स्टील अथॉरिटी ऑफ इण्डिया लिमिटेड
STEEL AUTHORITY OF INDIA LIMITED
रॉ मेटेरियल्स डिवीजन
RAW MATERIALS DIVISION
बरसुआ लोंह खदान
BARSUA IRON MINES
P.O. TENSA - 770042
Phone- 06625-236026 Fax - 236031

Ref. No. BIM /GM/ E&L / 789(A)

Date : 6.06.2017

To,
The Additional Director (S)
EI Division, Ministry of Environment & Forests,
ParyavaranBhawan, CGO complex, Lodi Road,
New Delhi – 110003

Sub : Six monthly status of compliance of conditions stipulated in Environmental Clearance (grant order of MoEF No. J-11015/351/2006-IA.II(M), dated 29th October 2010) for the period ending 31st March 2017.

Sir,

Please find enclosed herewith the updated six monthly compliance report with respect to the conditions stipulated by MoEF &CC, Govt. of India, New Delhi while granting Environmental Clearance to integrated Barsua-Taldih- Kalta Iron Ore Mines (ML-130) of M/s. Steel Authority of India Limited for production of 8.05 mtpa vide MoEF letter No. J-11015/351/2006-IA.II(M), dated 29th October 2010 for the period ending 31st March 2017.The report also contains the updated status of environmental monitoring of air, water and noise pertaining to the period ending 31st March 2017.

Thanking you,

Yours faithfully,

General Manager
Barsua Iron Mine

Encl : As Above

Copy :

1. The Additional Director (S), MoEF&CC, Govt. of India,
   Eastern Regional Office, A/3 Chandrasekharpur,
   Bhubaneswar-751023 (Odisha)
2. The Member Secretary, Central Pollution Control Board,
   Paribesh Bhawan, CBD-cum-Office Complex, East Arjun Nagar,
   New Delhi-110032
3. The Member Secretary, State Pollution Control Board,
   Paribesh Bhawan, A/118 Nilakantha Nagar, Unit-VIII,
   Bhubaneswar-751012 (Odisha)

Status of Compliance (Barsua Part) to Conditions Stipulated in Environmental Clearance (vide order no. J-11015/351/2006-IA.II(M), dt. 29.10.2010) of Integrated Barsua –Taldih – Kalta Iron Ore Mining Project (ML – 130), Village Tantra, District Sundergarh, Odisha, Raw Materials Division, SAIL

(Period: October 2016 to March 2017)

A. Specific Conditions

Sl. No	Condition	Compliance Status
(i)	The Project proponent shall obtain consent to Establish and Consent to Operate from the State Pollution Control Board, Orissa and effectively implement all the conditions stipulated therein.	Consent to Establish was obtained from SPCB, Odisha for a capacity of 8.05 MTPA for Integrated Barsua – Taldih- Kalta Mining Project(ML-130) vide No. 609/IND-II-NOC-5182, dated 13.01.2012.Also, Consent to Establish has been amended vide No.16127/IND-NOC-5182, dt.5.11.2016 and this amendment shall be valid for five years. CTO has also been obtained from SPCB, Odisha vide No. 4479/IND-I-CON-1(A), dated 23.03.2017 for a quantity of 8.05 MTPA with validity up to 31.03.2019. Necessary actions are being taken to effectively implement the conditions stipulated therein.
(ii)	The environmental clearance is subject to grant of approval of the State Land use Department, Government of Orissa for diversion of agricultural land for non agricultural use.	No agriculture land involved in the project for the purpose of mining and allied activities. Hence, question of diversion of agricultural land for non-agricultural purpose doesn't arise.
(iii)	Necessary Forestry Clearance (FC) under the FC Act, 1980 for an area of 2347.641 ha is forest land involved in the project shall be obtained. Environmental Clearance is subject to grant of FC.	Final Forestry Clearance (Stage-II) for mining and allied activities & safety zone for 2nd RML period has been granted by MoEF, Govt. of India vide letter No.F.No.8-90/1996-FC(pt.), dtd. 06.03.2013.
(iv)	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 Petition (Civil) No.460 of 2004, as may be applicable to this project.	Noted for compliance.
(v)	Environmental Clearance is subject to obtaining clearance under the Wildlife (Protection) Act, 1972 from the competent authority, as may be applicable to this project.	No notified National Park / Wildlife Sanctuary / Biosphere Reserve / Tiger Reserve are located within 10 kms from the Mining Lease boundary. Hence it is not applicable to this mining project However, a Site Specific Wildlife Conservation Plan(SSCP) has been prepared, approved by Conservator of Forests (WL) and Rs. 17,82,00,000/- deposited in favour of State CAMPA A/c.No.344902010105428 towards cost of SSCP.

Sl. No	Condition	Compliance Status
vi)	The project proponent shall ensure that no natural watercourse and drainage channels except first order channels Id1, Id2, Id3, Id4, Id5, Id6, Id7 and Id8 passing through the mine lease shall be diverted. The channels shall be so diverted that it finally meets its final natural course.	Due precautions are being taken and ensured that no natural watercourse / drainage channels obstructed due to any mining operation at the mines. So far only Id1, Id2 & Id8 have been diverted and finally meet their final natural course.
(vii)	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.	Though the generation of top soil is very less, it is being stacked separately and used rehabilitation of dumps and other areas through plantation. However, during the period around 150 tonnes of top soil have been recovered from Taldih block and stacked separately for plantation, coir-matting and nursery work.
(viii)	The OB generated shall be stacked at earmarked dump site(s) only and it should not be kept active for a long period of time and its phase-wise stabilization shall be carried out. There shall be nine external OB dumps. the project proponent shall carry out slope stability study through an expert organisation like CIMFR, Dhanbad for attaining the proposed height of dump of 60m in three lifts and submit report to the ministry and its Regional Office within three months. Proper terracing of the OB dumps shall be carried out so that the overall slope of the dump shall be maintained to 27°. Compliance status shall be submitted to the MoEF and its Regional Office located at Bhubaneswar on six monthly basis.	The over burden (OB) / sub-grade ore generated during the mining operations is being stored at earmarked sites as per the approved Scheme of Mining. Phase wise stabilization with installation of coir mats and broadcasting of grass seeds are carried out as per approved schemes. During the period, installation of geo-green coir mats over an area of 10000 sqm. area of Dump-8 at Barsua Iron Mine have been completed to control surface run-off and erosion. For effective stabilization, terracing of the OB dumps with overall slope of the dump is being maintained to below 27^0. Further, budgetary offers have been received from NIT, Rourkela and IIT, Kharagpur for conducting slope stability study.
(ix)	Catch drains and siltation ponds of appropriate size shall be constructed around the mine working, mineral and OB dumps to prevent run off of water and flow of sediments directly into the agricultural fields, the first order channels, the Samaj Nallah, the Kuradihi Nallah, 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 de-silted particularly after	During the period, proposals are in tendering stage to construct 3Nos. of dry-boulder check dams with wire mess and a siltation pond at Taldih block approaching to Tantara and Phuljhar village for management of surface run-off which will also minimize soil erosion and choking of streams. Also, another proposal has been initiated at Kalta to construct 2 Nos. of Check dams of 25m X 2.0/1.5 m X 2.5m and 30m X 2.0/1.5 m X 2.5m below Dump-9 & 10 across the nallah connecting the Samaj nallah. During the period, de-silting of 8000 cbm.(approx.)

