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

60TH YEAR OF PRODUCTION
सेल SAIL
Since 1960

Ref. No. BIM/E&L/2019/72

Date : 25.05.2019

To,
The Additional Director (S)
EI Division, Ministry of Environment & Forests,
Paryavaran Bhawan, 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 2019.

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 2019. The report also contains the updated status of environmental monitoring of air, water and noise pertaining to the period ending 31st March 2019.

Thanking You,

Yours faithfully,
For SAIL/Barsua Iron Mines

A K Sinha
General Manager, BIM & TIM

Encl : As Above

Copy to:

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 to Conditions Stipulated in Environmental Clearance

(EC order no. J-11015/351/2006-IA.II(M), dt. 29.10.2010 & F. No. J-11015/351/2006-IA.II(M) (pt.) dated 30.03.2016) of Integrated Barsua –Taldih – Kalta Iron Ore Mining Project (ML – 130), Village Tantra, District Sundergarh, Odisha, Raw Materials Division, SAIL

(Period: October 2018 to March 2019)

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 on dt.5.11.2016 which is valid for five years. CTO has also been obtained from SPCB, Odisha Vide No. 3374/IND-I-CON-1(A), dated 30.03.2019 for a quantity of 8.05 MTPA with validity up to 31.03.2020. 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.	Stage-II forestry clearance/ final approval under FC Act 1980 for mining and allied activities & safety zone for 2nd RML period was obtained from Ministry of Environment, Forest & Climate Change, Govt. of India vide its order 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.	Agreed.
(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.
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.

Sl. No	Condition	Compliance Status
(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 for rehabilitation of dumps and other areas through plantation. Total 3487 cbm of top soil has been generated during the period from Taldih C Block and added to existing 350 cbm of top soil which are temporarily being stored at earmarked site. The top soil will be utilized for land reclamation and plantation purpose only.
(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. The project proponent shall carry out slope stability study through an expert organization 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 only, 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. For effective stabilization, terracing of the OB dumps with overall slope of the dump is being maintained to below 27°. Also, Geo-textile coir matting of 28000 Sq. m has been done in Barsua Block and 25482 Sq. m has been done in Kalta Block. Plantation has also been carried out over all the old dumps slopes for stabilization and prevention of washout. Some of the photographs showing Geo-textile coir matting at Barsua & Kalta mines is shown in Annexure IX. Regular Compliance Status Report on six monthly basis is submitted to MoEF&CC and its Regional Office.
(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. 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.	There are 29 nos. of Check dams / Retaining wall / Toe walls provided in Barsua-Taldih-Kalta mines to prevent direct flow of washout to nearby agricultural fields and water bodies. The details of Check dams / Retaining wall / Toe walls is placed at **Annexure I.** Some of the photographs showing Check dams / Retaining wall / Toe walls in Barsua-Taldih-Kalta mines is shown in Annexure IX.
(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, 1.5m to 2.0m width and 1.5m to 2.0m height toe walls were provided.

Sl. No	Condition	Compliance Status
(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. Also a system for recovery and recycling of clean water from the tailing pond has been provided at Barsua Iron Mine under Zero Discharge Project. The quality of overflow water is monitored regularly and found within the norm. A photograph showing Zero Discharge Project is shown in Annexure IX.
(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. Some photographs of Dry Fog System (DFS) is shown in Annexure IX.
(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 60 % is being recycled and the underflow from thickener is discharged into Tailing Dam. 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 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 is being done with 2 X28 KL highly pressurized mobile water tankers for Barsua Block, 1 X 12 KL & 1 X 10KL mobile water tanker for loading area of Barsua, 2 X12 KL & 5 X 8 KL mobile water tankers for Kalta Block and 1 X 12 KL & 1 X 20 KL mobile water tankers for Taldih Block. The fixed haul road of 1 km in Barsua part and 1.2 km in loading area of Barsua has also been provided with fixed water sprinkler. Also proposal has been initiated for installation of 3 km fixed sprinkler in Barsua block and 1 km in Kalta block. Dry Fog System (DFS) and wet screening arrangements

Sl. No	Condition	Compliance Status
		have been provided in the Ore Handling Plant to mitigate fugitive dust emission. Some photographs of water sprinkling arrangement is shown in Annexure IX.
(xvii)	Plantation shall be raised in an area of 1658.803 ha 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 plantations by planting native species are being carried out within and outside the lease area and density is assessed as per the crown density of the area. So far 251565 saplings have been planted covering an area of 93.18 ha at Barsua and Kalta block since 2010. The detail of plantation is placed at **Annexure II.** During the period, total 12000 saplings have been planted over an area of 5.10 ha at Barsua and Kalta block. 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 through M/s Tirupati Balajee Maharaj Consultant (P) Ltd. Two (02) nos. of Check dams has already been constructed, one in Kuradih nala near pump house and other at Tantra Village near Taldih Block as per recommendation. 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 abandoned pit for further ground water recharge. ➢ Series of check dams at different strategic locations are being constructed.
(xix)	Regular monitoring of ground water level and quality shall be carried out in and around the project area 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.	3 Nos. of Piezometers have been installed at 3 locations to monitor ground water level. The ground water quality from hand pumps at Zero point, Tensa, Barsua valley and Kalta basti, Kalta are monitored through third party monitoring. The monitoring results are placed as **Annexure - IV**.
(xx)	The groundwater and surface water in and around the mine including tailing ponds shall be regularly monitored at strategic	Regular monitoring for heavy metals in ground water and surface water in and around the mine is being carried out. Water quality for the period from October

