

COMPLIANCE TO CONDITIONS OF ENVIRONMENTAL CLEARANCE

**Chuinpalli Quartzite Mines, Jharsuguda, Odisha
Period: October 2016 to March 2017**

**M/s TRL Krosaki Refractories Ltd,
Belpahar, Jharsuguda, Odisha**

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LIST OF ANNEXURES

ANNEXURE	TITLE
Annexure – 1	Copy of Test Reports of Monitoring carried out for the period (October 2016 to March 2017)

CHAPTER 1

INTRODUCTION

The present report is prepared in compliance with the Environmental Clearance letter issued by MoEF&CC, New Delhi vide letter number J-11015/134/2008-IA.II(M) dated 18th August 2012. The detail profile of the project is as below:

PROJECT DESCRIPTION

ATTRIBUTES	DETAILS
Location	Village – Chhuinpali, Tehsil- Lakhanpur, District – Jharsuguda, Odisha
Lease Area	102.123 Ha
Lease Execution	22.05.2000 for 20 years
Surface Right area	83.791 Hect. or 207.05 acres granted under surface right order no-1036/ mines dt.11.08.2014 of the collector Jharsuguda
Present area for Excavation	Smaller block of 4.561 ha in the west (Block A)
Mine Resumed on	01.11.2012
Consent to Establish	From State Pollution Control Board, Odisha vide letter no. 1739/III-CON (NOC)-296/2009-10 dtd. 21.06.2011
Consent to Operate	Consent to operate is granted From Regional office , State Pollution Control Board Jharsuguda ,Odisha for Chhuinpali Quartzite Mines of M/s-TRL Krosaki Refractories Ltd vide consent order no-RO/SPCB/JSG/APC& WPC-010 and the consent order valid for the period up to dt. 31.03.2022.
Latitude	21° 45' 31" to 21° 46' 28" N
Longitude	83° 33' 24" to 83° 34' 15" E
Toposheet No.	64 O/5

ML Area	102.123 Ha
Highest Altitude	425 m AMSL
Lowest Altitude	213m AMSL
Terrain & Gradient	Hilly, Slope is generally towards south.
Method of Mining	Opencast Semi-mechanized
Drainage Pattern	Dendritic
Water Bodies	Chhote - Kelo river at 1km west from the ML area. Nearest distance of Hirakud Back Water is at 300 m from the south eastern boundary of ML area.
Notified Sensitive Areas Within 10 Kms	NIL IB valley-Jharsuguda area (IB-Jharsuguda cluster defined by OSPCB & CPCB in the Action plan for abatement of pollution in critically polluted industrial clusters) at a distance of 29.02 Km
State Boundary	3.55 Km from Orissa – Chattishgarh state boundary
Water requirement/Sources	Domestic – 2cum per day (From dug well) Non Domestic use– 9.25 Cum Per day,
Life of the mine	50 Years
Grade of Ore	Less than 0.5% of Fe ₂ O ₃
Ultimate working depth	225 mRL (For Block A) & 270 mRL (For Block B)
The ground water table	200 mRL
Drilling and Blasting	Occasional Drilling & Shot hole blasting
Nature of Waste	OB Soil & Waste rock
Present Employment	135 Nos

PRESENT STATUS OF THE MINES

The mine is in working condition and environment protection measures have been undertaken as per the statutory requirement. Environment safe guard measures will be adopted for the mining operation as per the Environment management plan.

Monitoring of environmental monitoring is being conducted on monthly basis and compliance is being submitted on half yearly basis.

PURPOSE OF THE REPORT

This six-monthly report is being submitted as per the condition stipulated in the Environmental Clearance Order. The job of regular monitoring and analysis as per the requirement of post Environmental clearance has been assigned to M/s Kalyani Laboratories Pvt. Ltd. Bhubaneswar vide our W.O. no. 4700006878, Date-12.05.2016. M/s Kalyani Laboratories Pvt. Ltd. Bhubaneswar is a MoEF recognized Laboratory vide notification no. 1573 dated 6th August 2014.

The post EC compliance report depicts the environmental impacts of the project on the surrounding environment. This report reveals

- The environment management plan is being implemented during the operation of mines to minimize the impact of the mines on the surrounding environment.
- Compliance to the conditions stipulated in the Environmental Clearance Letter.
- That the Project Management is implementing the environmental mitigation measures and safeguards in true spirit as suggested in the approved Environmental Management Plan (EMP).

The present mining operation is producing quartzite consumed by M/s-TRL Krosaki Refractories Limited to the tune of 100 to 150 tonnes per day. The company has planned for expansion of production capacity of silica bricks, which will be require 1,50,000 tonnes of selected and sized usable grade quartzite per year (around 500 tonnes per day for 300 days of single shift working) for future. Proposal for production in the next five years have been kept to the tune of maximum 1, 500 MT per annum.

M/s- TRL Krosaki Refractories Limited obtain Environmental clearance vide letter no- J/11015/134/2008-IA.II(M) dated 18th August 2012 for production of Quartzite from the lease area of 102.123 Hect. Now the company proposed to set up a mobile crusher with screening facility of 100 TPH capacity in the area of 5000 sqm. area within the lease area of Chhuinpali Quartzite mines. There are 3 locations within lease area proposed for installation of crushing unit. The crushing & screening plant

has already been incorporated in the approved Amalgamated mining plan. The company now proposed to regularize the facility by obtaining consent to operate from State Pollution Control Board for installation of the crushing unit.

The proposed Crushing & screening with 100 TPH capacity will consist of feeder, Jaw crusher, impact crusher, vibrating screen, vertical impact crusher, circular vibrating screen, conveyor system and pollution control equipments.

The ROM ore will be crushed to sized ore at mines itself and transported directly to our plant site situated at Belpahar, Jharsuguda from the ML area and other user agency.