Sl. No	Condition	Compliance Status
	the monsoon and maintained properly. Garland drains, setting tanks and check dams of appropriate size, gradient and length shall be constructed around the mine pit, dumps to prevent run off of water and flow of sediments directly into the agricultural fields other water bodies.	volume of area near Gorakhpur site at Kalta Iron Mine have been de-silted flow of Kuradih Nallah. Also, at Barsua Iron Mine suitable garland drain have been constructed to channelize surface run-off of 3E area into an abandoned pit located inside the mine area with provision of intermediate baffle walls.
(x)	Dimension of the retaining wall at the toe of the over burden dumps and the OB benches within the mine to check run-off and siltation shall be based on the rain fall data.	Toe walls, garland drains and siltation ponds at the OB Dumps have been constructed to control the surface runoff from the OB dumps. Based on the rainfall of the region, 1.5 to 2.0m. width and1.5m to 2.0m. height toe walls and 1.0m. width and 1.50m. depth garland drains were provided.
(xi)	The water recovery and spill way system shall be so designed that the natural water resources are not affected and that no spill water goes into the nearby Karo River and other water bodies.	The tailing dam top is at 420.5m. AMSL. Maximum settled slime level is at 416.5m. AMSL and the spill way is at 418.0m. AMSL. The overflow clean water after siltation of slimes in the pond is channelized to the natural stream. The quality of overflow water is monitored regularly and found within the norm. However, system for recovery and recycling of clean water from the tailing pond has been provided at Barsua Iron Mine under Zero Discharge Project.
(xii)	The project proponent shall carry out conditioning of the ore with water to mitigate fugitive dust emission, without affecting flow of ore in the ore processing and handling areas.	Dry Fog System (DFS) and wet screening arrangements have been provided in the Ore Handling Plant to mitigate fugitive dust emission, without affecting flow of ore in the ore processing and handling areas.
(xiii)	The effluent from the ore beneficiation plant shall be treated to conform to the prescribed standards and the tailings slurry shall be transported through a closed pipeline to the tailing dam.	Effluent generated from the ore beneficiation plant is being treated in Thickeners followed by Tailing Ponds. The clear water to the tune of 40 % is being recycled and the underflow from thickener is discharged into Tailing Dam. As the tailings dam is hiving adequate capacity and the Barsua Mine is not being operated since May 2015, presently there is no overflow from the tailings pond except seepage from the dam body. The quality of the dam seepage water is being monitored and found to be in compliance with the discharge quality standards.
(xiv)	The project proponent shall take necessary safeguard measures to ensure that there is no leaching from the pond.	The Tailing Pond at Barsua Iron Mine is located on the hard & plain area and is in operation since 1969. As iron ore in the region does not containing any heavy metals and no chemicals are being used in the beneficiation of

Sl. No	Condition	Compliance Status
		ore at the mine, leaching of metals from the pond is not expected. The quality of the ground water at downstream of tailing pond is measured regularly.
(xv)	The decanted water from the tailing pond shall be re-circulated and there should be zero discharge from the tailing pond.	system for recovery and recycling of decanted water from the tailing pond has been provided at Barsua Iron Mine under Zero Discharge Project.
(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 crusher zone, loading and unloading point and all transfer points during handling of the ore. Extensive water sprinkling shall be carried out on roads. It should be ensured that the Ambient Air Quality parameters conform to the norms prescribed by the CPCB.	Regular water sprinkling through pressurized sprinkler of 28KL capacity (2 Nos.) at Barsua Iron Mine and with a 12 KL capacity at Kalta Iron Mine are being carried out effectively in all areas. Dry Fog System (DFS) and wet screening arrangements have been provided in the Ore Handling Plant to mitigate fugitive dust emission. Also, around 2.0 km length of permanent haul road has been covered with static water sprinkling system. All these dust control measures installed at the mines have significantly controlled fugitive dust emission and helped to maintaining the air quality in and around the mine below the prescribed standards.
(xvii)	Plantation shall be raised in an area of 1658.803ha including a 7.5m wide green belt in the safety zone around the mining lease, OB dumps, around beneficiation plant, mine benches around tailing ponds, roads etc. by planting the native species in consultation with the local DFO. The density of the trees should be around 2500 plants per Ha. Green belt shall be developed all along the mine lease area in a phased manner and shall be completed within first five years.	Phase wise plantation by planting native species is carried out within or outside of the lease area and density is assessed as per the crown density of the area. Also, a scheme for Safety Zone plantation was prepared and phase wise plantation within safety zone of ML-130 is done by State Forest Department.
(xviii)	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.	A technical feasibility study for hydro-geological, rain water harvesting and augmentation of ground water has been conducted and implementation of the measures as per recommendation is in process. The following measures have also been adopted to for conservation of ground water and augmentation ➢ The surface run-off generated from the mine is channelized through garland drain and discharged to an pits for further ground water recharge. ➢ Check dams at different strategic locations along the streams are being constructed for conservation of ground water. ➢ Series of check dams have been constructed across Najkura Nalla near Kalta Mine.

Sl. No	Condition	Compliance Status
(xix)	Regular monitoring of ground water level and quality shall be carried out in and around the project area (mine lease, beneficiation plant, pelletisation plant and tailing ponds) by establishing a network of existing wells and installation 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 GWB/Central GWB and the data thus collected may be sent regularly to the MoEF and its regional office at Bhubaneswar and the Regional Director, CGWB.	There are 3Nos.of abandoned open wells all around the mines which are not in use viz, (i) Barsua Valley (ii) Zero point, Tensa (iii) Kalta Basti, Kalta for regular monitoring of ground water levels. Moreover, 3 Nos. of bore wells have been dug to install Piezometers which have already been procured.
(xx)	The groundwater and surface water in and around the mine including tailing ponds shall be regularly monitored at strategic locations for heavy metals. The monitoring stations shall be established in consultation with the Regional Director, CGWB and SPCB.	Regular monitoring for heavy metals of ground water in and around the mine is being carried out. Water quality for the period from October 2016 to March 2017 are placed in ***Annexure.***
(xxi)	Appropriate mitigative measures shall be taken to prevent pollution of the Karo River in consultation with the State Pollution control Board.	Detailed study has been conducted through IIT Kharagpur to assess the impacts of mining on water bodies and suggest measures to minimize the impacts. Some of the recommendations suggested by IIT, Kharagpur like silt traps, check dams, sedimentation ponds, plantation on the slopes have been made at various strategic locations and the same are under continuous implementation at other sites.
(xxii)	Regular monitoring of the flow rate of the spring and perennial nallahs flowing in and around the project area shall be carried out and records maintained.	Regular monitoring of the flow rate of the spring and perennial nallahs i.e. Kuradih & Samaj at Barsua part and Najkura at Kalta part is being carried out and records are being maintained.
(xxiii)	The project proponent shall obtain necessary prior permission of the competent authorities for drawl of requisite quantity of water (surface water) required for the project.	Permission of water withdrawal has been obtained from State Irrigation Department for existing requirement i.e. 2,18,000 cbm. water per month exists.
(xxiv)	Suitable rainwater harvesting measures on long term basis shall be planned and implemented in consultation with the Regional Director, Central ground Water	A Technical Feasibility Study for hydro-geological, rain water harvesting & augmentation of ground water resources has been conducted and as per recommendation, a proposal is in process to take suitable measures for rain water harvesting as well as augmentation of ground water.