Sl. No	Condition	Compliance Status
	locations for heavy metals. The monitoring stations shall be established in consultation with the Regional Director, CGWB and SPCB.	2018 to March 2019 is placed in ***Annexure - V.***
(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. Also a system for zero discharge has been provided at Barsua Iron Mines to prevent discharge of tailing pond over flow water to Kuradih nalla.
(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 are is being done 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.	Agreement was made with Executive Engineer, Sundargarh Irrigation Division, Sundargarh for drawl of water for a quantity of 2, 50,000 cum per month on 15.08.2015 for one year. The agreement could not be renewed for the want of Water Conservation Fund (WCF) which is under challenge before the Hon'ble High Court, Odisha.
(xxiv)	Suitable rainwater harvesting measures on long term basis shall be planned and implemented in consultation with the Regional Director, CGWB.	A Technical Feasibility Study for hydro-geological, rain water harvesting & augmentation of ground water resources has been conducted through M/s Tirupati Balajee Maharaj Consultant (P) Ltd. Two (02) nos. of Check dams has already been constructed, one in Kuradih nala near pump house and other at Tantra Village near Taldih Block as per recommendation. The report has been submitted to Regional Director, CGWB for their consent. The other measures will be implemented after receiving the consent from CGWB.
(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.	Pollution Under Control (PUC) certificate is made compulsory for deployment of vehicles in Mines. Scheduled / Preventive maintenance of HEMM and light vehicles are undertaken regularly to keep the vehicular emissions under control. The vehicles used for transportation of ore are covered with tarpaulins and ensured that there is no overloading. The vehicular emission results are placed in **Annexure – VIII.**
(xxvi)	Mineral handling area shall be provided with adequate number of high efficiency dust extraction system. Loading and	Mineral handing plant has been provided with the dust control measures like 'Dry Fog System' (DFS) at hopper and other transfer units. Also water spraying is

Sl. No	Condition	Compliance Status
	unloading areas including all the transfer points should also have efficient dust control arrangements.	being done at Loading & unloading areas.
(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. 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, recycled back to the system. The underflow from the Thickener is being drained to the Tailing Pond for further settling of solids. Oil & grease traps have also been provided for treating the effluents from garages.
(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 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.	Land use and land cover of entire lease area has been studied through satellite imagery i.e. Linear Imaging Self-Scanner for the period of March, 2018 by IIT ISM, Dhanbad. Copy of the digital processed of the entire lease area using remote sensing technique is enclosed as **Annexure - X.**
(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, 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,	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

Sl. No	Condition	Compliance Status
	sloth bear, peacock etc. spotted in the study area. All the safeguard measures brought out in the Wildlife Conservation Plan so prepared specific to this project site shall be effectively implemented.	conservation activities regularly. Also State Government had approved the study report prepared by an expert committee under the chairmanship of RCCF, Rourkela. Accordingly, an amount of Rs.17.82 Crore has been deposited in CAMPA through RTGS in A/c. No.344902010105428 on 26.02.2013 as a part of the Site Specific Conservation. Also, an amount of Rs.10,69,14,469.00 @ Rs.43,000.00 per Ha. has been deposited in three phases towards implementation of comprehensive wild life management plan prepared for Bonai-Keonjhar forest division.
(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.	Critical parameters i.e. PM10, PM2.5, NOx and SO2 in ambient air and relevant parameters in the effluents are being monitored regularly. The effluent quality for the period from October 2018 to March 2019 is placed in ***Annexure - VI.*** Also 3 Nos. of Continuous Ambient Air Quality Monitoring Stations (CAAQMS) at Barsua-Kalta has been installed 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.
(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. ROM production at various mining blocks under ML-130 is kept within permitted capacity in the EC / approved Mining Plan. The quantity of Production during 2018-19 is as follows: BIM : ROM 1951880.00 Sub-Grade 385985.00 TIM : ROM 469149.03 Sub-Grade 65340.00

Sl. No	Condition	Compliance Status
		KIM : ROM 1673822.00 Sub-Grade 44010.00
(iii)	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.	Four nos. of ambient air quality monitoring stations at Barsua, Taldih & 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 (CAAQMS) at Barsua-Kalta have also been commissioned and data are being transmitted to SPCB server.
(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 2018 to March 2019 is placed as ***Annexure -III***. 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.	Regular water sprinkling is being done with 2 X28 KL highly pressurized mobile water tankers for Barsua Block, 1 X 12 KL & 1 X 10KL mobile water tanker for loading area of Barsua, 2 X12 KL & 5 X 8 KL mobile water tankers for Kalta Block and 1 X 12 KL & 1 X 20 KL mobile water tankers for Taldih Block. The fixed haul road of 1 km in Barsua part and 1.2 km in loading area of Barsua has also been provided with fixed water sprinkler. Also proposal has been initiated for installation of 3 km fixed sprinkler in Barsua block and 1 km in Kalta block. Dry Fog System (DFS) and wet screening arrangements have been provided in the Ore Handling Plant to mitigate fugitive dust emission. All these dust control measures installed at the mines are sufficient to control fugitive dust emission.
(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 PPEs 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