CHAPTER 2**STATUS OF IMPLEMENTATION OF EC CONDITIONS**

Sl. No	EC Conditions	Status of Implementation
Specific Conditions		
i.	The Project proponent shall obtain Consent to Establish and Consent to Operate from the State Pollution Control Board and effectively implement all the conditions stipulated therein.	Consent to establish has been obtained from State Pollution Control Board, Odisha vide letter no. 1739/III-CON (NOC)-296/2009-10 dtd. 21.06.2011 and consent to operate also obtained vide letter no. 482/Ind- II Con (Mines)18 dated 31.03.2016 with consent order no. RO/SPCB/JSG/ APC & WPC-010 and valid up to 31.03.2022 for operation of the mines. Copy already submitted.
ii.	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	Noted
iii	Environmental clearance is subject to obtaining clearance under the Wildlife (Protection) Act, 1972 from the competent authority, as may be applicable to this project.	The mine site is located outside of any eco sensitive zone. Therefore clearance under the Wildlife (Protection) Act, 1972 from the competent authority is not applicable for the present case of mining. However a site specific wildlife conservation plan has been prepared for the project and approved by Principal Chief Conservator of Forest (Wild Life)

		<p>and Chief wild life warden: Odisha, Bhubaneswar vide letter no. 3856/1/WL(C)SSP-293/2011 dtd. 7th June 2011.</p> <p><u>Rs. 43,91,289/- paid 18.02.2014 (Regional Wild Life Management Fund)</u></p> <p><u>Rs. 69 Lakh paid on 30.04.2014 (for Site Specific Wild Life Conservation Plan).</u> No further investment wrt Wildlife management plan has been incurred during the reporting period.</p> <p>Cost towards wild life management plan 1,32,000/- and salary of 2 persons @ 11000/- per month appointed to take care of forest plants.</p>
iv	<p>The Company shall submit within 3 month their policy towards Corporate Environment Responsibility which should inter-alia address (i) Standard Operating Process/ Procedure to bring into focus any infringements/ deviation/ violation of Environmental or forest norms/conditions. (ii) Hierarchical system or Administrative order of the company to deal with environmental issues and ensuring compliance EC conditions and (iii) System of reporting of non-compliance / violation environmental norms to the Board of Directors of the company and/or stakeholders and shareholders.</p>	<p>Policy towards Corporate Environment Responsibility has been already submitted vide letter no. SRMS/CQM/ENV/12-13/03 dtd. 01.11.2012. The policy addressing Standard Operating Process/ Procedure to bring into focus any infringements/ deviation/ violation of Environmental or forest norms/conditions. (ii) Hierarchical system or Administrative order of the company to deal with environmental issues and ensuring compliance EC conditions and (iii) System of reporting of non-compliance / violation environmental norms to the Board of Directors of the company and/or stakeholders and shareholders.</p>

v	<p>The mining operation shall be restricted to above ground water table and it should not intersect the ground water table. In case of working below the 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.</p>	<p>The ground water table of the area is at 200 mRL and the ultimate depth of the mining will be 225 mRL which is much above the ground water table. So the mining operation throughout the entire life will not intersect the ground water table.</p> <p>A hydro geological study has been carried out during 2015 – 16 at the lease area of Chuinpalli quartzite mines and its buffer zone. Sampling wells were selected from 14 villages including the dug well in the lease area. During the study water samples from the study area were collected and their analysis done to identify water quality. Estimation of groundwater resource and utilization in the buffer zone as per norms of Ground Water Estimation Committee, Govt. of India</p> <p>The study reveals that the annual replenishable groundwater resource of the area works out to be 59.62 mcm and the gross annual draft is only 22.18 mcm. Thus the present stage of development in the buffer zone is 37.20%. There is sufficient scope exists for further groundwater development in the area. Considering requirement of groundwater vis-à-vis availability, no short term or long term impact is expected on groundwater regime. The ultimate depth of mine working during the conceptual period will not intersect the ground water table. Further conservation of ground water and annual recharge is being increased through rainwater harvesting. Regular monitoring of groundwater level and quality would be by establishing a network of existing</p>
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		wells will help in easy interpretation of ground water fluctuation in the area.												
vi	The project proponent shall ensure that no natural watercourse and/or water resources shall be obstructed due to any mining operations. Adequate measures shall be taken for conservation and protection of the 1 st and 2 nd order streams, if any emanating or passing through the mine lease during the course of mining operation.	There is no natural water body passes through the ML area which will be obstructed due to mining operation. During the rainy season the rain water passed through the natural rain cuts connects to the garland drain and settling tanks. The water is utilized for ground water recharge. A proper rain water harvesting structure has been established and implemented for recharge of ground water. The stored rain water is also utilized for plantation purpose.												
vii	The project proponent shall take adequate environmental safe guard measure for control of rolling down of silt and sediments and protection of the catchment area of Kelo River and the Hirakud reservoir during the course of mining operation.	<ul style="list-style-type: none"> • Hirakud back water reservoir is located at a distance of 300m • Details of Garland drain and retaining wall is as below: <table border="1"> <thead> <tr> <th>Location</th> <th>Retaining wall</th> <th>Garland drain</th> </tr> </thead> <tbody> <tr> <td>Around OB dump</td> <td>100mt*1mt*1mt</td> <td>-</td> </tr> <tr> <td>Along haul road</td> <td>100mt*1mt*1mt</td> <td>Nil</td> </tr> <tr> <td>Along the slope</td> <td>50mt*1mt*1mt</td> <td>-</td> </tr> </tbody> </table> <ul style="list-style-type: none"> • The water from these drains is being diverted to settling pits for settling and the clean water is being discharged outside. • Contour trenches are made on overburden dumps to control surface run off and subsequent erosion. • The retaining wall constructed in the southern side of the lease boundary to check the surface run off from mine. 	Location	Retaining wall	Garland drain	Around OB dump	100mt*1mt*1mt	-	Along haul road	100mt*1mt*1mt	Nil	Along the slope	50mt*1mt*1mt	-
Location	Retaining wall	Garland drain												
Around OB dump	100mt*1mt*1mt	-												
Along haul road	100mt*1mt*1mt	Nil												
Along the slope	50mt*1mt*1mt	-												

		<ul style="list-style-type: none"> The clarified water will be diverted and discharged into irrigation tank and used in the agricultural field. The mine drainage water is being analyzed on regular basis. The analysis carried out in the month of February is being presented in the table below: Analysis result of mine drainage water carried out in the month of February 2017 is as below: <table border="1" data-bbox="889 724 1503 1060"> <thead> <tr> <th>Parameters</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>pH</td> <td>8.5</td> </tr> <tr> <td>TDS (mg/l)</td> <td>82</td> </tr> <tr> <td>TSS (mg/l)</td> <td>32</td> </tr> <tr> <td>DO(mg/l)</td> <td>7.1</td> </tr> <tr> <td>Total Iron (mg/l)</td> <td>4.5</td> </tr> </tbody> </table> The garland drain and settling tank is being cleaned time to time. 	Parameters	Result	pH	8.5	TDS (mg/l)	82	TSS (mg/l)	32	DO(mg/l)	7.1	Total Iron (mg/l)	4.5
Parameters	Result													
pH	8.5													
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DO(mg/l)	7.1													
Total Iron (mg/l)	4.5													
viii	The project proponent shall effectively implement the mitigative measures suggested by the Hirakud Dam Authorities to check the surface run-off and sediments into the reservoir back water.	<ul style="list-style-type: none"> We are effectively implement the mitigative measures suggested by Superintending Engineer, Hirkud Dam Circle, Burla. According to the suggestions of Hirakud Dam authority garland drains, retaining walls, contour trench and settling pits has been constructed to check the surface run off from the mines. The mine discharge water is regularly monitored and analyzed by authorized laboratory before discharge to outside. It has been observed from the analysis result that the parameters are within the prescribed range for 												