Sl. No	Condition	Compliance Status
	Board.	
(xxv)	Vehicular emissions shall be kept under control and regularly monitored. Measures shall be taken for maintenance of vehicles used in mining operation and in transportation of mineral. The vehicles carrying the mineral shall be covered with a tarpaulin and shall not be overloaded.	Scheduled / Preventive maintenance of HEMM and light vehicles are undertaken regularly to keep the vehicular emissions under control. Light Vehicles are having pollution control certificate. Ore transportation from ore crushing and screening plant of Taldih block to SAIL railway siding area located at Barsua Valley by vehicles covered with tarpaulin.
(xxvi)	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 handing plant have been provided with the dust control measures like 'Dry Fog System' (DFS) at hopper and other transfer units, covering of conveyors belt etc.
(xxvii)	Occupational health surveillance program of the workers shall be undertaken periodically to observe any contractions due to exposure of dust and take corrective measures, if needed. Health records of the workers shall be maintained.	Occupational health surveillance programs of the workers are being undertaken periodically to observe any contractions due to exposure of dust. Health records of the workers are maintained.
(xxviii)	Pre-placement medical examination and periodical medical examination of the workers engaged in the project shall be carried out and record 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 and record maintained. Schedule of health examination of the workers is also drawn and followed accordingly.
(xxix)	Sewage treatment plant shall be installed for the colony. ETP shall also be provided for the workshop and the wastewater generated during mining operation.	Individual septic tank with soak pits has been provided in the colony. Moreover, a study have been carried out by M/s. WATENVA SOLUTION PVT LTD, Bhubaneswar for stabilization of STP at colony. ETP has been provided for treatment of effluents from the ore beneficiation plant consisting of Thickeners followed by Tailing Pond. About 60% of clear water from the Thickener as overflow and recycled back to the system. The underflow from the Thickener is being drained to the Tailing Pond for further settling of solids.
(xxx)	The R&R of the project affected people, if any shall be carried out as per the NPRR.	Not Applicable.
(xxxi)	Digital processing of the entire lease area using remote sensing technique	Digital processing of the entire lease area has been studied through satellite Imagery for the period o

Sl. No	Condition	Compliance Status
	should be done regularly once in three years for monitoring land use pattern and report submitted to MOEF and its Regional office located at Bhubaneswar.	December 2013. Procurement of satellite imageries for the period of 2016 is under process. The study report in this regard will be submitted soon
(xxxii)	Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and construction such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, creche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.	SAIL has a well developed township at Tensa and Kalta with residential accommodation for its workers with all necessary infrastructure and construction such as LPG gas connection, electricity for cooking, welfare amenities like toilets, safe drinking water and medical facilities etc. Whenever required, the construction labour are hired from the local villagers and only few are being hired from outside, for which housing facilities along with necessary infrastructure are being provided at the existing colony of the mines.
(xxxiii)	The project proponent shall take all precautionary measures during mining operation for conservation and protection of endangered fauna namely elephant, sloth bear, peacock etc. spotted in the study area. Action plan for conservation of flora and fauna.All the safeguard measures brought out in the Wildlife Conservation Plan so prepared specific to this project site shall be effectively implemented.	All precautions are undertaken for not to disturb the flora and fauna inside the lease area. All necessary facilities are being extended to the local Forest Department for implementation of the wildlife conservation activities regularly. An amount of Rs.10,69,14,469.00 towards implementation of comprehensive wild life management plan prepared for Bonai-Keonjhar forest division. Activities as per the Site Specific Conservation Plan are implemented.
(xxxiv)	The critical parameters such as RSPM (Particulate matter with size less than 10micron i.e., PM10) SO_2 and NOx in the ambient air within the impact zone, peak particle velocity at 300m distance or written the nearest habitation whichever is closer shall be monitored periodically. Further, quality of discharged water shall also be monitored for TDS, DO, PH and TSS. 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 public domain. The circular No.J-20012/1/2006. IA.II(M) dated 27.05.2009 issued by MoEF, which is available on the website of the Ministry www.envfor.nic.in shall also be referred in this regard for its	Critical parameters i.e. PM10, PM2.5, NOx and SO2 in ambient air and relevant parameters in the effluents are being monitored regularly. Installation of 3 Nos. of Continuous Ambient Air Quality Monitoring Stations (CAAQMS) at Barsua-Kalta have been completed and data are being transmitted to SPCB server. The monitored data is being displayed at the main gate of the mines. Copy of EC compliance along with environmental quality data is being uploaded to the company website www.sail.co.in.

Sl. No	Condition	Compliance Status
	compliance.	
(xxxv)	A Final Mine Closure Plan along with details of Corpus Fund should be submitted to the Ministry of Environment & Forests 5 years in advance of final mine closure for approval.	A Final Mine Closure Plan along with details of corpus fund will be submitted to MoEF&CC, New Delhi 5 years in advance of final mine closure for approval.

B. General Conditions

Sl. No	Condition	Compliance Status
(i)	No change in mining technology and scope of working should be made without prior approval of the MoEF & CC.	Mining is being done as per the approved Mining Plan/ Scheme of Mining and amended Environmental Clearance.
(ii)	No change in the calendar plan including excavation, quantum of mineral iron ore and waste should be made.	There will be no change in the calendar plan including excavation, quantum of mineral iron ore and waste should be made. ROM production at various mining blocks under ML-130 is kept within permitted capacity in the EC / approved Mining Plan. The quantity of ROM Production during October to March is as follows: BIM : ROM — Plan(in mtpa) 1.65 — Actual(in mtpa) Nil Sub-Grade — 0.84 — 0.020 OB — Nil — 0.572 TIM : ROM — 0.70 — 0.231 Sub-Grade — Nil — 0.186 KIM : ROM — 1.22 — 0.72 OB — 0.03 — 0.135
	Four ambient air quality-monitoring stations should be established in the core zone as well as in the buffer zone for RSPM (Particulate matter with size less than 10 micron i.e., PM10), SO2 and Nox 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 SPCB.	Five nos. of ambient air quality monitoring stations at Barsua & Kalta Mines have been established based on the topography and meteorological conditions of the area. Regular ambient air quality monitoring of key parameters (PM2.5, PM10, SO2 and NOX) to mining industries as per the guidelines of MoEF&CC and CPCB is being done. Moreover, 3 Nos. of Continuous Ambient Air Quality Monitoring Stations (CAAQsS) at Barsua-Kalta have been completed and data are being transmitted to SPCB server.

