.26 | 11.45 | 0.16 |

| ANDHIRAKANCH | PM-10 µg/m ³ | PM-2.5 µg/m ³ | SO ₂ µg/m ³ | NO _x µg/m ³ | CO mg/m ³ |
|----------------|----------------------------|-----------------------------|--------------------------------------|--------------------------------------|-------------------------|
| October-15 | 57.56 | 33.32 | 4.50 | 12.07 | 0.19 |
| November-15 | 56.38 | 32.24 | 4.43 | 11.99 | 0.18 |
| December-15 | 60.78 | 34.22 | 4.87 | 12.30 | 0.21 |
| January-16 | 55.89 | 31.78 | 4.36 | 11.89 | 0.18 |
| February-16 | 54.50 | 31.08 | 4.44 | 11.68 | 0.18 |
| March-16 | 50.50 | 29.16 | 4.18 | 11.31 | 0.16 |
| Average | 55.93 | 31.97 | 4.46 | 11.87 | 0.18 |

| PAIKUPAKHAL | PM-10 µg/m ³ | PM-2.5 µg/m ³ | SO ₂ µg/m ³ | NO _x µg/m ³ | CO mg/m ³ |
|----------------|----------------------------|-----------------------------|--------------------------------------|--------------------------------------|-------------------------|
| October-15 | 61.67 | 34.99 | 4.80 | 12.48 | 0.23 |
| November-15 | 60.88 | 34.30 | 4.75 | 12.41 | 0.22 |
| December-15 | 65.78 | 36.82 | 5.32 | 12.84 | 0.24 |
| January-16 | 60.11 | 33.83 | 4.67 | 12.30 | 0.21 |
| February-16 | 57.63 | 33.35 | 4.71 | 12.19 | 0.21 |
| March-16 | 54.75 | 31.50 | 4.39 | 11.79 | 0.18 |
| Average | 60.13 | 34.13 | 4.77 | 12.33 | 0.22 |



FUGITIVE DUST EMISSION REPORT

| Sl. No. | Name of the Location | PARTICULATE MATTER $\mu\text{g}/\text{m}^3$ | | | | | | Average |
|---------|----------------------------------|---|-------------|-------------|------------|-------------|----------|---------|
| | | October'15 | November'15 | December'15 | January'16 | February'16 | March'16 | |
| 1 | CRUSHER POINT | 133 | 168 | 144 | 165 | 183 | 204 | 166.17 |
| 2 | DRILLING POINT | 113 | 148 | 127 | 149 | 161 | 178 | 146.00 |
| 3 | NEAR LDC | 151 | 177 | 167 | 192 | 191 | 206 | 180.67 |
| 4 | Near OVER BURDEN TRANSPORT POINT | 93 | 129 | 106 | 128 | 142 | 158 | 126.00 |



SURFACE WATER QUALITY ANALYSIS REPORT**SANA RIVER UPSTREAM:-**

| Sl. No. | Parameter | Unit | Standards as per IS-2296 Class - 'C' | October'15 | November'15 | December'15 | January'16 | February'16 | March'16 | AVERAGE |
|---------|-----------------------------|-----------|--------------------------------------|------------|-------------|-------------|------------|-------------|----------|------------|
| 1 | Colour & Odour | -- | 300 & \$ | 2 & U/O | CL & U/O | CL & U/O | CL & U/O | CL & U/O | CL & U/O | 4.83 & U/O |
| 2 | Suspended Solids | Mg/l | \$ | 66 | 49 | 42 | 33 | 31 | 26 | 41.17 |
| 3 | Particular Size of S.S. | μ(micron) | \$ | <850 | <850 | <850 | <850 | <850 | <850 | <850 |
| 4 | Dissolved Solids | Mg/l | 1500 | 183 | 169 | 138 | 132 | 140 | 129 | 148.50 |
| 5 | PH | -- | 6.5-8.5 | 7.2 | 7.2 | 7.3 | 7.2 | 7.2 | 7.2 | 7.22 |
| 6 | Temperature | 0C | \$ | 25 | 25 | 25 | 25 | 25 | 25 | 25.00 |
| 7 | Oil & Grease | Mg/l | 0.1 | ND | ND | ND | ND | ND | ND | ND |
| 8 | Total Residual Chlorine | Mg/l | \$ | ND | ND | ND | ND | ND | ND | ND |
| 9 | Amm. Nitrogen as N | Mg/l | \$ | 0.38 | 0.31 | 0.28 | 0.36 | 0.28 | 0.22 | 0.31 |
| 10 | Total Kjeldal Nitrogen as N | Mg/l | \$ | 1.24 | 1.17 | 1.04 | 1.25 | 1.15 | 1.1 | 1.16 |
| 11 | Free Ammonia as NH3 | Mg/l | \$ | 0.003 | 0.003 | 0.002 | 0.003 | 0.003 | 0.003 | ND |
| 12 | Dissolved Oxygen | Mg/l | 4 | 7.5 | 7.3 | 7.4 | 7.4 | 7.4 | 7.4 | 7.40 |
| 13 | BOD (3) days at 270C | Mg/l | 3 | 1.16 | 1.1 | 1 | 1.14 | 1.1 | 1 | 1.08 |
| 14 | COD | Mg/l | \$ | 3.49 | 3.37 | 3.1 | 3.28 | 3.26 | 2.86 | 3.23 |
| 15 | Arsenic as As | Mg/l | 0.2 | BDL | BDL | BDL | BDL | BDL | BDL | BDL |