		<p>discharge to outside. The test report attached for reference.</p> <ul style="list-style-type: none"> • Before discharging of mine drainage water it will pass through the garland drain and settle in the settling pit so that clean water will be discharged outside the ML area.
ix	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.	During the present compliance period no top soil has been generated as the mining activity will continue in the existing quarry only.
x	The over burden generated during the mining operation shall be temporarily stacked at earmarked dump site(s) only and it should not be kept active for long period of time and its phase-wise stabilization shall be carried out. Proper terracing of the dumps shall be carried out so that the overall slope of the dumps shall be maintained to 28°. The over burden dump shall be scientifically vegetated with suitable native species to prevent erosion and runoff. In critical areas, use of geotextiles shall be undertaken for stabilization of the dump. Monitoring and management of rehabilitated areas shall continue until the vegetation becomes self	<p>There is an existing waste dump over an area of 0.453 Ha with OB of 1200 cu.m. During the period of compliance no waste will be generated has been generated.</p> <p>Retaining wall and garland drain has been constructed around the dump for protection of surface runoff. Photograph showing the dump and retaining wall is given in the report.</p>

	sustaining. Compliance status shall be submitted to the Ministry of Environment and Forests and its Regional office located at Bhubaneswar on six monthly basis.	
xi	Catch drains and siltation ponds of appropriate size shall be constructed around the mine working, OB, sub-grade and mineral dump(s) to prevent run off of water and flow of sediments directly into the Kelo River, the Hirakud Reservoir and other water bodies. The water so collected should 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.	<ul style="list-style-type: none"> • To prevent the runoff from the ML area garland drains, retaining wall and settling pits has been constructed. • Three nos of settling pit of dimension 5 x 5 x 2m has been constructed in the ML area. • Photograph showing the garland drain and settling pit has been attached.
xii	Garland drains, settling tanks and check dams of appropriate size, gradient and length shall be constructed around the mine pit, OB, sub-grade and mineral dump(s) to prevent run off of water and flow of sediments directly into the Kelo River, the Hirakud Reservoir and other water bodies and sump capacity should be designed keeping 50% safety margin over and above	<ol style="list-style-type: none"> 1. Garland drain is being made to prevent rain water gushing through the slope. The water from these drains is being diverted to settling pits for settling and settled water is being discharged. 2. Check dam has been constructed in the southern side of the lease boundary to check the surface run-off from mine to the Hirakud Reservoir. 3. The clarified water will be diverted and discharged into irrigation tanks which will be used for plantation, dust suppression or agricultural activities.

	<p>peak sudden rainfall (based on 50 years data) and maximum discharge in the area adjoining the mine site. Sump capacity should 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.</p>	<p>4. Sedimentation pit has been constructed at the corners of garland drain and desilted at regular intervals.</p>
xiii	<p>Dimension of the retaining wall at the toe of temporary OB dumps and OB benches within the mine to check run-off and siltation should be based on the rainfall data.</p>	<p>Retaining wall of 100m x 1m x 1 m size has been constructed in the toe wall of the OB dump to check the runoff and siltation.</p>
xiv	<p>The void left unfilled in an area of 6.786ha shall be converted into water body. The higher benches of excavated void/mining pit shall be terraced and plantation done to stabilize the slopes. The slope of higher benches shall be made gentler for easy accessibility by local people to use the water body. Peripheral fencing shall be carried out all along the excavated area.</p>	<p>At present there is no void for reclamation. The reclamation procedure will start after complete exhaustion of the minerals from the mining quarry. During the conceptual period, a void of 12.0 Ha will be created. Out of the total quarry area 6.786ha shall be converted into water body and made accessible to the local people to use the water body. Proper fencing of the water body will do to avoid any accident.</p> <p>A 3m wide plantation zone will be created around the water reservoir to increase the aesthetic value of the area.</p> <p>5.214 Ha of the mined out area will be backfilled with the generated waste and covered by top soil. This area will be stabilized by plantation.</p>

		Till date 11.24 Ha of plantation zone with 14000 saplings has been made within the ML area and 8.0 Ha of plantation made in the village waste land of Banjari and Kumar village.					
xv	Plantation shall be raised in an area of 20.967ha including a 7.5m wide green belt in the safety zone around the mining lease by planting the native species around the reclaimed area, OB dumps, mine benches, around water body, along the roads etc. in consultation with the local DFO/Agriculture Department. The density of the trees should be around 2500 plants per hectare. Greenbelt shall be developed all along the mine lease area in a phased manner and shall be completed within first five years.	Yr.	Location	Area (Ha)	No. of sapling	Species planted	Density
		Jan- June 2013	Kumar village	6.0	6000	Neem, Karanja, Simarouba	1000/ Ha
		Sept 2013 - March 2014	Bhikampali Village	2.00	3000	Teak, Neem, Karanja	1500/ Ha
		March 2014- Sept 2014	Bhikampali Village	1.8	3000	Neem, Karanja, Simarouba	1600/ Ha
		April 2015 - Sept. 2015	Bhikampali Village (Green belt & Avenue)	1.0	1500	Debadaru- 330 Nos Saguan- 230 Nos Karanja- 550 Nos Krushnach uda- 200Nos Radhachuda- 200 Nos Neem- 440 Nos Jamu- 50 Nos	2000/Ha
		April - Sept. 2015	Safety zone	0.5	500	Teak, Krushnach uda, Bamboo,	1000/ Ha
		Oct 2015 - Mar 2016	Safety Zone	0.44	1100	Teak, Jackfruit, Mango, Jamun, Krushnach uda, Bamboo, Palash, deodar etc.	2500/Ha
		April	Safety Zone	0.512		Jamu	2500/ Ha