Sl. No	Condition	Compliance Status
(iv)	Data on ambient air quality RSPM (Particulate matter with size less than 10 micron i.e., PM10), SO2 and Nox should be regularly submitted to the Ministry of environment and Forest including its Regional office located at Bhubaneswar and the SPCB / CPCB in six months.	Ambient air quality monitoring data (PM2.5, PM10, SO2 and NO2) is being submitted to MoEF&CC, New Delhi and Regional Office, Bhubaneshwar along with the compliance reports. Air Quality report for the period October 2016 to March 2017 is placed as *Annexure*. Air quality data is also being submitted to SPCB and Central Pollution Control Board.
(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 on haul road is controlled by regular water sprinkling by mobile water sprinklers. Fugitive emission at hopper is controlled by pressurized water mist spray.
(vi)	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.	Regular maintenances and periodic checks of the HEMM are being carried out to control noise below 85 dB(A) in the work environment. The operators engaged in blasting/ drilling operations and operator of HEMM are provided with ear plug/ ear muffs with helmet. Use of these protective measures is ensured by educating the workers on ill effect of the prolonged excessive exposure to high Noise levels and daily checks by shift mining engineers regarding usage of ear plug/ear muffs.
(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 effluent.	Oil & grease traps have been provided for treating the effluents from garages. The treated water from these ETPs are being used for plantation. Effluents generated from the beneficiation plants are being treated in Thickeners followed by Tailing Ponds. The clear water to the tune of 60% is being recycled and the underflow from thickener is discharged into Tailing Dam. However, system for recovery and recycling of clean water from the tailing pond has been provided at Barsua Iron Mine under Zero Discharge Project.
(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. 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.	Dust masks have been provided to personnel working in dusty areas and ensured by daily checks. Training on safety and health aspects is being imparted on regular basis. A full fledged Occupational Health Centre(OHC) is run by the mines for regular health surveillance. Periodical Medical Examination (PME) of all workmen working in the mines is being done at our OHC once in every five years/three/one year depending on category.
(ix)	A separate environmental management	A full fledged Environmental Management Cell (EMC)

Sl. No	Condition	Compliance Status
	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.	has been established to look after environmental aspects headed by an experienced engineer with more than 10 years experience in the field of environment in the rank of Deputy General Manager, who directly reports to Head of Mines. He is further assisted by two more experienced officers for environmental management at mines. Besides, an E&L department at our HQ i.e. RMD, Kolkata with qualified and experienced environmental engineer who facilitates all the RMD mines. In addition to the EMC at mines level, an Environment & Lease Department at our headquarters i.e. Raw Materials Division, Kolkata with qualified (M Tech. in Environmental Engineering) and experienced environmental engineers who facilitates all the RMD Mines including Barsua – Kalta Mines in design, implementation and maintenance of various pollution control measures. Further, two senior and experienced persons in the fields of Forest and Environment have been engaged by SAIL as Advisors for guiding SAIL Mines in management of Environment and Forest aspects.
(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 MoEF&CC and its Regional Office located at Bhubaneswar.	Funds earmarked for environmental protection measures at the mines are booked separately and not being diverted for other purpose. During the period, expenditures in different heads for environmental protection measures in respect of Barsua Iron Mine are as follows : I) Plantation : 2.10 lakh II) Water spraying : 5.10 lakh III) Environmental monitoring : 4.20 lakh IV) Construction of check dams/ toe wall : 8.60 lakh V) Installation of 3 nos. CAAQMS : 124.00 lakh VI) Stabilization of Dump-8 : 9.95 lakh
(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.	The Barsua and Kalta Blocks under the ML-130 are operating since 1960 and 1966 respectively. Development work and installation of various facilities at Taldih Block are under progress & will be informed in due time after installation of the facilities.
(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	Full co-operation is extended to the officer(s) of the regional office of MoEF&CC by furnishing the requisition data information, monitoring reports etc.

Sl. No	Condition	Compliance Status
	requisite data / monitoring reports.	
(xiii)	The project proponent shall submit six monthly reports on the status of compliance of the stipulated environmental clearance conditions including results of monitored data to the MoEF, its Regional Office Bhubaneswar, the respective Zonal Office of CPCB. The proponent shall upload the status of compliance of the EC conditions on their website and shall update the same periodically. It shall simultaneously be sent to the regional Office of the MoEF, Bhubaneswar, the respective Zonal Office of CPCB and SPCB.	Six monthly compliance reports on the status of implementation of environmental safeguards are being submitted to MoEF&CC, New Delhi, Regional Office, MoEF&CC, Bhubaneswar, Central Pollution Control Board and State Pollution Control Board. Copy of the compliance report including environmental quality data is being uploaded to the SAIL web site i.e. www.sail.co.on.
(xiv)	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.	Copy of clearance letter was notified in public places and community centers. A copy of the environmental clearance letter has already been sent to the Panchayat. The clearance letter has been put on the Company website i.e. www.sail.co.on.
(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.	-
(xvi)	The environmental statement for each financial year ending 31st March in Form-V as is maintained to be submitted by the project proponent to the concerned SPCB as prescribed under the EP Rules- 1986, as amended subsequently, shall also be put on the website of the company and shall also be sent to the Regional office of the MoEF, Bhubaneswar by e-mail.	Being complied with.
(xvii)	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 7 days of the issue of the clearance letter is available with the SPCB and also at web site of the MoEF at http://envfor.nic.in and a copy of the same should be forwarded to the Regional Office of the Ministry located at Bhubaneswar.	Already advertised. Also, amended Environmental Clearance vide F.No.J-11015/351/2006-IA.II(M)(pt.), dt.30.03.2016 for integrated Barsua-Taldih-Kalta Iron ore Mines (ML-130) has been advertised.