ANNEXURE-III

| | | | | | | | | | | | | |
|----|--|---------|------|-------|-------|-------|-------|-------|-------|------|------|------|
| 16 | Mercury as Hg | Mg/l | \$ | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| 17 | Lead as Pb | Mg/l | 0.1 | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| 18 | Cadmium as Cd | Mg/l | 0.01 | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| 19 | Hexa Chromium as Cr +6 | Mg/l | 0.05 | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| 20 | Total Chromium as Cr | Mg/l | \$ | 0.14 | 0.12 | 0.09 | 0.12 | 0.079 | 0.065 | 0.10 | 0.10 | 0.10 |
| 21 | Copper as Cu | Mg/l | 1.5 | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| 22 | Zinc as Zn | Mg/l | 15 | 0.26 | 0.18 | 0.19 | 0.25 | 0.25 | 0.19 | 0.22 | 0.22 | 0.22 |
| 23 | Selenium as Se | Mg/l | 0.05 | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| 24 | Nickel as Ni | Mg/l | \$ | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| 25 | Cyanide as CN | Mg/l | 0.05 | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| 26 | Fluoride as F | Mg/l | 1.5 | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| 27 | Diss. Phosphate as P | Mg/l | \$ | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| 28 | Sulphide as S | Mg/l | \$ | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| 29 | Phenolic Compounds as C ₆ H ₅ OH | Mg/l | \$ | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| 30 | Bio-assay Test | -- | \$ | 98% | 98% | 98% | 98% | 98% | 98% | 98% | 98% | 98% |
| 31 | Manganese as Mn | Mg/l | \$ | 0.019 | 0.017 | 0.011 | 0.015 | 0.026 | 0.021 | 0.02 | 0.02 | 0.02 |
| 32 | Iron as Fe | -- Mg/l | 50 | 0.32 | 0.26 | 0.21 | 0.26 | 0.39 | 0.32 | 0.29 | 0.29 | 0.29 |
| 33 | Vanadium as V | Mg/l | \$ | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| 34 | Nitrate as NO ₃ | Mg/l | 50 | 0.2 | 0.17 | 0.14 | 0.19 | 0.24 | 0.19 | 0.19 | 0.19 | 0.19 |