		2016 – September r 2016	Dump Avenue Plantation	0.132 0.16 R Km		Karanja Neem Krushnach uda Teak		
xvi	Effective safeguard measures such as regular water sprinkling shall be carried out in critical areas prone to air pollution and having high levels of particulate matter such as around crushing and screening plant, loading and unloading point and transfer points. Extensive water sprinkling shall be carried out on haul roads. It should be ensured that the Ambient Air Quality parameters conform to the norms prescribed by the Central Pollution Control Board in this regard.	<p>Regular water sprinkling is being carried out twice in a day in the haul road, mining benches, on the dump and loading and unloading sites to minimize the emission of particulate matter. A 5000 liter capacity water tanker is being used for this purpose. Photographs attached.</p> <p>Regular monitoring of ambient air quality at 4 locations (2 inside lease area and 2 outside the lease area) is being carried out on monthly basis Test reports attached for reference.</p> <p>The concentration of PM10, PM2.5, SOx, and NOx for the period of October 2016 to March 2017 has been given in Chapter – 3 and Annexure 1.</p>						
xvii	The project authority should implement suitable conservation measures to augment ground water resources in the area in consultation with the Regional Director, Central Ground Water Board.	<p>The project authority has been taken up the rain water harvesting within the lease area. The rain water harvesting structure has been constructed.</p> <p>Dimension of storm water drain connecting to the settling tank cum recharge pit = 1m x1m 200m</p> <p>Dimension of the Settling tank cum recharge pit = 5m x5m x2m</p> <p>Storage capacity of the settling pit = 50 cu.m</p> <p>No. of settling tank cum R recharge pit constructed till date = 3 nos</p>						
xviii	Regular monitoring of ground water level and quality shall be carried out	<p>The ground water quality is being monitored once per season. It has been observed that the parameters</p>						

	<p>in and around the mine lease by establishing a network of existing wells and installing new piezometers during the operation. The periodic monitoring [(at least four times in a year- pre-monsoon (April-May), monsoon (August), post-monsoon (November) and winter (January); once in each season)] shall be carried out in consultation with the State Ground Water Board/Central Ground Water Authority and the data thus collected may be sent regularly to the Ministry of Environment and Forests and its Regional Office Bhubneswar, the Central Ground Water Authority and the Regional Director, Central Ground Water Board. If at any stage, it is observed that the groundwater table is getting depleted due to the mining activity; necessary corrective measures shall be carried out.</p>	<p>analyzed are found to be within the prescribed limit. The analysis result has been given in Chapter 3 and Annexure 1.</p>
xix	<p>Appropriate mitigate measures shall be taken to prevent pollution of Kelo River in consultation with the State Pollution Control Board.</p>	<p>As Kelo river is the major drainage system of the area which flows at a distance of 1 Km in the western side of the ML area and It meets Hirakud reservoir on Mahanadi. Before discharge of any mine drainage water to outside the lease area following necessary preventive measures have been under taken.</p>

		<ul style="list-style-type: none"> • Settling of the drainage water. • Regular analysis of the mine drainage water. • Reuse of the water in plantation and dust suppression activities.
xx	The project proponent shall obtain necessary prior permission of the competent authorities for drawl of requisite quantity of water required for the project.	<p>Total water requirement for the project is 11.25 KLD, out of which 9.25 KLD will be required for plantation, dust suppression and other non domestic purposes. Only 2 KLD water will be used for drinking purpose.</p> <p>Agreement with the Executive Engineer, Sambalpur Irrigation division, Burla, has been done on 19.09.2013 which has been deposited to the Ministry earlier. We are depositing water license fees @ Rs. 6.80 per KL for 15 KL per day every month since October'2012.</p>
xxi	The project proponent shall practice suitable rainwater harvesting measures on long term basis and work out a detailed scheme for rainwater harvesting in consultation with the Central Groundwater Authority and submit a copy of the same to the Ministry of Environment and Forests and its Regional Office, Bhubaneswar.	The project authority has taken up rainwater harvesting for ground water recharge within the ML area. Detail proposal has been already submitted to MoEF in our earlier compliance report.
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	<ul style="list-style-type: none"> • The transportation vehicles are regularly maintained to avoid pollution. • Overloading is strictly prohibited • Transportation will be done in the day time only. Vehicular emission monitoring is being

	transportation of mineral. The mineral transportation shall be carried out through the covered trucks only and vehicles carrying the mineral shall not be overloaded. No transportation of ore outside the mine lease shall be carried out after sunset.	carried out for the heavy vehicles used in the mines. The details of vehicular emission report are given in Chapter 3 and Annexure 1 .
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.	<ul style="list-style-type: none"> • Blasting will be carried out in day time only and the time is being fixed from 12.00 noon to 1.00 pm and this time is displayed on the display board for information of the workers. • For any possibility of objectionable ground vibration the broad blasting parameters may be implemented as per the field condition along with the use of delay detonator. The blasting parameters will be suitably set to minimize ground vibration within safety limit. • Muffled blasting with delay detonator is being restored to control the throw of rock and minimizing the ground • Blasting of the Jackhammer-drilled benches will be carried out with small diameter 80% strength Special Gelatine explosives. Detonation of the explosives will be carried out by electric delay detonators which will be exploded by multi-shot exploders. • Blasting shelters has been constructed within the lease area
xxiv	Drills shall either be operated with	Wet drilling is conducted in the lease area.

	the dust extractors or equipped with water injection system.	
xxv	Mineral handling area shall be provided with adequate number of high efficiency dust extraction system. Loading and unloading areas including all the transfer points should also have efficient dust control arrangements. These should be properly maintained and operated.	Mineral handling area, Loading and unloading area has been provided with water sprinkling facility to suppress dust emission.
xxvi	Sewage treatment plant shall be installed for the colony. ETP shall also be provided for the workshop and wastewater generated during the mining operation.	As the mines workers are from the nearby areas, there is no residence within the lease area. So there is no proposal for STP within the lease area. There is no generation of waste water during the mining operation. During the rainy season only there will be generation of mine drainage water which will be discharged outside after proper settling. So no ETP is proposed within the lease area.
xxviii	Effective safeguard measures should be taken to control fugitive emissions so as to ensure that RSPM (PM ₁₀) levels are within prescribed limits.	<ul style="list-style-type: none"> • Regular water sprinkling on the unmetalled hauls road of the ML area. • Water also sprinkled over the dumping area • Overloading of the transport equipments shall control to stop spillage. • While transport the material it should be covered with plastic polythene • Gaseous pollutants in the exhaust fumes generated by the transportation machinery are minimized by proper maintained.
xxix	Concentration of free silica in the	Respirable free silica was sampled by personal