Annexure- 1(A)

SAIL

BARSUA IRON MINE

DETAIL ANALYSIS OF AIR QUALITY MONITORING

Location	October 2016				November 2016				December 2016				January 2017				February 2017				March 2017			
	RSPM (PM_{10})	$PM_{2.5}$	SO_2	NO_x	RSPM (PM_{10})	$PM_{2.5}$	SO_2	NO_x	RSPM (PM_{10})	$PM_{2.5}$	SO_2	NO_x	RSPM (PM_{10})	$PM_{2.5}$	SO_2	NO_x	RSPM (PM_{10})	$PM_{2.5}$	SO_2	NO_x	RSPM (PM_{10})	$PM_{2.5}$	SO_2	NO_x
A) Ambient Air Quality in Residential, rural & other areas.																								
Norm as per NAAQS	**100**	**60**	**80**	**80**	**100**	**60**	**80**	**80**	**100**	**60**	**80**	**80**	**100**	**60**	**80**	**80**	**100**	**60**	**80**	**80**	**100**	**60**	**80**	**80**
A1	52	21	BDL	15	52	21	07	15	92	44	08	16	74	30	08	11	75	59	08	11	75	59	08	11
A5	-	-	-	-	46	20	06	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A6	48	17	08	13	48	17	08	11	72	46	09	15	52	21	07	13	62	53	08	12	66	48	08	12
A2	-	-	-	-	40	16	BDL	09	60	26	07	17	54	23	09	16	64	38	09	12	-	-	-	-

* unit in $\mu g/m^3$

Note : Ambient Air Quality Monitoring was conducted as per MoEF Notification No. GSR 826(E), dtd.16.11.2009.

B) Results of Fusitive Emission / Work Zone Quality.

	SPM	RSPM	SO_2	NO_x	SPM	RSPM	SO_2	NO_x	SPM	RSPM	SO_2	NO_x	SPM	RSPM	SO_2	NO_x	SPM	RSPM	SO_2	NO_x	SPM	RSPM	SO_2	NO_x
Norm as per IBM	**700**	**350**	**5000**	**6000**	**700**	**350**	**5000**	**6000**	**700**	**350**	**5000**	**6000**	**700**	**350**	**5000**	**6000**	**700**	**350**	**5000**	**6000**	**700**	**350**	**5000**	**6000**
A9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	899	310	15	24	575	232	-	-
A7	166	62	06	11	166	62	06	11	206	89	12	21	267	106	13	19	276	121	13	19	-	-	-	-
A8	210	96	08	15	210	96	08	15	147	74	08	16	189	76	09	17	300	123	09	17	556	224	-	-
A10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A11	175	76	07	10	175	76	07	10	154	78	12	17	177	70	11	16	215	85	11	16	-	-	-	-

* unit in $\mu g/m^3$

Note : Fusitive emission standards as per MoEF Notification No. GSR 809(E), dtd.4.10.2010 on iron ore mining and processing. Particulate matter (PM)-1200 $\mu g/m^3$ at a distance of 25±2m. In the pre dominant downward direction from the source of generation .

NB :

BDL - Below Detectable Limit ($6 \mu g/m^3$)

Locations :

A1 : Guest House, Tensa township

A5 : Barua valley, Township

A6 : Administrative Building, BIM

A2 : Tantara Village

A10 : Crusher Hopper

A3 : Screening Plant

A4 : Stock pile & wagon loading area (R/R Bin), Barsua Valley

A7 : Excavation & loading at Mine face.

A8 : Haul Road/Service Road

A9 : Drilling Point

Annex-I(B)

FOR THE MONTH OF OCT-2016 TO MAR-2017(HALF YEARLY)

KALTA IRON MINE

DETAIL ANALYSIS AIR QUALITY MONITORING

Location	Oct-16				Nov-16				Dec-16				Jan-17				Feb-17				Mar-17			
	RSPM (PM_{10})	$PM_{2.5}$	SO_2	NO_x	RSPM (PM_{10})	$PM_{2.5}$	SO_2	NO_x	RSPM (PM_{10})	$PM_{2.5}$	SO_2	NO_x	RSPM (PM_{10})	$PM_{2.5}$	SO_2	NO_x	RSPM (PM_{10})	$PM_{2.5}$	SO_2	NO_x	RSPM (PM_{10})	$PM_{2.5}$	SO_2	NO_x
A) Ambient Air Quality in Residential, rural & other areas.																								
Norm as per NAAQS	100	60	80	80	100	60	80	80	100	60	80	80	100	60	80	80	100	60	80	80	100	60	80	80
A1	48	22	9	13	--	--	--	--	66	37	11	15		_	_	_	-	-	-	-	72	36	9	17
A2	--	--	--	--	--	--	--	--	--	--	--	--		_	_	_	--	--	--	--	--	--	--	--
A7	54	28	8	15	54	28	8	15	70	51	9	17	66	31	9	18	78	59	9	18	65	52	8	11
A8	--	--	--	--	--	--	--	--	--	--	--	--		_	_	_	--	--	--	--	--	--	--	--

* unit in µg/m^3

Note : Ambient Air Quality Monitoring was conducted as per MoEF Notification No. GSR 826(E), dtd.16.11.2009.

B) Results of Fusitive Emission / Work Zone Quality.

	RSPM	SPM	SO_2	NO_x	RSPM	SPM	SO_2	NO_x	RSPM	SPM	SO_2	NO_x	RSPM	SPM	SO_2	NO_x	RSPM	SPM	SO_2	NO_x	RSPM	SPM	SO_2	NO_x
Norm as per IBM	350	700	5000	5000	350	700	5000	5000	350	700	5000	5000	350	700	5000	5000	350	700	5000	5000	350	700	5000	5000
A3	--	--	--	--	--	--	--	--	--	--	--	--		_	_	_	--	--	--	--	--	--	--	--
A4	132	310	10	19	--	--	--	--	--	--	--	--		_	_	_	--	--	--	--	--	--	--	--
A5	_	_	_	_	--	--	--	--	416	1056	14	23		_	_	_	279	807	16	25	798	317	--	--
A6	144	390	15	21	144	390	15	21	--	--	--	--		_	_	_	--	--	--	--	--	--	--	--
A9	_	_	_	_	--	--	--	--	211	475	11	19		_	_	_	186	455	12	21	--	--	--	--
Near W.B	_	_	_	_	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

* unit in µg/m^3

Note :

NB :

BDL - Below Detectable Limit (6µg/m^3)

Locations :

A1 : Kalta Township

A2 : Kalta Basti

A3:Derilling point

A4 : Excavation & Loading the mine face

A5 : Haul Road/Service road

A6 : Mobile crushing & screening plant Area

A7 : Kalta Admn.Bldg.

A8 : Roxy Railway Siding Hutting Area No.-3 (near UNION Office)

A9:Roxy Railway Siding Wagon loading area

NA:There is no mining operation during The monitoring period.