<table>
<tr><th>Sl. No</th><th>Condition</th><th>Compliance Status</th></tr>
<tr><td></td><td></td><td>ear plug/ear muffs. The measured noise level in critical areas is placed in Annexure – VII.</td></tr>
<tr><td>(vii)</td><td>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.</td><td>Oil & grease traps have been provided for treating the effluents from garages. 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.</td></tr>
<tr><td>(viii)</td><td>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.</td><td>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.</td></tr>
<tr><td>(ix)</td><td>A separate environmental management cell with suitable qualified personnel should be set-up under the control of a Senior Executive, who will report directly to the Head of the Organization.</td><td>An Environmental Management Cell (EMC) has been established to look after environmental aspects, which is headed by a Dy. Manager, who reports directly to Mines Manager. He is further assisted by one ACT for environmental management at mines.</td></tr>
<tr><td>(x)</td><td>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.</td><td>Funds earmarked for environmental protection measures at the mines are booked separately and not being diverted for other purpose. Year wise expenditure for last 3 years on Environmental protection measures is as furnished below,
<table><tr><td>Year</td><td>Approximate Expenditure</td></tr><tr><td>2016-17</td><td>209.25 Lakhs</td></tr><tr><td>2017-18</td><td>203.13 Lakhs</td></tr><tr><td>2018-19</td><td>115.66 Lakhs</td></tr></table></td></tr>
<tr><td>(xi)</td><td>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.</td><td>The Barsua and Kalta Blocks under the ML-130 are operating since 1960 and 1966 respectively. Development work in Taldih block started since 9th June 2016 and installation of various facilities at Taldih Block are under progress & will be informed in due time after installation of the facilities.</td></tr>
<tr><td>(xii)</td><td>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 / monitoring reports.</td><td>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.</td></tr>
</table>

Sl. No	Condition	Compliance Status
(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, and 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 - I

DETAILS OF CHECK DAMS/TOE WALLS AT BARSUA-TALDIH-KALTA IRON MINES

Barsua Iron Mines

Sl. No.	Location	Specification
1.	Near Dump-5 of 3E area	4.5m x 2.6m x 4.4/3.15m
2.	Near Dump-8	40m x 1.5m x 1.25m
3.	Near Dump-7	26.7m x 2.0m x 1.5/1.0m
4.	Between Dump-2&7 of area 3E	2.8m x 2.1mx1.5/1.25m
5.	Between Dump-2&7 of area 3E	4.6mx2.45mx3.0/2.3m
6.	At area 2&4	15m x 1.5m x 1.5/1.0m
7.	At area 2&4	25m x 1.5m x 1.5/1.0m
8.	At area 2&4 (toe of Lump stack)	48m x 1.5m x 1.5/1.4m
9.	At area 2&4 (toe of Fines stack)	50m x 1.8m x 1.5/1.4m
10.	At the bottom of Dump-9 (external portion)	35m x 3.0m x 4.0/2.5m.
11.	At the bottom of Dump-9 (external portion)	50m x 2.0m x 1.25m
12.	At the bottom of Dump-9 (external portion)	60m x 2.0m x 1.25m
13.	At the bottom of Dump-2&7(external portion)	35m x 4.0m x 6.0/3.0m
14.	At the bottom of Dump-2&7(external portion)	53m x 4.0m x 19.0/3.0m
15.	At the bottom of Dump-2&7(external portion)	9.5m x 2.2m x 3.2m
16.	Toe wall at the bottom of Dump-8	260mx1.25mx2.0m
17.	Toe wall at the bottom of Dump-8	500mx2.0mx1.5/1.0m

Taldih Iron Mines

Sl. No.	Location	Specification
18.	Near Phuljhar	27.5m x 1.0m x 1.0m
19.	Near Phuljhar	26.2m x 2.1m x 2.0m
20.	Near Phuljhar	70.0m x 2.0m x 2.8m
21.	Near Explosive Magazine	27.9m x 2.1m x 2.4m
22.	Near Sub-grade Dump	19.0m x 1.4m x 5.5m
23.	Near Tantara Village	33.0m x 1.5m x 1.5m

Kalta Iron Mines

Sl. No.	Location	Length
24.	Dump No. 1 near Goarkpur area	690m
25.	Dump No. 4 & 5 near C Block	80m
26.	Dump No. 6	520m
27.	Dump No. 9 & 10 near Challan Gate.	205m
28.	North-East part of the Dumps No. 1, 2, 3 & 6	450m
29.	downstream of Najkura Nalla	27m