	<p>ambient air shall be monitored regularly and records maintained as part of post project monitoring. Necessary safeguard measures as may be required based on monitoring data of free silica shall be taken</p>	<p>sampler Envirotech APM 800. The samples were collected from the breathing zone during an 8-hr work shift. The analysis was done by Visible spectrophotometric method as per NIOSH Manual of Analytical Methods (NMAM) No. 7601. The quotient of the respirable dust exposure and OSHA PEL was determined to establish the degree of compliance with the PEL. The Occupational Safety and Health Administration (OSHA) 8 h time-weighted (TWA) permissible exposure limit (PEL) was calculated and it is being observed that permissible limit for crystalline silica as respirable quartz is 0.1 mg/m³. The monitoring of free silica carried out during this reporting period is being attached Annexure 1.</p>
xxx	<p>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.</p>	<p>The initial medical examination for 100 nos of mines worker has been conducted during 27.06.2013 & 28.06.2013. The average age group of the workers undergone the medical examination is 35 – 45 yrs by Dr. B.N. Mohapatra & Team of Utkal Polyclinic, Bhubaneswar (ILO Classified) has conducted the medical examination. The periodical health examination will be conducted once in 5 years. The schedule for periodic health check up is given as below and followed in the mines. Next schedule of medical examination will be on April 2017. During the period of compliance periodic medical checkup was conducted for 6 Nos of workers and eye refraction test conducted for 03 nos of workers. In case of any emergency the</p>

		treatment for the mines worker will be provided by JG Hospital, Belpahar which is being operated by M/s TRL Krosaki Refractories Ltd.												
		<table border="1"><thead><tr><th colspan="2">Schedule for Periodic Health Check Up</th></tr><tr><th>Activity</th><th>Proposed schedule</th></tr></thead><tbody><tr><td>Risk rated workers will be examined and treated free of cost</td><td>Annual</td></tr><tr><td>Mobile medical camp</td><td>Twice in a year</td></tr><tr><td>Provision of supplying PPEs</td><td>All the workers will be supplied with PPEs while joining</td></tr><tr><td>First aid facility</td><td>As and when required.</td></tr></tbody></table>	Schedule for Periodic Health Check Up		Activity	Proposed schedule	Risk rated workers will be examined and treated free of cost	Annual	Mobile medical camp	Twice in a year	Provision of supplying PPEs	All the workers will be supplied with PPEs while joining	First aid facility	As and when required.
Schedule for Periodic Health Check Up														
Activity	Proposed schedule													
Risk rated workers will be examined and treated free of cost	Annual													
Mobile medical camp	Twice in a year													
Provision of supplying PPEs	All the workers will be supplied with PPEs while joining													
First aid facility	As and when required.													

xxxix	<p>The project proponent shall take all precautionary measures during mining operation for conservation and protection of endangered fauna namely python, monitor lizard, peacock etc. found in the study area. Action plan for conservation of flora & fauna prepared shall be effectively implemented in consultation with the State Forest and Wildlife Department. All the safeguard measures brought out in the Wildlife Conservation Plan prepared specific to this project shall be effectively implemented. Necessary allocation of funds for implementation of the conservation plan shall be made and the funds so allocated shall be included in the project cost. A copy of action plan shall be submitted to the Ministry of Environment and Forests and its Regional Office, Bhubaneswar.</p>	<p>During the operational phase of mines the proponent has taken proper measures for conservation and protection of endangered fauna namely python, monitor lizard, peacock etc. found in the study area. A detail action plan has been prepared with consultation of the forest department and as per the suggestions all the measures has been taken up by the proponent.</p> <p>The copy of site specific conservation plan has already been submitted to the Ministry earlier.</p> <p>Rs. 43,91,289/- paid 18.02.2014 (Regional Wild Life Management Fund).</p> <p>Rs. 69 Lakh paid on 30.04.2014 (for Site Specific Wild Life Conservation Plan)</p> <p>During the reporting period three forest guards is being paid by TRL Krosaki Refractories Ltd. @Rs.10,000.00 per month for keeping watch and ward of the wildlife of the area.</p> <p>Cost towards wild life management plan 1,32,000/- and salary of 2 persons @ 11000/-per month appointed to take care of the forest plants.</p>
xxxix	<p>Provision shall be made for the housing of construction labor 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</p>	<ul style="list-style-type: none"> • In mines area there are existing infrastructure like Officer's guest house, rest shed for workers and toilets facility for the workers. • All mines workers are belong to nearby village falling within 2-5 Kms from the Mine. So no permanent housing exists for workers • A first aid station has been provided with all

	housing may be in the form of temporary structures to be removed after the completion of the project.	<p>necessary medical kit. An ambulance is also provided for the mines worker.</p> <ul style="list-style-type: none"> • Drinking water facility is available for mines workers in the ML area • The mines workers also avail the free treatment facility at JG Hospital, Belpahar Hospital which is 45 Km from the lease area.
	The critical parameters such as RSPM (Particulate matter with size less than 10micron i.e. PM ₁₀ and NO _x in the ambient air within the impact zone peak particle velocity at 300m distance or within the nearest habitation, whichever is closer shall be monitored periodically. Further quality of discharged water shall also be monitored [(TDS, DO, PH and Total Suspended Solids (TSS)].	<p>The monitoring of PM₁₀ and NO_x is being carried out regularly on monthly basis within the ML area i.e. within the impact zone and in the nearest habitation. Details of monitoring given in Chapter 3 and monitoring report of PM₁₀ & NO_x for your reference. Annexure 1.</p> <p>The mine discharge water is regularly monitored for TDS, DO, PH and Total Suspended Solids (TSS) and found to be within the prescribed limit.</p>
xxxiii	The monitored data shall be uploaded on the website of the company as well as displayed on a display board at the project site at a suitable location near the main gate of the company in the public domain. The circular no. J-20012/1/2006-IA.II (M) dated 27.05.2009 issued by the Ministry of Environment and Forests which is available on the website of the Ministry www.envfor.nic.in shall	A display board has been placed near the main gate of the company for public domain. To display the monitoring data.

	also be referred in this regard for its compliances.																						
xxxiv	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 mine closure for approval.	Mine closure plan has already submitted.																					
General Conditions																							
(i)	No change in mining technology and scope of working should be made without prior approval of the Ministry of Environment & Forests.	As approved by MoEF the mine is continuing with semi-mechanized open cast method with occasional blasting.																					
(ii)	No change in the calendar plan including excavation, quantum of mineral iron ore and waste should be made.	<p>The average rate of production will be 1, 50,000 TPA.</p> <p>The excavation and production rate will not exceed the approved quantity. The production from the mine will be remaining within the maximum limit. The production detail for the reporting period is as below:</p> <table border="1"> <thead> <tr> <th>Month</th> <th>ROM Production</th> <th>Waste generation</th> </tr> </thead> <tbody> <tr> <td>Oct. 2016</td> <td>3500.00</td> <td>Nil</td> </tr> <tr> <td>Nov.2016</td> <td>1700.00</td> <td>Nil</td> </tr> <tr> <td>Dec.2016</td> <td>2200.00</td> <td>Nil</td> </tr> <tr> <td>Jan.2017</td> <td>1900.00</td> <td>Nil</td> </tr> <tr> <td>Feb.2017</td> <td>2150.00</td> <td>Nil</td> </tr> <tr> <td>March 2017</td> <td>1600.00</td> <td>Nil</td> </tr> </tbody> </table>	Month	ROM Production	Waste generation	Oct. 2016	3500.00	Nil	Nov.2016	1700.00	Nil	Dec.2016	2200.00	Nil	Jan.2017	1900.00	Nil	Feb.2017	2150.00	Nil	March 2017	1600.00	Nil
Month	ROM Production	Waste generation																					
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Feb.2017	2150.00	Nil																					
March 2017	1600.00	Nil																					
(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	Ambient air quality monitoring is being conducted in 4 sampling locations including the lease area once in a month. The sampling stations are decided based on the meteorological data, wind flow pattern																					