J. Badaik
Dy. Mgr. (Min) E&L
KIM, Kalta

SAIL

BARSUA IRON MINE

WATER QUALITY OF GROUND WATER

Sl.No	PARAMETERS	Oct-16			Nov-16			Dec-16			Jan-17			Feb-17			Mar-17		
	Locations >	W6	W7	W8	W6	W7	W8	W6	W7	W8	W6	W7	W8	W6	W7	W8	W6	W7	W8
1	Colour (Pt-Co Scale)	15	8	9	12	7	11	12	7	11	7	8	6	119	55	198	6	58	196
2	Temperature (^{0}C)	23.5	23.4	23.2	23.7	24.4	24.8	23.3	23.6	23.5	23.2	23.3	23.4	23.3	23.6	23.5	24	23.5	23.5
3	Odour	OL	OL	OL	OL	OL	OL	OL	OL	OL	OL	OL	OL	OL	OL	OL	OL	OL	OL
4	Taste	AG	AG	AG	AG	AG	AG	AG	AG	AG	AG	AG	AG	AG	AG	AG	AG	AG	AG
5	pH	7.2	7.6	7.4	7.8	7.2	6.9	7.6	7.7	7.1	7.7	7.7	7.1	7.2	7.2	7.1	7.6	7.2	7.1
6	Conductivity(in µS/cm)	182	194	176	310	166	380	210	150	222	182	98	122	218	212	244	88	221	248
7	TDS (in mg/l)	91	97	88	155	83	190	105	75	111	91	49	61	109	106	122	44	110.5	124
8	TSS (in mg/l)	7	6	7	16	1	3	16	2	1	5	3	5	21	8	15	6	12	16
9	TH (in CaCO3)	51	45	74	74	135	68	73	117	61	78	120	62	145	108	74	54	102	116
10	Calcium(in mg/l)	14	13	23	23	41	21	24.1	39	19.1	26	41	18.6	35.6	29.6	17	12.8	24.8	29.6
11	Magnesium(in mg/l)	4	3	4	4	8	4	3.1	4.8	3.2	3.2	4.2	3.8	13.5	8.2	7.5	5.3	9.7	10.2
12	Alkalinity(in mg/l)	28	21	27	38	11	20	27	12	17	19	17	21	42	64	56	28	68	62
13	Chloride (in mg/l)	24	20	22	1	12	17	4	17	19	5	15	17	4	23	21	11	25	22
14	Sulphate (in mg/l)	20	19	21	24	6	8	20	7	8	14	11	9	22	7	BDL	10	8	10
15	Phosphate (in mg/l)	0.05	0.11	0.17	0.027	0.02	0.07	0.022	0.08	0.06	0.012	0.08	0.07	0.69	0.13	1.59	0.05	0.18	1.55
16	Nitrate (in mg/l)	2.2	2.6	2.2	0.7	1.2	1.8	0.17	2.1	2.6	0.22	1.6	2.2	0.27	2.2	1.5	1.2	2.6	2.5
17	Copper (in mg/l)	0.02	0.02	0.02	0.01	0.05	0.15	0.01	0.04	0.05	0.01	0.06	0.07	0.03	0.03	0.04	0.01	0.03	0.04
18	Amm. Nitrogen (in mg/l)	0.05	BDL	BDL	0.1	BDL	0.13	0.1	BDL	0.17	0.1	0.11	0.13	0.1	0.07	0.08	0.04	0.07	0.08
19	Total Chlorine (in mg/l)	0.02	0.01	0.01	0.02	0.04	0.03	0.02	0.02	0.03	0.07	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02
20	Hex. Chromium (in mg/l)	BDL	BDL	BDL	0.009	BDL	BDL	BDL	BDL	BDL	0.006	BDL	BDL	BDL	0.012	0.014	BDL	0.012	0.013
21	Manganese (in mg/l)	0.02	0.03	0.04	0.08	0.04	0.1	0.02	0.06	0.08	0.02	0.02	0.09	0.04	0.08	0.2	0.04	0.07	0.2
22	Total Iron (in mg/l)	0.23	0.19	0.26	0.84	0.16	0.28	0.46	0.19	0.26	0.24	0.28	0.27	2.44	0.18	1.77	0.14	0.18	1.75
23	Sulfide(in µg/l)	BDL	BDL	BDL	BDL	0.004	0.011	BDL	0.007	0.012	0.009	0.005	0.01	0.004	0.008	0.013	0.005	0.012	0.013
24	Fluoride(in mg/l)	0.07	0.02	0.03	BDL	BDL	BDL	0.01	0.02	BDL	0.01	0.01	0.01	0.01	0.02	BDL	0.02	0.02	0.01

NB :

W6 : Hand Pump at Saraswati Shisu Vidyamandir, B/V
W7 : Hand Pump at Zero Point, Tensa
W8 : Hand Pump at Banka Bazar, B/V
BDL : Below the Detectable Limit

Annex-11(A)

FOR THE MONTH OF OCT-2016 TO MAR-2017(HALF YEARLY)

KALTA IRON MINE

WATER QUALITY OF DRINKING WATER & GROUND WATER

S. No	PARAMETERS	Oct-16		Nov-16		Dec-16		Jan-17		Feb-17		Mar-17		Limit as per IS 10
	Locations >	W3	W4	W3	W4	W3	W4	W3	W4	W3	W4	W3	W4	
1	Colour (Pt-Co Scale)	5	6	5	6	9	12	5	6	5	7	6	8	5
2	Temperature (°C)	25.8	25.1	25.8	25.1	22.1	22.4	23.2	23.6	23.8	23.1	23.7	23.2	–
3	Odour	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Odourless	Odourless	–
4	pH	7.3	7.1	7.3	7.1	7.8	7.9	7.6	7.7	7.3	7.1	7.3	7.2	6.5-8.5
5	Conductivity(in µS/cm)	122	190	122	190	188	310	110	136	122	210	50	88	–
6	TDS (in mg/l)	61	85	61	85	94	155	55	68	61	105	25	44	500
7	TSS (in mg/l)	4	6	4	6	4	16	2	3	4	6	10	21	–
8	TH (in CaCO3)	58	77	58	77	39	74	50	70	62	78	98	86	300
9	Calcium(in mg/l)	6	18.4	6	18.4	11	23	10.6	19.6	14.4	15.2	35.6	32.2	75
10	Magnesium(in mg/l)	10.4	7.5	10.4	7.5	2.8	4	5.7	5.1	6.2	9.7	6.2	5.8	30
11	Alkalinity(in mg/l)	13	26	13	26	16	38	11	21	24	28	29	23	200
12	Chloride (in mg/l)	8	18	8	18	7	1	9	15	8	16	20	31	250
13	Sulfate (in mg/l)	2	4	2	4	18	24	5	7	2	4	18	23	200
14	Phosphate (in mg/l)	0.22	0.28	0.22	0.28	0.018	0.027	0.2	0.21	0.22	0.28	0.02	0.02	–
15	Nitrate (in mg/l)	1.4	2.6	1.4	2.6	0.27	0.7	1.8	2.2	1.4	2.6	1.7	2.5	45
16	Copper (in mg/l)	0.04	0.05	0.04	0.05	0.02	0.01	0.02	0.03	0.04	0.05	0.02	0.02	0.05
17	Amm. Nitrogen (in mg/l)	0.05	0.03	0.05	0.03	BDL	0.1	0.04	0.03	0.05	0.03	BDL	BDL	–
18	Total Chlorine (in mg/l)	0.02	0.02	0.02	0.02	0.02	BDL	0.02	0.02	0.02	0.02	0.01	0.01	0.2
19	Hex. Chromium (in mg/l)	BDL	BDL	BDL	BDL	0.004	0.009	BDL	BDL	BDL	BDL	BDL	BDL	0.05
20	Manganese (in mg/l)	0.02	0.01	0.02	0.01	0.18	0.22	0.01	0.01	0.04	0.02	0.03	0.04	0.1
21	Total Iron (in mg/l)	0.11	0.53	0.11	0.53	0.1	0.32	0.11	0.24	0.11	0.52	0.16	0.23	0.3
22	Fluoride(in mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	–
23	Sulfide (in mg/l)	0.02	0.01	0.02	0.01	BDL	BDL	0.01	0.01	0.02	0.01	0.02	0.03	1.0