Annexure- II

BARSUA-TALDIH-KALTA IRON MINE, RMD, SAIL

DETAILS OF PLANTATION

YEAR	INSIDE MINING LEASE			OUTSIDE MINING LEASE		
	No. of trees	Area in Ha.	Rate of survival in %	No. of trees	Area in Ha.	Rate of survival in %
2010-11	2000	0.00	85	8450	3.86	85
2011-12	25000	8.00	74	4600	3.02	65
2012-13	72000	10.00	75	1780	0.80	70
2013-14	25480	10.20	95	1620	1.20	90
2014-15	16000	10.00	68	7400	3.30	72
2015-16	30300	16.00	80	8700	5.00	80
2016-17	8000	5.00	85	9985	3.50	80
2017-18	500	0.70	68	17750	8.10	74
2018-19	300	0.50	85	11700	4.00	79
TOTAL	**179580**	**60.400**	**78.47**	**71985**	**32.780**	**77.24**

BARSUA IRON MINES

DETAIL ANALYSIS OF AIR QUALITY MONITORING

Location	OCTOBER 2018				NOBEMBER 2018				DECEMBER 2018				JANUARY 2019				FEBRUARY 2019				MARCH 2019			
	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**
A 1	46.3	22.8	<4.1	<9.1	68.8	34.6	4.6	13.5	69	34.2	4.8	14.2	58.6	32	5.2	13.9	51.9	32.4	5.1	15.1	62.9	38.4	4.9	15.1
A 2	40.4	18.9	<4.0	<9.0	63.9	31	<4.0	10.2	59.5	29.1	<4.0	9.4	53.9	28.8	4.6	12.8	52.7	29.8	4.5	12	54.5	29.4	4.3	10.6
A 3	43	20.4	<4.0	<9.3	64.3	31.3	4.1	11	62.9	30.9	<4.1	9.8	61.4	34.9	4.5	13.3	61.7	35.9	4.7	13.1	62.8	38.5	4.4	12.1
A 4	56.4	27.8	<4.4	10.5	69.3	35	4.4	12.8	69.5	35.3	4.5	13.5	63.6	38.6	5.1	15.2	64.7	41	4.9	15.3	63.3	40.9	5.1	15.5

*** 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.

	OCTOBER 2018		NOBEMBER 2018		DECEMBER 2018		JANUARY 2019		FEBRUARY 2019		MARCH 2019	
Norm as per IBM	1200		1200		1200		1200		1200		1200	
Actual(PM)	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
F 1	195.9	266.7	272.8	334.7	307.9	369.5	285.3	386.3	295.3	371.2	269.3	362.1
F 2	187.7	254.7	266.5	352.5	344.5	390.7	469.3	677.3	621.3	742.1	723.5	813.7
F 3	185.1	258.4	282.8	340.4	323.1	381	295.6	378.9	284.4	356.1	274.1	336.9
F 4	177.2	252	223.1	288.4	295.7	370.4	306.2	382.1	265.4	371.2	289.5	375.1
F 5	179	241.1	254.4	326.8	316.8	384.7	312.5	398.2	312.4	374.1	297.6	389.5
F 6	240.5	466.7	472.8	591.7	598	722.8	695.2	865.3	699.5	812.3	692.3	814.5
F 7	226.8	468.8	467	559	584.5	746.5	754.1	856.6	710.8	811.2	741.2	852.3
F 8	234.7	481	467.7	607.8	622.8	755.5	714.2	812.3	703.6	792.1	722.3	811.3
F 9	293.9	544.5	568.7	682.8	715.1	854.7	786.3	924.6	845.5	922.4	854.7	968.3
F 10	285.2	530.7	606.8	716.5	732.8	862.8	811.2	956.2	845.3	965.1	852.3	974.3
F 11	276.7	526.7	574.8	732.8	752.9	842.9	831.5	952.1	863.2	966.1	812.3	965.2
F 12	279.2	539.2	566.8	712.5	750.9	852.5	902.5	992.1	911.3	1002.3	954.2	1011.3

*** unit in µg/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 µg/m^3 at a distance of 25±2m. In the pre dominant downward direction from the source of generation .

NB :

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

Locations :

A 1 : Guest House, Tensa township

A 2 : Barua valley, Township

A 3 : Tantara Village

A 4 : Mine Site Office (KIM)

F1 : Drilling Site (BIM)

F2: Excavation & loading (BIM)

F3 : Haul Road(BIM)

F4 : Dump Area(BIM)

F5 : Stock ple& Loading(B/V, BIM)

F6 : Haul Road (TIM)

F7 : Screening Area (TIM)

F8 : Excavation Area(TIM)