SANA RIVER DOWNSTREAM:-

| Sl. No. | Parameter | Unit | Standards as per IS-2296 Class - 'C' | October'15 | November'15 | December'15 | January'16 | February'16 | March'16 | AVERAGE |
|---------|-----------------------------|-----------|--------------------------------------|------------|-------------|-------------|------------|-------------|----------|------------|
| 1 | Colour & Odour | -- | 300 & \$ | 3 & U/O | 3 & U/O | 3 & U/O | 3 & U/O | CL & U/O | CL & U/O | 4.92 & U/O |
| 2 | Suspended Solids | Mg/l | \$ | 71 | 66 | 55 | 48 | 34 | 30 | 50.67 |
| 3 | Particular Size of S.S. | μ(micron) | \$ | <850 | <850 | <850 | <850 | <850 | <850 | <850 |
| 4 | Dissolved Solids | Mg/l | 1500 | 188 | 178 | 146 | 144 | 152 | 134 | 157.00 |
| 5 | PH | -- | 6.5-8.5 | 7.2 | 7.2 | 7.2 | 7.2 | 7.2 | 7.3 | 7.22 |
| 6 | Temperature | 0C | \$ | 25 | 25 | 25 | 25 | 25 | 25 | 25.00 |
| 7 | Oil & Grease | Mg/l | 0.1 | ND | ND | ND | ND | ND | ND | ND |
| 8 | Total Residual Chlorine | Mg/l | \$ | ND | ND | ND | ND | ND | ND | ND |
| 9 | Amm. Nitrogen as N | Mg/l | \$ | 0.43 | 0.39 | 0.34 | 0.48 | 0.34 | 0.27 | 0.38 |
| 10 | Total Kjeldal Nitrogen as N | Mg/l | \$ | 1.29 | 1.21 | 1.12 | 1.33 | 1.18 | 1.11 | 1.21 |
| 11 | Free Ammonia as NH3 | Mg/l | \$ | 0.003 | 0.002 | 0.002 | 0.003 | 0.004 | 0.003 | ND |
| 12 | Dissolved Oxygen | Mg/l | 4 | 7.5 | 7.3 | 7.4 | 7.4 | 7.4 | 7.3 | 7.38 |
| 13 | BOD (3) days at 270C | Mg/l | 3 | 1.23 | 1.14 | 1.1 | 1.22 | 1.16 | 1.1 | 1.16 |
| 14 | COD | Mg/l | \$ -- | 3.57 | 3.42 | 3.25 | 3.42 | 3.38 | 3.14 | 3.36 |
| 15 | Arsenic as As | Mg/l | 0.2 | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| 16 | Mercury as Hg | Mg/l | \$ | BDL | BDL | BDL | BDL | BDL | BDL | BDL |



ANNEXURE-III

| | | | | | | | | | | | | | |
|----|--|------|------|-------|------|-------|-------|-------|-------|-------|-----|-----|-----|
| 17 | Lead as Pb | Mg/l | 0.1 | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| 18 | Cadmium as Cd | Mg/l | 0.01 | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| 19 | Hexa Chromium as Cr +6 | Mg/l | 0.05 | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| 20 | Total Chromium as Cr | Mg/l | \$ | 0.17 | 0.13 | 0.11 | 0.16 | 0.88 | 0.074 | 0.25 | | | |
| 21 | Copper as Cu | Mg/l | 1.5 | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| 22 | Zinc as Zn | Mg/l | 15 | 0.31 | 0.2 | 0.2 | 0.31 | 0.31 | 0.24 | 0.26 | | | |
| 23 | Selenium as Se | Mg/l | 0.05 | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| 24 | Nickel as Ni | Mg/l | \$ | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| 25 | Cyanide as CN | Mg/l | 0.05 | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| 26 | Fluoride as F | Mg/l | 1.5 | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| 27 | Diss. Phosphate as P | Mg/l | \$ | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| 28 | Sulphide as S | Mg/l | \$ | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| 29 | Phenolic Compounds as C ₆ H ₅ OH | Mg/l | \$ | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| 30 | Bio-assay Test | -- | \$ | 98% | 98% | 98% | 98% | 98% | 98% | 97.9% | | | |
| 31 | Manganese as Mn | Mg/l | \$ | 0.026 | 0.02 | 0.017 | 0.021 | 0.031 | 0.025 | 0.02 | | | |
| 32 | Iron as Fe | Mg/l | 50 | 0.38 | 0.29 | 0.24 | 0.31 | 0.44 | 0.38 | 0.34 | | | |
| 33 | Vanadium as-V | Mg/l | \$ | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| 34 | Nitrate as NO ₃ | Mg/l | 50 | 0.25 | 0.18 | 0.16 | 0.14 | 0.31 | 0.24 | 0.21 | | | |