	(Particulate matter with size less than 10micron i.e., PM ₁₀) and 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.	and topographical features of the area. The detail monitoring results of Ambient air quality has been discussed in Chapter 3 and test reports attached as Annexure 1 .
(iv)	Data on ambient air quality [(RSPM(Particulate matter with size less than 10micron i.e., PM ₁₀) and NO _x)] should be regularly submitted to the Ministry including its Regional office located at Bhubaneswar and the State Pollution Control Board / Central Pollution Control Board once in six months.	Ambient air quality monitoring result from October 2016 to March 2017 has been given as Annexure 1 .
(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.	Fugitive dust emission control measures followed within the mine are: <ul style="list-style-type: none"> • The unmetalled hauls road has been adequately compacted. • Regular water sprinkling on roads. • Overloading of the transport equipments shall prevent in order to stop spillage. • Dumping areas will be sprayed with water and grass will be immediately planted on the completed dumps to reduce fugitive dusts. • Backfilled areas will be spread with good

		<p>quality soil and plantation will be made over the backfilled area.</p> <ul style="list-style-type: none"> Wet drilling on the benches is proposed.
(vi)	<p>Measures should be taken for control of noise levels below 85 dBA in the work environment. Workers engaged in operations of HEMM, etc. should be provided with ear plugs / muffs.</p>	<p>To control the noise level within the permissible limit following measures are taken:</p> <ul style="list-style-type: none"> Provision of protective devices like ear plug, and ear muffs to the workers exposed to noise more than 80 dBA. Provision of sound proof Cabins for the workers deployed on machines producing higher level of sound like dozers, dumpers, shovels etc. Proper maintenance of noise generating machineries including transporting vehicles would be ensured. A thick green belt shall be provided around the periphery of the mine to attenuate the high noise level to the local people. The monitoring of noise is being carried out with the ambient air in 4 sampling station and it has been found that the noise level is below the permissible limit. <p>The noise monitoring result is given Chapter 3 and test reports attached as Annexure 1.</p>
(vii)	<p>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</p>	<p>No generation of industrial waste water is there. Mine drainage water is being settled within the lease area and discharged outside for irrigation purpose. The mine drainage water is being analyzed regularly for presence of any toxic material and it has been observed that the mine drainage water does not contain any toxic element.</p>

	time. Oil and grease trap should be installed before discharge of workshop effluents.	
(viii)	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>To ensure the occupational safety of the workers following measures will be undertaken by the mining authority:</p> <ul style="list-style-type: none"> • Implementing safety and health management system and assessing the effectiveness through periodic audits. • Monitoring the effects of mining activities on safety and health and conducting regular performance reviews. • Provision of necessary personal protective equipments. • Establishing and maintaining a system of medical surveillance for employees • Ensuring employees at all levels receive appropriate training and are competent to carry out their duties and responsibilities. • Dust masks will be provided to the workers in dust prone area like excavation site, transfer points, loading and unloading sites etc to reduce the dust exposure and thereby reducing the risk of lungs disease. • Provision of periodical health check up • Training to the workers related to occupational safety and risk management. • The mines workers are regularly using the PPEs during the working hours. The PPEs provided during the compliance period is as below:

		<table border="1"> <tr> <th>SAFETY ITEM</th> <th>Nos</th> </tr> <tr> <td>Safety Helmet</td> <td>00</td> </tr> <tr> <td>Safety Shoe</td> <td>87</td> </tr> <tr> <td>Dust mask</td> <td>87</td> </tr> <tr> <td>Hand Gloves</td> <td>12</td> </tr> <tr> <td>Leg Guard</td> <td>56</td> </tr> <tr> <td>Safety goggles</td> <td>50</td> </tr> <tr> <td>Ear Muff</td> <td>00</td> </tr> </table>	SAFETY ITEM	Nos	Safety Helmet	00	Safety Shoe	87	Dust mask	87	Hand Gloves	12	Leg Guard	56	Safety goggles	50	Ear Muff	00
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Hand Gloves	12																	
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Ear Muff	00																	
(ix)	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>Occupational health surveillance program is being proposed as below:</p> <table border="1"> <thead> <tr> <th>Activity</th> <th>Proposed schedule</th> </tr> </thead> <tbody> <tr> <td>Risk rated workers will be examined and treated free of cost</td> <td>Annual</td> </tr> <tr> <td>Initial Medical examination</td> <td>During the joining of workers</td> </tr> <tr> <td>Periodical health check up</td> <td>Once in 5 years</td> </tr> <tr> <td>Mobile medical camp</td> <td>As and when required</td> </tr> <tr> <td>Provision of supplying PPEs</td> <td>All the workers will be supplied with PPEs while joining</td> </tr> <tr> <td>First aid facility</td> <td>As and when required.</td> </tr> </tbody> </table> <p>The initial medical checkup of all the employees has been conducted during 27.06.2013 & 28.06.2013. During the period of compliance periodic medical checkup was conducted for 6 Nos of workers and eye refraction test conducted for 03 nos of workers.</p>	Activity	Proposed schedule	Risk rated workers will be examined and treated free of cost	Annual	Initial Medical examination	During the joining of workers	Periodical health check up	Once in 5 years	Mobile medical camp	As and when required	Provision of supplying PPEs	All the workers will be supplied with PPEs while joining	First aid facility	As and when required.		
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(x)	A separate environmental	A separate environmental management cell has																