NB

W3 Drinking Water & Ground Water-Kalta G H Tape Water

W4 Hand Pump at Kalta Basti

BDL Below the Detectable L mit

NO Not Objectionable

OL Odourless

AG Agreeable

J. Badaik
Dy. Mgr. (Min) E&L
KIM, Kalta

सेल SAIL

Annexure-

BARSUA IRON MINE

WATER QUALITY RESULTS OF EFFLUENT

SL.NO	PARAMETERS	Oct' 2016	Nov' 2016	Dec' 2016	Jan' 2017	Feb' 2017	March' 2017
	Locations >	W4	W4	W4	W4	W4	W4
1	Color (Pt-Co Scale)	12	11	8	9	47	9
2	Temperature (^{0}C)	23.2	23.3	22.8	22.9	23.9	24.2
	pH	7.4	7.9	7.7	7.8	7.5	7.5
4	Conductivity(in uS/cm)	120	210	188	166	156	148
5	TDS (in mg/l)	60	105	94	83	78	74
6	TSS (in mg/l)	7	7	4	5	1	6
7	TH (in $CaCO_3$)	74	42	59	61	41	42
8	Calcium(in mg/l)	18.6	15	19	21	15.2	11.2
9	Magnesium(in mg/l)	6.7	1.1	2.8	2.1	0.72	3.3
10	Alkanity(in mg/l)	22	22	19	17	32	26
11	Chloride (in mg/l)	17	3	9	8	12	10
12	Sulphate (in mg/l)	18	BDL	BDL	BDL	BDL	BDL
13	Phospate (in mg/l)	0.18	0.08	0.11	0.41	1.69	1.31
14	Nitrate (in mg/l)	2.1	0.17	0.22	0.27	0.05	0.03
15	Copper (in mg/l)	0.06	1.7	2.1	1.7	1.6	1.1
16	Ammo. Nitrogen (in mg/l)	BDL	0.14	0.19	0.15	0.14	0.07
17	Total Chlorine (in mg/l)	0.02	0.03	0.02	0.02	0.01	0.02
18	Hexa. Chromium (in mg/l)	BDL	BDL	BDL	BDL	0.018	0.015
19	Manganese (in mg/l)	0.2	0.02	0.02	0.01	0.03	0.08
20	Iron (in mg/l)	0.19	0.11	0.17	0.22	0.08	0.14
21	Sulphide (in µµg/l)	BDL	0.016	0.019	0.038	0.008	0.011
22	Flouride(in mg/l)	0.06	0.3	0.2	0.22	0.08	0.02

IB :

V4 : Over flow from Tailing Dam

BDL : Below the Detectable Limit

BARSUA IRON MINE

WATER QUALITY OF STREAM SAMPLES/SURFACE WATER

Sl.No.	Parameters v	October 2016			November 2016			December 2016			January 2017			February 2017			March 2017		
		W1	W2	W3	W1	W2	W3	W1	W2	W3	W1	W2	W3	W1	W2	W3	W1	W2	W3
1	Colour (Pt-Co Scale)	06	09	08	7	19	7	7	19	7	7	19	05	41	43	18	10	12	14
2	Temperature (^{0}C)	23.4	23.2	23.5	22.9	23.1	22.8	22.9	23.1	22.8	23.2	23.6	23.1	23.2	23.1	23.8	23.5	23.5	13.8
3	Odour	OL	OL	OL	OL	OL	OL	OL	OL	OL	OL	OL	OL	OL	OL	OL	OL	OL	OL
4	pH	7.4	7.2	7.3	7.9	7.7	7.5	7.9	7.7	7.5	7.7	7.7	7.6	7.5	7.5	7.5	7.5	7.5	7.5
5	Conductivity(in µS/cm)	104	110	88	180	244	110	180	244	110	162	222	90	184	214	112	182	186	125
6	TDS (in mg/l)	52	55	44	90	122	55	90	122	55	81	111	45	92	107	56	91	93	62.5
7	TSS (in mg/l)	5	4	2	0	16	0	0	16	0	2	13	3	4	14	12	5	12	12
8	TH (in $CaCO_3$)	35	57	48	29	34	30	24	29	37	30	27	47	21	23	35	24	28	38
9	Calcium(in mg/l)	9	13	11	10	11	9	8	9	12.2	9	8.2	14	4.4	5.6	9	4.8	6.4	8.8
10	Magnesium(in mg/l)	3	6	5	1	1.6	1.8	1	1.6	1.6	1.8	1.6	2.9	1	2.1	3.1	2.9	2.9	3.9
11	Alkalinity(in mg/l)	21	23	21	14	19	8	14	19	8	17	21	11	14	19	16	14	19	24
12	Chloride (in mg/l)	19	24	28	7	11	9	7	11	9	9	13	7	8	12	10	8	12	10
13	Sulfate (in mg/l)	17	23	27	BDL	BDL	BDL	BDL	BDL	BDL	6	3	2	BDL	BDL	BDL	BDL	BDL	BDL
14	Phosphate (in mg/l)	0.03	0.01	0.03	0.1	1.9	1.4	0.1	1.9	1.40	0.2	1.6	1.9	3.1	2.82	1.5	2.48	2.84	1.8
15	Nitrate (in mg/l)	2.9	3.3	3.5	2.2	3.7	1.6	2.2	3.7	1.6	2	2.8	1.8	2.5	2.7	1.7	2.5	2.5	1.5
16	Copper (in mg/l)	0.03	0.02	0.02	0.06	0.08	0.07	0.06	0.08	0.07	0.03	0.07	0.06	0.11	0.08	0.08	0.11	0.12	0.14
17	Ammo. Nitrogen (in mg/l)	0.03	0.02	0.03	0.06	BDL	0.05	0.06	BDL	0.05	0.05	0.04	0.03	0.06	0.08	0.05	0.06	0.08	0.05
18	Free Chlorine (in mg/l)	0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.01	0.02	0.02	0.02	0.01	0.02	0.01	0.02	0.02	0.01	0.02
20	Hexa. Chromium (in mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.012	0.014	BDL	BDL	BDL	BDL
21	Manganese (in mg/l)	0.03	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.01	0.01	0.02	0.01	0.02	0.02	0.01	0.03	0.03	0.05
22	Total Iron (in mg/l)	0.18	0.21	0.23	0.06	0.19	0.33	0.06	0.19	0.33	0.11	0.22	0.36	0.08	0.19	0.23	0.08	0.14	0.21
23	Sulfide(in µg/l)	0.001	BDL	0.002	0.005	0.008	0.003	0.005	0.008	0.003	0.007	0.008	0.005	0.005	0.008	0.003	0.005	0.005	0.003
24	Flouride(in mg/l)	0.03	0.04	0.02	0.1	0.18	BDL	0.1	0.18	BDL	0.1	0.2	0.02	0.1	0.18	BDL	0.1	0.18	0.08