Annexure -IV

BARSUA IRON MINE

WATER QUALITY OF GROUND WATER

Sl.No.	Parameters V	OCTOBER 2018			NOVEMBER 2018			DECEMBER 2018			JANUARY 2019			FEBRUARY 2019			MARCH 2019		
		GW1	GW 2	GW3	GW1	GW2	GW3	GW1	GW2	GW3	GW1	GW2	GW3	GW1	GW2	GW3	GW1	GW2	GW3
1	Colour	CL	CL	CL	CL	CL	CL	CL	CL	CL	<5	<5	<5	<5	<5	<5	<5	<5	<5
2	Odour	U/O	U/O	U/O	U/O	U/O	U/O	U/O	U/O	U/O	U/O	U/O	U/O	U/O	U/O	U/O	U/O	U/O	U/O
3	Taste	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL
4	Turbidity	Nill	Nill	Nill	Nill	Nill	Nill	Nill	Nill	Nill	<1	<1	<1	<1	<1	<1	<1	<1	<1
5	pH Value	6.42	6.38	6.22	6.48	6.42	6.34	6.52	6.38	6.40	7.21	7.19	7.31	7.12	7.16	7.20	7.01	7.20	7.13
6	Total Hardness (as CaCO3)	93.90	89.90	87.90	94.90	96.90	86.90	101.90	94.50	91.90	110.00	85.00	85.00	90.00	88.00	82.00	136.00	126.00	122.00
7	Iron (as Fe)	0.27	0.28	0.29	0.26	0.24	0.28	0.27	0.25	0.27	0.21	0.25	0.29	0.34	0.29	0.27	0.36	0.31	0.33
8	Chloride (as Cl)	25.99	24.99	21.99	24.99	20.99	23.99	28.99	25.99	24.99	56.00	42.00	43.00	43.00	42.00	40.00	36.00	33.00	34.00
9	Residual, free Chlorine	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
10	Dissolved Solids	148.99	141.99	134.99	152.99	144.99	137.99	161.99	148.99	143.99	187.00	164.00	166.00	169.00	67.00	162.00	212.00	193.00	172.00
11	Calcium (as Ca)	25.29	24.79	24.39	26.29	24.49	24.99	27.69	25.29	24.39	28.00	20.00	20.00	20.00	21.00	20.00	40.00	35.20	31.10
12	Magnesium (as Mg)	7.49	6.79	6.59	7.79	8.19	7.09	7.99	7.79	7.49	8.50	8.00	7.80	9.70	9.20	8.40	9.00	10.30	11.20
13	Copper (as Cu)	ND	ND	ND	BDL	BDL	BDL	BDL	BDL	BDL	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
14	Manganese (as Mn)	ND	ND	ND	BDL	BDL	BDL	BDL	BDL	BDL	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
15	Sulphate (as SO4)	2.89	2.79	2.19	3.22	3.13	2.60	3.59	3.27	2.47	13.80	9.73	9.78	8.96	6.77	6.42	5.31	8.04	5.51
16	Nitrate (as NO3)	1.11	0.95	0.87	1.19	1.09	0.91	1.35	1.23	0.83	1.51	1.42	1.31	1.57	1.41	1.31	1.51	1.53	1.41
17	Fluoride (as F)	0.007	0.006	0.005	0.008	0.006	0.006	BDL	BDL	BDL	0.15	0.19	0.11	0.10	0.12	0.10	0.17	0.19	0.12
18	Phenolic Compounds (as C6H5OH)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
19	Mercury (as Hg)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
20	Cadmium (as Cd)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
21	Selenium (as Se)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
22	Arsenic (as As)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
23	Cyanide (as CN)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
24	Lead (as Pb)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Zinc (as Zn)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
26	Chromium (as Cr+6)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
27	Anionic Detergents (as MBAS	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
28	Mineral Oil	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
29	Alkalinity	87.00	83.00	81.00	89.00	86.00	81.00	93.00	88.00	85.00	104.00	97.00	93.00	112.00	101.00	97.00	120.00	112.00	102.00
30	Aluminium as(Al)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
31	Boron (as B)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
32	Poly Aromatic Hydrocarbon as PAH	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
33	Pesticide	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

NB :

GW 1 : Hand pump (Banka Bazar)
GW 2 : Hand pump at Zero point : (BIM)
GW 3 : Hand Pump at Kalta Village (KIM)
ND : Not Detected
UO : Un-Objectionable
AL : Agreeable
CL : Colorless