	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.	been established in the mines. The cell is being headed by Mines manager and supported by two of his senior staffs and assisted by other supervisory staffs														
(xi)	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 and its Regional Office located at Bhubaneswar.	<p>The detail cost for implementation of environmental management plan for the period of October 2016 to March 2017 has been given in the table below</p> <table border="1"> <thead> <tr> <th>Activities</th> <th>Cost (Rs.)</th> </tr> </thead> <tbody> <tr> <td>Maintenance of garland drain/ Retaining wall</td> <td>Rs. 50000/-</td> </tr> <tr> <td>Monitoring</td> <td>Rs.1,37,500/-</td> </tr> <tr> <td>Water sprinkler</td> <td>Rs. 20000/-</td> </tr> <tr> <td>Supply of Personal protective equipments for workers</td> <td>Rs. 50000/-</td> </tr> <tr> <td>Wild life conservation (Salary of 3 nos of forest guard)</td> <td>Rs.1,80,000.00</td> </tr> <tr> <td>Cost towards wild life management plan (Salary of 2 persons @ 11000/- per month appointed to take care of the forest plants)</td> <td>1,32,000/-</td> </tr> </tbody> </table>	Activities	Cost (Rs.)	Maintenance of garland drain/ Retaining wall	Rs. 50000/-	Monitoring	Rs.1,37,500/-	Water sprinkler	Rs. 20000/-	Supply of Personal protective equipments for workers	Rs. 50000/-	Wild life conservation (Salary of 3 nos of forest guard)	Rs.1,80,000.00	Cost towards wild life management plan (Salary of 2 persons @ 11000/- per month appointed to take care of the forest plants)	1,32,000/-
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Cost towards wild life management plan (Salary of 2 persons @ 11000/- per month appointed to take care of the forest plants)	1,32,000/-															
(xii)	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.	<p>The Mining scheme for the period of 2015-16 to 2019-20 has been approved from the Directorate of Mines, Bhubaneswar, Orissa.</p> <p>The mining operation was resumed on 01.11.2012 after obtaining environmental clearance from MoEF, New Delhi.</p>														
(xiii)	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.	
(xiv)	The project proponent shall submit six monthly reports on the status of compliance of the stipulated environmental clearance conditions including results of monitored data (both in hard copies as well as by e-mail) to the Ministry of Environment and Forests, its Regional Office Bhubneswar, the respective Zonal Office of Central Pollution Control Board and the State Pollution Control Board. The proponent shall upload the status of compliance of the environmental clearance conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of the Ministry of Environment and Forests, Bhubneswar, the respective Zonal Officer of Central Pollution Control Board and the State Pollution Control Board.	We are being submitting six monthly reports on the status of compliance of the environmental clearance conditions to the Ministry of Environment and Forests, its Regional Office Bhubaneswar. It will also be sent to the Regional Office of the Ministry of Environment and Forests, Bhubaneswar, the respective Zonal Officer of Central Pollution Control Board and the State Pollution Control Board. 7 th EC compliance report (October to 2016) has been submitted to MoEF regional Office, Bhubanewar vide letter no TRLK/CQM/2//2016 - 2017 dated 16.04.2016

(xv)	A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zila Parisad/ Municipal Corporation, Urban Local Body and the Local NGO, if any, from whom suggestions/ representations, if any, were received while processing the proposal. The clearance letter shall also be put on the website of the Company by the proponent.	A copy of the clearance letter has been sent by the proponent to concerned Panchayat, Zila Parisad/ Municipal Corporation, Urban Local Body and the Local NGO.
(xvi)	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.	--
(xvii)	The environmental statement for each financial year ending 31 st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of environmental clearance conditions and shall also be sent to	The environmental statement is being regularly submitted to State Pollution Control Board, Odisha.

	the respective Regional Office of the Ministry of Environment and Forests, Bhubaneswar by e-mail.	
(xviii)	The project authorities should advertise at least in two local newspapers of the District or State in which the project is located and widely circulated, one of which shall be in the vernacular language of the locality concerned, within 7 days 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.	Published in three local news papers. Details of publication have been already submitted. We have uploaded the EC grant letter and the EC compliances in our Company website. http://www.tataref.com/corporate-sustainability/mines-of-trl-krosaki.html .

CHAPTER 3

ENVIRONMENTAL MONITORING

3.1 AMBIENT AIR QUALITY MONITORING

Ambient air quality monitoring has been carried out at four locations i.e. two inside the lease area and other two in the nearby villages. This will enable to have a comparative analytical understanding about the ambient air quality and the changes in the air environment in the study area with respect to the condition prevailing. The locations of the ambient air quality monitoring stations are given in Table below:

3.1.1 Ambient Air Monitoring Stations

Sl. No	Location	Frequency
1.	Bhikampalli Village (A1)/ Pujaripalli Village	Once in a Month
2.	Near Quarry Faces Of block A (A2)	Once in a Month
3.	Near Southern Dump of Block B (A3)/ Weigh Bridge	Once in a Month
4.	Near Pump House (A4)	Once in a Month

As per the suggestion of the regional office, State Pollution Control Board based on the wind direction the sampling location (A1) has been changed from Bhikampalli village to Pujaripalli village and sampling location (A3) Near southern dump of Block B to Weigh bridge. The monitoring in the new locations has been initiated in the month of March 2017. The revised sampling location map has been attached for reference.

The Monitoring was conducted in respect of the following parameters:

- Particulate Matter (PM10)
- Particulate Matter (PM2.5)
- Sulphur Dioxide (SO₂)
- Oxides of Nitrogen (NO_x)

The duration of sampling of PM10, PM2.5, SO₂ and NO_x was 24 hourly continuous sampling. The monitoring was conducted for one day at each location. This is to allow a comparison with the National Ambient Air Quality Standards as given in the table below:

3.1.2 Technique & Standard of Ambient Air Quality

Sl. No.	Parameter	Analysis Procedure	National Ambient Air Quality Standards 18th November 2009
1.	Particulate Matter (PM _{2.5})	Gravimetric Method	60 µg/m ³
2.	Respirable Particulate Matter (PM ₁₀)	Respirable Dust Sampler (Gravimetric method)	100 µg/m ³
3.	Sulphur dioxide	Modified West and Gaeke	80 µg/m ³
4.	Oxides of Nitrogen	Jacob & Hochheiser	80 µg/m ³

3.1.3 Ambient Air Quality Monitoring Results

The ambient air quality monitoring is being carried out in four sampling location on monthly basis. The monthly test reports for the period (October 2016 to March 2017) is being attached as **Annexure 1**. The summarized Ambient Air quality result during the period October 2016 to March 2017 has been given as below:

A1: Bhikampalli Village / Pujari pali village

Ambient Air Quality Parameters	Oct.	Nov.	Dec.	Jan.	Feb.	March P.Village
PM10	63.0	67.0	73.0	62.0	64.0	68.0
PM2.5	42.0	46.22	51.73	40.31	41.31	46.4
SOx	8.4	9.20	7.8	8.6	9.6	7.8
NOx	14.2	15.72	14.7	15.7	16.7	17.3

A2 : Near Quarry Faces of Block A

Ambient Air Quality Parameters	Oct.	Nov.	Dec.	Jan.	Feb.	March
PM10	68.0	72.0	77.0	79.0	81.0	83.0

PM2.5	46.8	50.85	55.56	53.23	54.23	57.3
SOx	13.7	14.52	15.4	16.8	18.8	11.3
NOx	20.3	21.40	20.5	22.1	24.1	21.4

A3 : Near Surthern Dump of Block B / Weigh Bridge

Ambient Air Quality Parameters	Oct.	Nov.	Dec.	Jan.	Feb.	March (W.B)
PM10	59.0	56.0	59.0	63.0	65.0	73.0
PM2.5	37.8	34.34	38.14	39.92	40.92	49.8
SOx	10.0	11.44	10.8	8.2	9.7	9.2
NOx	17.6	16.46	17.6	16.2	18.2	19.4

A4: Near Pump House

Ambient Air Quality Parameters	Oct.	Nov.	Dec.	Jan.	Feb.	March
PM10	55.0	63.0	68.0	65.0	66.8	70.0
PM2.5	33.9	41.85	46.42	44.86	45.86	47.2
SOx	7.2	8.36	9.2	10.6	16.7	10.7
NOx	10.3	11.35	13.2	14.8	15.8	16.2

Conclusion

The ambient air monitoring result for the period of October 2016 to March 2017 reveals that the conc. of PM10 ranges from 55-83 µg/ cu.m within the lease area and 62 to 68 µg/ cu.m in Bhikampalli village. The result of PM₁₀ is below the permissible limit of 100 µg/ cu.m as per NAAQM standard, 2009.