NB :
W1 : Upstream of Kuradih River
W2 : Downstream of Kuradih River
W3 : Samaj Nallah
BDL : Below the Detectable Limit
OL : Odourless

Annex-IV(A)

FOR THE MONTH OF OCT-2016 TO MAR-2017(HALF YEARLY)

KALTA IRON MINE

WATER QUALITY OF STREAM SAMPLES/SURFACE WATER

S.No.	Parameters	Oct-16		Nov-16		Dec-16		Jan-17		Feb-17		Mar-17		Limit as per IS 10500
		W1	W2	W1	W2	W1	W2	W1	W2	W1	W2	W1	W2	
1	Colour (Pt-Co Scale)	89	100	89	100	7	19	21	33	58	31	6	9	5
2	Temperature (^{0}C)	23.8	23.7	23.8	23.7	22.9	23.1	23.2	23.6	23.2	23.4	23.3	23.5	–
3	Odour	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Odourless	Odourless	–
4	pH	7	7	7	7	7.9	7.7	7.2	7.4	7.2	7.2	7.3	7.1	6.5-8.5
5	Conductivity(in µS/cm)	434	215	434	215	180	244	244	160	382	224	56	110	–
6	TDS (in mg/l)	217	107.5	217	107.5	90	122	122	80	191	112	28	55	500
7	TSS (in mg/l)	11	12	11	12	0	16	5	3	14	16	18	23	–
8	TH (in $CaCO_3$)	75	112	75	112	29	34	62	94	68	78	124	138	300
9	Calcium(in mg/l)	24.8	35.2	24.8	35.2	10	11	20	31	16.8	19.2	30	37	75
10	Magnesium(in mg/l)	3.1	5.8	3.1	5.8	1	1.6	2.9	4	6.3	7.2	12	11	30
11	Alkalinity(in mg/l)	45	58	45	58	14	19	21	19	45	52	26	33	200
12	Chloride (in mg/l)	15	28	15	28	7	11	13	17	14	26	24	32	250
13	Sulfate (in mg/l)	0	0	0	0	BDL	BDL	8	9	0	0	17	25	200
14	Phosphate (in mg/l)	0.03	0.12	0.03	0.12	0.1	1.9	0.08	0.1	0.03	0.04	0.03	0.02	–
15	Nitrate (in mg/l)	5.5	6	5.5	6	2.2	3.7	2.4	2.1	5.2	6.1	2.2	2.1	45
16	Copper (in mg/l)	0.08	0.06	0.08	0.06	0.06	0.08	0.02	0.02	0.04	0.01	0.02	0.04	0.05
17	Ammo. Nitrogen (in mg/l)	BDL	BDL	BDL	BDL	0.06	BDL	BDL	BDL	BDL	BDL	BDL	BDL	–
18	Free Chlorine (in mg/l)	0.2	0.06	0.2	0.06	0.02	0.01	0.2	0.03	0.01	0.01	BDL	BDL	0.2
19	Hexa. Chromium (in mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05
20	Manganese (in mg/l)	0.2	0.2	0.2	0.2	0.02	0.02	0.1	0.2	0.06	0.05	0.02*	0.03	0.1
21	Total Iron (in mg/l)	0.43	0.1	0.43	0.1	0.06	0.09	0.33	0.15	0.54	0.12	0.17	0.2	0.3
22	Sulfide(in µg/l)	0.012	0.018	0.012	0.018	0.005	0.008	0.01	0.011	0.012	0.013	BDL	BDL	–
23	Flouride(in mg/l)	0.01	0.02	0.01	0.02	0.1	0.18	0.01	0.01	0.01	0.02	0.02	0.03	1.0

NB

W1 Water Stream Water From Hill Leading To Intake Pond

W2 Najkura Nallah Near N H -215

BDL Below the Detectable Limit

Jordan

Mgr. (Min) E&L

KIM, Kalta

Annexure-V

BARSUA IRON MINE

DETAIL MONITORING OF NOISE QUALITY

Sl.No.	LOCATION	Oct' 2015		Nov' 2015		Dec' 2015		Jan' 2016		Feb' 2016		March' 2015		Measuring Condition
		Leq. dB (A)	Lmax, dB (A)	Leq. dB (A)	Lmax, dB (A)	Leq. dB (A)	Lmax, dB (A)	Leq. dB (A)	Lmax, dB (A)	Leq. dB (A)	Lmax, dB (A)	Leq. dB (A)	Lmax, dB (A)	
1	Guest House	44.8	56.4	45	55	44.2	57	43.8	56.7	46.8	62.8	46.8	62.8	No major source of noise, except vehicular movement at a times
2	VTC	50.2	62	51.6	53	49.8	52.6	46.8	52.1	58.5	64.2	58.5	64.2	Normal working hours
3	Crusher Control Room	-	-	-	-	-	-	-	-	-	-	-	-	Not in operation
4	Secondary crusher	-	-	-	-	-	-	-	-	-	-	-	-	Not in operation
5	Haul Road	78.9	99.0	63.7	96.5	68.7	97.0	72.5	98.6	68.4	98	68.4	98.0	10 mt. distance from the edge of haul road, while transportation of ore.
6	Dumper Cabin	-	-	-	-	-	-	-	-	-	-	-	-	Inside the cabin while in operation
7	Excavation and Loading Point	90.6	100.2	68.7	102.5	71.1	99.7	76.8	100.2	81.5	99.8	82.5	99.5	15 mt. distance from dumper and shovel.
8	Drilling	82	98.1	92.6	98.6	-	-	-	-	-	-	-	-	Normal working condition. 10 mt. distance from drill
9	Wagon Loading Area, B/V	-	-	-	-	-	-	-	-	78	87.5	75	86.5	Loader and Dozer were in operation
10	Sceening Plant	-	-	-	-	-	-	-	-	-	-	-	-	Not in operation
11	Hospital, BIM	41.8	47.9	50.2	52	45.6	49.9	39.7	44	51.2	55.6	51.2	55.6	During visiting hours. Distant vehicular noise was observed.