BARSUA IRON MINE

WATER QUALITY OF STREAM SAMPLES/SURFACE WATER

Sl.No.	Parameters	October 2018							November 2018							December 2018						
		SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7
1	Colour (max)	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL
2	pH Value	6.24	6.30	5.94	5.82	5.85	5.98	6.12	6.08	6.02	5.80	5.84	5.82	5.88	5.98	6.20	6.08	6.04	5.95	5.96	6.01	6.14
3	TSS	27.18	35.18	41.18	49.18	33.18	44.18	61.18	11.18	15.18	17.18	19.18	9.18	14.18	22.18	9.18	19.18	13.18	15.18	13.18	25.18	27.18
4	DO	5.66	5.86	5.76	5.86	5.96	5.66	5.56	5.26	5.56	5.66	5.86	5.56	5.96	5.36	5.06	5.36	5.56	5.76	5.66	5.76	5.16
5	Turbidity	5.5	5.8	4.6	5.2	81	6.4	6.8	2.4	2.6	1.8	2.2	34	3.1	3.4	1.80	2.10	1.40	1.70	23.00	2.60	2.40
6	Chloride (as Cl)	13.80	16.80	14.80	16.80	12.80	16.80	18.80	14.80	15.80	16.80	17.80	13.80	15.80	16.80	15.80	17.80	18.80	18.80	15.80	16.80	18.80
7	TDS	77.30	83.30	85.30	89.30	85.30	81.30	86.30	73.30	77.30	77.30	81.30	67.30	71.30	75.30	79.30	87.30	85.30	87.30	73.30	75.30	81.30
8	BOD (3 days)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
9	COD	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
10	Arsenic as As	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
11	Lead as Pb(max)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
12	Cadmium as Cd (max)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13	Hexa Chromium as Cr^{+6}	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14	Copper as Cu (max)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15	Zinc as Zn(max)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
16	Selenium as Se (max)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17	Cyanide as CN (max)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
18	Fluride as F (max)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Sulphates (SO_4) (max)	1.89	2.09	1.69	1.59	1.89	2.09	2.29	2.09	2.19	1.89	1.89	2.09	2.19	2.49	1.89	2.39	2.19	2.09	2.29	2.09	2.39
20	Phenolic Compounds as C_6H_5OH (max)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Iron as Fe (max)	0.61	0.63	0.62	0.64	0.65	0.65	0.64	0.67	0.68	0.70	0.72	0.71	0.73	0.69	0.74	0.76	0.73	0.72	0.78	0.74	0.75
22	Nitrate as NO_3 (max)	0.51	0.53	0.47	0.49	0.61	0.65	0.61	0.55	0.57	0.49	0.53	0.65	0.67	0.63	0.67	0.77	0.81	0.65	0.77	0.73	0.87
23	Anionic Detergents (max)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Total Coli form	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80

NB :

SW 1: Kuradih Nala US : BIM

SW 2: Kuradih Nala DS : BIM

SW 3: Samaj Nallah US : Near Phuljhar

SW 4: Samaj Nallah DS : Near Phuljhar

SW 5: Najkura Nala D/S : KIM

SW 6 : Water stream from Hill : KIM (U/S of Najkura Nala)

SW 7: Kuradihi Nala US : Near Bhutuda

CL: Colourless

ND: Not Detected

BARSUA IRON MINE

WATER QUALITY OF STREAM SAMPLES/SURFACE WATER

Sl.No.	Parameters	January 2019							February 2019							March 2019						
		SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7
1	Colour (Pt-Co Scale)	15.00	10.00	5.00	10.00	10.00	10.00	5.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	5.00	10.00	5.00	5.00	10.00	10.00	10.00
2	pH Value	7.06	6.89	6.45	6.62	6.80	6.82	7.12	7.06	6.59	6.77	6.82	6.88	7.13	6.91	7.05	6.87	6.92	7.11	7.09	7.21	6.54
3	TSS	25.00	27.00	14.00	19.00	17.00	23.00	37.00	16.00	22.00	15.00	18.00	21.00	18.00	23.00	NIL	11.00	NIL	NIL	15.00	13.00	19.00
4	DO	5.10	5.50	6.20	6.10	6.50	6.40	5.20	5.30	5.80	6.70	6.90	6.20	6.70	5.50	5.30	5.80	6.10	6.70	6.40	6.10	5.70
5	Turbidity	2.10	2.60	2.30	2.70	5.30	3.60	4.20	1.30	1.90	NIL	NIL	6.30	NIL	4.70	NIL	NIL	NIL	NIL	NIL	NIL	NIL
6	Chloride (as Cl)	20.00	23.00	20.00	21.00	17.60	22.00	25.00	23.00	25.00	20.00	21.00	20.00	20.00	21.00	21.00	24.00	22.00	24.00	25.00	26.00	25.00
7	TDS	85.00	92.00	84.00	91.00	82.00	84.00	93.00	93.00	97.00	89.00	92.00	87.00	91.00	92.40	108.00	118.00	102.00	98.00	104.00	121.00	110.00
8	BOD (3 days)	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80
9	COD	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00
10	Arsenic as As	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
11	Lead as Pb(max)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
12	Cadmium as Cd (max)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
13	Hexa Chromium as Cr^{+6}	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
14	Copper as Cu (max)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
15	Zinc as Zn(max)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
16	Selenium as Se (max)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
17	Cyanide as CN (max)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
18	Fluride as F (max)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
19	Sulphates (SO_4) (max)	2.40	2.30	2.40	2.40	2.30	2.60	2.90	2.40	2.60	2.40	2.10	2.60	2.30	2.80	2.50	2.70	2.60	2.30	3.30	3.40	3.60
20	Phenolic Compounds as C_6H_5OH (max)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
21	Iron as Fe (max)	0.83	0.86	0.82	0.81	0.88	0.87	0.83	0.86	0.84	0.72	0.74	0.75	0.85	0.82	0.92	0.91	0.87	0.85	0.86	0.91	0.84
22	Nitrate as NO_3 (max)	0.78	0.82	0.76	0.67	0.81	0.75	0.96	0.81	0.97	0.85	0.63	0.83	0.83	0.01	0.93	1.05	1.02	0.81	1.01	1.05	1.20
23	Anionic Detergents (max)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
24	Total Coli form	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80	<1.80

NB :