The conc. of PM2.5 ranges from 33.9 to 57.3 µg/ cu.m within the lease area and 40.31- 51.73 µg/ cu.m outside the lease area. The result of PM_{2.5} is below the permissible limit of 60 µg/ cu.m as per NAAQM standard, 2009.

The conc. of SOx and NOx is much below the permissible limit i.e. 80 µg/ cu.m as per NAAQM standard, 2009.

3.2 AMBIENT NOISE MONITORING

The main objective of noise monitoring in the study area is to assess the present ambient noise levels in project site & project boundary due to various construction allied activities and increased vehicular movement. Ambient noise monitoring was conducted at 4 locations of the project site and the detailed described below.

3.2.1 Noise Monitoring Locations

Sl. No	Location	Frequency
1.	Bhikampalli Village (A1)/ Pujaripalli Village	Once in a Month
2.	Near Quarry Faces Of block A (A2)	Once in a Month
3.	Near Southern Dump of Block B (A3)/ Weigh Bridge	Once in a Month
4.	Near Pump House (A4)	Once in a Month

3.2.1 Ambient Noise Monitoring Results

The Ambient Noise variation as monitored has been given in the table below:

Sl. No	Date of Monitoring	Sampling Locations	Noise Level In dB(A) LEQ, Day Time (6.00AM TO 10.00PM)						Noise Level In dB(A) LEQ, Night Time (10.00 PM to 6.00 AM)					
			Oct.	Nov.	Dec.	Jan.	Feb.	March	Oct.	Nov.	Dec.	Jan.	Feb.	March
1.	10.10.2016	Bhikampalli Village (A1)/ Pujaripalli Village	48.9	53.4	51.6	53.2	54.2	52.3	43.2	42.6	43.2	42.7	43.7	41.7
2.	11.10.2016	Near Quarry Faces Of block A (A2)	64.5	72.3	70.4	72.1	74.1	73.4	58.4	48.7	55.7	58.3	59.3	65.2
3.	12.10.2016	Near Southern Dump of Block B (A3)/ Weigh	62.8	69.1	68.2	64.3	66.3	71.7	57.0	54.4	57.3	54.1	56.1	67.4

		Bridge												
4.	13.10.2016	Near Pump House (A4)	59.0	67.4	71.5	66.8	65.8	69.3	53.2	47.2	60.4	57.9	58.9	64.3
NOISE LIMIT AS PER NOISE RULE 2000		INDUSTRIAL AREA	75.0						70.0					
		RESIDENTIAL AREA	55.0						45.0					

Conclusion

The ambient noise level within the lease area varies from 59.0 to 74.1 dBA during the day time against the standard of 75 dBA. The day time noise is mainly contributed by blasting, movement of vehicles, excavation etc. Outside the lease area the noise level ranges from 48.9 to 54.2 dBA against standard of 55 dBA.

During the night time noise level is comparatively low in the lease area and ranges from 47.2 to 67.4 dBA against the standard of 70 dBA and outside the lease area noise level varies from 41.7 to 43.7 dBA against standard of 45 dBA.

3.3 GROUNDWATER QUALITY MONITORING

The ground water monitoring was carried out within the lease area once in 3 months. The water was collected from the bore well located within the lease area in the month of October 2016 and January 2017. The analysis report is attached as **Annexure 1**.

The analysis of ground water quality shows that the water is devoid of any heavy metals like Cd, Hg, Pb, Ni, Se, Ba, Cr etc. The water quality has been found to be well within the prescribed standard for ground water.

3.4 ANALYSIS OF MINE DRAINAGE WATER

The mine drainage water generated during monsoon was analyzed for presence of any toxic elements. During the reporting period the mine drainage water was analyzed during the month of February. The test report is being attached as **Annexure 1**.

3.5 VEHICULAR MONITORING:

Vehicular emission monitoring is being carried out by M/s Kalyani Laboratories Pvt. Ltd. In compliance to EC conditions on half yearly basis. Multi Gas Analyzer of model no-MN-05 developed by MARs Technologies is used for this monitoring of heavy vehicles. MN-05 multi gas analyzer (4 gas version) is based on infrared

spectrometry technology with signal inputs from an electrochemical cell. Non-dispersive infrared measurement technique uses for CO, CO₂ and HC gases. During the period of compliance emission monitoring was carried out for 6 nos of heavy vehicle used for mining operation. The detail of vehicles monitored is as below:

Date of Monitoring	Type Of Vehicle	Vehicle no
10.02.2017	Pay Loader	OR 23 C 4203
10.02.2017	Tipper	OR 23 C 5691
10.02.2017	Tipper	OR 23 C 5685
10.02.2017	Atlas Copco LM100	
10.02.2017	TATA HITACHI - 3	
10.02.2017	HYVA	OR 23 C 2574

The monitoring results has been tabulated as below:

SL. NO	TYPE OF VEHICLE	VEHICLE No.	DATE	NOx in gm/Kwhr	CO in gm/kwhr	HC in in gm/kwhr	NOx+HC	PM
01	Pay Loader	OR 23 C 4203	10.02.2017	0.042	0.541	0.054	0.096	0.11
02	Tipper	OR 23 C 5685	10.02.2017	0.058	2.156	0.039	0.097	0.16
03	Atlas Copco LM100	--	10.02.2017	0.072	1.75	0.085	0.157	0.2
04	Tipper	OR 23 C 5691	10.02.2017	0.082	2.35	0.087	0.169	0.16
05	TATA HITACHI - 3		10.02.2017	0.095	0.815	0.105	0.2	0.18
06	HYVA	OR 23 C 2574	12.09.2016	0.065	0.65	0.098	0.163	0.16
Std. As per Bharat stage III for construction equipments as per Central Vehicle Rule, 2007					3.5		4.0	0.2

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