BAPHLIMALI BAUXITE MINES
GROUND WATER ANALYSIS REPORT AS PER IS: 10500
PERIOD: October- 2015 TO March- 2016

| Sl.No | Parameters | Unit | IS-10500 Standards | Average Reading | | | |
|-------|---|------------|--------------------|-----------------|--------------|--------------|--------------|
| | | | | Paikupakhal | Andrakanch | Maligaon | Kandukhani |
| 1 | Colour | Hazen | 5.0 | CL | CL | CL | CL |
| 2 | Odour | - | Unobjectable | Unobjectable | Unobjectable | Unobjectable | Unobjectable |
| 3 | Taste | - | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable |
| 4 | Turbidity | NTU | 1.0 | <1 | <1 | <1 | <1 |
| 5 | pH | - | 6.5-8.5 | 7.10 | 7.20 | 7.20 | 7.10 |
| 6 | Temperature | °C | - | 25.00 | 25.00 | 25.00 | 25.00 |
| 7 | Total Dissolved Solids | mg/l | 500 | 131.50 | 132.00 | 128.50 | 134.00 |
| 8 | Total Hardness | mg/l | 300 | 45.00 | 45.50 | 42.00 | 55.00 |
| 9 | Calcium as Ca | mg/l | 75 | 9.10 | 9.10 | 9.35 | 9.50 |
| 10 | Magnesium (as Mg) | mg/l | - | 6.85 | 7.10 | 7.05 | 7.30 |
| 11 | Residual Free Chlorine | mg/l | 0.2 | ND | ND | ND | ND |
| 12 | Free CO ₂ | mg/l | - | 0.91 | 0.77 | 0.79 | 0.80 |
| 13 | Sulphates (as SO ₄) | mg/l | 200 | 14.20 | 15.85 | 15.65 | 16.65 |
| 14 | Chlorides (as Cl) | mg/l | 250 | 9.75 | 9.75 | 9.65 | 9.95 |
| 15 | Fluorides (as F) | mg/l | 1.0 | 0.040 | 0.055 | 0.060 | 0.050 |
| 16 | Acidity | mg/l | - | 4.25 | 4.20 | 4.35 | 4.60 |
| 17 | Alkalinity | mg/l | 200 | 23.50 | 27.00 | 29.00 | 30.50 |
| 18 | Iron (as Fe) | mg/l | 0.3 | 0.14 | 0.13 | 0.14 | 0.15 |
| 19 | Mineral Oil | mg/l | 0.01 | BDL | BDL | BDL | BDL |
| 20 | Manganese (as Mn) | mg/l | 0.1 | BDL | BDL | BDL | BDL |
| 21 | Total Coliform | MPN/10 Oml | <2 | NIL | NIL | NIL | NIL |
| 22 | Mercury (as Hg) | mg/l | 0.001 | BDL | BDL | BDL | BDL |
| 23 | Arsenic (as As) | mg/l | 0.05 | BDL | BDL | BDL | BDL |
| 24 | Zinc (as Zn) | mg/l | 5.0 | 0.22 | 0.23 | 0.21 | 0.25 |
| 25 | Cadmium (as Cd) | mg/l | 0.01 | BDL | BDL | BDL | BDL |
| 26 | Selenium (as Se) | mg/l | 0.01 | BDL | BDL | BDL | BDL |
| 27 | Cyanide (as CN) | mg/l | 0.05 | BDL | BDL | BDL | BDL |
| 28 | Copper (as Cu) | mg/l | 0.5 | BDL | BDL | BDL | BDL |
| 29 | Phenolic Compound (as C ₆ H ₅ OH) | mg/l | 0.001 | BDL | BDL | BDL | BDL |
| 30 | Lead (as Pb) | mg/l | 0.05 | BDL | BDL | BDL | BDL |
| 31 | Pesticide | mg/l | NIL | NIL | NIL | NIL | NIL |



MONITORING DATA OF GROUND WATER LEVEL

| Sl. No. | Location of Well | November-2015 | February-2016 |
|---------|------------------|---------------|---------------|
| 1. | Paikupakhal | 5.4 | 7.1 |
| 2. | Andirakanch | 4.5 | 6.2 |
| 3. | Maligaon | 5.0 | 6.4 |
| 4. | Kandukhani | 4.1 | 5.4 |



**EXPENDITURE INCURRED ON ENVIRONMENT AND POLLUTION CONTROL
IN BAPHLIMALI BAUXITE MINES FOR THE YEAR 2015-16**

| Sl.NO | ITEM EXPENDITURE | RS (in rupees) |
|--------------|--|--|
| 1. | Water Pollution Control Measures (like garland drain, retaining wall, parapet wall etc.) | 10,00,000 |
| 2. | Plantation and horticulture | 33,76,850 |
| 3. | Environmental Monitoring | 39,39,568 |
| 4. | Water Sprinkling For Dust Suppression | 60,00,000 |
| | Total | (Say One Crore Forty Three Lakhs) |