SW 1: Kuradih Nala US : BIM

SW 2: Kuradih Nala DS : BIM

SW 3: Samaj Nallah US : Near Phuljhar

SW 4: Samaj Nallah DS : Near Phuljhar

SW 5: Najkura Nala : KIM

SW 6 : Water stream from Hill : KIM

SW 7: Kuradihi Nala US : Near Bhutuda

CL: Colourless

ND: Not Detected

Annexure-VI

BARSUA IRON MINE

WATER QUALITY RESULTS OF EFFLUENT

SL.NO	PARAMETERS	October 2018	November 2018	December 2018	January 2019	February 2019	March 2019
	Locations >	**EW-1**	**EW-1**	**EW-1**	**EW-1**	**EW-1**	**EW-1**
1	**pH**	6.6	6.70	6.70	7.08	7.23	7.14
2	**Total Suspended Solids**	25.9	15.90	23.90	27	28	28
3	**Oil & Grease**	ND	ND	ND	ND	ND	ND
4	**BOD**	6.5	5.70	7.10	7.1	11	10.5
5	**COD**	27.9	25.90	31.90	42	65	63

EW 1 : Tailing Dam Discharge / Tensa garage of FM (Mech.) area.

BARSUA IRON MINE

DETAIL MONITORING OF NOISE QUALITY

Sl.No.	LOCATION	3rd Quarter 2018-19		4th Quarter 2018-19		Measuring Condition
		Day time Leq. dB (A)	Night time Leq. dB (A)	Day time Leq. dB (A)	Night time Leq. dB (A)	
AMBIENT NOISE QUALITY						
1	Tensa Guest House, (BIM Township)	68	62	65	60	Distant vehicular movement was observed
2	Vocational Training Centre (VTC)	62	54	65	55	Normal working condition
3	Hospital,BIM	49	42	50	40	Outside Hospital,Normal working condition
WORKZONE NOISE QUALITY						
Sl. No.	**LOCATION**	**Leq - dB(A)**	**L-max. dB(A)**	**Leq - dB(A)**	**L-max. dB(A)**	**Monitoring Condition**
4	Haul Road	71	83	68	82	Passing the dumper from 15meter distance umper Haul Road
5	Crusher Control Room	68	79	69	81	During operation time
6	Wagon Loading area, Barsua Valley	71	84	70	88	During Ore unloading from dumper, 15meter distance at the source.
7	Loading into dumper by Shovel	73	87	72	86	During loading to dumper, 15meter distance at the source.

Annexure - VIII

BARSUA IRON MINES

RESULTS OF VEHICULAR EMMISSION

SL. NO	Vehicle ID	Vehicle NO.	RESULTS (Hatridge Units) 3rd Qtr. 2018-19	RESULTS (Hatridge Units) 4th Qtr. 2018-19	Standard as per Vehicular Exhaust Emmission (1990-1996) at Free acceleration
1	VE1	OR 14 L-6063	47	43	65
2	VE2	OD 14 K-5258	40	48	65
3	VE3	OD 14 C-9072	43	44	65
4	VE4	OR 14 L- 6064	49	46	65
5	VE5	OD 14 C- 9071	42	41	65
6	VE6	OR 14 Y -3496	39	47	65
7	VE7	OD 14 E -9584	40	42	65
8	VE8	OR 14 X 1819	43	45	65
9	VE9	OR 14 X- 9889	42	47	65
10	VE10	OD 14 F-2932	37	37	65
11	VE11	OD 14 F-2933	35	33	65
12	VE12	OD 14 F-2934	37	34	65
13	VE13	OR 14 K- 3830	43	43	65
14	VE14	OR 09 D -5378	44	48	65
15	VE15	OR 14 Q-2219	41	45	65
16	VE16	OR 14 U-8109	45	44	65
17	VE17	OA 0 - 7567	50	52	65
18	VE18	OR 14 V -0759	44	49	65
19	VE19	OSE - 9804	51	55	65
20	VE20	OD 09 G-3768	56	56	65
21	VE21	OD 09 G-1349	54	52	65
22	VE22	OR 14 J - 4681	41	44	65
23	VE23	OR 02 BF- 2343	39	43	65
24	VE24	OD 14 E- 9664	42	47	65
25	VE25	EX -210 (EXCAVATOR) HITACHI	58	52	65
26	VE26	HM LOADER HINDUSTHAN	60	68	65
27	VE27	HM LOADER HINDUSTHAN	54	64	65
28	VE28	OR14T-9132 (TIPPER) HYVA	57	61	65
29	VE29	OR14T-9133 (TIPPER) HYVA	55	55	65
30	VE30	OR09M-0288(TIPPER) AMW	53	57	65
31	VE31	OR09K-2448(TIPPER) AMW	52	51	65
32	VE32	OR09L-4356(TIPPER) AMW	55	50	65
33	VE33	OR09L-5256(TIPPER) AMW	51	59	65
34	VE34	OR09K-8829(TIPPER) AMW	49	55	65
35	VE35	OR09K-8838(TIPPER) AMW	56	56	65
36	VE36	HYUNDAI-370 (EXCAVATOR)	54	51	65

* Date of Monitoring: 13.09.2018

Annexure - IX

PHOTOGRAPHS SHOWING ENVIRONMENTAL PROTECTION MEASURES AT BARSUA-TALDIH-KALTA IRON MINES

Coir mating over the active dump at Barsua

Coir Matting over the Dumps at Kalta

Retaining wall at Sub-grade dump at Barsua

Dry Boulder wall near Phuljhar, Taldih

Check Dam across the Najkura Nalla at Kalta

Tow wall at the bottom of Dump-8, Barsua

Check dam constructed across the overflow channel of tailing dam to re-cycle the water, Barsua

Dry fog system at Crusher, Barsua

Fixed sprinkler at Crusher, Barsua

Fixed Sprinkler at Loading Plant, Barsua

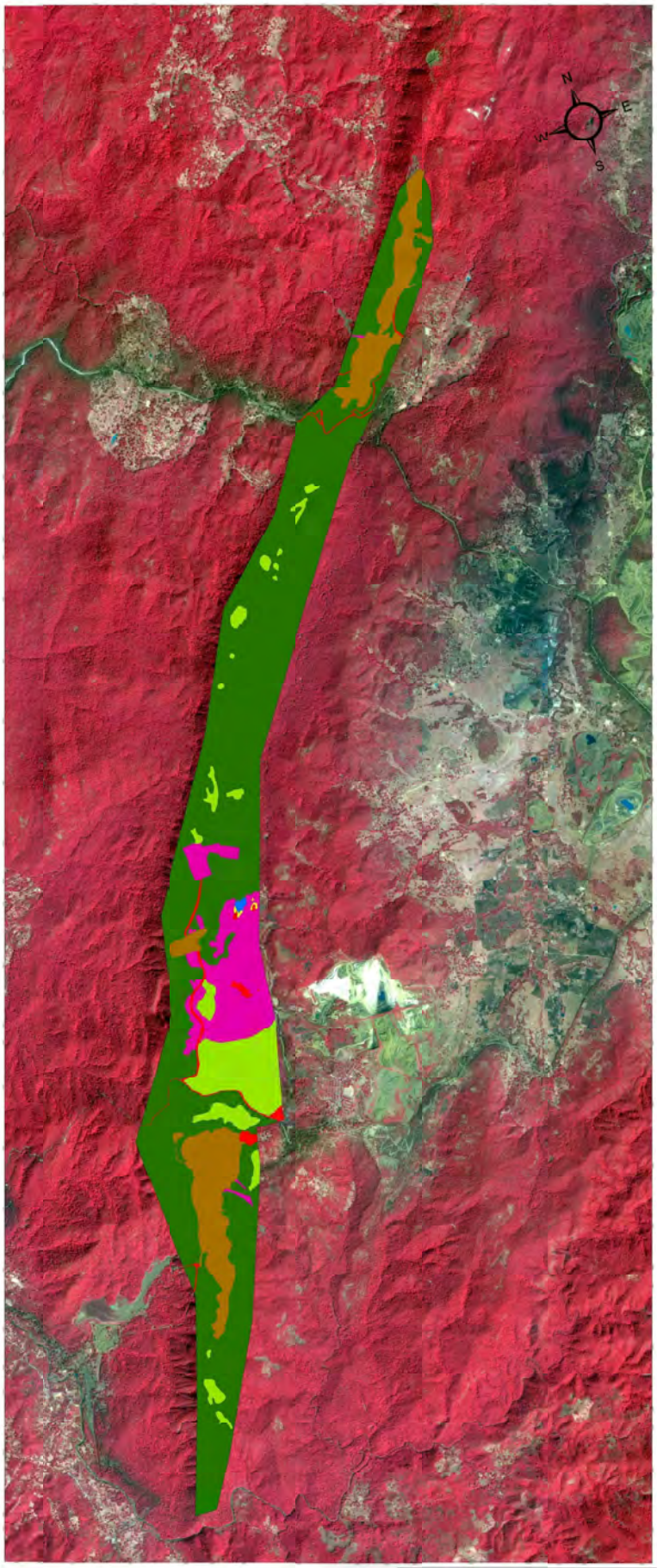
Road Dust Suppression at Kalta

Vehicle Washing Bay, Barsua

Oil & Grease trap at F/M Area, Barsua

Hazardous waste storage pit, Barsua

PLAN SHOWING THE BARSUA- TALDIH KALTA MINING LEASE (ML-130) BOUNDARY SUPERIMPOSED ON SATELLITE IMAGERY LISS-IV (MARCH 2018)
BARSUA IRON MINES, ODISHA
RAW MATERIALS DIVISION, STEEL AUTHORITY OF INDIA LTD.



Legend
- Built up -Mining Area (301.507 ha)
- Builtup- Allied Activities & Settlement Area (35.369 ha)
- Agricultral Land (1.650 ha)
- Waste Land (128.982 ha)
- Open Forest (212.318 ha)
- Dense Forest (1790.056 ha)
- Water Body (2.704 ha)
- Barsua(ML 130) Mine Lease Boundary (2172.586 ha)
- River
- Road